Roanoke Gateway Phase 2

ROANOKE, VA

SPECIFICATIONS

Grimm + Parker Project Number 22424.02

ROANOKE GATEWAY II, LP OWNER	318 Sixth St. | Annapolis, MD 21403 410-269-1222
HOMES FOR AMERICA, Inc. DEVELOPER	318 Sixth St. | Annapolis, MD 21403 410-269-1222
GRIMM AND PARKER ARCHITECTURE, INC. ARCHITECTS	11720 Beltsville Dr | Suite 600 | Calverton, MD 20705 301-595-1000
CATES ENGINEERING STRUCTURAL ENGINEER	13575 Heathcote Blvd. | Suite 170 | Gainesville, VA 20155 571-261-9280
MEI ENGINEERING, INC. MEP CONSULTANTS	1592 CF Pours Dr. | Harrisonburg, VA 22802 540-432-6272
HARKINS BUILDERS, INC. CONTRACTOR	10490 Little Patuxent Pkwy. | #400 | Columbia, MD 21044 410-750-2600
WESTWOOD PROFESSIONAL SERVICES CIVIL ENGINEER	1208 Corporate Circle | Roanoke, VA 24018 540-772-9580
LORAX PARTNERSHIPS SUSTAINABILITY CONSULTANT	808 St. Paul St. | Baltimore, MD 21202 443-449-6319

CONSTRUCTABILITY REVIEW

JUNE 2026

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SECTION 00 50 02 - AIA A201 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

PART 1 - GENERAL

1.1 The AIA A201 is attached after this section for the Contractor's use.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 00 50 02

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

Roanoke Gateway
624 Bullitt Avenue SE
Roanoke, VA 24022

THE OWNER:
(Name, legal status and address)

Homes for America
175 Admiral Cochrane Drive
Suite 402
Annapolis, MD 21401

THE ARCHITECT:
(Name, legal status and address)

Grimm and Parker Architecture, Inc.
123 East Main Street, 2nd Floor
Charlottesville, VA 22902

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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™–2017, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

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ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

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§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the

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purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the

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Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

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§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

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§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop

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Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the

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negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed.

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However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-

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subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a

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successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

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ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum; and

.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

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.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence

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the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon

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compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and

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the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and

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belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance

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companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and

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Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

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§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of

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when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements

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between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

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This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

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§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined

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consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.2 MODIFICATIONS TO GENERAL CONDITIONS

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION 00 73 00

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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 PROJECT

A. Project Name: Roanoke Gateway Phase 2

B. Owner's Name: Roanoke Gateway, LP**.**

C. Architect's Name: Grimm + Parker Architects

D. The Project consists of the construction of the following:

1. Project consists of a single garden 70-unit apartment building with unconditioned stairs and corridors. Units will range from 1- to 3-bedrooms. The ground floor will contain approximately 5,000 SF of amenity spaces to include a leasing office, community room, and fitness center. Site and infrastructure improvements will include 83 on-site parking spaces and new landscaping. The project will utilize LIHTC funding and target ZERH certification among other project goals

E. This Project shall be constructed to meet the 2020 Enterprise Green Communities (EGC) Standards. See Section 01 81 13 for Enterprise Green Communities Checklist for Project requirements to meet this standard.

F. This project shall be constructed, tested and certified to meet ENERGY STAR Multifamily New Construction (MFNC), Version 1.2 (Rev. 5) meeting, but not limited to, the requirements of the following:

1. MFNC.
2. HVAC System Quality Installation Contractor Checklist.
3. HVAC System Quality Installation Rater Checklist.
4. Water Management System Builder Checklist.
5. Mechanical equipment and energy and envelope related features will need to be coordinated with the energy model upgrade letter prepared by Lorax.

1.2 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price.

B. The work of each separate prime contract is identified in this section and on Drawings**.**

1.3 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.4 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings **[ ]**.

B. Arrange use of site and premises to allow:

1. Owner occupancy.
2. Work by Others.
3. Work by Owner.

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4. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.
3. Provide fire extinguishers and other safety equipment during construction as required by applicable building and fire safety codes and as required by local jurisdictions.

D. Existing building spaces may not be used for storage.

1.5 COORDINATION

A. Web-based Project Management Software:

1. RFIs, project submittals and contractor change proposals will be submitted, managed and responded to through a web-based solution for construction administration.
2. The Owner and Architect have selected Procore as the web-based solution for this Project. Refer to www.procore.com for additional information on the service.
3. The Web-based Project Management Software will provide a training session via web conference.
4. Additional PDF mark-up software may be required for electronic processing.
5. The Web-based Project Management Software service fees are to be included by the Contractor within the Base Bid.
6. Provide a project record CD or DVD or hard drive containing all data managed through the web-based project management software, at the conclusion of the Project.

B. Time Restrictions:

1. Limit conduct of noisy and malodorous especially noisy, malodorous, and dusty exterior work to the hours allowed by the jurisdiction.

1.6 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

B. Coordinate construction schedule and operations with Architect.

1.7 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

A. Unless otherwise noted, all provisions of the sections list4ed below apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.

B. Section 00 01 03 – Project Directory.

C. Section 01 20 00 – Price and Payment Procedures.

D. Section 01 21 00 – Allowances.

E. Section 01 22 00 – Unit Prices.

F. Section 01 23 00 – Alternate Bids.

G. Section 01 30 00 – Administrative Requirements.

H. Section 01 31 14 Facility Services Coordination.

I. Section 01 32 16 – Construction Progress Schedule.

J. Section 01 33 29 – Sustainable Design Reporting.

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PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 01 10 00

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SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.2 RELATED REQUIREMENTS

A. Section 00 50 00 - Contracting Forms and Supplements: Forms to be used.

B. Document 00 73 00 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit.

C. Section 01 78 00 - Closeout Submittals: Project record documents.

D. Section 01 80 04 Performance Requirements – DOE Efficient New Homes.

E. Section 01 81 13 - Sustainable Design Requirements: Green Communities.

F. Section 01 81 16 - Sustainable Design Requirements: Energy Star Multifamily New Construction.

1.3 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet**.** Contractor's standard form or electronic media printout will be considered.

E. Submit Schedule of Values within 20 days after date established in Notice to Proceed**.**

F. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section.

G. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.4 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Present required information on electronic media printout.

E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.

F. For each item, provide a column for listing each of the following:

1. Item Number.
2. Description of work.
3. Scheduled Values.
4. Previous Applications.
5. Work in Place and Stored Materials under this Application.
6. Authorized Change Orders.
7. Total Completed and Stored to Date of Application.
8. Percentage of Completion.
9. Balance to Finish.
10. Retainage.

G. Execute certification by signature of authorized officer.

H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products**.**

I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

J. Submit one electronic] and of each Application for Payment.

K. Include the following with the application:

1. Transmittal letter as specified for submittals in Section 01 30 00.
2. Construction progress schedule, revised and current as specified in Section 01 32 16**.**
3. Current construction photographs specified in Section 01 30 00.
4. Partial release of liens from major subcontractors and vendors.
5. Project record documents as specified in Section 01 78 00, for review by Owner which will be returned to the Contractor.
6. Sustainable design documentation applicable to work for which application is being made; see Section 01 81 13.
7. Sustainable design documentation applicable to work for which application is being made; see Section 01 81 16.
8. Affidavits attesting to off-site stored products.

L. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

M. Clearly indicate on the Application for Payment those line items which include materials or equipment, purchased or fabricated and stored, but not yet installed.

1. Differentiate between items stored on-site and items stored off-site.
2. Payments for material and equipment stored off-site will be at the sole discretion of the Owner. If required, Contractor will be responsible for all costs of travel and lodging for Architect, Engineers, and Owner to off-site storage locations to examine these items and the conditions of storage.
3. For items stored off-site, provide a bill of sale from supplier/Trade Contractors and certificates of insurance for the full value of stored materials with the Owner named as the insured.
4. For items stored off-site show a separate line item for the value of delivering and unloading the items at the Project site.
5. For items stored on or off-site, provide in a separate line item for the value of the installation of these items.

N. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

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1. List of subcontractors.
2. Staff names and assignments.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Products list.
6. Schedule of unit prices.
7. Submittals Schedule (preliminary if not final).
8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Certificates of insurance and insurance policies.
12. Performance and payment bonds.
13. Data needed to acquire Owner's insurance.

O. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

1.5 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

C. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710**.**

D. For other required changes, Architect will issue an AIA form G714 signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.

1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.

E. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within seven (7) days.

F. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors**.** Document any requested substitutions in accordance with Section 01 60 00.

G. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

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1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
4. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
5. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

H. Substantiation of Costs: Provide full information required for evaluation.

1. Provide the following data:

a. Quantities of products, labor, and equipment.
b. Taxes, insurance, and bonds.
c. Overhead and profit.
d. Justification for any change in Contract Time.
e. Credit for deletions from Contract, similarly documented.

2. Support each claim for additional costs with additional information:

a. Origin and date of claim.
b. Dates and times work was performed, and by whom.
c. Time records and wage rates paid.
d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

I. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

J. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum**.**

K. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

L. Promptly enter changes in Project Record Documents.

1.6 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:

1. All closeout procedures specified in Section 01 70 00.
2. All closeout procedures specified in Section 01 70 00, Section 01 77 00 and Section 01 78 00.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
6. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
7. AIA Document G707, "Consent of Surety to Final Payment."
8. Evidence that claims have been settled.

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9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 01 20 00

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SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Procedural requirements for proposed substitutions.

1.2 RELATED REQUIREMENTS

A. Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.

C. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

D. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

1.3 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials; products; assemblies; and/or equipment**.** Architect will not consider requests for substitution after defined time period, except for extenuating circumstances described below; requests may be considered or rejected at discretion of Architect.

1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.

a. The specification permits "Or Equal", or similar language defined in the project manual.
b. Unavailability.
c. Regulatory changes.
d. The specified product is identified as incompatible or inappropriate for the project.
e. The manufacturer or fabricator declares a specified product to be unsuitable for the use intended and refuses to warrant its installation, and where the Contractor certifies that the proposed substitution provides the required warranty.
f. The requested substitution offers the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. The Owner' s additional responsibilities may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner, and similar considerations.

2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

a. Substitution requests offering advantages solely to the Contractor will not be considered.

3. "Or Equal" Provision:

a. Similarly, a statement such as "equal product of other named manufacturers" will require compliance to the Comparable Product process, including the use of a Substitution Request Form. Refer to Section 01 60 00 Product Requirements for additional information.

B. Substitutions: See General Conditions for definition.

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1.4 REFERENCE STANDARDS

A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage).

B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase).

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, **and** equipment, constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
5. Waives claims for additional costs or time extension that may subsequently become apparent.
6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

B. A Substitution Request for specified installer constitutes a representation that the submitter:

1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

1. Note explicitly any non-compliant characteristics.

D. Content: Include information necessary to provide an actionable response.

1. Use Substitution Request Form included in the Project Manual following this section; requests without completed form will not be reviewed.
2. Contractor's Substitution Request documentation must include the following:

a. Project Information:

1) Official project name and number, and any additional required identifiers established in Contract Documents.

b. Substitution Request Information:

1) Indication of whether the substitution is for cause or convenience.
2) Issue date.
3) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
4) Description of Substitution.
5) Reason why the specified item cannot be provided.
6) Differences between proposed substitution and specified item.
7) Description of how proposed substitution affects other parts of work.

c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified and provided by named products, as appropriate and relevant for the item:

1) Physical characteristics.
2) In-service performance.
3) Expected durability.
4) Visual effect.
5) Sustainable design features.
6) Warranties.
7) Other salient features and requirements.

d. Include the following types of documentation:

1) Product data.
2) Samples.
3) Certificates, test, reports or similar qualification data.
4) Drawings, when required to show impact on adjacent construction elements.
5) List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
6) Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
7) Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall contract time. If specified product or method of construction cannot be provided within the contract time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
8) Cost benefit to the Owner.
9) Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
10) Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

e. Impact of Substitution:

1) Savings to Owner for accepting substitution.
2) Change to Contract Time due to accepting substitution.

E. Limit each request to a single proposed substitution item.

1. Submit an electronic document, combining the request from with supporting data into single document.

F. Submit an electronic document, combining the request form with supporting data into single document.

3.2 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period, and the documents required.

B. Section 00 21 13 - Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period, and the documents required.

C. Submittal Form (before award of contract):

1. Submit substitution requests by completing the form attached to this section. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.
2. Submit substitution requests by completing the form in Section 00 43 25; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

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3. Submit substitution requests by completing CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage). See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

D. Owner will consider requests for substitutions only if submitted at least **[10][or [ ]]** days prior to the date for receipt of bids.

3.3 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):

1. Submit substitution requests by completing the form attached to this section. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience within 14 days of discovery of is potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:

a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
b. Other construction by Owner.

D. Other unanticipated project considerations. Substitutions will not be considered under one or more of the following circumstances:

1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.
3. Without substantial cost savings benefit to the Owner.

3.4 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.

1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.5 ACCEPTANCE

A. Architects notification of acceptance will be in the following forms:

1. During Bidding: Indicated within an Addendum.
2. After Contract signing: Change Order.

B. Use product specified if Architect cannot make a decision on use of a proposed substitution due to incomplete documentation.

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C. During bidding, absence or mention within Addenda is to be interpreted as rejection of proposed substitution.

D. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.6 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

3.7 ATTACHMENTS

A. Grimm + Parker Architects Substitution Request Form.

B. A facsimile of the Substitution Request Form (During Construction) required to be used on the Project is included after this section.

END OF SECTION 01 25 00

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Substitution Request Form

IDENTIFICATION:

Contractor/CM: _____

Project Name: _____

Date: _____

REFERENCE:

Specification Title: _____

Specification No.: _____ Page: _____ Article/ Paragraph: _____

DESCRIPTION:

Proposed Substitution: _____

Manufacturer: _____

History: ☐ New Product ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old

Reason for requesting substitution: ☐ Cause ☐ Convenience

Explain: _____

_____

Differences between proposed substitution and specified item: _____

_____

_____

(Use attachment for additional space, if required.)

Proposed substitution affects other parts of Work or applicable Code requirements as follows: _____

_____

_____

(Use attachment for additional space, if required.)

Post-Bid Savings to Owner for accepting substitution: (N/A Pre-Bid) _____

Change to Contract Time due to accepting substitution: _____

LEED Contribution (if applicable to Project) - Explain effects to LEED Action Plan: _____

_____

_____

(Use attachment for additional space, if required.)

Will undersigned pay any costs caused by the substitution necessitating changes to the building design, construction, engineering and detailing, including additional Architect, inspection and testing fees? ☐ Yes ☐ No

Does the undersigned waive rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results? ☐ Yes ☐ No

Submitted by: _____
(Contractor or CM Only)

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

SUPPORTING DATA ATTACHED:

☐ **Point-by-Point Comparative Data Attached (Required)**

☐ **Completed Section 01 61 16.01, Accessory Material VOC Content Certification Form Attached (Required)**

☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

CERTIFICATION:

The Undersigned certifies:

- Proposed substitution has been investigated and determined that it meets or exceeds the quality level of the specified product.
- Same warranty will be furnished for proposed substitution as for specified product; **provide attachment if different**.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances; **provide attachment if otherwise**.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.
- Neither the Owner and Architect will be liable for license fees or royalties.

A/E's REVIEW AND ACTION:

☐ Substitution approved - Make submittals in accordance with Specification Section 01 60 00.

☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 60 00.

☐ Substitution rejected - Use specified materials.

☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

ADDITIONAL COMMENTS:

Contractor:

Architect:

Approvals are based upon the opinion, knowledge, information, and belief of Architect at time of decision and reliance upon data submitted. Approvals are therefore interim and subject to reconsideration as additional data, materials, workmanship and coordination with other Work are observed and reviewed. In proposing items, Contractor assumes risks, costs and responsibilities for items integration into Work and performance.

END OF FORM

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SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. General administrative requirements.

B. Electronic document processing service Procore**.**

C. Project coordination.

D. Requests for interpretation (RFI).

E. Subcontract list.

F. Staff names and assignments.

G. Preconstruction meeting.

H. Site mobilization meeting.

I. Progress meetings.

J. Construction progress schedule.

K. Contractor's daily reports.

L. Progress photographs.

M. Coordination drawings.

N. Submittal Schedule.

O. Submittals for review, information and project closeout.

P. Number of copies of submittals.

Q. Requests for Interpretation or Information (RFI) procedures.

R. Submittal procedures.

S. Contractor's use of Architect's CAD files.

T. Delegated design.

U. Contractor's review.

V. Architect's action.

W. Daily construction reports.

1.2 RELATED REQUIREMENTS

A. Section 00 73 00 - Supplementary Conditions: Duties of the Construction Manager.

B. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.

C. Section 01 60 00 - Product Requirements: General product requirements.

D. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.

E. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

F. Section 01 81 13 - Sustainable Design Requirements - Green Communities.

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1.3 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect:

1. Requests for Interpretation or Information (RFI).
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

1.4 PROJECT COORDINATOR

A. Project Coordinator**:** General Contractor**.**

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for < > access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect through the Project Coordinator:

1. Requests for Interpretation or Information.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

1.5 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

3. Frivolous RFIs: The Contractor will compensate the Owner for the Architect's time and expenses to process RFIs resulting from the Contractor's lack of studying and comparing the Contract Documents, coordinating their own Work, or repeating previous RFIs.
4. Submit RFIs via electronic processing service in PDF format.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Format of RFIs: Content provided by CSI Form 13.2.A, as provided at end of this Section.

1. Software-Generated RFIs:

    a. Preferred format.
    b. Software-generated form with substantially the same content as indicated above.
    c. Photographs shall be electronic files in JPG format.
    d. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond through the Web-based Project Management Software. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs may be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect's actions on submittals.
    f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, submit Change Order Request within 10 days of receipt of the RFI response as provided by General Conditions of the Contract.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

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F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.6 SUBCONTRACT LIST

A. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit one electronic copy of subcontractor list, unless otherwise indicated. Architect will return one electronic copy.Contractor to keep file accessible to project team via Web-based Project Management tool.

a. Mark up and retain one returned copy as a Project Record Document.

1.7 STAFF NAMES AND ASSIGNMENTS

A. Submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site, prior to or coinciding with initial Application for Payment.

B. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers.

C. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

D. Post copies of list in Project meeting room, in temporary field office, and by each temporary phone.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation or Information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.

2. Contractor and Architect are required to use this service.
3. It is Contractor's responsibility to submit documents in allowable format.
4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum**.**

C. Submittal Service: The selected service is: Procore

D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.

1. Representatives of Owner are scheduled and included in this training.

E. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.2 PRECONSTRUCTION MEETING

A. Project Coordinator will schedule a meeting after Notice of Award.

B. Attendance Required:

1. Owner.
2. Architect.
3. Contractor.

C. Agenda:

1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contract**…**
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.

D. Record minutes and electronically distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.3 SITE MOBILIZATION MEETING

A. the Project site prior to Contractor occupancy.

B. Attendance Required:

1. Contractor.
2. Owner.
3. Architect.

4. Special consultants.
5. Contractor's superintendent.
6. Major subcontractors.

C. Agenda:

1. Use of premises by Owner and Contractor.
2. Owner's requirements and partial occupancy prior to completion.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and building layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.
11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.4 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-Monthly intervals.

B. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:

1. Contractor.
2. Owner.
3. Architect.
4. Special consultants.
5. Contractor's superintendent.
6. Major subcontractors.

D. Attendance Required: Contractor's project manager and job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.

E. Agenda:

1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Sustainability requirements and documentation progress.
15. Other business relating to work.

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F. Record minutes and electronically distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.5 CONSTRUCTION PROGRESS SCHEDULE - See Section 01 32 16

A. Within 30 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outlnie for remainder of Work .

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that mechanical and electrical contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment **.**

3.6 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:

1. Date.
2. High and low temperatures, and general weather conditions
3. List of subcontractors at Project site.
4. List of separate contractors at Project site.
5. Approximate count of personnel at Project site.
    a. Include a breakdown for supervisors and laborers**.**
6. Major equipment at Project site.
7. Material deliveries.
8. Safety, environmental, or industrial relations incidents.
9. Meetings and significant decisions.
10. Unusual events (submit a separate special report).
11. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
15. Change Orders received and implemented.
16. Testing and/or inspections performed.
17. List of verbal instruction given by Owner and/or Architect.
18. Signature of Contractor's authorized representative

3.7 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Photography Type: electronic files/Digital.

C. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.

D. In addition to periodic, recurring views, take photographs of each of the following events:

1. Completion of site clearing.
2. Excavations in progress.
3. Foundations in progress and upon completion.
4. Structural framing in progress and upon completion.
5. Enclosure of building, upon completion.
6. Final completion, minimum of ten (10) photos.

E. Views:

1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
2. Consult with Architect for instructions on views required.
3. Provide factual presentation.
4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

F. Digital Photographs: Full Color, minimum resolution of 4 megapixel 1024 by 768, in JPG format provide files unaltered by photo editing software.

1. Delivery Medium: Web-based Project Management Software.
2. File Naming: Include project identification, date and time of view, and view identification.

3.8 COORDINATION DRAWINGS

A. Provide information required by Project Coordinator for preparation of coordination drawings.

B. Review drawings prior to submission to Architect.

3.9 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.

1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.
2. Coordinate with Contractor's construction schedule**.**
3. Format schedule to allow tracking of status of submittals throughout duration of construction.
4. Arrange information to include scheduled date for initial submittal, specification number and title, and description of item of work covered.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

    a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.10 SUBMITTALS FOR REVIEW

A. Within 30 days of Notice to Proceed, provide to the Architect a complete Submittal Schedule, by Specification Division, for review and approval.

B. When the following are specified in individual sections, submit them for review:

1. Product data.
2. Design data.
3. Shop drawings.
4. Samples for selection.
5. Samples for verification.
6. Sustainable submittals and reports.

C. Package these submittals by specification section, except closeout submittals or Work performed by separate trades, in a single delivery to the Architect; failure of the Contractor to package these submittals in a single delivery may cause the Architect to withhold action on submittal until associated submittals required by the particular specification section are received.

D. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in the contract documents.

E. Product data and shop drawings to be submitted and managed through the Web-based Project Management Software.

F. Samples will be reviewed for aesthetic, color, or finish selection.

G. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - CLOSEOUT SUBMITTALS**.**

3.11 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Sustainable submittals and reports.
3. Certificates.
4. Test reports.
5. Inspection reports.
6. Manufacturer's instructions.
7. Manufacturer's field reports.
8. Field engineering daily reports.
9. Daily construction reports.
10. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

C. Informational submittals to be submitted and managed through the Web-based Project Management Software.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Final Property Survey.

E. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

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B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.

1. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

A. Product Data Procedures:

1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Submit concurrently with related shop drawing submittal.
4. Do not submit (Material) Safety Data Sheets for materials or products.
5. Submit sustainable design reporting submittals under separate cover.

B. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
2. Do not reproduce the Contract Documents to create shop drawings.
3. Use of reproductions of the Contract Documents in digital data form to create shop drawings is only permitted as defined .
4. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

C. Samples Procedures:

1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

D. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

E. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

F. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

G. Submittals not requested will not be recognized or processed.

H. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

I. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 21 days for initial review of each submittal; duration of time is defined by date received in Architect's office until the day sent from the Architect's office. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal; duration of time is defined by date received in Architect's office until the day sent from the Architect's office.

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4. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal; duration of time is defined by date received in consultant's office until the day sent to the Contractor. Submittals required within the following divisions to be sent directly to the Architect's consultants:

    a. All required submittals indicated in Division 2 sections.
    b. All required submittals indicated in Division 3 section.
    c. The following required submittals indicated in Division 4:

        1) Product data, shop drawings, material certificates, mix designs, and cold-weather procedures.

    d. All required submittals indicated in the following Division 5 Sections:

        1) Structural Steel
        2) Steel Joists
        3) Steel Decking
        4) Cold-Formed Metal Framing
        5) Metal Stairs
        6) Railings and Handrails
        7) Metal Fabrications

    e. All required submittals indicated in the following Division 8 Section:

        1) Door Hardware

    f. All required submittals indicated in Mechanical Divisions 21 through 23 sections.
    g. All required submittals indicated in Division 26 sections.
    h. All required submittals indicated in Divisions 31 through 33 sections.

5. Color Selection: Architect will select colors within 60 days (to allow time for presentation to Owner and for Owner comments) after all color samples have been submitted including, but not limited to items listed below. The submittal data shall be complete, including shop drawings, product data, and color samples, and all required submittals and materials shall be in compliance with the specifications and be subsequently approved by the Architect. Color samples shall be actual samples of the material and not photographs. If there is a variation in color, shade, texture, or pattern, submit multiple samples to show full range of variation.

    a. Interior Items (including but not limited to):

        1) Plastic laminate and millwork.
        2) Wood door veneer.
        3) Ceramic tile.
        4) Resilient floor tile.
        5) Resilient wall base and accessories.
        6) Carpet.
        7) Paint.
        8) High-performance coatings.
        9) Toilet compartments.
        10) Signs and cast letters.
        11) Casework veneer.

    b. Prefinished Exterior Items (including but not limited to):

        1) Copings, perimeter edge systems.
        2) Site furnishings and equipment.

J. Submittal Sample Identification: Place a permanent label or title block on each submittal sample for identification.

    1. Indicate name of firm or entity that prepared each submittal on label or title block.

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2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:
    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.
        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).
        2) Number and title of appropriate Specification Section.
        3) Drawing number and detail references, as appropriate.
        4) Location(s) where product is to be installed, as appropriate.
        5) Other necessary identification.

K. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on submittals.

L. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

1. Transmittal Form: Use CSI Form 12.1A.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

M. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "No Exception Taken” or “Note Markings”.
4. Resubmission of items rejected or marked "Revise and Resubmit" will be reviewed one time by the Architect at no cost to the Contractor. Should the re-submittal be rejected or marked "Revise and Resubmit", the Contractor will reimburse the Owner by credit Change Order for all costs to the Owner for additional time spent by the Architect and the Architect's consultants to review the second (and subsequent) resubmission.

N. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

O. Use for Construction: Use only final submittals with mark indicating “No Exceptions Taken” or “Note Markings” taken by Architect.

3.15 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt, but will take no other action.

C. Architect's actions will be reflected by marking each returned submittal using or virtual stamp on electronic submittals.

1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Architect's and consultants' actions on items submitted for review:

1. Authorizing purchasing, fabrication, delivery, and installation:

a. **"**No Exception”.

1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.

b. **"**Approved as Noted **"**.

1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
2) Non-responsive resubmittals may be rejected.

2. Not Authorizing fabrication, delivery, and installation:

a. “Revise and Resubmit.

1) Resubmit revised item, with review notations acknowledged and incorporated.
2) Non-responsive resubmittals may be rejected.

b. **“**Rejected**”.**

1) Submit item complying with requirements of Contract Documents.

E. Architect's [and consultants'][or None - N/A] actions on items submitted for information:

1. Items for which action was taken:

a. " [No Action Required" - no further action is required from Contractor.

3.16 USE OF ARCHITECT'S AND ARCHITECT'S CONSULTANT'S DRAWING FILES REQUIRING RELEASE FORMS

A. Copies of Architect's drawing files listed within required release forms will be provided to Contractor for Contractor's and Trade Contractor's use in connection with Project; Contractor must sign and return the release form at the end of this Section. As applicable, the Architect’s consultants may require their own releases to be signed and included with the executed Architect’s form, and the Architect’s consultant may charge a fee for releasing electronic files.

B. Allow one week for processing and delivery after Architect receives the signed form.

C. Only the files indicated on Agreement(s) included at end of this Section shall be made available for use as backgrounds for preparation of shop drawings, fabrication drawings, and coordination drawings. No other drawing files, for this Project, will be made available.

D. Contractor does not have the right to release drawing files without first securing a signed Architect’s release and, as applicable, the Architect’s consultants’ forms. Submit executed forms to the Architect by subsequent Application for Payment, with consultant fees as applicable.

E. Any entity receiving the drawing files shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect, and its consultants from all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney’s fees, arising out of or resulting from the use of the drawing files by the Contractor, or by third party recipients of the drawing files from the Contractor.

F. Drawing files must not be considered to be Contract Documents as defined by the General Conditions of Contract.

3.17 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

3.18 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect through the Web-based Project Management Software.

C. Verify:

1. Field Measurements.
2. Field Construction Criteria.
3. Catalog Numbers and Similar Data.
4. Quantities.

D. Contractor's responsibility regarding errors and omissions in submittals is not relieved by Architect's review of submittals.

E. Contractor's responsibility regarding deviations in submittals from requirements of Contract Documents is not relieved by Architect's review of submittals, unless Architect gives written acceptance of specific deviations as approved by Owner.

F. When work is directly related and involves more than one trade, coordinate submittal with other trades and submit under one cover.

G. After a submittal has been submitted for review, no changes may be made to that Submittal other than changes resulting from review notes made by the Architect unless such changes are clearly identified and circled before being resubmitted. Any failure to comply with this requirement shall nullify and invalidate the Architect's review.

H. Approval Stamp: Stamp each submittal. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents as indicated below:

THIS IS TO CERTIFY THAT THE SPECIFICATION REQUIREMENTS HAVE BEEN MET AND ALL DIMENSIONS, CONDITIONS, AND QUANTITIES ARE VERIFIED AS SHOWN AND/OR CORRECTED ON THESE DRAWINGS.
SIGNED _____

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3.19 ARCHITECT'S/ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it; except where indicated otherwise. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. NO EXCEPTION TAKEN: The Work covered by the submittal is accepted as specified and the Work may proceed provided it complies with requirements of the Contract Documents.
2. NOTE MARKINGS: The Work covered by the submittal is accepted as noted and the Work may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents.
3. REVISE AND RESUBMIT: Do not proceed with the Work covered by the submittal. Revise or prepare a new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay. Unmarked items may be fabricated if indicated.
4. REJECTED: Architect will list reasons for rejection on the submittal or in the transmittal letter accompanying the submittal. Do not proceed with the Work covered by the submittal. Prepare new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay.
5. ACTION NOT REQUIRED: Either the submittal was not requested or the submittal was for information only or for record purposes.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.20 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report (including progress photos), recording the following information concerning events at the site.

1. List of Trade Contractors at the site.
2. List of major items of equipment on site.
3. List of construction activities performed (for each trade).
4. Approximate count of personnel at the site for each trade.
5. High and low temperatures, general weather conditions.
6. Accidents and unusual events.
7. Meetings and significant decisions.
8. Stoppages, delays, shortages, losses.
9. Meter readings and similar recordings.
10. Emergency procedures.
11. Orders and requests of governing authorities.
12. Change Orders received, implemented.
13. Services connected, disconnected.
14. Equipment or systems tests and start-ups.
15. Partial Completions, occupancies.

B. The daily construction report shall be emailed to the Architect, Owner and other appropriate parties to be determined at the end of each work day.

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END OF SECTION 01 30 00

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ELECTRONIC MODEL RELEASE

AN AGREEMENT BETWEEN ARCHITECT AND THIRD-PARTY USER FOR TRANSFER AND USE OF BUILDING INFORMATION MODEL FILES

Architect: Grimm and Parker Architecture, Inc.
11720 BELTSVILLE DRIVE
SUITE 600
CALVERTON, MD 20705

Third-Party User:

Date:

Project No: 22424.02
Project Name: Roanoke Gateway Phase 2

Software: Autodesk Revit
Version:

File Name	Date Revised

Architect has prepared drawings and/or specifications for different portions and aspects of the Project identified above using Building Information Modeling software ("BIM"). Third-party user ("User") agrees to pay Architect a fee of $ _____ for use of the aforementioned BIM files, subject to the following Terms & Conditions:

1. Architect makes no representation as to the compatibility of the Building Information Model (BIM) with any hardware or software. Architect does not warrant or guarantee that every portion of the BIM files are free of all computer viruses. User acknowledges that it has sole responsibility for assuring that BIM files are free of any viruses before using them. User shall not hold the Architect responsible for such viruses or their consequences.
2. Since the information set forth in the BIM can be modified unintentionally or otherwise, the Architect reserves the right to remove all indicia of its ownership and/or involvement from each electronic display. User represents and warrants that if Architect's or Architect's consultants name and/or logo appear on any portion of the BIM files it shall be deleted and be of no force and effect.

3. User shall use the BIM files, in whole or in part, solely for the Project, and for no other purpose. All information in the BIM is considered Instruments of Service of the Architect and shall not be used for other projects, for additions or alterations of or to this Project, or completion of this Project by others. The BIM shall remain the property of the Architect, and in no case shall the transfer of these files be considered a sale nor construed in any manner to be in derogation of Architect's reserved or intellectual property rights in the BIM files, including copyright. Architect makes no representations or warranties, express or implied, regarding the accuracy, completeness, or permanence of the BIM, or for its merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated above may not have been incorporated. Architect shall have no obligation to notify User of, or provide User with, revisions or changes to the underlying information contained in any portion of the BIM files. In the event of a conflict between the Architect's sealed Contract Drawings and the BIM files, the sealed Contract Drawings shall govern. It is the User's responsibility to determine if any conflicts exist. The BIM files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction.
4. User shall notify Architect of any errors or omissions in the BIM files that User discovers so that Architect will have a reasonable amount of time within which to correct, in its sole and absolute discretion, any such errors or omissions.
5. The use of BIM files prepared by the Architect shall not in any way obviate the User's responsibility of the proper checking and coordination of dimensions, details, member sizes and gauge, and quantities of materials as required to facilitate complete and accurate fabrication and erection.
6. User may neither assign its rights nor delegate its duties under this Agreement. Files provided are for the exclusive use of the User named in this Waiver and may not be shared, distributed, or otherwise made available to any other party or entity, directly or indirectly, and may not be stored in any place or in any manner accessible by the general public, including, but not limited to, websites. Should any other party or entity require access to BIM files, said party or entity shall secure a written release from the Architect and, as may be applicable, the Architect's consultants.
7. User, and any entity receiving the BIM, shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect, and its subconsultants from all claims, damages, losses, expenses, penalties, and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the BIM files by the User, or by third-party recipients of the BIM files from the User. User shall further indemnify and hold harmless Architect from any unauthorized, improper or illegal dissemination, or other distribution of the BIM files. Any unauthorized use or reuse by User or any other party shall be considered an infringement of the Architect's copyright, and there shall be no liability or legal exposure to Architect.
8. The Architect believes that no licensing or copyright fees are due to others on account of the transfer of the BIM files, but to the extent any are, the User will pay the appropriate fees and hold the Architect harmless from such claims.
9. Any purchase order number provided by the User is for User's accounting purposes only. Purchase order terms and conditions are void and are not a part of this agreement.
10. Payment of the service fee, if applicable, is due upon receipt of the BIM files.
11. This agreement shall be governed by the laws of the Commonwealth of Virginia, notwithstanding choice of law rules.
12. The Circuit Court for Fairfax County, Virginia and the U.S. District Court for the Eastern District of Virginia (Alexandria Division) shall have exclusive jurisdiction over any controversy, including, without limitation, matters of construction, validity, and performance arising out of this Agreement, and User hereby consents to personal jurisdiction and venue in either court and waives any objection it might otherwise be entitled to assert with respect thereto. User agrees to pay Architect's reasonable attorney's fees and expenses for the prosecution or defense of any cause pf action, claim or demand on or by Architect arising under this Agreement.

13. Any renderings produced from this BIM shall be able to be used by the Architect for promotional and marketing materials free of charge.
14. The provision of the BIM files to User by Architect is not to be construed as creating a joint venture, agency, or partnership between the parties.
15. This Agreement supersedes any and all prior agreements, understandings or communications, whether oral or written, with regard to the subject matter set forth herein and represents the entire Agreement between Architect and User, and no modification hereof shall be effective until reduced in writing and signed by both parties.

AGREED BY:

Architect	Third-Party User
_____	_____
Signature of Authorized Agent	*Signature of Authorized Agent*
_____	_____
Printed Name and Title of Authorized Agent	*Printed Name and Title of Authorized Agent*
_____	_____
Date	*Date*

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ARCHITECTS

CADD FILE RELEASE

AN AGREEMENT BETWEEN ARCHITECT AND THIRD-PARTY USER FOR TRANSFER AND USE OF COMPUTER AIDED DESIGN AND DRAFTING FILES

Architect: Grimm and Parker Architecture, Inc.
11720 BELTSVILLE DRIVE
SUITE 600
CALVERTON, MD 20705

Third-Party User:

Date:

Project No: 22424.02
Project Name: Roanoke Gateway Phase 2

Software: AutoCAD
Version:

Architect consents to the use of the following Drawings solely by User, subject to the terms and conditions of this Agreement between Architect and User for Transfer and Use of Computer Aided Design and Drafting ("CADD") Files:

File Name	Date Revised

Architect has prepared drawings, including but not limited to, drawings in electronic CADD format of different portions or aspects of the Project, identified above, which are attached hereto and incorporated herein by reference (the "Drawings"). In exchange for a fee of $ _____ , Architect will provide the aforementioned CADD files for the convenience of the Third-Party User ("User") in preparing shop fabrication drawings, coordination drawings, and/or rendered imagery solely for the Project. User hereby agrees to use the Drawings subject to the following terms and conditions:

TERMS AND CONDITIONS:

1. Architect makes no representation as to the compatibility of the CADD files with any hardware or software. Architect does not warrant or guarantee that every portion of the CADD files are free of all computer viruses. User acknowledges that is has sole responsibility for assuring that CADD files are free of any viruses before using them. User shall not hold the Architect responsible for such viruses or their consequences.
2. Since the information set forth on the CADD files can be modified unintentionally or otherwise, the Architect reserves the right to remove all indicia of its ownership and/or involvement from each electronic display. User represents and warrants that if Architect's or Architect's consultants name and/or logo appear on any portion of the CADD it shall be deleted and be of no force and effect.
3. User shall use the CADD files, in whole or in part, solely for the Project and no other purpose. The Drawings, CADD files, and all information on the CADD files, are considered instruments of service of the Architect and shall not be used for other projects, for additions to or alterations of this Project, or completion of this Project by others. CADD files shall remain the property of the Architect, and in no case shall the transfer of these files be considered a sale nor construed in any manner to be in derogation of Architect's reserved or intellectual property rights in the Drawings.
4. Architect makes no representations or warranties, express or implied, regarding the accuracy, completeness, or permanence of CADD files; nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the CADD files may not have been incorporated. Architect shall have no obligation to notify User of, or provide User with, revisions or changes to the underlying information contained in any portion of the CADD files. In the event of a conflict between the Architect's sealed contract drawings and CADD files, the sealed contract drawings shall govern. It is the User's responsibility to determine if any conflicts exist. The CADD files shall not be considered to be Contract Documents as defined by the General Conditions of Contract.
5. User shall notify Architect of any errors or omissions in the CADD files that User discovers so that Architect will have a reasonable amount of time within which to correct, in its sole and absolute discretion, any such errors or omissions.
6. The use of CADD files prepared by the Architect shall not in any way obviate the User's responsibility of the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.
7. User may neither assign its rights nor delegate its duties under this Agreement. User does not have the right to release CADD files without first securing a signed Architect's release and, as applicable, the Architect's consultants' forms. Further, User shall provide access to CADD files solely to the party identified in Architect's release, and User shall not disseminate the CADD files in place or manner accessible by the general public, including but not limited to, websites.
8. User, and any entity receiving the CADD files shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect, and its Consultants from all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the CADD files by the User, or by third party recipients of the CADD files from the User. User shall further indemnify and hold harmless Architect from any unauthorized, improper or illegal, or other distribution of the CADD files. Any unauthorized use or reuse by User or any other party shall be considered an infringement of Architect's copyright, and there shall be no liability or legal exposure to Architect.
9. The Architect believes that no licensing or copyright fees are due to others on account of the transfer of the CADD files, but to the extent any are, the User will pay the appropriate fees and hold the Architect harmless from such claims.
10. Any purchase order number provided by the User is for User's accounting purposes only. Purchase order terms and conditions are void and are not a part of this agreement.

11. This agreement shall be governed by the laws of the Commonwealth of Virginia, notwithstanding choice of law rules.
12. The provision of the CADD files to User by Architect is not to be construed as creating a joint venture, agency, or partnership between the parties.
13. This Agreement supersedes any and all prior agreements, understandings or communications, whether oral or written, with regard to the subject matter set forth herein and represents the entire Agreement between Architect and User, and no modification hereof shall be effective until reduced in writing and signed by both parties.

AGREED BY:

Architect	Third-Party User
_____	_____
Signature of Authorized Agent	*Signature of Authorized Agent*
_____	_____
Printed Name and Title of Authorized Agent	*Printed Name and Title of Authorized Agent*
_____	_____
Date	*Date*

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SECTION 01 30 03 - SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

PART 1 - GENERAL

1.1 The SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST form is attached after this section for the Contractor's use.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

Advancement of Construction Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____ From (Contractor): _____

_____ Date: _____

To (A/E): _____ A/E Project Number: _____

_____ Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (FaxNumber)	Contact

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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SECTION 01 30 07 - AGREEMENT BETWEEN ARCHITECT AND CONTRACTOR FOR TRANSFER OF CAD FILES

PART 1 - GENERAL

1.1 The AGREEMENT BETWEEN ARCHITECT AND CONTRACTOR FOR TRANSFER OF CAD FILES form is attached after this section for the Contractor's use.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 30 07

ELECTRONIC MODEL RELEASE FORM

Architect: Grimm + Parker Architects
11720 BELTSVILLE DRIVE
SUITE 600
CALVERTON, MD 20705

Contractor/CM: _____
_____
_____

Date: _____

Project No: G+P No. 22424.02

Software: Autodesk Revit
Version: 2024

File Name	Date Revised

Contractor/CM shall pay Architect a fee of ($0)
Terms & Conditions:

1. Architect makes no representation as to the compatibility of the Building Information Model (BIM) with any hardware or software.
2. Since the information set forth in the BIM can be modified unintentionally or otherwise, the Architect reserves the right to remove all indicia of its ownership and/or involvement from each electronic display.
3. All information in the BIM is considered instruments of service of the Architect and shall not be used for other projects, for additions to this project, or completion of this project by others. The BIM shall remain the property of the Architect, and in no case shall the transfer of these files be considered a sale.
4. Architect makes no representation regarding the accuracy, completeness, or permanence of the BIM, or for its merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated above may not have been incorporated. In the event of a conflict between the Architect's sealed contract drawings and the BIM files, the sealed contract drawings shall govern. It is the Contractor/CM's responsibility to determine if any conflicts exist. The BIM files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction.
5. The use of BIM files prepared by the Architect shall not in any way obviate the Contractor/CM's responsibility of the proper checking and coordination of dimensions, details, member sizes and gauge, and quantities of materials as required to facilitate complete and accurate fabrication and erection.
6. Contractor does not have the right to release BIM files without first securing a signed Architect's release and, as applicable, the Architect's consultants' forms.

7. Any entity receiving the BIM shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect, and its subconsultants from all claims, damages, losses, expenses, penalties, and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the BIM files by the Contractor/CM, or by third party recipients of the BIM files from the Contractor/CM.
8. The Architect believes that no licensing or copyright fees are due to others on account of the transfer of the BIM files, but to the extent any are, the Contractor/CM will pay the appropriate fees and hold the Architect harmless from such claims.
9. Any purchase order number provided by the Contractor/CM is for Contractor/CM's accounting purposes only. Purchase order terms and conditions are void and are not a part of this agreement.
10. Payment of the service fee, if applicable, is due upon receipt of the BIM files.
11. This agreement shall be governed by the laws of the principal place of business of the Architect.
12. Any renderings produced from this BIM shall be able to be used by the Architect for promotional and marketing materials free of charge.

AUTHORIZED ACCEPTANCE

By Architect	By Contractor/CM
_____	_____
Signature	Signature
_____	_____
Print Name and Title	Print Name and Title
_____	_____
Date	Date
_____	_____

An Agreement between Architect and Contractor
for Transfer of Computer Aided Drafting (CAD) Drawing Files

Architect Grimm + Parker Architects
11720 BELTSVILLE DRIVE, SUITE 600
CALVERTON, MD 20705

Contractor
_____
_____

Project No. 22424.02
Project Name: Roanoke Gateway Phase 2
Location: ROANOKE, VA

Date _____

The Architect will provide the following CAD Drawing files, dated _____, for the convenience of the Contractor in preparing shop fabrication drawings, coordination drawings, and/or rendered imagery:

Floor Plans and Reflected Ceiling Plans.

TERMS AND CONDITIONS:

1. Architect makes no representation as to the compatibility of the CAD Drawing files with any hardware or software.

2. Since the information set forth on the CAD Drawing files can be modified unintentionally or otherwise, the Architect reserves the right to remove all indicia of its ownership and/or involvement from each electronic display.
3. All information on the CAD Drawing files is considered instruments of service of the Architect and shall not be used for other projects, for additions to this project, or completion of this project by others. CAD Drawing files shall remain the property of the Architect, and in no case shall the transfer of these files be considered a sale.

4. Architect makes no representation regarding the accuracy, completeness, or permanence of CAD Drawing files; nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the CAD Drawing files may not have been incorporated. In the event of a conflict between the Architect's sealed contract drawings and CAD Drawing files, the sealed contract drawings shall govern. It is the Contractor's responsibility to determine if any conflicts exist. The CAD Drawing files shall not be considered to be Contract Documents as defined by the General Conditions of Contract.

5. The use of CAD Drawing files prepared by the Architect shall not in any way obviate the Contractor's responsibility of the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

6. Contractor does not have the right to release CAD Drawing files without first securing a signed Architect's release and, as applicable, the Architect's consultants' forms.

7. Any entity receiving the CAD Drawing files shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the Architect, and its Consultants from all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the CAD Drawing files by the Contractor, or by third party recipients of the CAD Drawing files from the Contractor.

8. The Architect believes that no licensing or copyright fees are due to others on account of the transfer of the CAD Drawing files, but to the extent any are, the Contractor will pay the appropriate fees and hold the Architect harmless from such claims.

9. Any purchase order number provided by the Contractor is for Contractor's accounting purposes only. Purchase order terms and conditions are void and are not a part of this agreement.

10. This agreement shall be governed by the laws of the principal place of business of the Architect.

AUTHORIZED ACCEPTANCE

by Architect	by Contractor
_____	_____
Signature	*Signature*
_____	_____
Print Name and Title	*Print Name and Title*
_____	_____
Date	*Date*

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SECTION 01 31 14 - FACILITY SERVICES COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Coordination documents.

1.2 SUBMITTALS

A. Submit coordination drawings and schedules prior to submitting shop drawings, product data, and samples.

B. Areas of Work requiring Coordination Drawings include (but not limited to) mechanical rooms, electrical rooms, equipment rooms, corridors, horizontal exits from duct shafts, cross-overs and any other areas where congestion of Work occurs. Complete the requirements for Coordination Drawings within 75 days of starting construction operations. Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale.
2. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. The Construction Documents in their original, copies or electronic file form are the Architect's instrument of service and are protected under copyright laws.
3. Include the following information, as applicable:
    a. Follow routing shown on Contract Drawings for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.
    b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    c. Indicate required installation sequences.
    d. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
5. Each trade shall sign and date the Coordination Drawings after the addition of their information.
6. Do not begin fabrication until receipt of completed Coordination Drawings are acknowledged by each contractor in writing to the Architect.
7. No progress payments will be made for any work affected by coordination drawings until coordination drawings governing that work have been accepted.
8. Any work installed prior to approval of coordination drawings shall be modified or replaced, as necessary, to conform to subsequently-approved construction drawings, at no additional cost to Owner.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 COORDINATION REQUIRED

A. Coordinate the work listed below:

1. Fire Suppression: Division 21.
2. Plumbing: Division 22.
3. Heating, Ventilating, and Air Conditioning: Division 23.
4. Integrated Automation: Division 25.
5. Electrical: Division 26.
6. Communications: Division 27.
7. Electronic Safety and Security: Division 28.
8. Site Utilities: Division 33.
9. Commissioning requirements throughout the Project Manual.

B. Coordinate progress schedules, including dates for submittals and for delivery of products.

C. Conduct meetings among subcontractors and others concerned, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.

D. Participate in progress meetings. Report on progress of work to be adjusted under coordination requirements, and any required changes in schedules. Transmit minutes of meetings and reports to concerned parties.

E. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

F. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

G. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

H. Make adequate provisions to accommodate items scheduled for later installation.

3.2 COORDINATION DOCUMENTS

A. Prepare coordination drawings to organize installation of products for efficient use of available space, for proper sequence of installation, and to identify potential conflicts.

1. Priority of Construction Space:

a. Coordinate installation of different components to ensure performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
b. Following is the Order of Priority of construction space:

1) First: Ductwork.
2) Second: Fire protection piping.
3) Third: Other piping.
4) Fourth: Conduit.

B. Prepare a master schedule identifying responsibilities for activities that directly relate to this work, including submittals and temporary utilities; organize by specification section.

C. Identify electrical power characteristics and control wiring required for each item of equipment.

D. Maintain maximum headroom at all locations without finished ceilings.

E. Maintain finished ceiling heights as indicated.

F. Coordinate installations with other trades to prevent conflict with Work of other trades and cooperate in making reasonable modifications in layout as needed.

G. Where conflicts occur with placement of mechanical and electrical materials as they relate to placement of other building materials, the Architect shall be consulted for assistance in coordination of the available space to accommodate all trades.

H. Maintain documents for the duration of the work, recording changes due to site instructions, modifications or adjustments.

I. After Architect review of original and revised documents, reproduce and distribute copies to concerned parties.

J. Any construction delays required to accomplish coordination, approval of submittals or re-submittals, or consequent to coordination work, shall be incurred at no additional cost to Owner; such delays may include, but not be limited to , the following:

1. Time taken for preparation and submission of acceptable coordination drawings, including a reasonable period for Architect's review and approval.
2. Time taken for preparation and approval of acceptable mock-ups.
3. Time taken for modifications and replacements of non-conforming work.

3.3 COORDINATION OF SUBMITTALS

A. Review shop drawings, product data, and samples for compliance with Contract Documents and for coordination with related work. Transmit copies of reviewed documents to Architect.

B. Check field dimensions and clearances and relationship to available space and anchors.

C. Check compatibility with equipment and work of other sections, electrical characteristics, and operational control requirements.

D. Check motor voltages and control characteristics.

E. Coordinate controls, interlocks, wiring of switches, and relays.

F. Coordinate wiring and control diagrams.

G. When changes in the work are made, review their effect on other work.

H. Verify information and coordinate maintenance of record documents.

3.4 COORDINATION OF SUBSTITUTIONS AND MODIFICATIONS

A. Review proposals and requests for substitution prior to submission to Architect.

B. Verify compliance with Contract Documents and for compatibility with work of other sections.

C. Submit with recommendation for action.

3.5 OBSERVATION OF WORK

A. Observe work for compliance with Contract Documents.

B. Maintain a list of observed deficiencies and defects; promptly submit.

3.6 DOCUMENTATION

A. Observe and maintain a record of tests. Record:

1. Specification section number and product name.
2. Name of Contractor and subcontractor .

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3. Name of testing agency and name of inspector.
4. Name of manufacturer's representative present.
5. Date, time, and duration of tests.
6. Type of test, and results.
7. Retesting required.

B. Assemble background documentation for dispute and claim settlement.

C. Submit copies of documentation to Architect upon request.

3.7 EQUIPMENT START-UP

A. Verify utilities, connections, and controls are complete and equipment is in operable condition as required by Section 01 70 00.

B. Observe start-up and adjustments, test run, record time and date of start-up, and results.

C. Observe equipment demonstrations made to Owner; record times and additional information required for operation and maintenance manuals.

3.8 INSPECTION AND ACCEPTANCE OF EQUIPMENT

A. Prior to inspection, verify that equipment is tested, operational, clean, and ready for operation.

B. Assist Architect with review. Prepare list of items to be completed and corrected.

END OF SECTION 01 31 14

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SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

C. Construction progress schedule, with network analysis diagrams and reports.

D. Responsibility for completion of Work per schedule and preparation of recovery schedules.

1.2 SUBMITTALS

A. Within 10 days after date of Agreement**,** submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work **.**

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment**.**

F. Submit electronic copy.

G. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.3 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a preliminary network diagram.

3.2 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

C. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

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D. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, Products identified under Allowances, and dates reviewed submittals will be required from Architect, within the Web-based Project Management Software. Indicate decision dates for selection of finishes.

1. The Contractor shall maintain the submittal log between the Architect and Contractor through Web-based Project Management Software.
2. Contractor to maintain a submittal log with subcontractors.

E. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.

F. Provide legend for symbols and abbreviations used.

3.3 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:

1. Preceding and following event numbers.
2. Activity description.
3. Estimated duration of activity, in maximum 15 day intervals.
4. Earliest start date.
5. Earliest finish date.
6. Actual start date.
7. Actual finish date.
8. Latest start date.
9. Latest finish date.
10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
11. Monetary value of activity, keyed to Schedule of Values.
12. Percentage of activity completed.
13. Responsibility.

D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and re-computation of all dates and float.

E. Required Reports: List activities in sorts or groups:

1. By preceding work item or event number from lowest to highest.
2. By amount of float, then in order of early start.
3. By responsibility in order of earliest possible start date.
4. In order of latest allowable start dates.
5. In order of latest allowable finish dates.
6. Contractor's periodic payment request sorted by [Schedule of Values listings][specifications sections][or [ ]].
7. Listing of basic input data that generates the report.
8. Listing of activities on the critical path

3.4 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

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3.5 FLOAT TIME

A. Float is not for the exclusive benefit of either Contractor or Owner.

B. Manage work according to early start dates, by commencing activities on the early start date (calculated by the latest approved Contract Schedule) or earlier if possible, unless constrained by a bona fide resource limitation.

C. Owner may reserve and apportion float time according to the needs of the Project.

D. Actual or projected Owner-caused delays that do not exceed available float time shall not have any effect upon Contractor's adherence to specified time constraints and shall not be a basis for any time extension.

E. Contractor acknowledges the following:

1. Activity delays shall not automatically result in adjustment of specified time constraints.
2. A Change Order or other Owner action or inaction may not affect existing critical activities or cause non-critical activities to become critical.
3. A Change Order or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the network, thereby not causing any effect on specified time constraints.

F. Pursuant to the above float sharing requirements, use of float releaded by elimination of float suppression techniques such as preferential sequencing, special lead/lag logic restraints, unreasonably extended activity durations, or imposed dates shall be distributed by Owner to the benefit of Owner and Contractor.

G. In the event of the Contractor wishes to complete the Work earlier than the time specified therefore:

1. Continue to calculate float based on the Work completion date specified as of Contract execution, by maintaining the specified Work completion date as a "finish-no-later-than" constraint.
2. The completion time for the Work shall be amended by Owner's acceptance of or acquiescence to Contractor's proposed earlier completion date.
3. Contractor shall not, under any circumstances, receive additional compensation for indirect, general, administrative or other forms of overhead costs, for the period between the time of earlier completion proposed by Contractor and the completion time for the Work specified as of NTP.

3.6 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate contractors.

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3.7 RESPONSIBILTY FOR COMPLETION

A. Take a combination of the following actions, at no additional cost to the Owner, when the progress schedule illustrates that the Contract Substantial Completion date can not be met:

1. Increase construction manpower in such quantities and trades to substantially eliminate the backlog of Work.
2. Increase the number of work hours per shift, shifts per working day, working days per week, or the amount of construction equipment, or any combination to substantially eliminate the backlog of Work.
3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities.

B. Recovery Schedule: Prepare a recovery schedule from all trades to accelerate progress, if a milestone is missed, a single duration work activitiy is incomplete for ten work days, or overall work progress is deemed insufficient by the Owner/Architect.

1. A recovery schedule must be initiated by the Contractor, reviewed by effected trade contractors and submitted ten working days after one of the above conditions occurs.
2. Submit recovery schedule in same number of copies as original.
3. Trades must execute means necessary to bring the Project back on schedule using the recovery schedule; accelerated Work and additional overhead necessary to keep the Project on schedule is included in the Contract.
4. Recovery schedule to be double the size of the original diagram, as a minimum, illustrating existing and revised activities alongside original data; revised activities must be easily differentiated from original schedule.

C. Failure of the Contractor to comply with requirements of this subsection may be a basis for determination that the Contractor is not prosecuting the Work with such diligence as will ensure completion within the time stipulated; upon such determination, the Owner may take such action deemed appropriate.

3.8 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner , and other concerned parties**.**

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION 01 32 16

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. References and standards.

B. Submittals.

C. Quality assurance.

D. References and standards.

E. Mock-ups.

F. Control of installation.

G. Tolerances.

H. Testing and inspection agencies and services.

I. Contractor's construction-related professional design services.

J. Control of installation.

K. Mock-ups.

L. Tolerances.

M. Manufacturers' field services.

N. Defect Assessment.

1.2 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.

B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.

1. Design Services Types Required:

a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor’s sole responsibilities for construction means, methods, techniques, sequences, and procedures.

b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.

C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.3 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:

1. Temporary sheeting, shoring, or supports.
2. Temporary scaffolding.
3. Temporary bracing.
4. Temporary falsework for support of spanning or arched structures.
5. Temporary stairs or steps required for construction access only.
6. Temporary hoist(s) and rigging.
7. Investigation of soil conditions and design of temporary foundations to support construction equipment.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Testing Agency Qualifications:

1. Prior to start of Work, submit agency name, address, and telephone number, and names of full-time specialist and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

C. Schedule of Tests and Inspections: Prepare in tabular form, within 30 days following mobilization, and include the following:

1. Specification section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents, or for Owner's information.

1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
2. Include required product data and shop drawings.
3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

E. Test Reports: After each test/inspection, promptly submit [electronic] copies of report to Architect and to Contractor.

1. Include:

a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.

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j. Compliance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents, or for Owner's information.

F. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.

1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

G. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

H. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.

1. Submit report within 30 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.

I. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.

1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Prior to start of work, submit agency name, address, and telephone number, and names of full time officer specialist**.**

B. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

1.6 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.7 TESTING AND INSPECTION AGENCIES AND SERVICES

A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform specified tesing and inspection. specified testing.

1. The individual specification section must clearly state that testing is the Owner's responsibility, otherwise the testing to be executed by Contractor.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections. Finish according to requirements. Provide required lighting and any supplemental lighting where required to enable Architect to evaluate quality of the mock-up.

E. Notify Architect seven (7) working days in advance of dates and times when mock-ups will be constructed.

F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

I. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.

1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
2. Make corrections as necessary until Architect's approval is issued.

J. Accepted mock-ups shall be a comparison standard for the remaining Work.

K. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction**,** remove mock-up and clear area when directed to do so by Architect.

L. Where possible salvage and recycle the demolished mock-up materials.

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:

1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
6. Perform additional tests and inspections required by Architect.
7. Attend preconstruction meetings and progress meetings.
8. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:

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1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
    a. To provide access to Work to be tested/inspected.
    b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    c. To facilitate tests/inspections.
    d. To provide storage and curing of test samples.
4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

G. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Sum.

3.5 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship start-up of equipment , test, adjust, and balance equipment as applicable, and to initiate instructions when necessary

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.6 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION 01 40 00

SECTION 01 43 39 - MOCK-UPS

PART 1 - GENERAL

1.1 MOCK-UPS

A. General mock-up requirements

1. Intent of mock-up is to permit review of appearance, quality of workmanship, coordination, compatibility, and relationships with adjacent materials, and to provide Contractor with opportunity to coordinate Subcontractor Work.
2. Mock-ups include, but are not necessarily limited to, the following:
3. Exterior claddings, air barriers and drainage plains.
4. Special Exterior Materials, brackets and accessories.
5. Windows, exhaust vents, and brick vents.
6. Roof overhangs, soffits, parapets and coping details.

B. Related sections include the following:

1. Section 04 20 00 Unit Masonry.
2. Section 05 70 00 Decorative Metal.
3. Section 06 16 00 Sheathing.
4. Section 07 42 43 Composite Wall Panels.
5. Section 07 62 00 Sheet Metal Flashing and Trim.
6. Section 07 92 00 Joint Sealants.

1.2 SUMMARY

A. Location of the mock-up assembly at project site must be approved by the owner and architect.

B. Provide a freestanding exterior building mock-up to permit review of appearance, quality of workmanship, coordination, compatibility, and relationships with adjacent materials. The contractor shall provide composite mock-up drawings prior to fabrication for approval by the owner’s representative. Mock-up shall be constructed out of sequence and will not be incorporated into the final building. The mock-up will stand through the completion of the building exterior and serve as the standard for workmanship once it has been accepted in writing by the owner’s representative. Provide the following exterior building mock-ups:

1. Exterior wall assembly systems and finishes, including all transitions and interfaces between different materials and walls to openings/curtain wall and storefronts. This is a single comprehensive mock-up.

C. Provide full size room mock-ups within the building. The rooms to serve as the mock-ups shall be as indicated on the drawings or as approved by architect/owner. Room mock-up shall include all required floor, wall, and ceilings finishes, casework, light fixtures, door(s) and frame(s), glazing, mechanical diffusers, and other required materials and finishes. Make necessary modifications until room mock-up is accepted by the architect/owner. Mock-up shall be constructed out of sequence. Upon acceptance, the room mock-up will be incorporated into the final completed project. Provide the following room mock-ups:

1. Typical apartment unit including all the finishes.

1.3 SUBMITTALS

A. Mock-ups shall not be fabricated until after acceptance of required submittals for all finish materials to be incorporated into the mock-ups. Project schedule shall take into account early submittal of these components to the architect.

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B. Submit shop drawings for the mock-up that integrate shop drawings of each finish material and footings and bracing. Clearly identify components and materials to be integrated into the assembly.

C. Prior to construction of mock-ups, provide material samples as specified in the respective specification sections included as part of the mock-ups.

1.4 QUALITY ASSURANCE

A. Performance: Mock-ups shall be constructed for the architect's review for compliance with the contract documents.

B. Make necessary additions and modifications to mock-ups as required by the architect.

C. Modify mock-ups, or install new components if requested by the architect until final acceptance is obtained.

D. Following acceptance, mock-ups shall serve as a performance standard of quality and appearance of the work it represents, including the interface with adjacent materials and components as applicable.

E. Coordinate fabrication, delivery, assembly, and installation with related materials to be included in the mock-ups. Construction of the mock-up assemblies shall be under the supervision of the same personnel who will be employed for the subsequent work.

F. Maintain mock-ups in neat, clean condition until removal or final acceptance. Repair damage as required to maintain in condition suitable for review and approval.

G. Accepted building mock-up shall be removed from the project site when indicated by the architect. Accepted room mock-up may be incorporated into the work.

1. Remove and clear area after approval of the exterior mock-up only as indicated by the architect.

H. Scheduling:

1. Construct mock-ups in a timely manner to permit review and modifications such that the work is not delayed.
2. Do not proceed with ordering of components or start construction until after mock-up acceptances have been obtained and the architect has approved.
3. Include line item in the construction schedule for the exterior building mock-up, showing submittals, construction, review, and approval periods.
4. The mock-up shall be erected in sufficient time to allow final approval of window frame color, glass selection, and sealant colors.

PART 2 - PRODUCTS

2.1 MATERIALS

A. As specified in the respective sections of the specifications.

2.2 EXTERIOR BUILDING MOCK-UPS

A. Purpose: Establish standards for work indicated and specified to be included in mock-up to demonstrate quality of workmanship, materials, colors, and textures required by the contract documents. Include windows, sealants, siding, flashing, and other exterior materials.

1. Interior finishes will not be required to be installed on the interior side of the exterior building mock-up.

B. Design Concept: Engineer and construct mock-up, including required shoring, bracing, foundations, power, etc., making required additions and modifications to details as required.

1. Comply with performance requirements specified in the individual specification sections while maintaining basic design concept, member profiles, and alignment of components.

C. Location: As indicated on the drawings or as approved by the architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installers proposed for use on the actual work shall install the mock-ups. Personnel representing manufacturers, and installers of exterior wall components shall be present during mock-up construction and testing as appropriate for efficient evaluation and revision if required.

3.2 SEQUENCE OF INSPECTION

A. Notify the architect at the start of construction of mock-ups and transmit progress reports to allow the architect to schedule reviews.

B. Visual examination of mock-ups shall be made by the architect.

C. After approximately 50 percent of each mock-up has been built, request the architect's preliminary review before completion. Incorporate visual and technical changes or variations requested by the architect into mock-ups during their construction and prior to their completion.

D. Obtain the architect's acceptance of visual and technical qualities of mock-ups before commencing the corresponding work for the project.

E. Maintain and protect mock-ups during construction to serve as a standard for judging work incorporated into the project. Do not alter, remove, or destroy remote mock-ups until authorized by the architect.

3.3 DISPOSAL

A. When authorized by the architect, demolish and remove all components of composite mock-ups from project site.

END OF SECTION 01 43 39

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Temporary telecommunications services.

B. Temporary telephone service.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures and fencing.

E. Security requirements.

F. Vehicular access and parking.

G. Waste removal facilities and services.

H. Project identification sign.

1.2 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

1.3 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.4 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.5 FENCING

A. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.6 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.7 VEHICULAR ACCESS AND PARKING – See Section 01 55 00

1.8 WASTE REMOVAL

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.9 PROJECT SIGNS – See Section 01 58 13

1.10 FIELD OFFICES – See Section 01 52 13

1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 01 51 00 - TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Provision of electricity lighting heat ventilation and water..

1.2 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards.

1.3 TEMPORARY ELECTRICITY

A. Cost: By Contractor.

B. Provide power service required from utility source.

C. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

D. Provide main service disconnect and over-current protection at convenient location and meter.

E. Permanent convenience receptacles may be utilized during construction.

F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain 2 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.

B. Maintain lighting and provide routine repairs.

C. Permanent building lighting may be utilized during construction.

1.5 TEMPORARY HEATING

A. Cost of Energy: By Contractor.

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.6 TEMPORARY COOLING

A. Cost of Energy: By Contractor.

B. Cost of Energy: By Owner.

C. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.

D. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

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E. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.7 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Contractor.

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 01 51 00

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SECTION 01 52 13 - FIELD OFFICES AND SHEDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Temporary field offices for use of Architect.

B. Temporary field offices for use of Contractor.

C. Maintenance and removal.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT, FURNISHINGS

A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.2 CONSTRUCTION

A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed.

C. Lighting for Offices: 50 fc at desk top height, exterior lighting at entrance doors.

2.3 ENVIRONMENTAL CONTROL

A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

2.4 CONTRACTOR OFFICE AND FACILITIES

A. Size: For Contractor's needs and to provide space for project meetings.

B. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.

C. Other Furnishings: Contractor's option.

D. Equipment: Six adjustable band protective helmets for visitors, one 10 inch outdoor weather thermometer.

2.5 OWNER AND ARCHITECT/ENGINEER OFFICE

A. Separate space for sole use of Owner and Architect, with separate entrance door with new lock and two keys.

B. Area: At least 150 sq ft, with minimum dimension of 8 ft.

C. Minimum four 110 volt duplex convenience outlets, one on each wall.

D. Telephone: As specified in Section 01 50 00.

E. Furnishings:

1. One desk 54 by 30 inch, with three drawers.
2. One drafting table 36 by 72 inch, with one equipment drawer and a 48 inch wide parallel straight edge.
3. One metal, double-door storage cabinet under table.
4. Plan rack to hold working drawings, shop drawings, and record documents.
5. One standard four-drawer legal size metal filling cabinet with locks and two keys per lock.

6. Six linear ft of metal bookshelves.
7. Two swivel arm chairs.
8. One drafting table stool.
9. One tackboard 36 by 30 inch.
10. One waste basket per desk and table.

PART 3 - EXECUTION

3.1 PREPARATION

A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.2 INSTALLATION

A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.

B. Parking: Two hard surfaced parking spaces for use by Owner and Architect, connected to office by hard surfaced walk.

3.3 MAINTENANCE AND CLEANING

A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.

B. Maintain approach walks free of mud, water, and snow.

3.4 REMOVAL

A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION 01 52 13

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SECTION 01 55 00 - VEHICULAR ACCESS AND PARKING

PART 1 - GENERAL

1.1 SUMMARY

A. Driveways, entrance and traffic routes.

B. Parking.

C. Existing pavements and parking areas.

D. Permanent pavements and parking facilities.

E. Construction parking controls.

F. Haul routes.

G. Traffic signs and signals.

H. Maintenance.

I. Removal, repair.

J. Mud from site vehicles.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Temporary Construction: Contractor's option.

B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base and topping.

2.2 SIGNS, SIGNALS, AND DEVICES

A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 01 58 13 - Temporary Project Signage.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

C. Flag Person Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.1 DRIVEWAYS, ENTRANCE AND TRAFFIC ROUTES

A. Keep driveways and entrances serving premises and site surrounding Project clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Provide continuous monitoring of site.

1. Schedule deliveries to minimize use of driveways and entrances.
2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Truck deliveries shall be scheduled so that the streets adjacent to the site do not back up with delivery trucks waiting to deliver materials. Trucks must be scheduled accordingly, or wait to unload inside the fence in the project site or off the Owner's property.

3.2 PARKING

A. Use of existing parking facilities by construction personnel is not permitted.

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B. Use of new parking facilities by construction personnel is not permitted.

C. Do not allow heavy vehicles or construction equipment in parking areas.

D. Arrange for temporary parking areas to accommodate construction personnel.

E. When site space is not adequate, provide additional off-site parking.

F. Locate as approved by Architect.

3.3 PERMANENT PAVEMENTS AND PARKING FACILITIES

A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.

B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.4 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.5 HAUL ROUTES

A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.6 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

C. Relocate as work progresses, to maintain effective traffic control.

3.7 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.8 REMOVAL, REPAIR

A. Repair existing and new permanent facilities damaged by use, to original condition.

B. Remove equipment and devices when no longer required.

C. Repair damage caused by installation.

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3.9 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION 01 55 00

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SECTION 01 57 19 - TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Construction procedures to promote adequate indoor air quality during and after construction.

B. Construction procedures to promote adequate indoor air quality during and after construction.

C. Building flush-out after construction and before occupancy.

D. Testing indoor air quality before commencement of construction,existing building areas only.

E. Testing indoor air quality after completion of construction.

F. Testing air change effectiveness after completion of construction.

G. Testing smoking room ventilation and isolation.

H. Testing residential unit air isolation.

1.2 PROJECT GOALS

A. See Section 01 33 29 - Sustainable Design Reporting, for overall project goals relating to environment and energy.

B. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.

1. Cleaning of ductwork is not contemplated under this Contract.
2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
3. Establish condition of existing ducts and equipment prior to start of alterations.

C. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.

1. Furnish products meeting the specifications.
2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

D. Ventilation: Design and construct the HVAC system to exceed by 30 percent the minimum requirements for ventilation specified in ASHRAE 62.1.

E. Residential Units Air Isolation: Units have been designed with impermeable party walls and sealed openings in walls and floors.

1.3 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements: Testing and inspection services.

B. Section 01 33 29 - Sustainable Design Reporting.

C. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

D. Section 23 40 00 - HVAC Air Cleaning Devices: HVAC filters.

E. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC: Testing HVAC systems for proper air flow rates, adjustment of dampers and registers, and settings for equipment.

F. Section 23 01 30.51 - HVAC Air-Distribution System Cleaning: Cleaning air ducts, equipment, and terminal units.

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1.4 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

B. ASHRAE Std 62.1 - Ventilation For Acceptable Indoor Air Quality.

C. ASHRAE Std 129 - Measuring Air-Change Effectiveness.

D. ASTM D5149 - Standard Test Method for Ozone in the Atmosphere: Continuous Measurement by Ethylene Chemiluminescence.

E. ASTM D5197 - Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology).

F. ASTM E779 - Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.

G. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers California Department of Public Health.

H. EPA (ESMHP) - Energy Star Multifamily High Rise Program Testing and Verification Protocols.

I. EPA 600/4-90/010 - Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

J. EPA 625/R-96/010b - Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air

K. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction.

1.5 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

E. Ventilation: The process of supplying and removing air to and from interior spaces by natural or mechanical means.

F. Volatile Organic Compound (VOC): Carbon compounds that participate in atmospheric photochemical reactions, (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate); the compounds vaporize (become a gas) at normal room temperatures.

1.6 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Sustainability Documentation: Submit all submittals required in this section.

C. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA (OCC) as a guide.

1. Submit not less than 60 days before enclosure of building.
2. Identify potential sources of odor and dust.
3. Identify construction activities likely to produce odor or dust.
4. Identify areas of project potentially affected, especially occupied areas.
5. Evaluate potential problems by severity and describe methods of control.

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6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
7. Describe cleaning and dust control procedures.
8. Describe coordination with commissioning procedures.

D. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

E. Duct and Terminal Unit Inspection Report.

F. Air Contaminant Test Plan: Identify:

1. Testing agency qualifications.
2. Locations and scheduling of air sampling.
3. Test procedures, in detail.
4. Test instruments and apparatus.
5. Sampling methods.

G. Air Contaminant Test Reports: Show:

1. Location where each sample was taken, and time.
2. Test values for each air sample; average the values of each set of 3.
3. HVAC operating conditions.
4. Certification of test equipment calibration.
5. Other conditions or discrepancies that might have influenced results

H. Ventilation Effectiveness Test Plan: Identify:

1. Testing agency qualifications.
2. Description of test spaces, including locations of air sampling.
3. Test procedures, in detail; state whether tracer gas decay or step-up will be used.
4. Test instruments and apparatus; identify tracer gas to be used.
5. Sampling methods.

I. Ventilation Effectiveness Test Reports: Show:

1. Include preliminary tests of instruments and apparatus and of test spaces.
2. Calculation of ventilation effectiveness, E.
3. Location where each sample was taken, and time.
4. Test values for each air sample.
5. HVAC operating conditions.
6. Other information specified in ASHRAE Std 129.
7. Other conditions or discrepancies that might have influenced results.

J. Residential Units Air Isolation Test Plan: Identify:

1. Testing agency qualifications.
2. Description of test spaces, including locations of air sampling.
3. Test procedures, in detail.
4. Test instruments and apparatus; identify tracer gas to be used.
5. Sampling methods.

K. Residential Units Air Isolation Reports: Show:

1. Include preliminary tests of instruments and apparatus.
2. Include inspection of membrane seals in test spaces.
3. HVAC operating conditions.
4. Location where each sample was taken, and time.
5. Test values for each air sample.
6. Other information specified in ASHRAE Std 129.

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7. Other information specified in ENERGY STAR Multifamily High Rise Program Testing and Verification Protocols, Version 1.0.
8. Other conditions or discrepancies that might have influenced results.

L. Closeout Submittals:

1. General: At completion of construction and prior to contract close-out, submit the following for information purposes in electronic format.
2. Final Construction Indoor Air Quality Management, During Construction: At completion of construction and prior to contract close-out, submit:

    a. Approved Construction Indoor Air Quality Management Plan.
    b. Construction Photographs: Six taken at three (3) separate times for a total of eighteen (18) digital photographs of required construction indoor air quality management measures.

        1) HVAC protection.
        2) Source Control.
        3) Pathway Interruption.
        4) Housekeeping.
        5) Scheduling.
        6) Protection of absorptive or dry sink materials, including but not limited to carpet, gypsum board, acoustical ceiling tiles, and insulation.
        7) Temporary filtration media, if HVAC is operated during construction.

    c. Product data of filtration media used during construction and installed immediately prior to occupancy including MERV values, manufacturer's name and model number.
    d. Meeting minutes, checklists, worksheets, notifications and deficiency or resolution logs related to the project IAQ issues.

3. Final Construction Indoor Air Quality Management Plan, Prior to Occupancy: At completion of construction and prior to contract close-out, submit:

    a. Compliance Path Option 1: Approved Building Flush-out Schedule including a statement that space was not occupied until after delivery of minimum outside air requirements were met.
    b. Compliance Path Option 2: Baseline Indoor Air Quality Testing reports showing results and location of each test indicating that the maximum chemical contaminate concentration requirements are not exceeded, a summary of HVAC operating conditions, a listing of discrepancies and recommendations for corrective actions, if needed.

        1) Include certification of test equipment calibration with each test report.

1.7 SCHEDULING

A. Coordinate construction activities to minimize or eliminate disruption of operations in occupied portions of building.

B. Schedule for storage, installation, and protection of all components of air distribution systems.

C. Schedule for storage, installation, and protect of absorptive materials (woven, fibrous or porous in nature, such as carpet, ceiling tiles, insulation, and fabrics) from exposure to emissions during and after installation from materials and finishes with potential for short-term release of off-gassing volatile organic compounds.

1. Highlight critical methods used to protect absorptive materials from airborne pollutants such as: dust, debris, moisture, gaseous and microbial contamination.
2. Sequence installation of absorptive materials after odor-emitting activities have occurred and have been mitigated by ventilation.

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D. Do not store absorptive materials on-site if protection measures as described above cannot be ensured.

E. Avoid building occupancy while construction related pollutants are present.

F. Ensure proper and complete curing of concrete before covering.

1.8 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: Independent testing agency having minimum of 5 years experience in performing the types of testing specified.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Low VOC Materials: See Section 01 61 16.

B. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.

C. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE Std 52.2.

D. Auxiliary Air Filters:

1. MERV of 8, minimum, when tested in accordance with ASHRAE 52.2, during construction.
2. MERV of 13, minimum, when tested in accordance with ASHRAE 52.2, installed prior to occupancy.

PART 3 - EXECUTION

3.1 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:

1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. HVAC system shall be kept clean, free of dust, debris, moisture, gaseous and microbial contamination during storage, handling, installation and punch-out. Inspect all air inlets, air outlets, grilles, diffusers, plenums, and ducts upon completion of Work.

1. Cover and protect (taped plastic or similar method) all exposed air inlet and outlet openings, grilles, ducts, plenums, to prevent water, moisture, dust and other contaminate intrusion.
2. Apply protection immediately after installation of equipment and ducting.
3. Ducting runs that require more than a single day to install shall be protected at end of each day's Work.
4. Leaks in return ducts and air handlers shall be checked and repaired.
5. Inspect filtration monthly and replace as needed with new media throughout the HVAC system; filtration media shall be minimum MERV 8.
6. After final phase of construction, install new filtration media throughout the HVAC system; filtration media shall be minimum MERV 8.
7. Cleaning of ductwork is not part of this contract; however Contractor shall bear cost of cleaning required by Owner due to failure of Contractor to protect ducts and equipment from construction pollutants as specified.

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D. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.

E. When working in a portion of an occupied building, prevent movement of air from construction area to occupied area.

F. Use of HVAC equipment and ductwork for ventilation during construction is not permitted:

1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.
2. Exhaust directly to outside.
3. Seal HVAC air inlets and outlets immediately after duct installation.

G. HVAC equipment and supply air ductwork may be used for ventilation during construction:

1. Operate HVAC system on 100 percent outside air, with 1.5 air changes per hour, minimum.
2. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.
3. Do not use return air ductwork for ventilation.
4. Do not use return air ductwork for ventilation unless absolutely necessary.
5. Seal return air inlets or otherwise positively isolate return air system to prevent recirculation of air; provide alternate return air pathways.
6. Where return air ducts must be used for ventilation, install auxiliary filters at return inlets, sealed to ducts; use filters with at least the equivalent efficiency as those required at supply air side; inspect and replace filters when they lose efficiency.

H. Do not store construction materials or waste in mechanical or electrical rooms.

I. Provide direct exhaust to the exterior during installation of strong emitting materials, including touch-up activities; keep exhaust away from intakes and occupied spaces.

J. Provide adequate ventilation of packaged dry products prior to installations. Remove from package and place in a secure, dry, well-ventilated space, free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree maximum continuously during ventilations period. Do not ventilate within limits of Work unless otherwise approved by Architect.

K. "Bake-out" or "super-heating" of spaces to accelerate the release of gaseous emissions is not permitted.

L. Prohibit smoking and use of fossil-fueled temporary heating units inside the building and near building entrances, windows and intakes and within 25 feet of building entrances.

M. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.

1. Inspect duct intakes, return air grilles, and terminal units for dust.
2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
3. Clean tops of doors and frames.
4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
5. Clean return plenums of air handling units.
6. Remove intake filters last, after cleaning is complete.

N. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.

O. Use low-toxic pest control chemicals such as boron, if needed, unless otherwise directed.

P. Remove spills or excess application of solvent-containing products as soon as possible. Use low-emitting cleaning agents, giving preference to Green Seal products.

Q. Keep work areas as dry as possible; replace any absorptive (dry sink) material that is exposed to moisture.

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R. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

3.2 PATHWAY INTERUPTION

A. Provide negative pressurization of spaces under construction and/or demolition and positive pressurization of occupied or finished spaces while construction work proceeds in adjacent areas.

B. Relocate pollutant sources when project equipment or staging areas coincide with critical air flow pathways and place plastic barriers to contain construction areas.

C. Temporarily seal building, including air intakes and exhaust vents, and any other building openings, when dust-generating or strong-emitting construction products or procedures are used on the exterior of the building.

D. Once spaces within building become occupied, work areas must remain under negative pressure. Exhaust air at a rate at least 10% greater than the rate of supply. Do not exhaust air where it can be drawn back into occupied spaces and place a continuous plastic barriers creating a seal between construction areas and occupied spaces.

3.3 INDOOR AIR QUALITY MANAGEMENT - PRIOR TO OCCUPANCY

A. Contractor's Option: Either full continuous flush-out OR satisfactory air contaminant testing is required, not both.

3.4 BUILDING FLUSH-OUT

A. Contractor's Option: Either full continuous flush-out OR satisfactory air contaminant testing is required, not both.

B. Do not start flush-out until:

1. All construction is complete.
2. HVAC systems have been tested, adjusted, and balanced for proper operation.
3. Cleaning of inside of HVAC ductwork, specified elsewhere, has been completed.
4. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
5. New HVAC filtration media have been installed.

C. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot or floor area has been supplied.

1. Obtain Owner's concurrence that construction is complete enough before beginning flush- out.
2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
4. If interior spaces must be occupied prior to completion of the flush-out, supply a minimum of 25 percent of the total air volume prior to occupancy, and:
5. Space may be occupied following delivery of a minimum of 3,500 cubic feet of outside air per square feet of floor area to space, until the total of 14,000 cubic feet per square foot of outside air has been delivered to the space, and:

a. Begin ventilation at least three hours prior to daily occupancy.
b. Continue ventilation during all occupied periods.
c. Provide minimum outside air volume **of** 0.30 cfm per square foot or design minimum outside air rate, whichever is greater.

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D. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

3.5 AIR CONTAMINANT TESTING

A. Contractor's Option: Either full continuous flush-out, or satisfactory air contaminant testing is required, not both.

B. Perform air contaminant testing before starting construction, as base line for evaluation of post-construction testing.

C. Perform air contaminant testing before occupancy.

D. Do not start air contaminant testing until:

1. All construction is complete, including interior finishes.
2. HVAC systems have been tested, adjusted, and balanced for proper operation.
3. Cleaning of inside of HVAC ductwork, specified elsewhere, has been completed.
4. New HVAC filtration media have been installed.

E. Use testing protocols consistent with US EPA “Compendium of Methods for the Determination of Air Pollutants in Indoor Air” and as additionally detailed in the LEED-S Reference Guide][provide the services of a qualified Indoor Air Quality Testing Services Firm.

1. Support the Indoor Air Quality Testing Services Firm by coordinating scheduling of required testing, and providing services during IAQ remediation if necessary.

F. Indoor Air Samples: Collect from spaces representative of occupied areas:

1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet; take samples from areas having the least ventilation and those having the greatest presumed source strength.
3. Collect samples from height from 36 inches **to** 72 inches above floor.
4. Collect samples from same locations on 3 consecutive days during normal business hours; average the results of each set of 3 samples.
5. Exception: Areas with normal very high outside air ventilation rates, such as laboratories, do not need to be tested.
6. For each sampling point where maximum concentration limits are exceeded conduct flush-out with outside air and retest the specific parameter(s) that were exceeded to indicate the requirements are achieved; repeat procedure until all requirements have been met.
7. When retesting the same building areas, take samples from at least the same locations as in first test.

G. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.

H. Analyze air samples and submit report.

I. Air Contaminant Concentration Limits:

1. Formaldehyde: Not more than 27 parts per billion.
2. Formaldehyde: Not more than 16.3 parts per billion.
3. PM10 Particulates: Not more than 50 micrograms per cubic meter.
4. PM10 Particulates: Not more than 20 micrograms per cubic meter.
5. PM2.5 Particulates: Not more than 15 micrograms per cubic meter.
6. Ozone: Not more than 0.075 parts per million.
7. Total Volatile Organic Compounds (TVOCs): Not more than 500 micrograms per cubic meter.

8. Total Volatile Organic Compounds (TVOCs): Not more than 200 micrograms per cubic meter.
9. Chemicals Listed in CAL (CDPH SM) Table 4-1, except Formaldehyde: Allowable concentrations listed in Table 4-1.
10. Carbon Monoxide: Not more than 9 parts per million and not more than 2 parts per million higher than outdoor air.
11. Carbon Dioxide: Measure in ppm, in relation to outdoor air ; not more than 700ppm higher than out door air;
12. Airborne Mold and Mildew: Measure in relation to outside air ; not higher than outside air.
13. Regulated Pollutants: Measure in relation to outside air ; not more than contained in outside air**.**

J. Air Contaminant Concentration Test Methods:

1. Formaldehyde: ASTM D5197, EPA 625/R-96/010b Method TO-11A, or EPA 600/4-90/010 Method IP-6.
2. Particulates: EPA 600/4-90/010 Method IP-10.
3. Ozone: ASTM D5149.
4. Total Volatile Organic Compounds (TVOC): EPA 625/R-96/010b Method TO-1, TO-15, or TO-17][or EPA 600/4-90/010 Method IP-1.
5. Chemicals Listed in CAL (CDPH SM) Table 4-1, except Formaldehyde: ASTM D5197, or EPA 625/R-96/010b Method TO-1, TO-15, or TO-17.
6. Carbon Monoxide: EPA 600/4-90/010 Method IP-3, plus measure outdoor air; measure in ppm; report both indoor and outdoor measurements.

K. Air Contaminant Concentration Determination and Limits:

1. 4-Phenylcyclohexene (4-PCH): 6.5 micrograms per cubic meter this test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.

L. If air samples show concentrations higher than those specified, ventilate with 100 percent outside air and retest at no cost to Owner, or conduct full building flush-out specified above.

3.6 VENTILATION EFFECTIVENESS TESTING

A. Perform ventilation effectiveness testing during commissioning period..

B. Do not begin ventilation effectiveness testing until:

1. HVAC testing, adjusting, and balancing has been satisfactorily completed.
2. Building flush-out or air contaminant testing has been completed satisfactorily.
3. New HVAC filtration media have been installed.

C. Test each air handler zone in accordance with ASHRAE Std 129.

D. If calculated air change effectiveness for a particular zone is less than 0.9 due to inadequate balancing of the system, adjust, and retest at no cost to Owner.

3.7 RESIDENTIAL UNITS AIR ISOLATION TESTING

A. Residential units have been designed to have an airtight sealed membrane between units][inspect membrane seal at the following locations and repair as required:

1. Between party walls and floor structure.
2. Between party walls and roof structure.
3. Around pipes, conduits, and ducts passing through floors and party walls.
4. Weatherstripping on entrance doors.

B. Airtight membrane has been designed to limit leakage area to less than 0.30 CFM50/ft^2 as tested using ANSI/RESNET/ICC Standard 380.

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C. If possible, perform inspection and testing prior to covering up air seals in walls and floors.

D. Otherwise, perform testing after completion of construction but before occupancy.

E. Test airtight membrane in accordance with ASTM E779 or other appropriate method.

F. Test acceptable sealing of residential units in multifamily projects using procedures described in ENERGY STAR Multifamily New Construction National Rater Field Checklist, Version 1.2 (Rev. 05) .

G. If test results show excess leakage area, reinspect, repair, and retest.

END OF SECTION 01 57 19

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Sustainable design-related product requirements.

C. Transportation, handling, storage and protection.

D. Substitution limitations.

E. Procedures for Owner-supplied products.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 REFERENCE STANDARDS

A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content Current Edition.

B. International Organization for Standardization document, ISO 14021 - Environmental Labels and Declarations - Self-declared Environmental Claims (Type II Environmental Labeling).

C. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products 2014.

D. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action Current Edition.

E. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action Current Edition.

F. HPDC (HPD-OLT) - Create an HPD On-Line Tool; Health Product Declaration Collaborative Current Edition.

G. ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures 2006.

H. ISO 14040 - Environmental management -- Life cycle assessment -- Principles and framework 2006.

I. ISO 14044 - Environmental management -- Life cycle assessment -- Requirements and guidelines 2006 (Amended 2017).

J. ISO 21930 - Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services 2017.

K. NEMA MG 1 - Motors and Generators 2018.

L. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. NSF 332 - Sustainability Assessment for Resilient Floor Coverings 2015.

1.3 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1. Submit within 45 calendar days after date of Notice to Proceed.
2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 - PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.2 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.

C. Where other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions, as defined in Section 01 61 16.
2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.
3. Are extracted, harvested, and/or manufactured closer to the location of the project.
4. Have longer documented life span under normal use.
5. Result in less construction waste. See Section 01 74 19
6. Are made of vegetable materials that are rapidly renewable.
7. Have a published GreenScreen Chemical Hazard Analysis.

D. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

E. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

F. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

2.3 PRODUCT OPTIONS

A. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, or follow substitution process described elsewhere in specifications while meeting product specifications.

2.4 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.1 OWNER-SUPPLIED PRODUCTS

A. Owner’s Responsibilities:

1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:

1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.2 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

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F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.3 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

J. Prevent contact with material that may cause corrosion, discoloration, or staining.

K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

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SECTION 01 61 16 - VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

C. Requirement for installer certification that they did not use any non-compliant products.

1.2 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:

1. Interior paints and coatings applied on site.
2. Interior adhesives and sealants applied on site, including flooring adhesives.
3. Flooring.
4. Composite wood.
5. Products making up wall and ceiling assemblies.
6. Thermal and acoustical insulation.
7. Free-standing furniture.
8. Other products when specifically stated in the specifications.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:

1. Interior paints and coatings applied on site.
2. Interior adhesives and sealants applied on site, including flooring adhesives.
3. Other products when specifically stated in the specifications.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:

1. Concrete.
2. Clay brick.
3. Metals that are plated, anodized, or powder-coated.
4. Glass.
5. Ceramics.
6. Solid wood flooring that is unfinished and untreated.

1.3 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

C. BIFMA e3 - Furniture Sustainability Standard; Business and Institutional Furniture Manufacturers Association.

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D. BIFMA M7.1 - Standard Test Method for Determining VOC Emissions from Office Furniture Systems, Components, and Seating.

E. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers.

F. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; California Air Resources Board.

G. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board.

H. CHPS (HPPD) - High Performance Products Database.

I. CRI (GLP) - Green Label Plus Testing Program - Certified Products.

J. GreenSeal GS-36 - Adhesives for Commercial Use.

K. SCAQMD 1113 - Architectural Coatings.

L. SCAQMD 1168 - Adhesive and Sealant Applications.

M. SCS (CPD) - SCS Certified Products.

N. UL (GGG) - GREENGUARD Gold Certified Products.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

C. Sustainable Design Reporting: Submit evidence of compliance.

D. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of installer's products, or 2) that such products used comply with these requirements.

1.5 QUALITY ASSURANCE

A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.

1. Wet-Applied Products: State amount applied in mass per surface area.
2. Paints and Coatings: Test tinted products, not just tinting bases.
3. Evidence of Compliance: Acceptable types of evidence are the following;

    a. Current UL (GGG) certification.
    b. Current SCS (CPD) Floorscore certification.
    c. Current SCS (CPD) Indoor Advantage Gold certification.
    d. Current listing in CHPS (HPPD) as a low-emitting product.
    e. Current CRI (GLP) certification.
    f. Test report showing compliance and stating exposure scenario used.

4. Product data submittal showing VOC content is NOT acceptable evidence.
5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.

B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.

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1. Evidence of Compliance: Acceptable types of evidence are:

    a. Report of laboratory testing performed in accordance with requirements.
    b. Certification by manufacturer that product complies with requirements.

C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.

1. Evidence of Compliance: Acceptable types of evidence are:

    a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scscertified.com.
    b. Report of laboratory testing performed in accordance with requirements.
    c. Published product data showing compliance with requirements.
    d. Certification by manufacturer that product complies with requirements.

D. Furnishings Emissions Standard and Test Method: BIFMA e3 Sections 7.6.1 and 7.6.2, tested in accordance with BIFMA M7.1.

1. Evidence of Compliance:

    a. Test report showing compliance and stating exposure scenario used.

E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:

1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
2. Furnishings: Comply with Furnishings Emissions Standard and Test Method.
3. Inherently Non-Emitting Materials.

C. VOC-Content-Restricted Products: VOC content not greater than required by the following:

1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
2. Aerosol Adhesives: GreenSeal GS-36.
3. Joint Sealants: SCAQMD 1168 Rule.
4. Paints and Coatings: Each color; most stringent of the following:

    a. 40 CFR 59, Subpart D.
    b. SCAQMD 1113 Rule.
    c. CARB (SCM).

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION 01 61 16

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SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition **[, except removal, disposal, and/or remediation of hazardous materials and toxic substances][, [ ]][or None – N/A]**.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Starting of systems and equipment.

H. Demonstration and instruction of Owner personnel.

I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

J. General requirements for maintenance service.

1.2 RELATED REQUIREMENTS

A. Section 01 10 00 – Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures **[, Electronic document submittal service][, [ ]][or None - N/A].**

C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

D. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.

E. Section 01 50 00 - Temporary Facilities and Controls: Temporary interior partitions.

F. Section 01 51 00 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

G. Section 01 57 13 - Temporary Erosion and Sediment Control: Additional erosion and sedimentation control requirements.

H. Section 01 71 23 - Field Engineering: Additional requirements for field engineering and surveying work.

I. Section 01 74 19 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

J. Section 4600 - 4600: Materials for protection of installed work.

K. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties[, and bonds][or None - N/A].

L. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

M. Section 01 91 13 - General Commissioning Requirements: Contractor's responsibilities in regard to commissioning.

N. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof][site utility demolition.

O. Section 02 84 00 - Polychlorinate Biphenyl (PCB) Remediation: Removal of equipment containing substances regulated under the Federal Toxic Substances Control Act (TSCA), including but not limited to PCB- and mercury-containing equipment.

P. Section 07 84 00 - Firestopping.

Q. Individual Product Specification Sections:

1. Advance notification to other sections of openings required in work of those sections.
2. Limitations on cutting **[structural][or [ ]]** members.

1.3 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of **[Surveyor][Engineer][or [ ]]** before starting survey work.

1. On request, submit documentation verifying accuracy of survey work.
2. Submit a copy of **[site drawing][certificate][and [ ]]** signed by the **[Land Surveyor][Engineer][or [ ]]**, that the elevations and locations of the work are in compliance with Contract Documents.
3. Submit surveys and survey logs for the project record.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.

1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
2. Identify demolition firm and submit qualifications.
3. Include a summary of safety procedures.

D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate Contractor.
6. Include in request:

a. Identification of Project.
b. Location and description of affected work.
c. Necessity for cutting or alteration.
d. Description of proposed work and products to be used.
e. Alternatives to cutting and patching.
f. Effect on work of Owner or separate Contractor.
g. Written permission of affected separate Contractor.
h. Date and time work will be executed.

E. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.5 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.

1. Minimum of [ ] years of [documented][or None - N/A] experience.

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B. For surveying work, employ a **[land surveyor][professional engineer][or [ ]]** registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities.

C. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

D. For design of temporary shoring and bracing, employ a **[Professional Engineer][Professional Structural Engineer][Professional Civil Engineer][or [ ]]** experienced in design of this type of work and licensed in the State in which the Project is located.

1.6 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. **[Provide water barriers as required to protect site from soil erosion.][Provide water barriers as required to protect site from [ ].][or None - N/A]**

D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

1. Minimize amount of bare soil exposed at one time.
2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

I. At All Times: Excessively noisy tools and operations will not be tolerated **[inside the building][outside the building][on site anywhere][or [ ]]** at any time of day; excessively noisy includes **[jackhammers][pile drivers][pneumatic hammers][air- operated nail guns][diesel engines][and [ ]]**.

1. Outdoors: Limit conduct of **[especially noisy][ ][or None – N/A]** exterior work to **[the hours of 8 am to 5 pm][8 am to 5 pm][or [ ]]**.
2. Indoors: Limit conduct of **[especially noisy][[ ]][or None – N/A]** interior work to **[the hours of 6 pm to 7 am][8 am to 5 pm][or [ ]]**.

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J. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

K. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

L. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.7 COORDINATION

A. See Section 01 10 00 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements **[, with provisions for accommodating items installed later][or None – N/A].**

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas **[except as otherwise indicated][or None – N/A],** conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

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D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of examination, preparation and installation procedures.
2. Review coordination with related work.
3. **Review conflicts and compatibility issues.**
4. **Review environmental limitations and protection.**
5. **Examine substrates.**
6. **Review requirements of the following:**

    a. **Contract Documents.**
    b. **Options.**
    c. **Related Change Orders.**
    d. **Submittals.**
    e. **Mockups.**
    f. **Testing and inspection.**

E. Record minutes and distribute copies within **[two][or [ ]]** days after meeting to participants, with **[two][or [ ]]** copies to Architect, Owner, participants, and those affected by decisions made.

3.4 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Owner will locate and protect survey control and reference points.

D. Contractor shall locate and protect survey control and reference points.

E. Control datum for survey is that established by Owner provided survey.

F. Control datum for survey is that indicated on drawings.

G. Control datum for survey is [ ].

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H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

I. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

K. Utilize recognized engineering survey practices.

L. Establish a minimum of **[two][or [ ]]** permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

M. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations **[ ][and [ ]][or None – N/A].**
2. Grid or axis for structures.
3. Building foundation, column locations, ground floor elevations **[, and [ ]][or None – N/A].**

N. Periodically verify layouts by same means.

O. Maintain a complete and accurate log of control and survey work as it progresses.

P. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction **[and site work][or None - N/A]**.

3.5 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.6 ALTERATIONS

A. Drawings showing existing construction and utilities are based on **[casual field observation and existing record documents only][casual field observation only][existing record documents only][or [ ]].**

1. Verify that construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.

1. Provide, erect, and maintain temporary dustproof partitions of construction **[specified in Section 01 50 00][indicated on drawings][or [ ]][in locations indicated on drawings][[ ]][or None – N/A]**.
2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.

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C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.

1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
2. Remove items indicated on drawings.
3. Relocate items indicated on drawings.
4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to **[HVAC][Plumbing][Fire Protection][Electrical][Telecommunications][and [ ]]):** Remove, relocate, and extend existing systems to accommodate new construction.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

    a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    b. See Section 01 10 00 for other limitations on outages and required notifications.
    c. Provide temporary connections as required to maintain existing systems in service.

4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.

1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. **Patch as specified for patching new work.**

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

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3. Where a change of plane of **[1/4 inch][or [ ] inch]** or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
4. Where a change of plane of **[1/4 inch][or [ ] inch]** or more occurs in existing work, [ ].
5. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:

1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
3. **Patch as specified for patching new work.**

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.7 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:

1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. **Execute cutting and patching [including excavation and fill][or None – N/A] to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing [when requested][or None – N/A], to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.**

E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. [In existing work, minimize damage and restore to original condition.][In existing work, minimize damage and restore to specified condition.][or None – N/A]

F. Employ [original][skilled and experienced][or [ ]] installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

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H. Restore work with new products in accordance with requirements of Contract Documents.

I. Fit work [air tight][or [ ]] to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with [fire rated][fire resistant][or [ ]] material [in accordance with Section 07 84 00][in accordance with Section [ ]][or None – N/A], to full thickness of the penetrated element.

K. Patching:

1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

L. **Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.**

M. Make neat transitions. Patch work to match adjacent work in texture and appearance. [Where new work abuts or aligns with existing, perform a smooth and even transition.][or None – N/A].

3.8 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site **[periodically][weekly][[ ]][or daily]** and dispose off-site; do not burn or bury.

3.9 PROTECTION OF INSTALLED WORK

A. See Section 01 76 10 for temporary protective covering materials.

B. Protect installed work from damage by construction operations.

C. Provide special protection where specified in individual specification sections.

D. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

E. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

F. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

G. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.

H. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

I. Prohibit traffic from landscaped areas.

J. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate with requirements of Section 01 91 13 - General Commissioning Requirements **[, and][or None - N/A][ ]**.

B. Coordinate schedule for start-up of various equipment and systems.

C. Notify Architect **[and Owner][or None - N/A][seven][or [ ]]** days prior to start-up of each item.

D. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

E. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

F. Verify that wiring and support components for equipment are complete and tested.

G. Execute start-up under supervision of applicable Contractor personnel **[and manufacturer's representative][or None – N/A]** in accordance with manufacturers' instructions.

H. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

I. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. See Section 01 79 00 - Demonstration and Training.

B. Demonstrate operation and maintenance of products to Owner's personnel **[two weeks][or [ ]]** prior to date of **[Substantial Completion][final inspection][or [ ]].**

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at **[scheduled time][agreed time][or [ ]]**, at **[equipment][designated][or [ ]]** location.

D. For equipment or systems requiring seasonal operation, perform demonstration for other season within **[six][or [ ]]** months.

E. Provide a qualified **[person][manufacturer's representative][or [ ]]** who is knowledgeable about the Project to perform demonstration **[and instruction of personnel][or None – N/A]**.

F. Perform instruction in a classroom environment located at [ ].

G. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

H. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

I. The amount of time required for instruction on each item of equipment and system is that specified in individual sections

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Section 23 05 93 Testing, Adjusting, and Balancing for HVAC.

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3.13 FINAL CLEANING

A. Owner will provide comprehensive cleaning after final acceptance.

B. Execute final cleaning **[prior to final project assessment][prior to Substantial Completion][after Substantial Completion but before making final application for payment][or None - N/A]**.

1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

C. **Employ experienced workers or professional cleaners for final cleaning; clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program.**

D. Use cleaning materials that are nonhazardous.

E. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, **[vacuum carpeted and soft surfaces.][or None - N/A]**.

F. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

G. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

H. **[Clean][Replace][or [ ]]** filters of operating equipment.

I. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems and **[ ]**.

J. Clean site; sweep paved areas, rake clean landscaped surfaces.

K. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

L. Clean Owner-occupied areas of work.

M. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

N. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

O. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

P. Remove tools, construction equipment, machinery, and surplus material from Project site.

Q. Remove snow and ice to provide safe access to building.

R. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

S. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

T. Sweep concrete floors broom clean in unoccupied spaces.

U. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

V. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped

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or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

W. Remove labels that are not permanent.

X. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1. **Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.**
2. Revise seven subparagraphs below to suit Project. Check for conflict or duplication with provisions in other Sections, particularly Divisions 20 through 29.

Y. **Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.**

Z. Replace parts subject to unusual operating conditions.

AA. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

BB. Clean exposed surfaces of diffusers, registers, and grills.

CC. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

DD. Leave Project clean and ready for occupancy.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide copies to Architect.
2. Provide copies to Owner.
3. Provide copies to Architect and Owner.

B. Accompany **[Project Coordinator][or [ ]]** on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's **[Notice of Substantial Completion][comprehensive list of items to be completed or corrected][or [ ]]**.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Owner will occupy **[all][portions][or [ ]]** of the building as specified in Section 01 10 00.

F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

H. Accompany **[Project Coordinator][or [ ]]** on Contractor's preliminary final inspection.

I. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

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J. Complete items of work determined by Architect listed in executed **[Certificate][Certificates][or [ ]]** of Substantial Completion.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than **[one year][[ ] years][or [ ]]** from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner

END OF SECTION 01 70 00

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SECTION 01 71 23 - FIELD ENGINEERING

PART 1 - GENERAL

1.1 SUMMARY

A. Field engineering services by Contractor.

B. Land surveying services by Contractor.

1.2 DESCRIPTION OF SERVICES

A. Specific services listed in this section are in addition to, and do not supersede, general Execution and Closeout Requirements.

B. Sole responsibility for establishing all locations, dimensions and levels of items of work.

C. Sole responsibility for provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure elevation stakes, and other items.

D. Keeping a transit, theodolite, or TST (total station theodolite with electronic distance measurement device); leveling instrument; and related implements such as survey rods and other measurement devices, at the project site at all times.

E. Provision of facilities and assistance necessary for Architect to check lines and grade points placed by Contractor.

1. Performance of excavation or embankment work until after all cross-sectioning necessary for determining payment quantities for Unit Price work have been completed and accepted by Architect.

F. Preparation and maintenance of daily reports of activity on the work. Submission of reports containing key progress indicators and job conditions to Architect.

1. Major equipment and materials installed as part of the work.
2. Location of areas in which construction was performed.
3. Work performed, including field quality control measures and testing.
4. Weather conditions.
5. Instructions received from Architect or Owner, if any.

G. Preparation and maintenance of professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the work.

H. Prior to backfilling operations, surveying - locating, and recording on a copy of Contract Documents - an accurate representation of buried work and Underground Facilities encountered.

1.3 REFERENCE STANDARDS

A. FGDC-STD-007.1 - Geospatial Positioning Accuracy Standards - Part 1: Reporting Methodology.

B. FGDC-STD-007.2 - Geospatial Positioning Accuracy Standards - Part 2: Standards for Geodetic Networks.

C. FGDC-STD-007.4 - Geospatial Positioning Accuracy Standards - Part 4: Architecture, Engineering, Construction, and Facilities Measurement.

D. State Plane Coordinate System for the jurisdiction where project is located.

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1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Submit in addition to items required in Section 01 70 00 - Execution and Closeout Requirements.

C. Informational Submittals: Submit the following:

1. Field Engineering: Submit daily reports, with content as indicated in this section.
2. Final property survey.

1.6 QUALITY ASSURANCE

A. Field Engineer's Qualifications: As established in Section 01 70 00 - Execution and Closeout Requirements.

B. Land Surveyor's Qualifications: As established in Section 01 70 00 - Execution and Closeout Requirements.

C. Use adequate number of skilled and thoroughly-trained workers to perform the work of this section in a timely and comprehensive manner.

D. Minimum accuracy for required work is as follows:

1. Grade: Horizontal Tolerance: Plus or minus 0.5 feet, Vertical Tolerance: Plus or minus 0.05 feet.
2. Culverts and ditches: Horizontal Tolerance: Plus or minus 0.5 feet, Vertical Tolerance: Plus or minus 0.05 feet.
3. Structures: Horizontal Tolerance: Plus or minus 0.5 feet (location), Vertical Tolerance: Plus or minus 0.05 feet.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. Notify Owner’s Representative and Architect of any discrepancies immediately in writing before proceeding to lay out the work. Locate and protect existing benchmarks and base line. Preserve permanent reference points during construction.

B. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify existing conditions.

3.2 FIELD ENGINEERING

A. Maintain field office files, drawings, specifications, and record documents.

B. Coordinate field engineering services with Contractor's subcontractors, installers, and suppliers as appropriate.

C. Prepare layout and coordination drawings for construction operations.

D. Check and coordinate the work for conflicts and interferences, and immediately advise Architect and Owner of all discrepancies of which Contractor is aware.

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E. Cooperate as required with Architect and Owner in observing the work and performing field inspections.

F. Review and coordinate work on a regular basis with shop drawings and Contractor's other submittals.

G. Check the location, line and grade of every major element as the work progresses. Notify the Architect when deviations from required lines or grades exceed allowable tolerances. Include in such notifications a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Do not proceed with remedial work without Owner's concurrence of the remediation plan.

H. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment for compliance with shop drawings and Contract Documents requirements.

I. Check all bracing and shoring for structural integrity and compliance with designs prepared by the Contractor.

3.3 LAND SURVEYING

A. General: Follow standards for geospatial positioning accuracy.

1. FGDC-STD-007.1 as amended by Authority Having Jurisdiction.
2. FGDC-STD-007.2 as amended by Authority Having Jurisdiction.
3. FGDC-STD-007.4 as amended by Authority Having Jurisdiction.

B. Coordinate survey data with the State Plane Coordinate System of the jurisdiction where project is located.

C. Contractor is responsible for the restoration of all property corners and control monuments damaged or destroyed by construction-related activities. Any disturbed monuments must be replaced at Contractor's expense by a surveyor licensed in the jurisdiction where project is located, and approved by the Architect.

1. Temporarily suspend work at such points and for such reasonable times as the Owner may require for resetting monuments. The Contractor will not be entitled to any additional compensation or extension of time.

3.4 CONSTRUCTION SURVEYING

A. General: Perform surveying as applicable to specific items necessary for proper execution of work.

1. Alignment Staking: Provide alignment stakes at 50 foot intervals on tangent, and at 25 foot intervals on curves.
2. Slope Staking: Provide slope staking at 50 foot intervals on tangent, and at 25 foot intervals on curves. Re-stake at every ten-foot difference in elevation.
3. Structure: Stake out structures, including elevations, and check prior to and during construction.
4. Pipelines: Stake out pipelines including elevations, and check prior to and during construction.
5. Site Utilities: Stake out utility lines including elevations, and check prior to and during construction.
6. Cross-sections: Provide original, intermediate, and final staking as required, for site work and other locations as necessary for quantity surveys.
7. Easement Staking: Provide easement staking at 50 foot intervals on tangent, and at 25 foot intervals on curves. If required by project conditions, provide wooden laths with flagging at 100 foot intervals.
8. Record Staking: Provide permanent stake at each blind flange and each utility cap is provided for future connections. Use stakes for record staking of material(s) acceptable to Architect.

9. Structural Frame: Upon completion, certify location and plumbness.

B. Record Log: Maintain a log of layout control work. Record any deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used.

C. Accuracy:

1. Establish Contractor's temporary survey references points for Contractor's use to at least second-order accuracy (e.g., 1:10000). Set construction staking used as a guide for the work to at least third-order accuracy (e.g., 1:5000). Provide the absolute margin for error specified below on the basis established by such orders.

a. Horizontal accuracy of easement staking: Plus or minus 0.1 feet.
b. Accuracy of other staking shall be plus or minus 0.04 feet horizontally and plus or minus 0.02 feet vertically.
c. Include an error analysis sufficient to demonstrate required accuracy in survey calculations.

2. Owner reserves the right to check the Contractor's survey, measurements, and calculations. The requirement for accuracy will not be waived, whether this right is exercised or not.

3.5 SUPPORT AND BRACING

A. General requirements: Design all support and bracing systems, if required. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design systems to not overstress the building structure.

3.6 REPORTS

A. Submit two copies of Contractor's daily reports electronically by 9:00 AM the next working day after the day covered in the associated report. Daily report shall be signed by responsible member of Contractor's staff, such as project manager or superintendent, or foreman designated by Contractor as having authority to sign daily reports.

3.7 RECORDS

A. Maintain at the Site a complete and accurate log of control and survey work as it progresses.

1. Organize and record survey data in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the jurisdiction where project is located. Record Contractor's surveyor's original field notes, computations, and other surveying data in Contractor-furnished hard-bound field books. Contractor is solely responsible for completeness and accuracy of survey work, and completeness and accuracy of survey records, including field books. Survey records,(including field books) may be rejected by Owner due to failure to organize and maintain survey records in a manner that allows reasonable and independent verification of calculations, and/or allows identification of elevations, dimensions, and grades of the work.
2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Architect.

B. Closeout Submittal: Submit three copies of final property survey to Owner. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey. Include the following information:

1. Structure locations from property lines, and distances to adjacent buildings.

2. Dimensions and locations of drives, walks, walls, underground utilities, appurtenances and major site features.
3. Location of easements.
4. Final grading topographic survey.

3.8 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

END OF SECTION 01 71 23

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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Owner may decide to pay for additional recycling, salvage, and/or reuse based on Landfill Alternatives Proposal specified below.

E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:

1. Aluminum and plastic beverage containers.
2. Corrugated cardboard.
3. Wood pallets.
4. Clean dimensional wood: May be used as blocking or furring .
5. Land clearing debris, including brush, branches, logs, and stumps; see Section 31 10 00 - Site Clearing for use options.
6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill .
7. Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill **.**
8. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill .
9. Precast concrete panels: May be used for erosion control or landscape features .
10. Asphalt paving: May be recycled into paving for project .
11. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
12. Glass.
13. Gypsum drywall and plaster.
14. Plastic buckets.
15. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed **:** DuPont (http://flooring.dupont.com) and Interface (www.interfaceinc.com) conduct reclamation programs.
16. Asphalt roofing shingles.
17. Paint.
18. Plastic sheeting.
19. Rigid foam insulation.
20. Vinyl siding.
21. Windows, doors, and door hardware.
22. Plumbing fixtures.
23. Mechanical and electrical equipment.
24. Fluorescent lamps (light bulbs).
25. Acoustical ceiling tile and panels.

F. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

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G. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

H. The following sources may be useful in developing the Waste Management Plan:

1. "Builders' Guide to Reuse & Recycling: A Directory for Construction and Demolition Materials in the Metropolitan Washington Region": www.mwcog.org/buidersrecyclingguide/
2. "MACREDO: Mid-Atlantic Consortium of Recycling and Economic Development Officials" provides a recycling markets and sources directory for the Mid-Atlantic States; website: http://macredo.libertynet.org/index.html
3. Habitat Restore of Northern Virginia, for construction materials reuse, 7770 Richmond
4. Highway, Alexandria, VA 22306, (703) 360-6700, http://www.restorenova.org.
5. “Used Building Materials Association (UBMA)” www.ubma.org.

I. Methods of trash/waste disposal that are not acceptable are:

1. Burning on the project site.
2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.
5. Incineration, either on- or off-site.

J. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.2 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Sustainable Design Submittals: Submit Waste Management Plan in accordance with procedures specified in Section 01 81 13 Sustainable Design Requirements – Green Communities.

C. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid**,** or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.

1. Submit to Architect for Owner's review and approval.
2. If Owner wishes to implement any cost alternatives, the Contract Sum will be adjusted as specified elsewhere.
3. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
4. Describe as many alternatives to landfilling as possible:

    a. List each material proposed to be salvaged, reused, or recycled.
    b. List the proposed local market for each material.
    c. State the estimated net cost resulting from each alternative, after subtracting revenue from sale of recycled or salvaged materials and landfill tipping fees saved due to diversion of materials from the landfill.

5.

D. Once Owner has determined which of the landfill alternatives addressed in the Proposal above are acceptable, prepare and submit Waste Management Plan; submit within 10 calendar days after notification by Architect.

E. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid**,** or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.

F. Waste Management Plan: Include the following information:

1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.

    a. List each material proposed to be salvaged, reused, or recycled.
    b. List the local market for each material.
    c. State the estimated net cost, versus landfill disposal

4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by

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designated facilities; include separation procedures for recyclables, storage, and packaging.

6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
7. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.

G. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
2. Submit Report on a form acceptable to Owner.
3. Landfill Disposal: Include the following information:

   a. Identification of material.
   b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
   c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

4. Recycled and Salvaged Materials: Include the following information for each:

   a. Identification of material, including those retrieved by installer for use on other projects.
   b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
   c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

5. Material Reused on Project: Include the following information for each:

   a. Identification of material and how it was used in the project.
   b. Amount, in tons or cubic yards.
   c. Include weight tickets as evidence of quantity.

6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

H. Final Waste Management Documentation: Submit at completion of Substantial Completion and prior to contract closeout:

1. All information required in Monthly Report Submittals.
2. Legible copies of on-site logs, manifests, weight tickets, and receipts.

   a.

PART 2 - PRODUCTS

2.1 PRODUCT SUBSTITUTIONS

A. See Section 01 60 00 - Product Requirements for substitution submission procedures.

B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00:

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1. Relative amount of waste produced, compared to specified product.
2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.
3. Proposed disposal method for waste product.
4. Markets for recycled waste product.

PART 3 - EXECUTION

3.1 WASTE MANAGEMENT PROCEDURES

A. See Section 01 10 00 for list of items to be salvaged from the existing building for relocation in project or for Owner.

B. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.

1. Prebid meeting.
2. Preconstruction meeting.
3. Regular job-site meetings.
4. Job safety meetings.

E. Records: Maintain onsite logs for each load of materials removed from site:

1. Landfill Log: Include type of material, load (by weight or volume), recycling/hauling service, date accepted by landfill, and facility fee.
2. Waste Diversion: Include type of material, load (by weight or volume), recycling/hauling service, date accepted by recycling service, or non-profit receiver and facility fee.
3. Where comingling occurs prior to collection, track the amount of construction waste diverted from landfill based on the weight or volume of the removed co-mingled waste and provide the documentation of percentages of recycled from the sorting facility.

F. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. Provide containers as required.
2. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
3. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
4. Locate enclosures out of the way of construction traffic.
5. Provide adequate space for pick-up and delivery and convenience to subcontractors.
6. If an enclosed area is not provided, clearly lay out and label a specific area on-site.

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7. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
8. Provide bi-lingual signage.

G. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

H. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

1. Coordinate work of recycling, composting and salvaging waste haulers with other trades.
2. Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

I. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

J. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 01 74 19

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SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."

2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Page number.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 01 77 00

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SECTION 01 77 01 - PUNCH LIST

PART 1 - GENERAL

1.1 The PUNCH LIST form is attached after this section for the Contractor's use.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

Advancement of Construction Technology

PUNCH LIST

Project: _____ From (A/E): _____

_____ Site Visit Date: ___

To (Contractor): _____ A/E Project Number: _____

_____ Contract For: _____

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check

☐ Attachments

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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September 1996
CSI Form 14.1A

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SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 - PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.2 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment. All Documents shall submitted as noted below as well as in electronic PDF Format on CD's, DVD's or Thumb Drives. Provide four (4) electronic copies minimum.

B. Operation and Maintenance Data:

1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
4. Submit four (4) sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

D. Electronic Format Submission:

1. All of the above documents shall be submitted in electronic format (PDF). Provide four (4) complete sets using one of the following:

a. Compact Disc (CD)
b. Digital Versatile Disc (DVD)
c. Thumb Drive (USB Drive)

PART 2 - PART 2 PRODUCTS - Not Used

PART 3 - PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS - PROVIDE FOUR (4) COPIES IN ELECTRONIC PDF FORMAT ON CD, DVD OR THUMB DRIVE IN ADDITION TO HARD COPIES AS LISTED HEREIN.

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

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1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawingsand Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:

1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.

4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

K. Lamp Submittal: Include data on all lamps labeled according to fixture type; this data shall include:

1. Manufacturer.
2. Lamp designation (ex. PAR38, M16, T5HO).
3. Manufacturer's catalog number.
4. Wattage.
5. Color temperature.
6. CRI.
7. Beam spread.
8. Initial lumens.
9. Catalog spec sheet for each fixture type.

L. Additional Requirements: As specified in individual product specification sections.

3.5 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

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H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

    a. Significant design criteria.
    b. List of equipment.
    c. Parts list for each component.
    d. Operating instructions.
    e. Maintenance instructions for equipment and systems.
    f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:

    a. Shop drawings and product data.

N. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

O. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect , Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.6 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

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G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

PART 4 - END OF SECTION

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SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:

1. All software-operated systems.
2. HVAC systems and equipment.
3. Plumbing equipment.
4. Electrical systems and equipment.
5. Security and audio visual systems.
6. Conveying systems.
7. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:

1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
2. Finishes, including flooring, wall finishes, ceiling finishes.
3. Fixtures and fittings.
4. Items specified in individual product Sections.

1.2 SUBMITTALS

A. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.

1. Format: DVD Disc.
2. Label each disc and container with session identification and date.

1.3 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.

1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

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D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.

1. Perform demonstrations not less than two weeks prior to Substantial Completion.
2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.

1. Perform demonstrations not less than two weeks prior to Substantial Completion.

F. Coordinate demonstration and training requirements with commissioning requirements.

END OF SECTION 01 79 00

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SECTION 01 80 04 - PERFORMANCE REQUIREMENTS - DOE INDOOR AIRPLUS

PART 1 - GENERAL

1.1 The project shall meet the requirements of DOEIndoor AirPlus. Indoor AirPlus is a requirement of ZERH, now Efficient New Homes (ENH)

A. The Indoor AirPlus Verification Checklist is attached to this section for reference.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

Indoor airPLUS Version 1 (Rev. 04) Verification Checklist

Home Address:	City:	State:	Zip:
Climate Zone (1-6):	Radon Zone (1-3):		

Section		Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must Correct	Builder Verified	Rater Verified	N/A
ENERGY STAR V3		***Note:*** **The Rev. 04 checklist reflects only the additional Indoor airPLUS requirements and their corresponding section numbers that must be met after completing the ENERGY STAR requirements. ENERGY STAR remains a prerequisite for Indoor airPLUS qualification.**				
		ENERGY STAR Version 3 (or 3.1, 3.2) Program Requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.	☐		☐	
Moisture Control	1.1	Drain or sump pump installed in basements and crawlspaces. In EPA Radon Zone 1, check valve also installed.	☐	☐	☐	☐
		Exception Applied: ☐ Slab-on-grade foundation ☐ Free-draining soils				
	1.2	Layer of aggregate or sand (4 in.) with geotextile matting installed below slabs AND radon techniques used in EPA Radon Zone 1.	☐	☐	☐	☐
		Exception Applied: ☐ Slab-on-grade foundation ☐ Free-draining soils ☐ Dry climate				
	1.4	Basements/crawlspaces insulated, sealed and conditioned.	☐	☐	☐	☐
		Exception Applied: ☐ 100-year flood zone ☐ Marine climate ☐ Dry climate ☐ Crawlspace sealed with capillary break and active dehumidification ☐ Raised pier foundation with no walls				
	1.7	Protection from water splash damage if no gutters.	☐	☐	☐	☐
		Exception Applied: ☐ Rainwater harvesting system ☐ Dry climates				
	1.11	Supply piping in exterior walls insulated with pipe wrap.	☐	☐	☐	☐
		Exception Applied: ☐ Dry climate AND climate zone 1-3 ☐ Air barrier insulation in wall cavity				
	1.14	Hard-surface flooring in kitchens, baths, entry, laundry, and utility rooms.	☐	☐	☐	
Radon	2.1	Radon-resistant features installed in Radon Zone 1 homes in accordance with Construction Specification 2.1.	☐	☐	☐	☐
		Exception Applied: ☐ Perimeter pipe loop in lieu of full aggregate (dry climate) ☐ Manufactured home with raised pier foundation				
Pests	3.2	Corrosion-proof rodent/bird screens installed at all openings that cannot be fully sealed. (Not required for clothes dryer vents.)	☐	☐	☐	
HVAC Systems	4.1	Equipment selected to keep relative humidity < 60% in "Warm-Humid" climates.	☐		☐	☐
		Exception Applied: ☐ Climate zones 4-8, 3B, 3C and portions of 3A and 2B				
	4.2	Duct systems protected from construction debris AND no building cavities used as air supplies or returns.	☐	☐	☐	
	4.3	No air-handling equipment or ductwork installed in garage.	☐		☐	
	4.6	Clothes dryers vented to the outdoors or plumbed to a drain according to manufacturer's instructions.	☐		☐	
	4.7	Central forced-air HVAC system(s) have minimum MERV 8 filter AND no ozone generators in home. Temporary filter installed to protect unit from construction dust.	☐	☐	☐	☐
Combustion Pollutants	5.1	Emissions standards met for fuel-burning and space-heating appliances.	☐		☐	☐
		Identify appliance type: ☐ Masonry heater ☐ Factory-built wood-burning fireplace ☐ Wood stove ☐ Pellet stove ☐ Natural gas/propane fireplace Appliance model name/number:_____				
	5.2	CO alarms installed in each sleeping zone (e.g., common hallway) according to NFPA 720.	☐		☐	☐
	5.3	Multifamily buildings: Smoking restrictions implemented AND ETS transfer pathways minimized.	☐	☐	☐	☐
	5.4	Attached garages: Door closer installed on all connecting doors.	☐		☐	☐
		Attached garages: In homes with exhaust-only whole-house ventilation EITHER ☐ 70 cfm exhaust fan installed in garage OR ☐ Pressure test conducted to verify the effectiveness of the garage-to-house air barrier.	☐		☐	☐

Materials	6.1	All composite wood products certified low-emission. See spec.	☐	☐	☐	
	6.2	Interior paints and finishes certified low-emission. See spec.	☐	☐	☐	
	6.3	Carpet, carpet adhesives, and carpet cushion certified low-emission. See spec.	☐	☐	☐	☐
Final	7.1	HVAC system and ductwork verified to be dry and clean AND new filter installed.	☐	☐	☐	
	7.2	Home ventilated before occupancy.	☐	☐	☐	
	7.3	Equipment manuals, Indoor airPLUS label, and certificate provided for owner/occupant.	☐	☐	☐	

Rater Company: _____	**Builder Company:** _____
Rater Employee: _____	**Builder Employee:** _____
Rater Signature: _____ **Date:** _____	**Builder Signature:** _____ **Date:** _____

Guidance for Completing the Indoor airPLUS Verification Checklist:

1. Only ENERGY STAR certified homes verified to comply with these specifications can earn the Indoor airPLUS label. See Indoor airPLUS Construction Specifications for full descriptions of the requirements, terms, exceptions, abbreviations, references and climate map used in this checklist. Verification is not complete until this checklist is completed in full and signed.

   Note: ENERGY STAR footnotes and exceptions will always be utilized unless otherwise noted in the Indoor airPLUS Construction Specifications. In some cases, Indoor airPLUS modifies or excludes certain ENERGY STAR exceptions or alternate pathways.

2. Check one box per line. Check "N/A" for specifications that do not apply for specific conditions (e.g., climate) according to the exceptions described in the Indoor airPLUS Construction Specifications. Check either "Builder Verified" or "Rater Verified" for all other items to indicate who verified each item. Items may be verified visually on site during construction, by reviewing photographs taken during construction, by checking documentation, or through equivalent methods as appropriate.

3. The Rater who conducted the verification, or a responsible party from the Rater's company, must sign the completed verification checklist. The builder must also sign the checklist if any items in the "Builder Verified" column are checked, and by so doing accepts full responsibility for verifying that those items meet Indoor airPLUS requirements.

4. The Rater shall retain the rating documentation, all required ENERGY STAR Certified Homes documentation, and the Indoor airPLUS Verification Checklist for the home for a minimum of 2 years from final verification. The Rater shall coordinate with the Provider and/or builder to provide an Indoor airPLUS label and certificate for each qualified home.

5. Raters who operate under a Sampling Provider are permitted to use a RESNET-approved sampling protocol for Indoor airPLUS homes located outside California, and a sampling protocol approved by the California Energy Commission for homes located in California, to verify any item designated "Rater Verified." For example, if the approved sampling protocol requires rating one in seven homes, then the checklist will be completed for the one home that was rated. Only Raters are permitted to use sampling. All items verified by the builder shall be verified for each qualified home or unit within a multifamily building. For example, if a Rater verifies 10 items on the Indoor airPLUS Checklist and the builder verifies the remaining checklist items, then an approved sampling protocol is permitted to be used only on the 10 Rater-verified items.

   However, the builder may provide the Rater with a single signed copy of the checklist for an entire building or group of units with builder-verified items under the condition that all units within the building or group utilize: 1) the same HVAC system type (i.e. ductless mini-split, forced air, hydronic); 2) the same combustion appliances and combustion pollutant controls; and 3) the same low-emission materials certification/standard for all products (within their respective categories) verified in Section 6 of the Indoor airPLUS Construction Specifications. If there are no builder-verified items, the Rater may also utilize one checklist per group of units if the above criteria are met. Groups of units with any of the following conditions will require a separate and unique checklist to be completed and signed by the Rater and builder:

   - Any units with differing HVAC system type (i.e., ductless mini-split, forced air, hydronic);
   - Any units with differing combustion appliance types (e.g., masonry heater, pellet stove, wood-burning fireplace) stove, factory-built, etc.) or combustion pollutant controls; or Any units/groups with low-emission materials or finishes addressed in Section 6 that are compliant based on different certifications/standards within their product category.
   - Exception: Builders and Raters may use a single checklist for units utilizing low-emission materials certified to different labels or standards, provided that documentation of the certifications for those materials are retained by the builder and available for inspection upon request.

For further information on the Indoor airPLUS program, visit www.epa.gov/indoorairplus

ENERGY STAR

All Indoor airPLUS qualified homes meet strict guidelines for energy efficiency set by ENERGY STAR, the nationally-recognized symbol for energy efficiency.

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SECTION 01 81 12 - VH 2025 MINIMUM DESIGN AND CONSTRUCTION REQUIREMENTS

PART 1 - GENERAL

1.1 The attached VH 2025 MINIMUM DESIGN AND CONSTRUCTION REQUIREMENTS is to be followed by the Contractor. Refer to drawings for full text for new construction projects.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

2025[1] Minimum Design and Construction Requirements

Requirements for All Developments

The following minimum requirements were created to address issues related to the design, construction, maintenance, marketing, life cycle costs and aesthetic concerns for developments utilizing low-income housing tax credits (LIHTC) and/or developments financed by the Virginia Housing Development Authority (Virginia Housing). Virginia Housing may require an expansion of the proposed scope of work for a project beyond those items specifically listed within the Minimum Design and Construction Requirements (MDCR) if it determines, in its sole discretion, that such expansion of scope is necessary after review of submitted plans and specifications for the project or examination of the existing conditions at the property. Any such required additions to the proposed scope of work shall be communicated to the developer by Virginia Housing in writing and shall be automatically incorporated into the MDCR herein by reference as it pertains to that specific project. For developments utilizing LIHTC, Virginia Housing will alert applicants to the additional required scope of work prior to allocating credits to the respective development. Architectural and Engineering (A&E) submission requirements for Virginia Housing loan and 4% LIHTC applications can be found at the end of the MDCR. Additional submission requirements for the LIHTC program can be found in the Virginia Housing Federal Housing Credit Manual. All developments utilizing LIHTC are subject to REAC Inspections utilizing the NSPIRE standard. The following MDCR do not account for all NSPIRE requirements. Developers are responsible for ensuring compliance with NSPIRE.

Drawings, specifications, scope of work, and installations must comply with the latest applicable issue of the *Virginia Uniform Statewide Building Code (USBC)*[2], *International Building Code (IBC)*[3], other applicable Virginia and national codes and standards, requirements of localities, prevailing design and construction practices and the *Minimum Design and Construction Requirements* of Virginia Housing. There may be only a single architect of record, and all work performed at the property must be managed and completed by a single prime Virginia-licensed Class A general contractor (GC) contracted by the developer. In no event may work be self-directed or self-performed by the developer unless the developer's construction arm is the contracted prime GC and Virginia Housing has approved, in writing, the developer's construction arm as the prime GC. Installation of materials, equipment, products, and building systems in both New Construction and Rehabilitation shall adhere to all manufacturers' requirements, specifications, and recommendations. All developments shall comply with applicable accessibility codes and standards, including but not limited to the USBC, the Fair Housing Act Design Requirements, and all accessibility commitments made through the LIHTC application process.

All additions and adaptive reuse shall comply with the Virginia Housing Minimum Design and Construction Requirements (MDCR) for ***New Construction***. Adaptive reuse may also be required to comply with the MDCR for ***Rehabilitation*** where Virginia Housing deems applicable.

Waiver requests for individual MDCR may be submitted to waiver@virginiahousing.com. Requests must document substantial infeasibility and propose alternate solutions to achieve the intent of the specific MDCR. See Virginia Housing Webpage for Waiver Request form and instructions.

[1] The 2025 Virginia Housing Minimum Design and Construction Requirements apply to Virginia Housing loans with a 2025 application date, as well as developments receiving Federal Low-Income Housing Tax Credit allocations for year 2025.

[2] (USBC 2021) *Virginia Uniform Statewide Building Code* (Latest applicable edition as referenced by the *USBC*).

[3] (IBC 2021) *International Building Code* (Latest applicable edition as referenced by the *IBC*).

Requirements for New Construction

SITE WORK

1. Finished floor elevations of buildings shall be a minimum of 8 inches higher than the adjoining finished grade. When achieving an 8-inch height separation is not feasible, due to accessibility requirements or other conditions, provide an alternate solution acceptable to Virginia Housing.

2. Grade around buildings to achieve a minimum 5% slope away from foundation walls for a minimum distance of 10 feet, per IBC. Install yard drains, storm inlets, or drainage pipes under concrete walks to drain properly if the space between foundation walls and concrete walks is less than 10 feet. Drainage systems shall be designed to avoid water flowing over sidewalks. Provide an alternate drainage solution acceptable to Virginia Housing:
   a. When buildings are closer than 10 feet to concrete walks.
   b. When a minimum 5% slope is not feasible.
   c. At entrances and accessible routes, when applicable.

3. Install seamless gutters, downspouts, and splash blocks, or an internal drainage system for all buildings. When discharging on grades steeper than 20%, or less than 1%, water from gutters and downspouts shall be piped underground to a storm sewer system, or to daylight at grades that will avoid soil erosion. Avoid water drainage over sidewalks.

4. Paving designs shall be based upon the geotechnical report, California Bearing Ratio (CBR) of the soil, traffic count, and loading. All drive lanes of parking lots shall be designed for dumpster trucks. Parking bays may have lighter paving than the drive lanes of parking lots.

5. Extend concrete dumpster pads at least 12 feet into the asphalt so that the load bearing wheels of trucks rest on concrete while servicing the dumpsters.
   a. Thickness of concrete shall be a minimum of 6 inches with reinforcement.
   b. Dumpsters and/or compactors accessed via an accessible route shall meet accessibility requirements.
   c. Install a privacy screen on at least three sides of all dumpster and/or compactor pads.
   d. Install concrete filled steel bollards behind dumpster locations to protect enclosure.

6. Minimum width of sidewalks shall be 3 feet. Sidewalks that are located perpendicular to parking spaces shall be a minimum of 5 feet wide excluding curb or 3 feet wide with 2 feet of space between the sidewalks and curbs. Provide gravel and sand base under walks when required by the geotechnical report. Provide control and expansion joints.

7. All crosswalks and accessible routes within parking areas and across drive lanes shall be striped.

8. Provide foundation plantings in the front of all buildings and at building entrances. All plantings must be shown on landscape drawings illustrating size at full maturity. Show dimension of tree locations from trunks/calipers to buildings. Portions of tree branches when fully mature shall not overhang roofs, contact building faces, or obstruct site lighting. Field verify planting locations match initial design.

9. Grade to avoid standing water. Provide a smoothly graded transition from disturbed to undisturbed areas. Finish grade with clean topsoil. Seed and straw, and/or landscape all bare and disturbed areas. Provide ground cover materials or sod for slopes steeper than 20%. Clean site and dispose of all construction debris. Grass shall be established prior to project closeout.

ARCHITECTURAL

1. Roofing
   a. Roof sheathing thickness shall be a minimum of 15/32 inch-thick plywood or 15/32 inch OSB. Install sheathing with clips. ZIP System roof sheathing or similar products are not accepted.
   b. Install drip edge on all sides of the roof.
   c. Install ice barrier extending from eave's edge to a point 24 inches beyond the exterior wall cladding.
   d. Roof shingles shall be a minimum 25-year, anti-fungal product, and shall be nailed (not stapled).
   e. Flat roofs shall have a minimum 20-year manufacturer's warranty for the entire roof system.
   f. Provide minimum 24-inch-wide walk pads from roof access point to serviceable side of all rooftop equipment.

2. Provide permanent access to all flat roofs. Access shall be located in an interior common area. Utilize direct walk out access from stairwell when feasible, otherwise provide a minimum 30-inch-wide premanufactured roof hatch with hold open device and permanent ladder.
   EXCEPTION: Secondary roof levels within one story of the primary roof access may utilize fixed ladders from the primary roof.

3. Provide roofs/overhangs over exterior entrance doors to all units and buildings that are accessed by residents or visitors. Provide a minimum 30 inches of overhang along the front and 12 inches along each side of the door; or the door may be setback a minimum of 24 inches from the face of the exterior wall.

4. Stairs to apartment units where stair halls are not enclosed shall be protected from weather by design features, such as, setting back stairs a minimum 5 feet from the exterior wall and/or installing a roof overhang at the second floor level, projecting a minimum of 5 feet beyond the first riser.

5. Crawl spaces to be free of debris and water. Provide a minimum 6 mil vapor barrier at floor with seams overlapped 12 inches. Edges and seams to be taped.

6. Provide passive or active radon mitigation system for buildings in EPA Radon Zone 1 or 2. See ANSI/AARST multifamily mitigation standard for guidance.

7. Install waterproofing on exterior walls up to finished grade where finished floors are below adjoining finished grades. Provide a 10-year material/manufacturer's warranty.

8. Install weep holes in brick veneer at foundation walls, over lintels, and relief angles.
   a. Weep holes at foundation walls shall be a minimum 6 inches above finished grade or 2 inches above hardscape.
   b. Provide mortar mesh to prevent blockage of weep holes.
   c. Provide continuous flashing at all weep holes and end dams at flashing terminations.

9. At masonry and precast window sills, and caps for masonry veneer walls that do not terminate directly under roofs, provide a positive slope resulting in a minimum 3/4 inch differential over the length of the sill/cap.

10. All wood framing in contact with concrete or masonry shall be of treated wood.

11. Provide sill sealer for sill plates at all exterior walls.

12. All brick veneer or sidings, such as vinyl, aluminum, wood and fiber cement board, shall have a solid backing of plywood, OSB, gypsum, or similar material. Siding and brick shall be installed over an independent drainage plane, such as Tyvek® or equal. Fasten siding to framing with nails penetrating a minimum 3/4 of an inch into studs. Install pre-manufactured mounting blocks for all penetrations in siding such as electrical, plumbing, HVAC, etc.
    EXCEPTION: Exterior wall sheathing systems with integrated drainage planes may be used when observation reports are provided by the manufacturer and the following conditions are met:
    1) Pre-installation
        a. General Contractor to hold pre-installation meeting with architect and manufacturer prior to installation. Manufacturer's observation reports to include documentation of meeting.
        b. Manufacturers' flashing details including windows, doors, joints and penetrations shall be maintained on site.
        c. Store materials to meet manufacturer's requirements.
    2) Installation
        a. The integral drainage plane must be preserved. Use manufacturer's approved products including tape, tape gun and roller.
        b. When weather conditions warrant, follow manufacturer's requirements for inclement weather installation and storage of materials.
        c. Manufacturer's representative to review the final installation to confirm all requirements are met prior to installation of exterior cladding. Manufacturer's observation reports documenting installation acceptance is required and must be maintained on site.

13. All panel type siding to be installed over vertical or corrugated furring to allow adequate drainage and ventilation, or provide siding product with integrated vented rain screen.

14. Building wall assemblies shall be vapor permeable with a minimum ASTM E96 perm rating >0.1. Foil faced building products, closed cell foam, and sheet plastic are examples of prohibited wall materials.

15. The bottom of all siding and window sills shall be a minimum of 6 inches above the finished grade or mulch beds.

16. Exterior wooden trim, brickmolding, sills, fascia, rake boards, and columns, shall be clad with vinyl, vinyl coated aluminum, or similar materials. Use materials designed for cladding with a minimum thickness of 0.019 inch and provide a stiffening crimp for trim and fascia boards are more than 8 inches wide. Virginia Housing recommends the use of fiber cement, PVC, or similar low maintenance materials instead of wood for exterior use.

17. Powder coat or galvanize all steel products exposed to the weather, or provide an exterior steel paint that can achieve a minimum 10-year material warranty. Prepare surfaces per warranty requirements. Prime and paint steel prior to placement in concrete.

18. Use vinyl, aluminum, or steel for exterior railings, handrails, guardrails, posts and pickets instead of wood products.

19. Balcony and stair railings at buildings shall be stable and secured to the wall structure with mounting block or equivalent.

20. Windows and sliding glass doors:
    a. Provide minimum 1/2 inch insulated glass.
    b. Provide minimum 10-year warranties for material and breakage of seal.
    c. Provide thermal break for aluminum frames.
    d. Install and flash per manufacturer's specifications.

e. Provide back dam flashing at sill, and extend sill flashing at least 6 inches up jambs.
f. Before installing windows; perform initial installation with the Construction Control Officer.
g. Provide removable metal pins or 'Charlie bar' at exterior sliding glass doors.

21. All exterior doors, except sliding glass doors, shall be either insulated fiberglass or insulated metal. Exterior wooden door jambs and molding require integral composite material, such as FrameSaver® or equal, for at least 3 inches from their lowest points.

22. Install hard surface flooring at the interior of all unit entrance doors, except for doors entered through carpeted interior hallways. Hard surface area shall be approximately 3 foot by 4 foot using flooring materials such as VCT, sheet vinyl, hardwood, or tile.

23. Resilient flooring such as, but not limited to, sheet vinyl and VCT shall be installed over minimum nominal 1/4 inch underlayment grade plywood, or similar underlayment material. Ceramic tile or similar flooring shall be installed over minimum nominal 1/4 inch cementitious board or similar underlayment material. Flooring may be installed over concrete provided concrete is finished smooth and uniform. When installed over Gypcrete, or a similar material, apply manufacturer approved sealer.

24. Carpets shall have the minimum number of seams. Seams are not to be located in heavily trafficked areas. T-seams are not acceptable except in closets.

25. All interior doors shall be side hinged. Bifold, pocket, or sliding doors are not acceptable. Door bottoms shall have a minimum of 3/4 inch clearance when closed to provide improved ventilation, and shall not drag on finish floors through door swing. Paint bottom, top, and all other sides of doors. All doors shall be factory assembled. Field cutting vents in doors is prohibited. Instead, pre- manufactured louvered doors must be installed.
    EXCEPTION: High/low or offset transfer grille in lieu of 3/4 inch clearance requirement.

26. All unit interior spaces shall have finished floor and solid wood base/molding. Base and base moldings shall match in design and finish.
    EXCEPTION 1: Ceramic or stone baseboard is acceptable at matching adjacent flooring.
    EXCEPTION 2: Mechanical closets may use an alternate base material such as vinyl.

27. All common area interior spaces shall have finished floor and base.
    EXCEPTION: Utility/service rooms may have sealed concrete floor.

28. All windows and doors with glazing shall have blinds, shutters, or similar operable products for shading and privacy. Horizontal blinds are prohibited at doors.
    EXCEPTION: Horizontal blinds at doors that are integrated with glazing.

29. Provide a minimum of one full-height closet that is at least 2 feet deep, measured between front and rear wall faces inside the closet, with at least 6 square feet for general storage, in a location other than a bedroom.
    EXCEPTION: Studio and one-bedroom units may utilize a single closet. Provide at least 8 linear feet of shelf/rod storage with at least 5 feet room depth from shelf/rod wall. Designs with opposing shelf/rods shall have at least 5 feet between the shelf/rods.

30. Provide a minimum of 1-1/2 bathrooms (one full bathroom and one half bathroom) in all two bedroom units and a minimum of 2 full bathrooms in all three or more bedroom units.

31. Concealed solid dimensional wood blocking (minimum 2x6 material) shall be provided for all handrails, grab bars and wall mounted cabinets and accessories.
    EXCEPTION: Minimum 6-inch-wide 16 gauge metal strapping may be used with metal studs.

32. The top of all handrails shall be installed at 34 inches above finished floor and stair tread nosings.

33. Seal around all penetrations. Use code compliant sealant at all penetrations in fire rated separations and assemblies.

34. Ceramic tile or similar material tub and shower surrounds shall be installed over minimum 1/2 inch cementitious board with applied waterproofing, or, moisture-resistant, fiberglass mat faced gypsum tile backerboard. All installations shall include flush head, non-corrosive fasteners, caulked corners, and fiberglass tape, per manufacturer specification.

35. Depress entire bathroom floor and build up as needed to account for accessibility and drainage requirements when designing for roll-in showers. Bathrooms which include a roll-in shower, shall have ceramic or similar tile flooring, with a minimum of 3 feet directly outside the shower sloped towards the shower drain at 1%-2%. Roll-in showers shall have a zero height transition between the bathroom floor and the shower floor and be either:
    a. Ceramic or similar tile floor with water proofing membrane extending a minimum 8 inches up walls, **OR**
    b. Pre-manufactured with a trench drain located immediately adjacent to, and the full length of, the shower.

36. Vanities may not have a side exposed within 12 inches of the tub or shower.

37. Where wall-hung lavatories, roll-under sinks, or pedestal sinks are installed, provide an alternate storage solution, minimum 6 inches interior depth, permanent with doors or drawers, complying with code required reach ranges and other accessibility requirements, which may apply to the unit.

38. Provide a pass-through opening with counter space when kitchen and dining/living areas are separated by a wall.

39. Kitchen cabinets and bathroom vanities shall comply with *Virginia Housing's Minimum Cabinet Requirements* in addition to the following:
    a. All cabinets shall be factory/manufacturer assembled.
    b. All exposed portions of cabinetry shall have factory applied finish.
    c. Kitchen cabinets and bathroom vanities shall abut the side walls or provide a minimum spacing of 10 inches between wall and cabinets. Wall cabinets shall abut the ceiling/ soffits or provide minimum of 10 inches between cabinet and ceiling/soffits.
    d. Kitchen wall cabinets shall be fastened to blocking with a minimum of four washer head cabinet screws; two in each upper and lower nailing strip for each wall cabinet.
    e. Plastic laminate countertops shall be post formed, or have back splashes that are factory attached to the countertop and sealed.
    f. A side splash shall be installed where countertops abut walls.
    g. Holes in cabinet backs for plumbing shall be drilled and completely covered by escutcheon plates.
    h. Provide at least one kitchen base cabinet with drawer, minimum 15-inch-wide.

40. Install a cleanable surface, such as plastic laminate, metal, or ceramic tile on the sidewall next to the cooking range when it is located directly adjacent to a wall. Materials such as plastic laminate or metal shall be installed with adhesive.

41. Appliances
    a. All kitchen appliances in an apartment unit shall match in color.
    b. Provide a 30-inch-wide range in all units.
        EXCEPTION: Studio/efficiency apartments and one bedroom elderly apartments may utilize a minimum 20-inch-wide range.
    c. Provide a 30-inch range hood or combination range hood-microwave over all cooking ranges, or a maximum 24-inch- wide range hood for all 20-inch-wide ranges.
    d. Provide a 24-inch-wide dishwasher in all units.
        EXCEPTION: Studio/efficiency apartments and one bedroom elderly apartments may utilize 18-inch-wide dishwashers.
    e. All refrigerators shall be frost free. Minimum rated sizes of refrigerators shall be 12 cubic feet for studio/efficiency apartments, 14 cubic feet for 1 and 2 bedroom apartments, and 16 cubic feet for 3 and 4 bedroom apartments. Side-by-side models must open fully or have at least 12 inches of cabinetry between an adjacent sidewall.
    f. Provide laundry equipment connections in all units. In-unit washer and dryer connections shall be in a closet with doors, and shall be accessible directly from the unit common area. Laundry closets must accommodate separate, full-size side-by-side or full-size stackable type laundry equipment.
        EXCEPTION: Studio and one bedroom apartments may utilize a closet in a bedroom for laundry equipment provided the equipment does not restrict access to storage. When connections are located within a closet intended to store garments provide a jumper duct to communicate with the return air location. See “Plumbing” section for washing machine pan requirements.
    g. When provided in units, all laundry equipment shall be separate, full-size side-by-side or full-size stackable type. Ventless dryers, all-in-one combination washer/dryers, and laundry centers are prohibited. See age restricted housing requirement below for additional information.
        EXCEPTION: In-unit laundry centers are acceptable in studio and one bedroom apartments, and age restricted housing. Equipment shall comply with code required reach ranges and other accessibility requirements, which may apply to the unit.

42. Age restricted housing serving residents 55 years or older:
    a. Provide a handrail on at least one side of common corridors.
    b. Provide an accessible elevator for buildings with two or more stories.
    c. Provide indoor resident garbage drop-off area and access.
    d. Provide in-unit laundry equipment, or, both connections for in-unit laundry equipment and onsite common laundry facilities with a minimum ratio of one washer and dryer per 20 units.
    e. Provide controlled access, automatic door opener, and call box at primary building entrance. Call box shall allow resident ability to communicate with visitor and unlock primary building entrance remotely with phone.

43. Provide space for a future dehumidifier in a stud cavity within the apartment living space. Utilize concealed power and plumbing drain (e.g. mechanical closet). Identify location in drawings and coordinate with plumbing and electrical.
    EXCEPTION 1: Not required where a permanent in-unit dehumidifier, or a balanced, whole-building DOAS dehumidification system is provided for all units.
    EXCEPTION 2: In lieu of stud cavity location, future in-line dehumidification at the air handler may be accepted when appropriate space and duct connections are demonstrated and provided.

MECHANICAL

1. Provide ducted Heating, Ventilation, and Air Conditioning (HVAC) equipment in all dwelling units and interior corridors except as noted in #3 below. PTACs are prohibited. Size of HVAC equipment, ducts, and diffusers shall be designed per heat gain/loss calculations. Refrigerant and condensate lines shall be concealed within walls with all penetrations sealed. All condensate to discharge onto splash blocks at grade or to locality approved hub drain.

2. For all ducted HVAC systems including ducted mini-splits and self-contained VTAC systems (similar to Magic-Pak or First Co):
   a. Air supply diffusers shall be located near windows in living rooms, dens and bedrooms.
      EXCEPTION: The mechanical engineer may locate supply diffusers at alternate locations with Virginia Housing's prior approval based on supporting calculations.
   b. Provide HVAC diffusers for kitchens and all full baths.
   c. Provide premanufactured air filters.
   d. Seal air duct penetrations in unheated spaces.
   e. Provide ducted return air to mechanical unit. Provide a separate ducted return for each floor of townhouse units.
      EXCEPTION: Mechanical closets may be utilized as return air plenums provided walls and ceiling receive finished or unfinished moisture-resistant, fiberglass mat faced gypsum and fiberglass tape. Closets shall comply with code plenum requirements for combustible materials. Provide a keyed deadbolt lock with door latch guard. Multi-level units require a ducted return pathway to mechanical closet from other floors.
   f. Heat pump to include auxiliary heat.
   g. Main supply trunk line from air handler to branch duct shall be sheet metal. Flex duct may be used only between main trunk line and supply diffuser. Fiberglass ductboard is prohibited.
   h. All ductwork shall be concealed behind permanent construction unless otherwise approved by Virginia Housing.
   i. Air handlers and ductwork may not decrease ceiling heights in any room below 7 feet 6 inches.
   j. Dedicated Outdoor Air Systems (DOAS) shall include dehumidification and reheat functionality.
   k. Provide certification for testing and balancing as required by mechanical code regardless of AHJ enforcement.

3. Ductless Heat Pumps (mini-splits) may be used in corridors, efficiencies, 1 bedroom units or elderly housing developments.
   a. Provide separate mini-split wall mounted unit for each bedroom, den or living room.
   b. Provide separate wired wall mounted thermostat for each mini-split wall mounted unit.
   c. Provide a heater with a thermostat or timer controlled heat lamp for all full baths.

4. All exhaust ducts shall discharge to the exterior of the building, and terminate into vent caps. Vent caps to be of a quality that will minimize repair and replacement.

5. Do not install condenser units in front of windows.

6. Electric baseboard heating and electric forced air heating shall not be used as the primary heating method.

PLUMBING

1. Install an overflow pan with a drain connected to the sewer system per applicable plumbing code where washing machine connections are provided.
   EXCEPTION: Common laundry facilities may utilize a floor drain without overflow pans.

2. The bottoms of bathtubs shall have slip resistant/textured finish.

3. All tubs/showers and shower diverters shall have internal shut-off-valves or external shut-off- valves with access panels.

4. Provide a maximum of two showerheads in all roll-in showers.

5. Wall-hung lavatories may only be installed in common areas or dwelling units recognized as UFAS, ANSI Type A, or fully accessible. When installing wall-hung sinks, provide concealed arm type carriers.

6. All pipes to be concealed behind permanent construction. All wet plumbing pipe to be solid wall construction. Cellular core pipe not permitted.

7. All floor drains and indirect waste receptors to receive trap primer or code approved drain trap seal device.

8. When installing individual apartment water heaters provide the following minimum rated sizes:
   a. Studio/1BR units 30 gallon.
   b. 2BR units 40 gallon.
   c. 3BR units 50 gallon.

9. Water heater temperature and pressure relief valve shall discharge through CPVC, PEX or Copper pipes and terminate between 2 inches and 6 inches from the pan.

10. Provide hub drain in mechanical closet to accept overflow pan and condensate lines.

11. Where a permanent in-unit dehumidifier, or a balanced, whole-building DOAS dehumidification system is not provided for all units, provide a hub drain for a future dehumidifier. Identify hub drain location in drawings and coordinate with architectural. Locate hub drain such that when dehumidifier is installed, hub drain will not be visible from a habitable space.
    EXCEPTION: The mechanical closet hub drain may be utilized when the designated future dehumidifier location is on an adjacent wall or in-line at the air handler.

ELECTRICAL

1. Provide fluorescent light fixtures or LED light fixtures in all public common areas such as offices, multipurpose rooms, laundry rooms, hallways, and stairs.

2. Kitchens shall have a minimum of one light fixture 4 feet long with either LED or two 32 watt fluorescent bulbs, or lighting fixture(s) that provide a minimum illumination of 30 foot-candles distributed across the leading edge of all countertops.

3. Provide both an overhead light fixture, and a light fixture above each bathroom sink.
   EXCEPTION: Half bathrooms may omit the overhead light fixture.

4. Pre-wire cable TV and data port/jack for all bedrooms, living rooms, and dens. All units shall provide working infrastructure with an internet service provider. Provide interface for incoming service at one central location per building. All wiring for the interior and exterior of the building shall be concealed within the walls, floors, or ceiling.
   EXCEPTION 1: Incoming power and telecommunication wiring run vertically in conduit from grade to the meter(s) and interface without horizontal runs.
   EXCEPTION 2: Wiring in metal conduit on exposed masonry or concrete structure inside building stairways and breezeways, parking garages, and spaces with no resident access. Conduit must be painted to match adjacent surface, run orthogonally and tight to corners of walls, floors, or ceilings.

5. Provide exterior LED or fluorescent lighting to illuminate all parking areas, dumpster pads, building entrances and mailboxes with a minimum of one foot-candle of illumination. Provide illumination so that building numbers and apartment numbers are legible at night.

6. Provide tenant controlled light fixture at all patios and balconies.

7. Where a permanent in-unit dehumidifier, or a balanced, whole-building DOAS dehumidification system is not provided for all units, provide an outlet for a future dehumidifier. Identify outlet location in drawings and coordinate with architectural. Locate outlet such that when dehumidifier is installed, power cord will not be visible from a habitable space.

8. Provide a CO detector immediately adjacent to bedrooms on each floor when the unit is serviced by gas fired equipment or has an attached garage. Combo smoke/CO detectors are acceptable.

Requirements for Rehabilitation

All **additions** and **adaptive** reuse shall comply with the Virginia Housing Minimum Design and Construction Requirements (MDCR) for *New Construction*. **Adaptive reuse** may also be required to comply with the MDCR for *Rehabilitation* where Virginia Housing deems applicable.

All rental offices, public areas, and associated parking and routes shall meet the latest USBC accessibility requirements for new construction. Developments that have accessible units, or are required to have accessible units due to applicable building codes, federal requirements, or as the result of commitments made in the LIHTC application, shall provide accessible routes through the site from those units to accessible parking and other accessible common areas.

Identify any hazardous materials/conditions such as asbestos, lead paint, radon, recalled drywall, mold on site and/or in buildings and contaminated soils. Address or abate all hazardous materials per applicable regulations. Submit abatement certification to Virginia Housing if requested.

SITE WORK

1. Identify areas that require grading to drain water away from buildings and areas where adjoining grades are higher than finished floor of buildings:
   a. Provide a minimum 6 inches between finished grade or mulch beds, and the bottom of siding and window sills. Remove mulch covering masonry weeps.
   b. Provide a minimum of 5% slope away from foundation walls, for a minimum distance of 10 feet.

   EXCEPTION: Provide alternate solutions acceptable to Virginia Housing when required grades, slopes, or other site conditions make the above requirements infeasible.

2. Provide seamless gutters, downspouts, and splash blocks for all buildings, or an internal drainage system. When discharging on grades steeper than 20%, or less than 1%, water from gutters and downspouts shall be piped underground to a storm sewer system, or to daylight at grades that will avoid soil erosion. Avoid water drainage over sidewalks.

3. Extend concrete dumpster pads at least 12 feet into the asphalt so that the load bearing wheels of trucks rest on concrete while servicing the dumpsters.
   a. Thickness of concrete shall be a minimum of 6 inches with reinforcement.
   b. Dumpsters and/or compactors accessed via an accessible route shall meet accessibility requirements.
   c. Install a privacy screen on at least three sides of all dumpster and/or compactor pads.
   d. Install concrete filled steel bollards behind dumpster locations to protect enclosure.

4. Concrete that is cracked, crumbling, spalling, heaving, settling, offset greater than 1/2 inches, or may be a safety issue shall be repaired or replaced. Provide a solution acceptable to Virginia Housing if any of these conditions exist. Sidewalks at new locations shall comply with new construction guidelines.

5. The top of all new handrails shall be installed at 34 inches above stair tread nosings. Secure existing handrails and comply with applicable accessibility codes. Handrails shall be continuous from level to level, and graspable. Provide at least one handrail at all stairs with four or more risers.

6. Provide guardrails according to new construction building code requirements.
   EXCEPTION: Existing guardrail height shall be minimum 36 inches above finished floor. Exception does not apply when modifying existing guardrails.

7. All crosswalks and accessible routes within parking areas and across drive lanes shall be striped.

8. Asphalt that has cracking, alligatoring, or a deteriorating sub-base shall be repaired or replaced. Provide a solution acceptable to Virginia Housing if any of these conditions exist. Paving at new locations to comply with new construction guidelines.

9. Remove all dead bushes, trees, tree-stumps, and their above-ground roots. Remove all portions of tree branches that overhang roofs, contact building faces, or obstruct site lighting. Remove trees with root structures that may compromise building foundations.

10. Provide foundation plantings in the front of all buildings and at building entrances. New plantings shall comply with new construction requirements.

11. Grade to avoid standing water. Provide a smoothly graded transition from disturbed to undisturbed areas. All areas which have dead grass shall be tilled. Seed and straw, and/or landscape all bare and disturbed areas. Finish grade with clean topsoil. Provide ground cover materials or sod for slopes steeper than 20%. Clean site and dispose of all construction debris. Grass shall be established prior to project closeout.

ARCHITECTURAL

1. Provide water intrusion report where evidence of water, moisture, or mildew is present at below grade spaces. As identified in the report, install waterproofing up to finished grades for all perimeter walls of finished and unfinished spaces. Waterproofing may be installed on the exterior or interior sides of the wall. The waterproofing system shall have a minimum 10-year manufacturer's warranty.

2. All debris and wood shall be removed from crawl spaces.
    a. Install sump pump or drain tile discharging to daylight for any area accumulating water.
    b. Install a minimum 6 mil vapor barrier at floor with seams overlapped 12 inches. Edges and seams to be taped. Provide adequate crawl space ventilation.

3. Remove all abandoned and non-operable equipment, devices and accessories. Virginia Housing may approve abandoned material that is secured, sealed and concealed.

4. Structural deficiencies shall be identified and corrected. If requested by Virginia Housing, corrective measures to be designed, inspected, and certified by a structural engineer.

5. Install insulation in crawlspaces and attics to meet Virginia Energy Code's minimum requirements for new construction.

6. When replacing drywall at an exterior wall or replacing exterior sheathing, provide new wall insulation where missing or damaged at affected areas. New insulation R-value shall match or exceed adjacent existing value. When adjacent insulation is not present, provide batt or rigid board insulation to the greatest R-value feasible.

7. Roof inspection reports are required for all roofs more than 5 years old. Report to include age and remaining life of roofs and areas that need repairs. Replace all roofs with a remaining life of less than 5 years. Repair or replace all roofs with damage or leaks.

8. When replacing pitched roofs:
    a. Repair or replace all damaged sheathing, rafters, and/or trusses.
    b. Replace all 3/8 inch sheathing with a minimum of 15/32 inch plywood or 15/32 inch OSB. Install sheathing with clips. ZIP System roof sheathing or similar products are not accepted.
    c. Replace all existing attic vents and pipe collars. Replace rusted or damaged flashing. Replace all existing sealant.
    d. Roof shingles shall be a minimum 25-year, anti-fungal product, and shall be nailed (not stapled). Do not install new shingles over existing shingles. Replace existing ridge vents.
    e. Install drip edge on all sides of the roof.
    f. Install ice barrier extending from eave's edge to a point 24 inches beyond the exterior wall cladding.
    g. Provide roof ventilation per the latest USBC for new construction.

9. When replacing flat roofs:
    a. Remove and dispose of existing roofing and above deck insulation, damaged vents and other items not in good condition.
    b. Install continuous roof deck insulation or attic space insulation to meet Virginia Energy Code's minimum requirements for new construction.
    c. New roofing shall have a minimum 20-year manufacturer's warranty for the entire roof system.
    d. Provide roof ventilation per the latest USBC for new construction.
    e. Provide minimum 24-inch-wide walk pads from roof access point to serviceable side of all rooftop equipment.

10. If equipment is installed on a roof, provide easily reachable access from an interior common area. Provide alternate solution acceptable to Virginia Housing when conditions make the above requirement infeasible.

11. Stairs to apartment units where stair halls are not enclosed shall be protected from weather by design features. Install an awning, a roof overhang at the second floor level, or a roof at the stair hall entrance. Provide a minimum overhang of 5 feet from first riser. All buildings in a development shall have similar design features. Historic buildings may be exempt.

12. Exterior wooden trim, brickmold, sills, fascia, rake boards, and columns shall be clad with vinyl, vinyl coated aluminum, or similar materials. Use materials designed for cladding with a minimum thickness of 0.019 inch and provide a stiffening crimp for trim and fascia boards are more than 8 inches wide. Replace all damaged wood prior to cladding. Virginia Housing recommends the use of fiber cement, PVC, or similar materials instead of wood for exterior use. Exceptions may be considered for historic buildings.

13. When repainting existing or installing new steel products that are exposed to the weather; powder coat, galvanize or provide an exterior steel paint that can achieve a minimum 10-year material warranty. Prepare surfaces per warranty requirements. Prime and paint steel prior to placement in concrete.

14. When replacing exterior railings, handrails, guard rails, posts and pickets use vinyl, aluminum, or steel.

15. Balcony and stair railings at buildings shall be stable and secured to the wall structure with mounting block or equivalent.

16. When replacing siding:
    a. New siding shall have solid backing of plywood, OSB, gypsum, or similar material. Siding shall be installed over an independent drainage plane, such as Tyvek® or equal.
        EXCEPTION: Exterior wall sheathing systems with integrated drainage planes may be used when observation reports are provided by the manufacturer and the following conditions are met:
        1) Pre-installation
            a. General Contractor to hold pre-installation meeting with architect and manufacturer prior to installation. Manufacturer's observation reports to include documentation of meeting.
            b. Manufacturers' flashing details including windows, doors, joints and penetrations must be maintained on site.
            c. Store materials to meet manufacturer's requirements.
        2) Installation
            a. The integral drainage plane must be preserved. Use manufacturer's approved products including tape, tape gun and roller.
            b. When weather conditions warrant, follow manufacturer's requirements for inclement weather installation and storage of materials.
            c. Manufacturer's representative to review the final installation to confirm all requirements are met prior to installation of exterior cladding. Manufacturer's observation reports documenting installation acceptance is required and must be maintained on site.
    b. Do not install new siding over materials such as vinyl siding, Thermo-ply®, or other flexible materials.
    c. Material such as T1-11, wood siding, or hardboard lap-siding may be used as backing for new siding, provided it is in good condition.
    d. Repair, replace, and re-nail all sections of damaged siding or sheathing to provide a uniform and flat surface.
    e. Fasten siding to framing with nails penetrating a minimum 3/4 of an inch into studs.
    f. Install mounting blocks for all penetrations in siding such as electrical, plumbing, HVAC, and ductwork etc.

17. All new panel type siding to be installed over vertical or corrugated furring to allow adequate drainage and ventilation, or provide siding product with integrated vented rain screen.

18. New building wall assembly components shall be vapor permeable with a minimum ASTM E96 perm rating >0.1. When existing vapor impermeable sheathing, and air and weather barriers are uncovered they shall be replaced to meet the new assembly standard. Foil faced building products, closed cell foam, and sheet plastic are examples of prohibited wall materials.

19. Repair masonry walls having cracks and/or settlement. Replace damaged brick and point-up deteriorated mortar to match existing. Replace rowlocks for window sills that do not have a slope to drain water away from building. Prime and paint all metal lintels which are corroded, or not already painted. Remove abandoned items from brick and power wash/clean exterior of buildings.

20. Replace all damaged and single glazed windows with insulated glass.
    EXCEPTION: When window replacement is not permitted in historic buildings, repair existing windows and install triple track operable storm sashes, with screens, over existing single glazed windows. When conditions make storm sashes not feasible, provide an alternative solution acceptable to Virginia Housing.

21. When replacing windows and/or sliding glass doors:
    a. Provide minimum 1/2 inch thick insulated glass.
    b. Provide minimum 10-year warranties for material and breakage of seal.
    c. Provide thermal break for aluminum frames.
    d. Provide new construction windows when replacing siding.
    e. Provide back dam flashing at sill, and extend sill flashing at least 6 inches up jambs.
    f. Install and flash per manufacturer's specifications. Perform initial replacement with Construction Control Officer.
    g. Provide removable metal pins or 'Charlie bar' at exterior sliding glass doors.

22. All windows and doors with glazing shall have blinds, shutters, or similar operable products for shading and privacy. Horizontal blinds are prohibited at doors. Replace all blinds and shades that are damaged and/or do not match in color.
    EXCEPTION: Horizontal blinds at doors that are integrated with glazing.

23. Repair or replace all damaged or dented doors, jambs and hardware.
    a. When replacing exterior doors, except sliding glass doors, replacement doors shall be insulated fiberglass or insulated metal. Wooden door jambs and molding require integral composite material, such as FrameSaver® or equal, for at least 3 inches at their lowest points.
    b. Solid core wood doors may be used where entrances are located in interior conditioned corridors.

24. All entry doors to apartment units, except entry doors located in conditioned corridors, shall have weather stripping and threshold to provide a tight seal around the door and to minimize heat loss/gain due to air infiltration.

25. Provide roofs/overhangs over entrance doors to all units and buildings that are accessed directly by residents or visitors. Provide a minimum 30 inches of overhang along the front and 12 inches along each side of the door; or the door may be setback a minimum of 24 inches from the face of the exterior wall.

26. Replace all damaged Gypcrete, or similar material, floor sheathing and floor joists.

27. Install an area approximately 3 feet by 4 feet using materials such as VCT, sheet vinyl, hardwood flooring, or tile at the interior of all unit entrance doors, except for doors entered through carpeted interior hallways.

28. Replace all damaged, stained, or mismatched flooring. On a room by room basis, all flooring shall match in color and design. All rooms shall have finished floor and base.

29. When installing new finish flooring, remove all existing layers to underlayment or substrate. Upon inspection, replace or seal damaged or stained underlayment, or underlayment which gives off odors. New resilient flooring such as, but not limited to, sheet vinyl and VCT, shall be installed over minimum nominal 1/4 inch underlayment grade plywood, or similar underlayment material. Ceramic tile or similar flooring shall be installed over minimum nominal 1/4 inch cementitious board or similar underlayment material. Flooring may be installed over concrete provided concrete is finished smooth and uniform. When installed over Gypcrete, or a similar material, apply manufacturer approved sealer.

30. Carpets shall have the minimum number of seams. Seams are not to be located in heavy traffic areas. T-seams are not acceptable except in closets. Remove and replace shoe molding/quarter-round molding and tack strip before installing carpet.

31. Provide a pass-through opening with counter space when kitchen and dining/living areas are separated by a wall.

32. Interior finishes: doors, moldings, paint, and drywall.
    a. Replace all interior bifold, pocket, or sliding doors with side hinged doors.
    b. Repair or replace all damaged doors and trim. Doors previously cut to allow for modifications, such as adding vents, shall be replaced with factory assembled louvered doors.
    c. All doors, door trim, and door hardware in a unit shall match in design and finish.
    d. Door bottoms shall have a minimum of 3/4 inch clearance when closed to provide improved ventilation, and shall not drag on finish floors through door swing.
        EXCEPTION: High/low or offset transfer grille in lieu of 3/4 inch clearance requirement.
    e. Paint bottoms, tops, and all other sides of new doors.
    f. All new doors shall be factory assembled.
    g. All base and base moldings in a unit shall be solid wood and shall match in design and finish.
        EXCEPTION 1: Ceramic or stone baseboard is acceptable at matching flooring.
        EXCEPTION 2: Mechanical closets may use an alternative base material such as vinyl.
    h. Provide consistent drywall/plaster and paint finish across each entire wall or ceiling surface. All new and previous repairs shall match the adjacent surface and the unit's intended finish.
        1) The unit condition survey must establish both repair and replacement quantities for each unit; exclude areas that will receive drywall due to other scope. Typical paint preparation specifications must include removing fasteners and tape/stickers, filling nail holes, cleaning surfaces, and must be separate from the unit condition survey repair quantities. Unit condition survey quantities should include:
            a. For repairs: flaws such as, but not limited to, holes (other than nails), failing tape joints and corner bead, cracks, and nail pops. Re-screw nail pops and settling drywall to framing. Architectural drawings and/or specifications must establish criteria for repair quantities.
            b. For replacement: all sections that have mold, mildew, signs of moisture, or otherwise extreme conditions. Match adjacent type and thickness
    i. Exposed or painted concrete masonry units are prohibited in apartments.

33. When each unit is made available to the general contractor for rehab work, the general contractor, owner and architect shall walk each unit, verify the original unit condition survey scope, and inspect for plumbing leaks, nonfunctioning devices, and structural deficiencies among other notable needs. The architect must document any scope revisions and update the unit condition survey quantities prior to unit completion.

34. Repair damaged or compromised draft stopping and/or fire stopping.

35. Seal around all new penetrations, and all existing penetrations that are accessible. Use code compliant sealant at all penetrations in fire rated separations and assemblies.

36. Concealed solid dimensional wood blocking (minimum 2x6 material) shall be provided for all new handrails, grab bars and wall mounted cabinets and accessories.
    EXCEPTION 1: Minimum 6-inch-wide 16 gauge metal strapping may be used with metal studs.
    EXCEPTION 2: Toggle bolts may be used at wall mounted accessories.

37. The top of all new handrails shall be installed at 34 inches above finished floor and stair tread nosings. Modify existing handrails to be securely fastened to structure and comply with applicable accessibility codes. Handrails shall be continuous from level to level, and graspable. Provide at least one handrail at all stairs with four or more risers.

38. Provide guardrails according to new construction building code requirements.
    EXCEPTION: Existing guardrail height shall be minimum 36 inches above finished floor. Exception does not apply when modifying existing guardrails.

39. Replacement or repairs of ceramic tile or similar tub and shower surrounds shall be installed over minimum 1/2 inch cementitious board with applied waterproofing, or, moisture resistant fiberglass mat faced gypsum tile backerboard. All installations shall include flush head, non-corrosive fasteners, caulked corners, and fiberglass tape, per manufacturer specification.

40. Bathrooms which include a **new** roll-in shower shall have ceramic or similar tile flooring. Roll-in showers shall be either:
    a. Ceramic or similar tile floor with water proofing membrane extending a minimum 8 inches up walls. A minimum of 3 feet of the bathroom floor directly outside the shower shall slope back towards the shower drain at 1%-2%, with a zero height transition between the bathroom floor and the shower floor, **OR**
    b. Premanufactured with a secondary floor drain located outside of the shower. The bathroom floor shall have a 1%-2% slope towards the secondary floor drain. Provide silicone joint between bathroom and shower floor.

41. Vanities with a side exposed to a tub or shower shall have plywood sides, back and bottom.
    EXCEPTION: Vanities with an exposed side greater than 12 inches from the tub or shower may solely comply with Virginia Housing Minimum Cabinet Requirements.

42. Where wall-hung lavatories, roll-under sinks or pedestal sinks exist in dwelling units, provide an alternate storage solution, minimum 6 inches interior depth, permanent with doors or drawers, complying with code required reach ranges and other accessibility requirements, which may apply to the unit.

43. When replacing kitchen cabinets and/or bathroom vanities all new cabinets shall comply with *Virginia Housing's Minimum Cabinet Requirements* in addition to the following:
    a. Cabinets and/or vanities that are not being replaced require pre-approval by Virginia Housing.
    b. All cabinets shall be factory/manufacturer assembled.
    c. All exposed portions of cabinetry shall have factory applied finish.
    d. Kitchen cabinets and bathroom vanities shall abut the side walls or provide a minimum spacing of 10 inches between wall and cabinets. Wall cabinets shall abut the ceiling/ soffits or provide minimum of 10 inches between cabinet and ceiling/soffits.
    e. Kitchen wall cabinets shall be fastened to blocking with a minimum of four washer head cabinet screws; two in each upper and lower nailing strip for each wall cabinet.
    f. Plastic laminate countertops shall be post formed, or have back splashes that are factory attached to the countertop and sealed.
    g. A side splash shall be installed where countertops abut walls.
    h. Install a cleanable surface, such as plastic laminate, metal, or ceramic tile to the side wall next to the cooking range when it is located directly adjacent to a wall.
    i. Remove and replace all drywall that has mold. Repair or replace all damaged drywall.
    j. Holes in cabinet backs for plumbing shall be drilled, and completely covered by escutcheon plates.
    k. Provide at least one kitchen base cabinet with drawer, minimum 15-inch-wide.

44. Appliances
    a. Replace all damaged and or dented appliances. All kitchen appliances in an apartment unit shall match in color.
    b. Provide a 30-inch-wide range in all units.
        EXCEPTION: Studio/efficiency apartments and one bedroom elderly apartments may utilize a minimum 20-inch-wide range.
    c. Provide a 30-inch-wide range hood or combination range hood-microwave over all cooking ranges, or a maximum 24-inch-wide range hood for all 20-inch-wide ranges.
    d. Provide a 24-inch-wide dishwasher in all units.
        EXCEPTION: Studio/ efficiency apartments and one bedroom elderly apartments may utilize 18-inch-wide dishwashers.
    e. All refrigerators shall be frost free. Minimum rated sizes of refrigerators shall be 12 cubic feet for studio/efficiency apartments, 14 cubic feet for 1 and 2 bedroom apartments, and 16 cubic feet for 3 and 4 bedroom apartments. Side-by-side models must open fully or have at least 12 inches of cabinetry between an adjacent sidewall.
    f. Provide laundry equipment connections in all units. When provided in units, washers and dryers shall be separate, full-size side-by-side or full-size stackable type, shall be installed in a closet with doors, and shall be accessible directly from the unit common area. Ventless dryers, all-in-one combination washer/dryers, and laundry centers are prohibited.
        EXCEPTION 1: Existing laundry closet locations may remain. When closet is intended to also store garments provide a jumper duct to communicate with return air location. See “Plumbing” section for washing machine pan requirements.
        EXCEPTION 2: Studio and one bedroom apartments may utilize a closet in a bedroom for laundry equipment provided the equipment does not restrict access to storage. When connections are located within a closet intended to store garments provide a jumper duct to communicate with return air location. See “Plumbing” section for washing machine pan requirements.
        EXCEPTION 3: In-unit laundry centers are acceptable in studio and one bedroom apartments, and age restricted housing. Equipment shall comply with code required reach ranges and other accessibility requirements, which may apply to the unit.
        EXCEPTION 4: Onsite common area laundry facilities may be provided in lieu of in-unit laundry connections, with the following minimum ratio of washers and dryers. See “Plumbing” section for washing machine pan requirements.
        1) 1 pair per 12 units for non-age restricted housing.
        2) 1 pair per 20 units for age restricted housing.

45. Age restricted housing serving residents 55 years or older:
    a. Provide a handrail on at least one side of common corridors.
    b. Provide controlled access, automatic door opener, and call box at primary building entrance. Call box shall allow resident ability to communicate with visitor and unlock primary building entrance remotely with phone.

46. Replace any item with an assessed original install date or equipment ID plate that places the item **at or older than**:

Item	Years*	Item	Years*
EXTERIOR**			
Exterior Doors	25	Windows	30
Asphalt shingle Roofing	20	Flat Roofing	15
Stairs - Wood	20	Stairs – Metal, Metal Pan Filled	25
Timber Retaining Wall	25	Fence - Wood	15
Playground Equipment	10	Gutter and Downspouts	20

Item	Years*	Item	Years*
INTERIOR**			
Kitchen/Vanity cabinets	15	Fire/Smoke/CO detectors	10
Kitchen/Vanity countertop	15	Air Handlers and Heat Pumps	15
Carpet	5	Water Heaters	10
Resilient Flooring	10	Plumbing Fixtures	20
Laundry Equipment	10	Elevator Equipment, Hoist and Rails	30
Kitchen Appliances	10	Bath Exhaust Fans	10
Interior Doors	20	Sump Pumps	7
Fiberglass Bath/surrounds	20	Window Coverings	5
Bath Accessories	10	Electrical Wiring	60
		Plumbing Supply, Waste, and Vent Piping	60

* At application date

** Due to poor existing conditions, some items may need replacement prior to the ages listed above. Evaluate the property fully and create a property/unit condition survey to identify items or other components that are in poor condition, and add their replacement to the scope of work. Through scope review and the construction inspection process, Virginia Housing may add items to the replacement scope based on evaluation.

MECHANICAL

1. All units shall have a Heating, Ventilation, and Air Conditioning (HVAC) system. Sizes of HVAC equipment, ducts and diffusers shall be designed per heat gain/loss calculations. All apartments shall have ducted HVAC systems except as noted in #3 below. PTACs are prohibited in apartments and corridors. All ductwork shall be concealed behind permanent construction unless otherwise approved by Virginia Housing. Refrigerant and condensate lines shall be concealed within walls and all penetrations sealed. All condensate to discharge onto splash blocks at grade or to locality approved hub drain.

   EXCEPTION: When concealing refrigerant lines within walls is not feasible due to new refrigerant code requirements, line sets may be run on building exteriors. Provide a new enclosure with matching siding and trim complementary to the main building façade, with design approved by Virginia Housing prior to the preconstruction meeting.

2. When installing a new HVAC system including, but not limited to, traditional split systems, ducted mini-split or self-contained VTAC systems (similar to Magic-Pak and First Co):
   a. Replace both air-handlers and condensers at the same time.
   b. Code compliant refrigerant is required in all new HVAC equipment.
   c. Verify if refrigerant lines are appropriate for new HVAC unit size and type. Lines not being replaced shall comply with all of the requirements of the manufacturer for using existing lines. Submit a letter from the manufacturer that states the use of existing lines will not reduce performance and/or warranty of the heat pumps or other air conditioning systems.
   d. Seal air duct penetrations in unheated spaces.
   e. When adding and/or replacing ductwork:
      1) Air supply diffusers shall be located near windows in living rooms, dens, and bedrooms.
         EXCEPTION: The mechanical engineer may locate supply diffusers at alternate locations with Virginia Housing's prior approval based on supporting calculations.
      2) Provide ducted return air to mechanical unit. Provide a separate ducted return for each floor of townhouse units.
         EXCEPTION: Mechanical closets may be utilized as return air plenums provided walls and ceiling receive finished or unfinished moisture-resistant, fiberglass mat faced gypsum and fiberglass tape. Closets shall comply with code plenum requirements for combustible materials. Provide a keyed deadbolt lock with door latch guard. Multi-level units require a ducted return pathway to mechanical closet from other floors.
      3) Fiberglass ductboard is prohibited
   f. Provide pre-manufactured air filters.
   g. Replace all diffusers and thermostats.
   h. Air supply diffusers shall be located in living rooms, dens, bedrooms, kitchens, and full baths.
   i. Replace condenser pads that are damaged. Pads shall be concrete, solid vinyl, or similar materials. Level all condenser units.
   j. Heat pumps to include auxiliary heat.
   k. Main supply trunk line from air handler to branch duct shall be sheet metal. Flex duct may be used only between main trunk line and supply diffuser.
   l. Provide certification for testing and balancing as required by mechanical code regardless of AHJ enforcement.

3. Ductless Heat Pumps (mini-splits) may be used in efficiencies, 1 bedrooms or elderly housing development.
   a. Provide separate mini-split wall mounted unit for each bedroom, den or living room.
   b. Provide separate wired wall mounted thermostat for each mini-split wall mounted unit.
   c. Provide a heater with a thermostat or timer controlled heat lamp for all full baths.

4. All exhaust ducts shall discharge to the exterior of the building, and terminate into vent caps. Vent caps to be of a quality that will minimize repair and replacement.

5. Clean existing HVAC ducts and plenums. Verify duct sizes and air flows (cubic feet per minute at supply diffusers) are appropriate for HVAC system. Replace all supply and return vent covers and diffusers. Seal all duct penetrations in unheated spaces. All existing ductwork located in crawl spaces, attics, or any unconditioned space, shall be properly insulated. Clean, service, and repair all HVAC units not being replaced.

6. All bathroom fans shall be in good working condition, cleaned, and ducted out to the exterior. Install fans in all bathrooms, including those with windows.

7. Electric baseboard heating and electric forced air heating shall not be used as the primary heating method.

PLUMBING

1. Identify all water supply material types. Water supply shall have adequate pressure.
   a. Replace all interior, exterior, and underground PB (Polybutylene) pipes such as “Quest” and “Big Blue” with current code accepted materials.
   b. Replace all galvanized pipes with CPVC, copper, plastic or other approved materials.

2. Video and jet all sanitary and storm sewer lines connecting buildings with the public sewer or stormwater management system. Provide report of video findings to Virginia Housing. Identify pipe material types and repair or replace all corroded, damaged, or settled underground sewer lines.
   EXCEPTION: Developments first occupied less than 20 years from loan application date may forgo video and report. Virginia Housing reserves the option to require this report regardless of development age if property presents a history of sewer issues.

3. Identify all sanitary pipe material types and replace all galvanized lines and traps with PVC.

4. All wet plumbing pipe to be solid wall construction. Cellular core pipe not permitted.

5. All floor drains and indirect waste receptors to receive trap primer or code approved drain trap seal device.

6. When replacing water heaters, installations shall comply with latest adopted edition of the *International Plumbing Code for New Construction*. Refer to Code for pan and drain specifications.

7. Install an overflow pan with a drain connected to the sewer system per applicable plumbing code where washing machine connections are provided.
   EXCEPTION 1: IntelliFlow A2C-WB automatic washing machine water shutoff valve with leak sensor, or approved equal, in lieu of connecting the overflow pan to the sewer system.
   EXCEPTION 2: Common laundry facilities may utilize a floor drain without overflow pans or leak sensor devices.

8. When installing new wall-hung sinks, provide concealed arm type carrier.

9. All new tubs/showers and shower diverters shall have internal shut-off-valves or external shut- off-valves with access panels.

10. Bathtubs, showers, and surrounds which will not be replaced, shall be refinished or repaired. Remove mold and stains, clean, and re-caulk all tubs, showers, and surrounds. The bottoms of all new bathtubs and showers shall have slip resistant/textured finish.

11. Provide a maximum of two showerheads in all roll-in showers.

12. When replacing plumbing fixtures, also replace shut off valves and supply lines from valves to fixture.

13. When replacing individual apartment water heaters provide the following minimum rated sizes:
    a. Studio/1BR units 30 gallon.
    b. 2BR units 40 gallon.
    c. 3BR units 50 gallon.

14. Water heater temperature and pressure relief valve shall discharge through CPVC, PEX or Copper pipes and terminate between 2 inches and 6 inches from the pan.

15. All new pipe shall be concealed behind permanent construction.

ELECTRICAL

1. Size electric panels and service per load calculations.

2. Electrical panels with fuses shall be replaced with circuit breakers.

3. Use appropriate connectors for connecting aluminum wiring to electrical outlet and switches.

4. All electrical devices shall be operational. All switches, outlets and cover plates that are painted, damaged or worn shall be replaced.

5. On a room by room basis, all electrical devices and cover plates shall match in color and design.

6. Provide ground fault outlets within 6ft. of a water source.
   EXCEPTION 1: Outlets designated for a major appliance.
   EXCEPTION 2: Outlets located below the countertop and enclosed in a cabinet.
   EXCEPTION 3: Outlet and water source in separate rooms.

7. All wiring for the interior and exterior of the building shall be concealed within the walls, ceiling or floor systems.
   EXCEPTION 1: Cable TV, internet and/or telephone wiring exposed within individual apartment units may be accepted when fastened to the edges of baseboards and/or door casings and not crossing any portion of floors, doorways or openings.
   EXCEPTION 2: Incoming power and telecommunication wiring run vertically in conduit from grade to the meter(s) and interface without horizontal runs.
   EXCEPTION 3: Overhead electrical service to the building in metal conduit, run vertically to the meter without horizontal runs, and painted to match adjacent surface.
   EXCEPTION 4: Wiring in metal conduit in lengths 18 inches or less, outside of apartments, painted to match adjacent surface.
   EXCEPTION 5: Wiring in metal conduit on exposed masonry or concrete structure inside building stairways and breezeways, parking garages, and spaces with no resident access. Conduit must be painted to match adjacent surface, run orthogonally and tight to corners of walls, floors, or ceilings.

8. When replacing kitchen cabinets and counter tops, electrical outlets for countertop, ranges, refrigerators, dishwashers, and other appliances shall comply with the latest applicable requirements of the *National Electric Code for New Construction*.

9. Provide fluorescent light fixtures or LED light fixtures in all public common areas such as offices, multipurpose rooms, laundry rooms, hallways, and stairs.

10. Kitchens shall have a minimum of one light fixture 4 feet long with either LED or two 32 watt fluorescent bulbs, or lighting fixture(s) that provide a minimum illumination of 30 foot-candles distributed across the leading edge of all countertops.

11. Provide a minimum of one permanent light fixture in each bathroom.

12. Provide a working smoke detector in each bedroom and an additional smoke detector in a common space in each unit. Provide at least one smoke detector in a common area on each level of multistory units. Smoke detectors at the lowest level of a unit shall be installed on the ceiling directly outside the stair. Ceiling mounted smoke detectors shall be more than 4 inches from a wall. Wall mounted smoke detectors shall be mounted between 4 inches and 12 inches from ceiling. Smoke detectors shall be installed more than 3 feet from windows, doors, and vents. Smoke detectors must be hardwired or have a sealed, tamper-resistant, 10-year battery.

13. Provide a working CO detector immediately adjacent to bedrooms on each floor when the unit is serviced by gas fired equipment or has an attached garage. Combo smoke/CO detectors are acceptable.

14. Provide exterior lighting to illuminate all parking areas, dumpster pads, building entrances and mailboxes with a minimum of one foot-candle of illumination. Provide illumination so that building numbers and apartment numbers are legible at night. New and replacement exterior fixtures shall be LED or fluorescent. Exterior fixture type and color temperature shall match throughout site.
    EXCEPTION: Tenant controlled exterior lighting.

Virginia Housing Loan Application A&E Submission Requirements:

- The submission requirements listed below are for developments applying for Virginia Housing financing.
- If the development is receiving both Virginia Housing financing and LIHTC, the scope of work must include enhancement items selected in the Tax Credit Application.
- Submit digital drawings, specifications and reports in PDF form for review through the Procorem Plan Review Work Center. Separate each design discipline into a separate PDF file for review, and include one PDF file for the specification book.
- See Virginia Housing Webpage for Review Process and Process Flow Charts

New Construction Requirements

1. Civil drawings **
2. Architectural drawings *
3. Structural drawings **
4. Mechanical drawings **
5. Plumbing drawings (including identification of NFPA fire suppression standard in code analysis sheet)**
6. Electrical drawings (including Fire Alarm as applicable) **
7. Three-part specification book encompassing all work *
8. Site lighting and photometric drawings **
9. Landscape drawings
10. Geotechnical Report ***
11. Phase I Environmental Site Assessment ***
12. Phase II Environmental Reports as recommended by Phase I, or required by Virginia Housing ***
13. Narrative scope of work with itemized cost estimate

Rehabilitation Requirements

1. Civil drawings **
2. Architectural drawings *
3. Structural drawings **
4. Mechanical drawings **
5. Plumbing drawings (including identification of NFPA fire suppression standard in code analysis sheet)**
6. Electrical drawings (including Fire Alarm as applicable) **
7. Three-part specification book, or outline specification, encompassing all work *
8. Site lighting and photometric drawings **
9. Landscape drawings
10. 100% unit condition survey not older than 6 months prior to submission (provided by architect or 3rd Party)
11. Termite report ***
12. Water intrusion report (provided by architect or 3rd Party) See Architectural Rehabilitation section for more information.
13. Sanitary and storm sewer video report. See Plumbing Rehabilitation section for more information ***
14. Roof Condition reports. See Architectural Rehabilitation section for more information ***
15. Elevator equipment inspection report ****
16. Phase I Environmental Site Assessment ***
17. Phase II Environmental Reports as recommended by Phase I, or required by Virginia Housing ***

18. Narrative scope of work with itemized cost estimate
19. Structural reports, when applicable. See Architectural Rehabilitation section for more information ***

* 85% complete Construction Documents prepared by a Virginia licensed architect.
** 85% complete Construction Documents prepared by a Virginia licensed Professional Engineer.
*** Provided by a third-party, licensed professional, at time of loan application.

4% LIHTC Application A&E Submission Requirements:

- The submission requirements listed below are for developments applying only for a 4% LIHTC allocation from Virginia Housing.
- The scope of work must include enhancement items selected in the Tax Credit Application.
- Submit digital drawings, specifications and reports in PDF form for review through the Procorem Plan Review Work Center. Separate each design discipline into a separate PDF file for review, and include one PDF file for the specification book.
- See Virginia Housing Webpage for Review Process and Process Flow Charts
- For 9% LIHTC submission requirements see the Virginia Housing Federal Housing Credit Manual.

New Construction Requirements

1. Civil drawings **
2. Architectural drawings *
3. Structural drawings **
4. Mechanical drawings **
5. Plumbing drawings (including identification of NFPA fire suppression standard in code analysis sheet)**
6. Electrical drawings (including Fire Alarm as applicable) **
7. Three-part specification book encompassing all work *
8. Site lighting and photometric drawings **
9. Landscape drawings ****
10. Phase I Environmental Site Assessment ***
11. Phase II Environmental Reports as recommended by Phase I, or required by Virginia Housing ****

Rehabilitation Requirements

1. Civil drawings **
2. Architectural drawings *
3. Structural drawings**
4. Mechanical drawings **
5. Plumbing drawings (including identification of NFPA fire suppression standard in code analysis sheet)**
6. Electrical drawings (including Fire Alarm as applicable) **
7. Three-part specification book, or outline specification, encompassing all work *
8. Site lighting and photometric drawings **
9. Landscape drawings ****
10. 100% unit condition survey not older than 6 months prior to submission (provided by architect or 3rd Party)
11. Termite report ****
12. Water intrusion report (provided by architect or 3rd Party). See Architectural Rehabilitation section for more information
13. Sanitary and storm sewer video report. See Plumbing Rehabilitation section for more information ***
14. Roof condition report. See Architectural Rehabilitation section for more information ***
15. Elevator equipment inspection report ****
16. Phase I Environmental Site Assessment ***
17. Phase II Environmental Reports as recommended by Phase I, or required by Virginia Housing ****
18. Structural reports, when applicable. See Architectural Rehabilitation section for more information ***

* Complete through Design Development phase and prepared by a Virginia licensed architect.

** Complete through Design Development phase and prepared by a Virginia licensed Professional Engineer.

*** Provided by a third-party, licensed professional, at time of LIHTC application.

**** Provided by a third-party, licensed professional, prior to Virginia Housing preconstruction conference.

Virginia Housing Architectural and Engineering Review Process

Prior to issuing 42(m) letter, or Loan Commitment

The architect of record must upload the A&E submission documents to the Procorem Plan Review work center at the time of loan or LIHTC application. Virginia Housing will review the submission and provide comments. A renovation deal will require a site visit to ensure the scope of work considers the existing condition of the property. A&E review comments will be captured in a memo that will be shared with the developer and their architect through the Procorem Plan Review work center. The developer's architect and engineers will amend the memo with their responses. An item will remain "open" until a satisfactory response and corresponding revision to the plans or specifications has been received. Resubmissions will be uploaded to Procorem by the architect of record, and must include both a fully responded to memo, and revised plans and specifications. All revisions must be "clouded and tagged", and the revision ID number and date must be added to the affected sheet's title block. **With each resubmission, provide an updated Title Sheet and Index of Drawings.** Show each sheet's revision dates in the index such that the Index of Drawings establishes a running record of revisions for each sheet. Sheet issuance dates may also be tracked in the index, but a sheet issuance shall not contain revisions unless each revision is identified as described above. **Finally, the review process must be completed (no "open" items) before a 42(m) letter or loan commitment will be issued**.

Further, developments seeking 4% LIHTC without financing from Virginia Housing must upload to the Procorem Plan Review work center the closed-out A&E memo, signed by the developer and architect of record, acknowledging that all MDCR, tax credit enhancements, and any comments generated from the A&E review will be incorporated into the development's final scope of work.

Prior to Bond Inclusion Date (Developments Financed by Virginia Housing Only)

A Contract Set of plans and specifications is required at least 7 days prior to Bond Inclusion date. If revisions occur after Virginia Housing closes the A&E review, they must be approved by Virginia Housing before the Contract Set submission. Submit a narrative describing and locating the revisions along with only the affected sheets.

Once all open items from the A&E review have been closed **and new revisions approved,** the developer may upload the Contract Set of plans and specifications which include all revisions and addenda made during the Virginia Housing A&E review process to the Procorem Plan Review work center. Past revision clouds and tags must be removed except for any revisions that were included in the narrative described above. The Contract Set shall include an Index of Drawings identifying all sheets in the set by sheet number and sheet title. **In addition, the index must identify all revision dates for each sheet.** Each sheet's revision dates must be identified on its title block **and match the Index of Drawings**. Add the Virginia Housing Signature Block (found on the Virginia Housing website) to the Contract Set's Title Sheet, the Index Sheet, and the seal section of the specification book. The signature block must be digitally signed (through Adobe or BlueBeam) by an **authorized officer** from the developer, architect of record, and general contractor's company. The developer is responsible for providing a copy of the signed Contract Set of plans and specifications to all parties of the Virginia Housing construction contract. Each sheet of the Contract Set must include the architect of record's seal and signature, except drawings completed by consulting engineers which must be signed and sealed by the applicable engineer. Digital seals and signatures are acceptable. **The signed Contract Set of plans and specifications must be reviewed and approved by Virginia Housing before the Bond Inclusion date, or the deal will not be included in the bond pricing. Virginia Housing reserves 7 days to review the set. Furthermore, the deal will not be included in the bond pricing if Locality final site plan approval has not been obtained prior to Bond Inclusion date.**

Submittals Required after Completion of Construction

Architect to review and approve the general contractor's as-built drawings and create an as-built package to include all revisions and changes to drawings and specifications. Architect to submit the as-built package in PDF format through the **Procorem** Plan Review work center at the completion of construction and before the loan may convert to permanent financing.

Solid vertical lines in margins identify technical changes and additions to Virginia Housing's 2024 Minimum Design and Construction Requirements. Format changes such as reorganization, number changes, and phrasing are not identified.

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SECTION 01 81 13 - ENTERPRISE GREEN COMMUNITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Building 1 in phase 1 of the project is designed to achieve the mandatory 2020 Enterprise Green Communities MultiFamily Specification requirements and no less than 40 points under the Enterprise Green Communities Criteria Checklist. This sustainability guideline will not apply to Buildings 2 and 3 in phase 2.

B. Refer to EGC Scorecard accompanying this Section for EGC Mandatory Criteria and Points pursued for this Project.

C. Contractor is responsible for all requirements of EGC that are contained throughout these Specifications.

1.2 CONTRACTOR EGC ACTION PLAN SUBMITTALS

A. General: Within 30 days of contract award, submit a Enterprise Green Communities Action Plan based upon Scorecard indications of Enterprise Green Communities Credits pursued Contractor's approach to achievement of those credits.

1.3 EGC PRODUCT DATA SUBMITTALS

A. General: Provide Submittal information demonstrating EGC compliance as described herein.

B. Material Content Data: For each EGC related product submitted for Divisions 03-10 and 31-33 provide the following data:

1. Designation of total recycled-content materials.
2. FSC-certification of sustainably harvested wood materials, or documentation of salvaged wood content, or documentation of engineered wood content in wood-based materials.

C. Low-Emitting Materials: Provide manufacturer information as described in Division 01 Section "Indoor Air Quality Requirements".

1.4 EGC MONTHLY REPORTS

A. Monthly Progress Tracking: with each application for payment, submit reports comparing actual purchasing and construction activities with EGC Action Plans. Provide updated information submittal using spreadsheet for the following GC Credits sought for this Project:

1.5 EGC CLOSEOUT SUBMITTALS

A. General: At completion of construction and prior to contract closeout, submit the following documentation in electronic format.

B. Final Package per requirements of Division 01 Section "Construction Waste Management and Disposal".

C. Final Packages per requirements of Division 01 section "Indoor Air Quality Requirements".

1.6 CONTRACTOR EGC COORDINATION

A. Designate one Contractor Coordinator for this project.

B. Contractor is responsible for all requirements of the 2020 Criteria that are contained throughout these Specifications, including successful compliance with and passage of visual inspections and performance tests by verifying party.

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C. ENERGY STAR verification: Contractor is responsible for coordinating with appropriate verification team members to ensure inspections and leakage tests can be performed at the appropriate times and without delaying construction progress;

1. Coordinate framers, plumbers, HVAC, insulators, and drywall trades to minimize uncontrolled air leakage pathways between residential units by sealing all penetrations in walls, ceilings, and floors in the units and by sealing all vertical chases adjacent to the units.

PART 2 - PRODUCTS

2.1 GENERAL

A. Calculate material cost per EGC guidelines, excluding labor, installation equipment, mechanical, electrical and plumbing components and specialty items such as elevators.

PART 3 - EXECUTION

A. See Attached 2020 Enterprise Green Communities Criteria Checklist.

1. Checklist is under development and will be attached to future submissions.
2. Phase 2 (Buildings 2 and 3) of Roanoke Gateway will be designed to meet 2020 Enterprise Green Communities but will not seek certification.
3. Phase 1 (Building 1) of Roanoke Gateway will seek certification under 2020 Enterprise Green Communities.

END OF SECTION

SD Set Update: 3/12/2025
Building 1 only

M = MANDATORY
= OPTIONAL POINTS

CRITERIA CHECKLIST

This checklist provides an overview of the technical requirements within the Enterprise Green Communities Criteria.

To achieve Enterprise Green Communities Certification, all projects must achieve compliance with the Criteria mandatory measures applicable to that construction type. **New Construction projects must also achieve at least 40 optional points, and Substantial and Moderate Rehab projects must also achieve at least 35 optional points.**

These projects that also comply with Criterion 5.2b or Criterion 5.4 will be recognized with Enterprise Green Communities Certification Plus.

1. INTEGRATIVE DESIGN

(X) YES ( ) NO ( ) MAYBE	M	**1.1 Integrative Design: Project Priorities Survey** Complete the Project Priorities Survey, which can be found in the *Appendix*.
(X) YES ( ) NO ( ) MAYBE	M	**1.2 Integrative Design: Charrettes and Coordination Meetings** Develop an integrative design process that moves the outputs of the Project Priorities Survey into action through a series of collaborative meetings. Prioritize multi-benefit strategies. Assign responsibility within your design and development teams for accountability.
(X) YES ( ) NO ( ) MAYBE	M	**1.3 Integrative Design: Documentation** Include Enterprise Green Communities Criteria information in your contract documents and construction specifications (Division 1 Section 01 81 13 Sustainable Design Requirements) as necessary for the construction team to understand the requirements and how they will be verified. Ensure, and indicate, that the drawings and specifications have been generated to be compliant and meet the certification goals.
(X) YES ( ) NO ( ) MAYBE	M	**1.4 Integrative Design: Construction Management** Create, implement, and document your contractor/subcontractor education plan to ensure that all persons working on-site fully understand their role in achieving the project objectives. Include a summary of the Project Priorities Survey (Criterion 1.1), the sustainability goals, and anticipated roles of each party in regards to the performance expected of the project. Attach and reference this training plan to Division 1 Section 01 81 13 Sustainable Design Requirements. Include timeline estimates for performance testing and verification schedules in the overall construction schedule. As relevant, review requirements for Criteria 8.1, 8.2, and 8.3, and begin populating these documents with relevant information from design and construction.
( ) YES ( ) NO ( ) MAYBE	12 or 15	**1.5 Design for Health and Well-Being: Health Action Plan** Follow Steps 1–6 of the Health Action Plan framework per the full criterion. *[12 points with extra 3 points for Step 7]* This includes: 1) Commit to embedding health into the project lifecycle; 2) Partner with a project health professional; 3) Collect and analyze community health data; 4) Engage with community stakeholders to prioritize health data and strategies; 5) Identify strategies to address those health issues; 6) Create an implementation plan; and 7) Create a monitoring plan.

M = MANDATORY
= OPTIONAL POINTS

INTEGRATIVE DESIGN *(continued)*

◯ YES ◯ NO ◯ MAYBE | 10

1.6 Resilient Communities: Multi-Hazard/Vulnerability Assessment

Conduct a four-part assessment (social, physical, functional, strategy) to identify critical risk factors of your property and implement at least two sets of strategies to enable the project to adapt to, and mitigate, climate related or seismic risks. See full criterion for more guidance.

◯ YES ◯ NO ◯ MAYBE | 8

1.7 Resilient Communities: Strengthening Cultural Resilience

Integrate community and resident participation in the development processes so that the built environment honors cultural identities, resident voices, and community histories.

Option 1: Complete a Cultural Resilience Assessment

OR
Option 2: Convene a Cultural Advisory Group

SUBTOTAL OPTIONAL POINTS

2. LOCATION + NEIGHBORHOOD FABRIC

(X) YES ◯ NO ◯ MAYBE | M

2.1 Sensitive Site Protection

All projects must:

1. Protect floodplain functions (e.g., storage, habitat, water quality) by limiting new development within the 100-year floodplain of all types of watercourses.
2. Conserve and protect aquatic ecosystems, including wetlands and deepwater habitats, that provide critical ecosystem functions for fish, other wildlife, and people.
3. Protect ecosystem function by avoiding the development of areas that contain habitat for plant and animal species identified as threatened or endangered.
4. Conserve the most productive agricultural soils by protecting prime farmland, unique farmland, and farmland of statewide or local importance.

If your site contains any of these ecologically sensitive features, follow the specific Requirements under that subheading.

(X) YES ◯ NO ◯ MAYBE | M

2.2 Connections to Existing Development and Infrastructure

(Mandatory for New Construction projects that do not qualify as Rural/Tribal/Small Town)
Locate the project on a site with access to existing roads, water, sewers, and other infrastructure and within or contiguous to (having at least 25% of the perimeter bordering) existing development. Connect the project to the existing pedestrian network. For sites over 5 acres, provide connections to the adjacent street network at least every 800 feet. Tie all planned bike paths to existing bike paths.

(X) YES ◯ NO ◯ MAYBE | M

2.3 Compact Development *(Mandatory for New Construction)*

At a minimum, build to the residential density (dwelling units/acre) of the census block group where the project is located. In Rural/Tribal/Small Town locations that do not have zoning requirements: Build to a minimum net density of 5 units per acre for single-family houses; 10 units per acre for multifamily buildings, single and two-story; and 15 units per acre for multifamily buildings greater than two-stories.

M = MANDATORY
= OPTIONAL POINTS

(X) YES ( ) NO ( ) MAYBE — 5 or [7]

existing: 4.27 units/acre
proposed: 38 units/acre

8X

2.4 Compact Development

Exceed the residential density (dwelling units/acre) of the census block group in which your project is located. Exceed by 2x for *[5 points]*; exceed by 3x for *[7 points]*. In Rural/Tribal/Small Towns that do not have zoning requirements, build to a minimum net density of 7.5 units per acre for single-family houses; 12 units per acre for multifamily buildings, single and two-story; and 20 units per acre for multifamily buildings greater than two stories. *[5 points]*

(X) YES ( ) NO ( ) MAYBE — M

2.5 Proximity to Services and Community Resources *(Mandatory for New Construction)*

Locate the project within a 0.5-mile walk distance of at least four, or a 1-mile walk distance of at least seven, of the listed services. For projects that qualify as Rural/Tribal/Small Town, locate the project within 5 miles of at least four of the listed services.

( ) YES ( ) NO ( ) MAYBE — N/A M

2.6 Preservation of and Access to Open Space for Rural/Tribal/Small Town

(Mandatory for New Construction Rural/Tribal/Small Town)

Option 1: Locate the project within a 0.25-mile walk distance of dedicated public open space that is a minimum of 0.75 acres; at least 80% of which unpaved.

OR

Option 2: Set aside a minimum of 10% (minimum of 0.25 acres) of the total project acreage as open and accessible to all residents; at least 80% of which unpaved.

( ) YES ( ) NO ( ) MAYBE — 6 max

2.7 Preservation of and Access to Open Space

Option 1: Locate the project within a 0.25-mile walk distance of dedicated open space that is a minimum of 0.75 acres; at least 80% of which unpaved.

OR

Option 2: Set aside a percentage of permanent open space for use by all residents; at least 80% of which unpaved. 20% *[2 points]*; 35% *[4 points]*; 45% + written statement of preservation/conservation policy *[6 points]*.

( ) YES ( ) NO (X) MAYBE

2.8 Access to Transit *(Mandatory for New Construction projects that do not qualify as Rural/Tribal/Small Town; Optional for all other project types)*

<0.1 miles to bus stops

need to check trip counts

1 mile walk to Amtrak - bike trails are probably not up to par for this, but worth more research on current city improvement plans

M

Mandatory: New Construction, not Rural/Tribal/Small Town

Locate projects within a 0.5-mile walk distance of transit services (bus, rail and/or ferry), constituting at least 45 or more transit rides per weekday, with some type of weekend service.

[2]

Optional: New Construction, not Rural/Tribal/Small Town

Locate the project along dedicated bike trails or lanes (Class I, II, or IV) that lead to high-quality transit services (100 trips per day) within 3 miles. *[2 points]*

2, 6, 8

Optional: Rehabilitation, not Rural/Tribal/Small Town

Locate projects within a 0.5-mile walk distance of public transit services (bus, rail and/or ferry), constituting at least 45 or more transit rides per weekday, with some type of weekend service. *[6 points]* Locate the project along dedicated bike trails or lanes (Class I, II, or IV) that lead to high-quality transit services (100 trips per day) within 3 miles. *[2 points]*

N/A 6

Optional: New Construction and Rehabilitation, Rural/Tribal/Small Town

Locate the project within 0.5 mile walk distance of public transit services with at least 45 rides per weekday and some weekend service. OR, Install at least two charging stations for electric vehicles. OR, Locate the project with 5 miles of one of the following transit options: 1) vehicle share program; 2) dial-a-ride program; 3) employer vanpool; 4) park-and-ride; 5) public/private regional transportation.

M = MANDATORY
= OPTIONAL POINTS

LOCATION + NEIGHBORHOOD FABRIC *(continued)*

◯ YES ◯ NO ◯ MAYBE	2–8	**2.9 Improving Connectivity to the Community** Improve access to community amenities through at least one of the options incentivizing biking mobility or improving access to transit.
◯ YES ◯ NO ◯ MAYBE	5 max	**2.10 Passive Solar Heating/Cooling** Design and build with passive solar design, orientation, and shading that meet the guidelines specified.
◯ YES ◯ NO ◯ MAYBE	6	**2.11 Adaptive Reuse of Buildings** Rehabilitate and adapt an existing structure that was not previously used as housing. Design the project to adapt, renovate, or reuse at least 50% of the existing structure and envelope.
◯ YES ◯ NO ◯ MAYBE	6	**2.12 Access to Fresh, Local Foods** Provide residents and staff with access to fresh, local foods through one of the following options: **Option 1:** Neighborhood Farms and Gardens **Option 2:** Community-Supported Agriculture **Option 3:** Proximity to Farmers Market
◯ YES ◯ NO ◯ MAYBE	8	**2.13 Advanced Certification: Site Planning, Design, and Management** Locate building(s) within a community that is certified in LEED for Neighborhood Development, LEED for Cities and Communities, Living Community Challenge, or SITES.
◯ YES ◯ NO (X) MAYBE Points achievable here - not sure how many at this time	6 max [2] OR 3 OR 3	**2.14 Local Economic Development and Community Wealth Creation** Demonstrate that local preference for construction employment and subcontractor hiring was part of your bidding process, and how it functioned during construction. Demonstrate that you achieved at least 20% local employment. Provide physical space for small business, nonprofits, and/or skills and workforce education.
(X) YES ◯ NO ◯ MAYBE	M	**2.15a Access to Broadband: Broadband Ready** *(Mandatory for New Construction and Substantial Rehab Projects in Rural/Tribal/Small Town Locations)* Incorporate broadband infrastructure so that when broadband service comes to a community, the property can be easily connected. Include a network of mini-ducts or conduit throughout the building, extending from the expected communications access point to each network termination point in the building.
◯ YES ◯ NO (X) MAYBE	[6]	**2.15b Access to Broadband: Connectivity** Ensure all units and common spaces in the property have broadband internet access with at least a speed of 25/3 mbs.

SUBTOTAL OPTIONAL POINTS

M = MANDATORY
= OPTIONAL POINTS

3. SITE IMPROVEMENTS

(X) YES ( ) NO ( ) MAYBE	M	**3.1 Environmental Remediation** Determine whether there are any hazardous materials present on the site through one of the four methods listed. Mitigate any contaminants found.
(X) YES ( ) NO ( ) MAYBE	M	**3.2 Minimization of Disturbance During Staging and Construction** For sites >1 acre, implement EPA's National Pollutant Discharge Elimination System Stormwater Discharges from Construction Activities guidance, or local requirements, whichever is more stringent. For sites with an area ≤1, follow guidance in full criterion.
(X) YES ( ) NO ( ) MAYBE	M	**3.3 Ecosystem Services/Landscape** *(Mandatory, if providing landscaping)* If providing plantings, all must be native or climate-appropriate (adapted) to the region and appropriate to the site's soil and microclimate. Do not introduce any invasive plant species. Plant, seed, or xeriscape all disturbed areas.
(X) YES ( ) NO ( ) MAYBE	M	**3.4 Surface Stormwater Management** *(Mandatory for New Construction; Mandatory for Substantial and Moderate Rehab projects if land disturbed is ≥5,000 sq.ft.)* Treat or retain on-site precipitation equivalent to the 60th percentile precipitation event. Where not feasible due to geotechnical issues, soil conditions, or the size of the site, treat or retain the maximum volume possible.
( ) YES ( ) NO ( ) MAYBE Further study needed	10 max	**3.5 Surface Stormwater Management** Through on-site infiltration, evapotranspiration, and rainwater harvesting, retain precipitation volume from 70% precipitation event *[6 points]*, 80% precipitation event *[8 points]*, or 90% precipitation event *[10 points]*.
( ) YES ( ) NO ( ) MAYBE	N/A M	**3.6 Efficient Irrigation and Water Reuse** *(Mandatory, if permanent irrigation is utilized)* If irrigation is utilized, install an efficient irrigation system per the requirements listed.
( ) YES ( ) NO ( ) MAYBE	4 or 6	**3.7 Efficient Irrigation and Water Reuse** *(Optional, if irrigation is utilized)* Meet the requirements of Criterion 3.6 AND: **Option 1:** Install an efficient irrigation system equipped with a WaterSense labeled weather-based irrigation controller (WBIC) OR **Option 2:** At least 50% of the site's irrigation satisfied by water use from the sources listed.
		SUBTOTAL OPTIONAL POINTS

M = MANDATORY
= OPTIONAL POINTS

4. WATER

(X) YES ( ) NO ( ) MAYBE — M

4.1 Water-Conserving Fixtures

Reduce total indoor water consumption by at least 20% compared to baseline indoor water consumption chart. Any new toilet, showerhead, and/or lavatory faucet must be WaterSense certified. For all single-family homes and all dwelling units in buildings three stories or fewer, the supply pressure may not exceed 60 psi.

( ) YES ( ) NO ( ) MAYBE — 6 max

4.2 Advanced Water Conservation

Reduce total indoor water consumption by at least 30% compared to baseline indoor water consumption chart. Any new toilet, showerhead, and/or lavatory faucet must be WaterSense certified.

( ) YES ( ) NO ( ) MAYBE

4.3 Water Quality

M, 3 — **Mandatory/Optional:** Mandatory for Substantial Rehabs of buildings built before 1986; Optional for all other building types: Replace lead service lines *[3 points]*

N/A M — **Mandatory:** For multifamily buildings with either a cooling tower, a centralized hot water system, or 10+ stories: Develop a Legionella water management program

8 — **Optional:** Test and remediate as indicated for lead, nitrates, arsenic, and coliform bacteria

( ) YES ( ) NO ( ) MAYBE — 4

4.4 Monitoring Water Consumption and Leaks

Conduct pressure-loss tests and visual inspections to determine if there are leaks; fix leaks.

AND

Install an advanced water monitoring and leak detection system capable of identifying and shutting water off during anomalous water events.

OR

Install a device to separately monitor water consumption of each cold branch off the apartment line riser for each dwelling unit or each cold water riser and the domestic hot water cold water feed for each building or each toilet that allows remote monitor readings; common laundry facilities; boiler makeup water; outdoor water consumption; and water consumption in any non-residential space.

( ) YES ( ) NO (X) MAYBE — 4

4.5 Efficient Plumbing Layout and Design

Store no more than 0.5 gallon of water in any piping/manifold between the fixture and the water heating source or recirculation line. No more than 0.6 gallon of water shall be collected from the fixture before a 10-degree Fahrenheit rise in temperature is observed. Recirculation systems must be demand-initiated.

( ) YES ( ) NO ( ) MAYBE — 6 max

4.6 Non-Potable Water Reuse

Harvest, treat, and reuse rainwater and/or greywater to meet a portion of the project's non-potable water needs: 10% reuse *[3 points]*; 20% reuse *[4 points]*; 30% reuse *[5 points]*; 40% reuse *[6 points]*.

( ) YES ( ) NO ( ) MAYBE — 8

4.7 Access to Potable Water During Emergencies

Provide residents with ready access to potable water in the event of an emergency that disrupts normal access to potable water, including disruptions related to power outages that prevent pumping water to upper floors of multifamily buildings or pumping of water from on-site wells, per one of the three options listed.

SUBTOTAL OPTIONAL POINTS

M = MANDATORY
= OPTIONAL POINTS

5. OPERATING ENERGY

(X) YES ( ) NO ( ) MAYBE — M

5.1a Building Performance Standard *(Mandatory for New Construction)*

Certify all buildings with residential units in the project through either ENERGY STAR Multifamily New Construction, ENERGY STAR Manufactured Homes, and/or ENERGY STAR Certified Homes as relevant.

AND

Provide projected operating energy use intensity and projected operating building emissions intensity.

( ) YES ( ) NO ( ) MAYBE — N/A M

5.1b Building Performance Standard *(Mandatory for Rehab)*

Provide projected operating energy use intensity and projected operating building emissions intensity.

AND

Conduct commissioning for compartmentalization, insulation installation, and HVAC systems as indicated.

AND one of the following options:

- ERI Option: ≤HERS 80 for each dwelling unit. Exception for some Rehabs built before 1980.
- ASHRAE Option: Energy performance of the completed building equivalent to, or better than, ASHRAE 90.1-2013 using an energy model created by a qualified energy services provider according to Appendix G 90.1-2016.

( ) YES ( ) NO ( ) MAYBE — 12 max / N/A

5.2a Moving to Zero Energy: Additional Reductions in Energy Use

(Not available for projects using prescriptive path for Criterion 5.1a or for projects following Criterion 5.2b or 5.4.)

Projects in CZ 1-4A following this criterion must also comply with Criterion 7.8.

Design and construct a building that is projected to be more efficient that what is required by Criteria 5.1a/b. Achieve HERS score of 5 lower than required by 5.1a/b if following ERI path for compliance OR 5% greater efficiency than required if following ASHRAE path for 5.1a/b compliance *[5 points]*.

Additional 1 point for each additional 2-point decrease in HERS score required by Criteria 5.1a/b if following ERI path for compliance OR for 1% greater efficiency if following ASHRAE path for Criteria 5.1a/b, up to a maximum of 12 optional points.

( ) YES ( ) NO (X) MAYBE — 12–15 / M or 12 pts?

5.2b Moving to Zero Energy: Near Zero Certification [Mandatory for Enterprise Green Communities Certification Plus] *(Not available for projects following Criterion 5.2a or 5.4.)*

Projects in CZ 1-4A following this criterion must also comply with Criterion 7.8.

Certify the project in a program that requires advanced levels of building envelope performance such as DOE ZERH *[12 points]* and/or PHI Classic or PHIUS+ *[15 points]*.

(X) YES ( ) NO ( ) MAYBE — 3–6

5.3a Moving to Zero Energy: Photovoltaic/Solar Hot Water Ready

(Not available for projects following Criterion 5.3b or 5.4.)

Orient, design, engineer, wire, and/or plumb the development through the Photovoltaic Ready pathway or Solar Hot Water Ready Pathway to accommodate installation of photovoltaic (PV) or solar hot water system in the future.

M = MANDATORY
= OPTIONAL POINTS

OPERATING ENERGY *(continued)*

◯ YES ◯ NO ◯ MAYBE	8 max	**5.3b Moving to Zero Energy: Renewable Energy** *(Not available for projects following Criterion 5.3a or 5.4)* Install renewable energy source to provide a specified percentage of the project's estimated source energy demand. See full criterion for allowable sources.
	4–8	**Option 1:** For percentage of total project energy consumption provided by renewable energy.
		OR
	1–5	**Option 2:** For percentage of common area meter energy consumption provided by renewable energy.
◯ YES ◯ NO ◯ MAYBE	24	**5.4 Achieving Zero Energy** [Automatic Qualification for Enterprise Green Communities Certification Plus] *(Not available for projects following Criterion 5.2a, 5.2b, 5.3a, or 5.3b.)* Projects in CZ 1-4A following this criterion must also comply with Criterion 7.8. Achieve Zero Energy performance through one of the following options: **Option 1:** Certify each building in the project to DOE Zero Energy Ready Home program or PHI Plus AND Either install renewables and/or procure renewable energy, which in sum will produce as much, or more, energy in a given year than the project is modeled to consume. OR **Option 2:** Certify each building in the project in a program that requires zero energy performance such as PHIUS+ Source Zero, PHI Plus, PHI Premium, ILFI's Zero Energy Petal, Zero Carbon Petal, or Living Building Certification.
◯ YES ◯ NO ◯ MAYBE	5 max N/A	**5.5a Moving to Zero Carbon: All-Electric Ready** *(Not available for projects following Criterion 5.5b)* Ensure the project has adequate electric service and has been designed and wired to allow for a seamless switch to electricity as a fuel source in the future for the following uses: space heating *[1 point]*, space cooling *[1 point]*, water heating (DHW) *[1 point]*, clothes dryers *[1 point]*, equipment for cooking *[1 point]*.
(X) YES ◯ NO ◯ MAYBE	15	**5.5b Moving to Zero Carbon: All Electric** *(Not available for projects following Criterion 5.5a)* No combustion equipment used as part of the building project; the project is all-electric.
◯ YES ◯ NO ◯ MAYBE	M N/A	**5.6 Sizing of Heating and Cooling Equipment** *(Mandatory for Substantial and Moderate Rehabs that include replacement of heating and cooling equipment. Not relevant for projects following 5.1a, 5.2b, or 5.4.)* Size and select heating and cooling equipment in accordance with ACCA manuals J and S OR in accordance with the ASHRAE Handbook of Fundamentals
◯ YES ◯ NO ◯ MAYBE	M N/A	**5.7 ENERGY STAR Appliances** *(Mandatory for Substantial and Moderate Rehabs providing appliances. Not relevant for projects following 5.1a, 5.2b, or 5.4.)* Install ENERGY STAR clothes washers, dishwashers, and refrigerators. If appliances will not be installed or replaced at this time, specify that at the time of installation or replacement, ENERGY STAR models must be used via Criterion 8.1 and Criterion 8.4.
(X) YES ◯ NO ◯ MAYBE	M	**5.8 Lighting** *(Mandatory for all lighting within New Construction and Substantial Rehab projects. Mandatory for new lighting in Moderate Rehab projects.)* Follow the guidance for high-efficacy permanently installed lighting and other characteristics for recessed light fixtures, lighting controls, lighting power density, and exterior lighting.

M = MANDATORY
= OPTIONAL POINTS

◯ YES ◯ NO ◯ MAYBE	8	**5.9 Resilient Energy Systems: Floodproofing** *(Not relevant for Rehab projects in Special Flood Hazard Areas)* Conduct floodproofing of lower floors, including perimeter floodproofing (barriers/shields). Design and install building systems as specified by the full criterion so that the operation of those systems will not be grossly affected in case of a flood.
◯ YES ◯ NO ◯ MAYBE	8	**5.10 Resilient Energy Systems: Critical Loads** Provide emergency power to serve at least three critical energy loads as described by the full criterion. **Option 1:** Islandable PV system OR **Option 2:** Efficient generator
		SUBTOTAL OPTIONAL POINTS

6. MATERIALS

◯ YES ◯ NO ◯ MAYBE	8 max	**6.1 Ingredient Transparency for Material Health** Install products that have publicly disclosed inventories characterized and screened to 1,000 ppm or better: ▪ 1 point per 5 installed Declare or HPD products from at least three different product categories ▪ 1 point per 2 installed Declare or HPD products in any of these categories: adhesives, sealants, windows ▪ 1 point per each product with third-party verified HPD or third party verified Declare label ▪ 2 points per each product with third-party verified HPD or third party verified Declare label in any of these categories: adhesives, sealants, windows
◯ YES ◯ NO ◯ MAYBE	3 max	**6.2 Recycled Content and Ingredient Transparency** Use building products that feature, and disclose, their recycled content. The building product must make up 75% by weight or cost of a project category for the project and be composed of at least 25% post-consumer recycled content.
◯ YES ◯ NO ◯ MAYBE	8 max	**6.3 Chemical Hazard Optimization** Install products that have third-party verification of optimization to 100 ppm or better per the options listed within the full criterion.
(X) YES ◯ NO ◯ MAYBE	M 15 max	**6.4 Healthier Material Selection** Select all interior paints, coatings, primers, and wallpaper; interior adhesives and sealants; flooring; insulation; and composite wood as specified. Optional points also available.
◯ YES ◯ NO ◯ MAYBE	12 max	**6.5 Environmentally Responsible Material Selection** Select concrete, steel, or insulation with a publicly disclosed EPD *[3 points]*, Install a green or cool roof *[3 points]*, use reflective paving *[3 points]*, and/or use FSC certified wood *[3 points]*. Refer to criterion for specifics.

M = MANDATORY
= OPTIONAL POINTS

MATERIALS *(continued)*

(X) YES ( ) NO ( ) MAYBE	M	**6.6 Bath, Kitchen, Laundry Surfaces** *(Mandatory for New Construction and Substantial Rehab. Moderate Rehabs that do not include work in the shower and tub areas are exempt from the shower and tub enclosure requirement.)* Use materials that have durable, cleanable surfaces throughout bathrooms, kitchens, and laundry rooms. Use moisture-resistant backing materials per ASTM # D 6329 or 3273 behind tub/shower enclosures, apart from one-piece fiberglass enclosures which are exempt.
( ) YES ( ) NO ( ) MAYBE Brick & concrete assumed	4 max 1	**6.7 Regional Materials** Use products that were extracted, processed, and manufactured within 500 miles of the project for a minimum of 90%, based on weight or on cost, of the amount of the product category installed. Select any or all of these options (every two compliant materials can qualify for 1 point): ▪ Framing ▪ Cladding (e.g. siding, masonry, roofing) ▪ Flooring ▪ Concrete/cement and aggregate ▪ Drywall/interior sheathing
(X) YES ( ) NO ( ) MAYBE	M	**6.8 Managing Moisture: Foundations** *(Mandatory for all New Construction projects and all Rehab projects with either basement and/or crawl space foundations)* Install capillary breaks and vapor retarders that meet specified criteria appropriate for the foundation type.
( ) YES ( ) NO ( ) MAYBE	M N/A	**6.9 Managing Moisture: Roofing and Wall Systems** *(Mandatory for all Rehab projects that include deficiencies in or include replacing particular assemblies called out below. New Construction projects are considered compliant per Criterion 5.1.)* Provide water drainage away from walls, window, and roofs by implementing the list of techniques.
(X) YES ( ) NO ( ) MAYBE	M 6 max	**6.10 Construction Waste Management** Develop and implement a waste management plan that reduces non-hazardous construction and demolition waste through recycling, salvaging, or diversion strategies through one of the three options. Achieve optional points by going above and beyond the requirement.
( ) YES ( ) NO ( ) MAYBE	2	**6.11 Recycling Storage** For projects with municipal recycling infrastructure and/or haulers, provide separate bins for the collection of trash and recycling for each dwelling unit and all shared community rooms. OR For projects without that infrastructure, advocate to the local waste hauler or municipality for regular collection of recyclables.
		SUBTOTAL OPTIONAL POINTS

M = MANDATORY
= OPTIONAL POINTS

7. HEALTHY LIVING ENVIRONMENT

(X) YES ( ) NO ( ) MAYBE — M

7.1 Radon Mitigation *(Mandatory for New Construction and Substantial Rehab)*

For New Construction in EPA Zone 1 areas, install passive radon-resistant features below the slab and a vertical vent pipe with junction box within 10 feet of an electrical outlet in case an active system should prove necessary in the future. For Substantial Rehab projects in EPA Zone 1, test before and after the retrofit and mitigate per the specified protocols.

( ) YES ( ) NO ( ) MAYBE — M / N/A

7.2 Reduce Lead Hazards in Pre-1978 Buildings
(Mandatory for Substantial Rehab of Buildings Constructed Before 1978)

Conduct lead risk assessment or inspection to identify lead hazards. Control identified lead hazards using lead abatement or interim controls, using lead-safe work practices that minimize and contain dust.

(X) YES ( ) NO ( ) MAYBE — M

7.3 Combustion Equipment

For New Construction and Rehab projects: Specify power-vented or direct-vent equipment when installing any new combustion appliance for space or water heating that will be located within the conditioned space. If there are any combustion appliances within the conditioned space, install one hard-wired carbon monoxide (CO) alarm with battery backup function for each sleeping zone, placed per National Fire Protection Association (NFPA) 72.

For Rehabs: If there is any combustion equipment located within the conditioned space for space or water heating that is not power-vented or direct-vent and that is not scheduled for replacement, conduct combustion safety testing prior to and after the retrofit; remediate as indicated.

( ) YES ( ) NO ( ) MAYBE — M / N/A

7.4 Garage Isolation

- Provide a continuous air barrier between the conditioned space and any garage space to prevent the migration of any contaminants into the living space. Visually inspect common walls and ceilings between attached garages and living spaces to ensure that they are air-sealed before insulation is installed.
- Do not install ductwork or air handling equipment for the conditioned space in a garage.
- Fix all connecting doors between conditioned space and garage with gaskets or make airtight.
- Install one hard-wired CO alarm with battery backup function for each sleeping zone of the project, placed per NFPA 72 unless the garage is mechanically ventilated or an open parking structure.

(X) YES ( ) NO ( ) MAYBE — M

7.5 Integrated Pest Management

Seal all wall, floor, and joint penetrations with low-VOC caulking or other appropriate nontoxic sealing methods to prevent pest entry.

(X) YES ( ) NO ( ) MAYBE

7.6 Smoke-Free Policy *(Mandatory and Optional)*

M — **Mandatory:** Implement and enforce a smoke-free policy in all common area and within a 25-foot perimeter around the exterior of all residential buildings. Lease language must prohibit smoking in these locations and provide a graduated enforcement policy. Make the smoke-free policy readily available.

10 — **Optional:** Expand the policy above to include all indoor spaces in the property.

M = MANDATORY
= OPTIONAL POINTS

HEALTHY LIVING ENVIRONMENT *(continued)*

X YES ◯ NO ◯ MAYBE — M / 12 max

7.7 Ventilation *(Mandatory for New Construction and Substantial Rehab; Optional for Moderate Rehab)*

For each dwelling unit in full accordance with ASHRAE 62.2-2010, install:

- A local mechanical exhaust system in each bathroom *[3 points if Moderate Rehab]*
- A local mechanical exhaust system in each kitchen *[3 points if Moderate Rehab]*
- A whole-house mechanical ventilation system *[3 points if Moderate Rehab]*

Verify these flow rates are either within +/– 15 CFM or +/– 15% of design value.

For each multifamily building of four or more stories, in full accordance with ASHRAE 62.1-2010, install:

- A mechanical ventilation system for all hallways and common spaces *[3 points if Moderate Rehab]*

For all project types, in addition to the above requirements:

- All systems and ductwork must be installed per manufacturer's recommendations
- All bathroom fans must be ENERGY STAR-labeled and wired for adequate run-time.
- If using central ventilation systems with rooftop fans, each fan must be direct-drive and variable-speed with speed controller mounted near the fan. Fans with design CFM 300-2000 must also have an ECM motor.

X YES ◯ NO ◯ MAYBE — M or 5

7.8 Dehumidification *(Mandatory for properties in Climate Zones 1A, 2A, 3A, and 4A following Criterion 5.2a, 5.2b, or 5.4. Optional for all other properties.)*

Option 1: Design, select, and install supplemental dehumidification equipment to keep relative humidity <60%.

OR

Option 2: Equip all dwelling units with dedicated space, drain, and electrical hook-ups for permanent supplemental dehumidification systems to be installed if needed and install interior RH monitoring equipment as described.

X YES ◯ NO ◯ MAYBE — 3

7.9 Construction Pollution Management

Option 1: Earn the EPA Indoor airPlus label

OR

Option 2: In all dwelling units, seal all heating, cooling, and ventilation return and supply floor ducts and returns throughout construction to prevent construction debris from entering. Flush all dwelling units after completion of construction and prior to occupancy for either 48 hours or with at least 14,000 ft3 per ft2 of floor area, then replace all air handling equipment filters.

X YES ◯ NO ◯ MAYBE — 3

7.10 Noise Reduction

Option 1: Test and demonstrate that noise levels in bedrooms meet 30 dB LAeq (continuous) and 45 dB LAmax, (single sound).

OR

Option 2: Provide a noise abatement plan specific to the site covering general noise mitigation techniques in accordance with 24 CFR 51B.

OR

Option 3: Ensure all exterior wall and party wall penetrations are sealed with acoustical sealant, all party walls and floor/ceiling assemblies have an STC rating of at least 55, and exterior windows and doors in projects near a significant exterior noise source have an STC rating of at least 35.

M = MANDATORY
= OPTIONAL POINTS

◯ YES ◯ NO ◯ MAYBE	8	**7.11 Active Design: Promoting Physical Activity** *(All projects must comply with at least one of either Criterion 7.11, 7.12, or 7.13. Points are not available for that criterion, but, are available for projects that meet two or three of these criteria.)* **Option 1:** Encouraging Everyday Stair Usage (buildings that include stairs as the only means to travel from one floor to another are not eligible for this option.) Provide a staircase that is accessible and visible from the main lobby and is visible within a 25-foot walking distance from any point in the lobby per the specifications listed. Place point-of-decision signage. OR **Option 2:** Activity Spaces. Provide on-site dedicated recreation space with exercise or play opportunities for adults and/or children that is open and accessible to all residents; see criterion for specifics.
◯ YES ◯ NO ⓧ MAYBE	8	**7.12 Beyond ADA: Universal Design** *(All projects must comply with at least one of either Criterion 7.11, 7.12, or 7.13. Points are not available for that criterion, but, are available for projects that meet two or three of these criteria.)* Select and implement at least one of the Options with at least three different strategies in at least 75% units. **Option 1:** Create welcoming and accessible spaces that encourage equitable use and social connections. **Option 2:** Create spaces that are easy and intuitive to use and navigate. **Option 3:** Promote safety and create spaces that allow for human error. **Option 4:** Create spaces that can be accessed and used with minimal physical effort. **Option 5:** Create spaces with the appropriate size and space to allow for use, whatever the user's form of mobility, size, or posture.
◯ YES ◯ NO ⓧ MAYBE	8	**7.13 Healing-Centered Design** *(All projects must comply with at least one of either Criterion 7.11, 7.12, or 7.13. Points are not available for that criterion, but, are available for projects that meet two or three of these criteria.)* Select and implement at least two of the Options with at least two different strategies listed in at least 75% units. **Option 1:** Provide an environment that promotes feelings of real and perceived safety. **Option 2:** Create flexible spaces that allow for personalization and/or manipulation to meet individual and community needs. **Option 3:** Connect residents and staff to a living landscape and the natural environment. **Option 4:** Utilize art and culture in project design and programming and promote social connectedness.
		SUBTOTAL OPTIONAL POINTS

M = MANDATORY
= OPTIONAL POINTS

8. OPERATIONS, MAINTENANCE, AND RESIDENT ENGAGEMENT

(X) YES ( ) NO ( ) MAYBE	M	**8.1 Building Operations & Maintenance Manual and Plan** *(For all Multifamily projects)* Develop a manual with thorough building operations and maintenance (O&M) guidance and a complementary plan. The manual and plan should be developed over the course of the project design, development, and construction stages, and should include sections/chapters addressing the list of topics.
(X) YES ( ) NO ( ) MAYBE	M	**8.2 Emergency Management Manual** *(For all Multifamily projects)* Provide a manual on emergency operations targeted toward operations and maintenance staff and other building-level personnel. The manual should address responses to various types of emergencies, leading with those that have the greatest probability of negatively affecting the project. The manual should provide guidance as to how to sustain the delivery of adequate housing throughout an emergency and cover a range of topics, including but not limited to: ▪ communication plans for staff and residents ▪ useful contact information for public utility and other service providers ▪ infrastructure and building "shutdown" procedures ▪ plan for regular testing of backup energy systems, if these exist
(X) YES ( ) NO ( ) MAYBE	M	**8.3 Resident Manual** Provide a guide for homeowners and renters that explains the intent, benefits, use, and maintenance of their home's green features and practices. The Resident Manual should encourage green and healthy activities per the list of topics.
(X) YES ( ) NO ( ) MAYBE	M	**8.4 Walk-Throughs and Orientations to Property Operation** Provide a comprehensive walk-through and orientation for all residents, property manager(s), and buildings operations staff.
(X) YES ( ) NO ( ) MAYBE	M	**8.5 Energy and Water Data Collection and Monitoring** For rental properties, upload project energy and water performance data in an online utility benchmarking platform annually for at least five years from time of construction completion per one of the four methods provided; grant Enterprise view access for that period. For owner-occupied units, collect and monitor utility data in a manner that allows for easy access and review.

SUBTOTAL OPTIONAL POINTS

43 at least 40 Maybe

TOTAL OPTIONAL POINTS

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SECTION 01 81 16 - SUSTAINABLE DESIGN REQUIREMENTS – ENERGY STAR MULTIFAMILY NEW CONSTRUCTION (MFNC)

PART 1 - GENERAL

1.1 SUMMARY

A. This project is designed to meet the requirements of Energy Star Multifamily New Construction (ES MFNC) version 1.2 Revision 05. Energy Star Multifamily New Construction certification will be pursued for both phase 1 and phase 2, and the project will meet items in this section.

1.2 ENERGY STAR Multifamily New Construction (MFNC) Program Requirements

A. Throughout the construction process, a number of inspections and diagnostic tests are required to verify proper installation of the selected energy-efficient features and overall energy performance of the project. Some of the required checklists have been attached after this section for refernce. All documents and checklists can be found on the website www.energystar.gov under the ENERGY STAR Multifamily New Construction Program.

B. Energy Star MFNC Workbook

1. Completion of the Multifamily Workbook is a requirement for all paths. Compliance with the checklists is mandatory.
2. The results of the inspections must be documented in the Workbook and provided to the EPA or its designated agent at the completion of construction. Inspections should be conducted throughout the project construction phase at a time that is best suited to determine whether the energy efficiency element is installed to specification.

1.3 REFERENCES

A. ANSI A208.1 Standard for Particleboard

B. ANSI A208.2 Standard for Medium Density Fiberboard

C. ASHRAE Standard 52.2-1999: Method of Testing General Ventilation Air cleaning devices for removal efficiency by Particle Size.

D. ASTM C1371-04 – Standard Test method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.

E. ASTM C1549-04 – Standard Test Method for Determination of Solar Relectance Near Ambient Temperature Using a Portable solar Reflectometer.

F. ASTM E408-71(1996)e1 – Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.

G. ASTM E1918-97 – Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.

H. ASTM E1980-01 – Standard Practice for Calculating Solar Reflectance index of Horizontal and Low-Sloped Opaque Surfaces.

I. Energy Policy Act 1992.

J. EPA “Compendium of Methods for the determination of Air Pollutants in Indoor Air,” PB90200288.

K. EPA Energy Star Program.

L. EPA Water Sense Program.

M. Forest Stewardship Council (FSC) Guidelines.

N. International Standard ISO 14021-1999 – Environmental Labels and Declarations – Self-Declared Environmental Claims (Type II Environmental Labeling).

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O. Sheet Metal and Air Conditioning-General Contractors National Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995.

1.4 DEFINITIONS

A. CERTIFIED WOOD: Wood grown in sustainably managed forest certified by an FSC-accredited certification agency. FSC-Certified wood products must have Chain of Custody from forest to manufacturer.

B. CHAIN-OF-CUSTODY: Tracking procedure documenting the status of wood products from the forest to the ultimate consumer. Used to verify compliance with Forest Stewardship Council (FSC) guidelines.

C. CONSTRUCTION WASTE: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition.

D. EMISSIVITY: (a.k.a. infrared emittance): Indication of ability of a material to shed infrared radiation.

E. NON-TOXIC: Neither immediately poisonous to humans, nor poisonous after a long period of exposure.

F. POST-CONSUMER RECYCLED CONTENT: Waste material generated by households or by commercial industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. Recycled content shall be defined in accordance with ISO Standard 14021.

G. POTABLE WATER: Water suitable for drinking and supplied from wells or municipal water systems.

H. PRE-CONSUMER RECYCLED CONTENT: Material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind and scrap generated in a process and capable of being reclaimed within the same process that generated it. Recycled content shall be defined in accordance with ISO Standard 14021.

I. RECYCLING: Collection, reprocessing, marketing and use of materials that were recovered or diverted from solid waste stream.

J. REGIONALLY EXTRACTED, HARVESTED, OR RECOVERED: Refers to location where material was extracted, harvested or recovered. For products containing multiple materials, each material must be calculated separately.

K. REGIONALLY MANUFACTURED: Refers to location of final assembly of components into the building product furnished and installed by trades' people.

L. SEDIMENT: Soil and other debris that has been eroded and transported by storm or production run-off water.

M. SOLAR REFLECTANCE INDEX: Measure of a material's ability to reject solar heat, as shown by a small temperature rise. It is calculated accordingly to ASTM E1980 using material's Emittance and Reflectivity values. Standard black has an SRI of 0 and standard white has an SRI of 100.

N. SUSTAINABLE DESIGN: Design which reduces negative effects on the environment using sound ecological, social, and economic methods, while considering the health and comfort of a building's occupants.

O. SUSTAINABLE FORESTRY: The practice of managing forest resources to meet the long-term product needs of humans while maintaining the biodiversity of forested landscapes. The primary goal is to restore, enhance, and sustain a full range of forest values, both economic and ecological.

P. TOXIC: Poisonous to humans, either immediately, or after a long period of exposure.

Q. VENTILATION: The process of supplying and removing air to and from interior spaces by natural or mechanical means.

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R. VOLATILE ORGANIC COMPOUNDS (VOC): Carbon compounds that participate in atmospheric photochemical reactions, (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate). The compounds vaporize (become a gas) at normal room temperatures.

S. WASTE: Extra material or material that has reached end of its useful life in its intended use.

PART 2 - PRODUCTS

2.1 RECYCLED-CONTENT MATERIALS

A. Provide materials with maximum recycled content that meet all indoor air quality and specification requirements.

PART 3 - EXECUTION

3.1 The Energy Star Multifamily New Construction Checklists are attached after this section for the Contractor's use.

A. Checklist is under development and will be attached to future submissions.

3.2

END OF SECTION 01 81 16

ENERGY STAR Multifamily New Construction National Program Requirements, Version 1.2 (Rev. 05)

Eligibility Requirements

The following multifamily building types are eligible to participate in the ENERGY STAR Multifamily New Construction (MFNC) program:

- Any multifamily building with dwelling or sleeping units that is NOT a detached dwelling (e.g., not a single-family home or a duplex) or townhouse [1, 2, 3]; OR
- Any mixed-use buildings with dwelling or sleeping units, where the dwelling units, sleeping units, and common space exceed 50% of the building square footage. Parking garage square footage is excluded from this calculation. [1, 2, 4]

To determine the applicable MFNC program requirements, including the minimum Version and Revision, to which a building is eligible to be certified, visit www.energystar.gov/MFNCVersions.

While primarily intended for new construction, existing buildings (e.g., undergoing a substantial reconstruction or rehabilitation) are also eligible to participate in the ENERGY STAR Multifamily New Construction program, with guidance available at: www.energystar.gov/RehabGuidance.

For information about other ENERGY STAR residential new construction programs, visit www.energystar.gov/newhomesrequirements.

Note that compliance with these requirements is not intended to imply compliance with all local code requirements that may be applicable to the building to be built. [5]

Partnership, Training, and Credentialing Requirements

The following requirements must be met prior to certifying multifamily buildings:

- The Builder or Developer for the building is required to sign an ENERGY STAR Partnership Agreement and complete the online "Builder / Developer Orientation", which can be found at www.energystar.gov/homesPA.
- FT Agents must meet one of the following:
  - The HVAC installing contractor AND credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO). An explanation of this process can be found at www.energystar.gov/eshvac; OR
  - Not the HVAC installing contractor, AND
    - Signed up online in the EPA's online database as an FT Agent and watched the online FT Agent orientation, which can be found at www.energystar.gov/ftas; AND
    - Holds one of the credentials listed online here: www.energystar.gov/ftas or is a representative of the Original Equipment Manufacturer (OEM).
- Energy Rating Companies (e.g., rater companies and Providers [6]) are required to sign an ENERGY STAR Partnership Agreement, which can be found at www.energystar.gov/homesPA.
- Raters [7] are required to complete EPA-recognized training, which can be found at www.energystar.gov/mftraining, and be credentialed by a Home Certification Organization (HCO) [8] or meet the credential requirements of a Multifamily Review Organization (MRO) prior to completing inspections. Learn more at www.energystar.gov/hco and at www.energystar.gov/mro.
- Modelers for buildings in the ASHRAE Path must sign up online in the EPA's online database as a Modeler and watch the online Modeler orientation, which can be found at www.energystar.gov/ASHRAEdirectory.

ENERGY STAR Certification Process [8]

1. The certification process offers three paths to meet the performance target. Each has varying levels of flexibility to select a custom combination of measures for each building:
   a. **Prescriptive Path**: The units and common spaces meet or exceed all the items in the National Rater Design Review and Field Checklists, including, where specified, meeting the minimum requirements set in the ENERGY STAR Multifamily Reference Design, Exhibit 1. Buildings following 1a must be certified through an MRO. The EPA recommends that Raters identify their MRO during the design stage, but at the latest, the building must be under MRO oversight prior to the first inspection. MROs have limited discretion to grant an exemption to this policy (e.g., when a building switched Paths).

   b. **ERI Path**: Each unit is equivalent in performance to the minimum requirements of the ENERGY STAR Multifamily Reference Design, Exhibit 1, as assessed through energy modeling, and the building meets or exceeds the requirements in the National Rater Design Review and Field Checklists, including, where specified for common spaces, meeting the minimum requirements set in Exhibit 1 for common spaces. Buildings following 1b must be certified through an HCO.

      An EPA-recognized Home Certification Organization (HCO)'s Approved Software Rating Tool shall automatically determine the ENERGY STAR ERI Target, which is the highest ERI value that each rated unit may achieve to earn the ENERGY STAR. [10]

      Note: Raters must use an Approved Software Rating Tool that has been updated to ANSI / RESNET / ICC 301-2019 or later to use the ERI Path for buildings that exceed five stories.

   c. **ASHRAE Path**: The building meets or exceeds the ASHRAE performance target, as described in Exhibit 3. Buildings following 1c must be certified through an MRO. The EPA recommends that Raters identify their MRO during the design stage, but at the latest, the building must be under MRO oversight prior to the first inspection. MROs have limited discretion to grant an exemption to this policy (e.g., when a building switched Paths).

      Buildings must follow the modeling requirements in the ENERGY STAR Multifamily New Construction Simulation Guidelines – Appendix G 2016. **Exception**: For buildings that are certified as Phius CORE 2021 or Phius ZERO 2021, achieving 15% less than the Phius CORE 2021 source energy criteria, without renewables, is accepted in lieu of achieving the ASHRAE performance target based on a baseline of ASHRAE 90.1-2019.

2. Based on the path chosen, select the efficiency measures for the building:
   a. Prescriptive Path: Meet or exceed the requirements specified in the National Rater Design Review and Field Checklists.
   b. ERI Path: Meet or exceed the requirements specified in the National Rater Design Review and Field Checklists. Using the same software program specified in Step 1, configure the preferred set of efficiency measures for the unit to be certified and verify that the resulting ERI meets or exceeds the ENERGY STAR ERI Target, as determined in Step 1.
   c. ASHRAE Path: Meet or exceed the requirements specified in the National Rater Design Review and Field Checklists. Following the Simulation Guidelines AppG2016, configure the preferred set of efficiency measures for the building to be certified and verify that the resulting energy savings above the ASHRAE Baseline Building meets or exceeds the required performance target per Exhibit 3.

      Exception: For buildings that are Phius Certified and submitting the specific source energy use per person in lieu of meeting the ASHRAE Performance Target, calculations are done in accordance with Phius modeling protocols.

   Note that, regardless of the path chosen or the measures selected, the Mandatory Requirements for All Certified Multifamily Buildings in Exhibit 2 are also required and impose certain constraints on the efficiency measures selected (e.g., insulation levels, insulation installation quality, window performance, duct leakage). Furthermore, on-site power generation may not be used to meet the ENERGY STAR ERI Target or the performance target in the ASHRAE Path.
3. Prior to certification, the Rater must submit design documentation to a Provider or MRO for their review and approval. The EPA strongly recommends submitting this documentation before construction; however, Raters may instead choose to submit the design documentation at final certification.
4. Upon completion of design, multifamily buildings may be eligible for the Designed to Earn the ENERGY STAR designation. To earn this optional additional designation, follow the guidance available at www.energystar.gov/mfdees.
5. Construct the building using the measures selected in Step 2 and the Mandatory Requirements for All Certified Multifamily Buildings, Exhibit 2.
6. Using a Rater, verify that all requirements have been met in accordance with the Mandatory Requirements for All Certified Multifamily Buildings and with the inspection procedures for minimum rated features in ANSI / RESNET / ICC 301, Appendix B. This will require a minimum of two inspections: one at pre-drywall and the other at final. Sampling protocols are permitted to be used within the limitations defined in Fn. 7. For modular multifamily buildings, a Rater must verify any requirement in the plant not able to be verified on-site because a feature will be concealed prior to shipment. [11]

   The Rater must review all items on the Rater checklists for the whole building to verify that each inspection checklist item has been met within program-defined tolerances. [2]

   In the event that a Rater determines that a program requirement has not been met, the building cannot earn the ENERGY STAR until the item is corrected. If correction of the item is not possible, the building cannot earn the ENERGY STAR and individual units in the multifamily building also cannot be certified. In the event that an item on a Rater checklist cannot be inspected by the Rater, the building also cannot earn the ENERGY STAR. The only exceptions to this rule are in the Thermal Enclosure System Section of the National Rater Field Checklist, where the builder may assume responsibility for verifying a maximum of five items and the sections of the National Rater Field Checklist where a Licensed Professional may assume responsibility for verifying the specified items. A Licensed Professional must be a Professional Engineer or Registered Architect in good standing and possess a current license. This option shall only be used at the discretion of the Rater. When exercised, the builder's and/or Licensed Professionals' responsibility will be formally acknowledged by the builder and/or Licensed Professional signing the checklist for the item(s) that they verified.

   In the event that a Rater is not able to determine whether a program requirement has been met (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their Provider or MRO. If the Provider or MRO also cannot make this determination, then the Rater, Provider, or MRO shall report the issue to the EPA prior to building completion at: energystarhomes@energystar.gov and will receive an initial response within 5 business days. If the EPA believes the current program requirements are sufficiently clear to determine whether the item in question has been met, then this guidance will be provided to the partner and enforced beginning with the building in question. In contrast, if the EPA believes the program requirements require revisions to make the intent clear, then this guidance will be provided to the partner but only enforced for buildings permitted after a specified transition period after the release of the revised program requirements, typically 60 days in length.

   This will allow the EPA to make formal policy decisions as partner questions arise and to disseminate these policy decisions through the Policy Record and the periodic release of revised program documents to ensure consistent application of the program requirements.
7. Once verification on all units and common spaces is complete, submit the whole building to the HCO or MRO for final certification (see alternative below). The Rater is required to keep electronic or hard copies of the completed and signed Rater checklists, and Multifamily Workbook. In addition, for buildings using Track A, the Rater is required to keep for each dwelling unit and each graded common space an HVAC design report compliant with ANSI / RESNET / ACCA / ICC 310. The Rater must also keep a National HVAC Design Supplement to Std. 310 for Dwellings & Units for each dwelling unit, and, where applicable, the National HVAC Design Supplement to Std. 310 for Common Spaces & Central Systems. For buildings using Track B, the Rater is required to keep the National HVAC Design Report. Finally, for both Tracks, when the FT Agent is not a HVAC Credentialed Contractor, National HVAC Functional Testing Checklists for all systems must be kept. Additionally, the following steps are required:
   a. ERI Path: submit the building to the HCO for final certification and follow the HCO's certification and oversight procedures (e.g., quality assurance, recordkeeping, and reporting).

      Generally, buildings must be submitted for certification after verification on all units and common spaces is complete. Alternatively, at the discretion of the Provider, individual dwelling units may be conditionally certified prior to the building completion if the following process is observed:

i. The Provider must generate a Conditional ENERGY STAR Certification Disclosure letter to be included with the label and certificate for the homebuyer of each conditionally certified unit.

ii. Once verification on all dwelling units and common spaces is complete, and the whole building is certified, the Provider must generate an ENERGY STAR Certification Confirmation letter for the builder to deliver to the applicable homebuyers.

In the event that any dwelling unit or common space in the building is ultimately unable to be verified, the building will not be able to earn certification; the Provider must decertify any conditionally certified units; and the builder must notify the applicable homebuyers.

b. ASHRAE and Prescriptive Path: submit the building to the MRO for final certification with the specified documentation based on as-built conditions, as described in Exhibit 2, and follow the MRO's certification and oversight procedures (e.g., quality assurance, recordkeeping, and supporting documentation).

Exhibit 1: ENERGY STAR Multifamily Reference Design Summary [12, 13]

For buildings pursuing the ERI Path, the following table summarizes the key efficiency features in the ENERGY STAR Multifamily Reference Design which is modeled to determine the ENERGY STAR ERI Target. They are not mandatory in the units for buildings pursuing the ERI Path, but if they are not used then other measures will be needed to achieve the ENERGY STAR ERI Target. The following features are mandatory within the common spaces where specified in the National Rater Design Review and Field Checklists.

For buildings pursuing the Prescriptive Path, the ENERGY STAR Multifamily Reference Design is the set of efficiency features that are mandatory within the units and common spaces, where specified in the National Rater and Field Checklists.

This Exhibit is not applicable for buildings pursuing the ASHRAE Path.

In addition, note that the Mandatory Requirements for All Certified Multifamily Buildings, Exhibit 2, contain additional requirements such as total duct leakage limits, minimum allowed insulation levels, and minimum allowed fenestration performance. Therefore, the EPA recommends that partners review the documents in Exhibit 2 prior to selecting measures.

Table 1: Envelope, Ventilation, Water Heating, Lighting, Appliances, and Residential Heating and Cooling Equipment

Climate Zone Type	Hot and Mixed Climates				Cold Climates				
2021 IECC Climate Zone [14]	**1**	**2**	**3**	**4**	**4C**	**5**	**6**	**7**	**8**
Dwelling Unit Insulation									
Ceiling, Wall & Floor Insulation Grade	I								
Ceiling Insulation U-Factor	0.035	0.026	0.026	0.024	0.024	0.024	0.024	0.024	0.024
Wall Insulation U-Factor	0.084	0.084	0.06	0.045	0.045	0.045	0.045	0.045	0.045
Frame Floor Insulation U-Factor	0.064	0.064	0.047	0.047	0.033	0.033	0.033	0.028	0.028
Mass Floor U-Factor	0.322	0.087	0.074	0.051	0.051	0.051	0.051	0.042	0.038
Slab Insulation & Depth	None	None	R-10 2ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft	R-10 4ft
Basement Wall Assembly U-Factor	0.36	0.36	0.091	0.059	0.05	0.05	0.05	0.05	0.05
Common Space Insulation									
All Assemblies	Refer to Item 2.1 of the National Rater Design Review Checklist for insulation levels								
Dwelling Unit Windows and Doors (Except Class AW)									
Window U-Factor	0.4	0.4	0.3	0.3	0.27	0.27	0.27	0.27	0.27
Window SHGC [15]	0.25	0.25	0.25	0.4	Any	Any	Any	Any	Any
Door (U-Factor / SHGC) [15]	Opaque: U-Factor: 0.17 / SHGC: Any; ≤½ lite: U-Factor: 0.25 / SHGC: 0.25; >½ lite: U-Factor: 0.30								
>½ lite Door (SHGC) [15]	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40
Common Space & Class AW Windows and Doors									
Fixed Window U-Factor	0.48	0.43	0.40	0.34	0.34	0.34	0.32	0.28	0.27
Operable Window U-Factor	0.59	0.57	0.51	0.43	0.43	0.43	0.4	0.34	0.3
Glazed Entrance Door U-Factor	0.79	0.73	0.65	0.6	0.6	0.6	0.6	0.6	0.6
SHGC	0.25	0.25	0.25	0.4	0.4	0.4	0.4	Any	Any
Residential Heating and Cooling Systems (See Table 2 for other HVAC systems.) [16]									
Ductless Air Conditioning (SEER2)	16	16	16	16	14	14	14	14	14
Ducted Split System Air Conditioning (SEER2)	15.2	15.2	15.2	15.2	13.3	13.3	13.3	13.3	13.3
Ducted Single Packaged System Air Conditioning (SEER2) [17]	15.2	15.2	15.2	15.2	13.3	13.3	13.3	13.3	13.3
Gas Furnace (AFUE) [18]	80	80	80	90	95	95	95	95	95
Gas Boiler (AFUE)	80	80	80	90	95	95	95	95	95
Ductless Heat Pump (HSPF2 / SEER2)	8.2 / 16								
Ducted Split System Heat Pump (HSPF2 / SEER2)	7.8 / 15.2								
Ducted Single Packaged System Heat Pump (HSPF2 / SEER2) [17]	7.7 / 15.2								
Thermostat Type	Programmable								
Duct and Air Handler Location	100% Conditioned Space								
Infiltration									
Infiltration Rate (CFM50 / sq. ft. of enclosure)	0.30								
Water Heating When Rated in UEF									
Dwelling Unit Gas Efficiency (UEF)	0.90 UEF								
Dwelling Unit Electric Efficiency (UEF)	1.49 UEF								
Common Space Gas Efficiency (UEF)	0.90 UEF								
Common Space Electric Efficiency (UEF)	0.93 UEF								
Water Heating When Rated in Et, Standby Loss (%/hr), or COP									
Dwelling Unit Electric Efficiency (COP)	2.0 COP								
Common Space Electric Efficiency (COP, SL)	1.0 COP or SL ≤ 0.29 + 26/V_m								
Non-Electric Efficiency (Et)	90%								
Lighting, Appliances & Fixtures									
Lighting	100% LED Lighting								
Refrigerators, Dishwashers, Clothes Washers and Dryers [19]	ENERGY STAR								
Bathroom Faucets, Aerators and Showerheads	WaterSense								

Table 2: Commercial Minimum Heating and Cooling Equipment

For Equipment Types not listed here, minimum efficiencies shall be based on 5% improvement over those listed in ASHRAE 90.1-2019. Use the efficiency values for "after 1/1/2023" where listed.

Equipment Type	CZ 1-4 [14]	CZ 4C-8 [14]
Room AC (window, through-wall)	ENERGY STAR certified	
Air conditioners, air cooled (Split system & single package)		
Air conditioners, air cooled (<65 kBtu/h)	Dwelling unit systems & common space split systems: See Table 1; Common space single package: 5% better than ASHRAE 90.1-2019	
Air conditioners, air cooled (≥65 and <135 kBtu/h)	15.7 IEER	14.6 IEER
Air conditioners, air cooled (≥135 and <240 kBtu/h)	15.1 IEER	14.0 IEER
Air conditioners, air cooled (≥240 and < 760 kBtu/h)	14.1 IEER	13.0 IEER
Electric resistance space heating [20]	• Not permitted in any dwelling unit using the Prescriptive Path • Electric resistance heating specified in common spaces and garages has a total heating capacity ≤ 12 kBtu/h (3.5 kW) per enclosed space and has automatic thermostatic controls	
Warm-Air Furnace (<225 kBtu/h, common spaces)	See Table 1	90% AFUE
Warm-Air Furnace (≥225 kBtu/h, common spaces)	80% Et	81% Et
Warm-Air Furnace (dwelling units)	See Table 1	
Packaged Terminal Air Conditioner (PTAC), w/gas-fired heat (dwelling units)	80% Et	82% Et, AND 0.25 cfm50/sq. ft. avg per unit
PTAC (dwelling units)	12.5 EER	11.9 EER
PTAC (common spaces)	<7 kBtu/h: 12.5 EER	<7 kBtu/h: 11.9 EER
	≥7 and ≤15 kBtu/h: 14.7 - (0.320 X Cap/1000) EER	≥7 and ≤15 kBtu/h: 14.0 - (0.300 X Cap/1000) EER
	>15 kBtu/h: 10.0 EER	>15 kBtu/h: 9.5 EER
Packaged Terminal Heat Pump (PTHP) (cooling) *	<7 kBtu/h: 12.5 EER	<7 kBtu/h: 11.9 EER
PTHP (dwelling units, cooling) *	≥7 and ≤ 10 kBtu/h: 14.7 - (0.320 X Cap/1000) EER	≥7 and ≤ 15 kBtu/h: 14.0 - (0.300 X Cap/1000) EER
	> 10 kBtu/h: 11.5 EER	> 15 kBtu/h: 9.5 EER
PTHP (common spaces, cooling) *	≥7 and ≤ 15 kBtu/h: 14.7 - (0.320 X Cap/1000) EER	≥7 and ≤ 15 kBtu/h: 14.0 - (0.300 X Cap/1000) EER
	>15 kBtu/h: 10.0 EER	>15 kBtu/h: 9.5 EER
PTHP (dwelling units, heating) *	< 8 kBtu/h: 3.3 COP ≥ 8 kBtu: 3.7– (0.052 X Cap/1000)	3.4 COP
PTHP (common spaces, heating) *	<7 kBtu/h: 3.3 COP	<10.5 kBtu/h: 3.4 COP
	≥7 and ≤15 kBtu/h: 3.7– (0.052 X Cap/1000) COP	≥10.5 and ≤12 kBtu/h: 3.3 COP
	> 15 kBtu/h: 2.9 COP	> 12 kBtu/h: 3.2 COP
Air cooled heat pump (Split system and single package) *		
Air cooled heat pump (<65 kBtu/h)	Dwelling unit systems & common space split systems: See Table 1; Common space single package: 5% better than ASHRAE 90.1-2019	
Air cooled heat pump (≥65 and <135 kBtu/h)	15.1 IEER, 3.5 COP	
Air cooled heat pump (≥135 and <240 kBtu/h)	14.4 IEER, 3.4 COP	
VRF Air Conditioners and Heat Pumps *	16.2 IEER, 3.3 COP	
Water-loop heat pump (WLHP) (<135 kBtu/h) *	15.0 EER, 4.5 COP	
Boilers, hot water (<300,000 Btu/h, dwelling units)	See Table 1	
Boilers, hot water (≥300,000 Btu/h, dwelling units)	CZ 1-3 80% Et	95% Et (90% Et with WLHP)
	CZ 4 86% Et (89% Et with WLHP)	
Boilers, hot water (common Spaces)	CZ 1-3 80% AFUE or Et	86% AFUE or Et
	CZ 4 86% AFUE or Et	

Cap means the rated capacity of the product in Btu/h.

* Where domestic hot water is provided by heat pump water heaters, the systems noted above with an * may instead meet the efficiency listed in ASHRAE 90.1-2019. Use the efficiency values for “after 1/1/2023” where listed.

Two tracks are provided for satisfying the mandatory requirements for all certified buildings, Exhibit 2. Track A – HVAC Grading by Rater allows a Rater to utilize ANSI / RESNET / ACCA 310 [21], a standard for grading the installation of residential HVAC systems serving individual spaces and a Functional Testing Agent to verify commercial and central systems. Track B – HVAC Testing by FT Agent utilizes a Functional Testing Agent for all systems. Either track may be selected, but all requirements within that track must be satisfied for the building to be certified.

Exhibit 2: Mandatory Requirements for All Certified Multifamily Buildings

Party Responsible	Mandatory Requirements
Requirements Applicable to All Buildings	
Rater	• Completion of MFNC National Rater Design Review Checklist, Version 1.1 / 1.2 / 1.3 • Completion of MFNC National Rater Field Checklist, Version 1.1 / 1.2 / 1.3 • Completion of Multifamily Workbook • Capture of Specified Photo Documentation
Functional Testing Agent	• Completion of MFNC National HVAC Functional Testing Checklist, Version 1.1 / 1.2 / 1.3 Note: Sections 2 and 3 are exempt for buildings following Track A for Dwelling Unit HVAC systems as the Rater is the party responsible for assessing the installation quality of these systems in accordance with ANSI / RESNET / ACCA 310.
Requirements Only Applicable to Track A – HVAC Grading by Rater [21]	
HVAC System Designer	• Completion of HVAC design report(s) compliant with ANSI / ACCA / RESNET 310, plus the SFNH / MFNC National HVAC Design Supplement(s) to Std. 310 for Dwellings & Units, All Versions • Completion of the MFNC National HVAC Design Supplement to Std. 310 for Common Spaces & Central Systems, All Versions, where applicable
Requirements Only Applicable to Track B – HVAC Testing by FT Agent	
HVAC System Designer	• Completion of MFNC National HVAC Design Report, Version 1.1 / 1.2 / 1.3
Requirements Only Applicable to ASHRAE Path	
ASHRAE Modeler	• Completion of ASHRAE Standard 90.1 Performance Based Compliance Form (Compliance Form) and ENERGY STAR MFNC / ZERH Companion Tool (Companion Tool)

Notes:

- For multifamily projects with multiple buildings, each building must demonstrate compliance with the program requirements, but can be documented using one Multifamily Workbook and one HVAC Design Report per project.
- For buildings pursuing the ASHRAE Path, where buildings are identical, only one set of modeling files, one Compliance Form, and one Companion Tool are required to be submitted. At the discretion of the ASHRAE modeler, connected buildings may be modeled as one building or separate buildings.
- For buildings choosing the Phius alternative modeling option in the ASHRAE Path, in lieu of submitting the Compliance Form, Companion Tool, and modeling files, documentation is instead provided that demonstrates achievement of the required source energy per person and final certification from Phius.
- For the Excel-based Compliance Form, Companion Tool, and Multifamily Workbook, while Partners are encouraged to always use the newest versions available online, unless otherwise specified, file updates between Program revisions will not be required. After a Program revision, Raters will be required to use the updated documents based on the enforcement timeline set for the revision.

Exhibit 3: ASHRAE Path Performance Targets

These Performance Targets are required for all buildings pursuing the ASHRAE Path in states under Version 1.2. The ASHRAE Path Performance Target for other Versions can be found at www.energystar.gov/mfnc.

The ASHRAE performance target is 15% over ASHRAE 90.1-2019. Buildings must meet a target of 15% energy cost savings OR 15% source energy savings when compared to ASHRAE 90.1-2019, as determined by the ENERGY STAR MFNC / ZERH Companion Tool. Appendix G from ASHRAE 90.1-2019 or 2022 must be used, along with the ASHRAE Standard 90.1 Performance Based Compliance Form, ENERGY STAR MFNC / ZERH Companion Tool, and Simulation Guidelines_AppG2016 available at www.energystar.gov/mfnc.

Footnotes:

1. Buildings that do not contain dwelling or sleeping units are not eligible for certification under MFNC. Hotels, motels, and assisted living or skilled nursing facilities that meet the definition of senior care facilities are also not eligible for certification under MFNC. Dormitories, residence halls, buildings with single-room occupancies, supportive housing, cohousing, and or other senior housing not meeting the definition of senior care facilities are eligible for the MFNC program. Visit https://www.energystar.gov/partner_resources/residential_new/program_reqs/mfnc_building_eligibility for more information.
2. The term 'building' refers to a structure that encompasses dwelling/sleeping units and (if present) common spaces, sharing one or more of the following attributes: a common street address, a common entrance or exit, central/shared mechanical systems, or structurally interdependent wall or roof systems. Attached structures such as 4-story two-unit structures (commonly referred to as "2-over-2s") may be considered separate buildings if they are divided by a vertical fire separation wall from the foundation to the roof sheathing and share none of the other attributes listed above. A skyway or a breezeway that connects two structures is not considered a common entrance or exit. A dwelling unit, as defined by ANSI / RESNET / ICC 301, is a single unit that provides complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation. A 'sleeping unit', as defined by ANSI / RESNET / ICC 301, is a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. A 'dwelling', as defined by ANSI /RESNET / ICC 301, is any building that contains one or two dwelling units used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.
3. A 'townhouse', as defined by ANSI / RESNET / ICC 301, is a single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides.
4. The term 'common space' refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration or maintenance in support of the residents. For the ASHRAE Path, the requirements for 'common spaces' apply to commercial or retail spaces where they are included in the energy model and savings contribute to achieving the Performance Target.
5. While certification will result in compliance with many code requirements, a Rater is not responsible for ensuring that all code requirements have been met prior to certification. For more information about how these program requirements help satisfy code requirements, visit: www.energystar.gov/newhomesguidance. In the event that a code requirement, a manufacturer's installation instructions, or an engineering document conflicts with a requirement of the ENERGY STAR program, then the conflicting requirement within these program requirements shall not be met. Certification shall only be allowed if the Rater has determined that no equivalent option is available that could meet the conflicting requirement. Note that a dwelling unit must still meet its ENERGY STAR ERI Target. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.
6. The term 'Provider' refers to an Approved Rating Provider as defined by ANSI / RESNET / ICC 301 that is a designee of an HCO.
7. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / ICC 301, or an equivalent designation as determined by an HCO or MRO; and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/mftraining. Raters who operate under an MRO or an HCO with a Sampling Protocol are permitted to verify the minimum rated features of the building and to verify any Checklist Item designated "Rater Verified" using an MRO or HCO-approved sampling protocol. Functional Testing Agents, except the installing contractor, may follow the sampling protocol described in the MFNC HVAC Functional Testing Checklist Sampling Protocols. No other parties are permitted to use sampling. All other items shall be verified for each certified building. For example, no builder verified items are permitted to be verified using a sampling protocol.
8. Home Certification Organizations (HCOs) are independent organizations recognized by the EPA to implement an ENERGY STAR certification program for single-family and multifamily homes and apartments using an Energy Rating Index (ERI) compliance path. Learn more and find a current list of HCOs at www.energystar.gov/partner_resources/residential_new/working/other_participants/hco.
9. These requirements apply to all dwelling units, sleeping units, common spaces [4], and garages (open or enclosed) in the building being certified, and where specified, parking lots. These requirements do not apply to commercial or retail spaces, except in the ASHRAE Path, if included in the energy model and the savings contribute to achieving the Performance Target. These requirements do not apply to common spaces that are located in buildings on the property without any dwelling or sleeping units. These requirements do not apply to parking garages or lots where the cost of the energy use of the parking garage or lot is not the responsibility of the Builder/ Developer, Building Owner or Property Manager.
10. The software program shall automatically determine (i.e., without relying on a user-configured ENERGY STAR Multifamily Reference Design) this target for each rated unit by following Rev. 05 of the National Multifamily ERI Target Procedure, Version 1.2, available at www.energystar.gov/mfnc.
11. A modular building is a prefabricated building that is made of multiple modules or sections that are manufactured and substantially assembled in a manufacturing plant. These pre–built sections are transported to the building site and constructed by a builder to meet all applicable building codes for site–built buildings.
12. For buildings pursuing the prescriptive path, where 'ENERGY STAR' is indicated, ENERGY STAR certification is required for these products. For current ENERGY STAR products, visit www.energystar.gov/products.
13. For buildings pursuing the ERI path, the ENERGY STAR ERI Target Procedures contain the complete set of the efficiency features modeled. While the corresponding ERI Target Procedure specifies air conditioners and heat pumps using SEER and HSPF, in this document they have been converted to the current rating metrics, SEER2 and HSPF2. Similarly, while water heaters have been specified using Energy Factor (EF), in this document they have been converted to Uniform Energy Factor (UEF).

14. 2021 IECC climate zones, as defined and illustrated in Section R301 of the code, are used to configure the ENERGY STAR Reference Design. Note that some locations have shifted to a different climate zone in the 2021 IECC compared to prior editions.
15. For the Prescriptive Path in CZ 4C-8, any SHGC may be used. For the ERI Path, the ERI Target Procedure specifies what SHGC has been used in determining the ERI Target.
16. For buildings pursuing the Prescriptive Path with oil-fired equipment, use the efficiency listed for gas-fired equipment.
17. These minimum efficiencies apply to single packaged systems less than 65,000 Btu/h where serving dwelling units. The minimum efficiencies for single packaged systems serving common spaces are 5% better than the efficiencies listed in ASHRAE 90.1-2019.
18. In CZ 4C-8, for gas furnaces <225 kBtu/h serving common spaces, 90% AFUE or greater is allowed.
19. While clothes washers and dryers must be ENERGY STAR certified for the Prescriptive Path, in the corresponding ERI Target Procedure they are not specified as ENERGY STAR. Note that the dishwasher and refrigerator efficiency features within the ENERGY STAR ERI Target Procedure aligned with the product specifications when this Version was first released. These efficiency features form the basis of the ENERGY STAR ERI target, regardless of any subsequent revisions to ENERGY STAR certified product specifications.
20. Electric resistance heating specified in common spaces has a total heating capacity ≤ 12 kBtu/h (3.5 kW) per enclosed space and has automatic thermostatic controls. Electric resistance limitations do not apply to heat pumps with integral supplemental or emergency electric resistance heating. The EPA recommends but does not require that heat pumps have controls to limit the use of emergency or supplemental heat to heat pump failures or when the heat pump cannot meet the heating load. The EPA also recommends but does not require that heat pumps in CZ 5-8 are ENERGY STAR certified cold-climate heat pumps. Electric resistance limitations do not apply to systems dedicated to heating outdoor air supplied by a mechanical ventilation system, as long as the space served is primarily heated by a non-electric-resistance system that meets the efficiency requirements noted in ENERGY STAR Multifamily Reference Design. Electric resistance limitations apply to garages, but do not apply to heated plenums meeting Item 5.12 of the Rater Field Checklist, or stairwells where automatic thermostatic controls prevent operation above 50°F.
21. Track A – HVAC Grading by Rater shall use ANSI / RESNET / ACCA 310 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under.

ENERGY STAR Multifamily New Construction
National Rater Field Checklist [1], Version 1.1 / 1.2 / 1.3 (Rev. 05)

Building Name: _____ Number of Units: _____ Permit Date: _____

Building Address: _____ City: _____ State: _____

Thermal Enclosure System **1. High-Performance Insulation & Fenestration**	Must Correct	Builder Verified [3]	Rater Verified [4]	N/A [5]
1.1 Insulation meets specifications in National Rater Design Review Checklist Item 2.1.	☐	Pre-rock+20 ☐	☐	-
1.2 All insulation achieves Grade I install. per ANSI / RESNET / ICC 301. Alternatives in Footnote 6. [7]	☐	Pre-rock+20 ☐	☐	-
1.3 Fenestration meets specifications in National Rater Design Review Checklist Items 2.1 & 2.2.	☐	-	☐	-
1.4 Prescriptive Path: Window-to-wall ratio ≤ 30%. [8]	☐	-	☐	☐
1.5 For mass or metal-framed above-grade walls (including floor perimeter edges), continuous rigid insulation, insulated siding, or combination of the two is: ≥ R-3 in CZ 1-4; ≥ R-5 in CZ 5-8. [9, 10,11, 12, 13, 14]	☐	≤ 20 sq. ft. ☐	☐	☐
1.6 For concrete slab floors in CZ 4-8 above ambient conditions, heated or unheated garages, or unconditioned spaces outside the thermal boundary, floor insulation meets the U-factor specified in Table 502.1.2 of the 2009 IECC for Group R when dwelling units are above the slab, & 'All Other' when common space is above the slab. Alternative in Fn. 15. [9, 16]	☐	≤ 20 sq. ft. ☐	☐	☐
1.7 Heated plenums in unconditioned space or ambient conditions must meet the following requirements: [17]				
1.7.1 Sides of heated plenum are an air barrier and insulated to ≥ R-3ci in CZ 1-4; ≥ R-5ci in CZ 5-6; ≥ R-7.5ci in CZ 7; ≥ R-9.5ci in CZ 8, [9] **AND;**	☐	≤ 20 sq. ft. ☐	☐	☐
1.7.2 Insulation at top of heated plenum meets Item 1.6 where applicable. Otherwise, meets or exceeds the R-value for mass floors from the "All Other" column of Table 502.2(1) of 2009 IECC, [9, 18] **AND;**	☐	≤ 20 sq. ft. ☐	☐	☐
1.7.3 Bottom of heated plenum must have at least R-13 insulation. [18, 19]	☐	≤ 20 sq. ft. ☐	☐	☐
1.8 Garages with space heating must meet the following requirements: [17]				
1.8.1 Insulation on above grade walls and walls on the first story below grade ≥ R-5ci in CZ 5-6; ≥ R-7.5ci in CZ 7; ≥ R-9.5ci in CZ 8, [9] **AND;**	☐	≤ 20 sq. ft. ☐	☐	☐
1.8.2 Ceiling insulation meets Item 1.6 where applicable. Otherwise, meets or exceeds the R-value for mass floors from the "All Other" column of Table 502.2(1) of 2009 IECC. [9]	☐	≤ 20 sq. ft. ☐	☐	☐
2. Fully-Aligned Air Barriers [20] At each insulated location below, a complete air barrier is provided that is fully aligned as follows:				
Ceilings: At interior or exterior horizontal surface of ceiling insulation in Climate Zones 1-3; at interior horizontal surface of ceiling insulation in Climate Zones 4-8. Also, at exterior vertical surface of ceiling insulation in all climate zones (e.g., using a wind baffle that extends to the full height of the insulation in every bay or a tabbed baffle in each bay with a soffit vent that prevents wind washing in adjacent bays). [9, 21]				
2.1 Dropped ceilings / soffits below unconditioned attics, chase / dead space, and all other ceilings.	☐	≤ 20 sq. ft. ☐	☐	☐
Walls: At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8. [9, 22]				
2.2 Walls behind showers, tubs, staircases, and fireplaces.	☐	≤ 20 sq. ft. ☐	☐	☐
2.3 Architectural bump-outs, dead space, and all other exterior walls.	☐	≤ 20 sq. ft. ☐	☐	-
Floors: At exterior vertical surface of floor insulation in all climate zones and, if over unconditioned space, also at interior horizontal surface including supports to ensure alignment. Alternatives in Footnotes 22 & 23. [23, 24, 25]				
2.4 Floors above garages, floors above unconditioned spaces, and cantilevered floors.	☐	≤ 20 sq. ft. ☐	☐	☐
2.5 All other floors adjoining unconditioned space (e.g., rim / band joists at exterior wall or at porch roof).	☐	≤ 20 sq. ft. ☐	☐	☐
3. Reduced Thermal Bridging – Reduced thermal bridging strategies are not mandatory. However, the following details must be accurately assessed per ANSI / RESNET / ICC 301 and Footnote 28. [26]				
3.1 Insulated ceilings assessed at the attic edge for variance in R-value and install quality.	☐	-	☐	☐
3.2 Insulation assessed beneath attic platforms and walkways for variance in R-value.	☐	-	☐	☐
3.3 Attic access panels and drop-down stairs assessed for insulated covers.	☐	-	☐	☐
3.4 Wood-framed above-grade walls separating conditioned from unconditioned space assessed for advanced framing.	☐	-	☐	☐
3.5 Above-grade and at-grade concrete floor edges (e.g., podiums, balconies, projected slabs) assessed for a complete thermal break per Footnote 28 and, in CZ 4-8, total building UA documented in the Multifamily Workbook. [9, 27, 28, 29]	☐	-	☐	☐
3.6 Slabs on grade assessed for insulation where walls separate conditioned from unconditioned space. [30]	☐	-	☐	☐
4. Air Sealing	**Must Correct**	**Builder Verified [3]**	**Rater Verified [4]**	**N/A [5]**
Rater has verified each air sealing detail below. Unless otherwise specified, items apply to assemblies in dwelling units and common spaces where adjacent to the exterior, other buildings, or unconditioned spaces. "Sealed" indicates the use of caulk, foam, or equivalent material.				
4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations are sealed, with blocking / flashing as needed.	☐	≤ 2 penetrations ☐	☐	-
4.2 Attic access panels, roof hatches and drop-down stairs are gasketed, (i.e., not caulked) or equipped with covers that are gasketed.	☐	-	☐	☐

ENERGY STAR Multifamily New Construction
National Rater Field Checklist [1], Version 1.1 / 1.2 / 1.3 (Rev. 05)

4. Air Sealing (cont.)	Must Correct	Builder Verified [3]	Rater Verified [4]	N/A [5]
4.3 Recessed lighting fixtures are ICAT labeled and gasketed.	☐	No limit ☐	☐	☐
4.4 Drywall is sealed to top plate during installation, or from the attic side at all unconditioned attic / wall interfaces. Drywall adhesive (but not other construction adhesives), is permitted to be used.	☐	No limit ☐	☐	☐
4.5 Rough opening around windows & exterior doors is sealed.	☐	-	☐	-
4.6 Assemblies that separate attached garages from occupiable space are sealed. In addition, an air barrier is installed, sealed, and aligned with these assemblies. [31]	☐	-	☐	☐
4.7 Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions are made substantially air-tight with door seal and weatherstripping or equivalent gasket.	☐	-	☐	☐
The following items must be additionally verified in dwelling units, to reduce air leakage between conditioned spaces.				
4.8 Doors serving as a unit entrance from a corridor/stairwell made substantially air-tight with door seal and weatherstripping or equivalent gasket.	☐	-	☐	☐
4.9 Rater-measured air leakage meets the following CFM50 per sq. ft. of Dwelling Unit Compartmentalization Boundary: [32, 33] For all Versions and Paths except National v1.3, Prescriptive Path: ≤ 0.30 CFM50 For National v1.3, Prescriptive Path: ≤ 0.27 CFM50	☐	-	☐	-
4.9.1 For dwelling units with forced air distribution systems without ducted returns and air handlers located in a closet or space adjacent to unconditioned space, the Rater-measured pressure difference between the space containing the air handler and the conditioned space during the compartmentalization test is no greater than 5 Pa. [34]	☐	-	☐	☐

HVAC System [35]		Must Correct	Rater Verified [4]	N/A [5]
5. Heating & Cooling Eqpt. Complete Track A - HVAC Grading by Rater[36] or Track B - HVAC Testing by FT Agent[37]				
Track A	5a.1 Blower fan volumetric airflow is Grade I or II per ANSI / RESNET / ACCA 310.	☐	☐	☐
	5a.2 Blower fan watt draw is Grade I or II per ANSI / RESNET / ACCA 310.	☐	☐	☐
	5a.3 Refrigerant charge is Grade I per ANSI / RESNET / ACCA 310. See Footnote 38 for exemptions.	☐	☐	☐
	5a.4 HVAC manufacturer & model number on installed equipment matches the HVAC Design Report in compliance with ANSI / RESNET / ACCA 310 or the HVAC Design Supplement to Std. 310 for Common Spaces and Central Systems. [39]	☐	☐	☐
Track B	5b.1 HVAC manufacturer & model number on installed equipment matches either of the following (check box):[40] ☐ National HVAC Design Report (4.6-4.9 & 4.25-4.26) ☐ Written approval received from designer	☐	☐	-
	5b.2 External static pressure measured by Rater at contractor-provided test locations and documented below: [41] Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure: _____ IWC	☐	☐	☐
5.5 Prescriptive Path: Heating and cooling equipment serving dwelling units, common spaces, and garages meet the efficiency levels specified in the ENERGY STAR Multifamily Reference Design. Electric resistance space heating is not installed in dwelling units. [42]		☐	☐	☐
5.6 ERI Path: Heating and cooling equipment serving common spaces and garages, but not serving dwelling units, meet the efficiency levels specified in the ENERGY STAR Multifamily Reference Design. See Footnote 42 for restrictions on electric resistance space heating. [42]		☐	☐	☐
5.7 National HVAC Functional Testing Checklist(s) collected prior to certification, with all HVAC systems in the building fully documented. Exception: Where credentialed HVAC Contractor(s) are completing the National HVAC Functional Testing Checklist, the checklist is not required to be collected for the systems they verify. [43]		☐	☐	☐
5.8 Rater has verified and documented that Functional Testing Agent(s) (FT Agent(s)) completing the National HVAC Functional Testing Checklist(s) hold one of the required credentials and completed orientation, if applicable. [43] Credential(s): _____ FT Agent Name(s):_____		☐	☐	☐

Equipment Controls	Must Correct	LP Verified[44]	Rater Verified [4]	N/A [5]
5.9 All heating and cooling systems serving a dwelling unit have thermostatic controls within the dwelling unit.	☐	-	☐	☐
5.9.1 Prescriptive Path: Dwelling unit thermostats are programmable.	☐	-	☐	☐
5.10 For all indoor / terminal units in dwelling units and common spaces: [45]				
5.10.1 Measured zone temperature is within 5°F of zone temperature displayed on thermostat or sensor.	☐	-	☐	☐
5.10.2 System turns on when there is a call for heat and heating is provided. System turns off when the heating setpoint has been met. If N/A, select the reason: ☐ due to high ambient temperature OR ☐ equipment lock-out	☐	-	☐	☐
5.10.3 System turns on when there is a call for cool and cooling is provided. System turns off when the cooling setpoint has been met. If N/A, select the reason: ☐ due to high ambient temperature OR ☐ equipment lock-out	☐	-	☐	☐

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Equipment Controls (Cont.)	Must Correct	LP Verified[44]	Rater Verified [4]	N/A [5]
5.11 Where present in CZ 4-8, stair and elevator shaft vents are equipped with motorized dampers that are capable of being automatically closed during normal building operation and are interlocked to open as required by fire and smoke detection systems. Dampers are verified to be closed at the time of inspection.	☐	☐	☐	☐
5.12 Garage heating, plenum heating, and freeze protection systems include automatic controls that are verified to shut systems off above 40°F space or pipe wall temperatures, as applicable. Freeze protection systems include heat tracing of piping, even if self-regulating.	☐	☐	☐	☐
5.12.1 Where heat tracing is installed for freeze-protection, controls must be based on pipe wall temperature and a minimum of R-3 pipe insulation is also required.	☐	☐	☐	☐
5.13 Snow- and ice-melting systems include automatic controls that are verified to shut off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control is installed that is verified to shut off system when the outdoor temperature is above 40°F, so that the potential for snow or ice accumulation is negligible.	☐	☐	☐	☐
Hydronic Distribution Requirements – Applies to heating or cooling systems serving more than one dwelling unit				
5.14 For hydronic distribution systems, all terminal heating and cooling distribution equipment are separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the dwelling unit distribution equipment when there is no call from the thermostat.	☐	☐	☐	☐
5.15 Terminal units in hydronic distribution systems are equipped with pressure independent balancing valves or pressure independent control valves.	☐	☐	☐	☐
5.16 Piping of a heating or cooling system is insulated in accordance with Item 4.42 on the National HVAC Design Report, including where passing through planks or any other penetrations. [46]	☐	☐	☐	☐
5.17 For circulating pumps serving hydronic heating or cooling systems with three-phase motors, 1 horse-power or larger, motors meet or exceed efficiency standards for NEMA Premium™ motors. If 5 horse-power or larger, also installed with variable frequency drives.	☐	☐	☐	☐
6. Duct Quality Installation – Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote.		**Must Correct**	**Rater Verified[4]**	**N/A [5]**
6.1 Ductwork installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. [47]		☐	☐	☐
6.2 All bedrooms provided with transfer grilles, jump ducts, dedicated return ducts, and/or undercut doors. Bedrooms with a design supply airflow ≥ 150 CFM (per Item 5.2 on the National HVAC Design Report) achieve a Rater-measured pressure differential ≥ -5 Pa and ≤ +5 Pa with respect to the main body of the dwelling unit when all air handlers are operating. See Footnote 48 for test configuration.		☐	☐	☐
6.3 All supply and return ducts in unconditioned space, including connections to trunk ducts, are insulated to ≥ R-6. [49]		☐	☐	☐
6.3.1 Prescriptive Path: Dwelling unit ductwork and air handlers are installed within conditioned space.		☐	☐	☐
6.4 Rater-measured total duct leakage in dwelling units (and common spaces using ANSI / RESNET / ACCA 310) meets one of the following: [50, 51]				
6.4.1 Rough-in: Tested per allowances below, with air handler & all ducts, building cavities used as ducts, & duct boots installed. In addition, all duct boots sealed to finished surface, Rater-verified at final. [52] No ducted returns [34]: The greater of ≤ 3 CFM25 per 100 sq. ft. of CFA or ≤ 30 CFM. Additionally, the Rater-measured pressure difference between the space containing the air handler and the conditioned space, with the air handler running at high speed, is ≤ 5 Pa. For systems > 1 ton, increase by 1 Pa per half ton. One or two ducted returns [34]: The greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM. Three or more ducted returns [34]: The greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM.		☐	☐	☐
6.4.2 Final: Tested per allowances below, with the air handler & all ducts, building cavities used as ducts, duct boots, & register grilles atop the finished surface (e.g., drywall, floor) installed. [53] No ducted returns [34]: The greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM. Additionally, the Rater-measured pressure difference between the space containing the air handler and the conditioned space, with the air handler running at high speed, is ≤ 5 Pa. For systems > 1 ton, increase by 1 Pa per half ton. One or two ducted returns [34]: The greater of ≤ 8 CFM25 per 100 sq. ft. of CFA or ≤ 80 CFM. Three or more ducted returns [34]: The greater of ≤ 12 CFM25 per 100 sq. ft. of CFA or ≤ 120 CFM.		☐	☐	☐
6.5 Common Space: Supply, return, and exhaust ductwork and all plenums serving common spaces are sealed at all transverse joints, longitudinal seams, and duct wall penetrations with mastic, mastic tape, or internal aerosol-based sealant.		☐	☐	☐
6.6 Duct leakage of central exhaust ductwork serving four or more dwelling units, meets one of the following two options: [54]				
6.6.1 Rough-in: Tested including all ductwork from the exhaust fan location up to, but not including the grilles, the leakage does not exceed 25% of exhaust fan flow. [55, 56, 57]		☐	☐	☐
6.6.2 Final: Tested inclusive of all ductwork between the fan and the grilles, the leakage does not exceed 30% of exhaust fan flow. [55, 56, 57]		☐	☐	☐

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7. Dwelling-Unit & Common Space Mechanical Vent. Systems ("Vent Systems") [58] & Inlets in Return Duct [59] (National HVAC Design Report Item # indicated in parenthesis)				
7.1 Ventilation manufacturer & model number on installed equipment matches either of the following (check box): [40] ☐ National HVAC Design Report ☐ Written approval received from designer		☐	☐	-
7.2 Rater-measured ventilation rate is within either ± 15 CFM or ±15% of dwelling unit design values (2.7), and meets or exceeds rates required by ASHRAE 62.2-2010. [60]		☐	☐	-
7.3 Measured ventilation rate is within either ± 15 CFM or ±15% of common space design values (2.9), and meets or exceeds rates required by ASHRAE 62.1-2010 (2.8). [61, 62]		☐	☐	☐
7.4 A ventilation override control installed and also labeled if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment).		☐	☐	-
7.5 For any outdoor air inlet connected to a ducted return of the dwelling unit HVAC system (Complete if present; otherwise check "N/A"): [59]				☐
7.5.1 Controls automatically restrict airflow using a motorized damper during vent. off-cycle and occupant override. [63]		☐	☐	-
7.5.2 Rater-measured vent. Rate is ≤ 15 CFM or 15% above design value at highest HVAC fan speed. Alt. in Fn. 64. [64]		☐	☐	-
7.6 Where OA inlets are connected to the dwelling unit HVAC system, a motorized damper is installed that closes when there is no call for ventilation or when fan is off.		☐	☐	☐
7.7 If located in the dwelling unit, system fan rated ≤ 3 sones if intermittent, ≤ 2 sones if continuous, or exempted. [65]		☐	☐	-
7.8 If dwelling-unit Vent System controller operates the dwelling unit HVAC fan, then HVAC fan operation is intermittent and either the fan type is ECM / ICM (4.12), or the controls will reduce the run-time by accounting for HVAC system heating or cooling hours. [66]		☐	☐	☐
7.9 In-unit bathroom fans or in-line fans are ENERGY STAR certified if used as part of the dwelling-unit mechanical ventilation system. [67]		☐	☐	☐
7.10 If central exhaust fans, ≤ 1 HP, are installed as part of the dwelling-unit mechanical ventilation system, then they are direct-drive, ECM, with variable speed controllers. If > 1 HP, their motors meet or exceed efficiency standards for NEMA Premium ™ motors. [68]		☐	☐	☐
7.11 Air inlet locations (Complete if ventilation air inlet locations were installed (2.23, 2.24); otherwise check "N/A"): [69]		-	-	☐
7.11.1 Inlet(s) pull ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.		☐	☐	-
7.11.2 Inlet(s) are ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources not exiting the roof, and ≥ 3 ft. distance from dryer exhausts and sources exiting the roof. [70, 71]		☐	☐	-
7.11.3 Inlet(s) are provided with rodent / insect screen with ≤ 0.5 in. mesh.		☐	☐	-

8. Local Mechanical Exhaust (National HVAC Design Report Item # indicated in parenthesis)

Dwelling Unit Mechanical Exhaust – In each dwelling unit kitchen and bathroom, a system is installed that exhausts directly to the outdoors and meets one of the following Rater-measured airflow and manufacturer-rated sound level standards: [58, 72]

Location		Continuous Rate	Intermittent Rate [73]	Must Correct	Rater Verified [4]	N/A [5]
8.1 Kitchen	Airflow	≥ 5 ACH, based on kitchen volume [74, 75] (Alternative in Fn. 74)	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume [74, 75, 76]	☐	☐	-
	Sound	Recommended: ≤ 1 sone	Recommended: ≤ 3 sones			
8.2 Bathroom	Airflow	≥ 20 CFM	≥ 50 CFM	☐	☐	-
	Sound	Required: ≤ 2 sones	Recommended: ≤ 3 sones			

Mechanical Exhaust for Common Spaces [2] and Shared Garages			
8.3 Measured exhaust rates are ≥ ASHRAE 62.1-2010 rates (2c). [61]	☐	☐	☐
8.4 Where an exhaust system is installed in a shared garage, it is equipped with controls that sense CO and NO2.	☐	☐	☐
9. Filtration			
9.1 MERV 6+ filter(s) installed in each ducted mechanical system serving an individual dwelling unit, designed so all return and mechanically supplied outdoor air passes through filter(s) prior to conditioning, and located to facilitate access & regular service by the occupant, building owner, or building maintenance staff. [77]	☐	☐	☐
9.1.1 Filter access panel includes gasket and fits snugly against the exposed edge of filter when closed to prevent bypass. [78]	☐	☐	☐
10. Combustion Appliances			
10.1 Furnaces, boilers, and water heaters located within the building's pressure boundary are mechanically drafted or direct-vented. Alternatives in Footnote 81. [79, 80]	☐	☐	☐
10.2 Fireplaces located within the building's pressure boundary are direct-vented. [79, 80]	☐	☐	☐
10.3 No unvented combustion appliances other than cooking ranges or ovens are located inside the building's pressure boundary. [79]	☐	☐	☐

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Other	Must Correct	LP Verified[44]	Rater Verified [4]	N/A [5]
11. Domestic Hot Water				
11.1 Prescriptive Path: Hot Water Equipment Minimum Efficiency Levels meet or exceed the ENERGY STAR Multifamily Reference Design.	☐	-	☐	☐
11.2 ERI Path: Hot Water Equipment Min. Efficiency Levels for equipment serving common spaces but not dwelling units nor shared laundry meet or exceed the ENERGY STAR Multifamily Reference Design.	☐	-	☐	☐
12. Lighting				
12.1 Common Space [2] Lighting Controls:				
12.1.1 ERI and Prescriptive Path: All common spaces [2] (including shared garages), except the building lobby, mechanical equipment rooms, and where automatic shutoff would endanger the safety of occupants [82], have occupancy or vacancy sensors, programmed timers, or automatic bi-level lighting controls [83] installed and operation has been verified.	☐	☐	☐	☐
12.1.2 ASHRAE Path only: All common spaces [2] (including shared garages), except the building lobby, mechanical equipment rooms, corridors, and stairwells and where automatic shutoff would endanger the safety of occupants [82], have occupancy or vacancy sensors, programmed timers, or automatic bi-level lighting controls [83] installed and operation has been verified.	☐	☐	☐	☐
12.2 Exterior lighting controls: Fixtures, including parking lot fixtures, must include automatic switching on timers or photocell controls except fixtures intended for 24-hour operation, required for security, or associated with the electric meter for an individual dwelling unit.	☐	☐	☐	☐
12.3 Common Spaces [2] , Exterior, and Garages: 90% of installed lighting fixtures are integrated LED fixtures or contain LED lamps. [84]	☐	-	☐	☐
12.4 Prescriptive Path: All dwelling unit lighting fixtures meet the efficiency requirements in the ENERGY STAR Multifamily Reference Design.	☐	-	☐	☐
12.5 Prescriptive Path: Dwelling unit overall in-unit lighting power density ≤ 0.75 W/sq. ft. When calculating overall lighting power density, use 1.1 W/sq. ft. where lighting is not installed. [85]	☐	-	☐	☐

13. Appliances and Plumbing Fixtures	Must Correct	Rater Verified [4]	N/A [5]
13.1 Prescriptive Path: Installed appliances are ENERGY STAR certified. Installed bathroom faucets, bathroom aerators, and showerheads are WaterSense labeled. [86]	☐	☐	☐
13.2 ERI Path: Where installed in common spaces, refrigerators and dishwashers are ENERGY STAR certified and showerheads are WaterSense labeled.	☐	☐	☐
13.3 Prescriptive Path: Shower compartments with multiple fixtures cannot be operated simultaneously OR the total flow rate per shower compartment must not exceed 1.75 gallons per minute, as rated at 80 psi.	☐	☐	☐
14. Whole Building Energy Consumption Data Acquisition Strategy			
14.1 For buildings 50,000 sq. ft. and larger, a strategy that enables the collection of monthly or annual building-level energy consumption data (electricity, natural gas, chilled water, steam, fuel oil, propane, etc.) has been confirmed. [87]	☐	☐	☐

Rater Name: _____ Rater Pre-Drywall Inspection Date(s) [88]:_____ Rater Initials: _____

Rater Company Name: _____ On-site Photos Documented [89] ☐ 📷

Rater Name: _____ Rater Final Inspection Date(s) [90]: _____ Rater Initials: _____

Rater Company Name: _____ On-site Photos Documented [89] ☐ 📷

Builder/Developer Employee: _____ Builder Inspection Date(s): _____ Builder Initials: _____

Builder/Developer Name: _____

Licensed Professional: _____ LP Inspection Date(s): _____ LP Initials: _____

Footnotes:

1. This Checklist applies to all dwelling units, sleeping units, common spaces [2], and garages (open or enclosed, shared or individual) in the building being certified, and where specified, parking lots. These requirements apply to all Paths, unless otherwise specified. These requirements do not apply to parking garages or lots where the cost of the energy use of the parking garage or lot is not the responsibility of the Builder/Developer, Building Owner or Property Manager. This Checklist does not apply to commercial or retail spaces, except in the ASHRAE Path, if included in the energy model and the savings contribute to achieving the Performance Target. This Checklist does not apply to common spaces [2] that are located in buildings on the property without any dwelling or sleeping units. A 'sleeping unit' as defined by ANSI / RESNET / ICC 301, is a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Where the term 'dwelling unit' is used in this Checklist, the requirement is also required of 'sleeping' units. The term 'building' refers to a structure that encompasses dwelling/sleeping units and (if present) common spaces, sharing one or more of the following attributes: a common street address, a common entrance or exit, central/shared mechanical systems, or structurally interdependent wall or roof systems. Attached structures such as 4-story two-unit structures (commonly referred to as "2-over-2s") may be considered separate buildings if they are divided by a vertical fire separation wall from the foundation to the roof sheathing and share none of the other attributes listed above. A skyway or a breezeway that connects two structures is not considered a common entrance or exit.
2. The term 'common space' refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration or maintenance in support of the residents. For the ASHRAE Path, the requirements for 'common spaces' apply to commercial or retail spaces where they are included in the energy model and savings contribute to achieving the Performance Target.
3. At the discretion of the Rater, the builder or developer may verify up to five of the indicated Checklist Items. For the purpose of this Checklist, "Builder" represents either the builder or the developer. When this allowance is used for Items marked "Pre-rock + 20", for each dwelling unit, up to 200 sq. ft. of wall areas that have drywall installed prior to general installation of drywall (i.e., "pre-rock" areas such as walls behind tubs or staircases), plus an additional 20 sq. ft., may be builder verified. In the remainder of the building, up to 500 sq. ft. of wall areas that have drywall installed prior to general installation of drywall, plus an additional 50 sq. ft., may be builder verified. For Items marked "20 sq. ft.", up to 20 sq. ft. of area per dwelling unit and 50 sq. ft. in the remainder of the building may be verified by the builder. For Items marked "2 penetrations", up to two penetrations per dwelling unit and 5 in the remainder of the building may be builder verified. The remaining items and areas (i.e., all the applicable area other than what the builder verifies) must be visually verified on-site by the Rater or, for applicable minimum rated features, verified using an alternative on-site inspection protocol defined by ANSI / RESNET / ICC 301 (e.g., for slab insulation or continuous exterior wall insulation). When exercised, the builder's responsibility will be formally acknowledged by the builder, or their designated agent, signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
4. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or an equivalent designation as determined by a Home Certification Organization (HCO) or Multifamily Review Organization (MRO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/mftraining.

   As stated in the National Program Requirements, Raters who operate under an MRO or an HCO Sampling Protocol are permitted to verify any Checklist Item designated "Rater Verified" using an MRO or HCO-approved sampling protocol. No parties other than Raters are permitted to use sampling to complete this Checklist.
5. The column titled "N/A," which denotes items that are "not applicable," should be used when the checklist Item is not present in the building or conflicts with local requirements.
6. Two alternatives are provided: a) Grade II cavity insulation is permitted to be used for assemblies that contain a layer of continuous, air impermeable insulation ≥ R-3 in Climate Zones 1 to 4, ≥ R-5 in Climate Zones 5 to 8; [1] b) Grade II batts are permitted to be used in floors if they fill the full width and depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving Grade I is the compression caused by the excess insulation.
7. Ensure compliance with this requirement using ANSI / RESNET / ICC 301 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is certified under, with approved exceptions listed at www.energystar.gov/ERIExceptions.
8. Window-to-Wall ratio is taken as the sum of all window area divided by the total exterior above-grade wall area. All decorative glass and skylight window area contribute to the total window area to above-grade wall ratio (WWR). Spandrel sections of curtain wall systems contribute to the above-grade wall area.
9. For all Versions except National v1.2 and 1.3, the 2009 IECC Climate Zone designations are applicable, as defined and illustrated in Section R301 of the code. For National v1.2 and 1.3, the 2021 IECC Climate Zone designations are applicable, as defined and illustrated in Section R301 of the code. Note that some locations have shifted to a different Climate Zone in the 2021 IECC compared to prior editions.
10. Item 1.5 is not applicable to wood-framed walls. Item 1.5 is also not applicable to the concrete floor edge associated with a podium since Item 3.5 applies. Item 1.5 is applicable to walls separating conditioned space from the exterior, including walls that are adjacent to other buildings and the wall area associated with between floor spandrels and intermediate floor perimeter edges..
11. Mass walls utilized as the thermal mass component of a passive solar design (e.g., a Trombe wall) are exempt from Item 1.5. To be eligible for this exemption, the passive solar design shall be comprised of the following five components: an aperture or collector, an absorber, thermal mass, a distribution system, and a control system. For more information, see: www.energy.gov/sites/prod/files/guide_to_passive_solar_home_design.pdf.

    Mass walls that are not part of a passive solar design (e.g., CMU block or log home enclosure) shall either utilize the strategies outlined in Item 1.5 or the pathway in the assembly with the least thermal resistance, as determined using a method consistent with the 2013 ASHRAE Handbook of Fundamentals, shall provide ≥ 50% of the applicable assembly resistance, defined as the reciprocal of the mass wall equivalent U-factor in the 2009 IECC Table 502.1.2. Documentation identifying the pathway with the least thermal resistance and its resistance value shall be collected by the Rater and any Builder Verified or Rater Verified box under Item 1.5 shall be checked.

12. Up to 10% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate intentionally designed details. This exemption does not apply to steel columns or the repeated concrete floor perimeter edges of a multistory building. To calculate the exempted wall area, the Rater shall sum the areas of the following features that either prevent the use of, or interrupt, continuous insulation when they are present in the design: architectural details (e.g., wing walls, shading devices, roof overhangs, projected balconies, brick returns, stone window sills, metal panels, or masonry fireplaces); cladding details (e.g., non-thermally broken shelf angles, metal clips, metal brackets, and metal z-girts; but not stand-off shelf angles, screws, bolts, or brick ties); mechanical openings (e.g., PTACs, PTHPs, through-wall air conditioners). It shall be apparent to the Rater that the exempted areas are intentionally designed details, or the exempted area shall be documented in a plan provided by the builder, architect, or engineer. The Rater need not evaluate the necessity of the designed detail to certify the building.
13. If used, insulated siding shall be attached directly over a water-resistive barrier and sheathing. In addition, it shall provide the required R-value as demonstrated through either testing in accordance with ASTM C 1363 or by attaining the required R-value at its minimum thickness. Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If non-insulated structural sheathing is used at corners, the advanced framing details assessed by Item 3.4 shall be met for those wall sections.
14. In a building undergoing a substantial reconstruction or rehabilitation, continuous interior insulation may be used in lieu of continuous exterior rigid insulation or insulated siding. This alternative does not require continuous interior insulation where a floor intersects an exterior wall, it only requires it from floor to ceiling. Continuous interior insulation is required where the demising wall intersects the exterior wall; however, it may be exempted per Footnote 12.
15. As an alternative to the insulation in Table 502.1.2, a maximum U-factor of 0.123 is permitted where compliance with Item 2.1 of the Rater Design Review Checklist is documented using the Multifamily Workbook and the concrete slab floor is explicitly entered as a row in the table.
16. While the EPA recommends insulating interior columns for a minimum of R-5 for 4 vertical ft. and vertically along other areas of discontinuity, such as where walls intersect the concrete slab; this is not required.
17. Compliance with Items 1.7 and 1.8 is not required for buildings pursuing the ASHRAE Path, but the energy used by the heating systems must be modeled following the requirements in the Simulation Guidelines, available at www.energystar.gov/mfguidance. Heated plenums and garages with space heating must also comply with Item 5.12.
18. Where conditioned space is above the plenum, in lieu of insulating the top of the plenum, the bottom of the plenum may be used to comply with Items 1.7.2 and 1.7.3, if its insulation meets the requirements of Item 1.7.2 and, where applicable, Item 1.6. When using this alternative, the bottom of the plenum must meet all the requirements for floor insulation which include a fully-aligned air barrier as described in Footnote 20 and Grade I installation per Item 1.2.
19. The bottom of the heated plenum is permitted to be suspended ceiling tiles or other non-air barrier material. If fiberglass insulation is installed, it shall achieve a Grade I or Grade II install.
20. For purposes of this Checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. The EPA recommends, but does not require, rigid air barriers.

    Open-cell or closed-cell foam shall have a finished thickness ≥ 5.5 in. or 1.5 in., respectively, to qualify as an air barrier unless the manufacturer indicates otherwise.

    If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 in. diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil.
21. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings, unless the ceiling is adiabatic.
22. All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls. The following exceptions apply: air barriers recommended, but not required, in adiabatic walls; and, in Climate Zones 4 through 8, an air barrier at the interior vertical surface of insulation is recommended but not required in basement walls or crawlspace walls. For the purpose of these exceptions, a basement or crawlspace is a space for which ≥ 40% of the total gross wall area is below-grade.
23. The EPA highly recommends, but does not require, an air barrier at the interior vertical surface of floor insulation in Climate Zones 4-8. [9]
24. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation. Alternatively, supports are not required if batts fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving the required installation grade is the compression caused by the excess insulation.
25. Alternatively, an air barrier is permitted to be installed at the exterior horizontal surface of the floor insulation if the insulation is installed in contact with this air barrier, the exterior vertical surfaces of the floor cavity are also insulated, and air barriers are included at the exterior vertical surfaces of this insulation.
26. Reduced thermal bridging details, while not mandatory, will improve the comfort and efficiency of the building and help meet the ENERGY STAR performance target, as well as the thermal backstop in Item 1.1, EPA recommends, but does not require, that builders include details on plans to ensure proper implementation during construction.
27. Item 3.5 applies to all balconies and projected slabs and first floor podiums, but does not otherwise apply to the intermediate concrete floor perimeter edges above the podium of a multistory building as those are subject to Item 1.5.
28. Concrete floor edges meeting one of the following are considered to have a thermal break:
    a. For projected concrete floors that are not resting on podiums, one of the following insulation options is met:
        i. Install ≥ R-2 insulation at the floor edge between conditioned space and the projected slab; OR
        ii. Install ≥ R-5 insulation, above and below the concrete slab that extends horizontally for a minimum of 4 ft. Insulation installed on top of slab shall be covered by a durable floor surface. When entering the floor edge into the Multifamily Workbook, R-1 insulation may be associated with the area of the wall that is uninsulated due to the projected slab.

b. For all concrete floors resting on podiums, including projected concrete floors, one of the following is met:
   i. R-5 insulation is installed that extends from the top of the floor edge and continues a minimum of 4ft. on both interior and exterior surfaces of the wall below the floor edge. For podiums that are at-grade or continue below-grade, insulate to a minimum of 4ft. or a depth of 2 ft.; OR
   ii. For projected slabs only: Insulation is installed per a.i. or a.ii. above AND R-5 insulation is installed that extends from the bottom of the floor edge and continues a minimum of 4ft. on both interior and exterior surfaces of the wall below the floor edge. For podiums that are at-grade or continue below-grade, insulate to a minimum of 4ft. or a depth of 2 ft.; OR
   iii. Where the horizontal slab is not in direct contact with the exterior wall, R-5 insulation is installed at the slab edge continuous with the floor insulation under the slab.; OR
   iv. Floor insulation meeting the requirements of Item 1.6 is installed above the slab and provides a continuous thermal break where it intersects the wall.

29. In CZ 4-8, where a building has concrete podiums, balconies, or projected slabs, with or without thermal breaks, the building must document compliance with Item 2.1 of the Rater Design Review Checklist using the Multifamily Workbook.

    Where a thermal break has not been met based on the requirements in Footnote 28:

    1. For the ASHRAE or ERI Paths, in the energy model, the concrete floor edge area must be modeled with R-0.
    2. In addition, for all Paths, in the Multifamily Workbook, a row representing this floor edge area should be added as either “Projected Concrete Floor Edge / Balcony” or “Podium Floor Edge” as applicable, with the following U-factors:
       a. Where the concrete floor is above conditioned space, U-1.20.
       b. Where the concrete floor is above unconditioned space, U-1.64.

    Where a thermal break has been met based on the requirements in Footnote 28:

    1. For the ASHRAE or ERI Paths, in the energy model, the concrete floor edge area must be modeled with the insulation provided at that edge, which may be different than the R-value of the wall above.
    2. In addition, for all Paths, in the Multifamily Workbook, a row representing this floor edge area should be added as either “Projected Concrete Floor Edge / Balcony” or “Podium Floor Edge” as applicable, with the U-factor associated with the assembly based on the insulation installed.

30. Slab edge insulation shall be assessed for slab-on-grade floors with a floor surface less than 24 in. below grade, including where an insulated wall separates a garage, patio, or other unconditioned space from the conditioned space of the building. Whether insulated or not, these perimeters must be documented in the energy model and, where using to document compliance with Item 2.1 of the Rater Design Review Checklist, the Multifamily Workbook. F-Factors for use in the Multifamily Workbook shall be determined using the guidance available at www.energystar.gov/F-Factor.
31. For dwelling or sleeping units adjacent to garages, the EPA recommends, but does not require, carbon monoxide (CO) alarms installed in a central location in the immediate vicinity of each separate sleeping zone and according to NFPA 720.
32. Where a sampling protocol is permitted in accordance with the National or California Program Requirements, at least 20% of the dwelling or sleeping units adjacent to a garage shall be selected for testing.
33. Air leakage shall be measured and documented by a Rater using ANSI / RESNET / ICC 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under.
34. A ‘ducted return’ is defined as a continuous duct made of sheet metal, duct board, or flexible duct that connects one or more return grilles to the return-side inlet of the air handler. Any other approach to convey air from return or transfer grille(s) to the air handler, such as the use of building cavities, does not constitute a ‘ducted return’. Where there are no ‘ducted returns’, the duct leakage test shall include the leakage from the air handler and supply side of the forced air system. Where building cavities used to return air to the air handler are included in the duct leakage test, the allowances for “One or two ducted returns” shall be permitted.
35. This section of the Checklist is designed to meet ASHRAE 62.1-2010 or later, ASHRAE 62.2-2010 or later, and ANSI / ACCA’s 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new multifamily buildings when compared to multifamily buildings built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems, (e.g., those caused by a lack of maintenance or by occupant behavior). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
36. To be eligible for Track A – HVAC Grading by Rater, dwelling units must have at least one unitary HVAC system including air conditioners or heat pumps up to 65 kBtuh, or furnaces up to 125 kBtuh (i.e., within the scope of ANSI / RESNET / ACCA Standard 310). Track A – HVAC Grading by Rater shall use ANSI / RESNET / ACCA 310 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under for all dwelling units.
37. For Track A, all unitary HVAC Systems including air conditioners and heat pumps up to 65 kBtuh and furnaces up to 125 kBtuh serving individual dwelling units shall comply with 5a.1 through 5a.4 for the building to be certified. Other systems within the scope of ANSI / RESNET / ACCA 310, except for serving common spaces, may meet Items 5a.1 through 5a.4, or meet Item 5a.4 and Sections 2 and 3 on the National HVAC Functional Testing Checklist. When systems serving common spaces complete Items 5a.1 through 5a.3 they are exempt from meeting the prerequisite ANSI / RESNET / ACCA 310 design review criteria.

    For Track B, Item 5b.1 is applicable for all systems. Item 5b.2 is applicable to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtuh with forced-air distribution systems (i.e., ducts) and to furnaces up to 225 kBtuh with forced-air distribution systems (i.e., ducts). All systems shall comply with 5b.1 and 5b.2, as applicable, for the building to be certified.

    If, based on the selected Track, an Item in Section 5 is not applicable to any systems in the building, the Rater shall mark ‘N/A’ for that Item.
38. If the non-invasive procedure in ANSI / RESNET / ACCA 310 is not permitted to be used during the final inspection of a unit (i.e., due to the equipment type or to outdoor air temperatures that do not meet the requirements of the non-invasive method), then the unit is permitted to be

certified with a default refrigerant charge designation of Grade III. Note that in these circumstances, the weigh-in method procedure in ANSI / RESNET / ACCA 310 may still be used to pursue a Grade I designation.

39. While this verification is completed as part of ANSI / RESNET / ACCA 310, it must also be documented in this checklist.
40. If installed equipment does not match the National HVAC Design Report, then prior to certification the Rater shall obtain written approval from the designer (e.g., email, updated National HVAC Design Report) confirming that the installed equipment meets the requirements of the National HVAC Design Report. In addition, the Rater shall verify that all installed equipment are still exempted types per Footnote 30 of the National HVAC Design Report or, if no longer an exempted type, shall re-review Section 3b of the National Rater Design Review Checklist to ensure compliance with all requirements (e.g., full completion of HVAC Design Report, HVAC design tolerances). In cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the HVAC Contractor or Functional Testing Agent after installation is complete.
41. The Rater shall measure and record the external static pressure in the return-side and supply-side of the system using the contractor-provided test locations. However, at this time, the Rater need not assess whether these values are within a specific range to certify the dwelling unit. Ductless systems and systems with a total amount of supply ductwork or distribution building cavities ≤ 10 ft. in length are exempted from this requirement. The Rater is also not required to measure external static pressure for multi-split systems and may mark “N/A”. If the space provided in Item 5b.2 does not accommodate all the measurements, use the table in Appendix A to supplement.
42. Electric resistance heating specified in common spaces has a total heating capacity ≤ 12 kBtu/h (3.5 kW) per enclosed space and has automatic thermostatic controls. Electric resistance limitations do not apply to heat pumps with integral supplemental or emergency electric resistance heating. The EPA recommends but does not require that heat pumps have controls to limit the use of emergency or supplemental heat to heat pump failures or when the heat pump cannot meet the heating load. The EPA also recommends but does not require that heat pumps in CZ 5-8 are ENERGY STAR certified cold-climate heat pumps. Electric resistance limitations do not apply to systems dedicated to heating outdoor air supplied by a mechanical ventilation system, as long as the space served is primarily heated by a non-electric-resistance system that meets the efficiency requirements noted in the ENERGY STAR Multifamily Reference Design. Electric resistance limitations apply to garages, but do not apply to heated plenums meeting Item 5.12, or stairwells where automatic thermostatic controls prevent operation above 50°F.
43. Functional Testing Agents must hold an approved credential, as listed at www.energystar.gov/ftas, or must be a representative of the Original Equipment Manufacturer (OEM), or a contractor credentialed by an HVAC Quality Installation Training and Oversight Organization (H-QUITO), if not completing Sections 5 and higher. Functional Testing Agents may not be the installing contractor, nor employed by the same company as the installing contractor, unless they are a credentialed contractor. An explanation of the credentialing process and links to H-QUITOs, which maintain lists of credentialed contractors, can be found at www.energystar.gov/findhvac. A directory of other FT Agents can be found at www.energystar.gov/ftas. Raters can confirm FT Agents have met the requirements by documenting they are listed in a directory. For Track A, Sections 2 and 3 of the National HVAC Functional Testing Checklist do not need to be completed for systems using ANSI / ACCA / RESNET 310 and meeting Items 5a.1 – 5a.4.
44. At the discretion of the Rater, a Licensed Professional (LP), (i.e., a Registered Architect or Professional Engineer in good standing and with a current license), may verify any of the items in Sections 5, and 12 of this Checklist, where a checkbox is provided for “LP Verified”. When exercised, the LP’s responsibility will be formally acknowledged by the LP signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
45. Item 5.10 must be completed for all heating and cooling equipment located within dwelling units and common spaces, including, but not limited to the indoor units associated with split systems (e.g., split air conditioners and air-source heat pumps, mini-splits, multi-splits), unitary air conditioners, furnaces, unit heaters, PTAC’s, PTHP’s, GLHP’s, WLHP’s, fan coils, and hydronic distribution systems. For shared VRF systems, where a Rater is using sampling to complete Item 5.10, Raters must select units from a representative sample of the associated outdoor units.
46. Item 5.16 does not apply to factory-installed piping within HVAC equipment or piping that conveys fluids having a design operating temperature range between 60°F and 105°F, inclusive.
47. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
48. Item 6.2 does not apply to ventilation ducts, exhaust ducts, or non-ducted systems. For an HVAC system with a multi-speed fan, the highest design fan speed shall be used when verifying this requirement. When verifying this requirement, doors separating bedrooms from the main body of the dwelling unit (e.g., a door between a bedroom and a hallway) shall be closed and doors to rooms that can only be entered from the bedroom (e.g., a closet, a bathroom) shall be open. The Rater-measured pressure shall be rounded to the nearest whole number to assess compliance.
49. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust or exhaust-only dwelling-unit mechanical ventilation systems. The EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
50. Item 6.4 generally applies to the ducts of space heating, space cooling, and dwelling-unit mechanical ventilation systems.

    However, visual inspection is permitted in lieu of testing for the following system types: 1) a dwelling-unit mechanical ventilation system not connected to the space heating or space cooling system, regardless of the number of dwelling units it serves, except where testing is required by Item 6.6; 2) a space heating or space cooling system for which the ducts and air handler are in conditioned space and the total supply duct length of the system, including all supply trunks and branches, is ≤ 10 ft.; and 3) a space heating or space cooling system that serves more than one dwelling unit. In such cases, a Rater shall visually verify that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.

    For duct systems requiring testing, duct leakage shall be determined and documented by a Rater using ANSI / RESNET / ICC 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under. Leakage limits shall be assessed on a per-system, rather than per-dwelling unit, basis.

51. Note that compliance with Item 6.4.1 or 6.4.2 in conjunction with Section 3a of the National Rater Design Review Checklist automatically achieves Grade I total duct leakage per ANSI / RESNET / ACCA 310.
52. Cabinets (e.g., kitchen, bath, multimedia) or ducts that connect duct boots to toe-kick registers are not required to be in place during the 'rough-in' test.
53. Registers atop carpets are permitted to be removed and the face of the duct boot temporarily sealed during testing. In such cases, the Rater shall visually verify that the boot has been durably sealed to the subfloor (e.g., using duct mastic or caulk) to prevent leakage during normal operation.
54. Item 6.6 does not apply to central exhaust systems serving clothes dryers but is required for the central exhaust portion of balanced systems such as HRVs and ERVs.
55. Duct leakage shall be measured using one of the following two options:
    a. Measure duct leakage using a duct leakage tester: To determine leakage, measure duct leakage by testing at the design or average operating pressure following the procedures available at www.energystar.gov/centralexhausttest. Where testing at the design or average operating pressure is not feasible, testing at 50 Pa is permitted, however the following flow equation must be used to determine the leakage allowance at 50 Pa:

    $$CFM_{50} = CFM_{design} / [P_{design}^{(0.65)} / 50^{(0.65)}]$$

    The design pressure, P_{design}, can be obtained from the HVAC Designer and typically is reported on the mechanical schedule as the "external static pressure" or "ESP". Where reported in "inches of water column", convert to Pascals: 1 in. w.c. = 250 Pascals. Compare the measured leakage to the applicable leakage allowances.

    Where testing at rough-in, to calculate the 25% leakage allowance, the 'exhaust fan flow' shall be the lesser of the rated fan flow (i.e., nameplate rating) and 133% of the sum of the design exhaust airflow of the spaces served by that fan.

    Where testing at final, to calculate the 30% leakage allowance, the 'exhaust fan flow' shall be the lesser of the rated fan flow (i.e., nameplate rating) and 143% of the sum of the design exhaust airflow of the spaces served by that fan.

    Measured fan flow (either at the fan itself or the total airflow measured from all exhaust grilles served by the fan) may be used in lieu of the rated fan flow to determine the leakage allowance.

    To calculate central exhaust duct leakage allowance, the EPA recommends using worksheet 3b of the Multifamily Workbook.

    b. Measure duct leakage as the difference in exhaust system airflows: To determine leakage, first the total exhaust airflow from a central exhaust fan is measured by a Rater or certified air-balancing contractor. Duct leakage is then calculated as the difference of the total measured exhaust fan airflow and the sum of the measured exhaust airflows from each of the spaces served by the fan. This test option is only permitted for exhaust fans with a rated fan flow (i.e., nameplate rating) that does not exceed 143% of the sum of the design exhaust airflow of the spaces served by that fan. Where there are more than 8 exhaust fans, sampling at a rate of 1 in 7 is permitted after 7 exhaust fans demonstrate compliance with Item 6.6.2.
56. Where testing for duct leakage following the pressurization or depressurization test procedure in Footnote 55a, sampling is permitted given the following requirements are all met:
    a. No less than 50% of the exhaust ductwork, based on total linear feet, are tested. Where failures occur, the percentage of total linear feet required to be tested increases by 10%.
    b. Where aerosol-based sealant is used on some but not all ductwork, the ductwork selected for testing must be representative of all sealing strategies used in the building.
    c. Testing only a portion of the ductwork associated with an exhaust fan is permitted, however the total tested ductwork in the building must include representative portions of all ductwork sections, such as vertical risers, main trunks, horizontal run outs, branches, take-offs, and register boxes.
    d. Floor plans or riser diagrams that clearly document the total duct length and the length of the duct sections tested must be collected and retained by the Rater.
    e. Where portions of ductwork are tested, the leakage allowed is calculated by multiplying the total allowance by this ratio: linear feet being tested divided by the total duct length served by the fan.
57. Where aerosol-based sealant is used on an entire exhaust ductwork system (i.e., 100% of the ductwork between an exhaust fan and the grilles served by the fan), the duct-sealing contractor is permitted to perform the duct leakage test. The Rater is not required to witness these tests. Where the duct-sealing contractor is not performing the test on all exhaust ductwork systems, at least 50% of the ductwork in the untested systems, based on linear feet, shall be tested by the Rater according to the requirements in Footnote 56.
58. As defined by ANSI / RESNET / ICC 301-2019, a Dwelling Unit Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides dwelling-unit ventilation at a known or measured airflow rate.
59. Item 7.5 applies to any outdoor air inlet connected to a ducted return of the dwelling unit HVAC system, regardless of its intended purpose (e.g., for ventilation air, make-up air, combustion air). This Item does not apply to HVAC systems without a ducted return.
60. The dwelling-unit ventilation air flows and local exhaust air flows shall be determined and documented by a Rater using ANSI / RESNET / ICC 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under. To facilitate testing the air flow of a microwave-integrated exhaust fan, Raters are permitted to tape off all air inlets except at the bottom. However, no correction factors shall be applied to the measured air flow to account for the increased airflow restriction. In Item 7.2, the dwelling-unit ventilation rates required by ASHRAE 62.2-2010 can be calculated using the Multifamily Workbook or the following equation: 0.01 x Conditioned Floor Area + 7.5 x (number of bedrooms + 1). For sleeping units, the following equation must be used: 0.01 x Conditioned Floor Area + 7.5 x (number of beds). Where local codes do not permit dwelling-unit ventilation to exceed ASHRAE 62.2-2010 rates, Rater-measured ventilation rate is permitted to be 0-15 CFM less than rates required by ASHRAE 62.2-2010. Designers are permitted to provide multiple combinations of a design ventilation airflow rate, run-time per cycle, and cycle time. When multiple

combinations are provided, the Rater shall first assess the run-time setting of the installed system and use that to determine the corresponding design ventilation rate. The Rater-measured ventilation rate must fall within the program-specified tolerance relative to that design ventilation rate.

61. While common spaces are not under the scope of ANSI / RESNET / ICC 380, the ventilation air flow and exhaust air flows in common spaces shall be measured in accordance with the procedures in ANSI / RESNET / ICC 380. The air flows may be measured by a Rater or a certified air-balancing contractor under the observation of a Rater. Sampling is only permitted where airflows are measured directly by the Rater. Where a system provides supply air that is a mix of return and outdoor air, and not 100% outdoor air, the outdoor air airflow shall be measured and compared to the total supply airflow to determine percentage of outdoor air supplied. This percentage shall be applied to airflow measured at supply registers to determine outdoor air provided for comparison to design airflow rates. Where the building has total corridor space ≤ 250 sq. ft. and does not contain any of the other common spaces which require outdoor air per Item 2.2 of the National HVAC Design Report, outdoor air is not required to be provided to the corridor.
62. For permits on or before 01/01/2024, where outdoor air is supplied via a PTAC or PTHP, in lieu of measurement, the design CFM shall meet or exceed the ventilation rates required by ASHRAE 62.1-2010 and the space served by the PTAC or PTHP shall have at least one operable window. For permits after 01/01/2024, both the runtime and measurement of outdoor air through these systems will be required to demonstrate compliance with ASHRAE 62.1-2010 or alternative ventilation system specified (e.g., ducted supply).
63. For example, if an outdoor air inlet connected to a ducted return is used as a dedicated source of outdoor air for an exhaust ventilation system (e.g., bath fan), the outdoor airflow must be automatically restricted when the exhaust fan is not running and in the event of an override of the exhaust ventilation system.

    In dwelling / sleeping units in multifamily buildings, automatic restriction of airflow is exempted if a manual shutoff damper is used with a continuous exhaust ventilation system and is readily-accessible, labeled as the override, and not used as a balancing damper.
64. When assessing the ventilation rate, the highest HVAC fan speed applicable to ventilation mode shall be used (e.g., if the inlet only opens when the HVAC is in 'fan-only' mode, then test in this mode). If the inlet has a motorized damper that only opens when the local mechanical kitchen exhaust is turned on, then testing is not required.

    When required, the ventilation airflow through the inlet shall be measured and documented by a Rater using ANSI / RESNET / ICC 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under. As an alternative, measurement of the outdoor airflow can be waived if a Constant Airflow Regulating (CAR) damper with a manufacturer-specified maximum flow rate no higher than 15 CFM or 15% above the ventilation design value is installed on the inlet.
65. Dwelling-unit mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.7 of the National HVAC Design Report. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grille. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
66. Note that the 'fan-on' setting of a thermostat would not be an acceptable controller because it would continuously operate the HVAC fan.
67. Bathroom fans with a rated flow rate ≥ 500 CFM and heat/energy recovery ventilation fans are exempted from the requirement to be ENERGY STAR certified.
68. As an alternative to meeting or exceeding the efficiency standards for NEMA Premium motors, documentation that an exhaust fan motor has a fan energy index (FEI) ≥ 1.2 at the design point of operation OR a fan efficacy ≥ 1.1 CFM/Watt is permitted.
69. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, the EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the building owner or maintenance staff. Ventilation air inlets that are only visible via rooftop access are exempted from Item 7.11 and the Rater shall mark "N/A".
70. Two alternatives to the required 10 ft. distance are provided: 1) inlets providing outdoor air to a dwelling unit are permitted to be ≥ 5 ft. of stretched-string distance from outlets of both exhaust dwelling-unit mechanical ventilation systems and local mechanical exhaust systems, and 2) the outlet and inlet of ERV's and HRV's may use a smaller distance if allowed by the manufacturer of the system. If the second alternative is used, the manufacturer's instructions shall be collected for documentation purposes.
71. Known contamination sources include, but are not limited to, stacks, vents, exhausts, and vehicles.
72. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the airflow rate in Item 8.2. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the airflow rate in Items 8.1 and 8.2. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
73. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
74. Where 5 ACH is selected, kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. In addition, the continuous kitchen exhaust rate shall be ≥ 25 CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume. As an alternative to 5 ACH for dwelling units and sleeping units, 50 CFM of continuous exhaust is permitted to be used, regardless of kitchen volume. In such cases, the edge of the exhaust fan or intake grille shall be located within 10 ft. of the edge of the range, as measured horizontally on the floor plan.
75. Alternatively, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 or later are permitted to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC. If the rated airflow is unknown, ≥ 6 in. smooth duct shall be used, with a rectangular to round duct transition as needed. Guidance to assist partners with these alternatives is available at www.energystar.gov/newhomesguidance. As an alternative to Item 8.1, dwelling units are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they

are either a) Phius or PHI certified, or b) provide both dwelling-unit ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate ≤ 1.0 ACH50 or ≤ 0.05 CFM50 per sq. ft. of Enclosure Area. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.

76. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting ≥ 5 ACH, based on the kitchen volume.
77. Based upon, ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space with a total amount of supply ductwork exceeding 10 ft. in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. Filters are recommended, but not required, for mini-split systems, HRV's, and ERV's. HVAC filters located in the attic shall be considered accessible to the occupant, building owner, or building maintenance staff if either 1) drop-down stairs, a pull-down ladder, or door provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter or 2) the filter location enables arm-length access from a portable ladder without the need to step into the attic and the height of the ceiling access panel or the bottom of the wall access panel where access is provided is ≤ 12 ft.
78. Sealing mechanisms comparable to a gasket are also permitted to be used. The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement. These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grille.
79. The pressure boundary is the primary enclosure boundary separating indoor and outdoor air. For example, a volume that has more leakage to outside than to conditioned space would be outside the pressure boundary.
80. Per the 2009 International Mechanical Code, a direct-vent appliance is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.
81. Naturally drafted equipment is only allowed if located in a space outside the pressure boundary, where the envelope assemblies separating it from conditioned space are insulated and air-sealed.
82. For common spaces where automatic lighting controls are not installed due to safety concerns associated with automatic lighting shutoff, the architect or engineer must provide the specific location(s) where this concern is applicable. The Rater shall retain a copy of the email or letter that documents the location(s) for their records and check the box in the "Rater Verified" column. For Item 12.1.1, this exemption does not apply to corridors or stairwells; where safety is a concern in those spaces, the ASHRAE Path should be pursued.
83. Bi-level lighting controls include any design strategy that achieves at least one intermediate step between all fixtures being fully ON and fully OFF that provides 30-70% of full lighting power to that space. This can be achieved by light fixtures with integral bi-level controls or with occupancy sensors that activate select fixtures ON/OFF, while the others remain fully on.
84. This requirement applies to exterior lighting fixtures that are attached to the building, but does not apply to landscape or parking lot lighting fixtures. For the ASHRAE Path, where the proposed lighting power in a given space is modeled with 30% or greater savings compared to the allowance in the Simulation Guidelines, field measurement of footcandles is required.
85. For senior housing buildings, Prescriptive Path dwelling unit overall in-unit lighting power density is permitted to be ≤ 1.3 W/sq. ft., using 1.65 W/sq. ft. where lighting is not installed.
86. Appliances include refrigerators, dishwashers, clothes washers, and clothes dryers. Where an appliance type is not eligible for ENERGY STAR certification, (e.g., commercial dryers) the appliance is exempt from this requirement. Where a bathroom faucet or aerator is not eligible for WaterSense certification, (e.g., public use lavatory faucets) the fixture is exempt from this requirement.
87. Building area shall be calculated according to Gross Floor Area as defined by ENERGY STAR Portfolio Manager, which specifies to measure from the outside surface of exterior walls and includes all areas inside the building and excludes parking areas. Refer to the ENERGY STAR Portfolio Manager Glossary for a complete definition. Strategies include: an agreement with the utility companies to provide the aggregated building-level data, in a spreadsheet format or directly through Portfolio Manager; OR evidence that securing signed utility data release forms will be a mandatory component of all lease agreements; OR installation of a building-level energy monitor, data acquisition system, or utility-owned energy meter. If an energy monitor is installed, the builder shall provide the building operator with the manufacturer's documentation and operations manual. The EPA recommends, but does not require, that one of these strategies also be implemented in buildings 25,000-49,999sq. ft.
88. Any Item that will be concealed by drywall (e.g., wall insulation) must be verified during the pre-drywall inspection.
    If drywall is installed prior to the inspection, then it must be entirely removed to fully verify all Items. It is not sufficient to remove only portions of drywall to inspect a subset of areas. Furthermore, it is not acceptable to complete a Sampled Rating on a unit that has missed the pre-drywall inspection. Additional information is available in the Technical Bulletin: Pre-Drywall Inspection Is Always Required.
89. The Rater is required to capture photos according to the Photo Documentation Guidance Document available at www.energystar.gov/mfnc, which generally requires one representative photo per building for each specified item, as well as one geo-tagged and time-stamped photo of the Rater in front of the dwelling unit or building during each inspection.
90. Some Items can typically only be verified at a later stage of construction than when the pre-drywall inspection occurs (e.g., bath fan airflow). Any Item that has not been verified during the pre-drywall inspection must be verified prior to or during the final inspection.

Appendix A – Supplementary tables for Section 5

5. Heating & Cooling Equipment			
5b.2 External static pressure measured by Rater at contractor-provided test locations and documented below:	**Must Correct**	**Rater Verified [4]**	**N/A [5]**
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐
Dwelling Unit / Common Space Served: _____ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure _____ IWC	☐	☐	☐

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HVAC Designer Responsibilities:

- This Supplement shall be used for MFNC buildings where "Track A – HVAC Grading by Rater" is used for all dwelling unit HVAC systems.
- Complete one Supplement for Common Spaces & Central Systems for each building. This Supplement includes system design for all hydronic systems, common space heating and cooling systems, and common space and central ventilation requirements not covered under ANSI / RESNET / ACCA 310 or the National HVAC Design Supplement to Std. 310 for Dwellings & Units. For projects with multiple buildings, one Supplement per building or per project is permitted. [1]
- Obtain efficiency features (e.g., window performance, insulation levels, and infiltration rate) from the builder, architect, or Rater. [2]
- Provide the completed Supplement to the Rater and the person / company completing the National HVAC Functional Testing Checklist. [2]

1. Design Overview

1.1 Designer name: _____ Designer company: _____ Date: _____

1.2 Select which party you are providing these design services to: ☐ Builder / Developer ☐ FT Agent ☐ MEP / Credentialed HVAC contractor

1.3 Name of company you are providing these design services to (if different than Item 1.1): _____

1.4 Building address: _____ City: _____ State: _____ Zip code: _____

2a. Common Space Mechanical Ventilation Design ("Vent System") [3] & Inlets in Return Duct [4, 5]						**Designer Verified**
Airflow:						
2.1 Common space outdoor airflow design rate meet the requirements of Section 6 of ASHRAE 62.1 [5, 6] -_____. ERI and Prescriptive Path Only: Rates shall not exceed 2013 rates by more than 50%.[7]						☐
2.2 Access points to measure airflow rate and inspect outdoor air dampers are provided and accessible by the Rater. [9]						☐
List common space for which 62.1 ventilation rates were calculated in the spaces to the right: [8, 9, 10]						
2.3 Ventilation airflow required by ASHRAE 62.1 (CFM): [6]						
2.4 Ventilation airflow designed (CFM): [6]						
Common Space System Type & Controls:						
List Ventilation System ID in the spaces to the right: [8]						
2.5 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)						
2.6 Manufacturer:						
2.7 Model Number:						
2.8 # installed in the building:						
2.9 # of spaces served (e.g., single, multiple)						
2.10 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)						
2.11 Specified control location: (e.g., Master bath, utility):						
2.12 Specified controls allow the systems to operate automatically, without occupant intervention. A ventilation override control is specified and also labeled if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment).						☐

Common Space Air Inlet Locations: (Complete this section if system has specified air inlet location(s); otherwise check "N/A".) [11]	**Designer Verified** ☐ N/A
2.13 Inlet(s) pull ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.	☐
2.14 Inlet(s) are ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from dryer exhausts and sources exiting the roof. [12]	☐
2.15 Inlet(s) are provided with rodent / insect screen with ≤ 0.5 in. mesh.	☐

2b. Common Space and Garage Minimum Exhaust Rates – System(s) are designed that mechanically exhaust air from each common space listed below, as required by ASHRAE 62.1-2010 (or later). ☐

Location	ASHRAE 62.1 Rate	Design Rate	Location	ASHRAE 62.1 Rate	Design Rate
Janitor Room	1 cfm/sq. ft.		Common space kitchen [13]	50 cfm / 100 cfm	
Trash / Recycling Room	1 cfm/sq. ft.		Common space bathroom [14]	50 cfm per toilet / urinal	
Parking Garage	0.05 cfm/sq. ft., standby 0.75 cfm/sq. ft., full-on		☐ Shared garage exhaust fan controls include CO and NO2 sensors.		

3. Heating & Cooling Loads

3.1 Common Space Heating & Cooling Loads [8]

Common Space Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)

Common Space Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)

Common Space Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)

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3.2 Building Heating & Cooling Loads [8] (only required when shared systems such as central boilers or chillers are specified.)	**Designer Verified** ☐ N/A
System Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)	
System Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)	
4. Heating & Cooling Equipment Selection	
4.1 Equipment selected per ☐ ACCA Manual S, or where not applicable, ☐ Other: _____.	☐
4.2 Prescriptive and ERI Path: Equipment serving common spaces and garages but not dwelling units meets the efficiency levels specified in the ENERGY STAR Multifamily Reference Design. Also see the ENERGY STAR Multifamily Reference Design for restrictions on electric space resistance.[15]	☐ ☐ N/A

Common Space Cooling Equipment [8](Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".)							
List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.3 Equipment type: (e.g., PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)							
4.4 Area / Space(s) that system serves:							
4.5 Chiller / condenser / outdoor unit manufacturer:							
4.6 Chiller / condenser / outdoor unit model #:							
4.7 Evaporator / indoor unit manufacturer:							
4.8 Evaporator / indoor unit model #:							
4.9 AHRI reference #: [16]							
4.10 Rated efficiency:							
4.11 Evaporator fan type: PSC, ECM / ICM, Other							
4.12 Compressor speed: Single, Two, Variable							
4.13 Turn down ratio (for variable speed equipment):							
4.14 Latent capacity at design conditions (kBtuh): [17]							
4.15 Sensible capacity at design conditions (kBtuh): [17]							
4.16 Total capacity at design conditions (kBtuh): [17]							

Common Space Heating Equipment [7] (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".)							**Designer Verified** ☐ N/A
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.17 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance							
4.18 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace							
4.19 Area / Space(s) that system serves:							
4.20 Manufacturer:							
4.21 Model Number:							
4.22 AHRI reference #: [16]							
4.23 Rated efficiency:							
4.24 Equipment output capacity (kBtuh): [18]							
4.25 Air-source heat pump output capacity (17°F) (kBtuh):							
4.26 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent [19]							

Equipment Controls	
4.27 All equipment controls below have been included where applicable in the HVAC Design.	☐
4.28 Where present in CZ 4-8, stair and elevator shaft vents shall be equipped with motorized dampers that are capable of being automatically closed during normal building operation and are interlocked to open as required by fire and smoke detection systems.	
4.29 Garage heating, plenum heating, and freeze protection systems shall include automatic controls capable of shutting systems off above 40°F space or pipe wall temperatures. Freeze protection systems include heat tracing of piping, even if self-regulating. Where heat tracing is specified for freeze protection, controls must be based on pipe wall temperature and a minimum of R-3 pipe insulation is also required.	
4.30 Snow- and ice-melting systems shall include automatic controls capable of shutting off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F so that the potential for snow or ice accumulation is negligible.	

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Hydronic Distribution Requirements – Applies to heating or cooling systems serving more than one dwelling unit	☐N/A
4.31 All hydronic distribution requirements below have been included where applicable in the HVAC Design.	☐
4.32 All terminal heating and cooling distribution equipment must be separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the dwelling unit distribution equipment when there is no call from the thermostat.	
4.33 Terminal units must be equipped with pressure independent balancing valves or pressure independent control valves.	
4.34 Piping of a heating or cooling system (e.g., steam, hot or chilled water, brine, refrigerant) shall be thermally insulated in accordance with ASHRAE 90.1-2007, Section 6.4.4.1.3. Construction documents must account for piping total thickness including required insulation when passing through planks or any other penetrations and shall specify that the piping must be inspected before access is covered up: [20] Heating System: Pipe size:____ in. Insulation thickness:___ in. Pipe size:____ in. Insulation thickness:___ in. Cooling System: Pipe size:____ in. Insulation thickness:___ in. Pipe size:____ in. Insulation thickness:___ in.	
4.35 For circulating pumps serving hydronic heating or cooling systems with three-phase motors, 1 horse-power or larger, motors shall meet or exceed efficiency standards for NEMA Premium™ motors. If 5 horse-power or larger, must also be specified with variable frequency drives.	
4.36 If a variable speed pumping system is installed, system designed to prevent “dead-heading” and a method of water flow bypass is provided, such as a minimum flow bypass valve or 3-way valves on specific terminal units.	
4.37 For shared boilers, chillers, and cooling towers, temperature and pressure gauges, air eliminator, expansion tank, and check valves are clearly shown on the drawings. A complete sequence of operations for all systems indicating recommendations for all setpoints is provided. For condensing boilers, design return temperature is indicated, and system is designed to return water at a temperature that enables condensing.	
5. Duct Quality Installation - *Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote*	
Common Spaces	
5.1 Applicable duct quality installation requirements in Items 5.2 – 5.5 below have been included in the HVAC Design.	☐
5.2 Ductwork specified without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. [21]	
5.3 All supply and return ducts not in conditioned space, including connections to trunk ducts, are insulated to ≥ R-6. [22]	
5.3.1 Prescriptive Path: Dwelling unit ductwork meets the location and insulation requirements specified in the ENERGY STAR MF Reference Design.	
5.4 Duct design specifies that all supply, return, and exhaust ductwork and all plenums serving common spaces shall be sealed at all transverse joints, longitudinal seams, and duct wall penetrations.	
Duct Testing for Central Systems Serving Dwelling Units	
5.5 Central exhaust systems (that serve four or more dwelling units): Ductwork air-sealing specified such that measured duct leakage does not exceed 25% of exhaust fan flow at rough-in (e.g., all ductwork from the exhaust fan) or 30% of exhaust fan flow at final (e.g., inclusive of all ductwork between the fan and the grilles). [23]	

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Footnotes:

1. This report shall represent system design for all unique common spaces, hydronic systems, central ventilation systems serving common spaces or dwelling units, and where applicable, parking garages. The term 'common space' refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration or maintenance in support of the residents. For the purpose of completing this report, for buildings being certified using the ASHRAE Path, the term 'common space' also includes commercial or retail spaces where they are included in the energy model and savings contribute to achieving the Performance Target. As an alternative, for common spaces using Track A-HVAC grading by Rater, designers may instead choose to complete an ANSI / RESNET / ACCA 310 HVAC Design Report and National HVAC Design Supplement to Std. 310 for Dwellings & Units for each unique common space. For those spaces, Items 2.2-2.13, 3.1, 4.1-4.27, and 5.1-5.4 of this Report are not required to be completed. All other systems serving common spaces, must be documented in this Design Report.
2. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or an equivalent designation as determined by a Home Certification Organization (HCO) or Multifamily Review Organization (MRO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/mftraining.
3. A Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides outdoor air at a known or measured airflow rate.
4. In "Warm-Humid" climates as defined by 2009 IECC Figure 301.1 (i.e., CZ 1 and portions of CZ 2 and 3A below the white line), it is recommended, but not required, that equipment be specified with sufficient latent capacity to maintain indoor relative humidity at ≤ 60%.
5. Airflow design rates shall be determined using ASHRAE 62.1-2010 or later. Designers are permitted, but not required, to use published addenda and/or more recent editions of the standard to assess compliance. The year of the standard that is used shall be listed in the space provided.
6. The following spaces require outdoor air ventilation: corridors, offices, break rooms, gyms, fitness centers, exercise rooms, lobbies, community rooms, meeting rooms, multi-purpose rooms, lounges, laundry rooms, swimming pools, daycares, classrooms, shared or commercial kitchens, shared dining rooms, and computer rooms.
7. When calculating whether common space ventilation rates exceed ASHRAE 62.1-2013 rates by more than 50%, the calculation should use the minimum rates listed in Section 6 of the Standard by space, but it is permitted to combine the total ventilation provided to all common space areas when determining whether ventilation exceeds the 50%.
8. If the tables provided cannot accommodate all the unit plans, spaces, or systems in the building, use the tables in Appendix A to supplement the Design Report.
9. For permits on or before 01/01/2024, where outdoor air is supplied to a common space via a PTAC or PTHP, in lieu of measurement, the design CFM shall meet or exceed the ventilation rates required by ASHRAE 62.1-2010 and the space served by the PTAC or PTHP shall have at least one operable window. For permits after 01/01/2024, both the runtime and measurement of outdoor air through these systems will be required to demonstrate compliance with ASHRAE 62.1-2010 or alternative ventilation system specified (e.g., ducted supply).
10. List each individual common space separate from other spaces, such that when reporting airflow for Items 2.2 and 2.3, compliance for each space can be demonstrated. For example, list an office space separate from a community room, even if these spaces are served by the same system and even if the outdoor air rates required are the same. Similarly, where a space is repeated in the building, such as a corridor, report each space by floor (e.g., FL1 Corridor, FL2 Corridor). Rather than list these values in this report, as an alternative, the HVAC Designer is permitted to submit the values in a separate document or file. Where the building has total corridor space ≤ 250 sq. ft. and does not contain any of the other common spaces which require outdoor air per Item 2.1, outdoor air is not required to be provided to the corridor and "N/A" may be entered for Item 2.4.
11. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, the EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the building maintenance staff.
12. Two alternatives to the required 10 ft. distance are provided: 1) inlets providing outdoor air to a dwelling unit are permitted to be ≥ 5 ft. of stretched-string distance from outlets of both exhaust dwelling-unit mechanical ventilation systems and local mechanical exhaust systems, and 2) the outlet and inlet of ERV's and HRV's may use a smaller distance if allowed by the manufacturer of the system. If the second alternative is used, the manufacturer's instructions shall be collected for documentation purposes.
13. For continuous system operation, the lower rate may be used. Otherwise, use the higher rate. Commercial kitchens shall be designed to provide a minimum continuous rate of 0.70 cfm/sq. ft.
14. As an alternative, for a toilet room intended to be occupied by one person at a time, a minimum continuous rate of 25 cfm is permitted.
15. Electric resistance limitations do not apply to heat pumps with integral supplemental or emergency electric resistance heating. The EPA recommends but does not require that heat pumps have controls to limit the use of emergency or supplemental heat to heat pump failures or when the heat pump cannot meet the heating load. The EPA also recommends but does not require that heat pumps in CZ 5-8 are ENERGY STAR certified cold-climate heat pumps. Electric resistance limitations do not apply to systems dedicated to heating outdoor air supplied by a mechanical ventilation system, as long as the space served is primarily heated by a non-electric-resistance system that meets the efficiency requirements noted in the ENERGY STAR Multifamily Reference Design. Electric resistance limitations apply to garages, but do not apply to heated plenums meeting Item 4.29, or stairwells where automatic thermostatic controls prevent operation above 50ºF.
16. If the equipment contains multiple components, the AHRI Reference # shall represent the rated efficiency of the specific combination of indoor and outdoor components. The EPA recommends, but does not require, that the rating also encompass the furnace when such a rating is available. If an AHRI Reference # is not available, OEM-provided documentation shall be attached with the rated efficiency. For split air conditioners and heat pumps, the rated efficiency shall be for the specific combination of indoor and outdoor components of the air conditioner or heat pump, along with confirmation that the two components are designed to be used together. If the AHRI Reference # is reported in Item 4.9 (e.g., heat pumps), the AHRI Reference # does not need to be listed again in Item 4.23.

17. The full system capacity at design conditions, from OEM expanded performance data, shall be listed and shall include the capacity of all systems providing space cooling to the dwelling unit. For two-speed or variable-speed equipment, the full system capacity shall reflect the capacity at the maximum available compressor speed or when the compressor operates at the AHRI rating test speed, respectively.
18. The full system capacity shall be listed. For two-stage and modulating furnaces, the full system capacity shall reflect the maximum output available. For shared boilers, the full system capacity may exclude standby equipment needed for redundancy.
19. Per the 2009 International Mechanical Code, a direct-vent furnace or boiler is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under non-positive static vent pressure entirely by natural draft. Naturally drafted equipment is only allowed if located in a space outside the pressure boundary, where the envelope assemblies separating it from conditioned space are insulated and air-sealed. For mechanically drafted boilers, make-up air sources must be mechanically closed when the boiler is not in operation.
20. Item 4.34 does not apply to factory-installed piping within HVAC equipment or piping that conveys fluids having a design operating temperature range between 60°F and 105°F, inclusive.
21. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
22. Item 5.3 does not apply to ducts that are a part of local mechanical exhaust or exhaust-only dwelling-unit ventilation systems. The EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
23. This test is not required of central exhaust systems serving clothes dryers but is required for the central exhaust portion of balanced systems such as HRVs and ERVs.

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Appendix A – Supplementary tables for Section 2 and 3

2a. Common Space Mechanical Ventilation Design [3, 5]						
List common space for which 62.1 ventilation rates were calculated in the spaces to the right: [7, 9, 10]						
2.3 Ventilation airflow required by ASHRAE 62.1 (CFM): [6, 11]						
2.4 Ventilation airflow designed (CFM): [6, 11]						

System Type & Controls:						
List Ventilation System ID in the spaces to the right: [7]						
2.5 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)						
2.6 Manufacturer:						
2.7 Model Number:						
2.8 # installed in the building						
2.9 # of spaces served (e.g., single, multiple)						
2.10 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)						
2.11 Specified control location: (e.g., Master bath, utility):						

3. Heating & Cooling Loads		
3.1 Common Space Heating & Cooling Loads [7, 10]		
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)

3.2 Building Heating & Cooling Loads [7] (only required when shared systems such as central boilers or chillers are specified)		
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)

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Appendix A – Supplementary tables for Section 4

4. Heating & Cooling Equipment Selection							
Common Space Cooling Equipment (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".) ☐ N/A							
List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.3 Equipment type: (PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)							
4.4 Area / Space(s) that system serves:							
4.5 Chiller / condenser / outdoor unit manufacturer:							
4.6 Chiller / condenser / outdoor unit model #:							
4.7 Evaporator / indoor unit manufacturer:							
4.8 Evaporator / indoor unit model #:							
4.9 AHRI reference #: [17]							
4.10 Rated efficiency:							
4.11 Evaporator fan type: PSC, ECM / ICM Other:							
4.12 Compressor speed: Single, Two, Variable							
4.13 Turn down ratio (for variable speed equipment):							
4.14 Latent capacity at design conditions (kBtuh): [18]							
4.15 Sensible capacity at design conditions (kBtuh): [18]							
4.16 Total capacity at design conditions (kBtuh): [18]							

Common Space Heating Equipment (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".) ☐ N/A							
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.17 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance							
4.18 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace							
4.19 Area / Space(s) that system serves:							
4.20 Manufacturer:							
4.21 Model Number:							
4.22 AHRI reference #: [17]							
4.23 Rated efficiency:							
4.24 Equipment output capacity (kBtuh): [19]							
4.25 Air-source heat pump output capacity (kBtuh) (17°F):							
4.26 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent [21]							
4.27 Furnace heating sizing % = Total capacity (Item 4.24) divided by Total Heat Loss of space(s) in Item 4.20:							

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HVAC Designer Responsibilities:

- Complete one National HVAC Design Report for each building which includes system design for all unique unit plans and common spaces. For projects with multiple buildings, one National HVAC Design Report per building or per project is permitted. [1]
- Obtain efficiency features (e.g., window performance, insulation levels, and infiltration rate) from the builder, architect, or Rater. [2]
- Provide the completed National HVAC Design Report to the Rater and the person / company completing the National HVAC Functional Testing Checklist.

1. Design Overview

1.1 Designer name: _____ Designer company: _____ Date: _____

1.2 Select which party you are providing these design services to: ☐ Builder / Developer ☐ FT Agent ☐ MEP / Credentialed HVAC contractor

1.3 Name of company you are providing these design services to (if different than Item 1.1): _____

1.4 Building address: _____ City: _____ State: _____ Zip code: _____

2a. Dwelling Unit & Common Space Mechanical Ventilation Design ("Vent System") [3] & Inlets in Return Duct [4, 5, 6]	Designer Verified
Airflow:	
2.1 Dwelling unit ventilation airflow design rate & run-time meet the requirements of Section 4 of ASHRAE 62.2 [7] – _____ Prescriptive Path Only: Rates shall not exceed 2013 rates by more than 50%. [8]	☐
2.2 Common space outdoor airflow design rate meet the requirements of Section 6 of ASHRAE 62.1 [9, 10] – _____ ERI and Prescriptive Path Only: Rates shall not exceed 2013 rates by more than 50%. [11]	☐
2.3 Access points to measure airflow rate and inspect outdoor air dampers are provided and accessible by the Rater. [12]	☐

List unique unit plan for which 62.2 ventilation rates were calculated in the spaces to the right: [13]						
2.4 # of bedrooms:						
2.5 Square footage:						
2.6 Ventilation airflow rate required by ASHRAE 62.2:						
2.7 Ventilation airflow rate designed:						
2.7.1 If applicable, run-time per cycle (minutes):						
2.7.2 If applicable, cycle time (minutes):						
List common space for which 62.1 ventilation rates were calculated in the spaces to the right: [12, 13, 14]						
2.8 Ventilation airflow required by ASHRAE 62.1 (CFM): [10]						
2.9 Ventilation airflow designed (CFM): [10]						

System Type & Controls:						
List Ventilation System ID in the spaces to the right: [13]						
2.10 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)						
2.11 Manufacturer:						
2.12 Model Number:						
2.13 # installed in the building:						
2.14 Spaces each fan serves (i.e., single, multiple)						
2.15 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)						
2.16 Specified control location: (e.g., Master bath, utility):						

2.17 Specified controls allow the systems to operate automatically, without occupant intervention. A ventilation override control is specified and also labeled if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment). The override control is not required to be readily accessible to the occupant. However, in such cases, the EPA recommends but does not require that the control be readily accessible to others (e.g., building maintenance staff) in lieu of the occupant.	☐	
2.18 For any outdoor air inlet designed to connect to the dwelling unit HVAC system, specified controls automatically restrict airflow using a motorized damper during ventilation off-cycle and occupant override. [6, 15]	☐	☐ N/A
Sound:		
2.19 If located in the dwelling unit, the fan of the specified system is rated ≤ 3 sones if intermittent and ≤ 2 sones if continuous, or exempted. [16]	☐	☐ N/A
Efficiency:		
2.20 If dwelling-unit Vent System controller operates the dwelling unit HVAC fan, then HVAC fan operation is intermittent and either the fan type in Item 4.12 is ECM / ICM, or the controls will reduce the run-time by accounting for HVAC system is heating or cooling hours. [17]	☐	☐ N/A
2.21 If in-unit bathroom fans or in-line fans are specified as part of the Dwelling Unit Mechanical Ventilation System, then they are ENERGY STAR certified. [18]	☐	☐ N/A

2.22 If central exhaust fans, ≤ 1 HP, are specified as part of the Dwelling Unit Mechanical Ventilation System, then they are direct-drive, ECM, with variable speed controllers. If > 1 HP, they are specified to meet or exceed efficiency standards for NEMA Premium™ Motors. [19]	☐	☐ N/A

Air Inlet Locations: (Complete this section if system has specified air inlet location(s); otherwise check "N/A".) [20]	**Designer Verified** ☐ N/A
2.23 Inlet(s) pull ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.	☐
2.24 Inlet(s) are ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from dryer exhausts and sources exiting the roof. [21]	☐
2.25 Inlet(s) are provided with rodent / insect screen with ≤ 0.5 in. mesh.	☐

2b. Dwelling Unit Local Mechanical Exhaust Design – System(s) are designed that mechanically exhaust air from each dwelling unit kitchen and bathroom directly to the outdoors or to ventilation risers and meet the continuous and/or intermittent rates. [22] ☐

Location		**Continuous Rate**	**Intermittent Rate** [23]	**Exhaust Fan Type**
Kitchen	Airflow	≥ 5 ACH, based on kitchen volume [24,25,26] (Alternative in Fn. 24)	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume [24, 25, 26, 27]	☐ Continuous ☐ Intermittent ☐ In-unit fan ☐ Central / shared fan
	Sound	Recommended if in-unit: ≤ 1 sone	Recommended if in-unit: ≤ 3 sones	
Bathroom	Airflow	≥ 20 CFM	≥ 50 CFM	☐ Continuous ☐ Intermittent ☐ In-unit fan ☐ Central / shared fan
	Sound	Required if in-unit: ≤ 2 sones	Recommended if in-unit: ≤ 3 sones	

2c. Common Space and Garage Minimum Exhaust Rates – System(s) are designed that mechanically exhaust air from each common space listed below, as required by ASHRAE 62.1-2010 (or later). ☐

Location	**ASHRAE 62.1 Rate**	**Design Rate**	**Location**	**ASHRAE 62.1 Rate**	**Design Rate**
Janitor Room	1 cfm/sq. ft.		Common space kitchen [28]	50 cfm / 100 cfm	
Trash / Recycling Room	1 cfm/sq. ft.		Common space bathroom [29]	50 cfm per toilet / urinal	
Parking Garage	0.05 cfm/sq. ft., standby 0.75 cfm/sq. ft., full-on		☐ Shared garage exhaust fan controls include CO and NO2 sensors.		

3. Heating & Cooling Loads

Dwelling Unit Heating & Cooling Loads (only required for ducted split AC, unitary AC, ASHP, WSHP, GSHP, and furnaces.) [30] ☐ N/A

3.1 Loads calculated using: ☐ Unabridged ACCA Manual J v8 ☐ 2013 / 2017 ASHRAE Fundamentals ☐ ASHRAE 183 ☐ Other per AHJ [31]

3.2 Check one box only to indicate whether the Dwelling Unit Loads is unit-specific or represents the design of more than one unit: [32]
☐ Unit-specific design ☐ Group design [33] ____ total groups for this building, representing ____ units.
☐ Worst-case design (If the top floor unit with the greatest CFA and window area results in total heat gain <18 kBtuh, it may represent all other units if cooling system selected for all is single-speed & <20 kBtuh or two-speed / variable-speed & <25 kBtuh.

3.3 Indoor design temperatures used in loads are 70°F for heating and 75°F for cooling. ☐

3.4 Outdoor design temperatures used in loads: (See Footnote 34 and www.energystar.gov/hvacdesigntemps.) [32]
County & State, or US Territory selected: _____ Cooling season: _____°F Heating season: _____°F

List the unit plan for which Loads were calculated: [13]								
3.5 Location of Unit: top, mid, bottom, corner, interior								
3.6 Number of occupants used in loads: [32, 35]								
3.7 Total occupant gains (Btuh): [32]								
3.8 Conditioned floor area used in loads: [32, 36]								
3.9 Window area used in loads: [32, 37]								
3.10 Predominant window SHGC used in loads: [32, 38]								
3.11 Infiltration (ACH / ACH50 / CFM) used in loads: [39]								
3.12 Mechanical ventilation (CFM) used in loads: [32]								
3.13 Non-occupant Internal gains (appliance, equipment and lighting) used in loads (Btuh): [32]								
3.14 Door orientation (N, NE, E, SE, S, SW, W, NW): [33]								
3.15 Sensible Heat Gain At Design Conditions (kBtuh): [32]								
3.16 Latent Heat Gain At Design Conditions (kBtuh):								
3.17 Total Heat Gain at Design Conditions (kBtuh): [32]								
3.18 Total Heat Loss at Design Conditions (kBtuh):								

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3.19 Common Space Heating & Cooling Loads [13] (required for all common space heating and cooling systems)	**Designer Verified** ☐ N/A
Common Space Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)	
Common Space Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)	
Common Space Name: _____ Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)	
3.20 Building Heating & Cooling Loads [13] (only required when shared systems such as central boilers or chillers are specified.) ☐ N/A	
System Name: _____Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)	
System Name: _____Design Conditions: Total Heat Gain: _____(kBtuh) Total Heat Loss: _____(kBtuh)	

4. Heating & Cooling Equipment Selection		
4.1 Equipment selected per ☐ ACCA Manual S, or where not applicable, ☐ Other: _____. (See Footnote 40)	☐	
4.2 Prescriptive Path: Equipment serving dwelling units, common spaces, and garages meet the efficiency levels specified in the ENERGY STAR Multifamily Reference Design. Electric resistance space heating is not specified in dwelling units. [41]	☐	☐ N/A
4.3 ERI Path: Equipment serving common spaces and garages but not serving dwelling units meet the efficiency levels specified in the ENERGY STAR Multifamily Reference Design. Also see the ENERGY STAR Multifamily Reference Design for restrictions on electric space resistance. [41]	☐	☐ N/A

Cooling Equipment [13] (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".) ☐ N/A

List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.4 Equipment type: (e.g., PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)							
4.5 Area / Space(s) that system serves:							
4.6 Chiller / condenser / outdoor unit manufacturer:							
4.7 Chiller / condenser / outdoor unit model #:							
4.8 Evaporator / indoor unit manufacturer:							
4.9 Evaporator / indoor unit model #:							
4.10 AHRI reference #: [42]							
4.11 Rated efficiency:							
4.12 Evaporator fan type: PSC, ECM / ICM, Other							
4.13 Compressor speed: Single, Two, Variable							
4.14 Turn down ratio (for variable speed equipment):							
4.15 Latent capacity at design conditions (kBtuh): [43]							
4.16 Sensible capacity at design conditions (kBtuh): [43]							
4.17 Total capacity at design conditions (kBtuh): [43]							
4.18 Cooling sizing % = Total capacity (Item 4.17) divided by Total Heat Gain of space(s) in Item 4.5: [30]							
4.19 Meets cooling sizing limit: (see below for A, B, C, D or N/A) [30, 32]							
4.20 If "B", list Load sensible heat ratio = Max. sensible heat gain (Item 3.15) / Max. total heat gain (Item 3.17): [44]							
4.21 If "B", calculate HDD / CDD ratio: [44]							

Equipment Type & Climate Condition	**Compressor Type (Per Item 4.13)**		
	Single-Speed	Two-Speed	Variable-Speed
A: For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate [44]	Recommended: 90 – 115% Allowed: 90 – 130%	Recommended: 90 – 120% Allowed: 90 – 140%	Recommended: 90 – 130% Allowed: 90 – 160%
B: For Cooling Mode of Heat Pump in Condition B Climate [44]	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh
C: For low-load spaces (≤15 kBtuh) [45]	≤ 20 kBtuh		
D: For low-load spaces (≤18 kBtuh) [45]		≤ 25 kBtuh	≤ 25 kBtuh

Heating Equipment [13] (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".)							**Designer Verified** ☐ N/A
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.22 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance							
4.23 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace							
4.24 Area / Space(s) that system serves:							
4.25 Manufacturer:							
4.26 Model Number:							
4.27 AHRI reference #: [42]							
4.28 Rated efficiency:							
4.29 Equipment output capacity (kBtuh): [46]							
4.30 Air-source heat pump output capacity (17°F) (kBtuh):							
4.31 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent [47]							
4.32 Furnace heating sizing % = Total capacity (Item 4.29) divided by Total Heat Loss of space(s) in Item 4.24: [30]							
4.33 Meets furnace sizing limit: (see below for A, B, C, or N/A) [30]							

A: For low-load spaces (≤ 10 kBtuh), furnace output capacity is ≤ 40 kBtuh

B: When Used for Heating Only	C: When Paired With Cooling
100 – 400%	Recommended: 100 – 140% Allowed: 100 – 400%

Equipment Controls	
4.34 All equipment controls below have been included where applicable in the HVAC Design.	☐
4.35 All heating and cooling systems serving a dwelling unit shall have thermostatic controls within the dwelling unit.	
4.35.1 Prescriptive Path: Dwelling unit thermostats are programmable.	
4.36 Where present in CZ 4-8, stair and elevator shaft vents shall be equipped with motorized dampers that are capable of being automatically closed during normal building operation and are interlocked to open as required by fire and smoke detection systems.	
4.37 Garage heating, plenum heating, and freeze protection systems shall include automatic controls capable of shutting systems off above 40°F space or pipe wall temperatures. Freeze protection systems include heat tracing of piping, even if self-regulating. Where heat tracing is specified for freeze protection, controls must be based on pipe wall temperature and a minimum of R-3 pipe insulation is also required.	
4.38 Snow- and ice-melting systems shall include automatic controls capable of shutting off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F so that the potential for snow or ice accumulation is negligible.	
Hydronic Distribution Requirements – Applies to heating or cooling systems serving more than one dwelling unit	☐ N/A
4.39 All hydronic distribution requirements below have been included where applicable in the HVAC Design.	☐
4.40 All terminal heating and cooling distribution equipment must be separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the dwelling unit distribution equipment when there is no call from the thermostat.	
4.41 Terminal units must be equipped with pressure independent balancing valves or pressure independent control valves.	
4.42 Piping of a heating or cooling system (e.g., steam, hot or chilled water, brine, refrigerant) shall be thermally insulated in accordance with ASHRAE 90.1-2007, Section 6.4.4.1.3. Construction documents must account for piping total thickness including required insulation when passing through planks or any other penetrations and shall specify that the piping must be inspected before access is covered up: [48] Heating System: Pipe size:____ in. Insulation thickness:___ in. Pipe size:____ in. Insulation thickness:___ in. Cooling System: Pipe size:____ in. Insulation thickness:___ in. Pipe size:____ in. Insulation thickness:___ in.	
4.43 For circulating pumps serving hydronic heating or cooling systems with three-phase motors, 1 horse-power or larger, motors shall meet or exceed efficiency standards for NEMA Premium™ motors. If 5 horse-power or larger, must also be specified with variable frequency drives.	
4.44 If a variable speed pumping system is installed, system designed to prevent "dead-heading" and a method of water flow bypass is provided, such as a minimum flow bypass valve or 3-way valves on specific terminal units.	
4.45 For shared boilers, chillers, and cooling towers, temperature and pressure gauges, air eliminator, expansion tank, and check valves are clearly shown on the drawings. A complete sequence of operations for all systems indicating recommendations for all setpoints is provided. For condensing boilers, design return temperature is indicated and system is designed to return water at a temperature that enables condensing.	

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5. Dwelling Unit Duct Design (Complete if heating or cooling equipment will be installed with ducts; otherwise check "N/A".)	**Designer Verified** ☐ N/A
5.1 Duct system designed for the equipment selected in Section 4, per ☐ ACCA Manual D ☐ Other: _____	☐

5.2 Room-by-room design airflows documented below (which must sum to the mode with the higher Design HVAC fan airflow). [13, 49, 50]

Name of the unit plan:	Name of the unit plan:
Design HVAC fan airflow: [51] Cooling mode _____ CFM Heating mode _____ CFM	Design HVAC fan airflow: [51] Cooling mode _____ CFM Heating mode _____ CFM
Design HVAC fan speed setting (e.g., low, medium, high): [52] Cooling mode _____ Heating mode _____	Design HVAC fan speed setting (e.g., low, medium, high): [52] Cooling mode _____ Heating mode _____
Design total external static pressure (corresponding to the mode with the higher airflow above): [53] _____ IWC	Design total external static pressure (corresponding to the mode with the higher airflow above): [53] _____ IWC

	Room Name	Design Airflow (CFM)		Room Name	Design Airflow (CFM)
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
	Total for all rooms	0		Total for all rooms	0

6. Duct Quality Installation – *Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote*	
6.1 Applicable duct quality installation requirements in 6.2 – 6.8 below have been included in the HVAC Design.	☐
6.2 Ductwork specified without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. [54]	
6.3 All supply and return ducts not in conditioned space, including connections to trunk ducts, are insulated to ≥ R-6. [55]	
6.3.1 Prescriptive Path: Dwelling unit ductwork and air handlers are specified to be within conditioned space.	
Dwelling Unit	
6.4 MERV 6+ filter(s) specified for each ducted mechanical System serving an individual dwelling unit, designed so all return and mechanically supplied outdoor air passes through filter(s) prior to conditioning, and located to facilitate access & regular service by the occupant, building owner, or building maintenance staff. Filter access panel specified with a gasket or comparable sealing mechanism.	
6.5 Ductwork air-sealing specified such that Rater-measured total duct leakage is ≤ 4 CFM25 per 100 sq. ft. of CFA at rough-in or ≤ 8 CFM25 per 100 sq. ft. at final, or if there are no ducted returns, ≤ 3 CFM25 per 100 sq. ft. of CFA at rough-in or ≤ 6 CFM25 per 100 sq. ft at final. [56, 57]	
6.6 All bedrooms provided with transfer grilles, jump ducts, dedicated return ducts, and/or undercut doors. Bedrooms with a design supply airflow ≥ 150 CFM (as reported in Item 5.2) are specified to achieve a Rater-measured pressure differential ≥ - 5 Pa and ≤ 5 Pa with respect to the main body of the dwelling unit when all air handlers are operating.	
Common Space and Central Exhaust	
6.7 Duct design specifies that all supply, return, and exhaust ductwork and all plenums serving common spaces shall be sealed at all transverse joints, longitudinal seams, and duct wall penetrations.	
6.8 Central exhaust systems (that serve four or more dwelling units): Ductwork air-sealing specified such that measured duct leakage does not exceed 25% of exhaust fan flow at rough-in (e.g., all ductwork from the exhaust fan) or 30% of exhaust fan flow at final (e.g., inclusive of all ductwork between the fan and the grilles). [58]	

Footnotes:

1. This report shall represent system design for all unique unit plans, common spaces, and where applicable, parking garages. The term 'common space' refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration or maintenance in support of the residents. For the purpose of completing this report, for buildings being certified using the ASHRAE Path, the term 'common space' also includes commercial spaces where they are included in the energy model and savings contribute to achieving the Performance Target. As an alternative, for dwelling units, designers may instead choose to complete a Single-Family New Homes National HVAC Design Report for each unique unit plan, if room-by-room loads are calculated using Unabridged ACCA Manual J v8. Sections 4 and 5 must be completed in either Design Report unless exempted by this Report. All other systems, including all systems serving common spaces, must be documented in this Design Report. This report is designed to meet ASHRAE 62.1-2010 or later, ASHRAE 62.2-2010 or later, and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new multifamily buildings when compared to multifamily buildings built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems (e.g., those caused by a lack of maintenance or occupant behavior). Therefore, system designs documented through the use of this report are not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
2. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or an equivalent designation as determined by a Home Certification Organization (HCO) or Multifamily Review Organization (MRO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/mftraining.
3. As defined by ANSI / RESNET / ICC 301-2019, a Dwelling Unit Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides dwelling-unit ventilation at a known or measured airflow rate.
4. The dwelling-unit mechanical ventilation system shall have at least one supply or exhaust fan with associated ducts and controls. Local exhaust fans are allowed to be part of a dwelling-unit mechanical ventilation system. Designers may provide supplemental documentation as needed to document the system design. For example, for Item 2.7, designers are permitted to provide multiple combinations of a design ventilation airflow rate, run-time per cycle, and cycle time. When multiple combinations are provided, the Rater will be required to first assess the run-time setting of the installed system and use that to determine the corresponding design ventilation rate. The Rater-measured ventilation rate then must fall within the program-specified tolerance relative to that design ventilation rate.
5. In "Warm-Humid" climates as defined by 2009 IECC Figure 301.1 (i.e., CZ 1 and portions of CZ 2 and 3A below the white line), it is recommended, but not required, that equipment be specified with sufficient latent capacity to maintain indoor relative humidity at ≤ 60%.
6. Item 2.18 applies to any outdoor air inlet connected to the dwelling unit HVAC system, regardless of its intended purpose (e.g., for ventilation air, make-up air, combustion air). For example, if an outdoor air inlet connected to a ducted return is used as a dedicated source of outdoor air for an exhaust ventilation system (e.g., bath fan), the outdoor airflow must be automatically restricted when the exhaust fan is not running and in the event of an override of the exhaust ventilation system.

   Automatic restriction of airflow is exempted if a manual shutoff damper is used with a continuous exhaust ventilation system and is readily-accessible, labeled as the override, and not used as a balancing damper.

   Note that a Rater will generally measure the ventilation rate at the highest HVAC fan speed applicable to ventilation mode (e.g., if the inlet only opens when the HVAC is in 'fan-only' mode, then test in this mode) to verify that it is ≤ 15 CFM or 15% above design value. If the inlet has a motorized damper that only opens when the local mechanical kitchen exhaust is turned on, then testing is not required. As an alternative, measurement of the outdoor airflow can be waived if a Constant Airflow Regulating (CAR) damper with a manufacturer-specified maximum flow rate no higher than 15 CFM or 15% above the ventilation design value is installed on the inlet.
7. Airflow design rates and run-times shall be determined using ASHRAE 62.2-2010 or later. Designers are permitted, but not required, to use published addenda and/or more recent editions of the standard to assess compliance. The year of the standard that is used shall be listed in the space provided. For dwelling units, the minimum ventilation rate required by ASHRAE 62.2 can be calculated using either Equation 4.1a or Table 4.1a. For sleeping units, the following equation must be used to determine minimum airflow rates: 0.01 x Conditioned Floor Area + 7.5 x (number of beds).
8. Where the Exhaust Fan Type in Section 2b indicates "Continuous" for both Bathroom and Kitchen, the Rater may use this equation to determine the maximum ventilation rate allowed: 30 CFM x number of bathrooms + 75 CFM.
9. Airflow design rates shall be determined using ASHRAE 62.1-2010 or later. Designers are permitted, but not required, to use published addenda and/or more recent editions of the standard to assess compliance. The year of the standard that is used shall be listed in the space provided.
10. The following spaces require outdoor air ventilation: corridors, offices, break rooms, gyms, fitness centers, exercise rooms, lobbies, community rooms, meeting rooms, multi-purpose rooms, lounges, laundry rooms, swimming pools, daycares, classrooms, shared or commercial kitchens, shared dining rooms, and computer rooms.
11. When calculating whether common space ventilation rates exceed ASHRAE 62.1-2013 rates by more than 50%, the calculation should use the minimum rates listed in Section 6 of the Standard by space, but it is permitted to combine the total ventilation provided to all common space areas when determining whether ventilation exceeds the 50%.
12. For permits on or before 01/01/2024, where outdoor air is supplied to a common space via a PTAC or PTHP, in lieu of measurement, the design CFM shall meet or exceed the ventilation rates required by ASHRAE 62.1-2010 and the space served by the PTAC or PTHP shall have at least one operable window. For permits after 01/01/2024, both the runtime and measurement of outdoor air through these systems will be required to demonstrate compliance with ASHRAE 62.1-2010 or alternative ventilation system specified (e.g., ducted supply).
13. If the tables provided cannot accommodate all the unit plans, spaces, or systems in the building, use the tables in Appendix A to supplement the Design Report.
14. List each individual common space separate from other spaces, such that when reporting airflow for Items 2.8 and 2.9, compliance for each space can be demonstrated. For example, list an office space separate from a community room, even if these spaces are served by the same system and even if the outdoor air rates required are the same. Similarly, where a space is repeated in the building, such as a corridor, report

each space by floor (e.g., FL1 Corridor, FL2 Corridor). Rather than list these values in this report, as an alternative, the HVAC Designer is permitted to submit the values in a separate document or file. Where the building has total corridor space ≤ 250 sq. ft. and does not contain any of the other common spaces which require outdoor air per Item 2.2, outdoor air is not required to be provided to the corridor and "N/A" may be entered for Item 2.9.

15. In addition, consult manufacturer requirements to ensure return air temperature requirements are met.
16. Dwelling-unit mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.7. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
17. Note that the 'fan-on' setting of a thermostat would not be an acceptable controller because it would continuously operate the HVAC fan.
18. Bathroom fans with a rated flow rate ≥ 500 CFM and heat/energy recovery ventilation fans are exempted from the requirement to be ENERGY STAR certified.
19. As an alternative to meeting or exceeding the efficiency standards for NEMA Premium motors, documentation that an exhaust fan motor has a fan energy index (FEI) ≥ 1.2 at the design point of operation OR a fan efficacy ≥ 1.1 CFM/Watt is permitted.
20. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, the EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the building maintenance staff.
21. Two alternatives to the required 10 ft. distance are provided: 1) inlets providing outdoor air to a dwelling unit are permitted to be ≥ 5 ft. of stretched-string distance from outlets of both exhaust dwelling-unit mechanical ventilation systems and local mechanical exhaust systems, and 2) the outlet and inlet of ERV's and HRV's may use a smaller distance if allowed by the manufacturer of the system. If the second alternative is used, the manufacturer's instructions shall be collected for documentation purposes.
22. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the design airflow rate. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the design airflow rate. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
23. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
24. Where 5 ACH is selected, kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. In addition, the continuous kitchen exhaust rate shall be ≥ 25 CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume. As an alternative to 5 ACH for Dwelling Units and Sleeping Units, 50 CFM of continuous exhaust is permitted to be used, regardless of kitchen volume. In such cases, the edge of the exhaust fan or intake grille shall be located within 10 ft. of the edge of the range, as measured horizontally on the floor plan.
25. While not required, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 are recommended to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC.
26. As an alternative, dwelling units are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) PHIUS+ or PHI certified, or b) provide both dwelling unit ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate ≤ 1.0 ACH50 or ≤ 0.05 CFM50 per sq. ft. of Enclosure Area. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.
27. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting ≥ 5 ACH, based on the kitchen volume.
28. For continuous system operation, the lower rate may be used. Otherwise, use the higher rate. Commercial kitchens shall be designed to provide a minimum continuous rate of 0.70 cfm/sq. ft.
29. As an alternative, for a toilet room intended to be occupied by one person at a time, a minimum continuous rate of 25 cfm is permitted.
30. This section / item applies to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtuh with forced-air distribution systems and to furnaces up to 225 kBtuh with forced-air distribution system serving individual dwelling units. Forced-air distribution systems are those that supply air through ductwork exceeding 0 ft. in length. For VRF air conditioners or heat pumps, the capacity of the system is the rated cooling capacity of the outdoor unit. This section / item is recommended, but not required for non-ducted systems, such as non-ducted mini-splits, multi-splits, PTHP's, or PTAC's.
31. Select "2013 / 2017 ASHRAE Fundamentals" if using Chapter 17 of the 2013 or 2017 ASHRAE Handbook of Fundamentals. Select "Other per AHJ" if the Authority Having Jurisdiction where the unit will be certified mandates the use of a load calculation methodology other than Unabridged ACCA Manual J v8 or 2013 or 2017 ASHRAE Handbook of Fundamentals.
32. Check the box for "unit-specific design" if the design was created for the specific plan configuration (i.e., elevation, option, orientation, and county) of the unit to be certified. Check the box for "group design" if designs were created for unit plans that are repeated throughout the building with potentially different configurations (i.e., different elevations and/or orientations). Check the box for "worst-case design" if loads for the unit with the largest heat gain in the building are less than 18 kBtuh and are being used to represent all other units. Only one box may be checked. Regardless of the box checked, the system design as documented on this HVAC Design Report must fall within the following tolerances for the unit to be certified:
    - Item 3.4: The outdoor design temperature used in loads are within the limits defined at www.energystar.gov/hvacdesigntemps.
    - Item 3.6: The number of occupants used in loads is within ± 2 of the dwelling unit to be certified.

- Item 3.7: Total occupant gains used in loads shall not exceed 645 Btuh per occupant.
- Item 3.8: The conditioned floor area used in loads is between 100 sq. ft. smaller and 300 sq. ft. larger than the dwelling unit to be certified.
- Item 3.9: The window area used in loads is between 15 sq. ft. smaller and 60 sq. ft. larger than the dwelling unit to be certified, or for dwelling units with > 500 sq. ft. of window area, between 3% smaller and 12% larger.
- Item 3.10: The predominant window SHGC is within 0.1 of the predominant value in the dwelling unit to be certified.
- Item 3.12: The mechanical ventilation rate used in loads is the same as the value in Section 2a for the given unit plan.
- Item 3.13: The sum of the internal gains associated with lighting and appliances used in loads shall not exceed 3,600 Btuh.
- Items 3.15 & 3.17: The sensible & total heat gain are documented for the configuration of the dwelling unit to be certified.
- Item 4.19: The cooling sizing % is within the cooling sizing limit selected.

Provide the National HVAC Design Report to the party you are providing these design services to (i.e., a builder / developer, Functional Testing Agent (FT Agent), and/or MEP / credentialed HVAC contractor) and to the Rater. The report is only required to be provided once per project / building. As long as a report has been provided that falls within these tolerances for the units to be certified, no additional work is required. However, if no report falls within these tolerances or if any aspect of the system design changes, then an additional report will need to be generated prior to certification. Buildings certified under Rev. 04 of the program requirements are permitted to use any Revision of the MFNC National HVAC Design Report.
Visit www.energystar.gov/hvacdesigntools for a tool to assist with group designs and for more information.

33. For each unique unit floorplan, document the loads for the configuration (e.g., level, orientation) that the dwelling unit might be built in. For example, if a unit plan will only be built in a specific level and orientation (e.g., top-floor, facing South), then the designer only needs to document the loads for this one configuration. To determine whether a unit floorplan is “unique”, the guidance in ANSI 301-2019, Section 5.1.4.4.1 may be followed. Orientation represents the direction that the front door of the dwelling unit is facing. In Section 4, to calculate Cooling sizing % for each configuration of each unique floorplan, the same system may need to be duplicated in multiple columns.
34. Visit www.energystar.gov/hvacdesigntemps for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR. For “County & State, or US Territory, selected”, select the County and State or US Territory (i.e., Guam, Northern Mariana Islands, Puerto Rico, or US Virgin Islands), where the unit is to be certified. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Fauquier County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93°F, then the same report could be used in Fairfax County (which has a higher limit of 94°F) but not in Arlington County (which has a lower limit of 92°F). If a jurisdiction-specified design temperature is used that exceeds the limit in the ENERGY STAR Single-Family New Homes Design Temperature Limit Reference Guide, designers must submit a Design Temperature Exception Request. Visit www.energystar.gov/hvacdesigntemps for a copy of this form.
35. To determine the number of occupants among all HVAC systems in the dwelling unit, calculate the number of bedrooms, as defined below, and add one. This number of occupants must be within ± 2 of the dwelling unit to be certified.

    A bedroom is defined by ANSI / RESNET / ICC 301-2014 as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A “den”, “library”, or “home office” with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

    An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

    - have a sill height of not more than 44 in. above the floor; AND
    - have a minimum net clear opening of 5.7sq. ft.; AND
    - have a minimum net clear opening height of 24 in.; AND
    - have a minimum net clear opening width of 20 in.; AND
    - be operational from the inside of the room without the use of keys, tools or special knowledge.
36. The difference between the Conditioned Floor Area (CFA) used in the design and the actual dwelling unit to be certified must fall within the tolerance specified in Footnote 32, as verified by a Rater. Be advised, the Rater will calculate CFA using the definition in ANSI / RESNET / ICC 301-2019, which defines this value, in part, as the floor area of the Conditioned Space Volume within a building or Dwelling Unit, not including the floor area of attics, crawlspaces, and basements below air sealed and insulated floors. See https://codes.iccsafe.org/content/RESNET3012019P1/3-definitions- for the complete definition.
37. The difference between the window area used in the design and the actual dwelling unit to be certified must fall within the tolerance specified in Footnote 32, as verified by a Rater. Be advised, the Rater will calculate window area using the on-site inspection protocol provided in Normative Appendix B of ANSI / RESNET / ICC 301-2019, which instructs the Rater to measure the width and height of the rough opening for the window and round to the nearest in., and then to use these measurements to calculate window area, rounding to the nearest tenth of a sq.. See https://codes.iccsafe.org/content/RESNET3012019P1/normative-appendix-b-inspection-procedures-for-minimum-rated-features for the complete protocol.
38. “Predominant” is defined as the SHGC value used in the greatest amount of window area in the dwelling unit.
39. Infiltration rate shall use “Tight” values for the cooling season infiltration rate and “Tight” values for the heating season infiltration rate, as defined by Table 5A or 5B of ACCA Manual J, Eighth Edition, Version Two. Alternatively, infiltration rate shall not exceed 0.24 air changes per hour.
40. Equipment shall be selected using the maximum total heat gain and the total heat loss in Section 3 per ACCA Manual S, Second Edition, except that cooling ranges above ACCA Manual S limits are temporarily allowed, per Item 4.19, and heating ranges above ACCA Manual S limits are allowed where heating and hot water are provided by the same equipment or where standby equipment is needed for redundancy, but only operate when the primary equipment is not operating. For equipment outside the scope of ACCA Manual S, “Other” may be indicated and the equipment sizing approach listed in the space provided.

41. Electric resistance limitations do not apply to heat pumps with integral supplemental or emergency electric resistance heating. The EPA recommends but does not require that heat pumps have controls to limit the use of emergency or supplemental heat to heat pump failures or when the heat pump cannot meet the heating load. The EPA also recommends but does not require that heat pumps in CZ 5-8 are ENERGY STAR certified cold-climate heat pumps. Electric resistance limitations do not apply to systems dedicated to heating outdoor air supplied by a mechanical ventilation system, as long as the space served is primarily heated by a non-electric-resistance system that meets the efficiency requirements noted in the ENERGY STAR Multifamily Reference Design. Electric resistance limitations apply to garages, but do not apply to heated plenums meeting Item 4.37, or stairwells where automatic thermostatic controls prevent operation above 50ºF.
42. If the equipment contains multiple components, the AHRI Reference # shall represent the rated efficiency of the specific combination of indoor and outdoor components. The EPA recommends, but does not require, that the rating also encompass the furnace when such a rating is available. If an AHRI Reference # is not available, OEM-provided documentation shall be attached with the rated efficiency. For residential split air conditioners and heat pumps, the rated efficiency shall be for the specific combination of indoor and outdoor components of the air conditioner or heat pump, along with confirmation that the two components are designed to be used together. If the AHRI Reference # is reported in Item 4.10 (e.g., heat pumps), the AHRI Reference # does not need to be listed again in Item 4.27.
43. The full system capacity at design conditions, from OEM expanded performance data, shall be listed and shall include the capacity of all systems providing space cooling to the dwelling unit. For two-speed or variable-speed equipment, the full system capacity shall reflect the capacity at the maximum available compressor speed or when the compressor operates at the AHRI rating test speed, respectively.
44. Per ACCA Manual S, Second Edition, if the load sensible heat ratio is ≥ 95% and the HDD / CDD ratio is ≥ 2.0, then the Climate is Condition B, otherwise it is Condition A.
45. As an alternative for low-load dwelling units, a system match-up including a single-speed compressor with a total capacity ≤ 20 kBtuh is permitted to be used in spaces with a total cooling load ≤ 15 kBtuh. A system match-up including a two-speed or variable-speed compressor with a total capacity ≤ 25 kBtuh is permitted to be used in spaces with a total cooling load ≤ 18 kBtuh.
46. The full system capacity shall be listed for the heating system. For two-stage and modulating furnaces, the full system capacity shall reflect the maximum output available. For shared boilers, the full system capacity may exclude standby equipment needed for redundancy.
47. Per the 2009 International Mechanical Code, a direct-vent furnace or boiler is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under non-positive static vent pressure entirely by natural draft. Naturally drafted equipment is only allowed if located in a space outside the pressure boundary, where the envelope assemblies separating it from conditioned space are insulated and air-sealed. For mechanically drafted boilers, make-up air sources must be mechanically closed when the boiler is not in operation.
48. Item 4.42 does not apply to factory-installed piping within HVAC equipment or piping that conveys fluids having a design operating temperature range between 60°F and 105°F, inclusive.
49. Designers may provide supplemental documentation with room-by-room and total design airflows in lieu of completing Item 5.2. Sample supplemental documentation can be found at www.energystar.gov/hvacdesigntools.
50. Orientation-specific room-by-room design airflows are recommended, but not required, to distribute airflow proportional to load, thereby improving comfort and efficiency. While air-balancing of supply registers and return grilles is not required to be completed as part of HVAC Functional Testing, it is recommended that ducted HVAC systems be designed such that they can be balanced in the field (i.e., provide proper access to any and all balancing dampers, provide ducting and grille layouts such that accurate air measurements can be taken).
51. Design HVAC fan airflow is the design airflow for the blower in CFM, as determined using the manufacturer's expanded performance data. The Functional Testing Agent is required to measure the HVAC fan airflow using the mode with the higher airflow, within ± 15% of design.
52. Design HVAC fan speed setting is the fan speed setting on the control board (e.g., low, medium, high) that corresponds with the Design HVAC fan airflow.
53. Design total external static pressure is the pressure corresponding to the Design HVAC fan airflow, inclusive of external components (e.g., evaporator coil, whole-house humidifier, or ≥ MERV 6 filter).
54. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
55. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust or exhaust-only dwelling-unit ventilation systems. The EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
56. Item 6.5 generally applies to the ducts of space heating, space cooling, and Dwelling Unit Mechanical Ventilation Systems. However, visual inspection is permitted in lieu of testing for the following system types: 1) a Dwelling Unit Mechanical Ventilation System not connected to the space heating or space cooling system, regardless of the number of dwelling units it serves; 2) a space heating or space cooling system for which the ducts and air handler are in conditioned space and the total supply duct length of the system, including all supply trunks and branches, is ≤ 10 ft.; and 3) a space heating or space cooling system that serves more than one dwelling unit. In such cases, a Rater shall visually verify that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.
57. Duct leakage shall be determined and documented by a Rater in accordance with ANSI / RESNET / ICC 380. Leakage limits shall be assessed on a per-system, rather than per-dwelling unit, basis. For a duct system with one or two returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM25 at 'rough-in' or the greater of ≤ 8 CFM25 per 100 sq. ft. of CFA or ≤ 8 CFM25 at 'final'. For a duct system with three or more returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM25 at 'rough-in' or the greater of ≤ 12 CFM25 per 100 sq. ft. of CFA or ≤ 120 CFM25 at 'final'. For a duct system without any ducted returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 3 CFM25 per 100 sq. ft. of CFA or ≤ 30 CFM25 at 'rough-in' or the greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM25 at 'final' and, the Rater-measured pressure

difference between the space containing the air handler and the conditioned space, with the air handler running at high speed, is ≤ 5 Pa. For systems > 1 ton, increase by 1 Pa per half ton.

58. This test is not required of central exhaust systems serving clothes dryers but is required for the central exhaust portion of balanced systems such as HRVs and ERVs.

ENERGY STAR Multifamily New Construction
National HVAC Design Report [1], Version 1.1 / 1.2 / 1.3 (Rev. 05)

Appendix A – Supplementary tables for Section 2 and 3

2a. Dwelling Unit & Common Space Mechanical Ventilation Design [4, 5]						
List unique unit plan for which 62.2 ventilation rates were calculated in the spaces to the right:						
2.4 # of bedrooms:						
2.5 Square footage:						
2.6 Ventilation airflow rate required by ASHRAE 62.2:						
2.7 Ventilation airflow rate designed:						
2.7.1 If applicable, run-time per cycle (minutes):						
2.7.2 If applicable, cycle time (minutes):						

List common space for which 62.1 ventilation rates were calculated in the spaces to the right:						
2.8 Ventilation airflow rate required by ASHRAE 62.1:						
2.9 Ventilation airflow rate designed:						

System Type & Controls:						
List Ventilation System ID in the spaces to the right:						
2.10 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)						
2.11 Manufacturer:						
2.12 Model Number:						
2.13 # installed in the building:						
2.14 Spaces each fan serves (i.e., single, multiple)						
2.15 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)						
2.16 Specified control location: (e.g., Master bath, utility):						

3. Heating & Cooling Loads								
Dwelling Unit Heating & Cooling Loads (only required for ducted split AC, unitary AC, ASHP, WSHP, GSHP, and furnaces) [29] ☐ N/A								
List the unit plan for which Loads were calculated:								
3.5 Location of Unit: top, mid, bottom, corner, interior								
3.6 Number of occupants used in loads: [32, 35]								
3.7 Total occupant gains (Btuh): [32]								
3.8 Conditioned floor area used in loads: [32, 36]								
3.9 Window area used in loads: [32, 37]								
3.10 Predominant window SHGC used in loads: [32, 38]								
3.11 Infiltration (ACH / ACH50) used in loads: [39]								
3.12 Mechanical ventilation (CFM) used in loads:								
3.13 Non-occupant Internal gains (appliance, equipment and lighting) used in loads (Btuh): [32]								
3.14 Door orientation (N, NE, E, SE, S, SW, W, NW): [33]								
3.15 Sensible Heat Gain At Design Conditions (kBtuh): [32]								
3.16 Latent Heat Gain At Design Conditions (kBtuh):								
3.17 Total Heat Gain at Design Conditions (kBtuh): [32]								
3.18 Total Heat Loss at Design Conditions (kBtuh):								

Appendix A – Supplementary tables for Section 3

3.19 Common Space Heating & Cooling Loads (required for all common space heating and cooling systems)		
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)

3.20 Building Heating & Cooling Loads (only required when shared systems such as central boilers or chillers are specified)		
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____(kBtuh)	Total Heat Loss: _____(kBtuh)

Appendix A – Supplementary tables for Section 4

4. Heating & Cooling Equipment Selection							
Cooling Equipment (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".) ☐ N/A							
List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.4 Equipment type: (PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)							
4.5 Area / Space(s) that system serves:							
4.6 Chiller / condenser / outdoor unit manufacturer:							
4.7 Chiller / condenser / outdoor unit model #:							
4.8 Evaporator / indoor unit manufacturer:							
4.9 Evaporator / indoor unit model #:							
4.10 AHRI reference #: [42]							
4.11 Rated efficiency:							
4.12 Evaporator fan type: PSC, ECM / ICM Other:							
4.13 Compressor speed: Single, Two, Variable							
4.14 Turn down ratio (for variable speed equipment):							
4.15 Latent capacity at design conditions (kBtuh): [43]							
4.16 Sensible capacity at design conditions (kBtuh): [43]							
4.17 Total capacity at design conditions (kBtuh): [43]							
4.18 Cooling sizing % = Total capacity (Item 4.17) divided by Total Heat Gain of space(s) in Item 4.5:							
4.19 Meets cooling sizing limit: (A, B, C, D or N/A) [30, 32]							
4.20 If "B", list Load sensible heat ratio = Max. sensible heat gain (Item 3.15) / Max. total heat gain (Item 3.17): [40]							
4.21 If "B", calculate HDD / CDD ratio: [44]							

	Compressor Type (Per Item 4.13)		
Equipment Type & Climate Condition	Single-Speed	Two-Speed	Variable-Speed
A: For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate [44]	Recommended: 90 – 115% Allowed: 90 – 130%	Recommended: 90 – 120% Allowed: 90 – 140%	Recommended: 90 – 130% Allowed: 90 – 160%
B: For Cooling Mode of Heat Pump in Condition B Climate [44]	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh
C: For low-load spaces (≤15 kBtuh) [45]	≤ 20 kBtuh		
D: For low-load spaces (≤18 kBtuh) [45]		≤ 25 kBtuh	≤ 25 kBtuh

Heating Equipment (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".) ☐ N/A							
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.22 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance							
4.23 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace							
4.24 Area / Space(s) that system serves:							
4.25 Manufacturer:							
4.26 Model Number:							
4.27 AHRI reference #: [42]							
4.28 Rated efficiency:							
4.29 Equipment output capacity (kBtuh):							
4.30 Air-source heat pump output capacity (kBtuh) (17°F):							
4.31 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent [47]							

4.32 Furnace heating sizing % = Total capacity (Item 4.29) divided by Total Heat Loss of space(s) in Item 4.24:							
4.33 Meets furnace sizing limit: (A, B, C, or N/A) [30]							
A: For low-load spaces (≤ 10 kBtuh), furnace output capacity is ≤ 40 kBtuh							
B: When Used for Heating Only	C: When Paired With Cooling						
100 – 400%	Recommended: 100 – 140% Allowed: 100 – 400%						

Appendix A – Supplementary tables for Section 5

5. Dwelling-Unit Duct Design

5.2 Room-by-room design airflows documented below (which must sum to the mode with the higher Design HVAC fan airflow). [13, 49, 50]

Name of the unit plan:			Name of the unit plan:		
Design HVAC fan airflow: [51] Cooling mode _____ CFM Heating mode _____ CFM			Design HVAC fan airflow: [51] Cooling mode _____ CFM Heating mode _____ CFM		
Design HVAC fan speed setting (e.g., low, medium, high): [52] Cooling mode _____ Heating mode _____			Design HVAC fan speed setting (e.g., low, medium, high): [52] Cooling mode _____ Heating mode _____		
Design total external static pressure (corresponding to the mode with the higher airflow above): [53] _____ IWC			Design total external static pressure (corresponding to the mode with the higher airflow above): [53] _____ IWC		
	Room Name	Design Airflow (CFM)		Room Name	Design Airflow (CFM)
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
	Total for all rooms			Total for all rooms	
Name of the unit plan:			Name of the unit plan:		
Design HVAC fan airflow: [51] Cooling mode _____ CFM Heating mode _____ CFM			Design HVAC fan airflow: [51] Cooling mode _____ CFM Heating mode _____ CFM		
Design HVAC fan speed setting (e.g., low, medium, high): [52] Cooling mode _____ Heating mode _____			Design HVAC fan speed setting (e.g., low, medium, high): [52] Cooling mode _____ Heating mode _____		
Design total external static pressure (corresponding to the mode with the higher airflow above): [53] _____ IWC			Design total external static pressure (corresponding to the mode with the higher airflow above): [53] _____ IWC		
	Room Name	Design Airflow (CFM)		Room Name	Design Airflow (CFM)
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
	Total for all rooms			Total for all rooms	

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SECTION 01 81 18 - DOE EFFICIENT NEW HOMES VERSION 2 (REV. 02)

PART 1 - GENERAL

A. This project shall be designed to qualify as a DOE Efficient New Homes Version 2 (REV. 02) and shall meet the minimum requirements of either the Performance Path or the Prescriptive Path to qualify. The Contractor is responsible to meet the requirements of DOE Efficient New Homes Version 2 (REV. 02) referenced herein as part of the Contract Documents. The DOE Efficient New Homes Version 2 (REV. 02)) is available under separate cover.

B. Program is only applicable at Building 1 in Phase 1. Does not apply to Buildings 2 or 3 in Phase 2.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

DOE Efficient New Homes Multifamily EV-Ready Checklist Version 2 (Rev. 1)

Applicability[1]

These Electric Vehicle Ready provisions of the DOE Efficient New Homes program must be met by any building eligible for certification under the Multifamily National Program Requirements Version 2 and the Multifamily California Program Requirements Version 2, unless one or more of the exceptions noted below applies. For Exception A, a project may be certified under the DOE Efficient New Homes program if all other applicable program requirements are met, and this checklist is not required. If Exceptions B and/or C applies, check the box below. If this box is checked, the rater must record the percentage of spaces provided and may mark the EV-Ready checklist as complete on the Rater Checklist.

Exceptions

A. The cost of the energy use of the parking garage or lot is not the responsibility of the Builder, Developer, Building Owner, or Property Manager, or no parking is provided.
B. Where the local electric distribution entity has certified in writing that it is not able to provide 100% of the necessary distribution capacity that would be needed according to this checklist (assuming that all of the required EVSE, EV Ready, and EV Capable spaces are eventually energized) within 2 years after the estimated certificate of occupancy date, the required EV charging infrastructure shall be reduced based on the available existing electric distribution capacity. The Rater must include the utility's written explanation in the project records.
C. Where meeting the capacity requirements associated with eventually energizing all of the EVSE, EV Ready, and EV Capable spaces required by this checklist will alter the local utility infrastructure design requirements on the utility side of the meter so as to increase the utility side cost to the builder or developer by more than $450 per dwelling unit, the required EV charging infrastructure shall be reduced based on the available existing electric distribution capacity. The Rater must include documentation from the utility regarding added costs in the project records.

Exception B and/or C applies and required documentation is retained by the rater.	☐
Both Exceptions require that EV charging infrastructure is installed based on the available existing electric distribution capacity. Document the percentage of total automobile parking spaces which are EV Capable, EV Ready, or EVSE spaces. All installed spaces must meet the design requirements of this checklist.	___ %

Notes

1. All electrical infrastructure shall be in accordance with NFPA 70.
2. An asterisk (*) denotes a requirement that must be field verified. All other requirements (i.e., those without an asterisk) may be verified based on construction documents or field verification.
3. These requirements are adapted from Appendix RE of the 2024 Residential IECC.

U.S. DEPARTMENT of ENERGY

DOE Efficient New Homes Multifamily EV-Ready Checklist Version 2 (Rev. 1)

Item	Requirement	Rater Verified[2]	Builder or LP Verified[3]
1	Allocated parking for dwelling units in multifamily or mixed-use buildings are provided with an EV Capable, EV Ready, or EVSE space for 20% of units or automobile parking spaces, whichever is less. See endnotes for parking that is shared by multiple buildings[4] and alternative percentage requirements for Low-Power Level 2 (L2) charging.[5] The following minimum types of spaces are provided:[6] 10% of the spaces provided must be EVSE spaces. 10% of the spaces provided may be any combination of EVSE, EV Capable, or EV Ready spaces. ***Advisory:*** DOE intends to raise these percentages in a future program update.		
All **EV Capable** spaces must comply with items 2a – 2d, below.			
2a	A continuous raceway or cable assembly is installed between a suitable panelboard (or other on-site electrical distribution equipment) and an enclosure or outlet located within 6 feet of the EV Capable space.		
2b	The raceway or assembly and panelboard (or other electrical distribution equipment) are sized and rated to supply a system capacity not less than: 6.2 kVA per space, if serving a single space or serving multiple spaces without an energy management system. 2.1 kVA per space, if serving multiple spaces with an energy management system.[7]		
2c	The panelboard (or other electrical distribution equipment) to which the raceway or cable assembly connects has sufficient dedicated space and spare electrical capacity for a two-pole circuit breaker or set of fuses.		
2d	The electrical enclosure or outlet and the panelboard (or other electrical distribution equipment) are both marked: “For electric vehicle supply equipment (EVSE)”		
All **EV Ready** spaces must comply with items 3a – 3c, below.			
3a	A branch circuit is installed and terminates at an enclosure or outlet located within 6 feet of the EV Ready space. The termination is marked “For electric vehicle supply equipment (EVSE).”		
3b	Circuit and panelboard (or other electrical distribution equipment) are sized and rated to supply a system capacity not less than: 6.2 kVA per space, if serving a single space or serving multiple spaces without an energy management system. 2.1 kVA per space, if serving multiple spaces with an energy management system.[7]		
3c	The electrical enclosure or outlet and the panelboard (or other electrical		

	distribution equipment) are both marked: “For electric vehicle supply equipment (EVSE)”		
All **EVSE** spaces must comply with items 4a – 4d, below. An installed EVSE[8] with multiple output connections is permitted to serve multiple EVSE spaces.			
4a	EVSE is installed within 6 feet of the EVSE space.		
4b	Circuit and panelboard (or other electrical distribution equipment) serving EVSE are sized and rated to supply a system capacity not less than: 6.2 kVA per space, if serving a single space or serving multiple spaces without an energy management system. 2.1 kVA per space, if serving multiple spaces with an energy management system.[7]		
4c	Nameplate charging capacity of installed EVSE is not less than: 6.2 kVA (or 30A and 208/240V) per space, if serving a single space or serving multiple spaces without an energy management system. 2.1 kVA per space (or 10A at 208/240V), if serving multiple spaces with an energy management system.[7]		
4d	EVSE is listed and labeled in accordance with UL 2202 or UL 2594.		

Verification Signoffs		
Rater Name: Rater Company Name:	Rater Pre-Drywall Inspection[9] Date(s):	Rater Initials:
Rater Name: Rater Company Name:	Rater Final Inspection[10] Date(s):	Rater Initials:
Builder/Developer Employee: Builder/Developer Name:	Builder/Developer Inspection Date(s):	Builder Initials:
Licensed Professional:	Licensed Professional Inspection Date(s):	LP Initials:

Endnotes

[1] For projects certifying under the DOE Efficient New Homes Single Family Version 2 program requirements, this checklist must be applied to the shared parking area (if provided) when homes are not provided with a private driveway or garage. These project types are eligible to claim Exceptions A, B, and/or C, if applicable.

Only units seeking DOE Efficient New Homes certification must be included when determining the number of spaces required to be EVSE, EV-Ready, and/or EV-Capable.

[2] The Rater is defined as the person(s) completing the third-party verification required for certification. Raters must comply with the following:

- Raters are required to complete all training modules applicable to the DOE Efficient New Homes Multifamily Version 2 program specifications (according to the timeline posted on the program website) prior to completing a project's first inspection. Please note that required training modules are subject to change and Raters will have an allocated time period to complete additional or updated training modules as they become available. If a Rater does not successfully complete these modules before the end of the allocated time period, they may not certify DOE Efficient New Homes projects until the modules are complete.
- Raters must be (a) a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or (b) credentialed by a Home Certification Organization for DOE Efficient New Homes (HCO for DOE), or (c) meet the credential requirements of a Multifamily Review Organization for DOE Efficient New Homes (MRO for DOE). Learn more and find a current list of HCOs and MROs for DOE here.

[3] At the discretion of the Rater, a licensed professional (LP) may verify those line items in this Checklist where a checkbox is in the "Licensed Professional" column. A Licensed Professional must be a Professional Engineer, Registered Architect, or other industry professional (e.g., electrician) in good standing and possess a current license. When exercised, the LP's responsibility will be formally acknowledged by the LP signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.

[4] For developments where multiple buildings (and/or townhomes, when certifying under DOE Efficient New Homes Multifamily Version 2) share common parking area(s) (e.g., lot(s) or garage(s)), the percentage of spaces required by this checklist shall be applied to the total number of parking spaces in the common parking area(s) that are intended for use by the buildings' residents *or* by the total number of units in the buildings, whichever is less, and shall be based on the total number of dwelling units that share the parking area(s).

[5] Projects that do not include an energy management system may opt to reduce the capacity of EVSE spaces (and associated circuit and panel board/distribution equipment) to a nameplate rating less than 6.2 kW (but no less than 3.3 kW, or 16A at 208/240V), if the percentage of EVSE spaces is increased from 10% to 20% of units or automobile parking spaces, whichever is less. If this alternative is used, the project is not required to provide any additional EV Ready or EV Capable spaces.

[6] To determine the number of EVSE, EV-Ready, and EV-Capable spaces required for a project:

1. Calculate the number of spaces equal to 20% of spaces provided for resident parking or 20% of dwelling units, whichever is less. Round up to the next whole number.
2. At least half of these spaces must be EVSE. The remaining spaces may be any combination of EVSE, EV Ready, and/or EV Capable.

For example, a building with 70 dwelling units and 62 spaces provided for resident parking would require at least 7 EVSE spaces and 6 EVSE, EV Ready, or EV Capable spaces.

1. *20% of 62 = 12.4, rounded up to the next whole number = 13*
2. *At least half of 13 must be EVSE (7). The remaining 6 may be any combination of EVSE, EV Ready, and EV Capable.*

[7] An energy management system is defined as a system of one or more monitors, controllers, communications systems, or other devices used to control electric vehicle charging loads by increasing or reducing electric power supplied to the vehicle charging location. If used, an energy management system must not be configured to turn off electrical power to EVSE or EV Ready spaces used to meet DOE Efficient New Homes requirements.

[8] Electrical Vehicle Service Equipment (EVSE) transfers power to an electric vehicle. EVSE must include an energized conductor, and a connector and plug (i.e., charging cord) or apparatus for wireless (e.g., inductive) charging to provide power directly to a vehicle. EVSE may also optionally include load management, scheduling, adapters, and other features to facilitate on-site electric vehicle charging.

[9] Any Item that will be concealed by drywall (e.g., wall insulation) must be verified during the pre-drywall inspection. If drywall is installed prior to the inspection, then it must be entirely removed to fully verify all Items. It is not sufficient to remove only portions of drywall to inspect a subset of areas. Additional information is available in the ENERGY STAR Technical Bulletin: Pre-Drywall Inspection Is Always Required.

[10] Some Items can typically only be verified at a later stage of construction than when the pre-drywall inspection occurs (e.g., bath fan airflow). Any Item that has not been verified during the pre-drywall inspection must be verified prior to or during the final inspection.

DOE Efficient New Homes Multifamily PV-Ready Checklist Version 2 (Rev. 1)

The Photovoltaic Ready provisions of the DOE Efficient New Homes program shall be met by any building eligible for certification under the Multifamily National Program Requirements Version 2 or the Multifamily California Program Requirements Version 2, unless one or more of the exceptions (noted below) applies. Checklist requirements may be verified using final construction documents or direct field observation unless an item is marked as "Field Verify," in which case it must be verified in the field.

If one or more exceptions apply, a project may be certified under the DOE Efficient New Homes program if all other applicable program requirements are met.

The exceptions are:

a. The building already includes an on-site PV system with a capacity of at least 1 Watt per square foot of roof area. Documentation of the system must be retained by the rater.
b. The building receives renewable energy from a community solar system, and there is a legally binding agreement in place for the provision of this energy to the building with a duration ≥ 15 years and written to survive a full or partial transfer of ownership of the property. Documentation of this agreement must be retained by the rater.
c. A building with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually. Documentation of the analysis concluding that the 70 percent threshold is not met must be retained by the rater.
d. Buildings where 75% or more of the roof (by surface area) has a slope of 4:12 or greater and no portion of the 4:12 or greater roof section is oriented in between 110 degrees to 270 degrees of true north. Documentation must be retained by the rater.
e. A building where the licensed professional certifies that the solar zone area required by this checklist cannot be met because of extensive rooftop equipment, skylights, vegetated roof areas, or other obstructions. Rater must retain this documentation.

These requirements are based, in part, on the provisions of the 2021 Commercial IECC, Appendix CB.

U.S. DOE Efficient New Homes Multifamily PV-Ready Checklist Version 2 (Rev. 1)		
Item	**Requirement**	**Rater Verified** [1]
One or more of the exceptions listed above applies and required documentation is retained by the rater. If this box is checked, the remaining items on this list are not required and the rater may mark the PV-Ready checklist as complete on the Rater Checklist.		☐
1	A solar-ready zone (a section or sections of the roof or building overhang designated and reserved for the future installation of a solar PV system) is located on the roof and/or other viable building surfaces (which may include awnings and the roofs of ancillary buildings including carports). For buildings where solar-ready zone(s) are located on roof slopes of 4:12 or greater, solar-ready zone is located in between 110 degrees to 270 degrees of true north.	☐
2	The total solar-ready zone area is not less than 40 percent of the roof area calculated as the horizontally projected gross roof area less the area covered by skylights, occupied roof decks, vegetated roof areas and mandatory access or set back areas required by the International Fire Code (IFC). For buildings with roof slopes of 4:12 or greater, the solar-ready zone is not less than 40 percent of the horizontally projected gross roof area with an orientation between 110 degrees to 270 degrees of true north (less the area covered by skylights, occupied roof decks, vegetated roof areas and mandatory access or set back areas required by the IFC).	☐

3	The solar-ready zone is either a single area or several smaller, separated sub-zone areas not less than 5 feet (1524 mm) in width in the narrowest dimension.	☐
4	The solar-ready zone is free from obstructions, including pipes, vents, ducts, HVAC equipment, skylights, and roof-mounted equipment.	☐
5	A collateral dead load[2] of not less than 5 pounds per square foot (PSF) shall be included in the gravity and lateral design calculations for the solar-ready zone. The structural design loads for roof dead load and roof live load are indicated on construction documents.	☐
6	Construction documents indicate pathways for routing of conduit or piping from the solar-ready zone(s) to the main electrical service panel.[3]	☐
7	The main electrical service panel[3] has a reserved space to allow installation of a dual-pole circuit breaker for future solar electric system. This space is labeled "For Future Solar Electric." The reserved space is positioned at the end of the panel that is opposite from the panel supply conductor connection. ***Field Verify***.	☐
8	A permanent certificate indicating the solar-ready zone and all other requirements of this checklist is posted near the electrical distribution panel or other conspicuous location by the builder or registered design professional. ***Field Verify.***	☐

Verification Signoffs		
Rater Name: _____ Rater Company Name: _____	Rater Inspection Date(s): _____	Rater Initials: _____

Endnotes:

[1] The Rater is defined as the person(s) completing the third-party verification required for certification. Raters must comply with the following:

- Raters are required to complete all training modules applicable to the DOE Efficient New Homes Multifamily Version 2 program specifications (according to the timeline posted on the program website) prior to completing a project's first inspection. Please note that required training modules are subject to change and Raters will have an allocated time period to complete additional or updated training modules as they become available. If a Rater does not successfully complete these modules before the end of the allocated time period, they may not certify DOE Efficient New Homes projects until the modules are complete.
- Raters must be (a) a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or (b) credentialed by a Home Certification Organization for DOE Efficient New Homes (HCO for DOE), or (c) meet the credential requirements of a Multifamily Review Organization for DOE Efficient New Homes (MRO for DOE). Learn more and find a current list of HCOs and MROs for DOE here.

[2] Collateral dead load is a subset of dead load that includes the weight of any materials (current or future) other than permanent construction.

[3] If the building does not have a main electrical service panel serving the entire building, then an electrical service panel serving common space may be used to satisfy this provision. If the building also does not have an electrical service panel serving common space, this requirement shall be applied to the electrical service panels within individual dwelling units. If this approach is used, at least 50% of the dwelling units in the building must meet the stated requirements.

Projects may also choose to use this individual dwelling unit approach even if a main electrical service panel or an electrical service panel serving common spaces exists. When designing the electrical service panels in dwelling units to be PV Ready, builders are permitted to include disclosures to residents in buildings where the resident may need permission to install a rooftop PV system in the future.

U.S. DEPARTMENT of ENERGY

DOE Efficient New Homes
Multifamily National Program Requirements
Version 2 (Rev. 2)

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1. Building Eligibility Requirements

The following multifamily building types are eligible to participate in the DOE Efficient New Homes program using the DOE Efficient New Homes Multifamily National Program Requirements Version 2 (Rev. 2).[1, 2]

Eligible building types:

- Any multifamily building with dwelling units[3] or sleeping units[4] that is NOT a detached dwelling.[5]
- Any mixed-use buildings with dwelling units or sleeping units, where the dwelling units, sleeping units, and common space exceed 50% of the building square footage (parking garage square footage is excluded from this calculation).[6]
- Townhouses with permit dates[7] on or before 12/31/2025. Townhouses must follow the requirements listed in the endnote.[8]

Throughout the remainder of this document, the term 'dwelling unit' is implied to also apply to 'sleeping units' unless otherwise stated.

Townhouses are eligible to participate in the DOE Efficient New Homes program, using either the DOE Efficient New Homes Multifamily Version 2 or the Single Family Version 2 National Program Requirements. For more information about DOE Efficient New Homes Single Family Version 2, visit: https://www.energy.gov/eere/buildings/doe-efficient-new-homes-single-family-version-2. Dwelling units in eligible multifamily and mixed-use buildings may only be certified under the program if the entire building (all dwelling units and covered common spaces) is certified to meet the DOE Efficient New Homes program requirements.[9] Certification under the ENERGY STAR Multifamily New Construction and Indoor AirPlus programs is also required for a building to be eligible. See Exhibit 1 below for additional details.

Compliance with these requirements does not imply compliance with all local code requirements that may be applicable to the building. In cases where local codes overlap with and/or exceed the DOE Efficient New Homes program requirements, these local requirements must be met.[10]

To determine the required version and revision of DOE Efficient New Homes program requirements to use based on a project's location, building type, and permit date partners must reference the DOE Efficient New Homes implementation timeline information posted on the program requirements website.[7] Note that these National Program Requirements do not apply to projects located in California, where the program has state-specific requirements. Partners are advised to check the program website and IRS Guidance on the 45L tax credit for information about tax credit eligibility.

2. Partnership, Training, and Credentialing Requirements

The following requirements must be met by program participants before a multifamily building can be certified:

- The builder or developer must register as a DOE Efficient New Homes partner and sign the Builder Partner Agreement, available in Partner Central.
- Energy Rating Companies (e.g., rater companies and Providers) are required to register as a DOE Efficient New Homes partner and sign a Partnership Agreement, available in Partner Central.
- Raters[11] are required to complete all DOE Efficient New Homes training modules applicable to the DOE Efficient New Homes Multifamily Version 2 program specifications (according to the timeline posted on the program website) prior to completing a project's first inspection. Please note that required training modules are subject to change and Raters will have an allocated time

period to complete additional or updated training modules as they become available. If a Rater does not successfully complete these modules before the end of the allocated time period, they may not certify DOE Efficient New Homes projects until the modules are complete.

- Raters must be (a) a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or (b) credentialed by a Home Certification Organization for DOE Efficient New Homes (HCO for DOE), or (c) meet the credential requirements of a Multifamily Review Organization for DOE Efficient New Homes (MRO for DOE). Learn more and find a current list of HCOs and MROs for DOE here.
- Where Functional Testing (FT) Agents are used for field verification of DOE Efficient New Homes Multifamily Version 2 HVAC requirements, the ESMFNC credentialing requirements for FT Agents shall apply. See the ENERGY STAR FT Agent requirements here.

3. Certification Process [9]

The certification process offers three paths to meet the DOE Efficient New Homes Multifamily Version 2 performance target. Each has varying levels of flexibility to select a custom combination of measures for each building. Dwellings may qualify using the Prescriptive path, the Energy Rating Index (ERI) path, or the ASHRAE 90.1 path. Regardless of the path chosen or the efficiency measures selected, the Mandatory Requirements (Exhibit 1) are also required and impose certain constraints on the efficiency measures selected (e.g., insulation levels, window specifications). On-site power generation may not be used to meet the performance target.

3.1 Prescriptive Path Certification Process

Under the Prescriptive path, each dwelling unit must be equivalent in performance to the applicable minimum requirements of the Target Dwelling Design (Exhibit 2). Dwelling units and common spaces must also meet or exceed the requirements in the DOE Efficient New Homes Multifamily Version 2 National Rater Checklist, which includes meeting the applicable mandatory requirements as shown in Exhibit 1. Buildings following this path must be certified through an MRO for DOE. DOE recommends that Raters and Builders identify their MRO for DOE during the design stage, but at the latest, projects must be under MRO for DOE oversight ***prior to the first inspection***. MROs for DOE have limited discretion to grant an exemption to the first inspection policy (e.g., when a building switches certification paths). The following process applies for certification under the Prescriptive path:

3.1.1. Select efficiency measures for dwelling units and common spaces that meet or exceed all applicable items in the DOE Efficient New Homes Multifamily Version 2 National Rater Checklist, which includes meeting the minimum requirements set in Exhibit 1. In addition, the efficiency features described in the DOE Efficient New Homes Multifamily Version 2 Target Dwelling Design (Exhibit 2) are mandatory within the dwelling units.

3.1.2. Prior to certification, the Rater must submit design documentation to an MRO for DOE for review and approval. DOE strongly recommends submitting this documentation before construction; however, Raters may instead choose to submit the design documentation at final certification. Exhibit 4, below, lists all documents required for certification,

3.1.3. Construct the building using the measures selected in Step 3.1.1, with all dwelling units meeting the minimum requirements in Exhibit 1 and the mandatory requirements in Exhibit 2, as they apply.

3.1.4. Use a Rater operating under a recognized MRO for DOE to verify that all requirements for certification have been met in accordance with the inspection procedures for minimum rated features in

ANSI/RESNET/ICC 301, Appendix B.[12] This will require a minimum of two inspections: one at pre-drywall and the other at final. For modular multifamily buildings, a Rater must verify any requirement in the plant not able to be verified on-site because a feature will be concealed prior to shipment.[13]

3.1.5. The Rater submits the whole building to the MRO for DOE for final certification once verification on all units and common spaces is complete. The submission must include the documentation specified in Exhibit 4 based on as-built conditions. The Rater is required to keep electronic or hard copies of the completed and signed National Rater Field Checklist.

3.2 Energy Rating Index (ERI) Path Certification Process

Under the ERI path, each dwelling unit must be at least equivalent in performance to the applicable minimum requirements of the DOE Efficient New Homes Multifamily Version 2 Target Dwelling Design (Exhibit 2), as assessed through energy modeling. Dwelling units and common spaces must also meet or exceed the requirements in the DOE Efficient New Homes National Rater Checklist, which includes meeting the applicable mandatory requirements as shown in Exhibit 1. On-site power generation may not be used to meet the DOE Efficient New Homes Multifamily Version 2 ERI Target. Buildings following this path must be certified through an HCO for DOE. The following process applies:

3.2.1. Obtain the ERI score for the Target Dwelling Design, which is determined using a recognized HCO for DOE's Approved Software Rating Tool.[14]

3.2.2. Using the same software program specified in Step 3.2.1, configure the preferred set of efficiency measures for the unit to be certified and verify that the resulting ERI meets or exceeds the DOE Efficient New Homes Multifamily Version 2 Target Dwelling ERI score, as determined in Step 3.2.1. Select efficiency measures for units that also meet or exceed all applicable items in Exhibit 1 (Mandatory Requirements). Select efficiency measures for common spaces that meet or exceed all items in the National Rater Checklist (which contains all Exhibit 1 Mandatory items) to the extent that they apply.

3.2.3. Prior to certification, the Rater must submit design documentation to a Provider for review and approval. DOE strongly recommends submitting this documentation before construction; however, Raters may instead choose to submit the design documentation at final certification. Exhibit 4, below, lists all documents required for certification.

3.2.4. Construct the building using the measures selected in Step 3.2.2.

3.2.5. Use a Rater operating under a recognized HCO for DOE to verify that all requirements for certification have been met in accordance with the inspection procedures for minimum rated features in ANSI/RESNET/ICC 301, Appendix B.[12] This will require a minimum of two inspections: one at pre-drywall and the other at final. For modular multifamily buildings, a Rater must verify any requirement in the plant not able to be verified on-site because a feature will be concealed prior to shipment.[13]

3.2.6. The Rater submits the whole building to the HCO for DOE for final certification once verification on all units and common spaces is complete.[15] The submission must include all documentation specified by the HCO for DOE, based on as-built conditions. The Rater is required to keep electronic or hard copies of the completed and signed National Rater Checklist.

3.3. ASHRAE 90.1 Path Certification Process

Under the ASHRAE 90.1 compliance path, the building must meet or exceed the ASHRAE performance target, described in Exhibit 3. Buildings following this path must be certified through an MRO for DOE. DOE recommends that Raters and Builders identify their MRO for DOE during the design stage, but at the latest, projects must be under MRO for DOE oversight ***prior to the first inspection***. MROs for DOE have limited discretion to grant an exemption to the first inspection policy (e.g., when a building switches compliance paths). Buildings using this path must follow the modeling requirements in the ENERGY STAR Multifamily Simulation Guidelines, located here. The following process applies:

3.3.1. Meet or exceed the mandatory requirements specified in Exhibit 1. Following the ENERGY STAR Multifamily Simulation Guidelines, configure the preferred set of efficiency measures for the unit to be certified and verify that the resulting energy savings above the ASHRAE building baseline meets or exceeds the required performance target per Exhibit 3.

> 3.3.1.1. For buildings that are certified as Phius CORE 2021, Phius ZERO 2021, Phius CORE 2024, or Phius ZERO 2024 (using Phius modeling protocols in lieu of ENERGY STAR Multifamily Simulation Guidelines), achieving 20% less energy use than the Phius CORE 2021 or Phius CORE 2024 source energy criteria, without renewables, is accepted in lieu of achieving the ASHRAE performance target based on a baseline of ASHRAE 90.1-2019.

3.3.2. Prior to certification, the Rater must submit design documentation to an MRO for DOE for their review and approval. DOE strongly recommends submitting this documentation before construction; however, Raters may instead choose to submit the design documentation at final certification. Exhibit 4, below, lists all documents required for certification.

3.3.3. Construct the building using the measures selected in step 3.3.1 and the Mandatory Requirements in Exhibit 1.

3.3.4. Use a Rater operating under a recognized MRO for DOE to verify that all requirements have been met in accordance with the inspection procedures for minimum rated features in ANSI/RESNET/ICC 301, Appendix B.[12] This will require a minimum of two inspections: one at pre-drywall and the other at final. For modular multifamily buildings, a Rater must verify any requirement in the plant not able to be verified on-site because a feature will be concealed prior to shipment.[13]

3.3.5. Once verification on all units and common spaces is complete, submit the whole building to the MRO for DOE for final certification with the MRO for DOE-specified documentation (Exhibit 4) based on as-built conditions. The Rater is required to keep electronic or hard copies of the completed and signed National Rater Checklist.

Exhibit 1: DOE Efficient New Homes Multifamily Mandatory Requirements

Where DOE Efficient New Homes Mandatory requirements apply only to dwelling units and not to common spaces, common space requirements shall be met through compliance with ENERGY STAR Multifamily New Construction Version 1.2 and Indoor AirPlus National Program Requirements. In all Exhibits, the term 'in-unit' references equipment that is installed within a dwelling unit or only serves a single dwelling unit.

Component	Mandatory Requirements	Applicability[16]
1. DOE Efficient New Homes National Rater Checklist	1.1 Rater completes the DOE Efficient New Homes Multifamily Version 2 (Rev. 2) National Rater Checklist.[17]	Dwelling units; common spaces
2. ENERGY STAR Baseline	2.1 Building is certified under ENERGY STAR Multifamily New Construction National Version 1.2 or 1.3.[18]	Dwelling units; common spaces
3. Building Envelope	3.1a **ERI and ASHRAE paths:** ceiling, wall, floor, and slab insulation for the building meets specified efficiency levels from the 2021 or 2024 IECC.[19, 20] 3.1b **Prescriptive path:** ceiling, wall, floor, and slab insulation for the building meets specified DOE Efficient New Homes Multifamily Version 2 Target Dwelling Design insulation levels in dwelling units, and specified efficiency levels from the 2021 or 2024 IECC in common spaces.[20, 21] 3.2 Windows, skylights, and doors in dwelling units that are ≥ 50% glazed achieve an area-weighted average SHGC less than or equal to 0.23 (Climate Zone 1-2), 0.25 (Climate Zone 3), or 0.40 (Climate Zone 4A, 4B).[22, 23]	Dwelling units; common spaces
4. Duct System	4.1 All in-unit heating and cooling system distribution ducts and in-unit heating and cooling system air-handling equipment are located within the thermal and air barrier boundary.[24]	Dwelling units
5. Hot Water Efficiency	5.1 WaterSense labeled fixtures for dwelling unit showerheads, bathroom sink faucets, and/or bathroom sink faucet accessories.[25] 5.2 Hot water delivery systems meet stored volume criteria.[26] 5.3 In-unit recirculation systems use on-demand controls.[27] 5.4 Recirculating central hot water distribution systems meet pipe insulation thickness criteria.[28]	Dwelling units

6. Lighting & Appliances [29]	6.1 All builder-supplied and builder-installed in-unit refrigerators,[30] dishwashers, clothes washers, and clothes dryers are ENERGY STAR certified.[31] 6.2 100% of in-unit, builder-installed lighting fixtures and lamps are LEDs.[32, 33] 6.3 All in-unit, builder-installed bathroom ventilation fans are ENERGY STAR certified.[34]	Dwelling units
7. Indoor Air Quality	7.1 Certified under EPA Indoor AirPlus (Version 1 or Version 2 (Certified or Gold), determined by permit date).[35]	Dwelling units; common spaces
	7.2 Either in-unit or centralized energy efficient balanced ventilation (HRV or ERV) is provided for dwelling units in Climate Zones 6, 7, and 8.[36, 37]	Dwelling units
8. Renewable Ready	8.1 Provisions of the DOE Efficient New Homes Multifamily PV-Ready Checklist Version 2 (Rev. 1) are completed.	See Checklist
9. Electric Vehicle Ready	9.1 Provisions of the DOE Efficient New Homes Multifamily EV-Ready Checklist Version 2 (Rev. 1) are completed.	See Checklist
10. Heat Pump Water Heater Ready	10.1 Dwelling units with in-unit water heaters meet minimum electric and space requirements.[38] 10.2 Dwelling units with in-unit water heaters have a condensate drain installed within three feet of existing water heater.[39]	Dwelling units
11. Heat Pump Space Heating Ready	11.1 For units with in-unit combustion space heaters, individual branch circuit outlet is installed, or conduit is installed to facilitate future wiring for a heat pump installation. Circuit or conduit labeled as “For future heat pump.” [40]	Dwelling units
12. HPWH Installation Quality ***Advisory Only***	Where heat pump water heaters are installed in dwelling units, partners are encouraged, but not required, to adhere to these installation practices to achieve optimal performance: 12.1 HPWH has direct access to manufacturer-specified volume of ambient air (typical specs range from 450 to 1200 ft3), free of major dust sources, in the space surrounding the water heater through the mechanical room volume or the use of a louvered door, wall vents, ducting, or other strategy. 12.2 HPWH installation complies with the manufacturer’s minimum clearance requirements to make the unit accessible for maintenance and filter cleaning/replacement. 12.3 HPWH has a sound rating of ≤ 55 dBA and a louvered door is not used to separate the unit from living space, or the HPWH has a sound rating of ≤ 35 dBA when a louvered door is used. Alternately, the HPWH is separated from living spaces by sound-attenuating assemblies with STC 35 or greater (i.e., by adding batt insulation to the surrounding wall assembly). *DOE will consider making these installation practices requirements in a future program update.*	

Exhibit 2: DOE Efficient New Homes Target Dwelling Design

The following requirements apply to all dwelling units, as well as to equipment, fixtures, building envelope assemblies, and appliances that serve both dwelling units *and* common spaces, unless otherwise specified. For equipment, fixtures, building envelope assemblies, and appliances serving *only* common spaces, follow ENERGY STAR Multifamily New Construction Version 1.2 National Program Requirements. This Exhibit does not apply to projects pursuing the ASHRAE path. For ASHRAE path projects, see Exhibit 3.

Residential Cooling Equipment (where provided) serving Dwelling Units[17, 41]
If specified equipment type is not listed here, see Exhibit A.

2021 IECC Climate Zone	Unit	1	2	3	4A, 4B	4C, 5	6	7	8
Ductless Air Conditioner	SEER2	18	18	16	16	14	14	14	14
Ducted Split Air Conditioner	SEER2	18	18	16	16	16	16	16	16
Single Packaged Air Conditioner	SEER2	17.1	17.1	15.2	15.2	13.3	13.3	13.3	13.3
Ductless Air Source Heat Pump (HP)	SEER2	18	18	16	16	16	16	16	16
Ducted Split Air Source HP	SEER2	17.1	17.1	15.2	15.2	15.2	15.2	15.2	15.2
Ducted Single Packaged Air Source HP	SEER2	17.1	17.1	15.2	15.2	15.2	15.2	15.2	15.2
Ductless Ground Source HP	EER2	16	16	14	14	14	14	14	14
Ducted Split Ground Source HP	EER2	15.2	15.2	13.3	13.3	13.3	13.3	13.3	13.3
Single Packaged Ground Source HP	EER2	15.2	15.2	13.3	13.3	13.3	13.3	13.3	13.3

Residential Heating Equipment (where provided) serving Dwelling Units[17, 41]
If specified equipment type is not listed here, see Exhibit A.

2021 IECC Climate Zone	Unit	1, 2	2	3	4A, 4B	4C, 5	6	7	8
Gas Furnace, Gas Boiler	AFUE	90%	90%	90%	95%	95%	95%	95%	95%
Ductless Air Source Heat Pump (HP)	HSPF2	8.2	8.2	8.2	8.2	8.5	8.5	8.5	8.5
Ducted Split Air Source HP	HSPF2	7.8	7.8	7.8	7.8	8.0	8.0	8.0	8.0
Ducted Single Packaged Air Source HP	HSPF2	7.7	7.7	7.7	7.7	7.9	7.9	7.9	7.9
Ground Source Heat Pump	COP	2.7	2.7	2.7	2.7	2.8	2.8	2.8	2.8

HVAC Grading for Residential Heating and Cooling Equipment (where provided) in Dwelling Units

Total Duct Leakage	Airflow Deviation	Watt Draw Efficiency	Refrigerant Grade
Grade I [42]	Grade 1, -7.5%	Grade I, 0.45 W/cfm	Grade III (as applicable)

Infiltration and Mechanical Ventilation in Dwelling Units[17]

2021 IECC Climate Zone	1	2	3	4A, 4B	4C, 5	6	7	8
Mech. Ventilation Efficacy (cfm/W) [43]	2.9	2.9	2.9	2.9	1.2	1.2	1.2	1.2
Heat Recovery	None				Balanced, 65% ASRE			
Infiltration Rate [44]	0.25 CFM50/ft^2 of enclosure surface							
Mechanical Ventilation Rate	CFM = (0.01 x CFA) + (7.5 x (Nbr +1)); CFA = Conditioned Floor Area; Nbr = Number of Bedrooms; Runtime: 24 hours/day							
Mechanical Ventilation Fan Watts	Watts = CFM Rate/Ventilation Efficacy, where CFM Rate and Ventilation Efficacy are determined above							

Dwelling unit insulation levels modeled to 2021 IECC levels (Residential, wood-frame) and Grade I installation per ANSI/RESNET/ICC 301.[19]								
2021 IECC Climate Zone	**1**	**2**	**3**	**4A, 4B**	**4C, 5**	**6**	**7**	**8**
Slab Insulation R-value	0	0	10	10	10	10	10	10
Slab insulation Depth (ft)	0	0	2	4	4	4	4	4
Basement Wall U-Factor	0.360	0.360	0.091	0.059	0.050	0.050	0.050	0.050
Wood Framed Floor Assembly U-Factor [45]	0.064	0.064	0.047	0.047	0.033	0.033	0.028	0.028
Mass Floor U-Factor	0.322	0.087	0.074	0.051	0.051	0.051	0.042	0.038
Wall Assembly U-Factor	0.084	0.084	0.060	0.045	0.045	0.045	0.045	0.045
Celling Assembly U-factor	0.035	0.026	0.026	0.024	0.024	0.024	0.024	0.024
Dwelling Unit Windows Except Class AW (Prescriptive pathway: meet SHGC requirements in Exhibit 1, Item 3.2 in place of SHGC requirements below.)								
2021 IECC Climate Zone	**1**	**2**	**3**	**4A, 4B**	**4C, 5**	**6**	**7**	**8**
Window U-Value	0.40	0.40	0.30	0.30	0.27	0.25	0.25	0.25
Window SHGC	0.23	0.23	0.25	0.30	0.30	0.30	0.30	0.30
Dwelling Unit Doors (for Class AW, see below)								
Door type[46]	**Opaque**		**≤ ½ Lite**		**> ½ Lite**			
2021 IECC Climate Zone	**Any**		**Any**		**1 – 3**		**4 – 8**	
Whole Door U-Factor	0.17		0.25		0.30		0.30	
Door SHGC	Any		0.25		0.25		0.40	
Dwelling Unit Class AW Fenestration (Prescriptive pathway: meet SHGC requirements in Exhibit 1, Item 3.2 in place of SHGC requirements below.)								
2021 IECC Climate Zone	**1**	**2**	**3**	**4A, 4B**	**4C, 5**	**6**	**7**	**8**
Fixed Window U-Factor	0.48	0.43	0.40	0.34	0.34	0.32	0.28	0.27
Operable Window U-Factor	0.59	0.57	0.51	0.43	0.43	0.40	0.34	0.30
Glazed Entrance Door U-Factor	0.79	0.73	0.65	0.60	0.60	0.60	0.60	0.60
SHGC	0.25	0.25	0.25	0.40	0.40	0.40	any	any
Water Heater Serving Dwelling Units								
In-Unit Gas Water Heater: UEF = 0.95	In-Unit Electric Water Heater: UEF = 1.95							
Central System Gas Water Heater: E_t = 95%	Central System Electric Water Heater: COP = 1.6							
In-Unit Solar Water Heating System SF [47]	**1**	**2**	**3**	**4A, 4B**	**4C, 5**	**6**	**7**	**8**
	0.80	0.80	0.64	0.64	0.47	0.47	0.28	0.28
Thermostat and Ductwork								
Programmable thermostat								
All ducts and air handlers located in conditioned space, uninsulated.[48]								
Dwelling Unit Lighting, Appliances, and Fixtures								
Lighting	ENERGY STAR light bulbs or fixtures with Tier II efficiency in 100% of Qualifying Light Fixture Locations, as defined by ANSI/RESNET/ICC 301.							
ENERGY STAR Certified Appliances	Refrigerator, Dishwasher, Ceiling Fans (if used)							
WaterSense Fixtures	WaterSense bathroom faucets, aerators, showerheads							

Exhibit 3: DOE Efficient New Homes ASHRAE Path Performance Targets

ASHRAE Energy Savings Requirements
20% energy cost savings or 20% source energy savings above ASHRAE 90.1-2019. The use of on-site renewable energy, including cogeneration, photovoltaics, or wind turbines, may not contribute to meeting the Performance Target (but may be used to exceed it).

Appendix G from ASHRAE 90.1 must be used, along with the ASHRAE Standard 90.1 Performance Based Compliance Form and ENERGY STAR's Multifamily Simulation Guidelines_AppG2016, available on the ENERGY STAR Guidance Documents page which can be found at www.energystar.gov/mfguidance at the bottom of the page under 'Supporting Documents.' DOE encourages the use of Appendix G from ASHRAE 90.1-2022, but will accept the use of Appendix G-based modeling for 90.1-2016 and 90.1-2019 until further notice.

Projects must demonstrate that a proposed building achieves a Performance Cost Index less than or equal to 80% of the Performance Cost Index Target calculated in accordance with Section 4.2.1.1c of ASHRAE 90.1. Regardless of which version of Appendix G is used, the modeling must demonstrate a Performance Cost Index that is ≤ 80% of the Performance Cost Index Target calculated using the following Building Performance Factors from 90.1-2019.

For energy cost savings use the BPFs from the Building Performance Factor (BPF) Energy Cost table and for source energy savings use the BPFs from the Building Performance Factor (BPF) Source Energy table:

Building Performance Factor (BPF) Energy Cost from ASHRAE 90.1-2019																
CZ	0A, 1A	0B, 1B	2A, B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
BPF, MF	0.68	0.70	0.66	0.69	0.68	0.59	0.74	0.76	0.74	0.70	0.73	0.75	0.68	0.71	0.68	0.72
Building Performance Factor (BPF) Source Energy from ASHRAE 90.1-2019																
CZ	0A, 1A	0B, 1B	2A, 2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
BPF, MF	0.68	0.71	0.66	0.70	0.69	0.60	0.72	0.76	0.74	0.68	0.73	0.75	0.66	0.70	0.66	0.70

Exhibit 4: Documentation Requirements

Prior to certification, the Rater must submit all documents listed to a Provider or MRO for DOE for review and approval. Where noted in these documents, Raters are also required to submit evidence (e.g., construction documents, modeling files) showing that program requirements have been met.

Party Responsible	Documents
Requirements Applicable to all Building	
Rater	ENERGY STAR Multifamily Workbook, including ZERH addenda
	DOE Efficient New Homes Multifamily National Rater Checklist Version 2[49]
	DOE Efficient New Homes Multifamily PV-Ready Checklist Version 2[49]
	DOE Efficient New Homes Multifamily EV-Ready Checklist Version 2[49]
	DOE Efficient New Homes Multifamily Version 2 Photo Documentation (final only)
Requirements Applicable to the ASHRAE Path Only	
ASHRAE Modeler	ASHRAE Standard 90.1 Performance-Based Compliance Form (Compliance Form)
	ESMFNC/DOE Efficient New Homes MF Companion Tool (Companion Tool)

Exhibit 5: Additional Dwelling Unit HVAC Efficiency Levels

For any equipment not listed, minimum efficiencies shall be based on 10**%** improvement over those listed in ASHRAE 90.1-2019. Use the values for "after 1/1/2023" where listed. For equipment types listed below that serve only common spaces, requirements may be found in the ESMFNC V1.2 National Program Requirements, Table 2. Use the values that apply to common spaces.

Equipment Type	Equipment Size	CZ: 1-2	3	4A, B	4C, 5, 6, 7, 8
Room A/C (window, through-wall)		Certified under ENERGY STAR Version 5.0 (or later) Requirements for Room Air Conditioners			
Air conditioners, air cooled (split system and single package)	< 65 kBtu/h	See Exhibit 2			
	≥ 65 and < 135 kBtu/h	16.3 IEER	15.7 IEER		14.6 IEER
	≥ 135 and < 240 kBtu/h	15.6 IEER	15.1 IEER		14.0 IEER
	≥ 240 and < 760 kBtu/h	14.5 IEER	14.1 IEER		13.0 IEER
Warm-air furnace (gas)		See Exhibit 2			
Gas heating component of a Packaged Terminal Air Conditioner (PTAC)		80% Et	82% Et, with infiltration rate of 0.25 cfm50/ft^2 of enclosure area, (average across all units)		
Packaged Terminal Air Conditioner cooling efficiency		12.7 EER	12.5 EER		11.9 EER
Packaged Terminal Heat Pump (PTHP) cooling efficiency*	< 7 kBtu/h	13.0 EER	12.5 EER		11.9 EER
	≥ 7 and ≤ 10 kBtu/h CZ 1-4 ≥ 7 and ≤ 15 kBtu/h CZ 4C-8	15.0 - (0.340 x Cap/1000) EER	14.7 - (0.320 x Cap/1000) EER		14.0 - (0.300 x Cap/1000) EER
	> 10 kBtu/h CZ 1-4 > 15 kBtu/h CZ 4C-8	11.6 EER	11.5 EER		9.5 EER
PTHP heating efficiency*	< 8 kBtu/h	3.3 COP			3.6 COP
	≥ 8 kBtu/h	3.7 - (0.052 x Cap/1000) COP			3.5 COP
Air cooled heat pump (split system and single package) cooling efficiency*	< 65 kBtu/h	See Exhibit 2			
	≥ 65 and < 135 kBtu/h	15.5 IEER	15.1 IEER		
	135 and < 240 kBtu/h	14.9 IEER	14.4 IEER		
Air cooled heat pump (split system and single package) heating efficiency*	< 65 kBtu/h	See Exhibit 2			
	≥ 65 and < 135 kBtu/h	3.5 COP			3.7 COP
	135 and < 240 kBtu/h	3.4 COP			3.6 COP
VRF air conditioners and heat pumps, cooling efficiency*		16.6 IEER	16.2 IEER		
VRF heat pumps, heating efficiency*		3.3 COP			3.5 COP
Water-loop heat pump (WLHP) cooling efficiency*	< 135 kBtu/h	15.0 EER			
WLHP heating efficiency*	< 135 kBtu/h	4.5 COP			
Boilers, hot water	< 300 kBtu/h	See Exhibit 2			
	≥ 300 kBtu/h	80% Et	86% Et (89% Et with WLHP)	95% Et (90% Et with WLHP)	

Cap means the rated capacity of the product in Btu/h

*For buildings where dwelling units are served by a heat pump water heater, space conditioning equipment that is marked with an asterisk in Exhibit 5 may instead meet the efficiency listed in ASHRAE 90.1-2019. Use the values for "after 1/1/2023" where listed.

Endnotes

[1] Buildings that do not contain dwelling or sleeping units are not eligible for certification under DOE Efficient New Homes. Hotels, motels, and assisted living or skilled nursing facilities that meet the definition of senior care facilities are also not eligible for certification under MFNC. Dormitories, residence halls, buildings with single-room occupancies, supportive housing, cohousing, and other senior housing not meeting the definition of senior care facilities are eligible for the DOE Efficient New Homes program. DOE adopts these parameters from the ENERGY STAR program, thus, building type eligibility for certification under DOE Efficient New Homes Multifamily Version 2 is the same as building type eligibility for certification under ENERGY STAR Multifamily New Construction Version 1.2 (California: ENERGY STAR Multifamily New Construction, California Version 1.4). Visit the ENERGY STAR website for more information.

[2] The term 'building' refers to a structure that encompasses dwelling/sleeping units and (if present) common spaces, sharing one or more of the following attributes: a common street address, a common entrance or exit, central/shared mechanical systems, or structurally interdependent wall or roof systems. Attached structures such as townhouses and 4-story two-unit structures (commonly referred to as "2-over-2s") may be considered separate buildings if they are divided by a vertical fire separation wall from the foundation to the roof sheathing and share none of the other attributes listed above. A skyway or a breezeway that connects to structures is not considered a common entrance or exit.

[3] A dwelling unit, as defined by ANSI/RESNET/ICC 301, is a single unit that provides complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

[4] A sleeping unit, as defined by ANSI/RESNET/ICC 301, is a room or space in which people sleep that can also include permanent provisions for living, eating, and either sanitation or kitchen facilities, but not both. Such rooms and spaces that are part of a dwelling unit are not considered sleeping units, but rather part of the dwelling unit.

[5] A dwelling, as defined by ANSI/RESNET/ICC 301, is any building that contains one or two dwelling units used, intended, or designed to be built, used, rented, leased, let, or hired out to be occupied, or that are occupied for living purposes.

[6] The term 'common space' refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration, or maintenance in support of the residents. For the ASHRAE path, the requirements for 'common spaces' apply to commercial or retail spaces where they are included in the energy model and savings contribute to achieving the Performance Target.

[7] The 'permit date' is the date on which the permit authorizing construction of the building was issued. In cases where multiple permits are issued for a project (e.g., footing permits, building permits), the 'permit date' is the date on which the permit authorizing construction of the building, including the building features affecting energy use (e.g., insulation levels, window U/SHGC specifications, mechanical equipment efficiency), was issued. Alternatively, the or the application date of the permit authorizing construction of the building or the date that the Rater first verifies a DOE Efficient New Homes program provision requiring an on-site inspection (e.g., inspection of slab insulation) is allowed to be used as the 'permit date'.

[8] A 'townhouse,' as defined by ANSI/RESNET/ICC 301, is a single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to the roof and has open space on at

least two sides. They must use the ERI path of the DOE Efficient New Homes Multifamily program, as they are not eligible to use the Prescriptive path or the ASHRAE 90.1 path. However, the ERI Target for townhouses must be determined using Exhibit 2 of the DOE Efficient New Homes Single Family Homes National Program Requirements Version 2. In addition, all program requirements shall be verified for each certified townhouse and sampling protocols shall not be used to verify DOE Efficient New Homes requirements in any townhouse.

[9] These requirements apply to all dwelling units and common spaces covered by the program, and garages (open or enclosed, shared or individual) in the building being certified, and where specified, parking lots. These requirements do not apply to commercial or retail spaces, except in the ASHRAE path, if included in the energy model and the savings contribute to achieving the Performance Target. These requirements do not apply to common spaces that are located in buildings on the property without any dwelling units. These requirements do not apply to parking garages or lots where the cost of the energy use of the parking garage or lot is not the responsibility of the builder/developer, building owner, or property manager.

Sampling of those requirements for ENERGY STAR Multifamily New Construction (ESMFNC) and Indoor AirPlus certification is allowed to the extent permitted by their respective program requirements and allowances for sampling. Sampling of these DOE Efficient New Homes requirements may be allowed if the Multifamily Review Organization (MRO) for DOE or Home Certification Organization (HCO) for DOE overseeing the project's certification has a sampling protocol approved by DOE as part of the MRO/HCO for DOE approval process. Apartments participating in sampling must be within the same building, be the same construction type, and include the same envelope systems.

[10] While certification will result in compliance with many code requirements, a Rater is not responsible for ensuring that all code requirements have been met prior to certification. In the event that a code requirement, a manufacturer's installation instructions, or an engineering document conflicts with a requirement of the DOE Efficient New Homes program, then the conflicting requirement within these program requirements shall not be met. Certification shall only be allowed if the Rater has determined that no equivalent option is available that could meet the conflicting requirement. Note that a dwelling unit must still meet its energy performance target. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.

[11] The Rater is defined as the person(s) completing the third-party verification required for certification.

[12] The Rater must review all items on the DOE Efficient New Homes Multifamily Version 2 National Rater Checklist for the whole building to verify that each inspection checklist item has been met within program-defined tolerances. If a Rater determines that a program requirement has not been met, the building cannot earn DOE Efficient New Homes certification until the item is corrected. If correction of the item is not possible, the building cannot earn certification and individual units in the multifamily building also cannot be certified. If an item on the National Rater Checklist cannot be inspected by the Rater, the building as well as individual dwelling units also cannot earn certification.

If a Rater is not able to determine whether a program requirement has been met, (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their Provider (e.g., rating company) or MRO for DOE. If the Provider or MRO for DOE also cannot make this determination, then the Rater, MRO for DOE, or Provider shall report the issue to DOE prior to building completion at EfficientNewHomes@doe.gov and will typically receive an initial response within 10 business days. If DOE believes the current program requirements are sufficiently clear to determine whether the item in question has been met, then this guidance will be provided to the partner and enforced beginning with the building in question. However, if DOE believes the program requirements need revisions to make the intent clear, then this guidance will be provided to the partner but only enforced for buildings permitted after a specified transition period following the release of the revised requirements, typically 60 days in length. This process will allow DOE to make formal

policy decisions as partner questions arise and to disseminate these policy decisions through the Policy Record and the periodic release of revised program documents to ensure consistent application of the program guidelines.

[13] A modular building is a prefabricated building that is made of multiple modules or sections that are manufactured and substantially assembled in a manufacturing plant. These pre-built sections are transported to the building site and constructed by a builder to meet all applicable building codes for site-built buildings.

[14] The software program shall automatically determine (i.e., without relying on a user-configured DOE Efficient New Homes Multifamily Target Dwelling Design) the ERI target for each rated unit by following the DOE Efficient New Homes Multifamily National Program, Version 2 ERI Target Procedure. DOE will review an HCO for DOE's software tool(s) prior to the software being approved for use for certifications.

[15] Generally, buildings must be submitted for certification after verification on all units and common spaces is complete. Alternatively, at the discretion of the Provider, individual dwelling units that are part of ERI path projects may be conditionally certified prior to the building completion if the following process is observed:

i. The Provider must generate a Conditional DOE Efficient New Homes Certification Disclosure letter to be included with the label and certificate for the homebuyer of each conditionally certified unit.
ii. Once verification on all dwelling units and common spaces is complete and the whole building is certified, the Provider must generate a DOE Efficient New Homes Certification Confirmation letter, for the building to deliver to the applicable homebuyers.

If any dwelling unit or common space in the building is ultimately unable to be verified, the building will not be able to earn certification, the Provider must decertify any conditionally certified units, and the builder must notify the applicable homebuyers.

[16] "Applicability" refers to the space types covered by the provision, including the systems located within the listed spaces as well as the systems serving those spaces. The term 'dwelling unit' in Exhibits 1 and 2 includes both sleeping and dwelling units, unless otherwise noted.

[17] Two tracks are provided for satisfying the DOE Efficient New Homes Multifamily National Version 2 Rater Checklist item for HVAC Systems. Track A – HVAC Grading by Rater allows a Rater to utilize ANSI/RESNET/ACCA 310 for grading the installation of residential HVAC systems serving individual spaces and a Functional Testing (FT) Agent to verify commercial and central systems and systems serving common spaces. Track B – HVAC Testing by FT Agent uses an FT agent to assessing all HVAC systems. Either track may be selected, but all requirements within that track must be satisfied for the building to be certified. See the ZERH MF V2 Rater Checklist for specific requirements for both tracks.

[18] DOE Efficient New Homes Multifamily Version 2 requires certification under ESMFNC V1.2 or 1.3, including in states where ESMFNC V1.1 (or an earlier version) is effective. In states where the ENERGY STAR Residential New Construction program requires additional measures or efficiency levels beyond ESMFNC V1.2, these measures are also mandatory for compliance with the DOE Efficient New Homes Multifamily Version 2 National Program.

[19] ERI and ASHRAE path projects may use a whole-building 2021 IECC UA calculation or whole-building 2024 IECC TC calculation to demonstrate compliance with the mandatory envelope insulation requirements. When using the 2021 UA approach, the total building envelope UA must be less than or equal to the sum of UA values that result from multiplying the U factors specified in Table 3.1a below (for the 2021 IECC) by the same exterior assembly areas as the building being certified. When using the 2024 TC approach, the total building envelope TC

must be less than or equal to the total TC resulting from using the assembly factors specified in Table 3.1a below for the 2024 IECC and Equation 4-1 in the Residential chapter of that code.

ERI path projects may also meet the thermal backstop on a unit-by-unit basis but must document common space compliance using the Multifamily Workbook.

Table 3.1a: Mandatory Envelope Insulation Requirements for ERI and ASHRAE Path Projects

Space Type	Opaque assemblies (including opaque doors and opaque spandrel panels)	Windows and glazed doors (except Class AW)	Class AW windows and glazed doors	Skylights
Mandatory Building Envelope Requirements, 2021 IECC UA Option (Table references found in the 2021 IECC)				
Dwelling Units	Table R402.1.2 [a] or Table C402.1.4 (Group R) [b]	Table R402.1.2	Table C402.4	Table C402.4
Common Spaces	Table R402.1.2 [a] or Table C402.1.4 (All Other) [c]		**ERI path:** DOE Efficient New Homes Reference Design (Exhibit 2) **ASHRAE path:** Table C402.4	
Mandatory Building Envelope Requirements, 2024 TC Option (Table references found in the 2024 IECC)				
Dwelling Units	Table R402.1.2 or Table C402.1.2 (Group R) [b]	Table R402.1.2	Table C402.5	Table C402.5
Common Spaces	Table R402.1.2 or Table C402.1.2 (All Other) [c]		**ERI path:** DOE Efficient New Homes Reference Design (Exhibit 2) **ASHRAE path:** Table C402.5	

[a] For steel-frame ceilings, walls, and floors, use 2021 IECC Table R402.2.6.
[b] The same chapter must be used for all opaque dwelling unit envelope components.
[c] The same chapter must be used for all opaque common space envelope components.

[20] Compliance notes and alternatives:

a. The calculations shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.
b. Where documenting UA within the workbook, F-factors and slab perimeter lengths will be used in place of U-factors and areas.
c. The 2021 UA or 2024 TC calculation (and energy model) for the dwelling unit must accurately reflect all envelope details assessed in Items 3.1 through 3.6 of the ESMFNC National Rater Field Checklist.
d. If no NFRC rating is noted on a window or in its product literature (e.g., for site-built fenestration), select the U factor from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest U-factor among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating).
e. In jurisdictions designated by a code official as having Very Heavy Termite Infestation, the slab edge insulation value and depth shall be adjusted in the target UA or TC calculation for all paths. The slab insulation level and depth used in the UA or TC limit calculation and the energy model shall be set to the insulation level and depth found in the Rated Dwelling Unit. However, these projects are still required to achieve the DOE Efficient New Homes Target ERI, which assumes the use of slab edge insulation per Exhibit 2.

[21] Prescriptive path projects may meet these requirements in one of two ways. The calculations below are integrated into the ENEGY STAR Multifamily Workbook with DOE Efficient New Homes addenda, which must be used to demonstrate compliance with this requirement for Prescriptive path projects.

(1) Meet the requirements for all individual building envelope components using the U or R method:

- When using the 2021 IECC for common spaces, equivalent R values to the U factors provided for dwelling units in Exhibit 2 may be taken from the 2021 IECC, Table R402.1.3. When using R values to demonstrate compliance for steel-frame assemblies, the steel-frame equivalent R-value from Table 402.2.6 must be used.
- *Note: When individual U factors are used, each component must have a U-factor* ***less than or equal to*** *what is prescribed by the table below. When individual R values are used, each component must have an R-value* ***greater than or equal to*** *what is prescribed by the references in the above bullets.*

(2) Meet the requirements by using the whole building UA or TC. When using the UA or TC method, the as-built UA shall be less than or equal to the target UA or TC. When using the 2021 UA approach, the total building envelope UA must be less than or equal to the sum of UA values that result from multiplying the U factors specified in the table below for the 2021 IECC by the same exterior assembly areas as the building being certified. When using the 2024 TC approach, the total building envelope TC must be less than or equal to the total TC resulting from using the assembly factors specified below for the 2024 IECC and Equation 4-1 in the Residential chapter of that code.

Table 3.1b: Mandatory Envelope Insulation Requirements for Prescriptive path projects

Space Type	Opaque assemblies (including opaque doors and opaque spandrel panels)	Windows and glazed doors (except Class AW)	Class AW windows and glazed doors	Skylights
Mandatory Building Envelope Requirements, 2021 IECC UA Option (Table references found in the 2021 IECC)				
Dwelling Units	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	Table C402.4
Common Spaces	Table R402.1.2 [a] or Table C402.1.4 (All Other) [c]	ENERGY STAR MFNC 1.2 Reference Design		
Mandatory Building Envelope Requirements, 2024 TC Option (Table references found in the 2024 IECC)				
Dwelling Units	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	Table C402.5
Common Spaces	Table R402.1.2 or Table C402.1.2 (All Other) [c]	ENERGY STAR MFNC 1.2 Reference Design		

[a] For steel-frame ceilings, walls, and floors, use 2021 IECC Table R402.2.6.
[b] The same chapter must be used for all opaque dwelling unit envelope components.
[c] The same chapter must be used for all opaque common space envelope components.

[22] Exceptions:
a. Fenestration used as part of a passive solar design is exempt from the SHGC requirements and may be excluded from area-weighted average. fenestration must be facing within 45 degrees of true south and directly coupled to thermal storage mass that has a heat capacity > 20 btu / ft^3x°F and provided in a ratio

of at least 3 sq. ft. per sq. ft. of south facing windows. Generally, thermal mass materials will be at least 2 in. thick.

b. In Phius or PHI certified homes, where triple-glazed window assemblies with thermal breaks/spacers between the panes are used, such windows meet the intent of Item 3.2 and may be excluded from the area-weighted average SHGC.
c. Structural dwelling unit windows and doors that are classified as “Class AW” under the North American Fenestration Standard may use the following SHGC values:

Climate Zone	1-3	4A, 4B	4C, 5-8
Class AW SHGC	≤ 0.25	≤ 0.40	Any

[23] If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating). Alternatively, where the U-factor is determined in accordance with NFRC 100 by a laboratory accredited by a nationally recognized accreditation organization, such as the NFRC, documentation provided by the laboratory or manufacturer listing the assembly U-factor and SHGC can be used in lieu of NFRC labels.

[24] Exceptions and alternative compliance paths to this requirement are:

a. Up to 10 ft. of total duct length is permitted to be outside of the thermal and air barrier boundary. Jump ducts are not included as part of this duct length and are covered by exception (d).
b. Ducts (but not air handlers) may be located in a vented attic if minimum R-8 duct insulation is used, duct leakage to outdoors is measured ≤ 3 CFM25 per 100ft2 of conditioned floor area, and:
    i. In Moist (A) climate zones (per 2021 IECC Table R301.1), an additional 1.5 in. (min.) of closed-cell spray foam encapsulates the ducts and ductwork is buried under 2 in. (min.) of blown-in insulation; OR
    ii. In Dry (B) and Marine (C) climate zones (per 2021 IECC Table R301.1, ductwork is buried under at least 3.5 in. of blown-in insulation.
c. Ducts which meet the criteria for “Ducts Located in Conditioned Space” as defined by the 2021 IECC Section R403.3.2.
d. Jump ducts which do not directly deliver conditioned air from the heating/cooling equipment may be located in attics if all joints, including boot-to-drywall, are air sealed and the jump duct is fully buried under the attic insulation.
e. Ducts and air-handling equipment associated with dedicated outdoor air systems (DOAS), which may also provide supplemental heating and cooling, are permitted to be outside of the building’s thermal and air barrier boundary.

This requirement does not apply to equipment or ductwork that only provides ventilation, including make-up air systems. This requirement does not apply to air handling equipment or ductwork serving multiple dwelling units. This requirement does not apply to through-wall systems (i.e., packaged terminal heat pumps (PTHPs), packaged terminal air conditioners (PTACs), and vertical terminal air conditioners (VTACs)).

[25] WaterSense labelling of products may be verified in one of two ways:

a. A cut sheet for the installed product indicates that it is WaterSense labeled and field verification shows that the installed product is the one described on the cut sheet.
b. The installed product can be found in the most recent WaterSense Product Search tool (https://lookforwatersense.epa.gov/products/) and field verification shows that the installed product matches the product described in the search tool.

[26] To minimize water wasted while waiting for hot water and water heating energy, the hot water distribution system shall store no more than 1.8 gallons (6.8 liters) of water in any piping/manifold between the hot water source (e.g., central or in-unit hot water tank, central or in-unit recirculation loop) and any in-unit hot water fixture. This provision applies to in-unit plumbing systems and central hot water distribution systems. In-unit system options include manifold-fed systems; structured plumbing systems; core plumbing layouts, and recirculation systems. This provision does not apply to fixtures in dwelling unit bathrooms without a shower or bathtub.

To verify that the distribution system stores no more than 1.8 gallons (6.8 liters), raters shall either use the Calculation method ***or*** the Field Verification method. In the Calculation method, the rater shall calculate the stored volume between the hot water source and the furthest fixture from the source using the piping or tubing inside diameter and the length of the piping/tubing. In the case of recirculation systems (either within the dwelling or central systems), the 1.8 gallon (6.8 liter) storage limit shall be measured from the point where the branch feeding the furthest fixture branches off the recirculation loop, to the fixture itself. An Excel-based tool is available on the DOE Efficient New Homes website for this calculation.

Using the Field Verification method, no more than 2 gallons (7.6 liters) of water shall be collected from the hot water fixture before hot water is delivered. This accounts for any water stored in the fixture in addition to the 1.8-gallon limit on pipe storage. Only the fixture with the greatest stored volume between the fixture and the hot water source (or recirculation loop) needs to be tested. To field-verify that the system meets the 2-gallon (7.6 liter) limit, raters shall first initiate operation of recirculation systems, if present, and let such systems run for at least 40 seconds. Next, a bucket or flow measuring bag (pre-marked for 2 gallons) shall be placed under the hot water fixture. The hot water shall be turned on completely and a digital temperature sensor used to record the initial temperature of the water flow. Once the water reaches the pre-marked line at 2 gallons, the water shall be turned off and the ending temperature of the water flow (not the collection bucket) shall be recorded. The temperature of the water flow must increase by ≥ 10 °F in comparison to the final to the initial temperature reading.

[27] In-unit hot water recirculation systems meet the following requirements:

a. Must be based on an occupant-controlled switch or an occupancy sensor. A sensor or switch must be installed for each fixture or set of fixtures within a room (e.g., a bathroom with multiple fixtures) in the dwelling unit located beyond a 1.8 gallon stored-volume range from the water heater or central recirculation loop.
b. In-unit recirculation systems which operate based on “adaptive” scheduling, meaning that they “learn” the hot water demand profile in the dwelling unit and adapt their operation to anticipate this profile, are permitted at this time, and do not require the use of occupant-controlled switches or occupancy sensors.
c. In-unit recirculation systems that are activated based **solely** on a timer and/or temperature sensor are not eligible.

These provisions do not apply to recirculating central hot water distribution systems.

[28] For recirculating central hot water distribution systems, the following pipe insulation thickness levels or R-values must be met or exceeded. Additionally, pipe insulation shall cover the entire length of the recirculation loop to the extent possible. If piping is routed in building cavities that prevent the noted thickness or R-value from being used due to space constraints, then the maximum thickness of insulation possible within the space shall be used.

Nominal Pipe or Tube Size (inches)	Insulation Thickness (inches)
< 1.5	1.5 (or R10 minimum)
≥ 1.5	2.0 (or R12 minimum)

[29] ENERGY STAR product certification must be verified with a visual confirmation that installed product is listed in the online ENERGY STAR product registry.

[30] Due to industry supply chain challenges, DOE is temporarily allowing the use of non-ENERGY STAR certified refrigerators for projects using the ERI and ASHRAE compliance paths. Any project utilizing this temporary alternative must account for the non-ENERGY STAR certified refrigerator in the energy model and still achieve the required performance threshold. DOE advises partners that this alternative may be rescinded in a future program update.

[31] Products in categories which are not covered by ENERGY STAR product criteria are exempt.

[32] Up to 5% of lighting, for task or decorative lighting, may be exempt from this provision. The Target Dwelling specification for lighting will remain at 100% regardless of whether this exemption is used. Projects following the prescriptive path may not use this 5% exemption.

[33] This requirement does not apply to lighting inside appliances (e.g., refrigerator, laundry, microwave, cooking equipment).

[34] This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms or to exhaust ventilation systems serving more than one dwelling unit.

[35] Buildings permitted on or before 12/31/2026 must certify under either Indoor airPLUS (IAP) Version 1 (Rev 4), or the IAP Version 2 Certified or Gold tier. Buildings permitted on or after 1/1/2027 must certify under the IAP Version 2 Certified or Gold tier. See the Indoor airPLUS program site for information on Version 2 requirements: https://www.epa.gov/indoorairplus/indoor-airplus-version-2.

[36] An in-unit HRV or ERV is required to provide whole-dwelling mechanical ventilation for dwelling units in Climate Zones 6 – 8 and must meet or exceed the following specifications: ≥ 65% SRE (@ 32 °F) and ≥ 1.2 CFM/Watt (at one or more rating points). Alternatively, projects may utilize centralized H/ERVs serving multiple dwelling units with any efficacy and recovery efficiency.

[37] Advisory: DOE encourages, but does not require, that partners use equipment listed in the Home Ventilating Institute (HVI) Certified Products Directory (CPD) to comply with this requirement. The listing may be used to demonstrate compliance with this program requirement.

[38] Each dwelling unit with an in-unit fossil fuel water heater must have:

a. An individual branch circuit outlet that is installed and energized and terminates within 3 feet of each installed fossil fuel water heater. The individual branch circuit shall have a rating not less than 240V/30A or 120V/20A.
b. A volume of open space located within the dwelling unit that is at least 3’ x 3’ wide and 7’ high available surrounding or within 3 feet of the installed fossil fuel water heater, to facilitate future heat pump water heater installation. The 3’ x 3’ x 7’ volume may contain the existing water heater. The 3’ x 3’ x 7’ space does not need to be provided if the installed water heater is a tankless water heater system.

Dwelling units utilizing an electric water heater are exempt from these requirements.

[39] Drain is no more than two inches higher than the base of the installed water heater and allows draining without pump assistance. Drain is not required to be reserved exclusively for use with a future heat pump water heater. Drain does not need to be provided if the installed water heater is a tankless water heater or an electric system with a nominal tank volume less than 50 gallons.

[40] If a branch circuit outlet is installed, it shall be in compliance with 2021 IRC Section E3702.11 based on heat pump space heating equipment sized in accordance with 2021 IECC R403.7 and shall terminate within three feet

of each fossil fuel space heater. Alternatively, code-compliant wiring conduit to facilitate future wiring for a heat pump installation may be installed and shall terminate within three feet of each fossil fuel space heater.

Dwelling units utilizing in-unit electric heating systems as the primary heating for the dwelling unit are exempt from this requirement.

[41] While the corresponding ERI Target Procedure specifies air conditioners and heat pumps using SEER and HSPF, in this document they have been converted to the current rating metrics, SEER2 and HSPF2.

[42] The Target Dwelling's duct leakage shall be configured as the maximum allowable total duct leakage to achieve Grade I, per Standard 310, section 5.4.1, Table 2a (shown below):

Time of Test	Number of Returns	Leakage Limit (CFM at 25 Pa)
Rough-In	< 3	The greater of ≤ 4 per 100 ft^2 of CFA or ≤ 40
Rough-In	≥ 3	The greater of ≤ 6 per 100 ft^2 of CFA or ≤ 60
Final	< 3	The greater of ≤ 8 per 100 ft^2 of CFA or ≤ 80
Final	≥ 3	The greater of ≤ 12 per 100 ft^2 of CFA or ≤ 120

[43] Prescriptive path projects using in-unit H/ERVs in Climate Zones 1-4B may utilize an H/ERV with an SRE ≥ 65% (@ 32 °F) and CFM/Watt ≥ 1.2 (at one or more rating points) in lieu of meeting the 2.9 CFM/W requirement in the Target Dwelling Design. Prescriptive path projects in *all* climate zones may also use centralized H/ERVs serving multiple dwelling units with any efficacy and recovery efficiency.

[44] Field verification of infiltration levels must be done on a unit-by-unit basis. Infiltration requirements may not be verified with whole-building testing or with an average of results across all units.

[45] For all floor assemblies other than mass floors, prescriptive path projects must use the U-factor requirements listed in this row.

[46] DOE Efficient New Homes has adopted the following definitions for door types (from the ENERGY STAR eligibility criteria in the Version 6.0 Product Specification for Residential Windows, Doors, and Skylights):

Door or Sidelite Type	Glazing Area (per NFRC 100)	Notes
Opaque	None	
≤ ½-Lite Door	≤ 900 in^2 (6.25 ft^2, 0.581 m^2)	Includes ¼- and ½-lite Doors and Sidelites
≤ ½-Lite Sidelite	≤ 281 in^2 (1.95 ft^2, 0.181m^2)	
> ½-Lite Door	> 900 in^2 (6.25 ft^2, 0.581 m^2)	Includes ¾-lite and fully glazed Doors and Sidelites.
> ½-Lite Sidelite	> 281 in^2 (1.95 ft^2, 0.181m^2)	

[47] The solar water heating system's Solar Fraction (SF) must be documented by an OG-300 certification. Alternatively, projects may find an equivalent system in the OG-300 directory which contains the same OG-100 elements as the chosen system and meets or exceeds the minimum required solar fraction. In this situation, documentation of the OG-100 elements and the comparable OG-300 system must be provided. All systems must be made up of OG-100 tested components.

When a solar water heating system meeting these specifications is used in a Prescriptive path project, gas and electric water heaters used for backup are exempt from the Uniform Energy Factor requirements of 0.95 and 1.95, respectively.

The Solar Fractions listed in Exhibit 2 are for Prescriptive path projects only and are not included in the ERI Target Dwelling.

[48] While the Target Dwelling Design for ERI path projects must be configured with uninsulated ducts in conditioned space, Prescriptive path projects are permitted, but not required, to insulate ducts in conditioned space.

[49] When submitting the DOE Efficient New Homes Checklists as part of a proposed design submittal (i.e., prior to construction), the Rater may indicate that checklist items have been completed if they have verified the intent to complete via a review of construction documents. The Rater shall provide a written explanation for all items that have been verified in this way.

DOE Efficient New Homes Multifamily National Rater Checklist Version 2 (Rev. 2)

The program requirements in this checklist must be verified based on as-built conditions unless noted otherwise. Project teams are strongly encouraged to use this checklist during the project design phase as well. Raters are reminded that these checklist items must be completed in addition to the items required by ENERGY STAR Multifamily New Construction Version 1.2 or 1.3 and Indoor AirPlus. Overlapping requirements are not repeated in this checklist.[1] For items that do not apply based on selected compliance path (ERI, ASHRAE, or Prescriptive) the Rater may enter "N/A." This checklist must be completed for each certified dwelling unit.

DOE Efficient New Homes – Multifamily National Rater Checklist Version 2 (Rev. 2)						
Dwelling Unit Address:			Must Correct	Rater [2] Verified	Verified by Builder or Licensed Professional [3]	Exception or Alternate Used [4] (enter endnote #)
City:	State:	Permit Date[5]:				
1. Partnership Status						
1.1 Rater has verified that builder is a registered DOE Efficient New Homes Builder Partner and identified the builder's Partner ID.[6]			☐	☐		
1.2 Rater has verified and documented that their company has a DOE Efficient New Homes partnership agreement using the Partner Locator.[7]			☐	☐		
1.3 Rater(s) signing checklists attest that they have completed DOE-recognized training (according to the timeline posted on the program website) and are credentialed by a Home Certification Organization for DOE Efficient New Homes (HCO for DOE) or meet the credential requirements of a Multifamily Review Organization for DOE Efficient New Homes (MRO for DOE).			☐	☐		
2. ENERGY STAR Baseline						
2.1 Unit is certified under ENERGY STAR Multifamily New Construction National Program Version 1.2 or 1.3.[8]			☐	☐		
3. Building Envelope						
3.1a ERI and ASHRAE paths: ceiling, wall, floor, and slab insulation for the building meets specified efficiency levels from the 2021 IECC or 2024. [9, 10]			☐	☐		
3.1b Prescriptive path: ceiling, wall, floor, and slab insulation for the building meets or exceeds specified DOE Efficient New Homes Multifamily Version 2 Target Dwelling Design insulation levels in dwelling units, and specified efficiency levels from the 2021 or 2024 IECC in common spaces.[10, 11]			☐	☐		
3.2 Windows, skylights, and doors in dwelling units that are ≥ 50% glazed achieve an area-weighted average SHGC less than or equal to 0.23 (Climate Zone 1-2), 0.25 (Climate Zone 3), or 0.40 (Climate Zone 4A, 4B).[12, 13]			☐	☐		
4. Duct System						
4.1 All in-unit heating and cooling system distribution ducts and in-unit heating and cooling system air-handling equipment are located within the thermal and air barrier boundary.[14]			☐	☐		
5. Hot Water Efficiency						
5.1 WaterSense labeled fixtures for dwelling unit showerheads and bathroom sink faucets and/or faucet accessories.[15]			☐	☐		

5.2 Hot water delivery systems meet stored volume criteria (using Calculation or Field Verification method).[16]		☐	☐		
5.3 In-dwelling unit recirculation systems use on-demand controls.[17]		☐	☐		
5.4 Recirculating central hot water distribution systems meet pipe insulation thickness criteria.[18]		☐	☐	☐	
6. Lighting & Appliances[19]					
6.1 All builder-supplied and builder-installed in-dwelling refrigerators,[20] dishwashers, clothes washers, and clothes dryers are ENERGY STAR certified.[21]		☐	☐		
6.2 100% of in-dwelling, builder-installed lighting fixtures and lamps are LEDs.[22, 23]		☐	☐		
6.3 All installed bathroom ventilation fans in dwelling units are ENERGY STAR certified.[24]		☐	☐		
7. Indoor Air Quality					
7.1 Certified under EPA Indoor AirPlus (Version 1 or Version 2 (Certified or Gold), determined by permit date).[25]		☐	☐		
7.2 Either in-unit or centralized energy efficient balanced ventilation (HRV or ERV) is provided for dwelling units in Climate Zones 6, 7 and 8.[26,27]		☐	☐		
8. Renewable Ready					
8.1 Provisions of the DOE Efficient New Homes Multifamily PV-Ready Checklist Version 2 (Rev. 1) are completed.		☐	☐		
9. Electric Vehicle Ready					
9.1 Provisions of the DOE Efficient New Homes Multifamily EV-Ready Checklist Version 2 (Rev. 1) are completed.		☐	☐		
10. Heat Pump Water Heater Ready					
10.1 Dwelling units with in-unit water heaters meet minimum electric and space requirements.[28]		☐	☐	☐	
10.2 Dwelling units with in-unit water heaters have a condensate drain installed within three feet of existing water heater.[29]		☐	☐		
11. Heat Pump Space Heating Ready					
11.1 For units with in-unit combustion space heaters, individual branch circuit outlet is installed, or conduit is installed to facilitate future wiring for a heat pump installation. Circuit or conduit labeled as “For future heat pump.” [30]		☐	☐	☐	
12. HVAC System[31]					
Track A	12a.1 For Prescriptive path projects: blower fan volumetric airflow is Grade I per ANSI/RESNET/ACCA 310.	☐	☐		
	12a.2 For Prescriptive path projects: blower fan watt draw is Grade I per ANSI/RESNET/ACCA 310.	☐	☐		
Track B	12b.1 For Prescriptive path projects [32]: Install a heat pump water heater ***OR*** Achieve dwelling unit infiltration ≤ 0.20 CFM50/sf [33]	☐	☐		

12.3 For Prescriptive path projects: HVAC system meets or exceeds efficiency levels based on climate zone and system type as defined by Exhibit 2 of the DOE Efficient New Homes Multifamily Version 2 National Program Requirements.	☐	☐		
13. Energy Efficiency Threshold				
13.1 ERI Path: Dwelling unit's ERI value ≤ DOE Efficient New Homes Target Dwelling ERI.	☐	☐		
13.2 ASHRAE Path: Whole building model complies and meets DOE Efficient New Homes savings target.	☐	☐		
13.3 Prescriptive Path: Efficiency features described in the DOE Efficient New Homes Multifamily Version 2 Target Dwelling Design (Exhibit 2 of the National Program Requirements) are present in the Rated Unit as applicable.	☐	☐		
14. Photo Documentation				
14.1 For ASHRAE and Prescriptive path projects, photo documentation is collected that complies with the DOE Efficient New Homes Photo Documentation Guidance. For ERI path projects, photo documentation is collected that complies with the Rater's HCO for DOE's documentation requirements.	☐	☐		

Verification Signoffs		
Rater Name: _____ Rater Company Name: _____	Rater Pre-Drywall Inspection[34] Date(s): _____	Rater Initials: _____
Rater Name: _____ Rater Company Name: _____	Rater Final Inspection[35] Date(s): _____	Rater Initials: _____
Builder/Developer Employee: _____ Builder/Developer Name: _____	Builder Inspection Date(s): _____	Builder Initials: _____
Licensed Professional: _____	LP Inspection Date(s): _____	LP Initials: _____

Endnotes:

The following endnotes are intended to relate the same exemptions and clarifications as noted in the DOE Efficient New Homes Multifamily Version 2 National Program Requirements. However, if there are any inconsistencies, the endnotes in the National Program Requirements shall take precedence.

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[1] This Checklist applies to all dwelling units, sleeping units, common spaces, and garages (open or enclosed, shared or individual) in the building being certified, and where specified, parking lots. These requirements apply to all compliance Paths, unless otherwise specified. These requirements do not apply to parking garages or lots where the cost of the energy use of the parking garage or lot is not the responsibility of the Builder/Developer, Building Owner or Property Manager. This Checklist does not apply to commercial or retail spaces, except in the ASHRAE path, if included in the energy model and the savings contribute to achieving the Performance Target. This Checklist does not apply to common spaces that are located in buildings on the property without any dwelling or sleeping units. A 'sleeping unit' as defined by ANSI / RESNET / ICC 301, is a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Where the term 'dwelling unit' is used in this Checklist, the requirement is also required of 'sleeping' units. The term 'building' refers to a structure that encompasses dwelling/sleeping units and (if present) common spaces, sharing one or more of the following attributes: a common street address, a common entrance or exit, central/shared mechanical systems, or structurally interdependent wall or roof systems. Attached structures such as townhouses and 4-story two-unit structures (commonly referred to as "2-over-2s") may be considered separate buildings if they are divided by a vertical fire separation wall from the foundation to the roof sheathing and share none of the other attributes listed above. A skyway or a breezeway that connects two structures is not considered a common entrance or exit. DOE adopts these parameters from the ENERGY STAR program, thus, building type eligibility for certification under DOE Efficient New Homes Multifamily Version 2 is the same as building type eligibility for certification under ENERGY STAR Multifamily New Construction Version 1.2.

[2] The Rater is defined as the person(s) completing the third-party verification required for certification. Raters must comply with the following:

- Raters are required to complete all training modules applicable to the DOE Efficient New Homes Multifamily Version 2 program specifications (according to the timeline posted on the program website) prior to completing a project's first inspection. Please note that required training modules are subject to change and Raters will have an allocated time period to complete additional or updated training modules as they become available. If a Rater does not successfully complete these modules before the end of the allocated time period, they may not certify DOE Efficient New Homes projects until the modules are complete.
- Raters must be (a) a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or (b) credentialed by a Home Certification Organization for DOE Efficient New Homes (HCO for DOE), or (c) meet the credential requirements of a Multifamily Review Organization for DOE Efficient New Homes (MRO for DOE). Learn more and find a current list of HCOs and MROs for DOE here.

As stated in the National Program Requirements, Raters who operate under an MRO or HCO for DOE with a Sampling Protocol are permitted to verify any Checklist Item designated "Rater Verified" using an MRO or HCO for DOE-approved sampling protocol. No parties other than Raters are permitted to use sampling to complete this Checklist. Apartments participating in sampling must be within the same building, be the same construction type, and include the same envelope systems.

[3] At the discretion of the Rater, a licensed professional (LP) may verify those line items in this Checklist where a checkbox is in the "Licensed Professional" column. A Licensed Professional must be a Professional Engineer, Registered Architect, or other industry professional (e.g., electrician) in good standing and possess a current license. When exercised, the LP's responsibility will be formally acknowledged by the LP signing off on the

checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.

[4] If an exception for a program requirement or an alternate compliance method is used, enter the number of the corresponding endnote from this document that lists the exception or alternate.

[5] The 'permit date' is the date on which the permit authorizing construction of the building was issued. In cases where multiple permits are issued for a project (e.g., footing permits, building permits), the 'permit date' is the date on which the permit authorizing construction of the building, including the building features affecting energy use (e.g., insulation levels, window U/SHGC specifications, mechanical equipment efficiency), was issued. Alternatively, the application date of the permit authorizing construction of the building or the date that the Rater first verifies a DOE Efficient New Homes program provision requiring an on-site inspection (e.g., inspection of slab insulation) is allowed to be used as the 'permit date'.

[6] The DOE Efficient New Homes Partner ID number for the builder may be obtained from the builder or found on the Partner Locator tool on the DOE Efficient New Homes program website.

[7] Raters are only required to document the partnership status of their company once, for the first home that the Rater certifies for them.

[8] DOE Efficient New Homes Multifamily Version 2 requires certification under ESMFNC V1.2 or 1.3, including in states where ESMFNC V1.1 (or an earlier version) is effective. In states where the ENERGY STAR Residential New Construction program requires additional measures or efficiency levels beyond ESMFNC V1.2, these measures are also mandatory for compliance with the DOE Efficient New Homes Multifamily Version 2 National Program.

[9] ERI and ASHRAE path projects may use a whole-building 2021 IECC UA calculation or whole-building 2024 IECC TC calculation to demonstrate compliance with the mandatory envelope insulation requirements. When using the 2021 UA approach, the total building envelope UA must be less than or equal to the sum of UA values that result from multiplying the U factors specified in Table 3.1a below (for the 2021 IECC) by the same exterior assembly areas as the building being certified. When using the 2024 TC approach, the total building envelope TC must be less than or equal to the total TC resulting from using the assembly factors specified in Table 3.1a below for the 2024 IECC and Equation 4-1 in the Residential chapter of that code.

ERI path projects may also meet the thermal backstop on a unit-by-unit basis but must document common space compliance using the Multifamily Workbook.

Table 3.1a: Mandatory Envelope Insulation Requirements for ERI and ASHRAE Path Projects

<table>
<tr><th>Space Type</th><th>Opaque assemblies (including opaque doors and opaque spandrel panels)</th><th>Windows and glazed doors (except Class AW)</th><th>Class AW windows and glazed doors</th><th>Skylights</th></tr>
<tr><td colspan="5">Mandatory Building Envelope Requirements, 2021 IECC UA Option (Table references found in the 2021 IECC)</td></tr>
<tr><td>Dwelling Units</td><td>Table R402.1.2 [a] or Table C402.1.4 (Group R) [b]</td><td rowspan="2">Table R402.1.2</td><td>Table C402.4</td><td rowspan="2">Table C402.4</td></tr>
<tr><td>Common Spaces</td><td>Table R402.1.2 [a] or Table C402.1.4 (All Other) [c]</td><td>ERI path: DOE Efficient New Homes Reference Design (Exhibit 2)
ASHRAE path: Table C402.4</td></tr>
<tr><td colspan="5">Mandatory Building Envelope Requirements, 2024 TC Option (Table references found in the 2024 IECC)</td></tr>
</table>

Dwelling Units	Table R402.1.2 or Table C402.1.2 (Group R) [b]	Table R402.1.2	Table C402.5	Table C402.5
Common Spaces	Table R402.1.2 or Table C402.1.2 (All Other) [c]		**ERI path:** DOE Efficient New Homes Reference Design (Exhibit 2) **ASHRAE path:** Table C402.5	

[a] For steel-frame ceilings, walls, and floors, use 2021 IECC Table R402.2.6.
[b] The same chapter must be used for all opaque dwelling unit envelope components.
[c] The same chapter must be used for all opaque common space envelope components.

[10] Compliance notes and alternatives:

a. The calculations shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.
b. Where documenting UA within the workbook, F-factors and slab perimeter lengths will be used in place of U-factors and areas.
c. The 2021 UA or 2024 TC calculation (and energy model) for the dwelling unit must accurately reflect all envelope details assessed in Items 3.1 through 3.6 of the ESMFNC National Rater Field Checklist.
d. If no NFRC rating is noted on a window or in its product literature (e.g., for site-built fenestration), select the U factor from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest U-factor among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating).
e. In jurisdictions designated by a code official as having Very Heavy Termite Infestation, the slab edge insulation value and depth shall be adjusted in the target UA or TC calculation for all paths. The slab insulation level and depth used in the UA or TC limit calculation and the energy model shall be set to the insulation level and depth found in the Rated Dwelling Unit. However, these projects are still required to achieve the DOE Efficient New Homes Target ERI, which assumes the use of slab edge insulation per Exhibit 2.

[11] Prescriptive path projects may meet these requirements in one of two ways. The calculations below are integrated into the ENEGY STAR Multifamily Workbook with DOE Efficient New Homes addenda, which must be used to demonstrate compliance with this requirement for Prescriptive path projects.

(1) Meet the requirements for all individual building envelope components using the U or R method:

- When using the 2021 IECC for common spaces, equivalent R values to the U factors provided for dwelling units in Exhibit 2 may be taken from the 2021 IECC, Table R402.1.3. When using R values to demonstrate compliance for steel-frame assemblies, the steel-frame equivalent R-value from Table 402.2.6 must be used.
- *Note: When individual U factors are used, each component must have a U-factor* ***less than or equal to*** *what is prescribed by the table below. When individual R values are used, each component must have an R-value* ***greater than or equal to*** *what is prescribed by the references in the above bullets.*

(2) Meet the requirements by using the whole building UA or TC. When using the UA or TC method, the as-built UA shall be less than or equal to the target UA or TC. When using the 2021 UA approach, the total building envelope UA must be less than or equal to the sum of UA values that result from multiplying the U factors specified in the table below for the 2021 IECC by the same exterior assembly areas as the building being certified. When using the 2024 TC approach, the total building envelope TC must be less than or equal to the total TC resulting from using the assembly factors specified below for the 2024 IECC and Equation 4-1 in the Residential chapter of that code.

Table 3.1b: Mandatory Envelope Insulation Requirements for Prescriptive path projects

Space Type	Opaque assemblies (including opaque doors and opaque spandrel panels)	Windows and glazed doors (except Class AW)	Class AW windows and glazed doors	Skylights
Mandatory Building Envelope Requirements, 2021 IECC UA Option (Table references found in the 2021 IECC)				
Dwelling Units	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	Table C402.4
Common Spaces	Table R402.1.2 [a] or Table C402.1.4 (All Other) [c]	ENERGY STAR MFNC 1.2 Reference Design		
Mandatory Building Envelope Requirements, 2024 TC Option (Table references found in the 2024 IECC)				
Dwelling Units	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	DOE Efficient New Homes Reference Design (Exhibit 2)	Table C402.5
Common Spaces	Table R402.1.2 or Table C402.1.2 (All Other) [c]	ENERGY STAR MFNC 1.2 Reference Design		

[a] For steel-frame ceilings, walls, and floors, use 2021 IECC Table R402.2.6.
[b] The same chapter must be used for all opaque dwelling unit envelope components.
[c] The same chapter must be used for all opaque common space envelope components.

[12] Exceptions:
a. Fenestration used as part of a passive solar design is exempt from the SHGC requirements and may be excluded from area-weighted average. fenestration must be facing within 45 degrees of true south and directly coupled to thermal storage mass that has a heat capacity > 20 btu / ft^3x°F and provided in a ratio of at least 3 sq. ft. per sq. ft. of south facing windows. Generally, thermal mass materials will be at least 2 in. thick.
b. In Phius or PHI certified homes, where triple-glazed window assemblies with thermal breaks/spacers between the panes are used, such windows meet the intent of Item 3.2 and may be excluded from the area-weighted average SHGC.
c. Structural dwelling unit windows and doors that are classified as “Class AW” under the North American Fenestration Standard may use the following SHGC values:

Climate Zone	1-3	4A, 4B	4C, 5-8
Class AW SHGC	≤ 0.25	≤ 0.40	Any

[13] If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating). Alternatively, where the U-factor is determined in accordance with NFRC 100 by a laboratory accredited by a nationally recognized accreditation organization, such as the NFRC, documentation provided by the laboratory or manufacturer listing the assembly U-factor and SHGC can be used in lieu of NFRC labels.

[14] Exceptions and alternative compliance paths to this requirement are:
a. Up to 10 ft. of total duct length is permitted to be outside of the thermal and air barrier boundary. Jump ducts are not included as part of this duct length and are covered by exception (d).

b. Ducts (but not air handlers) may be located in a vented attic if minimum R-8 duct insulation is used, duct leakage to outdoors is measured ≤ 3 CFM25 per 100ft2 of conditioned floor area, and:
   i. In Moist (A) climate zones (per 2021 IECC Table R301.1), an additional 1.5 in. (min.) of closed-cell spray foam encapsulates the ducts and ductwork is buried under 2 in. (min.) of blown-in insulation; OR
   ii. In Dry (B) and Marine (C) climate zones (per 2021 IECC Table R301.1, ductwork is buried under at least 3.5 in. of blown-in insulation.
c. Ducts which meet the criteria for "Ducts Located in Conditioned Space" as defined by the 2021 IECC Section R403.3.2.
d. Jump ducts which do not directly deliver conditioned air from the heating/cooling equipment may be located in attics if all joints, including boot-to-drywall, are air sealed and the jump duct is fully buried under the attic insulation.
e. Ducts and air-handling equipment associated with dedicated outdoor air systems (DOAS), which may also provide supplemental heating and cooling, are permitted to be outside of the building's thermal and air barrier boundary.

This requirement does not apply to equipment or ductwork that only provides ventilation, including make-up air systems. This requirement does not apply to air handling equipment or ductwork serving multiple dwelling units. This requirement does not apply to through-wall systems (i.e., packaged terminal heat pumps (PTHPs), packaged terminal air conditioners (PTACs), and vertical terminal air conditioners (VTACs)).

[15] WaterSense labelling of products may be verified in one of two ways:
a. A cut sheet for the installed product indicates that it is WaterSense labeled and field verification shows that the installed product is the one described on the cut sheet.
b. The installed product can be found in the most recent WaterSense Product Search tool (https://lookforwatersense.epa.gov/products/) and field verification shows that the installed product matches the product described in the search tool.

[16] To minimize water wasted while waiting for hot water and water heating energy, the hot water distribution system shall store no more than 1.8 gallons (6.8 liters) of water in any piping/manifold between the hot water source (e.g., central or in-unit hot water tank, central or in-unit recirculation loop) and any in-dwelling hot water fixture. This provision applies to in-dwelling unit plumbing systems and central hot water distribution systems. In-dwelling unit system options include manifold-fed systems; structured plumbing systems; core plumbing layouts, and recirculation systems. This provision does not apply to fixtures in dwelling unit bathrooms without a shower or bathtub.

To verify that the distribution system stores no more than 1.8 gallons (6.8 liters), raters shall either use the Calculation method ***or*** the Field Verification method. In the Calculation method, the rater shall calculate the stored volume between the hot water source and the furthest fixture from the source using the piping or tubing inside diameter and the length of the piping/tubing. In the case of recirculation systems (either within the dwelling or central systems), the 1.8 gallon (6.8 liter) storage limit shall be measured from the point where the branch feeding the furthest fixture branches off the recirculation loop, to the fixture itself. An Excel-based tool is available on the DOE Efficient New Homes website for this calculation.

Using the Field Verification method, no more than 2 gallons (7.6 liters) of water shall be collected from the hot water fixture before hot water is delivered. This accounts for any water stored in the fixture in addition to the 1.8-gallon limit on pipe storage. Only the fixture with the greatest stored volume between the fixture and the hot water source (or recirculation loop) needs to be tested. To field-verify that the system meets the 2-gallon (7.6 liter) limit, raters shall first initiate operation of recirculation systems, if present, and let such systems run for at least 40 seconds. Next, a bucket or flow measuring bag (pre-marked for 2 gallons) shall be placed under the hot water

fixture. The hot water shall be turned on completely and a digital temperature sensor used to record the initial temperature of the water flow. Once the water reaches the pre-marked line at 2 gallons, the water shall be turned off and the ending temperature of the water flow (not the collection bucket) shall be recorded. The temperature of the water flow must increase by ≥ 10 °F in comparison to the final to the initial temperature reading.

[17] In-dwelling unit hot water recirculation systems meet the following requirements:

a. Must be based on an occupant-controlled switch or an occupancy sensor. A sensor or switch must be installed for each fixture or set of fixtures within a room (e.g., a bathroom with multiple fixtures) in the dwelling unit which is located beyond a 1.8 gallon stored-volume range from the water heater or central recirculation loop.
b. In-dwelling unit recirculation systems which operate based on "adaptive" scheduling, meaning that they "learn" the hot water demand profile in the dwelling unit and adapt their operation to anticipate this profile, are permitted at this time, and do not require the use of occupant-controlled switches or occupancy sensors.
c. In-dwelling unit recirculation systems that are activated based **solely** on a timer and/or temperature sensor are not eligible.

These provisions do not apply to recirculating central hot water distribution systems.

[18] For recirculating central hot water distribution systems, the following pipe insulation thickness levels or R-values must be met or exceeded. Additionally, pipe insulation shall cover the entire length of the recirculation loop to the extent possible. If piping is routed in building cavities that prevent the noted thickness or R-value from being used due to space constraints, then the maximum thickness of insulation possible within the space shall be used.

Nominal Pipe or Tube Size (inches)	Insulation Thickness (inches)
< 1.5	1.5 (or R10 minimum)
≥ 1.5	2.0 (or R12 minimum)

[19] ENERGY STAR product certification must be verified with a visual confirmation that installed product is listed in the online ENERGY STAR product registry.

[20] Due to industry supply chain challenges, DOE is temporarily allowing the use of non-ENERGY STAR certified refrigerators for projects using the ERI and ASHRAE compliance paths. Any project utilizing this temporary alternative must account for the non-ENERGY STAR certified refrigerator in the energy model and still achieve the required performance threshold. DOE advises partners that this alternative may be rescinded in a future program update.

[21] Products in categories which are not covered by ENERGY STAR product criteria are exempt.

[22] Up to 5% of lighting, for task or decorative lighting, may be exempt from this provision. The Target Dwelling specification for lighting will remain at 100% regardless of whether this exemption is used. Projects following the prescriptive path may not use this 5% exemption.

[23] This requirement does not apply to lighting inside appliances (e.g., refrigerator, laundry, microwave, cooking equipment).

[24] This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms or to exhaust ventilation systems serving more than one dwelling unit.

[25] Buildings permitted on or before 12/31/2026 must certify under either Indoor airPLUS (IAP) Version 1 (Rev 4), or the IAP Version 2 Certified or Gold tier. Buildings permitted on or after 1/1/2027 must certify under the IAP

Version 2 Certified or Gold tier. See the Indoor airPLUS program site for information on Version 2 requirements: https://www.epa.gov/indoorairplus/indoor-airplus-version-2.

[26] An in-unit HRV or ERV is required to provide whole-dwelling mechanical ventilation for dwelling units in Climate Zones 6 – 8 and must meet or exceed the following specifications: ≥ 65% SRE (@ 32 °F) and ≥ 1.2 CFM/Watt (at one or more rating points). Alternatively, projects may utilize centralized H/ERVs serving multiple dwelling units with any efficacy and recovery efficiency.

[27] Advisory: DOE encourages, but does not require, that partners use equipment listed in the Home Ventilating Institute (HVI) Certified Product Directory (CPD) to comply with this requirement. The listing may be used to demonstrate compliance with this program requirement.

[28] Each dwelling unit with an in-unit fossil fuel water heater must have:

a. An individual branch circuit outlet that is installed and energized and terminates within 3 feet of each installed fossil fuel water heater. The individual branch circuit shall have a rating not less than 240V/30A or 120V/20A.
b. A volume of open space located within the dwelling unit that is at least 3’ x 3’ wide and 7’ high available surrounding or within 3 feet of the installed fossil fuel water heater, to facilitate future heat pump water heater installation. The 3’ x 3’ x 7’ volume may contain the existing water heater. The 3’ x 3’ x 7’ space does not need to be provided if the installed water heater is a tankless water heater system.

Dwelling units using an electric water heater are exempt from these requirements.

[29] Drain is no more than two inches higher than the base of the installed water heater and allows draining without pump assistance. Drain is not required to be reserved exclusively for use with a future heat pump water heater. Drain does not need to be provided if the installed water heater is a tankless water heater system or an electric system with a nominal tank volume less than 50 gallons.

[30] If a branch circuit outlet is installed, it shall be in compliance with 2021 IRC Section E3702.11 based on heat pump space heating equipment sized in accordance with 2021 IECC R403.7 and shall terminate within three feet of each fossil fuel space heater. Alternatively, code-compliant wiring conduit to facilitate future wiring for a heat pump installation may be installed and shall terminate within three feet of each fossil fuel space heater.

Dwelling units utilizing in-unit electric heating systems as the primary heating for the dwelling unit are exempt from this requirement.

[31] Any project may choose to follow Track B for common spaces, even if Track A has been used for dwelling units. Systems eligible for Track A include all systems eligible for Track A under ENERGY STAR Multifamily New Construction, Version 1.2.

[32] For Prescriptive Path projects using Track B, one of these additional measures is required to achieve energy savings that would be achieved through HVAC Grading for projects using Track A. Projects may use either option for each dwelling unit in the building. If any units are served by a central heat pump water heater, those units also comply with this requirement.

[33] Field verification of infiltration requirements must be done on a unit-by-unit basis. Infiltration requirements may not be verified with whole-building testing or with an average of results across all units.

[34] Any Item that will be concealed by drywall (e.g., wall insulation) must be verified during the pre-drywall inspection. If drywall is installed prior to the inspection, then it must be entirely removed to fully verify all Items. It

is not sufficient to remove only portions of drywall to inspect a subset of areas. Additional information is available in the ENERGY STAR Technical Bulletin: Pre-Drywall Inspection Is Always Required.

[35] Some Items can typically only be verified at a later stage of construction than when the pre-drywall inspection occurs (e.g., bath fan airflow). Any Item that has not been verified during the pre-drywall inspection must be verified prior to or during the final inspection.

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SECTION 01 82 00 - AIR & DUCT SEALING

PART 1 - GENERAL

PART 2 - 1.1 SUMMARY

2.1 A. Air Barriers: Materials that form a system to stop passage of air through exterior surfaces (walls, ceilings, and floors), interior surfaces between dwelling units and common areas, interior surfaces separating dwelling units; joints between exterior walls and roof, joints between walls and floors, joints between walls and ceilings, and joints around frames of openings in exterior walls and interior walls that separate dwelling units from adjacent common areas; penetrations through all exterior and interior air barriers including electrical box wire openings.

2.2 B. Duct Sealing: Materials that form a system to stop passage of air through the surfaces of ductwork and air handling equipment.

2.3 1.2 RELATED REQUIREMENTS

A. 06 10 00 - Rough Carpentry.

B. 07 21 00 - Thermal Insulation.

C. 07 25 00 - Weather Barriers.

D. 07 90 05 - Joint Sealers.

E. 23 00 00 - Heating and Air Conditioning.

2.4 1.3 REFERENCE STANDARDS

A. ENERGY STAR Certified Homes, Version 3 Thermal Enclosure System Rater Checklist (Revision 7)

B. ENERGY STAR Certified Homes, Version 3 HVAC Quality Installation Rater Checklist (Revision 7)

C. UL-181A Closure Systems for Use With Rigid Air Ducts

D. UL-181B Closure Systems for Use With Flexible Air Ducts and Air Connectors

E. RESNET Mortgage Industry National Home Energy Rating Systems Standards

2.5 1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on material characteristics.

C. Manufacturer's Installation Instructions: Indicate preparation.

D. Completed ENERGY STAR Certified Homes, Version 3 Thermal Enclosure System Rater Checklist (Revision 7)

E. Completed ENERGY STAR Certified Homes, Version 3 HVAC Quality Installation Rater Checklist (Revision 7)

PART 3 - PRODUCTS

3.1 2.1 AIR BARRIER ASSEMBLIES

A. Air Barrier:

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1. In interior wall assemblies separating dwelling units from each other and adjacent common areas, maintain a continuous air barrier that extends to the underside of the subfloor above using a solid, durable material consistent with required fire rating.

B. AIR BARRIER MATERIALS

1. Air Barrier Materials Being Utilized:

a. Tyvek Commercial Housewrap.
b. Closed-Cell Foam exterior wall insulation at floor truss band boards.
c. Sealants.
d. Duct Seal putty for electrical box wire openings.
e. Tape.
f. Sill sealers.

C. SEALANTS

1. Silicone Sealants.
2. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.
3. Duct Sealant: UL-181A or UL-181B listed water based duct sealant mastic, appropriate to application, and compatible with adjacent materials

D. ACCESSORIES

1. Tyvek Tape.
2. Electrical outlet gaskets.
3. Duct Seal putty.
4. Sill sealer.

PART 4 - EXECUTION

4.1 3.1 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

4.2 3.2 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

4.3 3.3 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Duct Sealing:

1. Apply mastic within temperature range and according to all other manufacturer’s requirements at all factory made and field fabricated joints, take offs, and connections to air handling equipment.
2. Apply mastic or other sealant materials to any un-gasketed openings of the air handling equipment.
3. Gap between take-off duct and gypsum board has been effectively sealed.

D. Openings and Penetrations in Air Barriers:

1. All Penetrations: Apply sealant material to all penetrations and openings in installed air barriers.

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E. Install Duct Seal putty to each electrical box wire openings located on resilient channel walls (Unit demising walls and corridor walls).

4.4 3.4 FIELD QUALITY CONTROL

A. Do not cover installed air barriers until required inspections have been completed.

B. Perform blower door testing, in accordance with RESNET Mortgage Industry National Home Energy Rating Systems Standards, to confirm compliance with ENERGY STAR Certified Homes Version 3.0 air sealing requirements on a minimum sample of 10% of the dwellings units.

C. Perform duct leakage testing, in accordance with RESNET Mortgage Industry National Home Energy Rating Systems Standards, to confirm compliance with ENERGY STAR Certified Homes Version 3.0 duct leakage requirements on a minimum sample of 10% of the dwelling units.

4.5 3.5 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 01 82 00

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SECTION 02 20 01 - PHASE I ENVIRONMENTAL SITE ASSESSMENT

PART 1 - GENERAL

1.1 The Phase I Environmental Site Assessment Report dated **[]** by **[]** is to be considered as part of these specifications and is available from the Owner under separate cover. The Contractor is responsible to thoroughly review this document, to become familiar with the findings and recommendations included therein and to identify the environmental mitigation scope of work with the Owner's environmental consultant.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 02 20 01

Roanoke Gateway

Phase I Environmental Site Assessment

632 Bullitt Avenue SE
Roanoke VA 24013

March 12, 2025

Prepared for: Homes for America Inc.
c/o Denise Fazio
318 6th Street
Annaplois, MD 21403

Agent: Balzer and Associates
15871 City View Drive, Suite 200
Midlothian, VA 23113
Prepared by: Emily Salkind, L.P.S.S.

BALZER & ASSOCIATES
a Westwood company

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1.0 GENERAL INFORMATION

Project Information:
Roanoke Gateway
Project Number:
R0067028.00

Consultant Information:
Balzer & Associates, Inc.
15871 City View Drive, Suite 200
Midlothian, VA 23113
Phone: 804-794-0571
Fax: 804-794-2635
E-mail Address: esalkind@balzer.cc
Inspection Date: March 11, 2025
Report Date: March 12, 2025

Site Information:
Roanoke Gateway
632 Bullitt Avenue Southeast
Roanoke, VA 24013
County: Roanoke City
Latitude, Longitude: 37.267948, -79.931249
Site Access Contact: Denise Fazio

Client Information:
Homes for America Inc
Denise Fazio
318 6th Street
Annapolis, Maryland 21403

Site Assessor

Tim A. Sakowski
Environmental Scientist

Senior Reviewer

Emily Salkind
Environmental Specialist

Certification:

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in 40 CFR Part 312. I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Emily Salkind - Environmental Specialist

2.0 EXECUTIVE SUMMARY

2.1 Subject Property Description

Balzer and Associates, Inc. has been contracted to perform a Phase I Environmental Site Assessment (Phase I ESA) on thirty parcels located in Roanoke, Virginia. The parcels will be collectively referred to as the Subject Property or Site for the purpose of this report. The Subject Property is approximately 3.74 aces in size and is currently zoned for industrial, mixed-use, and residential use. The Property currently has one owner, Gateway Project LLC, and can be directly accessed from Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.

The Property consists of a parking lot, a basketball court, and maintained lawns. Other improvements include driveways and utility lines. Drainage through the Property moves as sheet flow to the north and eventually off-site through the municipal storm sewer system.

The Property exists on multiple parcels along Bullitt Ave SE and Jamison Ave SE. For a complete list of all parcels that make up the Property, refer to Section 4.1.

2.2 Data Gaps

Balzer and Associates, Inc. was able to research the Property back to 1890. No significant data gaps have been identified in the course of research for this Phase I ESA Report.

2.3 Environmental Report Summary

Balzer and Associates, Inc. has performed an Environmental Site Assessment in conformance with the Scope of Work developed in cooperation with the client and the provisions of ASTM Practice E 1527-21. Any exceptions to, or deletions from, the practice are described in Section 3.2 of this report.

Within the scope of this investigation, Balzer and Associates, Inc. has discovered no evidence of Recognized Environmental Conditions (RECs) in connection with the Subject Property.

The Subject Property includes thirty parcels located in Roanoke, Virginia. The Subject Property is approximately 3.74 aces in size and is currently zoned for industrial, mixed-use, and residential use. The Property currently has one owner, Gateway Project LLC, and can be directly accessed from Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.

The Property consists of a parking lot, a basketball court, and maintained lawns. Other improvements include driveways and utility lines. Drainage through the Property moves as sheet flow to the north and eventually off-site through the municipal storm sewer system.

Historical records including aerial photographs, topographic maps, Sanborn maps, and city directories beginning in 1890 were provided by EDR and reviewed for this Phase I ESA. These records are provided in Appendix C of this report. The sources indicate that as early as 1890, the Property was undeveloped land with no frontage. Between 1890 and 1903, several dwellings were constructed on the Property. The Property was also depicted with frontage along Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE. Between 1903 and 1919, most of

the undeveloped lots of the Property were developed with dwellings. By 1947, the Property was developed with many single-family homes along its borders as well as a church in the southwest corner. The Property was in a similar state up until 1967, when the homes in the northwest section of the Property were removed and the shape of the parcels had been altered to match the new layout of Jamison Ave SE. The Property was relatively unchanged up until 1982, when the land around the church had been developed into a parking lot. The Property was in a similar state up until 2005, when the homes along the northern border were all removed. According to the city directories, the Property is associated with different church services from 1940 to 2010, as well as various private owners from 1940 to 2020.The Property was relatively unchanged up until the latest historical record from 2022.

The Subject Property was identified in 1 database (ERNS) at the address 708 Bullitt Ave SE. The ERNS case record provide by EDR is related to a 2016 call reporting lead-based paint dust and chips resulting from building construction. In order to obtain additional information on these records, a Freedom of Information Act (FOIA) request was made (See Section 6.2). The request did not yield any additional records related to the site. Balzer also contacted local Health Department and Fire Department offices for information on reports concerning the Subject Properties and did not receive a response at the time of report publication. Since the related Emergency Response Notification System (ERNS) case does not indicate any lingering contamination or required remediation efforts it is now considered a Historic REC. No further corrective actions or investigations are recommended at this time.

In this records review process, it was identified that many of the sites and facilities in the vicinity of the Subject Property reportedly utilize petroleum products and hazardous chemicals in conjunction with their normal operation. Though these sites are under monitored compliance and do not pose a current material threat to the Subject Property, Balzer and Associates, Inc. recommends that the Property ownership remain aware of leaks, spills, violations, and other incidents which may cause adverse environmental impacts originating from these sites and pursue further environmental investigation if warranted at such time.

Small quantities of non-hazardous debris consisting primarily of litter was identified on the Property. The debris is not considered a current material threat to the site. It is recommended that the debris be removed from the Property and properly disposed of in accordance with Virginia waste regulations.

This Phase I ESA did not include a review of Asbestos, Lead Paint, Radon, PFAS and other emerging contaminants, Wetlands, or Mold.

Report Section		No Further Action	REC	HREC	CREC	Issue/Further Investigation	Comments
4.4	Current Use of Property						
4.6	Adjoining Property Information	X					
6.1	Standard Environmental Records Sources			X			ERNS case regarding lead paint that did not require remediation.
6.4.1	Historical Summary	X					
6.4.7	Other Environmental Reports	X					
7.3.1	Hazardous Substances						

Report Section		No Further Action	REC	HREC	CREC	Issue/Further Investigation	Comments
7.3.2	Petroleum Products						
7.3.3	USTs						
7.3.4	ASTs						
7.3.5	Other Suspect Containers						
7.3.6	Equipment Likely to Contain PCBs						
7.3.7	Interior Staining/Corrosion						
7.3.8	Discharge Features						
7.3.9	Pits, Ponds, And Lagoons						
7.3.10	Solid Waste Dumping/Landfills						
7.3.11	Stained Soil/Stressed Vegetation						
7.3.12	Wells						

2.4 Recommendations

Balzer and Associates, Inc. has performed a Phase I Environmental Site Assessment (Phase I ESA) on the Subject Property identified as Gateway Project in Roanoke, Virginia. The Phase I ESA has performed in general conformance with the scope of work and limitations of ASTM Practice E 1527-21.

This assessment has revealed no evidence of Recognized Environmental Conditions (RECs) in connection with the Subject Property. It is the opinion of Balzer and Associates, Inc. that no further environmental assessment is warranted at this time.

In this records review process, it was identified that many of the sites and facilities in the vicinity of the Subject Property reportedly utilize petroleum products and hazardous chemicals in conjunction with their normal operation. Though these sites are under monitored compliance and do not pose a current material threat to the Subject Property, Balzer and Associates, Inc. recommends that the Property ownership remain aware of leaks, spills, violations, and other incidents which may cause adverse environmental impacts originating from these sites and pursue further environmental investigation if warranted at such time.

Small quantities of non-hazardous debris consisting primarily of litter was identified on the Property. The debris is not considered a current material threat to the site. It is recommended that the debris be removed from the Property and properly disposed of in accordance with Virginia waste regulations.

The Subject Property was identified in 1 database (ERNS) at the address 708 Bullitt Ave SE. The ERNS case record provide by EDR is related to a 2016 call reporting lead-based paint dust and chips resulting from building construction. In order to obtain additional information on these records, a Freedom of Information Act (FOIA) request was made (See Section 6.2). The request did not yield any additional records related to the site. Balzer also contacted local Health Department and Fire Department offices for information on reports concerning the Subject Properties and did not receive a response at the time of report completion. Since the related Emergency Response Notification System (ERNS) case does not indicate any lingering contamination or required remediation efforts it is now considered a Historic REC. No further corrective actions or investigations are recommended at this time.

3.0 INTRODUCTION

3.1 Purpose

The purpose of the Phase I Environmental Site Assessment (ESA) was to evaluate the current and historical conditions of the Subject Property in an effort to identify recognized environmental conditions in connection with the Subject Property.

A recognized environmental condition is defined by ASTM as:

Recognized Environmental Condition - The presence or likely presence of any hazardous substances or petroleum products in, on, or at a property due to release to the environment; under conditions indicative of a release to the environment; or conditions that pose a material threat of a future release to the environment. De minimis conditions are not recognized environmental conditions.

The identification of recognized environmental conditions in connection with the subject property may impose an environmental liability on owners or operators of the site, reduce the value of the site, or restrict the use or marketability of the site, and therefore, further investigation may be warranted to evaluate the scope and extent of potential environmental liabilities.

3.2 Scope of Work

The Phase I ESA conducted at the Subject Property was in general accordance with ASTM Standard E 1527-21 and included the following:

- Review of previous environmental site assessments;
- Records review;
- Interviews with regulatory officials and personnel associated with the subject and adjoining properties;
- A site visit; and
- Evaluation of information and preparation of the report provided herein.

Typically, a Phase I ESA does not include sampling or testing of air, soil, groundwater, surface water, or building materials. These activities would be carried out in a Phase II ESA, if required. For this Phase I ESA, no additions to the ASTM E 1527-21 standard were made.

3.3 Significant Assumptions

There is a possibility that even with the proper application of these methodologies there may exist on the Subject Property conditions that could not be identified within the scope of the assessment or which were not reasonably identifiable from the available information. Balzer and Associates, Inc. believes that the information obtained from the records review and the interviews concerning the site is reliable. However, Balzer and Associates, Inc. cannot and does not warrant or guarantee that the information provided by these other sources is accurate or complete. The methodologies of this assessment are not intended to produce all-inclusive or comprehensive results, but rather to provide the client with information relating to the Subject Property.

It is assumed that this investigation is being conducted to identify Recognized Environmental Conditions concerning the Subject Property, and to permit the user to satisfy one of the requirements to qualify for the innocent landowner defense to CERCLA liability. This investigation may mention but does not fully address non-scope considerations such as, but not limited to, asbestos-containing materials (ACM), radon, lead-based paint (LBP), lead in drinking water, mold, wetlands, regulatory compliance, cultural and historical resources, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality, and/or high voltage power lines, although, one or more may be mentioned in the report as a business environmental risk concern.

3.4 Limitations and Exceptions

Along with all of the limitations set forth in various sections of the ASTM E 1527-21 protocol, the accuracy and completeness of this report may be limited by the following:

Access Limitations - None
Physical Obstructions to Observations - None
Outstanding Information Requests - Balzer contacted local Health Department and Fire Department offices for information on reports concerning the Subject Properties and did not receive a response at the time of report publication
Historical Data Source Failure - None
Other - None

It should be noted that this assessment did not include a review or audit of operational environmental compliance issues, or of any environmental management systems (EMS) that may exist on the property. Where required, the documents listed in Appendices A through H were used as reference material for the completion of the Phase I ESA. Some of the information presented in this report was provided through existing documents and interviews. Although attempts were made, whenever possible, to obtain a minimum of two confirmatory sources of information, Balzer and Associates, Inc. in certain instances has been required to assume that the information provided is accurate.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. The conclusions and recommendations presented represent the best judgment of Balzer and Associates, Inc. based on the data obtained from the work. Due to the nature of investigation and the limited data available, Balzer and Associates, Inc. cannot warrant against undiscovered environmental liabilities. Conclusions and recommendations presented in this report should not be construed as legal advice.

Should additional information become available which differs significantly from our understanding of conditions presented in this report, we request that this information be brought to our attention so that we may reassess the conclusions provided herein.

3.5 Deviations

No deviations from the recommended scope of ASTM Standard E 1527-21 were performed as part of this Phase I ESA with the exception of any additions noted in the Scope of Work identified in Section 3.2 of this report.

3.6 Special Terms and Conditions

Authorization to perform this assessment was given by the client on February 28, 2025. Instructions as to the location of the property, access, and an explanation of the property and facilities to be assessed were provided by Denise Fazio of Homes for America Inc.

3.7 Reliance

This report has been prepared for the sole benefit of the client. The report may not be relied upon by any other person or entity without the express written consent of Balzer and Associates, Inc. and the client.

4.0 SITE DESCRIPTION

4.1 Location and Legal Description

The Subject Property includes thirty parcels located in Roanoke, Virginia. The Subject Property is approximately 3.74 aces in size and is currently zoned for industrial, mixed-use, and residential use. The Property currently has one owner, Gateway Project LLC, and can be directly accessed from Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.

The Property consists of a parking lot, a basketball court, and maintained lawns. Other improvements include driveways and utility lines. Drainage through the Property moves as sheet flow to the north and eventually off-site through the municipal storm sewer system.

Address: N/A; Parcel ID: 4013004; Size: ±0.10 acres; Zoning: Industrial; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013003; Size: ±0.08 acres; Zoning: Industrial; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013002; Size: ±0.05 acres; Zoning: Industrial; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013009; Size: ±0.02 acres; Zoning: Industrial; Current Owner: Gateway Project LLC
Address: 632 Bullitt Ave SE; Parcel ID: 4013018; Size: ±0.01 acres; Zoning: Mixed-Use; Current Owner: Gateway Project LLC
Address: 624 Bullitt Ave SE; Parcel ID: 4013015; Size: ±0.83 acres; Zoning: Mixed-Use; Current Owner: Gateway Project LLC
Address: 612 Bullitt Ave SE; Parcel ID: 4013014; Size: ±0.25 acres; Zoning: Industrial; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013012; Size: ±0.16 acres; Zoning: Industrial; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013011; Size: ±0.12 acres: Zoning: Industrial; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID 4013010; Size: ±0.11 acres; Zoning: Industrial; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013111; Size: ±0.12 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 729 Jamison Ave SE; Parcel ID: 4013110; ±Size: 0.12 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 727 Jamison Ave SE; Parcel ID: 4013109; ±Size: 0.12 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013108; Size: ±0.12 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 715 Jamison Ave SE; Parcel ID: 4013107; Size: ±0.12 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 711 Jamison Ave SE; Parcel ID: 4013106; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 709 Jamison Ave SE; Parcel ID: 4013105; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013104; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 705 Jamison Ave SE; Parcel ID: 4013103; Size: ±0.09 acres: Zoning: Residential; Current Owner: Gateway Project LLC
Address: 703 Jamison Ave SE; Parcel ID: 4013102; Size: ±0.12 acres: Zoning: Residential; Current Owner: Gateway Project LLC

Address: N/A; Parcel ID: 4013101; Size: ±0.12 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013120; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013119; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 716 Bullitt Ave SE: Parcel ID: 4013118; Size: ±0.09 acres Size: 0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 712 Bullitt Ave SE: Parcel ID: 4013117; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 710 Bullitt Ave SE: Parcel ID: 4013116; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 708 Bullitt Ave SE: Parcel ID: 4013115; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013114; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: 704 Bullitt Ave SE; Parcel ID: 4013113; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC
Address: N/A; Parcel ID: 4013112; Size: ±0.09 acres; Zoning: Residential; Current Owner: Gateway Project LLC

4.2 Activity/Use Limitations

This Phase I Environmental Site Assessment has revealed no evidence of Recognized Environmental Conditions in connection with the Subject Property that would limit any activities or use of the Property.

4.3 Site and Vicinity Description

The Subject Property includes thirty parcels located in Roanoke, Virginia. The Subject Property is approximately 3.74 aces in size and is currently zoned for industrial, mixed-use, and residential use. The Property currently has one owner, Gateway Project LLC, and can be directly accessed from Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.

The Property consists of a parking lot, a basketball court, and maintained lawns. Other improvements include driveways and utility lines. Drainage through the Property moves as sheet flow to the north and eventually off-site through the municipal storm sewer system.

Parcels in the vicinity of the Site are primarily residential. For more information on parcels adjoining the Subject Property, refer to Section 4.6.

4.4 Current Use of Property

The Property currently does not have any discernible use and is vacant.

4.5 Description of Structures and Other Improvements

There is a parking lot on the Property, as well as a basketball court, driveways, and utility lines. The surrounding streets are serviced with municipal stormwater systems. No structures exist on the Property.

4.6 Adjoining Property Information

Parcels in the vicinity of the Site are primarily residential. For more information on parcels adjoining the Subject Property, refer to the table below.

Direction From Site	Occupant	Use	Comments
North	Various owners	Residential	Single-family homes
South	Various owners	Residential	Single-family homes
East	Various owners	Residential	Single-family homes
West	Various owners	Residential	Single-family homes

5.0 USER PROVIDED INFORMATION

5.1 Specialized Knowledge

Balzer and Associates, Inc. has performed services on the Subject Property including civil engineering design and site surveying, beginning in 2022. No information obtained in the course of the completed studies has revealed evidence of a Recognized Environmental Condition in connection with the Subject Property.

The property ownership and tenants as well as all individuals who were interviewed as part of this investigation, have not reported any specialized knowledge of this Subject Property outside of what is contained in this report.

5.2 Valuation Reduction for Environmental Issues

No environmental issues were identified by the user/client that could result in Property value reduction.

5.3 Owner, Property Manager, and Occupant Information

No written or verbal communication with the property owner, manager and tenants revealed any information which suggested that there are currently or historically any Recognized Environmental Conditions associated with the Subject Property.

5.4 Reason For Performing Phase I ESA

The purpose of this Phase I Environmental Site Assessment (ESA) was to identify existing or potential Recognized Environmental Conditions (as defined by ASTM Standard E 1527-21) in connection with the Subject Property. Balzer and Associates, Inc. understands that the findings of this study will be used to evaluate a pending financial transaction in connection with the Subject Property.

The Phase I ESA is being conducted as part of environmental due diligence prior to property transfer or refinancing.

6.0 RECORDS REVIEW

6.1 Standard Environmental Records Sources

Balzer and Associates, Inc. contracted Environmental Data Resources, Inc. (EDR) to conduct a search of Federal and State databases containing known and suspected sites of environmental contamination. The number of listed sites identified within the approximate minimum search distance (AMSD) from the Federal and State environmental records database listings specified in ASTM Standard E 1527-21 are summarized in the following table. Detailed information for sites identified within the AMSDs is provided below, along with an opinion about the significance of the listing to the analysis of Recognized Environmental Conditions in connection with the Subject Property. Copies of the EDR research data and a description of the databases are included in Appendix D of this report.

Map Findings Summary

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
ERNS	1	0.001	0	NR	NR	NR	NR	1
RCRA-SQG		0.25	0	1	NR	NR	NR	1
RCRA-VSQG		0.25	0	3	NR	NR	NR	3
US BROWNFIELDS		0.5	0	0	2	NR	NR	2
PFAS ECHO		0.25	0	1	NR	NR	NR	1
UST FINDER RELEASE		0.5	0	0	11	NR	NR	11
RCRA NonGen / NLR		0.25	0	1	NR	NR	NR	1
EDR Hist Auto		0.125	2	NR	NR	NR	NR	2
E MANIFEST		0.25	0	2	NR	NR	NR	2
UST FINDER		0.25	1	6	NR	NR	NR	7
EDR Hist Cleaner		0.125	1	NR	NR	NR	NR	1
SWF/LF		0.5	0	0	1	NR	NR	1
LUST		0.5	0	1	15	NR	NR	16
LTANKS		0.5	1	4	18	NR	NR	23
UST		0.25	1	7	NR	NR	NR	8
EDR MGP		1	0	0	0	1	NR	1

Detail Summary

Site Name:	Subject Property
Databases:	ERNS
Address:	708 BULLITT AVE SE
Distance:	0
Direction:	East-Southeast
Elevation:	Higher
Comments:	ERNS report references a 2016 phone call identifying lead-based paint chips and dust being released in the air during house rehabilitation. No lingering contamination or required remediation efforts noted in the record.

Site Name:	822 JAMISON AVE PROPERTY
Databases:	LTANKS
Address:	822 JAMISON AVE SE
Distance:	288
Direction:	Northeast
Elevation:	Lower
Comments:	Closed LTANKS case.

Site Name:	PIC-QUIK
Databases:	UST FINDER, UST
Address:	615 NINTH ST SE
Distance:	441
Direction:	East-Northeast
Elevation:	Lower
Comments:	3 inactive USTs removed from ground.

Site Name:	VALLEY CLEANERS
Databases:	EDR Hist Cleaner
Address:	703 9TH STREET SOUTHEAST
Distance:	508
Direction:	East
Elevation:	Lower
Comments:	Registered as historic dry cleaner from 1987 to 2014.

Site Name:	HERNDON EDWARD P JR
Databases:	EDR Hist Auto
Address:	608 9TH ST SE
Distance:	513
Direction:	East-Northeast
Elevation:	Lower
Comments:	Registered as historic gasoline service from 1970 to 1971.

Site Name:	RAKES CHAS J
Databases:	EDR Hist Auto
Address:	522 9TH ST SE
Distance:	564
Direction:	Northeast
Elevation:	Lower
Comments:	Registered as historic gasoline service in 1970.

Site Name:	806 MOUNTAIN AVE PROPERTY
Databases:	LTANKS
Address:	806 MOUNTAIN AVE SE
Distance:	680
Direction:	Southeast
Elevation:	Higher
Comments:	Closed LTANKS case.

Site Name:	P & N 96
Databases:	FIN ASSURANCE 1, UST, UST FINDER, PFAS ECHO
Address:	404 ELM AVE SE
Distance:	703
Direction:	West-Southwest
Elevation:	Higher
Comments:	3 active gasoline USTs with Financial Assurance. Active metal coating industry. Violations not found.

Site Name:	CVS PHARMACY #6285
Databases:	RCRA-VSQG, E MANIFEST, FINDS, ECHO
Address:	702 9TH STREET, SE
Distance:	710
Direction:	East
Elevation:	Lower
Comments:	Violations found and resolved in 2014 and 2017.

Site Name:	AMOCO #812-TANKS
Databases:	RCRA-SQG, FINDS, ECHO
Address:	401 ELM AVE SE
Distance:	794
Direction:	West-Southwest
Elevation:	Higher
Comments:	Violations not found.

Site Name:	NORM'S TRANSMISSIONS
Databases:	RCRA-VSQG
Address:	818 STEWART AVENUE SE
Distance:	814
Direction:	North-Northeast
Elevation:	Lower
Comments:	Violations found and resolved in 2023.

Site Name:	DEVOE & RAYNOLDS COMPANY INC
Databases:	UST, UST FINDER
Address:	701 FOURTH ST
Distance:	835
Direction:	West
Elevation:	Higher
Comments:	1 inactive UST removed from ground.

Site Name:	STAR VALLEY MINUTE MART
Databases:	UST FINDER, UST
Address:	831 HIGHLAND AVE
Distance:	880
Direction:	East-Southeast
Elevation:	Higher
Comments:	2 inactive USTs removed from ground.

Site Name:	APPLE MARKET 1508
Databases:	UST FINDER, FIN ASSURANCE 1, LTANKS, UST
Address:	403 ELM AVE
Distance:	890
Direction:	West-Southwest
Elevation:	Higher
Comments:	Closed LTANKS case. 3 active USTs (2 gasoline, 1 diesel) with Financial Assurance. 4 inactive USTs removed from ground.

Site Name:	SHELOR ALLAN PROPERTY
Databases:	LTANKS
Address:	654 HIGHLAND AVE
Distance:	968
Direction:	South
Elevation:	Higher
Comments:	Closed LTANKS case.

Site Name:	RESCUE MISSION OF ROANOKE
Databases:	UST FINDER, UST
Address:	402 FOURTH STREET SE
Distance:	1102
Direction:	Northwest
Elevation:	Lower
Comments:	2 inactive USTs removed from ground.

Site Name:	WOODING'S AUTO BODY WORKS, INC.
Databases:	RCRA-VSQG, E MANIFEST, FINDS, ECHO
Address:	824 TAZEWELL AVE SE
Distance:	1154
Direction:	North-Northeast
Elevation:	Lower
Comments:	Violations not found.

Site Name:	WOODKINGS AUTO BODY WORKS INC
Databases:	RCRA NonGen / NLR, FINDS, ECHO
Address:	205 8 1/2 ST SE
Distance:	1192
Direction:	North
Elevation:	Lower
Comments:	Violations not found.

Site Name:	STONEWALL JACKSON MIDDLE SCHOOL
Databases:	LTANKS, UST, LUST REG NO, UST FINDER
Address:	1022 9TH STREET S.W.
Distance:	1261
Direction:	Southeast
Elevation:	Higher
Comments:	Closed LTANKS and LUST cases. 1 inactive UST removed from ground.

Site Name:	RICHARDS GUTTERING & SIDING CO
Databases:	UST
Address:	1024 JAMISON AVE
Distance:	1307
Direction:	East-Northeast
Elevation:	Lower
Comments:	2 inactive USTs removed from ground.

Site Name:	LLOYD ELECTRIC COMPANY
Databases:	LTANKS, LUST REG NO
Address:	605 THIRD ST SE
Distance:	1395
Direction:	West-Northwest
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases.

Site Name:	FORMER COREAST FEDERAL
Databases:	LTANKS, LUST REG NO. UST FINDER RELEASE, UST FINDER
Address:	605 CAMPBELL AVENUE
Distance:	1498
Direction:	North-Northwest
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases.

Site Name:	MR A'S MART
Databases:	FIN ASSURANCE 1, LTANKS, UST, UST FINDER RELEASE, UST FINDER
Address:	421 CAMPBELL AVENUE SE
Distance:	1537
Direction:	Northwest
Elevation:	Lower
Comments:	Closed LTANKS cases. 3 active USTs (2 gasoline, 1 diesel) with Financial Assurance. 4 inactive USTs removed from ground.

Site Name:	SUPR NO.1087
Databases:	LUST REG NO
Address:	421/417 CAMPBELL AVE.,S.E.,RKE.VA 24013
Distance:	1633
Direction:	Northwest
Elevation:	Lower
Comments:	Closed LUST case.

Site Name:	NINTH STREET CHURCH OF THE BRETHEREN PARSONAGE
Databases:	LTANKS
Address:	745 MONTROSE AVE SE
Distance:	1638
Direction:	Southeast
Elevation:	Higher
Comments:	Closed LTANKS case.

Site Name:	ANTHEM ROANOKE PROPERTY
Databases:	LUST REG NO, LTANKS,
Address:	302 CAMPBELL AVENUE S.E.
Distance:	1809
Direction:	Northwest
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases.

Site Name:	NORFOLK SOUTHERN-EAST END SHOP
Databases:	LUST REG NO
Address:	8TH ST. & CAMPBELL AVE.
Distance:	1897
Direction:	North
Elevation:	Lower
Comments:	Closed LUST case.

Site Name:	KETON MARTIN RESIDENCE
Databases:	LTANKS
Address:	1139 STEWART AVE
Distance:	1963
Direction:	Northeast
Elevation:	Higher
Comments:	Closed LTANKS case.

Site Name:	BLUE CROSS/ BLUE SHIELD
Databases:	LUST REG NO
Address:	602 S. JEFFERSON STREET
Distance:	2071
Direction:	West
Elevation:	Lower
Comments:	Closed LUST case.

Site Name:	SFD RENTAL UNIT
Databases:	LTANKS
Address:	122 10 1/2 ST SW
Distance:	2077
Direction:	North-Northeast
Elevation:	Lower
Comments:	Closed LTANKS case.

Site Name:	JEFFERSON MOTOR LODGE
Databases:	LTANKS, LUST REG NO, UST FINDER
Address:	612 AND 616 JEFFERSON ST
Distance:	2107
Direction:	West
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases.

Site Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Databases:	FIN ASSURANCE 1, LTANKS, SWF/LF, UST, UST FINDER RELEASE, UST FINDER
Address:	101 ELM AVENUE SE
Distance:	2113
Direction:	West
Elevation:	Higher

Comments:	Closed LTANKS case. 2 active USTs with Financial Assurance. 5 inactive USTs (2 closed in ground, 3 removed from ground).

Site Name:	HARTSOOK
Databases:	FINDS, US BROWNFIELDS
Address:	210 MARKET STREET SE
Distance:	2181
Direction:	West-Northwest
Elevation:	Lower
Comments:	According to the EPA, the site does not require cleanup and is ready for anticipated use. This assessment, along with the site's drainage not flowing into the Property, means it is not represent a current material threat.

Site Name:	GETTY MART #31, D&G MART
Databases:	UST FINDER RELEASE, FIN ASSURANCE 1, LTANKS, UST, LUST REG NO
Address:	1219 JAMISON AVE SE
Distance:	2203
Direction:	East-Northeast
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases. 4 active USTs with Financial Assurance. 1 inactive UST removed from ground.

Site Name:	HEIRONIMUS WAREHOUSE
Databases:	LTANKS, UST
Address:	315 ALBEMARLE AVENUE SE
Distance:	2218
Direction:	Southwest
Elevation:	Lower
Comments:	Closed LTANKS case. 3 inactive USTs removed from ground.

Site Name:	HISTORIC FIRE STATION #1
Databases:	US BROWNFIELDS
Address:	13 CHURCH AVE SE
Distance:	2247
Direction:	West-Northwest
Elevation:	Lower
Comments:	According to the EPA, the site does not require cleanup. This assessment, along with the site's drainage not flowing into the Property, means it is not represent a current material threat.

Site Name:	BLUE CROSS-BLUE SHIELD OF VA
Databases:	UST FINDER RELEASE, UST FINDER, LTANKS, UST
Address:	602 JEFFERSON ST.
Distance:	2289
Direction:	West
Elevation:	Lower
Comments:	Closed LTANKS case. 1 inactive UST closed in ground.

Site Name:	ALLRIGHT PARKING GARAGE SERVICE PIT
Databases:	LTANKS, LUST REG NO, UST FINDER RELEASE
Address:	635 S JEFFERSON ST
Distance:	2334
Direction:	West
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases.

Site Name:	HEIRONIMUS WAREHOUSE
Databases:	LUST REG NO
Address:	3RD & ALBERMARLE ST.,S.E.
Distance:	2378
Direction:	Southwest
Elevation:	Lower
Comments:	Closed LUST case.

Site Name:	T & R GARAGE
Databases:	LUST REG NO
Address:	41 WEST 4TH ST., SALEM, VA 24153
Distance:	2389
Direction:	North-Northwest
Elevation:	Lower
Comments:	Closed LUST case.

Site Name:	ART MUSEUM FUTURE SITE
Databases:	UST FINDER RELEASE, LTANKS, LUST REG NO
Address:	100 SALEM AVE SE
Distance:	2424
Direction:	Northwest
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases.

Site Name:	YELLOW CAB,ROANOKE
Databases:	LUST REG NO
Address:	202 SHENANDOAH AVE., N.E.
Distance:	2485
Direction:	Northwest
Elevation:	Lower
Comments:	Closed LUST case.

Site Name:	GUARD RAIL PROPERTY
Databases:	LTANKS
Address:	1131 4TH ST SE
Distance:	2507
Direction:	Southwest
Elevation:	Lower
Comments:	Closed LTANKS case.

Site Name:	YELLOW CAB CO OF ROANOKE INC
Databases:	LTANKS, UST FINDER RELEASE
Address:	200 SHENANDOAH AVE NE
Distance:	2510
Direction:	Northwest
Elevation:	Lower
Comments:	Closed LTANKS case.

Site Name:	STAR CITY FOOD CENTER
Databases:	LTANKS, LUST REG NO, UST FINDER RELEASE
Address:	509 13TH STREET, SE
Distance:	2625
Direction:	Northeast
Elevation:	Lower
Comments:	Closed LTANKS and LUST cases.

Site Name:	ROANOKE TOWN GAS
Databases:	EDR MGP
Address:	NE KIMBALL AND RUTHERFORD AVE
Distance:	3541
Direction:	North
Elevation:	Lower
Comments:	Manufactured Gas Plant identified in EDR Records with alternate names Roanoke Gas and Water, Roanoke Gas and Light Co.

Orphans Summary

Facility Name:	CITY OF ROANOKE STORM WATER PROJEC
Databases:	LTANKS
Address:	1ST STREET AND SALEM AVE
Comments:	Closed LTANKS case.

Facility Name:	FORMER CAMPBELL COURT REDEVELOPMEN
Databases:	LTANKS
Address:	APPROXIMATELY 17 CAMPBELL AVE
Comments:	Closed LTANKS case.

Facility Name:	VIRGINIA ASPHALT AND PAVING
Databases:	LUST
Address:	BUCK MOUNTAIN ROAD & PARKWAY
Comments:	Closed LUST case.

Facility Name:	N&W ROANOKE SHOPS
Databases:	LTANKS
Address:	8 1/2 CAMPBELL AVE
Comments:	Closed LTANKS case.

Facility Name:	VACANT LOT (CORNER OF FRANKLIN & E
Databases:	LUST
Address:	CORNER OF FRANKLIN & ELM
Comments:	Closed LUST case.

Facility Name:	VDOT-GEORGE'S ENTERPRISES#
Databases:	LUST
Address:	ELM & FRANKLIN RDS.
Comments:	Closed LUST case.

Facility Name:	ROANOKE MEMORIAL HOSPITAL#
Databases:	LUST
Address:	JEFFERSON & BELLVIEW STS.
Comments:	Closed LUST case.

Facility Name:	ROANOKE RIVER FLOOD CONTROL
Databases:	SEMS-ARCHIVE
Address:	ALONG ROANOKE RIVER FROM ROA.
Comments:	Site is not listed on the NPL, and does not require site assessment work.

6.1.1 Regulatory File Review

The Subject Property was identified in 1 database (ERNS) at the address 708 Bullitt Ave SE. The ERNS case record provide by EDR is related to a 2016 call reporting lead-based paint dust and chips resulting from building construction. In order to obtain additional information on these records, a Freedom of Information Act (FOIA) request was made (See Section 6.2). The request did not yield any additional records related to the site. Balzer also contacted local Health Department and Fire Department offices for information on reports concerning the Subject Properties and did not receive a response at the time of report publication. Since the related Emergency Response Notification System (ERNS) case does not indicate any lingering contamination or required remediation efforts it is now considered a Historic REC. No further corrective actions or investigations are recommended at this time.

All active underground (UST) identified in the vicinity of the Property have associated Financial Assurances mitigating risk to the Subject Property.

The leaking underground storage cases (LTANKS, LUST) identified in the vicinity of the Property are closed and do not pose a current material threat to the Subject Property.

Sites operating under RCRA in the vicinity of the Subject Property do not have listed violations or historic violations have been resolved. These sites do not pose a current material threat.

None of the historic automobile services (EDR Hist Auto), cleaners (EDR Hist Cleaner), or manufactured gas plants (EDR MGP) drain into the Subject Property and do not pose a current material threat.

The 2 US BROWNFIELD cases identified in the vicinity of the Property do not require cleanup. These assessments, along with the sites' drainage not flowing into the Property, means they do not represent a current material threat.
8 Orphan cases were found in the vicinity of the Property. After reviewing each one, it was decided that these cases do not pose a current material threat to the Subject Property.

In this records review process, it was identified that many of the sites and facilities in the vicinity of the Subject Property reportedly utilize petroleum products and hazardous chemicals in conjunction with their normal operation. Though these sites are under monitored compliance and do not pose a current material threat to the Subject Property, Balzer and Associates, Inc. recommends that the Property ownership remain aware of leaks, spills, violations, and other incidents which may cause adverse environmental impacts originating from these sites and pursue further environmental investigation if warranted at such time.

6.2 Additional Environmental Record Sources

Additional Environmental Record Sources were obtained from the U.S. Environmental Protection Agency (EPA) and Virginia Department of Environmental Quality (DEQ) for facilities in the vicinity of the Subject Property. The EPA Enforcement and Compliance History Online (ECHO) system search identified facilities in the vicinity of the Subject Property operating under RCRA or US AIRS including some facilities which were reviewed in the Standard Environmental Records Sources in Section 6.1 of this report. No significant violations were identified in connection with the facilities in the ECHO system. The DEQ Environmental Data Mapper was also reviewed for incident reports in the vicinity of the Subject Property. No incidents of adverse effect to the Subject Property were identified in these records.

The Subject Property was identified in 1 database (ERNS) at the address 708 Bullitt Ave SE. The ERNS case record provide by EDR is related to a 2016 call reporting lead-based paint dust and chips resulting from building construction. In order to obtain additional information on these records, a Freedom of Information Act (FOIA) request was made (See Section 6.2). The request did not yield any additional records related to the site. Balzer also contacted local Health Department and Fire Department offices for information on reports concerning the Subject Properties and did not receive a response at the time of report publication. Since the related Emergency Response Notification System (ERNS) case does not indicate any lingering contamination or required remediation efforts it is now considered a Historic REC. No further corrective actions or investigations are recommended at this time.

These Additional Environmental Record Sources do not identify any facility operation or incident which poses a current material threat to the Subject Property. Copies of pertinent Environmental Records are provided in Appendix E of this report.

6.3 General Site Setting

The Subject Property includes thirty parcels located in Roanoke, Virginia. The Subject Property is approximately 3.74 aces in size and is currently zoned for industrial, mixed-use, and residential use. The Property currently has one owner, Gateway Project LLC, and can be directly accessed from Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.

The Property consists of a parking lot, a basketball court, and maintained lawns. Other improvements include driveways and utility lines. Drainage through the Property moves as sheet flow to the north and eventually off-site through the municipal storm sewer system.

Parcels in the vicinity of the Site are primarily residential. For more information on parcels adjoining the Subject Property, refer to Section 4.6.

6.3.1 Topography

Based on a review of the 2022 USGS topographic map for the site area (Roanoke quadrangle), the site is situated at an elevation of approximately 962 feet above mean sea level. The local topographic gradient of the site slopes gently to the north. Groundwater flow direction is not known but can be inferred to flow in the same direction as the general gradient.

6.3.2 Surface Water Bodies

The nearest surface water in the vicinity of the Property is the Roanoke River located approximately 0.47 miles to the southwest of the Property. No surface water is located on the Property.

6.3.3 Geology and Hydrology

Geologic information for the Subject Property, provided by EDR and USGS Digital Data Series (1994), identified the geologic age category as Stratified Sequence. The Rock Stratigraphic Unit of the Subject Property is described as follows:

Era: Paleozoic
System: Cambrian
Series: Cambrian

Based on the soil survey maps published by the US Soil Conservation Service, the Subject Property is mapped as the following soil series:

Chiswell channery silt loam - Well drained, very slow infiltration rates (Hydrologic Class D), moderate corrosion potential

6.4 Historical Use

6.4.1 Historical Summary

Historical records including aerial photographs, topographic maps, Sanborn maps, and city directories beginning in 1890 were provided by EDR and reviewed for this Phase I ESA. These records are provided in Appendix C of this report. The sources indicate that as early as 1890, the Property was undeveloped land with no frontage. Between 1890 and 1903, several dwellings were constructed on the Property. The Property was also depicted with frontage along Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE. Between 1903 and 1919, most of the undeveloped lots of the Property were developed with dwellings. By 1947, the Property was developed with many single-family homes along its borders as well as a church in the southwest corner. The Property was in a similar state up until 1967, when the homes in the northwest section of the Property were removed and the shape of the parcels had been altered to match the new layout of Jamison Ave SE. The Property was relatively unchanged up until 1982, when the land around the church had been developed into a parking lot. The Property was in a similar state up until 2005, when the homes along the northern border were all removed. According to the city directories, the Property is associated with different church services from 1940 to 2010, as well as various private owners from 1940 to 2020.The Property was relatively unchanged up until the latest historical record from 2022.

6.4.2 Title Records

No title records were provided by the user/client. Please refer to the Records Review section for current and historical ownership/use of the Subject Property.

6.4.3 City Directories

City Directories for the Subject Property and surrounding area beginning in 1940 were reviewed and are included in Appendix C of this report. The Subject Property addresses were first identified in the listings in 1940 as as collection of private owners as well as a church. From 1940 to 2010 the Property is associated with different church services, as well as various private owners from 1940 to 2020. A full review of the listings identified at the Subject Property is included in the table below.

Listings for parcels in the vicinity of the Property indicate that the area has been residentially developed since the earliest provided records. Within the area surrounding the Subject Property, listings include private residences. The listings are consistent with other historic records as well as historic listings identified in the Standard Environmental Records Sources in this report.

The City Directory listings for occupants in the vicinity of the Subject Property did not yield information that would indicate a current material threat to the site.

Summary

Date(s)	Property Comments	Surrounding Area Comments
1940	716 Bullitt Ave SE	Brugh Margt Mrs
	712 Bullitt Ave SE	Myers Florence A Mrs
	710 Bullitt Ave SE	Ellis Mamie E Mrs
	708 Bullitt Ave SE	Smit Jas C & Ratliff Amos L
	704 Bullitt Ave SE	Sink Minnie O Mrs
	632 Bullitt Ave SE	Mayfield Amos F
	612 Bullitt Ave SE	Four Square Gospel Tabernacle

Date(s)	Property Comments	Surrounding Area Comments
1964	716 Bullitt Ave SE	Dishman Wm A & Elkins Wm E
	712 Bullitt Ave SE	Myers Edw L & Myers Jas D
	710 Bullitt Ave SE	Ellis Giles L jr
	708 Bullitt Ave SE	Six Mary C
	704 Bullitt Ave SE	Lavinder Edna E Mrs
	632 Bullitt Ave SE	Mayfield Josie C Mrs
	624 Bullitt Ave SE	Helms Harold E Rev
	612 Bullitt Ave SE	First Hoursquare Gospel Church
1969	716 Bullitt Ave SE	Dishman WM A
	712 Bullitt Ave SE	Myers Susie S Mrs
	710 Bullitt Ave SE	Ellis Giles L Jr
	708 Bullitt Ave SE	Vacant
	704 Bullitt Ave SE	Vacant
	632 Bullitt Ave SE	Mayfield Josie C Mrs
	624 Bullitt Ave SE	Harrison Robt M Rev
	612 Bullitt Ave SE	First Foursquare Gospel Church
1974	716 Bullitt Ave SE	Dishman WM A
	712 Bullitt Ave SE	Myers F Susie Mrs
	708 Bullitt Ave SE	Vacant
	704 Bullitt Ave SE	Smith Virginia P Mrs
	632 Bullitt Ave SE	Mayfield Josie C Mrs
	624 Bullitt Ave SE	Dowdy Roy
	612 Bullitt Ave SE	First Foursquare Gospel Church
1979	716 Bullitt Ave SE	Dishman WM A
	712 Bullitt Ave SE	Myers F Susie Mrs
	710 Bullitt Ave SE	Vacant
	708 Bullitt Ave SE	Vacant
	704 Bullitt Ave SE	Mitchell C E
	632 Bullitt Ave SE	Evangel Four Square Gospel Church Office
	624 Bullitt Ave SE	Evangel Four Square Gospel Church
	612 Bullitt Ave SE	Evangel Four Square Gospel Day Care
1984	716 Bullitt Ave SE	Dishman WM A
	712 Bullitt Ave SE	Trent Dodnna S
	710 Bullitt Ave SE	Rogers Mark D
	708 Bullitt Ave SE	Vacant
	704 Bullitt Ave SE	Vacant
	632 Bullitt Ave SE	Evangel Four Square Gospel Church Office
	624 Bullitt Ave SE	Evangel Four Square Gospel Church
	612 Bullitt Ave SE	Evangel Four Square Gospel Day Care
1989	716 Bullitt Ave SE	Graybill Jannie
	712 Bullitt Ave SE	Trent B S
	710 Bullitt Ave SE	Hedrick Betty
	708 Bullitt Ave SE	No Return
	704 Bullitt Ave SE	Vacant
	632 Bullitt Ave SE	Evangel Four Square Gospel Church Office
	624 Bullitt Ave SE	Evangel Four Square Gospel Church
	612 Bullitt Ave SE	Evangel Four Square Gospel Day Care
1992	716 Bullitt Ave SE	Graybill Keith
	624 Bullitt Ave SE	WEFC TV-38 Prayer Line
	612 Bullitt Ave SE	Evangel Four Square Gospel Day Care
1995	716 Bullitt Ave SE	Graybill Keith
	712 Bullitt Ave SE	Occupant Unknown
	710 Bullitt Ave SE	Nahodyl Marsha
	704 Bullitt Ave SE	Occupant Unknown
	624 Bullitt Ave SE	WEFC TV-38 Prayer Line
	612 Bullitt Ave SE	Evangel Four Square Gospel Day Care
2000	716 Bullitt Ave SE	Graybill Keith
	704 Bullitt Ave SE	Sarver Lisa A
	612 Bullitt Ave SE	Wright Ken Rev Study

Date(s)	Property Comments	Surrounding Area Comments
2005	704 Bullitt Ave SE 612 Bullitt Ave SE	Casey Patricia Evangel Four Square Gospel Church
2010	716 Bullitt Ave SE 708 Bullitt Ave SE 704 Bullitt Ave SE 632 Bullitt Ave SE 612 Bullitt Ave SE	Eckles Hilarie G Parker Jack L Casey Patricia D Hodges Niki New Beginnings Pentecostal
2014	716 Bullitt Ave SE 710 Bullitt Ave SE 708 Bullitt Ave SE 704 Bullitt Ave SE 632 Bullitt Ave SE	Graybill Ronald K Occupant Unknown Hopcroft Cheyenne Casey Patricia D Occupant Unknown
2017	716 Bullitt Ave SE 710 Bullitt Ave SE 708 Bullitt Ave SE 704 Bullitt Ave SE	Graybill Randy Santure Susanne Robker Lisa M Casey Patricia D
2020	708 Bullitt Ave SE 704 Bullitt Ave SE	Randall Cook Dimitruis Casey & Patricia Casey

6.4.4 Aerial Photos

Available aerial photographs of the Subject Property dated 1947 to 2018 were provided by EDR and reviewed for this Phase I ESA. Copies of these photographs are included in Appendix C of this report. A summary of available aerial photography is provided in the table below.

The aerial photography indicates that as early as 1947, the Property was developed with many single-family homes along its borders as well as a church in the southwest corner. The Property was also depicted with frontage along Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE. The Property was in a similar state up until 1968, when the homes in the northwest section of the Property were removed and the shape of the parcels had been altered to match the new layout of Jamison Ave SE. The Property was relatively unchanged up until 1982, when the land around the church had been developed into a parking lot. The Property was in a similar state up until 2005, when the homes along the northern border were all removed. The Property was relatively unchanged up until the latest aerial image from 2018.

Summary

Date(s)	Property Comments	Surrounding Area Comments
1947	- The Property is depicted with many single-family homes along the border, as well as a church in the southwest corner. - The Property is depicted with frontage along Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.	- The surrounding area is mostly composed of single-family homes, as well as a few businesses and institutions to the west and the railroad yard to the north. - The parcels adjacent to the Property are developed with single-family homes.
1956	- The Property is largely the same.	- The surrounding area is largely the same.
1960	- The Property is largely the same.	- The surrounding area is largely the same.
1968	- The homes in the northwest section of the Property have been removed and the shape of the parcels have been altered to match the new layout of Jamison Ave SE.	- Several streets have been altered, including Jamison Ave SE. - Rte 220 Hwy is depicted in the western section of the surrounding area. - There is an increase in commercial development in the northwestern section of the surrounding area.
1977	- The Property is largely the same.	- The surrounding area is largely the same.
1982	- The land around the church on the Property has been developed into a parking lot.	- There is an increase in commercial development in the northwestern section of the surrounding area.
1988	- The Property is largely the same.	- The surrounding area is largely the same.

Date(s)	Property Comments	Surrounding Area Comments
1995	- The Property is largely the same.	- There is an increase in commercial development in the northwestern section of the surrounding area.
2000	- The Property is largely the same.	- The surrounding area is largely the same.
2005	- The homes along the northern border of the Property are no longer depicted.	- The surrounding area is largely the same.
2009	- The Property is largely the same.	- The surrounding area is largely the same.
2011	- The Property is largely the same.	- The surrounding area is largely the same.
2014	- The Property is largely the same.	- The surrounding area is largely the same.
2018	- The Property is largely the same.	- The surrounding area is largely the same.

6.4.5 Sanborn/Historical Maps

Available Sanborn maps dated 1903 to 1969 from The Sanborn Library were reviewed for this Environmental Site Assessment. Copies of Sanborn maps are included in Appendix C of this report.

Summary

Date(s)	Property Comments	Surrounding Area Comments
1903	- The Property is depicted with frontage along Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE. - The Property is depicted as a mix of undeveloped lots and dwellings.	- The surrounding area is mostly composed of undeveloped lots and dwellings, as well as a church and several shops.
1907	- The Property is largely the same.	- The surrounding area is largely the same.
1919	- Most of the undeveloped lots in the Property are now depicted with dwellings.	- Most of the undeveloped lots within the surrounding area are now depicted with dwellings.
1951	- A church is depicted in the southwest corner of the Property.	- The surrounding area is largely the same.
1955	- The Property is largely the same.	- The surrounding area is largely the same.
1967	- The dwelling have been removed and the shape of the parcels in the northwest section of the Property have been altered to match the new layout of Jamison Ave SE.	- Several streets have been altered, including Jamison Ave SE.
1969	- The Property is largely the same.	- The surrounding area is largely the same.

6.4.6 Historical Topographic Maps

Available historical topographic maps dated 1890 to 2022 were provided by EDR and reviewed for this Phase I ESA. Copies of these maps are included in Appendix C of this report. A summary of the available topographic maps is provided below.

Summary

Date(s)	Quad	Property Comments	Surrounding Area Comments
1890	Roanoke	- The Property is depicted as undeveloped with no frontage.	- The surrounding area is depicted as a mix of undeveloped land and the City of Roanoke. - Many roads and highways are depicted running through the surrounding area. - Several railroads are depicted running through the surrounding area. - Several streams and the Roanoke River are depicted flowing through the surrounding area.
1891,1891	Bedford,Roanoke	- The Property is largely the same.	- The surrounding area is largely the same.
1929	Roanoke	- The Property is depicted with many structures along the borders. - The Property is depicted with frontage	- Most of the surrounding area has been developed and made part of the City of Roanoke.

		along Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.	- Many new roads are depicted running through the surrounding area, including Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE. - Many new structures are depicted throughout the surrounding area, including the parcels adjacent to the Property.
1933	Roanoke	- The Property is largely the same.	- The surrounding area is largely the same.
1962	Roanoke	- An aerial photograph is depicted instead of a topographic map.	- An aerial photograph is depicted instead of a topographic map.
1963,1963	Garden City,Roanoke	- The Property is largely the same.	- There is an increase in development throughout the surrounding area.
1968	Roanoke	- The Property is largely the same.	- The surrounding area is largely the same.
1977,1977	Garden City,Roanoke	- An aerial photograph is depicted instead of a topographic map.	- An aerial photograph is depicted instead of a topographic map.
1978,1978	Garden City,Roanoke	- The Property is largely the same.	- The surrounding area is largely the same.
1984,1984	Roanoke,Garden City	- The Property is largely the same.	- The surrounding area is largely the same.
2013,2013	Roanoke,Garden City	- The Property is largely the same.	- There is an increase in development throughout the surrounding area.
2016,2016	Roanoke,Garden City	- The Property is largely the same.	- The surrounding area is largely the same.
2019,2019	Roanoke,Garden City	- The Property is largely the same.	- The surrounding area is largely the same.
2022,2022	Roanoke,Garden City	- The Property is largely the same.	- The surrounding area is largely the same.

6.4.7 Other Environmental Reports

No other environmental reports were identified or made available by the client/user during the Phase I ESA.

6.4.8 Building Department Records

The Roanoke City Real Estate Records were reviewed for the Subject Property and are included in Appendix H of this report. The Property is composed of 30 parcels owned by Gateway Project LLC. Though the records obtained note structures on some parcels, no structures were present during site reconnaissance.

These records contain additional information referencing improvements on the parcel and remarks regarding other transactions for the Property. Information obtained from these records regarding improvements are detailed in Section 4.5 of this report. The Roanoke City Real Estate Records associated with the Subject Property are provided in Appendix H of this report.

6.4.9 Other Land Use Records

No other land use records were reviewed for this Phase I ESA report.

6.5 Environmental Liens and Activity/Use Limitations

No environmental liens or activity/use restrictions in connection with the Subject Property were identified by the user/client.

6.6 Vapor Encroachment Evaluation

Balzer and Associates, Inc. contracted EDR to conduct a search of Federal and State databases containing known or suspected sources of environmental contamination which may pose a risk of vapor encroachment. Copies of the EDR research data and a description of the databases are included in Appendix F of this report.

6 sites of concern were identified by EDR's Vapor Encroachment Screen in the vicinity of the Subject Property. An ERNS case on the Subject Property was related to lead paint dust and chips in the air and is not considered a risk for vapor encroachment. Other records are related to leaking tanks cases which are closed. Balzer and Associates, Inc. is of the opinion that there is little risk of vapor encroachment for the Subject Property.

Standard Environmental Records	Maximum Search Distance*	Property Total	Total within 1/10 mile from Property	Total between 1/10-1/3 mile from Property
Federal ERNS list	property	1		
State and tribal leaking storage tank lists	0.333			5
State and tribal registered storage tank lists	property			1
Other Standard Environmental Records	0.333			2

*Each category may include several separate databases, each having a different search distance. For each category, the table reports the maximum search distance applied.

7.0 SITE RECONNAISSANCE

7.1 Methodology and Limiting Conditions

The site reconnaissance was conducted on March 11, 2025 by Shane Ware with Balzer & Associates. Weather conditions at the time of the site reconnaissance were sunny. The visual reconnaissance consisted of observing the boundaries of the property and systematically traversing the site to provide an overlapping field of view, wherever possible. Photographs of pertinent site features identified during the site reconnaissance are included in Appendix B.

Adjacent land use was visually confirmed during site reconnaissance.

7.2 General Site Setting

The Subject Property includes thirty parcels located in Roanoke, Virginia. The Subject Property is approximately 3.74 aces in size and is currently zoned for industrial, mixed-use, and residential use. The Property currently has one owner, Gateway Project LLC, and can be directly accessed from Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.

The Property consists of a parking lot, a basketball court, and maintained lawns. Other improvements include driveways and utility lines. Drainage through the Property moves as sheet flow to the north and eventually off-site through the municipal storm sewer system.

7.3 Site Visit Findings

7.3.1 Hazardous Substances

No hazardous materials were identified on the Property during site reconnaissance.

7.3.2 Petroleum Products

No evidence of petroleum products was identified on the Property during site reconnaissance.

7.3.3 USTs

While the presence of PVC stubs indicate that there is sanitary infrastructure on-site, no readily apparent evidence of underground storage tanks was identified on the Property during site reconnaissance.

7.3.4 ASTs

No above-ground storage tanks were observed on the Property during site reconnaissance.

7.3.5 Other Suspect Containers

No other suspect containers were observed on the Property during site reconnaissance.

7.3.6 Equipment Likely to Contain PCBs

No equipment likely to contain PCBs was observed on the Property during the site reconnaissance.

7.3.7 Interior Staining/Corrosion

No structures currently exist on the Property. No staining or corrosion was observed on the Property which indicated the presence of a current or historic Recognized Environmental Condition for the Site.

7.3.8 Discharge Features

No discharge features constituting a material threat were identified on the Property during site reconnaissance.

7.3.9 Pits, Ponds, And Lagoons

No pits, ponds, or lagoons were located on the Property during site reconnaissance.

7.3.10 Solid Waste Dumping/Landfills

No readily apparent evidence of solid waste dumping or landfills were identified on the Property during site reconnaissance. Non-hazardous debris was identified in various places throughout the Property. The debris is not considered a current material threat to the Subject Property, however, it is recommended that the debris is removed from the Property in accordance with Virginia waste regulations.

7.3.11 Stained Soil/Stressed Vegetation

No stained soil or stressed vegetation was observed on the Property during site reconnaissance.

7.3.12 Wells

No wells were identified on the Property during site reconnaissance.

8.0 INTERVIEWS

	Summary
Role:	Local Gov't Official
Title:	Roanoke City, VA Parcel Viewer Application
Name:	Roanoke City GIS Office
Company:	Roanoke City
Method:	Website Review
Comments:	A review of the Roanoke City GIS system was completed for the parcels contained within the Subject Property. Parcel details including ownership, zoning, and acreage was available and are provided in Appendix H. None of the available information reviewable on the Roanoke City GIS website indicated the presence of a Recognized Environmental Condition in connection with the Subject Property
Role:	Client
Title:	CEO
Name:	Lee Clark
Company:	Rescue Mission of Roanoke
Method:	Written Response
Comments:	Mr. Clark was provided a questionnaire and replied with responses on March 3, 2025. The responses provided no knowledge of current or historic RECs in connection with the Subject Property.
Role:	Client
Title:	Vice President
Name:	Andrew Hanson
Company:	Homes for America Inc
Method:	Written Response
Comments:	Mr. Hanson was provided a questionnaire and replied with responses on March 3, 2025. The responses provided no knowledge of current or historic RECs in connection with the Subject Property.

FINDINGS

The Subject Property includes thirty parcels located in Roanoke, Virginia. The Subject Property is approximately 3.74 aces in size and is currently zoned for industrial, mixed-use, and residential use. The Property currently has one owner, Gateway Project LLC, and can be directly accessed from Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE.

The Property consists of a parking lot, a basketball court, and maintained lawns. Other improvements include driveways and utility lines. Drainage through the Property moves as sheet flow to the north and eventually off-site through the municipal storm sewer system.

Historical records including aerial photographs, topographic maps, Sanborn maps, and city directories beginning in 1890 were provided by EDR and reviewed for this Phase I ESA. These records are provided in Appendix C of this report. The sources indicate that as early as 1890, the Property was undeveloped land with no frontage. Between 1890 and 1903, several dwellings were constructed on the Property. The Property was also depicted with frontage along Bullitt Ave SE, Jamison Ave SE, 7th St SE, and 8th St SE. Between 1903 and 1919, most of the undeveloped lots of the Property were developed with dwellings. By 1947, the Property was developed with many single-family homes along its borders as well as a church in the southwest corner. The Property was in a similar state up until 1967, when the homes in the northwest section of the Property were removed and the shape of the parcels had been altered to match the new layout of Jamison Ave SE. The Property was relatively unchanged up until 1982, when the land around the church had been developed into a parking lot. The Property was in a similar state up until 2005, when the homes along the northern border were all removed. According to the city directories, the Property is associated with different church services from 1940 to 2010, as well as

various private owners from 1940 to 2020.The Property was relatively unchanged up until the latest historical record from 2022.

The Subject Property was identified in 1 database (ERNS) at the address 708 Bullitt Ave SE. The ERNS case record provide by EDR is related to a 2016 call reporting lead-based paint dust and chips resulting from building construction. In order to obtain additional information on these records, a Freedom of Information Act (FOIA) request was made (See Section 6.2). The request did not yield any additional records related to the site. Balzer also contacted local Health Department and Fire Department offices for information on reports concerning the Subject Properties and did not receive a response at the time of report publication. Since the related Emergency Response Notification System (ERNS) case does not indicate any lingering contamination or required remediation efforts it is now considered a Historic REC. No further corrective actions or investigations are recommended at this time.

In this records review process, it was identified that many of the sites and facilities in the vicinity of the Subject Property reportedly utilize petroleum products and hazardous chemicals in conjunction with their normal operation. Though these sites are under monitored compliance and do not pose a current material threat to the Subject Property, Balzer and Associates, Inc. recommends that the Property ownership remain aware of leaks, spills, violations, and other incidents which may cause adverse environmental impacts originating from these sites and pursue further environmental investigation if warranted at such time.

Small quantities of non-hazardous debris consisting primarily of litter was identified on the Property. The debris is not considered a current material threat to the site. It is recommended that the debris be removed from the Property and properly disposed of in accordance with Virginia waste regulations.

OPINIONS

Balzer and Associates, Inc. has performed a Phase I Environmental Site Assessment (Phase I ESA) on the Subject Property identified as Gateway Project in Roanoke, Virginia. The Phase I ESA has performed in general conformance with the scope of work and limitations of ASTM Practice E 1527-21.

This assessment has revealed no evidence of Recognized Environmental Conditions (RECs) in connection with the Subject Property. It is the opinion of Balzer and Associates, Inc. that no further environmental assessment is warranted at this time.

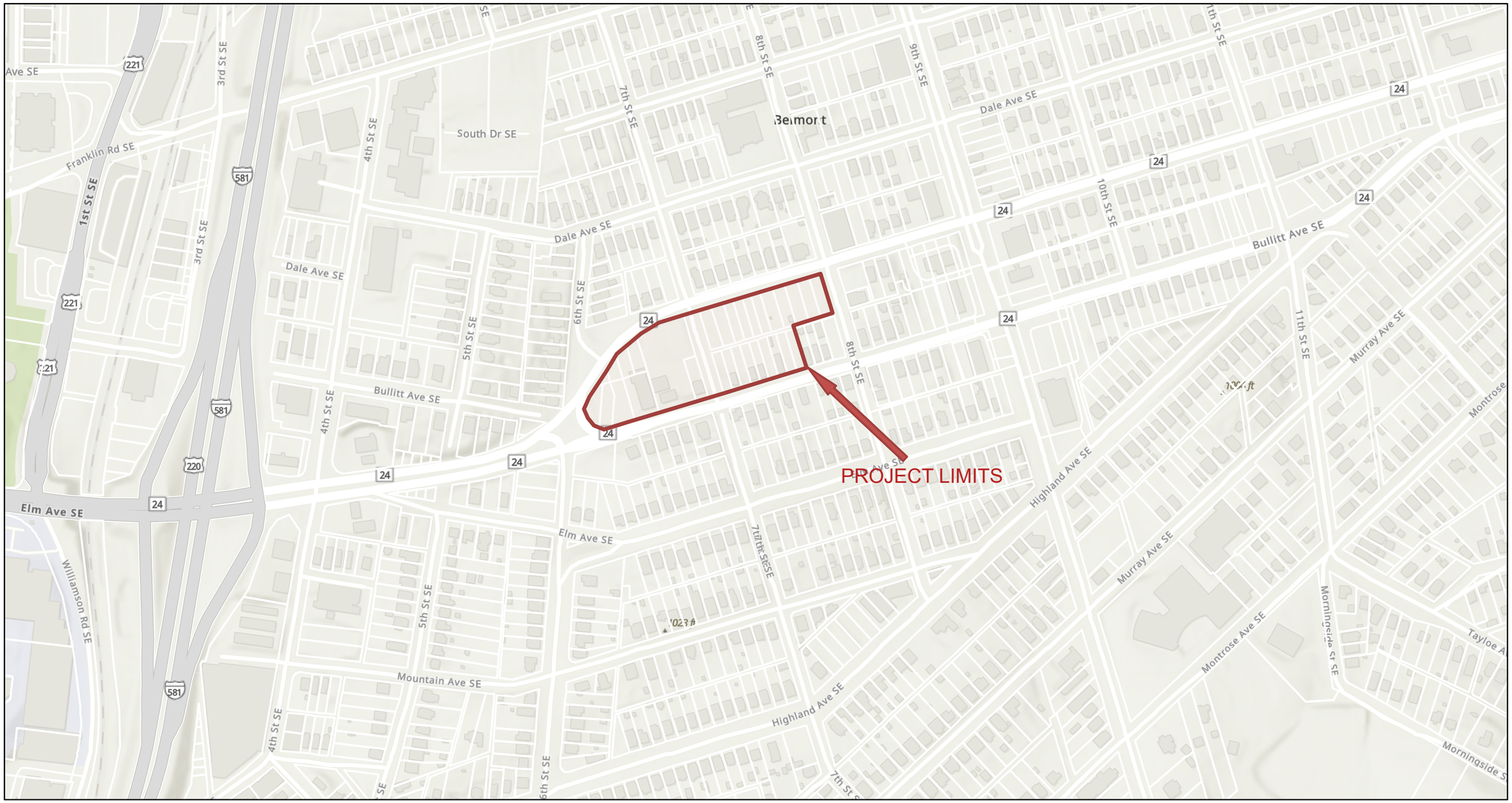
CONCLUSIONS

After completion of the research for the Subject Property, Balzer and Associates, Inc. has concluded that the Property does not contain Recognized Environmental Conditions (RECs) and no further evaluation is warranted at this time.

Appendix A:

Figures

Wetland Web Map



2/28/2025, 1:24:19 PM

1:4,514

0 0.04 0.09 0.18 mi

0 0.05 0.1 0.2 km

Areas

- Override 1
- Override 2
- Parcel (VDEM)

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and

Balzer & Associates, Inc.

Esri Community Maps Contributors, VGIN, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS | GIS Office, Planning | GIS Office | GIS Office, Public Works | GIS Office, Real Estate | GIS Office, Public Utilities |

Appendix B:

Photographs



1: Adjacent properties to the north



2: Adjacent properties to the east



3: Adjacent properties to the south



4: Center of the Property



5: Driveway cutting through the center of the Property



6: Parking lot located in the western corner of the Property



7: Basketball court and powerlines in western corner of the Property



8: Underground utilities located on-site



9: Trash found on the Property

Appendix C:

Historical Research

Gateway Project - Homes for America

632 Bullitt Avenue Southeast

Roanoke, VA 24013

Inquiry Number: 7912252.4

February 28, 2025

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

02/28/25

Site Name:

Gateway Project - Homes for A
632 Bullitt Avenue Southeast
Roanoke, VA 24013
EDR Inquiry # 7912252.4

Client Name:

Balzer & Associates
15871 City View Drive
Midlothian, VA 23113
Contact: Tim Sakowski

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Balzer & Associates were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# NA
Project: 04220022.01

Coordinates:

Latitude:	37.267948 37° 16' 5" North
Longitude:	-79.931249 -79° 55' 52" West
UTM Zone:	Zone 17 North
UTM X Meters:	594760.02
UTM Y Meters:	4125132.59
Elevation:	962.03' above sea level

Maps Provided:

2022	1963
2019	1962
2016	1933
2013	1929
1984	1891
1978	1890
1977	
1968	

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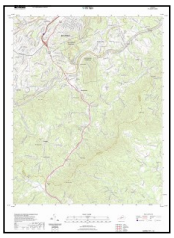
Topo Sheet Key

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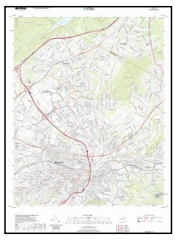


Roanoke
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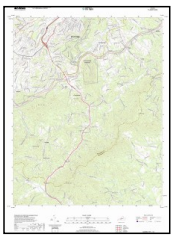


Garden City
2022
7.5-minute, 24000

2019 Source Sheets

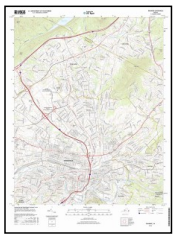


Roanoke
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Garden City
2019
7.5-minute, 24000

2016 Source Sheets

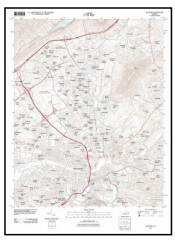


Roanoke
2016
7.5-minute, 24000



Garden City
2016
7.5-minute, 24000

2013 Source Sheets



Roanoke
2013
7.5-minute, 24000



Garden City
2013
7.5-minute, 24000

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1984 Source Sheets



Roanoke
1984
7.5-minute, 24000
Aerial Photo Revised 1982



Garden City
1984
7.5-minute, 24000
Aerial Photo Revised 1962

1978 Source Sheets



Garden City
1978
7.5-minute, 24000
Aerial Photo Revised 1977



Roanoke
1978
7.5-minute, 24000
Aerial Photo Revised 1977

1977 Source Sheets



Garden City
1977
7.5-minute, 24000
Aerial Photo Revised 1977



Roanoke
1977
7.5-minute, 24000
Aerial Photo Revised 1977

1968 Source Sheets



Roanoke
1968
7.5-minute, 24000
Aerial Photo Revised 1968

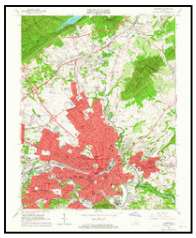
Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1963 Source Sheets



Garden City
1963
7.5-minute, 24000
Aerial Photo Revised 1962



Roanoke
1963
7.5-minute, 24000
Aerial Photo Revised 1960

1962 Source Sheets



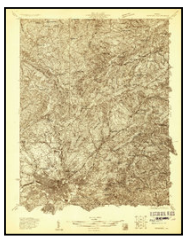
Roanoke
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7.5-minute, 24000
Aerial Photo Revised 1960

1933 Source Sheets



Roanoke
1933
15-minute, 62500

1929 Source Sheets

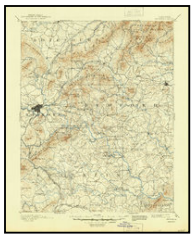


Roanoke
1929
15-minute, 48000

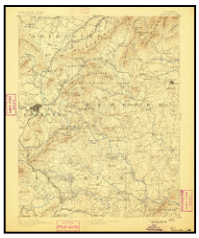
Topo Sheet Key

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1891 Source Sheets



Bedford
1891
30-minute, 125000



Roanoke
1891
30-minute, 125000

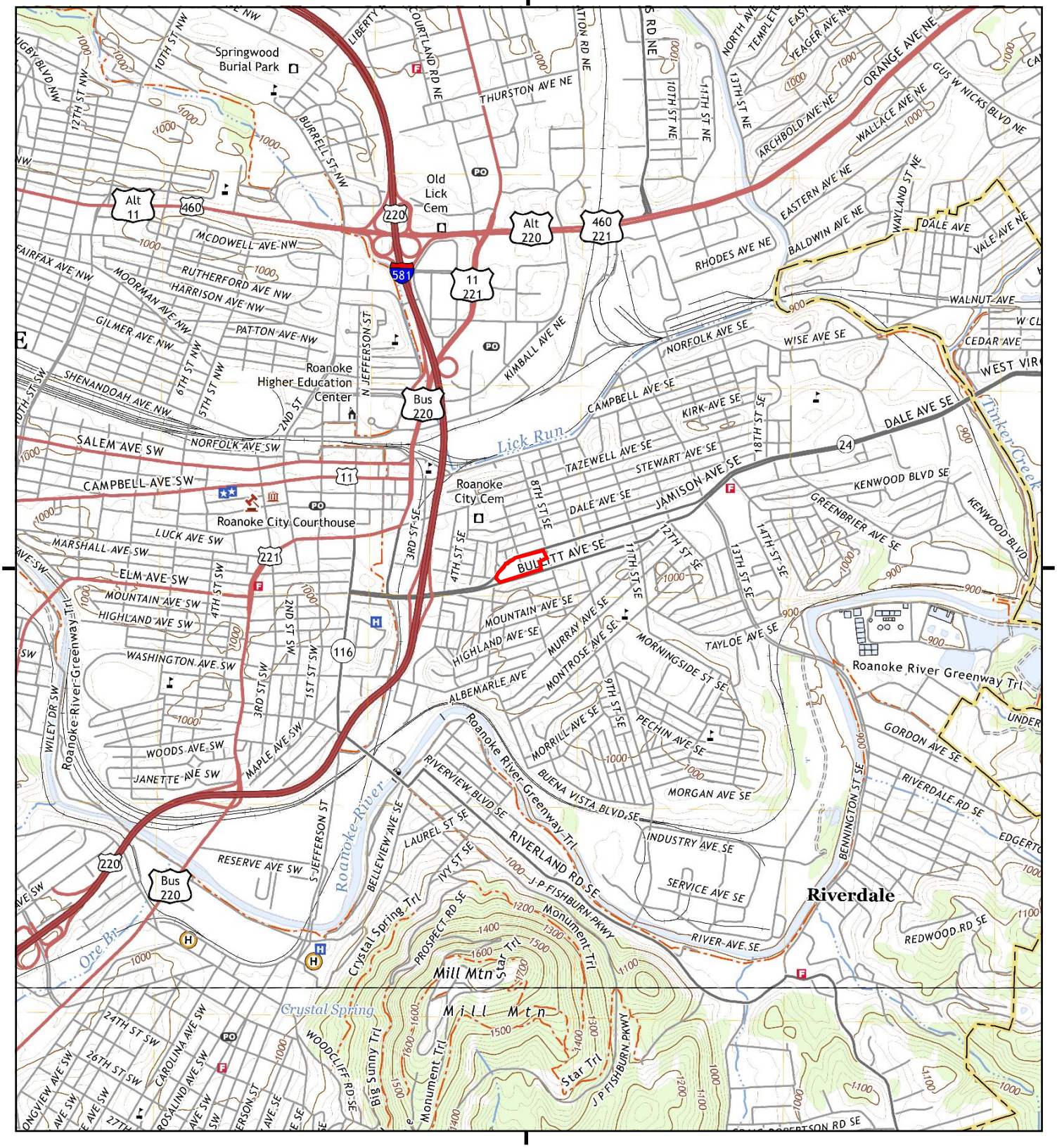
1890 Source Sheets



Roanoke
1890
30-minute, 125000

Historical Topo Map

2022



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W E
SW S SE

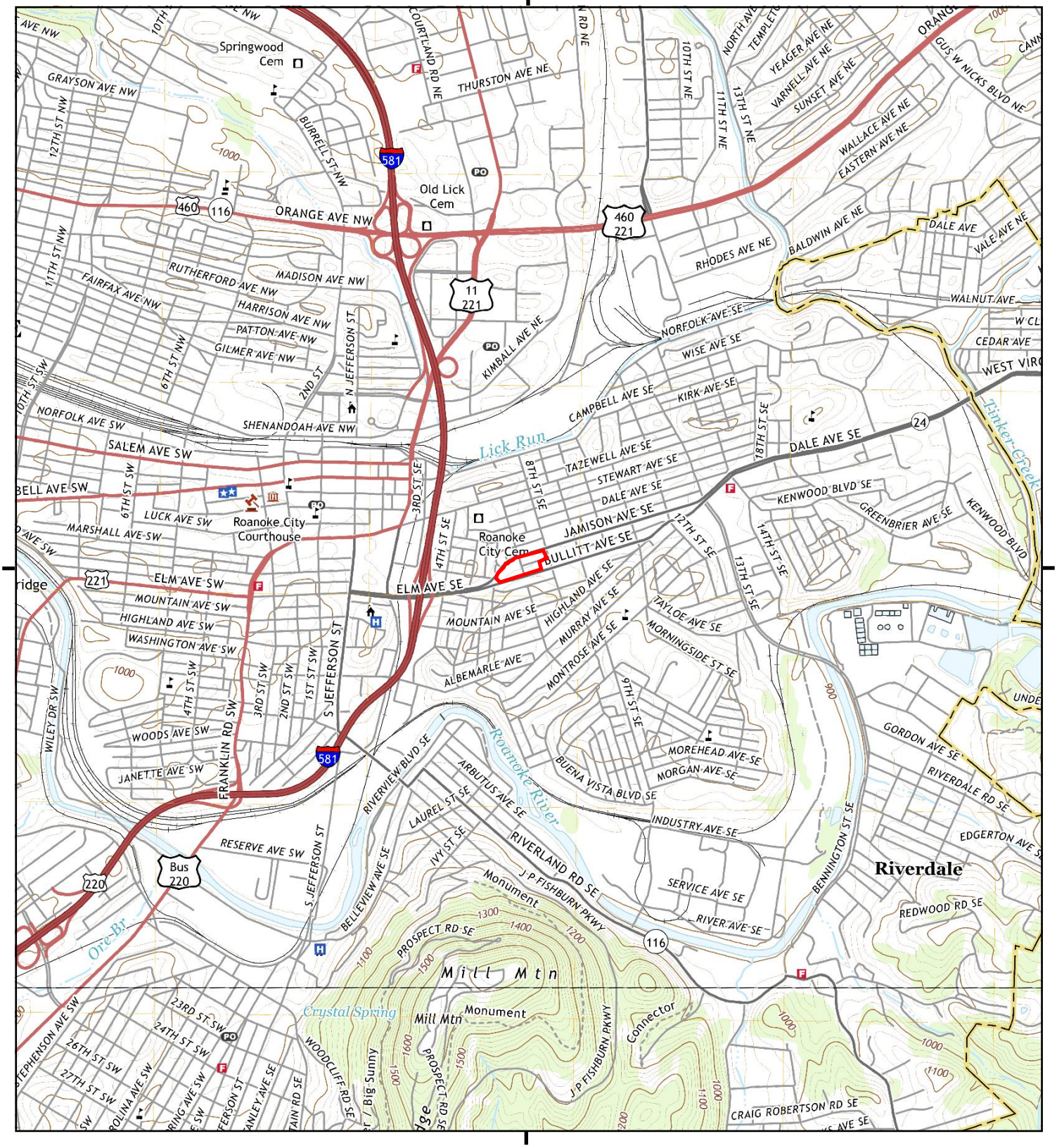
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S, Garden City, 2022, 7.5-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N

Historical Topo Map

2019



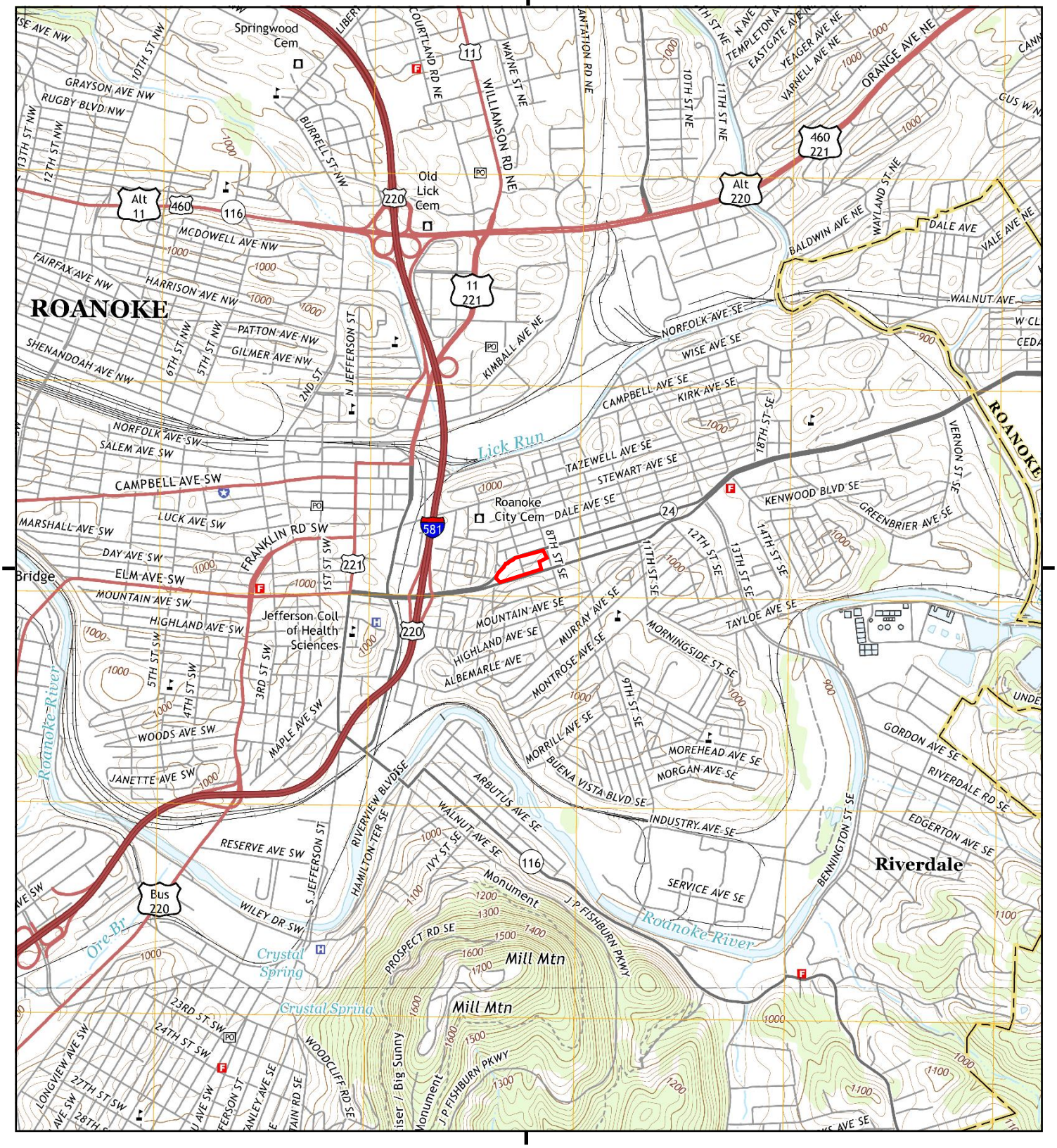
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W E
SW S SE

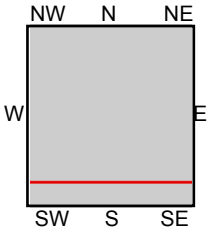
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ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

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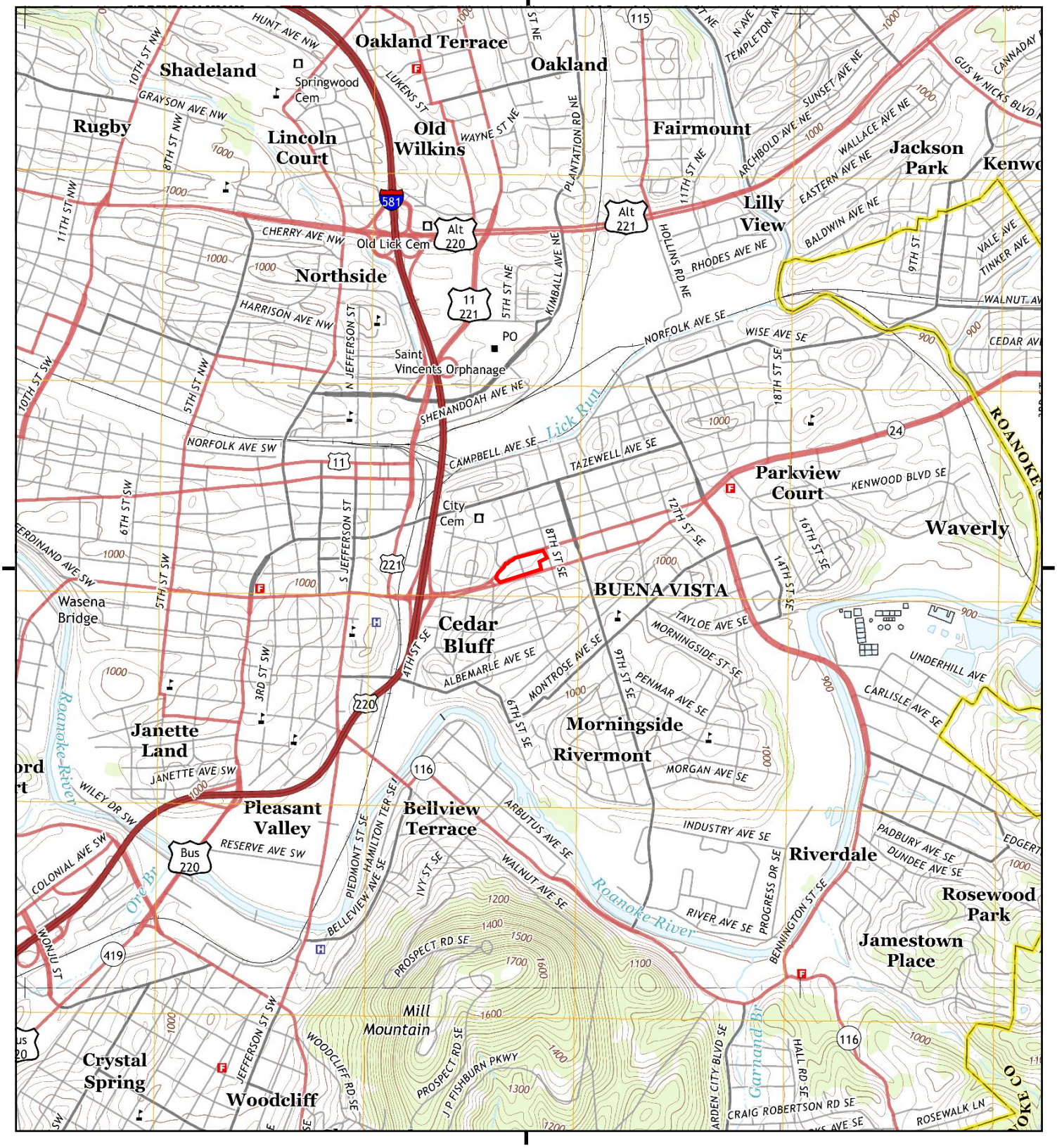
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SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N



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0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

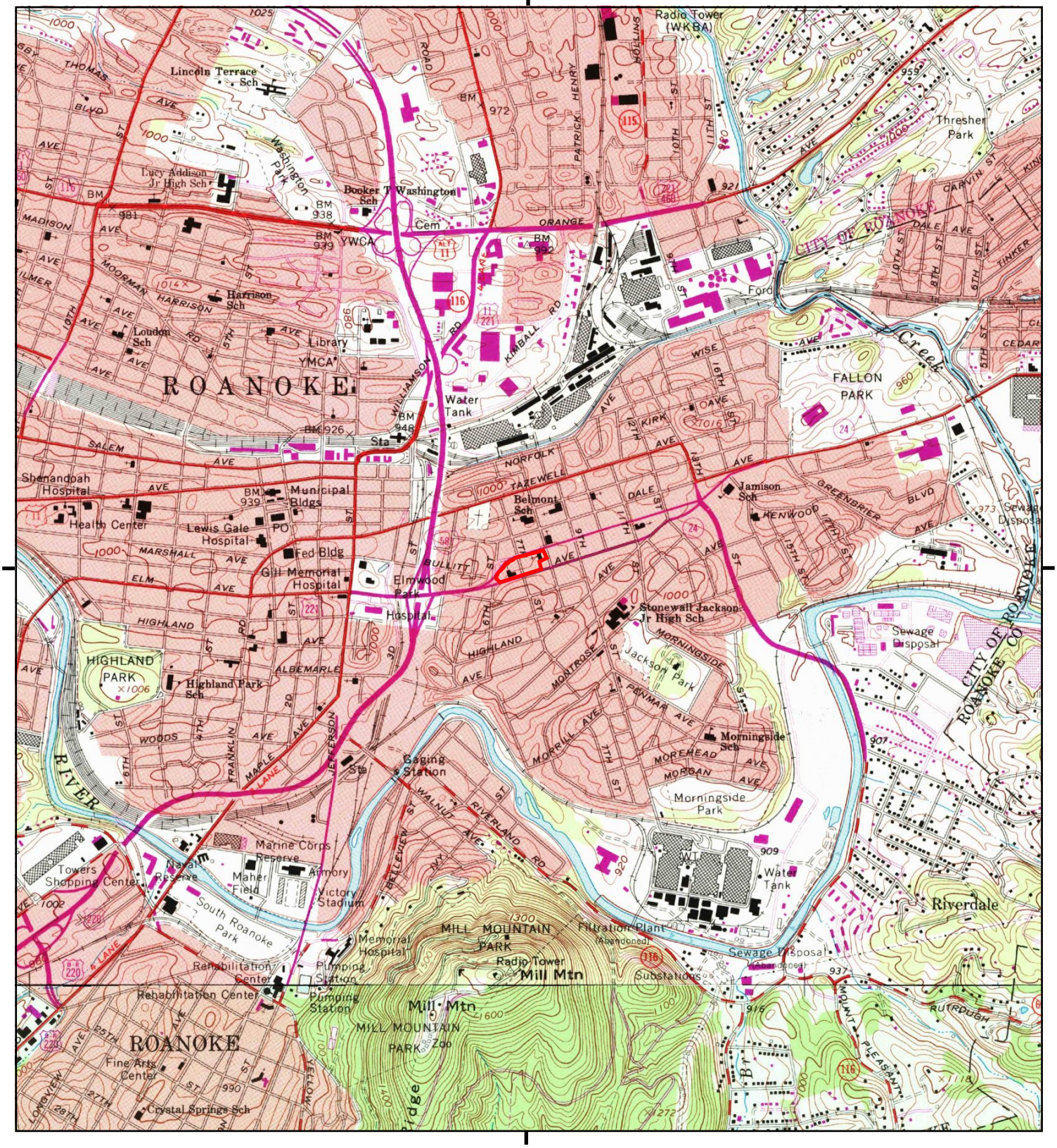
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Roanoke, VA 24013
CLIENT: Balzer & Associates

N

Historical Topo Map

1984



This report includes information from the following map sheet(s).

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NW N NE
W E
SW S SE

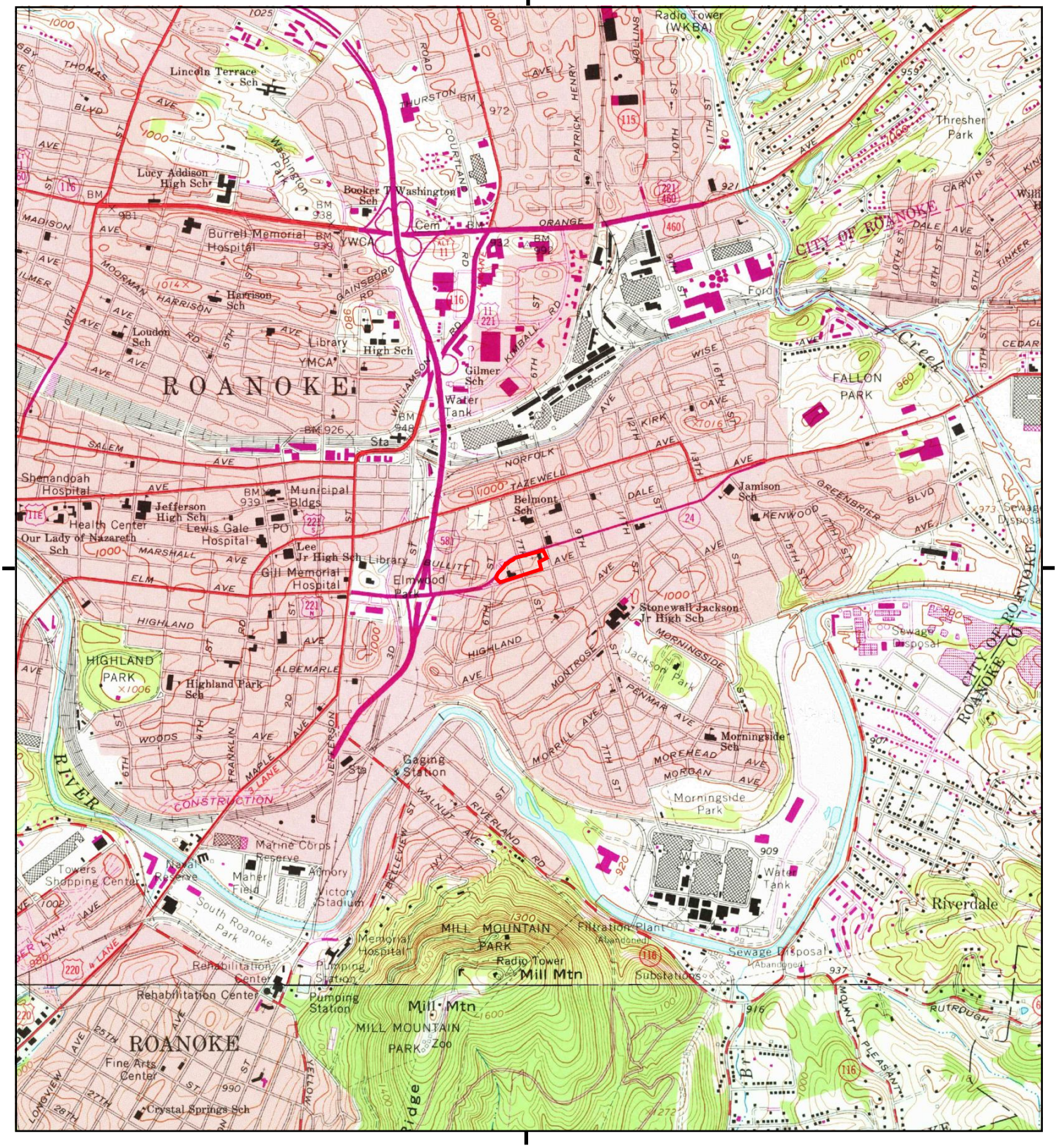
TP, Roanoke, 1984, 7.5-minute
S, Garden City, 1984, 7.5-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N

Historical Topo Map

1978



This report includes information from the following map sheet(s).

TP, Roanoke, 1978, 7.5-minute
S, Garden City, 1978, 7.5-minute

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N

Historical Topo Map

1977



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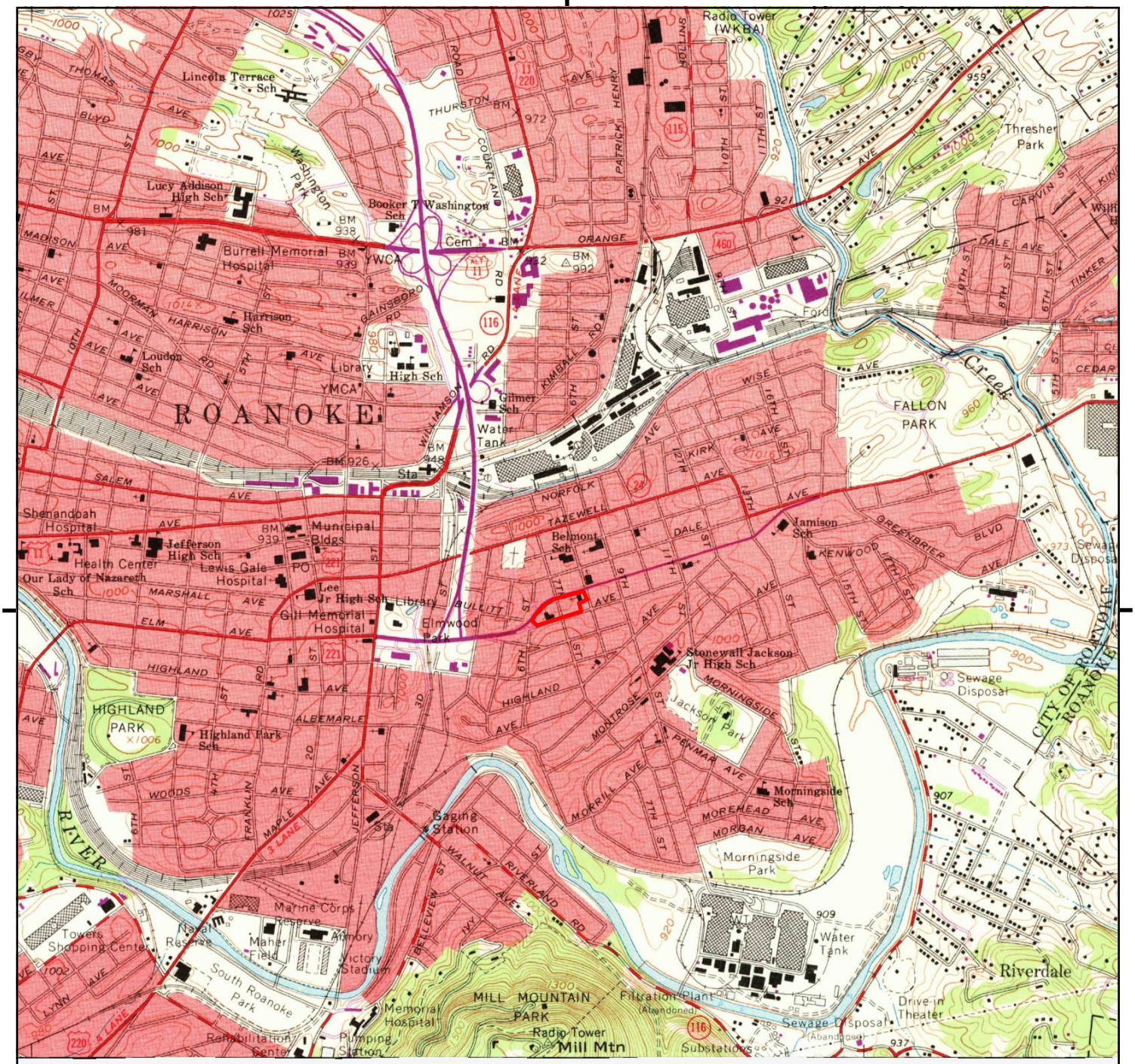
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Roanoke, 1977, 7.5-minute
S, Garden City, 1977, 7.5-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N



This report includes information from the following map sheet(s).

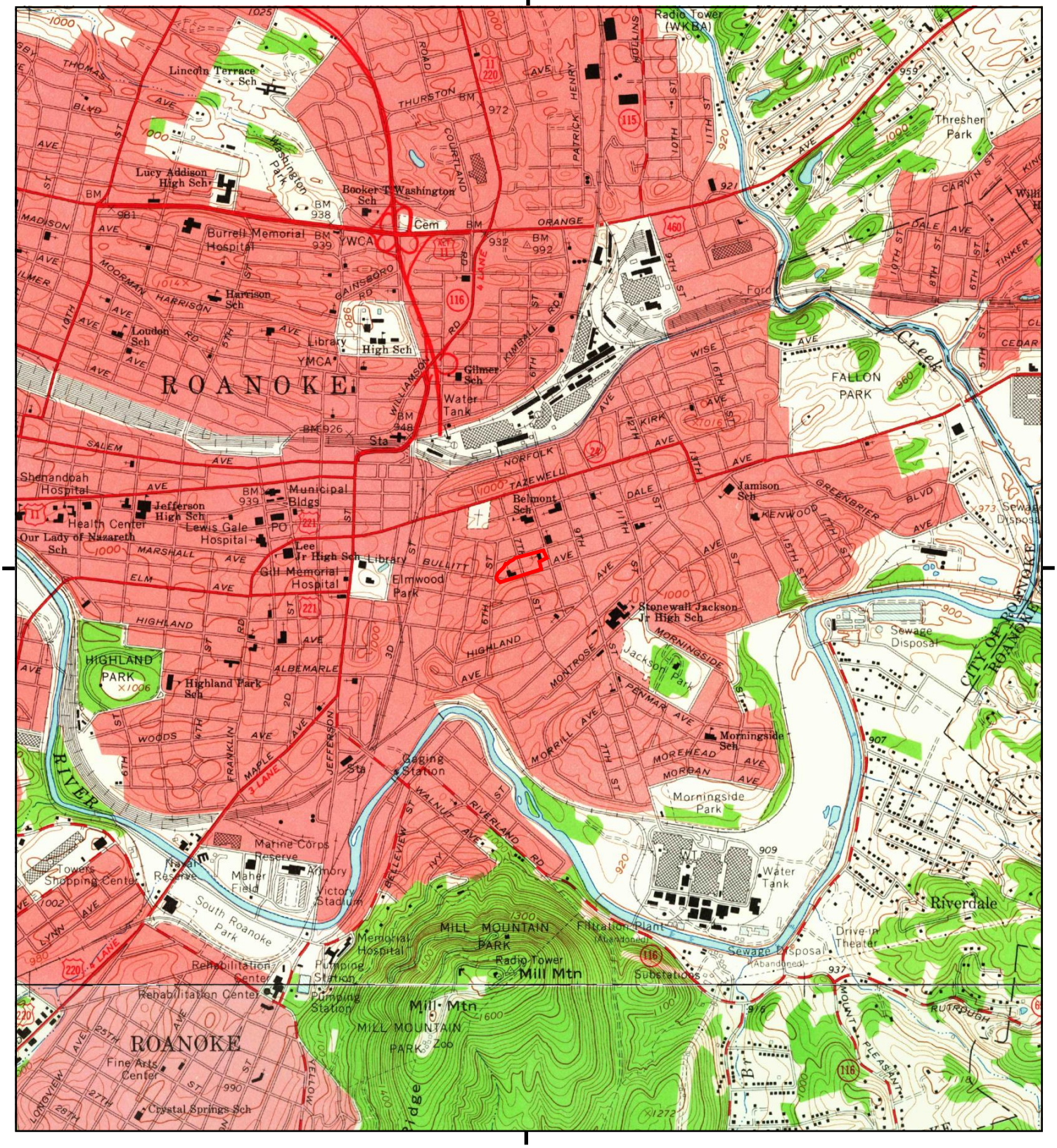
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Roanoke, 1968, 7.5-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N



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TP, Roanoke, 1963, 7.5-minute
S, Garden City, 1963, 7.5-minute

NW N NE
W E
SW S SE

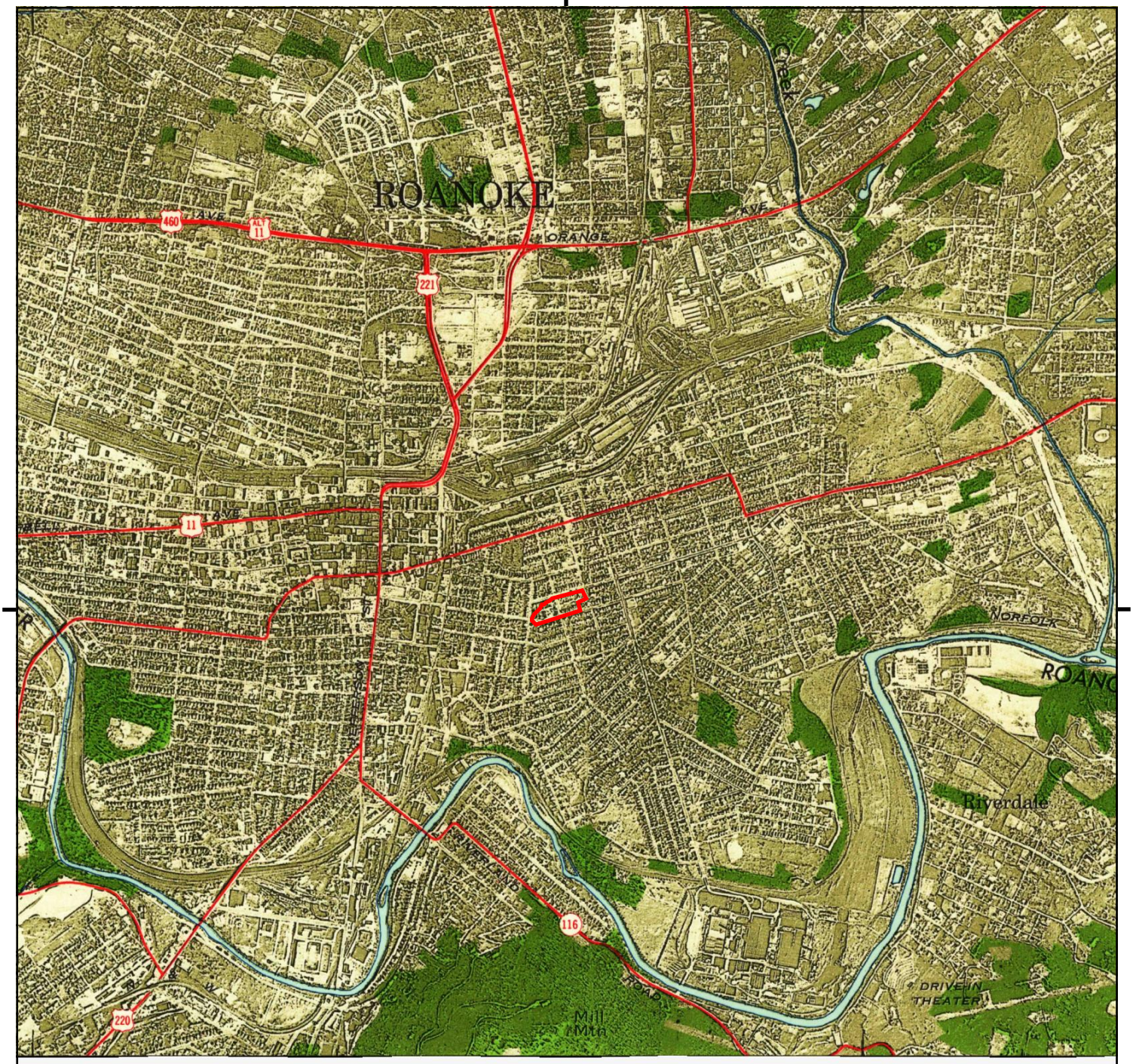
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SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N

Historical Topo Map

1962



UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED
UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED

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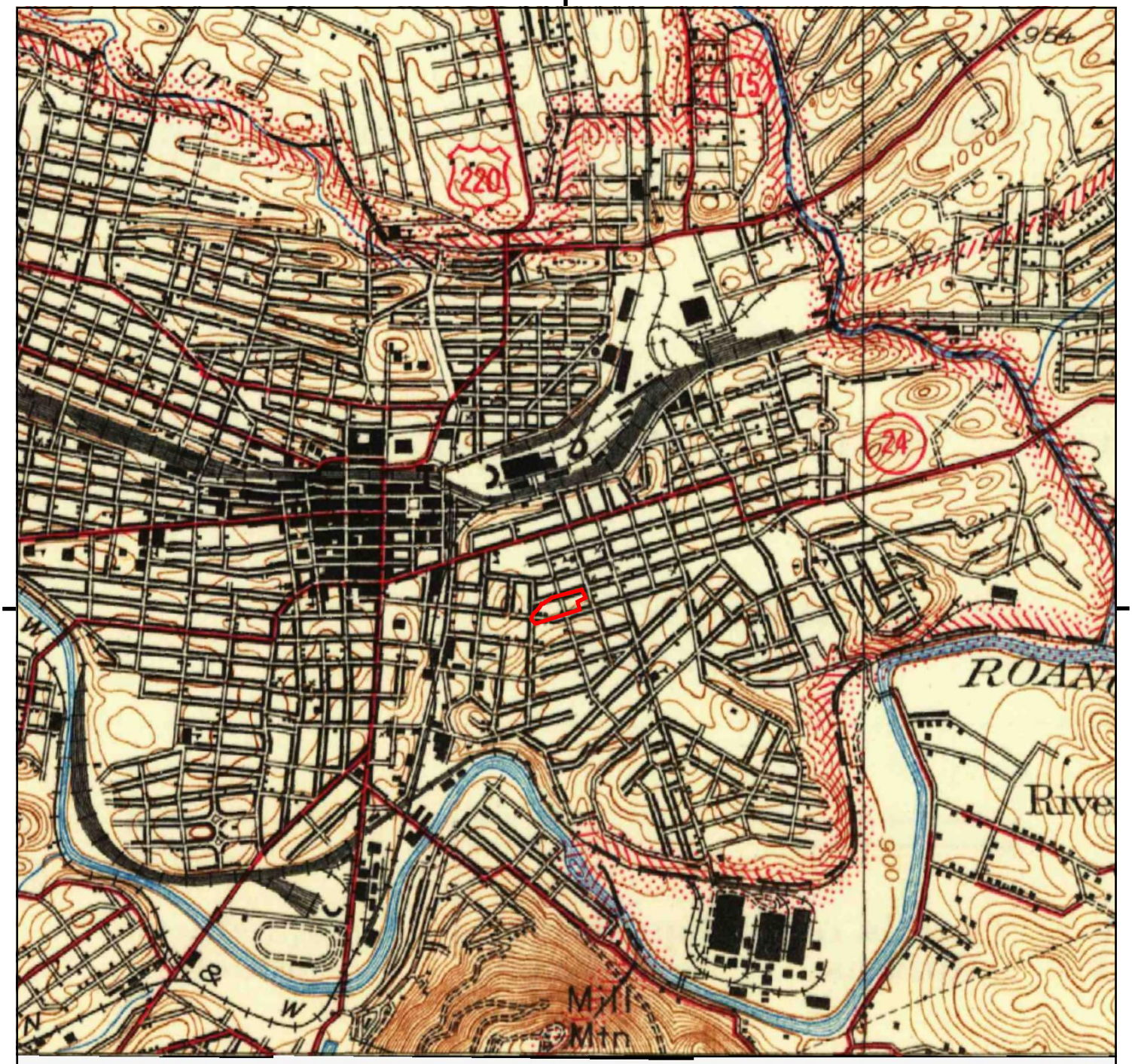
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NW N NE
W E
SW S SE

TP, Roanoke, 1962, 7.5-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N



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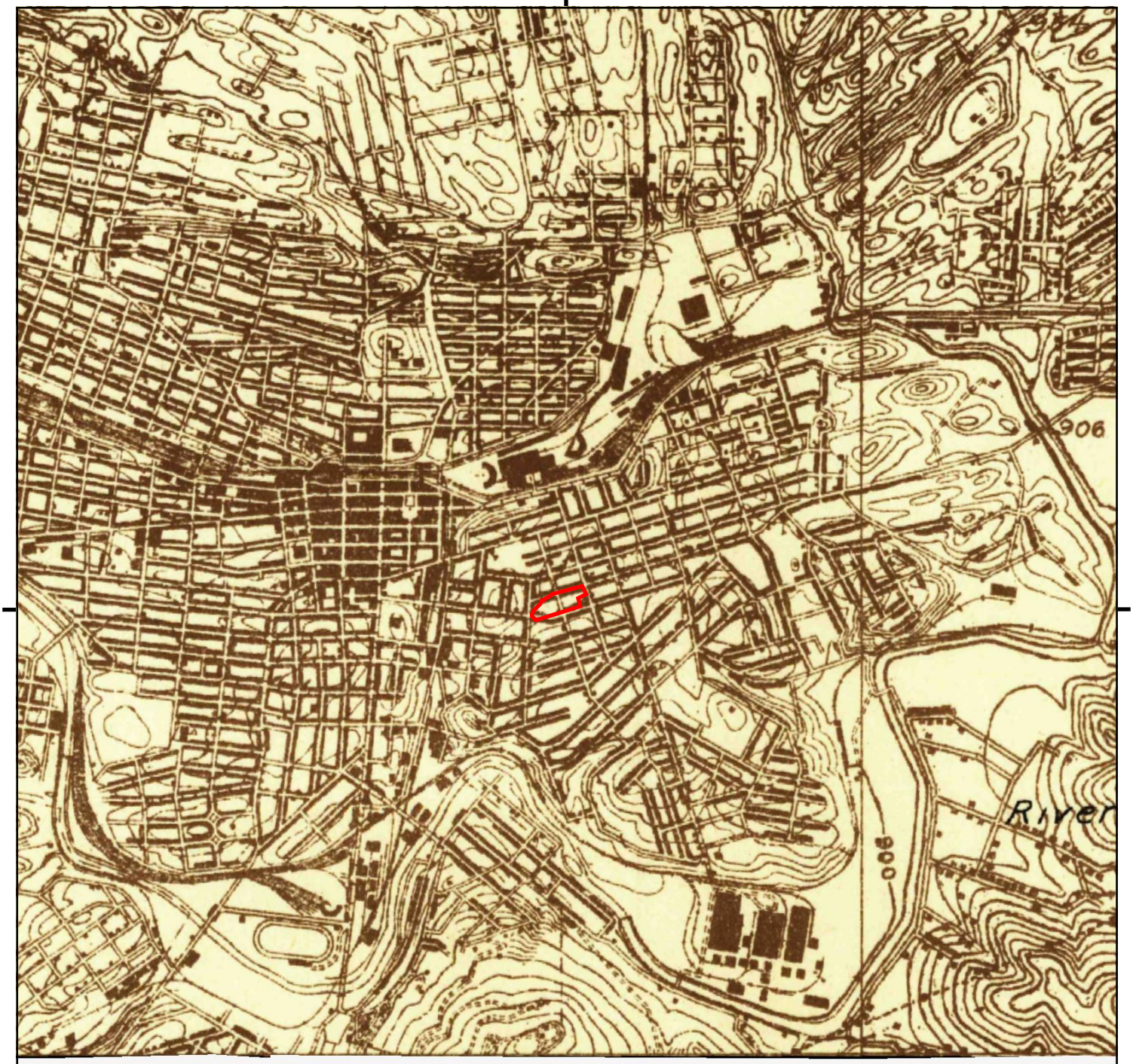
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NW N NE
W E
SW S SE

TP, Roanoke, 1933, 15-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N



UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED
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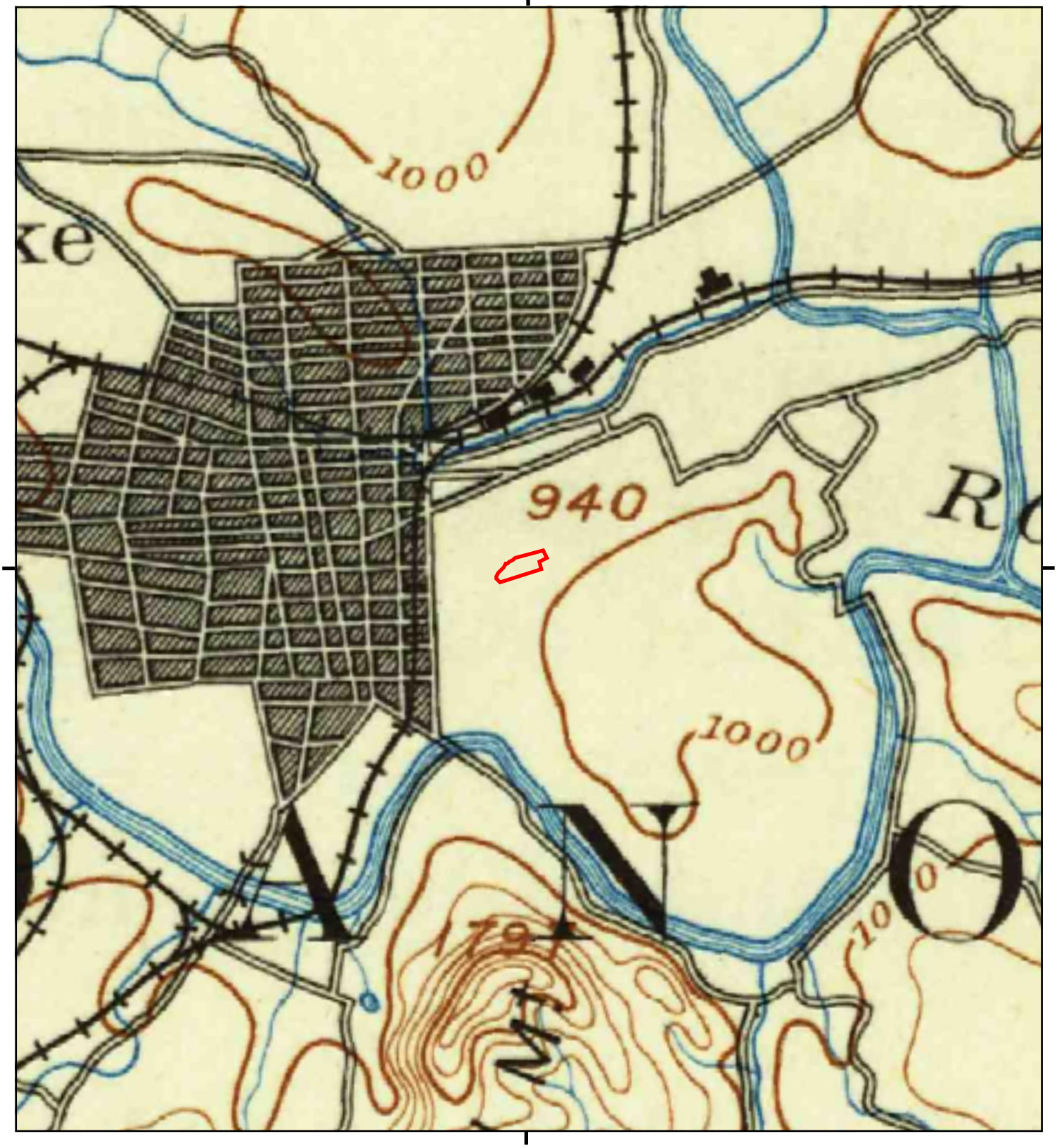
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NW N NE
W E
SW S SE

TP, Roanoke, 1929, 15-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N



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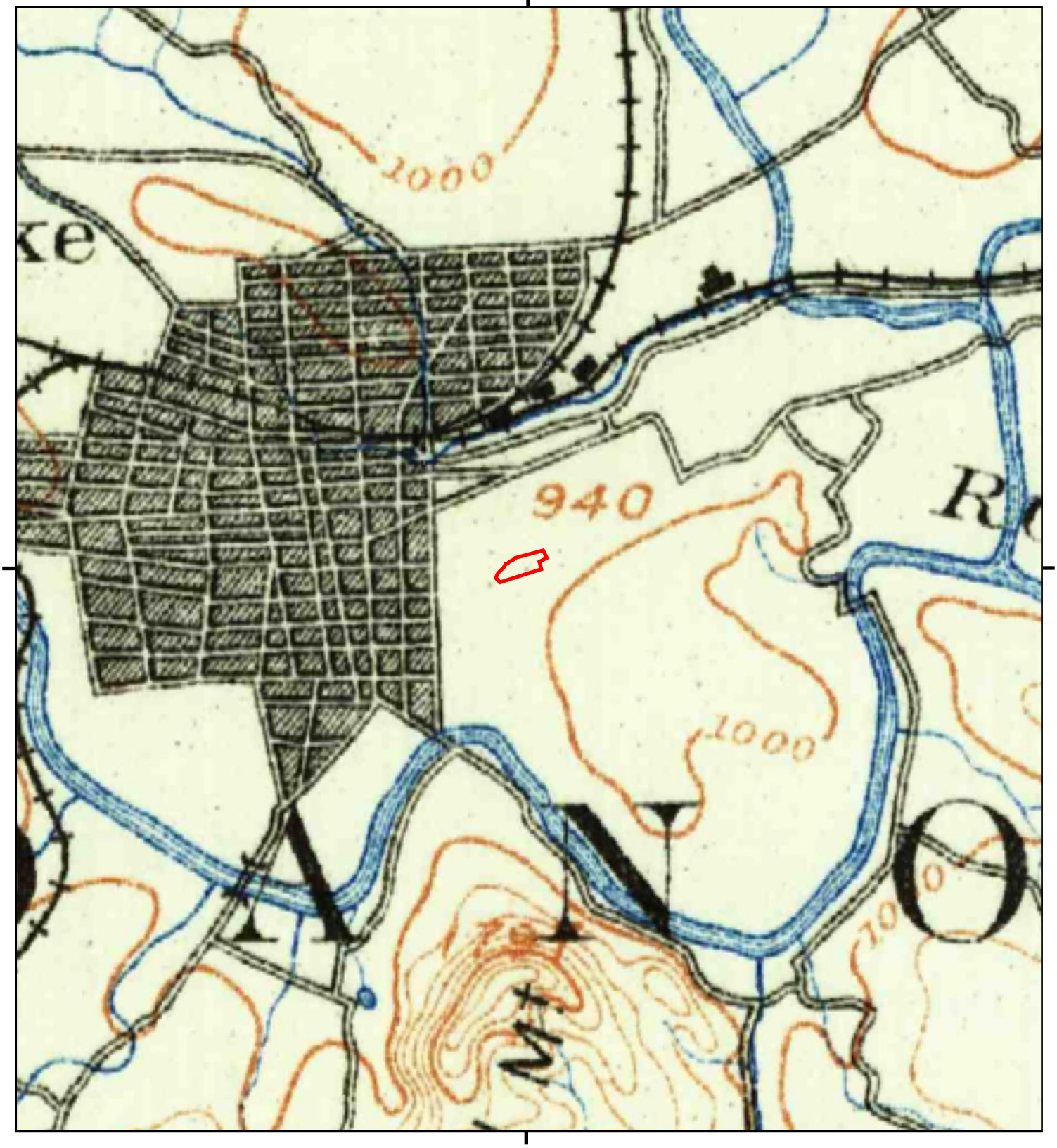
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Bedford, 1891, 30-minute
TP, Roanoke, 1891, 30-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Roanoke, 1890, 30-minute

SITE NAME: Gateway Project - Homes for America
ADDRESS: 632 Bullitt Avenue Southeast
Roanoke, VA 24013
CLIENT: Balzer & Associates

N

Gateway Project - Homes for America

632 Bullitt Avenue Southeast

Roanoke, VA 24013

Inquiry Number: 7912252.3

February 28, 2025

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

02/28/25

Site Name:

Gateway Project - Homes for A
632 Bullitt Avenue Southeast
Roanoke, VA 24013
EDR Inquiry # 7912252.3

Client Name:

Balzer & Associates
15871 City View Drive
Midlothian, VA 23113
Contact: Tim Sakowski

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Certified Sanborn Results:

Certification # E91C-4D8A-A832

PO # NA

Project 04220022.01

Maps Provided:

1969
1967
1955
1951
1919
1907
1903

Sanborn® Library search results

Certification #: E91C-4D8A-A832

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- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

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Sanborn Sheet Key

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

1969 Source Sheets



Volume 1, Sheet 70
1969

1967 Source Sheets



Volume 1, Sheet 70
1967

1955 Source Sheets



Volume 1, Sheet 70
1955

1951 Source Sheets



Volume 1, Sheet 70
1951

Sanborn Sheet Key

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

1919 Source Sheets



Volume 1, Sheet 70
1919

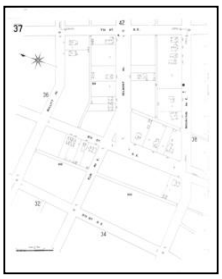
1907 Source Sheets



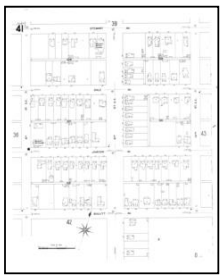
Volume 1, Sheet 36
1907



Volume 1, Sheet 42
1907

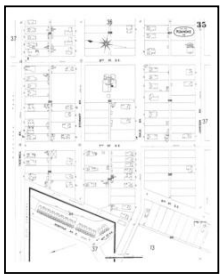


Volume 1, Sheet 37
1907



Volume 1, Sheet 41
1907

1903 Source Sheets



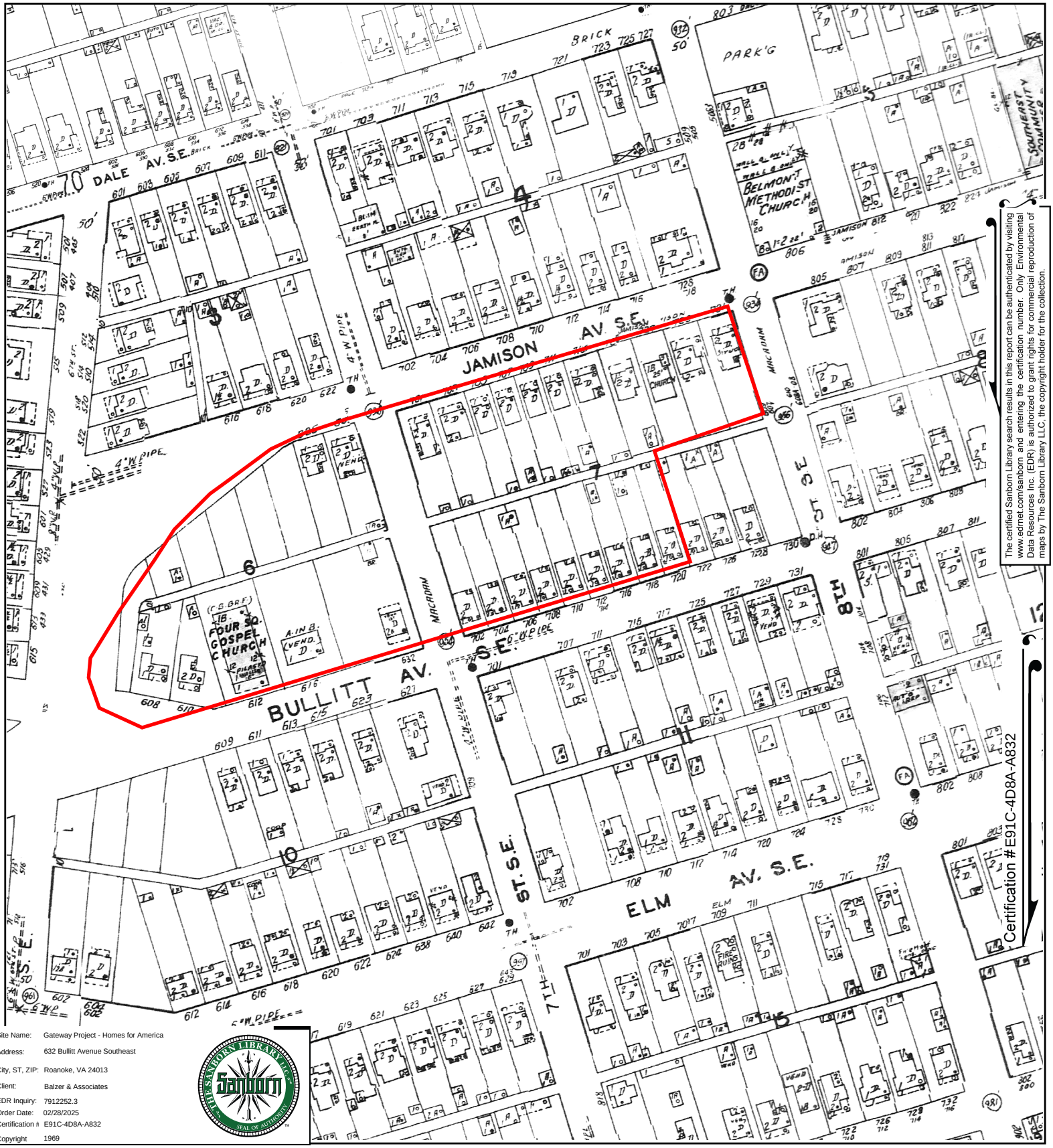
Volume 1, Sheet 35
1903



Volume 1, Sheet 37
1903

Certified Sanborn® Map

1969



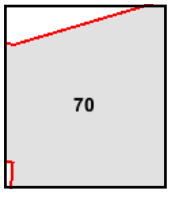
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Site Name:	Gateway Project - Homes for America
Address:	632 Bullitt Avenue Southeast
City, ST, ZIP:	Roanoke, VA 24013
Client:	Balzer & Associates
EDR Inquiry:	7912252.3
Order Date:	02/28/2025
Certification #:	E91C-4D8A-A832
Copyright	1969

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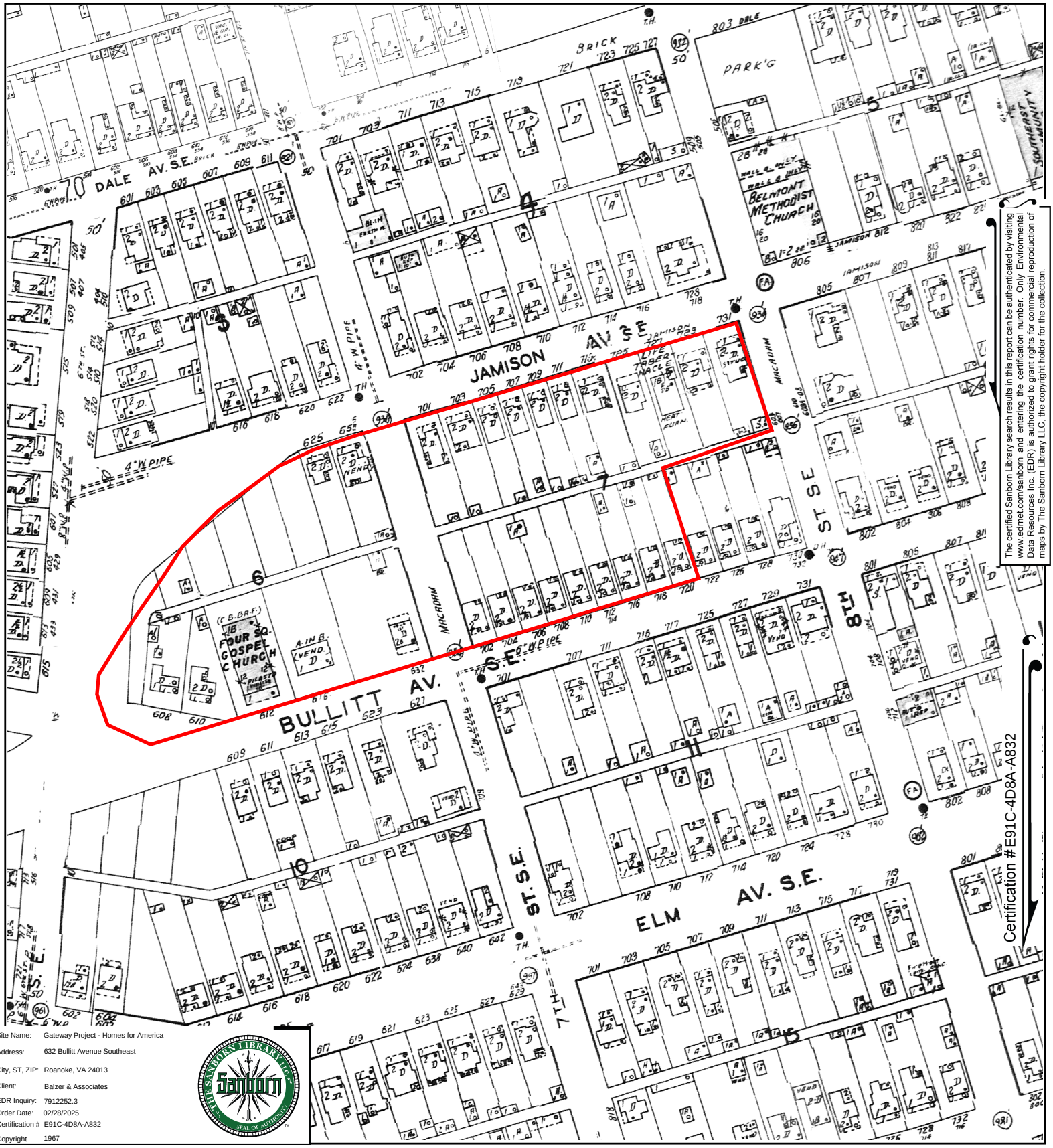
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Volume 1, Sheet 70

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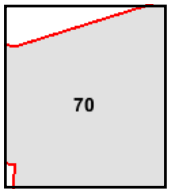
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Site Name:	Gateway Project - Homes for America
Address:	632 Bullitt Avenue Southeast
City, ST, ZIP:	Roanoke, VA 24013
Client:	Balzer & Associates
EDR Inquiry:	7912252.3
Order Date:	02/28/2025
Certification #:	E91C-4D8A-A832
Copyright	1967

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Volume 1, Sheet 70

N



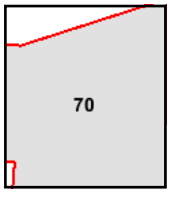
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Site Name:	Gateway Project - Homes for America
Address:	632 Bullitt Avenue Southeast
City, ST, ZIP:	Roanoke, VA 24013
Client:	Balzer & Associates
EDR Inquiry:	7912252.3
Order Date:	02/28/2025
Certification #:	E91C-4D8A-A832
Copyright	1955

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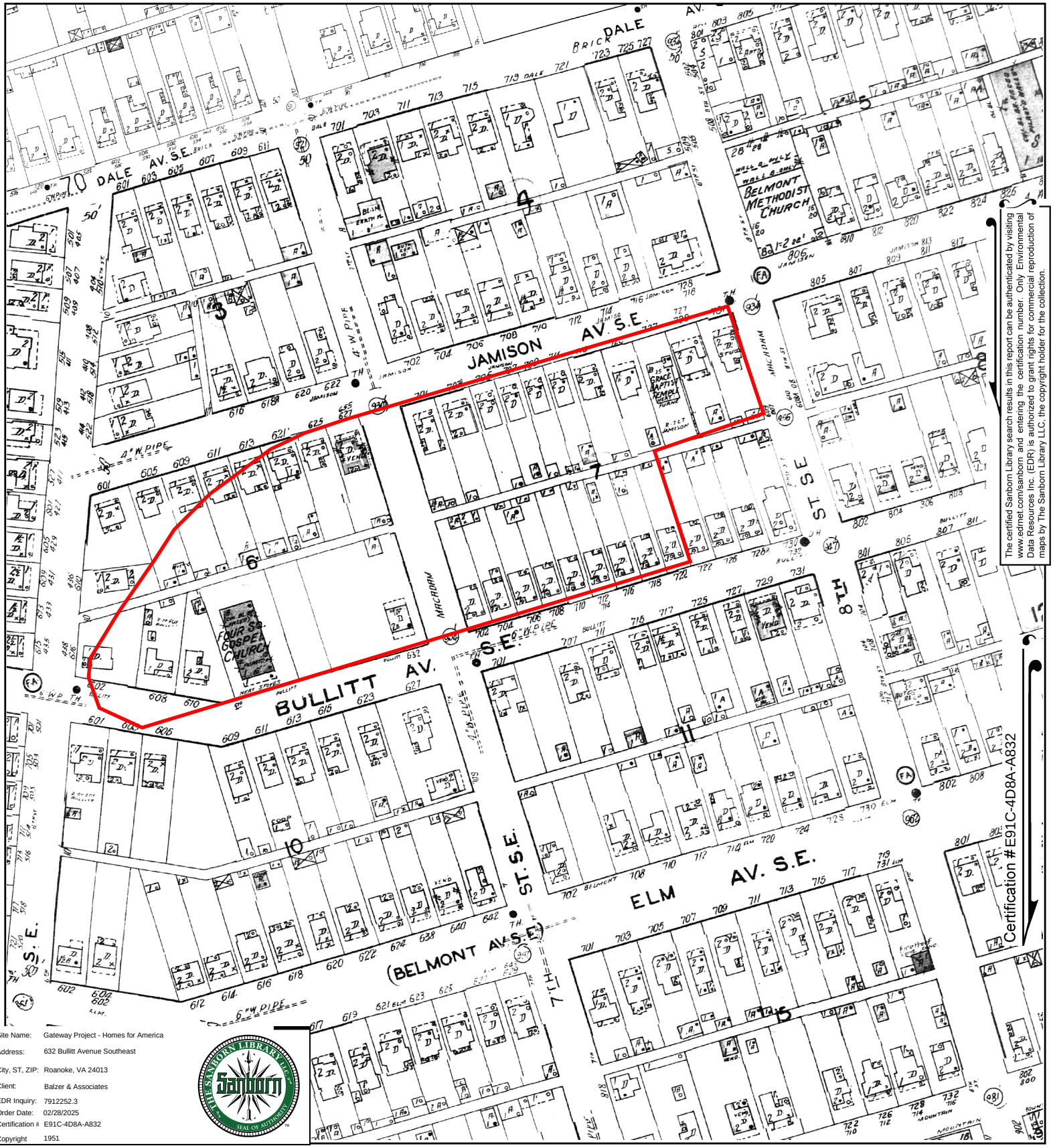
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Volume 1, Sheet 70

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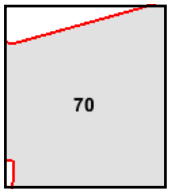
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Site Name:	Gateway Project - Homes for America
Address:	632 Bullitt Avenue Southeast
City, ST, ZIP:	Roanoke, VA 24013
Client:	Balzer & Associates
EDR Inquiry:	7912252.3
Order Date:	02/28/2025
Certification #:	E91C-4D8A-A832
Copyright	1951

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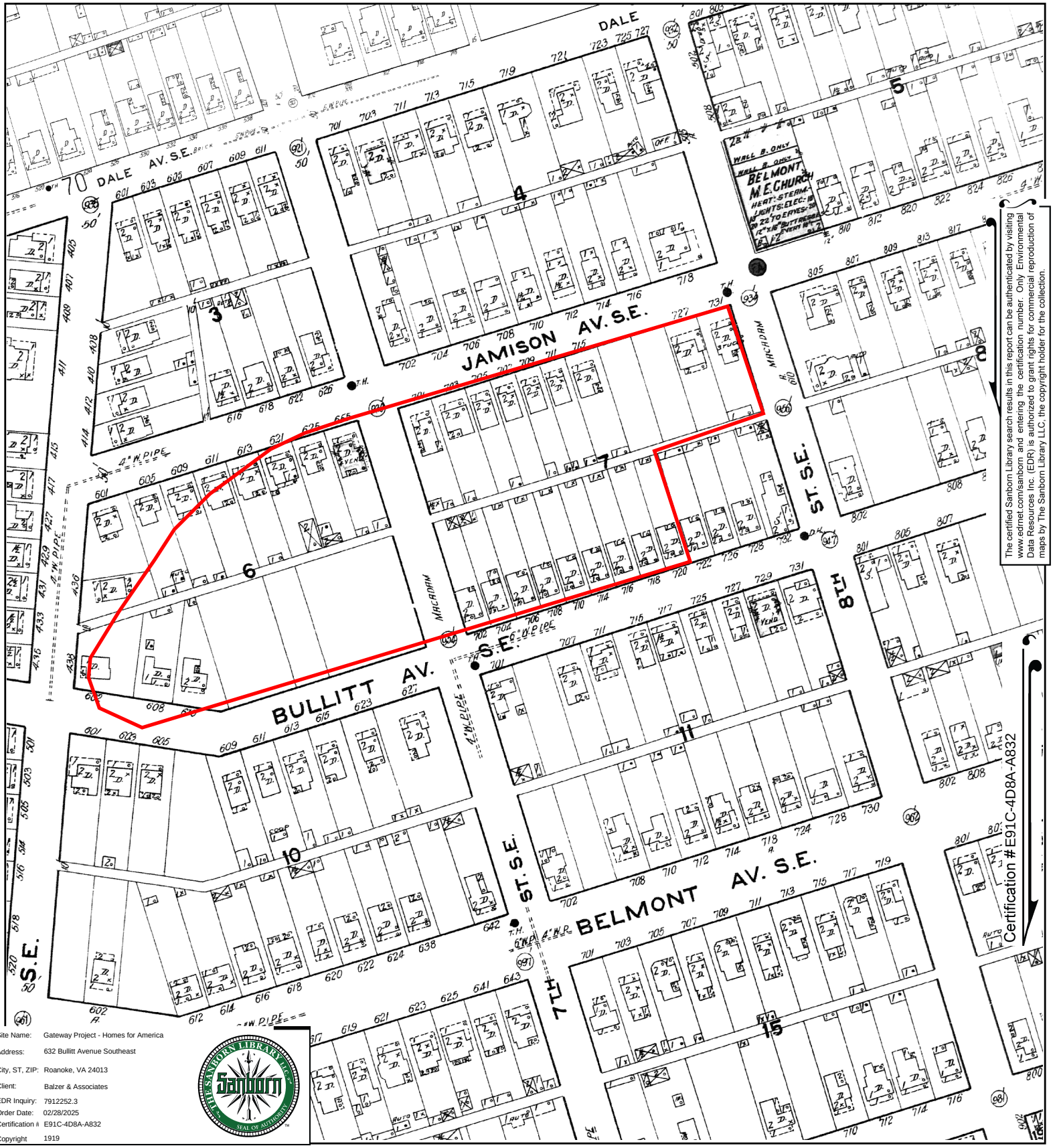


Volume 1, Sheet 70

N

Certified Sanborn® Map

1919



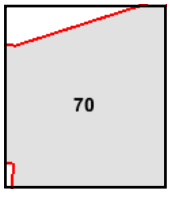
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Address:	632 Bullitt Avenue Southeast
City, ST, ZIP:	Roanoke, VA 24013
Client:	Balzer & Associates
EDR Inquiry:	7912252.3
Order Date:	02/28/2025
Certification #:	E91C-4D8A-A832
Copyright	1919

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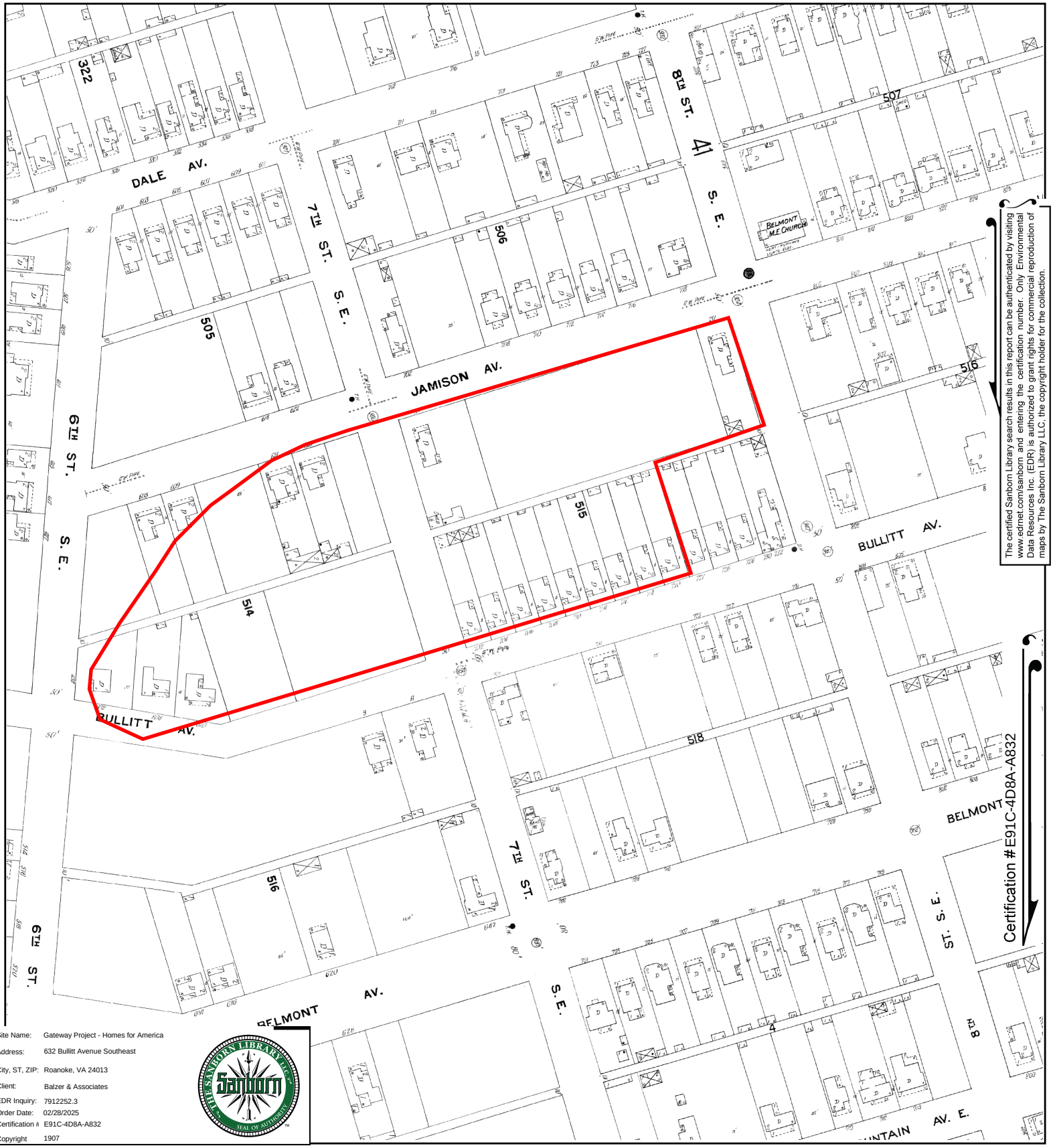
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Volume 1, Sheet 70

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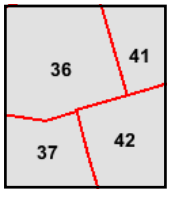


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Address:	632 Bullitt Avenue Southeast
City, ST, ZIP:	Roanoke, VA 24013
Client:	Balzer & Associates
EDR Inquiry:	7912252.3
Order Date:	02/28/2025
Certification #:	E91C-4D8A-A832
Copyright	1907

This Certified Sanborn Map combines the following sheets.
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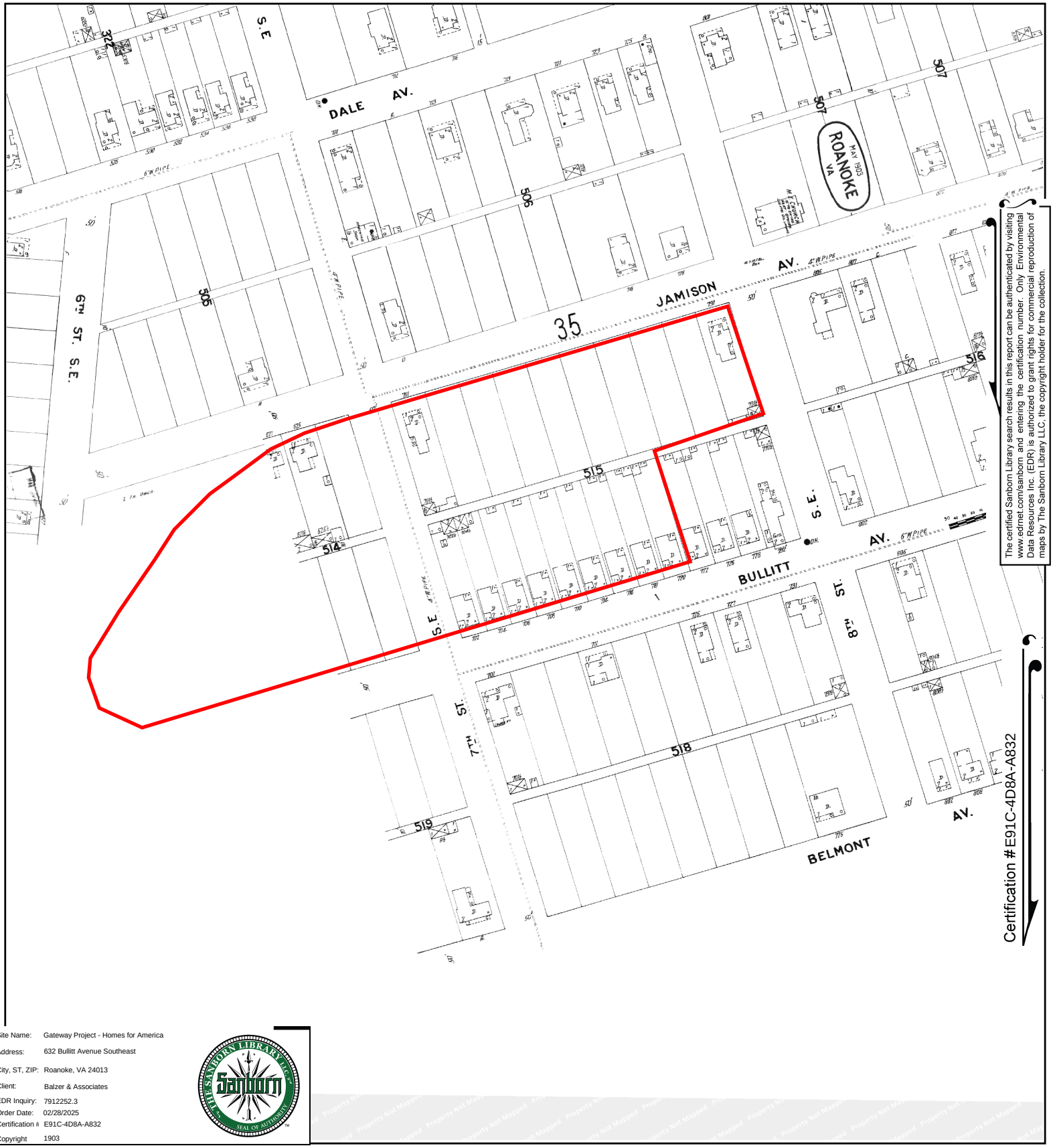




Volume 1, Sheet 41
Volume 1, Sheet 37
Volume 1, Sheet 42
Volume 1, Sheet 36

0 Feet 150 300 600

N



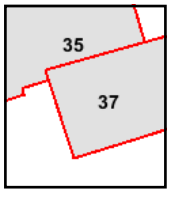
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Certification #E91C-4D8A-A832

Site Name:	Gateway Project - Homes for America
Address:	632 Bullitt Avenue Southeast
City, ST, ZIP:	Roanoke, VA 24013
Client:	Balzer & Associates
EDR Inquiry:	7912252.3
Order Date:	02/28/2025
Certification #	E91C-4D8A-A832
Copyright	1903

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Volume 1, Sheet 37
Volume 1, Sheet 35

0 Feet 150 300 600

N

Gateway Project - Homes for America

632 Bullitt Avenue Southeast

Roanoke, VA 24013

Inquiry Number: 7912252.8

February 28, 2025

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

02/28/25

Site Name:

Gateway Project - Homes for A
632 Bullitt Avenue Southeast
Roanoke, VA 24013
EDR Inquiry # 7912252.8

Client Name:

Balzer & Associates
15871 City View Drive
Midlothian, VA 23113
Contact: Tim Sakowski

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Search Results:

Year	*Scale*	*Details*	*Source*
2018	1"=500'	Flight Year: 2018	USDA/NAIP
2014	1"=500'	Flight Year: 2014	USDA/NAIP
2011	1"=500'	Flight Year: 2011	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
2000	1"=500'	Flight Date: April 01, 2000	USGS
1995	1"=500'	Acquisition Date: March 24, 1995	USGS/DOQQ
1988	1"=500'	Flight Date: April 06, 1988	USGS
1982	1"=500'	Flight Date: April 01, 1982	USDA
1977	1"=500'	Flight Date: March 15, 1977	USGS
1968	1"=500'	Flight Date: March 25, 1968	USGS
1960	1"=500'	Flight Date: October 18, 1960	USGS
1956	1"=500'	Flight Date: October 08, 1956	USGS
1947	1"=500'	Flight Date: March 10, 1947	USGS

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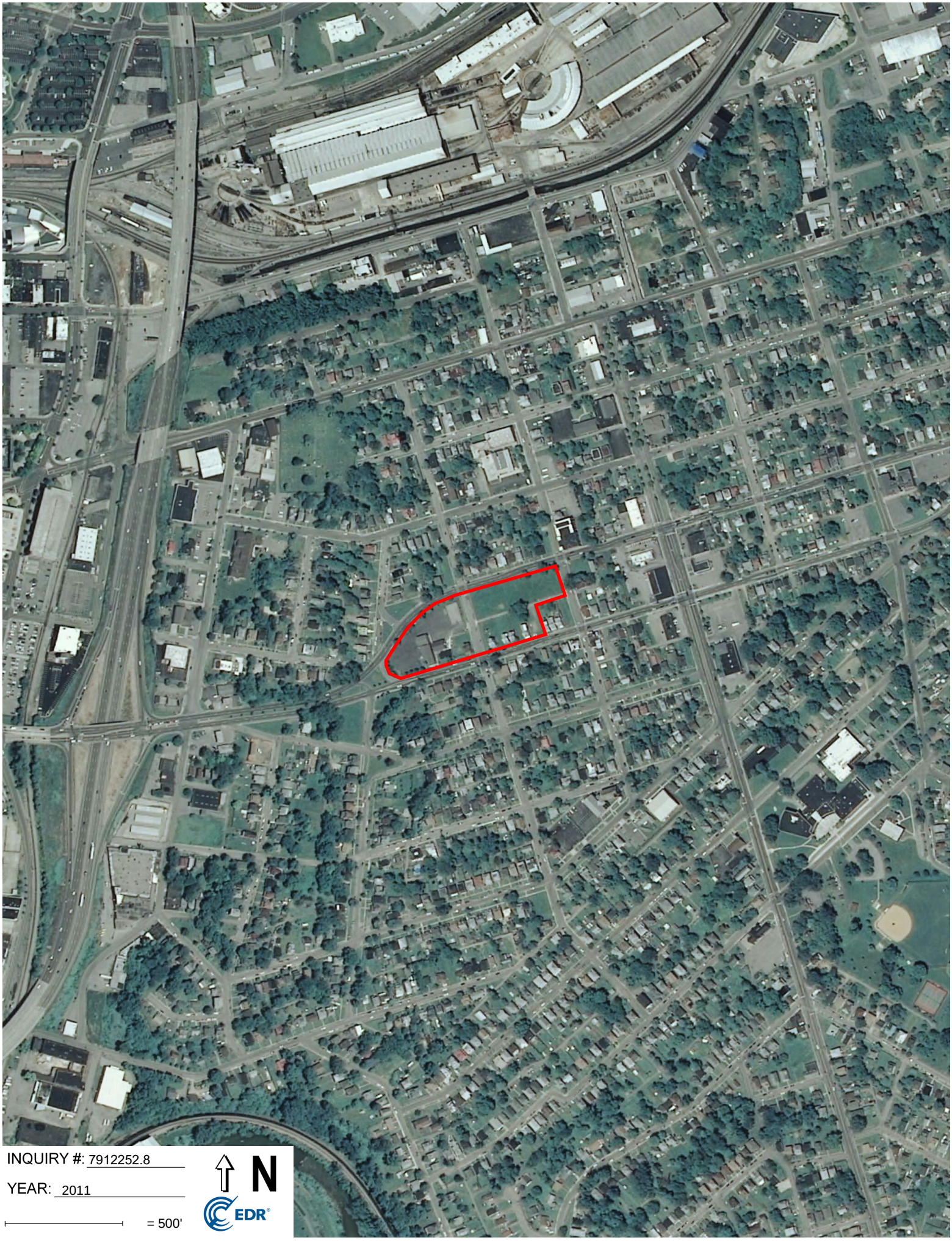
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YEAR: 2018
= 500'
N
EDR


INQUIRY #: 7912252.8
YEAR: 2014
= 500'
N
EDR


INQUIRY #: 7912252.8
YEAR: 2011
= 500'
N
EDR


INQUIRY #: 7912252.8
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 7912252.8
YEAR: 2005
= 500'
N
EDR



INQUIRY #: 7912252.8

YEAR: 2000

= 500'

N

EDR


INQUIRY #: 7912252.8
YEAR: 1995
= 500'
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EDR


INQUIRY #: 7912252.8
YEAR: 1988
= 500'
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EDR



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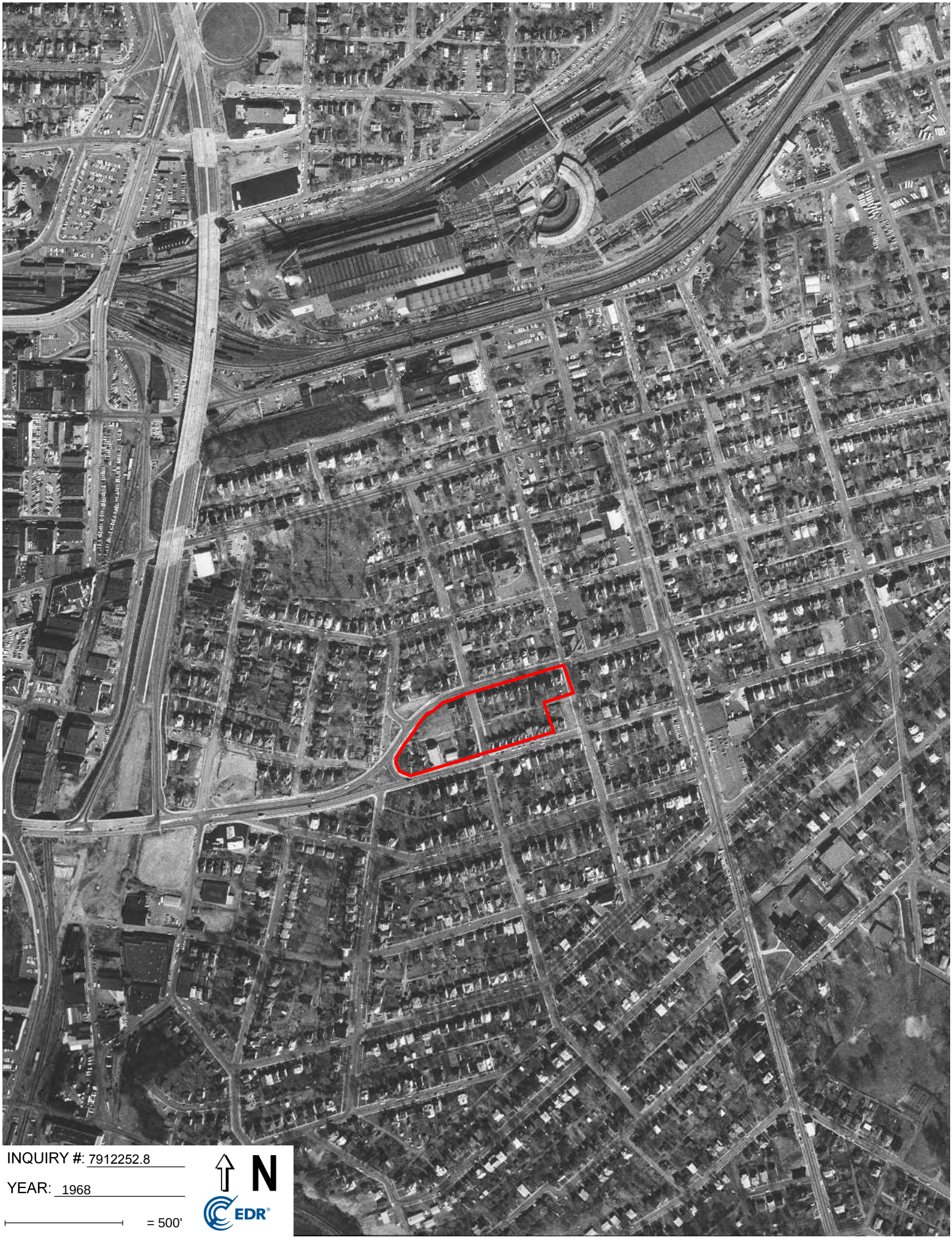
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INQUIRY #: 7912252.8
YEAR: 1977
= 500'
N
EDR



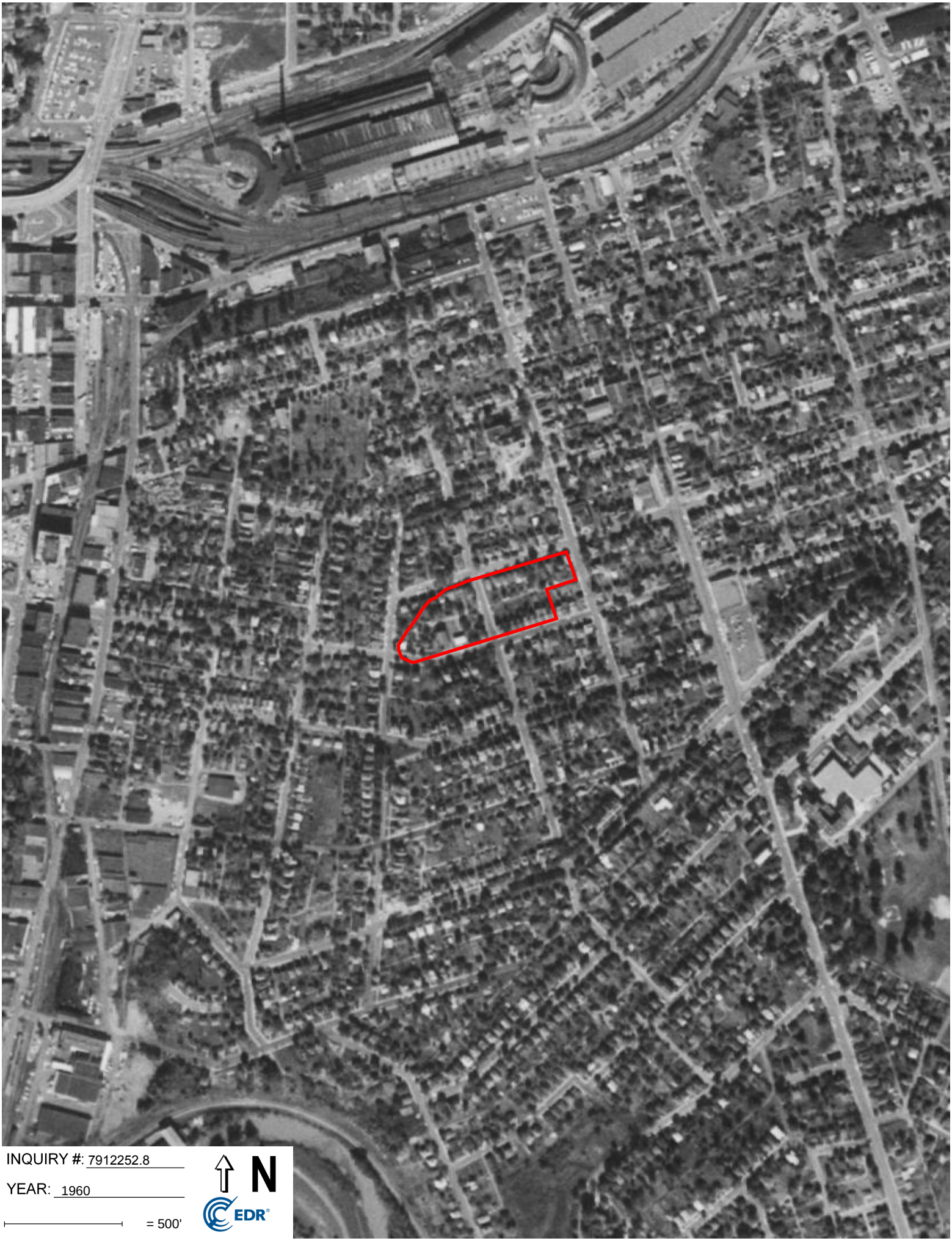
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YEAR: 1968

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EDR


INQUIRY #: 7912252.8
YEAR: 1960
= 500'
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EDR



INQUIRY #: 7912252.8

YEAR: 1956

= 500'

N

EDR



INQUIRY #: 7912252.8

YEAR: 1947

= 500'

N

EDR

Gateway Project - Homes for America
632 Bullitt Avenue Southeast
Roanoke, VA 24013

Inquiry Number: 7912252.5
February 28, 2025

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available business directory data at approximately five year intervals.

RECORD SOURCES

The EDR City Directory Report accesses a variety of business directory sources, including Haines, InfoUSA, Polk, Cole, Bresser, and Stewart. Listings marked as EDR Digital Archive access Cole and InfoUSA records. The various directory sources enhance and complement each other to provide a more thorough and accurate report.

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RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	*Target Street*	*Cross Street*	*Source*
2020	☑	☑	EDR Digital Archive
2017	☑	☑	Cole Information
2014	☑	☑	Cole Information
2010	☑	☑	Cole Information
2005	☑	☑	Cole Information
2000	☑	☑	Cole Information
1995	☑	☑	Cole Information
1992	☑	☑	Cole Information
1989	☑	☑	Polk's City Directory
1984	☑	☑	Polk's City Directory
1979	☑	☑	Hill's City Directory
1974	☑	☑	Hill's City Directory
1969	☑	☑	Hill's City Directory
1964	☑	☑	Hill's City Directory
1940	☑	☑	Hill's City Directory

FINDINGS

TARGET PROPERTY STREET

632 Bullitt Avenue Southeast
Roanoke, VA 24013

Year	*CD Image*	*Source*

BULLITT AVE SE

2020	pg A2	EDR Digital Archive
2017	pg A4	Cole Information
2014	pg A6	Cole Information
2010	pg A8	Cole Information
2005	pg A10	Cole Information
2000	pg A12	Cole Information
1995	pg A14	Cole Information
1992	pg A16	Cole Information
1989	pg A18	Polk's City Directory
1989	pg A19	Polk's City Directory
1984	pg A21	Polk's City Directory
1984	pg A22	Polk's City Directory
1979	pg A25	Hill's City Directory
1979	pg A26	Hill's City Directory
1974	pg A28	Hill's City Directory
1974	pg A29	Hill's City Directory
1969	pg A31	Hill's City Directory
1969	pg A32	Hill's City Directory
1964	pg A34	Hill's City Directory
1964	pg A35	Hill's City Directory
1940	pg A37	Hill's City Directory
1940	pg A38	Hill's City Directory

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*
7TH ST SE		
2020	pg. A1	EDR Digital Archive
2017	pg. A3	Cole Information
2014	pg. A5	Cole Information
2010	pg. A7	Cole Information
2005	pg. A9	Cole Information
2000	pg. A11	Cole Information
1995	pg. A13	Cole Information
1992	pg. A15	Cole Information
1989	pg. A17	Polk's City Directory
1984	pg. A20	Polk's City Directory
1979	pg. A23	Hill's City Directory
1979	pg. A24	Hill's City Directory
1974	pg. A27	Hill's City Directory
1969	pg. A30	Hill's City Directory
1964	pg. A33	Hill's City Directory
1940	pg. A36	Hill's City Directory

City Directory Images

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

7TH ST SE 2020

420	Debra Forde
	Lawrence Barker
	Sharon Woeher
	Shirley Donald
	Velma Salyers
	Wanda Alley
709	Jason Schieber
	Kelsie Biviano
	Myesha Jones
1008	Montae Combs
1009	Charles Gorig
	Christopher Worrell
1015	Candy Ryan
	Joanne Carlton
	Mark Ferguson
	Patricia Whitt
	Tony Smith

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

BULLITT AVE SE 2020

504	Michael McKnew
507	Craig McClanahan
607	Devin Brown
611	Ronald Jamison
613	Barbara Armentrout
615	Charles Wright
	Delmar Hall
	Floyd Griffith
623	Karen Underwood
627	Virginia Koch
704	Dimitruis Casey
	Patricia Casey
708	Randall Cook
711	Jody Medina
	Tiffany Whorley
717	Alicia Stahl
	Dennis Stahl
722	Deville Wyche
726	Lavar Davis
727	Gabriel Rhoads
	Gwendolyn Dillon
	Gwendolyn Rhoads
	Jearl Dillon
	Wendy Dillon
728	Cory Nealy
731	Andrew Johns
	Christopher Cotton
801	Robert Barnett
802	Althea Morgan
	Dennis Huynh
804	Arthur Rotenberry
806	Blanch Sapp
	Gary Sapp
811	Jackie Flinchum
819	Ashley Fink
	Cathy Mitchell
910	Christopher Clark
	Dorothy Monroe

Target Street	Cross Street	Source
-	✓	Cole Information

7TH ST SE 2017

420	ALLEY, WANDA J
	DONALD, SHIRLEY J
	FORDE, DEBRA
	SALYERS, VELMA S
	SMITH, J
709	SCHIEBER, JASON F
1015	CARLTON, JOANNE E
	WEBB, MISSY

Target Street	Cross Street	Source
✓	-	Cole Information

BULLITT AVE SE 2017

501	FLOWERS, SHIRLEY
	JOHNSON, VICTORIA
503	STEBAR, LYDIA
504	MCKNEW, MICHAEL A
505	BANKS, JAMES
607	BROWN, DEVIN A
611	GRIFFITH, FLOYD R
613	WYMER, DWAYNE
615	WILLIAMS, MORRIS A
	WRIGHT, CHARLES
623	TAYLOR, DEBBIE
	TOLBERT, GARY L
701	BURR, JEREMY
704	CASEY, PATRICIA D
705	EASTER, MARK
	WRAY, RODNEY E
707	FREDAY, RUSSELL
	LEMON, PAUL D
708	ROBKER, LISA M
710	SANTURE, SUSANNE
716	GRAYBILL, RANDY
717	STAHL, DENNIS M
722	BERISA, ELVIRA
726	MARTIN, ANGELA
727	RHOADS, GWENDOLYN
731	BROWN, QUINTON
	CALDWELL, PAMELA S
	COTTON, CHRISTOPHER
	SARVER, ANDREW C
802	MORGAN, ALTHEA
804	ROTENBERRY, ARTHUR
806	SAPP, GARY L
808	SAPP, GARY L
811	HALL, ALEXANDER
819	MITCHELL, JOSHUA
	ROBINSON, FRANK D
910	MONROE, DOROTHY A

Target Street	Cross Street	Source
-	✓	Cole Information

7TH ST SE 2014

420	ALLEY, WANDA J
	DONALD, SHIRLEY J
	ROBERTSON, BONNIE
	SALYERS, VELMA S
	SMITH, SHIRLEY A
	VANNOY, CHIANYAUN
720	MIGNOTT, QWNESHINA
1008	HAPPY HAIR
1009	OCCUPANT UNKNOWN,
1015	FERGUSON, MICHAEL S
	OCCUPANT UNKNOWN,
	POFF, MARK
	RYAN, CANDY A

Target Street	Cross Street	Source
✓	-	Cole Information

BULLITT AVE SE 2014

501	FLOWERS, SHIRLEY
	JOHNSON, VICTORIA
	OCCUPANT UNKNOWN,
	POWELL, DALLAS S
	ROSALES, RHONDA
503	OCCUPANT UNKNOWN,
504	JORDAN, LINDA
	MCKNEW, MICHAEL A
	SMALL, JIM
	WALLACE, CHIANTI
507	BULLARD, CLAUDIA
607	BROWN, DEVIN A
611	CRAIG, VERSHAUN
	LIMBAUGH, TIFFANY
	WILLIAMS, MORRIS A
613	BRYANT, LAKORE
	WYMER, DWAYNE
623	OCCUPANT UNKNOWN,
	SPRADLIN, JOHN D
627	LIAKOS, JOHN G
632	OCCUPANT UNKNOWN,
701	OCCUPANT UNKNOWN,
704	CASEY, PATRICIA D
705	ALSHIMARY, AUDAH
	WRAY, RODNEY E
707	DILLON, JOSEPH
708	HOPCROFT, CHEYENNE
710	OCCUPANT UNKNOWN,
715	DRUMMOND, JOHN R
716	GRAYBILL, RONALD K
717	STAHL, DENNIS M
726	SMITH, LINDSEY M
727	DILLON, G
728	LYLE, JAMES R
729	DOSS, BRITTANY
	THOMAS, TERRY L
731	DUMIRE, LARA L
	JOHNS, ANDREW W
	REED, JEFFREY
	SARVER, ANDREW C
789	MIKES, CARLY
802	OCCUPANT UNKNOWN,
806	SAPP, GARY L
807	OTEY, BETTY J
	TAYLOR, RUTH L
811	GRAY, JERRY L
819	FINK, ASHLEY
910	CLARK, CHRIS

Target Street	Cross Street	Source
-	✓	Cole Information

7TH ST SE 2010

414	WALKER, PAUL D
420	DONALD, SHIRLEY J
	RIFE, DONALD R
	SALYERS, VELMA S
	WOEHR, S
709	BAUMGARDNER, KEVIN J
1008	HAPPY HAIR
1009	GORIG, CHUCK D
1015	FERGUSON, MARK
	POFF, MARK
	TUCKER, CURTIS L

Target Street	Cross Street	Source
✓	-	Cole Information

BULLITT AVE SE 2010

501	BAUBLITZ, JOHNNY
	POWELL, DALLAS S
504	DAVIS, ANNE
	SMALL, KAREN J
	VANDELLEN, DAWN
	WALLACE, CHIANTI
505	MARSH, CHARLES W
507	MCCLANNAHAN, JANETTE A
607	GRANT, LORI
611	MATTHEWS, SHARON
	WILLIAMS, M
612	NEW BEGINNINGS PENTECOSTAL
623	CREGGER, SANDRA
	HODGES, KRISTINA
627	LIAKOS, JOHN G
632	HODGES, NIKI
701	TOLLEY, BRENDA
704	CASEY, PATRICIA D
705	BUTLER, GEETA
708	PARKER, JACK L
711	BRYANT, DANNY
715	DRUMMOND, JOHN R
716	ECKLES, HILARIE G
717	STAHL, DENNIS
722	SUMMITT, CONNIE A
727	DILLON, G
729	BAKER, RACHAEL
731	REED, JEFFREY
	SARVER, S
	THOMPSON, CARL L
	WILSON, ANGELA
789	MIKES, CARLY
806	SAPP, GARY L
807	BRYANT, BONNIE J
	CALDWELL, STEVEN
	SARVER, WALTER L
	TAYLOR, RUTH L
	WYRICK, HELEN C
811	FLINCHUM, SANDI E
819	ROBINSON, FRANK D

Target Street	Cross Street	Source
-	✓	Cole Information

7TH ST SE 2005

414 WALKER, PAUL
420 DILLON, GENE
HARDIN, CAROLE
HARRIS, ROBERT B
MOORE, STANLEY T
RIFE, DONALD R
SALYERS, V S
SHOCKLEY, LONNIE E
1008 HAPPY HAIR
1015 FERGUSON, SANDRA J
OCCUPANT UNKNOWN,

Target Street	Cross Street	Source
✓	-	Cole Information

BULLITT AVE SE 2005

501	NELSON, NANNIE
504	CHISOM, JESSE
505	BARNETT, KENNETH W
	MARSH, CHARLES W
	PRITCHETT, TIMOTHY D
507	PHILLIPS, ALEASIA J
611	SINK, DANNIE
612	EVANGEL FOURSQUARE CHURCH
	ROYAL FAMILY ESTATES
613	ARMENTROUT, BARBARA
	COCHRANE, NATHAN L
	HAWKINS, GREGG
615	CLARK, REBECCA C
	HOLDREN, GEORGE S
623	UNDERWOOD, JAMES R
627	HACKNEY, SHIRLEY M
701	FRANCISCO, SUSAN C
704	CASEY, PATRICIA
705	BUTLER, GEETA
	HALE, CHRISTINA L
	QUARLES, BUTTERFLY
	WHITLOW, R A
711	BRYANT, DANNY
726	COURTNEY, ROSA L
727	RHOADS, GWENDOLYN
728	KINGERY, IDA L
729	GATES, DENISE T
	HARRISON, JOEL R
	NEWTON, TROY
	THOMAS, TERRY L
731	BURTON, JOHN W
	HALE, MICHELLE
	SMITH, FRANK
	THOMPSON, CARL L
	WILLIAMSON, MELLISA
801	SARVER ROOFING & HM IMPROVEMENT
802	RIEKOFSKI, STEVEN T
806	SAPP, GARY L
807	COMPTON, KATRINA G
	FIZER, SANDRA D
	TAYLOR, RUTH L
815	JACKSON, GEORGIA A
819	ROBINSON, FRANK D
910	ROBERTSON, MATTIE

Target Street	Cross Street	Source
-	✓	Cole Information

7TH ST SE 2000

420	COOPER, E L
	DILLON, GENE
	HELSLEY, DONNA
	HICKAM, IMOGENE
	RIFE, D
	SALYERS, V S
	SHOCKLEY, LONNIE
709	OCCUPANT UNKNOWN,
1008	HAPPY HAIR
1009	GORIG, CHUCK
1015	CLARK, JOHN D
	SMITH, TERESA C

Target Street	Cross Street	Source
✓	-	Cole Information

BULLITT AVE SE 2000

501	NELSON, NANNIE M
505	DAVIS, MARLINA
507	JACKSON, DAVID W
	SEIS, DONALD L
611	SINK, DANNIE
	SNYDER, JUSTIN P
612	WRIGHT KEN REV STUDY
613	BLEVINS, D A
615	TUGGLE, AUDREY
627	LIAKOS, JOHN
704	SARVER, LISA A
705	CRAIN, JOSEPH C
	WHITLOW, R A
707	CONNER, L
711	BOOTHE, M
715	PASCOE, R
716	GRAYBILL, KEITH
722	WILLIFORD, DOROTHY
728	PARKER, JANEVA R
729	ALLEN, REX
802	RIEKOFSKI, STEVEN T
806	SAPP, GARY L
807	MCCROSKEY, TOSHA D
808	PREAS, N E
811	BROOKS, E M
815	JACKSON, GEORGIA A
819	ROBINSON, FRANK
910	ROBERTSON, MATTIE

Target Street	Cross Street	Source
-	✓	Cole Information

7TH ST SE 1995

414	WALKER, BARBARA C
420	COOPER, EULA L
	GRIGGS, JOHN
	HICKAM, IMOGENE
	JOHNSON, ROBERT T
	SALYERS, V S
	SMALLWOOD, PAULINE
709	VIAR, V L
1008	HAPPY HAIR SALON

Target Street	Cross Street	Source
✓	-	Cole Information

BULLITT AVE SE 1995

501	NELSON, NANNIE M
503	WRIGHT, W
504	DUNCAN, S L
	ROUTT, PAM
505	JENNINGS, THERESA L
507	OCCUPANT UNKNOWNN
611	SINK, DANNIE
612	EVANGEL CHILDCARE
	EVANGEL FOURSQUARE CHURCH
	WEFC TV
613	SHOCKLEY, JUDY L
615	CRITZER, JUDY L
623	PERDUE, P
	SNEAD, CHERYL J
624	WEFC TV-38 PRAYER LINE
627	WRAY, CHARLES P
701	OCCUPANT UNKNOWNN
704	OCCUPANT UNKNOWNN
705	HAZELWOOD, J E
706	OCCUPANT UNKNOWNN
707	PRINGLE, RAHSAAN
710	NAHODYL, MARSHA
711	OCCUPANT UNKNOWNN
712	OCCUPANT UNKNOWNN
715	OCCUPANT UNKNOWNN
716	GRAYBILL, KEITH
717	RICKMAN, R S
718	OCCUPANT UNKNOWNN
722	OCCUPANT UNKNOWNN
726	COURTNEY, LARRY
727	PITTS, TIMOTHY B
728	OCCUPANT UNKNOWNN
729	KELLY, LISA
731	GARDNER, TIMOTHY
	SAFERIGHT, DIANA
801	SARVER, JEAN D
802	MUSSERA, W C
804	BITRICK, JESSIE D
806	SAPP, GARY L
807	DAVIS, P
808	PREAS, N E JR
811	BROOKSE, KENDREL P
815	JACKSON, H J
819	WESTMORELAND, HARLESS JR
910	ROBERTSON, TIM

Target Street	Cross Street	Source
-	✓	Cole Information

7TH ST SE 1992

414	MOORE, TOMMY
420	BOYLL, F M
	SIMMON, L N
1008	HAPPY HAIR SLN

Target Street	Cross Street	Source
✓	-	Cole Information

BULLITT AVE SE 1992

501	NELSON, NANNIE M
504	DUNCAN, S L
505	KING, BOBBY L
507	MCCLENAHAN, CECIL
611	BRYANT, ALICE H
	JOHNSON, WILLIAM E
612	EVANGEL CHILDCARE
	EVANGEL FOURSQUARE CH
	SONSHINE PRODUCTIONS
	WEFC TV
	WRIGHT KEN REV STDY
615	BARTON, TIMOTHY E
624	WEFC TV-38 PRAYER LINE
627	WRAY, CHARLES P
705	YOUNG, GUY H
707	HENLEY, DAVID N
716	GRAYBILL, KEITH
731	SARVER, C R
801	SARVER, WALTER
	SARVERS CONSTRUCTION
802	MUSSER, A B
804	SCHLAMB, MAGGIE S
806	SAPP, GARY L
808	PREAS, N E JR
811	BROOKS, KENDREL P
815	JACKSON, H J
910	ROBERTSON, EDWARD A

Target Street	Cross Street	Source
-	✓	Polk's City Directory

7TH ST SE 1989

7TH ST SE –FROM 705 CAMPBELL AV SE SOUTH 1 EAST OF 6TH ST

ZIP CODE 24013
CHURCH AV INTERSECTS
STEWART AV INTERSECTS
414 Moore Tommy
420 J & J Apartments 982-1210
1 Simmons Louise N 342-8766
2 Salyers Velma S
3 No Return
4 Helton Mattie H
5 Hickam Imogene A 342-0596
6 Cooper Eula L 343-0597
7★Doyle Flora
8 Mc Cormack W J
9 Transient
10 Proffit Rex P 343-0810
DALE AV INTERSECTS
BULLITT AV INTERSECTS
709 Viar Virginia L 344-8483

ELM AV INTERSECTS
818 Vacant
MOUNTAIN AV INTERSECTS
915 Vacant
HIGHLAND AV INTERSECTS
1008 Happy Hair Beauty Salon 343-3531
1009 No Return
1015a Johnson Lomax 344-2981
1015b★Mc Manus John D
MURRAY AV INTERSECTS

Target Street	Cross Street	Source
✓	-	Polk's City Directory

BULLITT AVE SE 1989

5TH INTERSECTS
501 Nelson Nannie M Mrs ◎ 345-2707
503 Hall Linda 342-9867
504 No Return
505 Fridley
507 Mc Clanahan Cecil Rev ◎ 342-8757
507a Mc Clanahan Gary
611 Apartments
A★Mitchell Jason
B Johnson Wm E 345-4889
C Vacant
D Moore David
612 Evangel Foursquare Church 982-3694
Evangel Child Care Ministries 982-3694
W E F C Television Channel 38 982-3694
613a Tolley Daryl
613b No Return
615a Vacant
615b No Return
623a Vacant
623b No Return
624 Evangel Foursquare Church (ofcs)
627 Hackmay Eula M ◎ 344-3613
632 Evangel Foursquare Ch ofcs study
982-3694
7TH INTERSECTS
NUMBERS IRREGULAR
701★La Prade
702 Vacant
704 Vacant
706 No Return
705 Apartments
1 Bailey Sharon D
2 Hazelwood J E
3 Evans Tim
4 No Return
707 Vacant
708 No Return

Target Street	Cross Street	Source
✓	-	Polk's City Directory

BULLITT AVE SE 1989

BULLITT AV SE–Contd

710 Hedrick Betty 345-3185
711 Lancaster P
712★Trent B S 343-3296
715 No Return
716 Graybill Jannie 982-8060
717★Rickman R S 343-2196
718 Kennett Verona S Mrs 343-5493
722 Ferguson Marion O Mrs
726 Courtney Larry E ◎ 981-0728
727 Vest John E ◎ 345-7444
728 Parker Janeva R Mrs ◎
729 Harrison Addison C 344-5339
731a No Return
731b★Sarver Gregory

8TH INTERSECTS

801 Sarver Gregory ◎
802 Musser Annabell J Mrs ◎ 342-1557
804 Schlamb Maggie L Mrs ◎ 344-4732
806 Sapp Gary L 344-1888
807 Martin Ruby H Mrs ◎ 344-2695
808 Preas Ruth M Mrs ◎ 344-2392
811 Brooks Kendrel P ◎ 344-3004
815 Jackson Clara G Mrs ◎ 344-3752
819 Akers Billy R
819a Vacant

9TH INTERSECTS

910 Robertson Edw A ◎ 345-2441
Robertson Ruby A Mrs 981-0655
912 No Return

Target Street	Cross Street	Source
-	✓	Polk's City Directory

4

7TH ST SE —FROM 705 CAMPBELL AV SE SOUTH 1 EAST OF 6TH ST

ZIP CODE 24013
CHURCH AV INTERSECTS
STEWART AV INTERSECTS
414 J & J Apartments (ofc) 982-1210
Hodger Robert L 981-0353
420 Apartments
1★Simmons Louise N 342-8766
2★Salyers Velma S 342-5442
3★Craighead F E 343-3956
4 Helton Mattie
5 Hickam Imogene A 342-0596
6 No Return
7★Boyll Flora M
8★Mc Cosmack W J
9 Toler Sue
10 Ramsey James
DALE AV INTERSECTS
BULLITT AV INTERSECTS
709 Transient

6

ELM AV INTERSECTS
818 Vacant
MOUNTAIN AV INTERSECTS
915 Vacant
HIGHLAND AV INTERSECTS
1008 Happy Hair Beauty Salon 343-3531
1009 Robertson Donald E 982-0604
1015a Vacant
1015b Vacant
MURRAY AV INTERSECTS

Target Street	Cross Street	Source
✓	-	Polk's City Directory

BULLITT AVE SE 1984

5TH INTERSECTS
501 Ferris Geo H
Nelson Nannie M Mrs 345-2707
503★Faries Mable C 345-7411
504 Graham Henry E Jr ◎
505 Vacant
507 Mc Clanahan Cecil ◎ 342-8757
★Bushnell Lydia R 342-8760
6TH INTERSECTS
611 Apartments
A Hicks Jas F
B★Wilson Thos B
C★Howell Walter C 342-1350
D Johnson Wm E 345-4889
612 Evangel Foursquare Church 982-3694
Evangel Child Care Ministries 982-3694
Sonshine Television Cable Channel 22
p t l network 982-3694
613 Vacant
615a★Ayers Janice E
615b★Lynsky Janice H
623★Chisom Don
624 Evangel Foursquare Church
627 Liakos Mary ◎ 344-3613
632 Evangel Foursquare Ch ofcs study
982-3694
7TH INTERSECTS
NUMBERS IRREGULAR
701 Vacant
702 Reynolds Madelyn C Mrs ◎
704 Vacant

Target Street	Cross Street	Source
✓	-	Polk's City Directory

BULLITT AVE SE 1984

706 Duncan Douglas C ◎
707 Vacant
705 Apartments
1★Bailey Sharon D
2★Hazelwood Josie E 344-7649
3 No Return
4 Bramblett L W 345-6681
708 Vacant
710★Rogers Mark D
711 Vacant
712 Trent Dodnna S
715★Thompson Kermit D
716 Dishman Wm A ◎ 342-0346
717★Wright Gary W
718 Stanley Mary Louise ◎ 343-5493
722 Ferguson Marion O Mrs ◎
726★Courtney Larry E ◎ 981-0728
727 Vest John E ◎ 345-7444
728 Parker Janeva R Mrs ◎
729 Thomas Irwin K ◎ 344-3940
731 Vacant
731a Jones Willard B

8TH INTERSECTS

802 Musser Annabell J Mrs ◎ 342-1557
804 Schlamb Maggie L Mrs ◎ 344-4732
806 Sapp Gary L 344-1888
807 Martin Ruby H Mrs ◎ 344-2695
808 Preas Ruth M Mrs ◎ 344-2392
811 Brooks Kendrel P ◎ 344-3004
815 Jackson Clara G Mrs ◎ 344-3752
819 Mills Rosa B Mrs 342-6951
819a Lynskey Linda M 345-6562

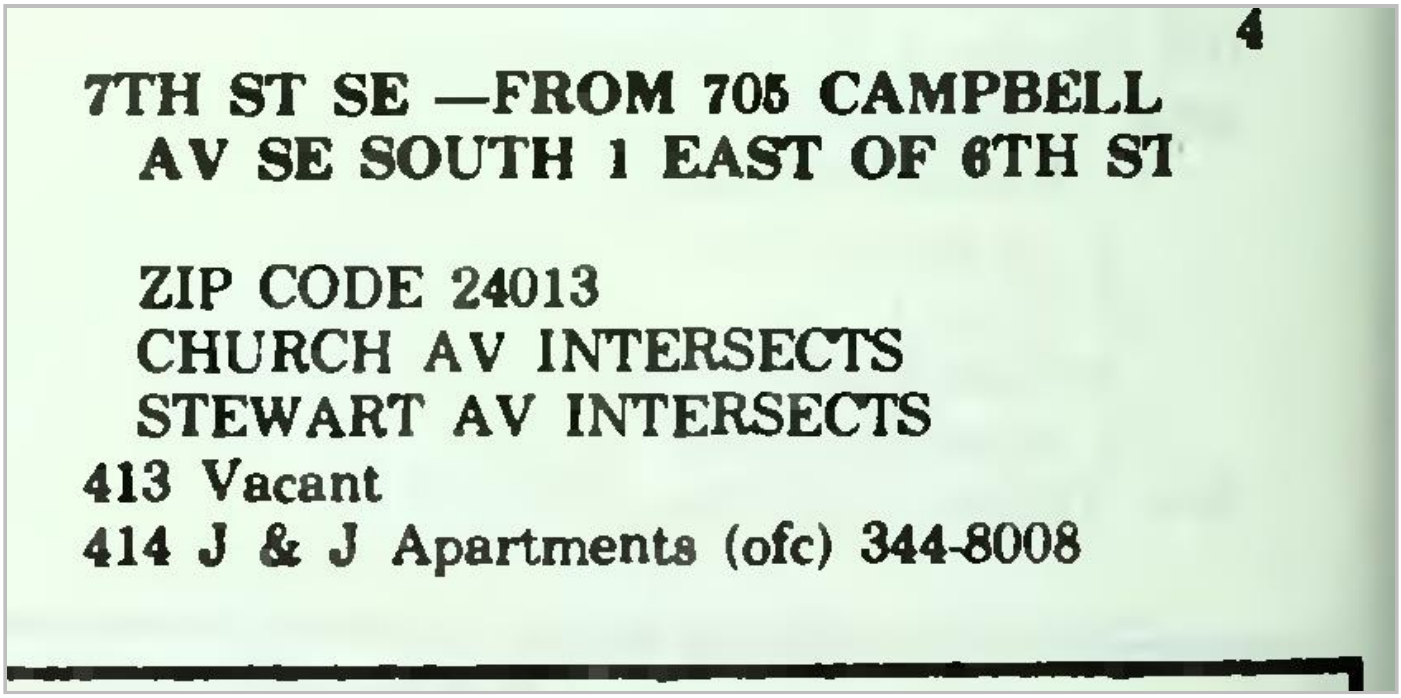
12

9TH INTERSECTS

910 Robertson Edw A ◎ 345-2441
Robertson Ruby M Mrs 981-0655

Target Street	Cross Street	Source
-	✓	Hill's City Directory

7TH ST SE 1979



4

7TH ST SE —FROM 705 CAMPBELL AV SE SOUTH 1 EAST OF 6TH ST

ZIP CODE 24013
CHURCH AV INTERSECTS
STEWART AV INTERSECTS
413 Vacant
414 J & J Apartments (ofc) 344-8008

Target Street	Cross Street	Source
-	✓	Hill's City Directory

7TH ST SE 1979

7TH ST SE—Contd

420 Apartments
1 Harrison Harold
2★Campbell Theo L
3★Oliver Charles V
4 Vacant
6 Harrison Clinton E
7 Transient
8★Shilling Susan
9 Dodd Gloria Mrs
10 Vacant

DALE AV INTERSECTS
BULLITT AV INTERSECTS

709 No Return

6

ELM AV INTERSECTS

818 Dodd Muriel C Mrs © 344-1297

MOUNTAIN AV INTERSECTS

915 Vacant

HIGHLAND AV INTERSECTS

1008 Happy Hair Beauty Salon 343-3531
1009 Robertson Donald E © 342-2358

ALBEMARLE AV ENDS

1015 Byrd Ethel L Mrs 343-7435
1015a Byrd Paula

MURRAY AV INTERSECTS

Target Street	Cross Street	Source
✓	-	Hill's City Directory

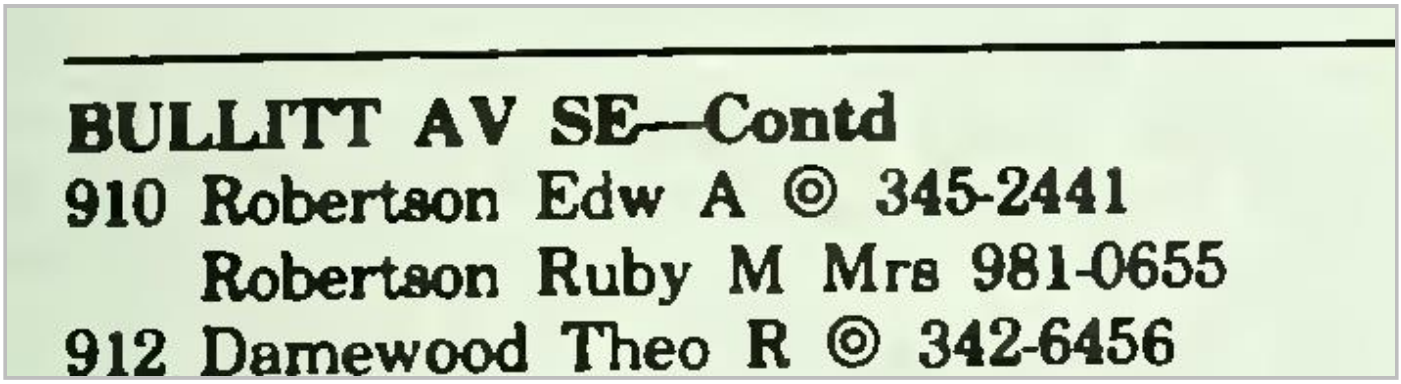
BULLITT AVE SE 1979

5TH INTERSECTS
501 Ferris Geo H
Nelson Nannie M Mrs 345-2707
503 Bushnell James H ◎ 342-3691
504 Graham Willie L Mrs ◎
505 Vacant
507 Stewart Lois J Mrs ◎ 343-9903
6TH INTERSECTS
611 Apartments
A Transient
B Transient
C★Kerbey David
D Johnson Wm E 345-4889
612 Evangel Foursquare Church 982-3694
Evangel Foursquare Church Day Care Centers 982-3809
613 Vacant
615★Mc Millan John
615a★Bramblett L W
623 Whittaker
624 Evangel Four Square Gospel Church 982-3694
627 Hackney Eula G Mrs ◎ 344-3613
632 Evangel Four Square Gospel Ch ofcs study 982-3694
7TH INTERSECTS
701 Vacant
702 Reynolds Madelyn C Mrs ◎
704★Mitchell C E 343-1526
706 Duncan Dorothy Mrs ◎
707★Richards John B ◎
705 Apartments
1★Kesler Crocie J 981-0639
2★Richards Cornelia B 345-2568
3★Campbell Robt
708 Vacant
710 Vacant
711 Johnson Lewis D ◎ 345-1202
712 Myers F Susie Mrs ◎ 342-4407
715★Clifton Dorothy M
716 Dishman Wm A ◎ 342-0346
717★Duncan Geo W
718 Stanley Ola G Mrs ◎ 343-5493
720 Vacant
722 Ferguson Marion O Mrs ◎
725 Crowder James R
726 Price Clay D ◎ 345-8939
727 Vest John E ◎ 345-7444
728 Parker Janeva R Mrs ◎
729 Thomas Irwin K ◎ 344-3940
731 Boothe Louise J Mrs 345-8489
Cronk Lillie Mrs 342-5275
8TH INTERSECTS
802 Musser Foster ◎ 342-1557
804 Schlamb Maggie L Mrs ◎ 344-4732
806 Sapp Gary L 344-1888
806a Fisher Jackie L 345-2312
807 Martin Ruby H Mrs ◎ 344-2695
808 Preas Ruth M Mrs ◎ 344-2392
811 Brooks Kendrel P ◎ 344-3004
815 Jackson Clara
819 Mills Rosa B Mrs 342-6951
819a Mitchell Doug E 342-7339

9TH INTERSECTS

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1979



BULLITT AV SE—Contd
910 Robertson Edw A ◎ 345-2441
Robertson Ruby M Mrs 981-0655
912 Damewood Theo R ◎ 342-6456

Target Street	Cross Street	Source
-	✓	Hill's City Directory

7TH ST SE 1974

4

7TH ST SE —FROM 705 CAMPBELL AV SE SOUTH 1 EAST OF 6TH ST

ZIP CODE 24013
CHURCH AV INTERSECTS
STEWART AV INTERSECTS
413 Vacant
414 J & J Apartments (ofc)
420 Apartments
1 Vacant
2★Sultz Archer R 344-5616
3★Blankenship Mary T Mrs 344-3480
4 Vacant
5★Dunford Conrad W 345-6238
6 Vacant (3 Apts 6-8)
9★Dent K Susie Mrs 345-1907
10★Abbott Michl L
DALE AV INTERSECTS
BULLITT AV INTERSECTS
709 Watts Herbert S ◎ 344-9709

6

ELM AV INTERSECTS
818 Dodd Lynwood R Jr ◎ 342-0222
MOUNTAIN AV INTERSECTS
915 Vacant
HIGHLAND AV INTERSECTS
1008 Hilltop Beauty Salon 343-3531
1009 Robertson Donald E ◎ 342-2358
ALBEMARLE AV ENDS
1015 Byrd Ethel L Mrs
MURRAY AV INTERSECTS

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1974

5TH INTERSECTS

501 Blackwell Charles T 345-2707
Nelson Nannie M Mrs 345-2707
503 Bushnell James H ◎ 342-3691
504 Graham Willie L Mrs ◎
505 Bushnell Donald R ◎ 344-0458
507 Stewart Lois J Mrs ◎ 343-9903

6TH INTERSECTS

608 Ensor Lawrence B 342-5814
610★Crowder Juanita
611 Apartments
A★Craft Carl C 344-4268
B Vacant
C★Milton S J 981-0174
D★Johnson Wm E 345-4889
612 First Foursquare Gospel Church 342-0112
613★Lee Charles M
615★Mc Million Virginia ◎ 343-3742
623 Cadd Minnie N Mrs ◎ 345-7133
Thompson Mamie N Mrs 345-7133
624★Dowdy Roy 981-1774
627 Hackney Eula G Mrs ◎ 344-3613
632 Mayfield Josie C Mrs ◎ 345-7014

7TH INTERSECTS

701 Patsell Jenae S
702 Reynolds Fred B ◎ 342-6103
704★Smith Virginia P Mrs
706 Duncan Doug C ◎
707★Lovell Robt E
708 Vacant (2 Hses 708-10)
711 Johnson Lewis D ◎ 345-1202
712 Myers F Susie Mrs ◎ 342-4407

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1974

715★Hester Jerry L 344-3576
716 Dishman Wm A ◎ 342-0346
717 Graly Edith V Mrs ◎ 343-0752
718 Stanley Ola G Mrs ◎ 343-5493
720 Ferguson Garland W 344-4526
722 Carper Frank P ◎ 343-6075
725★Crowder James R
726 Price Clay D ◎ 345-8939
727 Vest John J 345-7444
728 Parker Janeva R Mrs ◎
729 Thomas Irwin K ◎ 344-3940
731 Boothe Louise J Mrs 345-8489
Cronk Lillie Mrs 342-5275

8TH INTERSECTS

801 Vacant
802 Musser Foster ◎ 342-1557
804 Schlamb Maggie L Mrs ◎ 344-4732
806★Sapp Gary L 344-1888
807 Martin Ruby H Mrs 344-2695
808 Preas Ruth M Mrs ◎ 344-2392
811 Brooks Kendrel P ◎ 344-3004
815 Mc Ghee Clarence E ◎ 345-6021
816 Hambrick Jesse G
819 Vacant
820 Sweeney Pauline Mrs
824 Vacant

12

9TH INTERSECTS

910 Robertson Edw A ◎ 345-2441

Target Street	Cross Street	Source
-	✓	Hill's City Directory

7TH ST SE 1969

4

7TH ST SE -FROM 705 CAMPBELL AV SE
SOUTH 1 EAST OF 6TH ST

---ZIP CODE 24013
---CHURCH AV INTERSECTS
---STEWART AV INTERSECTS
413 VACANT
414 VACANT
---DALE AV INTERSECTS
---BULLITT AV INTERSECTS
709 WATTS HERBERT S ● 344-9709

6

---ELM AV INTERSECTS
818 DODD LYNWOOD R JR 342-0222
---MOUNTAIN AV INTERSECTS
915 VACANT
---HIGHLAND AV INTERSECTS
1008 HILLTOP BEAUTY SALON 343-3531
1009 ROBERTSON DONALD E ● 342-2358
---ALBEMARLE AV ENDS
1015 BYRD ETHEL L ● 342-2420
SHELBOURNE AUBREY J 342-1324
---MURRAY AV INTERSECTS

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1969

---5TH INTERSECTS
501 BLACKWELL CHARLES B
503 BUSHNELL JAMES H
504 GRAHAM WILLIE L MRS ●
505 BUSHNELL DONALD
507 STEWART LOIS J MRS ● 343-9903
---6TH INTERSECTS
608 ENSOR LAWRENCE B 342-5814
609 COLLINS OTIS ●
610 MANSPILE ALICE B MRS 345-1294
CHUMBLEY SAMMY L
611 NORCROSS J WESLEY JR ●
343-9579
612 FIRST FOURSQUARE GOSPEL CHURCH
342-0112
613 ROBINSON KENNETH
615 VACANT
MC CALL FRANK H 345-1741
623 CADD MINNIE N MRS ● 345-7133
THOMPSON MAMIE N MRS
624 HARRISON ROBT H REV 342-0112
627 HACKNEY EULA G MRS ●
632 MAYFIELD JOSIE C MRS ●
345-7014
---7TH INTERSECTS
701 PATSELL J E HEATING & SERVICE
343-4681
PATSELL JIMMIE E ● 343-4681
702 REYNOLDS FREO B ●
704 VACANT
706 DUNCAN DOUG C ●
707 CLIFTON BERNARD W 344-8129
DILLON M KINLEY L
708 VACANT
710 ELLIS GILES L JR ●
711 JOHNSON LEWIS D ● 345-1202
712 MYERS SUSIE S MRS ● 342-4407
715 WEST JULIA M MRS ● 344-0727
716 DISHMAN WM A ● 342-0346
717 GRALY GEO A ● 343-0752
718 STANLEY OLA M MRS ● 343-5493
720 FERGUSON GARLAND W 344-4526
722 CARPER FRANK P ● 343-6075
725 VACANT
726 PRICE CLAY O ● 345-8939
727 VEST JOHN E JR 345-7444
728 PARKER H D JR INSURANCE AGENCY
342-8081
PARKER LUCY S MRS ● 432-8081
PARKER JANEVA R MRS 342-8081
729 THOMAS I KASPER ● 344-3940
731 BOOTHE LOUISE J MRS 345-8489
---8TH INTERSECTS

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1969

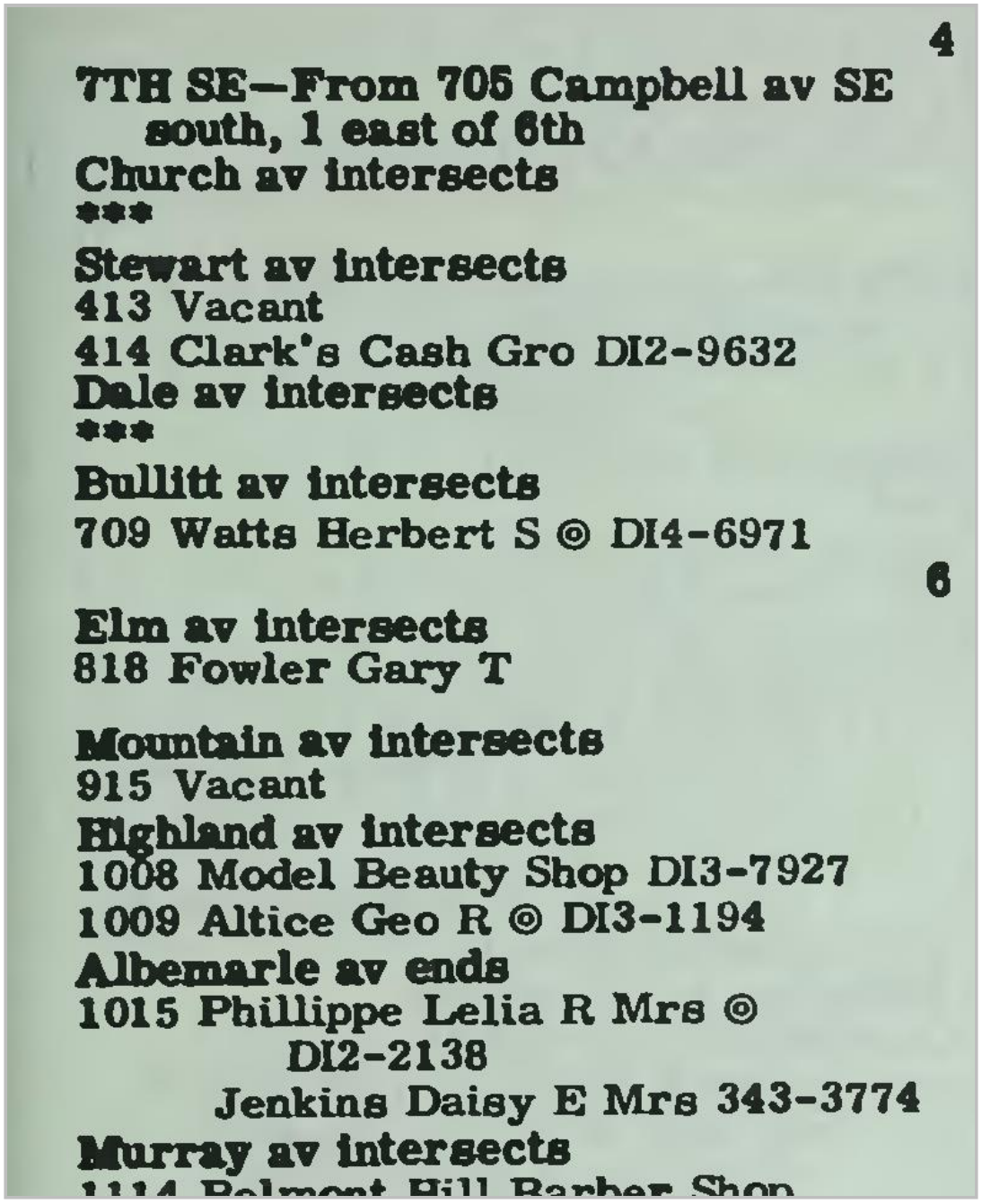
801 VACANT
802 MUSSER FOSTER ● 342-1557
804 SCHLAMB MAGGIE L MRS ●
344-4732
806 COOK MALINE MRS
GRUNDY T C
SHEPARO VIRGINIA MRS
807 MARTIN RUBY H MRS 344-2695
808 PREAS NORBORNE E ● 344-2392
811 BROOKS KENOREL P ● 344-3004
815 MC GHEE MARVIN J ● 342-4872
816 HAMBRICK JESSE G 345-7027
818 VACANT
819 WAGGONER BEULAH C 343-9797
820 LYNSKEY PAUL N
SWEENEY PAULINE MRS
824 FORBES OSSIE F MRS 343-0636
GRIGGS ROBT O 342-0695

12

---9TH INTERSECTS
902 VENCILL CLAUDE S
904 CURTAIN JERRY
910 ROBERTSON MATTIE Q MRS ●
342-3726

Target Street	Cross Street	Source
-	✓	Hill's City Directory

7TH ST SE 1964



4

7TH SE—From 705 Campbell av SE south, 1 east of 6th
Church av intersects
***
Stewart av intersects
413 Vacant
414 Clark's Cash Gro DI2-9632
Dale av intersects
***
Bullitt av intersects
709 Watts Herbert S ◎ DI4-6971

6

Elm av intersects
818 Fowler Gary T

Mountain av intersects
915 Vacant
Highland av intersects
1008 Model Beauty Shop DI3-7927
1009 Altice Geo R ◎ DI3-1194
Albemarle av ends
1015 Phillippe Lelia R Mrs ◎ DI2-2138
Jenkins Daisy E Mrs 343-3774
Murray av intersects
1114 Belmont Hill Barber Shop

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1964

5th intersects
501 Vacant
503 Craighead Winfred I 344-7971
504 Graham Willie L Mrs ©
505 Bushnell Jas H 342-1589
507 Stewart Lois J Mrs © DI3-9903
6th intersects
601 Sigmon Eural H © DI2-5302
603 Wright Minnie S Mrs ©
Munson Thos B DI2-0467
605 Sexton Eug M © DI3-1894
608 Ensor Lawrence B 342-5814
609 Collins Otis ©
610 Vacant
611 Norcross J Wesley jr © DI3-9579
612 First Foursquare Gospel Church
DI2-0112
613 Gorman Dorothy F Mrs
615 Hurst Jas C DI3-3503
623 Cadd Omar W © DI5-7133
Thompson Mamie N Mrs
624 Helms Harold E Rev DI2-0112
627 Hackney Eula G Mrs
632 Mayfield Josie C Mrs © DI5-7014
7th intersects
701 Patsell Jimmie E © DI3-4681
Patsell J E Htg & Service
DI3-4681
702 Reynolds Fred B © 342-1941
704 Lavinder Edna E Mrs
706 Bocock Lacy T
707 Vacant
708 Six Mary C
710 Ellis Giles L jr ©
711 Johnson Lewis D © DI5-1202
712 Myers Edw L © DI2-4407
Myers Jas D © DI2-4407
715 Peters Dora B Mrs © DI5-7536
716 Dishman Wm A © 342-0346
Elkins Wm E
717 Graly Geo A © DI3-0752
718 Stanley Ola M Mrs © DI3-5493
720 Ferguson Garland W 344-4526
722 Carper Frank P © DI3-6075
725 Higgins Ralph E DI4-3614
726 Price Clay D © DI5-8939
727 Vest Gertrude M Mrs © DI5-7444
728 Parker Lucy S Mrs © DI2-8081
Parker Howard D jr DI2-8081
729 Thomas I Kasper © DI4-3940
730 Walker Olive P Mrs
731 Boothe Jas T DI5-8489
8th intersects
801-05 Vacant
802 Musser Foster © DI2-1557

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1964

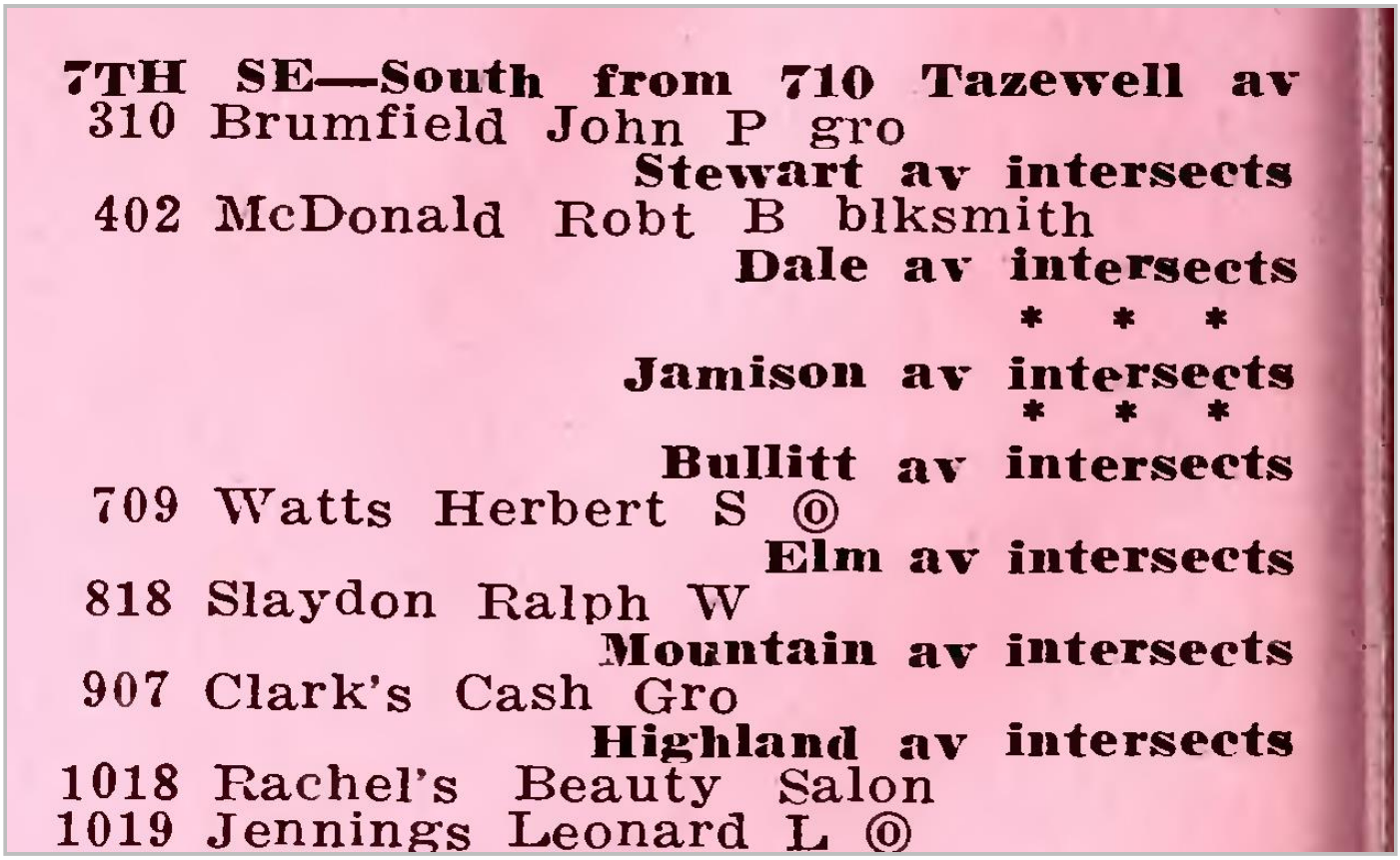
804 Schlamb Frank L © 344-4732
806 Reavis Ralph
807 Martin Ruby H Mrs DI4-2695
808 Preas Norborne E © DI4-2392
811 Brooks Kendrel P © DI4-3004
815 McGhee Marvin J © DI2-4872
816 Hambrick Jesse G DI5-7027
818 Ratcliffe Retta L Mrs © DI4-3558
819 Martin Geo M © DI3-9797
820 James Herbert L DI3-9719
821 Vacant
824 Forbes Ossie F Mrs DI3-0636
Griggs Robt D 342-0695
827 Gibson J C
829 Neal Allen T
832 Vacant

12

9th intersects
902 Vencill Claude S
904 Vacant
909 Arthur Susie A Mrs © DI4-9100
910 Robertson Wm J © DI2-3726
911 Williams Effie Y Mrs

Target Street	Cross Street	Source
-	✓	Hill's City Directory

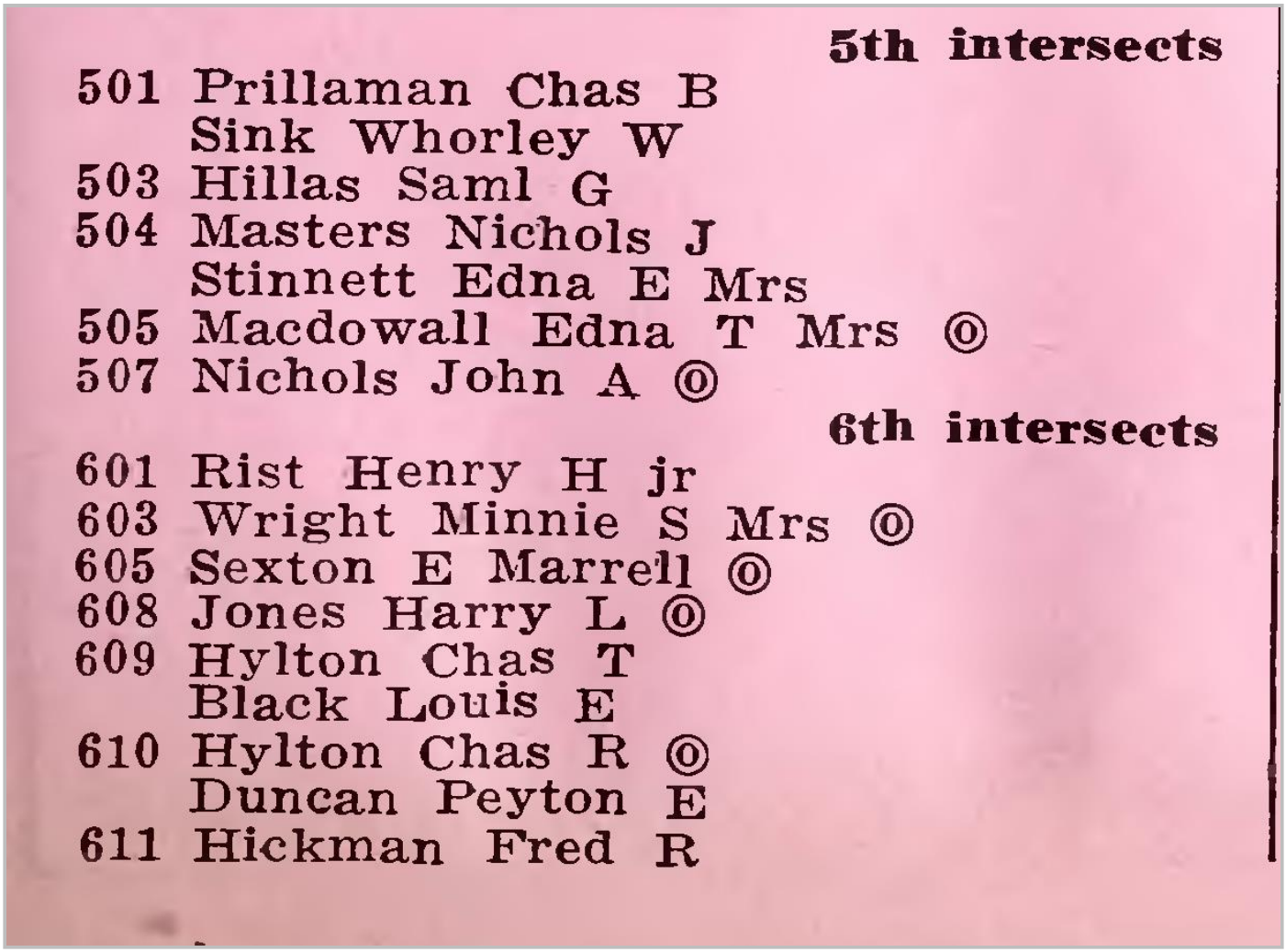
7TH ST SE 1940



7TH SE—South from 710 Tazewell av
310 Brumfield John P gro
Stewart av intersects
402 McDonald Robt B blksmith
Dale av intersects
* * *
Jamison av intersects
* * *
Bullitt av intersects
709 Watts Herbert S ©
Elm av intersects
818 Slaydon Ralph W
Mountain av intersects
907 Clark's Cash Gro
Highland av intersects
1018 Rachel's Beauty Salon
1019 Jennings Leonard L ©

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1940



5th intersects

501 Prillaman Chas B
Sink Whorley W
503 Hillas Saml G
504 Masters Nichols J
Stinnett Edna E Mrs
505 Macdowall Edna T Mrs ©
507 Nichols John A ©

6th intersects

601 Rist Henry H jr
603 Wright Minnie S Mrs ©
605 Sexton E Marrell ©
608 Jones Harry L ©
609 Hylton Chas T
Black Louis E
610 Hylton Chas R ©
Duncan Peyton E
611 Hickman Fred R

Target Street	Cross Street	Source
✓	-	Hill's City Directory

BULLITT AVE SE 1940

612 Four Square Gospel Tabernacle
613 Wright Robt K ⓪
615 Rader Harry P ⓪
623 Cadd Omer W ⓪
Prilliman Burgie
627 Hartberger Geo H ⓪
632 Mayfield Amos F ⓪

7th intersects

701 Merchent John W ⓪
702 Cheek John N
704 Sink Minnie O Mrs
706 Ratliff John F
707 Smith Darian J ⓪
708 Smith Jas C
Ratliff Amos L
710 Ellis Mamie E Mrs ⓪
711 Johnson Lewis D ⓪
712 Myers Florence A Mrs ⓪
715 Peters Cammie F Mrs ⓪
716 Brugh Margt Mrs ⓪
717 Graly Geo A ⓪
718 Bondurant Chas R ⓪
Hambrick Alf J
720 Thompson Geo E
722 Fraley Howard B ⓪
725 Tuck Jesse D
726 Dooley Nellie R ⓪
Dooley Helen F ⓪
727 Vest Maude G Mrs ⓪
728 Parker Howard D ⓪
729 Melton J Benj
730 Keffer Jas W ⓪
Dillon Robt S
731 Taylor Austin F
Rumberg Eugenia Mrs

8th intersects

801-03 Mick or Mack Stores Co Inc gros
802 Musser Foster ⓪
Richmond Edw
804 Grubb Carl E
Overstreet Benj
805 Robertson Wm J
806 Hicks Lura F Mrs ⓪
807 Graham Lillian Mrs
Wagoner Kenneth
808 Preas Norborne E
816 Clinevell Wm M
818 Purdy John T
Jones Otho C
819 Hylton Nannie E Mrs bdg
820 Musselwhite John A
821 Lemon Robt J ⓪
824 Forbes W Irving ⓪
827 Lankford Clemmie N Mrs
829 Scott Henry B ⓪
Creasey Lula L Mrs
832 Rice Philip L ⓪

9th intersects

902 Pentecost Rosser B
White Edmund
904 Linkenhoker Ollie L Mrs ⓪
908 Willis R Lee ⓪
Puckett Carl
909 Hudgins Oscar P
Richards Rupert C
910 Dixon Wm M ⓪
Dixon C Irving
911 Henry Mary L Mrs

Appendix D:

Regulatory Records

Gateway Project - Homes for America
632 Bullitt Avenue Southeast
Roanoke, VA 24013

Inquiry Number: 7912252.2s
February 28, 2025

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E1527 - 21), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E2247 - 16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E1528 - 22) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

632 BULLITT AVENUE SOUTHEAST
ROANOKE, VA 24013

COORDINATES

Latitude (North):	37.2679480 - 37° 16' 4.61''
Longitude (West):	79.9312490 - 79° 55' 52.49''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	594762.4
UTM Y (Meters):	4124928.8
Elevation:	962 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	50022782 ROANOKE, VA
Version Date:	2022

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20181018, 20180824
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
632 BULLITT AVENUE SOUTHEAST
ROANOKE, VA 24013

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1		708 BULLITT AVE SE	ERNS	Higher	1 ft.
2	822 JAMISON AVE PROP	822 JAMISON AVE SE	LTANKS	Lower	288, 0.055, NE
A3	PIC-QUIK	615 NINTH ST SE	UST FINDER	Lower	441, 0.084, ENE
A4	PIC-QUIK	615 NINTH ST SE	UST	Lower	441, 0.084, ENE
A5	VALLEY CLEANERS	703 9TH STREET SOUTH	EDR Hist Cleaner	Lower	508, 0.096, East
A6	HERNDON EDWARD P JR	608 9TH ST SE	EDR Hist Auto	Lower	513, 0.097, ENE
7	RAKES CHAS J	522 9TH ST SE	EDR Hist Auto	Lower	564, 0.107, NE
8	806 MOUNTAIN AVE PRO	806 MOUNTAIN AVE SE	LTANKS	Higher	680, 0.129, SE
B9	P & N 96	404 ELM AVE SE	UST, Financial Assurance	Higher	703, 0.133, WSW
B10	P & N 96	404 ELM AVE SE	UST FINDER	Higher	703, 0.133, WSW
11	CVS PHARMACY #6285	702 9TH STREET, SE	RCRA-VSQG, FINDS, ECHO, E MANIFEST	Lower	710, 0.134, East
B12	PNN MARKET #96		PFAS ECHO	Higher	710, 0.134, WSW
B13	AMOCO #812-TANKS	401 ELM AVE SE	RCRA-SQG, FINDS, ECHO	Higher	794, 0.150, WSW
14	NORM'S TRANSMISSIONS	818 STEWART AVENUE S	RCRA-VSQG	Lower	814, 0.154, NNE
B15	DEVOE & RAYNOLDS COM	701 FOURTH ST	UST	Higher	835, 0.158, West
B16	DEVOE & RAYNOLDS COM	701 FOURTH ST	UST FINDER	Higher	872, 0.165, West
C17	STAR VALLEY MINUTE M	831 HIGHLAND AVE	UST FINDER	Higher	880, 0.167, ESE
C18	STAR VALLEY MINUTE M	831 HIGHLAND AVE	UST	Higher	880, 0.167, ESE
B19	APPLE MARKET 1508	403 ELM AVE	UST FINDER	Higher	890, 0.169, WSW
B20	APPLE MARKET 1508	403 ELM AVENUE SE	LTANKS, UST, Financial Assurance	Higher	890, 0.169, WSW
21	SHELOR ALLAN PROPERT	654 HIGHLAND AVE	LTANKS	Higher	968, 0.183, South
D22	RESCUE MISSION OF RO	402 FOURTH STREET SE	UST FINDER	Lower	1102, 0.209, NW
D23	RESCUE MISSION OF RO	402 FOURTH STREET SE	UST	Lower	1102, 0.209, NW
E24	WOODING'S AUTO BODY	824 TAZEWELL AVE SE	RCRA-VSQG, FINDS, ECHO, E MANIFEST	Lower	1154, 0.219, NNE
E25	WOODKINGS AUTO BODY	205 8 1/2 ST SE	RCRA NonGen / NLR, FINDS, ECHO	Lower	1192, 0.226, North
F26	STONEWALL JACKSON MI	1022 9TH STREET S.W.	LTANKS, UST	Higher	1261, 0.239, SE
F27	STONEWALL JACKSON MI	1022 9TH ST. SE	LUST	Higher	1261, 0.239, SE
F28	STONEWALL JACKSON MI	1022 9TH STREET S.W.	UST FINDER	Higher	1261, 0.239, SE
29	RICHARDS GUTTERING &	1024 JAMISON AVE	UST	Lower	1307, 0.248, ENE
30	LLOYD ELECTRIC COMPA	605 THIRD ST SE	LUST, LTANKS	Lower	1395, 0.264, WNW
G31	FORMER COREAST FEDER	605 CAMPBELL AVENUE	LUST, LTANKS	Lower	1498, 0.284, NNW
G32	FORMER COREAST FEDER	605 CAMPBELL AVENUE	UST FINDER, UST FINDER RELEASE	Lower	1498, 0.284, NNW
G33	MR A'S MART	421 CAMPBELL AVENUE	LTANKS, UST, Financial Assurance	Lower	1537, 0.291, NW
G34	MR A'S MART	421 CAMPBELL AVENUE	UST FINDER, UST FINDER RELEASE	Lower	1537, 0.291, NW
35	SUPR NO.1087	421/417 CAMPBELL AVE	LUST	Lower	1633, 0.309, NW
36	NINTH STREET CHURCH	745 MONTROSE AVE SE	LTANKS	Higher	1638, 0.310, SE
H37	ANTHEM ROANOKE PROPE	302 CAMPBELL AVENUE	LUST	Lower	1809, 0.343, NW
H38	ANTHEM PROPERTY AT C	302 CAMPBELL AVE SE	LTANKS	Lower	1809, 0.343, NW
H39	ANTHEM ROANOKE PROPE	302 CAMPBELL AVENUE,	LUST	Lower	1809, 0.343, NW

MAPPED SITES SUMMARY

Target Property Address:
632 BULLITT AVENUE SOUTHEAST
ROANOKE, VA 24013

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
40	NORFOLK SOUTHERN-EAS	8TH ST. & CAMPBELL A	LUST	Lower	1897, 0.359, North
41	KETON MARTIN RESIDEN	1139 STEWART AVE	LTANKS	Higher	1963, 0.372, NE
I42	BLUE CROSS/ BLUE SHI	602 S. JEFFERSON STR	LUST	Lower	2071, 0.392, West
43	SFD RENTAL UNIT	122 10 1/2 ST SW	LTANKS	Lower	2077, 0.393, NNE
J44	JEFFERSON MOTOR LODG	612 AND 616 JEFFERSO	LUST, LTANKS	Lower	2107, 0.399, West
K45	CARILION ROANOKE COM	101 ELM AVENUE SE	SWF/LF, LTANKS, UST, Financial Assurance	Higher	2113, 0.400, West
K46	CARILION ROANOKE COM	101 ELM AVENUE	UST FINDER, UST FINDER RELEASE	Higher	2113, 0.400, West
47	HARTSOOK	210 MARKET STREET SE	US BROWNFIELDS, FINDS	Lower	2181, 0.413, WNW
L48	GETTY MART #31	1219 JAMISON AVE SE	UST FINDER RELEASE	Lower	2203, 0.417, ENE
L49	D&G MART	1219 JAMISON AVE SE	UST FINDER RELEASE	Lower	2203, 0.417, ENE
L50	D & G MART	1219 JAMISON AVE SE	LTANKS, UST, Financial Assurance	Lower	2203, 0.417, ENE
L51	D&G MART	1219 JAMISON AVE SE	LUST, LTANKS	Lower	2203, 0.417, ENE
M52	HEIRONIMUS WAREHOUSE	315 ALBEMARLE AVENUE	LTANKS, UST	Lower	2218, 0.420, SW
53	HISTORIC FIRE STATIO	13 CHURCH AVE SE	US BROWNFIELDS	Lower	2247, 0.426, WNW
I54	JEFFERSON MOTOR LODG	612 AND 616 JEFFERSO	UST FINDER RELEASE	Lower	2269, 0.430, West
I55	BLUE CROSS-BLUE SHIE	602 JEFFERSON ST.	UST FINDER, UST FINDER RELEASE	Lower	2289, 0.434, West
I56	BLUE CROSS-BLUE SHIE	602 JEFFERSON ST.	LTANKS, UST	Lower	2318, 0.439, West
J57	ALLRIGHT PARKING GAR	635 S JEFFERSON ST	LUST, LTANKS	Lower	2334, 0.442, West
J58	ALLRIGHT PARKING GAR	635 S JEFFERSON ST	UST FINDER RELEASE	Lower	2334, 0.442, West
M59	HEIRONIMUS WAREHOUSE	3RD & ALBERMARLE ST.	LUST	Lower	2378, 0.450, SW
60	T & R GARAGE	41 WEST 4TH ST., SAL	LUST	Lower	2389, 0.452, NNW
N61	ART MUSEUM FUTURE SI	100 SALEM AVE SE	UST FINDER RELEASE	Lower	2424, 0.459, NW
N62	ART MUSEUM FUTURE SI	100 SALEM AVE SE	LUST, LTANKS	Lower	2424, 0.459, NW
O63	YELLOW CAB,ROANOKE	202 SHENANDOAH AVE.,	LUST	Lower	2485, 0.471, NW
64	GUARD RAIL PROPERTY	1131 4TH ST SE	LTANKS	Lower	2507, 0.475, SW
O65	YELLOW CAB CO OF ROA	200 SHENANDOAH AVE N	LTANKS	Lower	2510, 0.475, NW
O66	YELLOW CAB CO OF ROA	200 SHENANDOAH AVE N	UST FINDER RELEASE	Lower	2510, 0.475, NW
P67	STAR CITY FOOD CENTE	509 13TH STREET, SE	LUST, LTANKS	Lower	2625, 0.497, NE
P68	STAR CITY FOOD CENTE	509 13TH STREET, SE	UST FINDER RELEASE	Lower	2625, 0.497, NE
69	ROANOKE TOWN GAS	NE KIMBALL AND RUTHE	EDR MGP	Lower	3541, 0.671, North

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Lists of Federal Delisted NPL sites

Delisted NPL ---------- National Priority List Deletions

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS ---------- Corrective Action Report

Lists of Federal RCRA TSD facilities

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Lists of Federal RCRA generators

RCRA-LQG ---------- RCRA - Large Quantity Generators

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROLS ---------- Institutional Controls Sites List

Lists of state- and tribal hazardous waste facilities

SHWS ---------- This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

EXECUTIVE SUMMARY

Lists of state and tribal leaking storage tanks

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

Lists of state and tribal registered storage tanks

FEMA UST ---------- Underground Storage Tank Listing
AST ---------- Registered Petroleum Storage Tanks
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

ENG CONTROLS ---------- Engineering Controls Sites Listing
INST CONTROL ---------- Voluntary Remediation Program Database

Lists of state and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing
VCP ---------- Voluntary Remediation Program

Lists of state and tribal brownfield sites

BROWNFIELDS ---------- Brownfields Site Specific Assessments

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands
ODI ---------- Open Dump Inventory
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
IHS OPEN DUMPS ---------- Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ---------- Delisted National Clandestine Laboratory Register
US CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
SPILLS ---------- Prep/Spills Database Listing
SPILLS 90 ---------- SPILLS 90 data from FirstSearch

Other Ascertainable Records

FUDS ---------- Formerly Used Defense Sites
DOD ---------- Department of Defense Sites
SCRD DRYCLEANERS ---------- State Coalition for Remediation of Drycleaners Listing

EXECUTIVE SUMMARY

US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
MINES MRDS	Mineral Resources Data System
FINDS	Facility Index System/Facility Registry System
UXO	Unexploded Ordnance Sites
DOCKET HWC	Hazardous Waste Compliance Docket Listing
ECHO	Enforcement & Compliance History Information
FUELS PROGRAM	EPA Fuels Program Registered Listing
PFAS NPL	Superfund Sites with PFAS Detections Information
PFAS FEDERAL SITES	Federal Sites PFAS Information
PFAS TRIS	List of PFAS Added to the TRI
PFAS TSCA	PFAS Manufacture and Imports Information
PFAS RCRA MANIFEST	PFAS Transfers Identified In the RCRA Database Listing
PFAS ATSDR	PFAS Contamination Site Location Listing
PFAS WQP	Ambient Environmental Sampling for PFAS
PFAS PROJECT	NORTHEASTERN UNIVERSITY PFAS PROJECT
PFAS NPDES	Clean Water Act Discharge Monitoring Information
PFAS ECHO FIRE TRAIN	Facilities in Industries that May Be Handling PFAS Listing
PFAS PT 139 AIRPORT	All Certified Part 139 Airports PFAS Information Listing
AQUEOUS FOAM NRC	Aqueous Foam Related Incidents Listing
BIOSOLIDS	ICIS-NPDES Biosolids Facility Data
AIRS	Permitted Airs Facility List
NPDES	Comprehensive Environmental Data System
COAL ASH	Coal Ash Disposal Sites
DRYCLEANERS	Drycleaner List
ENF	Enforcement Actions Data
Financial Assurance	Financial Assurance Information Listing
TIER 2	Tier 2 Information Listing

EXECUTIVE SUMMARY

UIC..... Underground Injection Control Wells

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF..... Recovered Government Archive Solid Waste Facilities List
RGA LUST..... Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal RCRA generators

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 09/16/2024 has revealed that there is 1 RCRA-SQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
AMOCO #812-TANKS EPA ID:: VAD988198321	***401 ELM AVE SE***	***WSW 1/8 - 1/4 (0.150 mi.)***	***B13***	***90***

RCRA-VSQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-VSQG list, as provided by EDR, and dated 09/16/2024 has revealed that there are 3 RCRA-VSQG sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CVS PHARMACY #6285	***702 9TH STREET, SE***	***E 1/8 - 1/4 (0.134 mi.)***	***11***	***29***

EPA ID:: VAR000523696				
NORM'S TRANSMISSIONS EPA ID:: VAVSQG022302	818 STEWART AVENUE S	NNE 1/8 - 1/4 (0.154 mi.)	14	92
WOODING'S AUTO BODY EPA ID:: VAD988202156	***824 TAZEWELL AVE SE***	***NNE 1/8 - 1/4 (0.219 mi.)***	***E24***	***130***

Federal ERNS list

ERNS: The Emergency Response Notification System records and stores information on reported releases of oil and hazardous substances. The source of this database is the U.S. EPA.

A review of the ERNS list, as provided by EDR, and dated 12/03/2024 has revealed that there is 1 ERNS site within approximately 0.001 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported NRC Report #: 1140852 Incident Date Time: 2016-01-11 12:00:00	708 BULLITT AVE SE	0 - 1/8 (0.000 mi.)	1	8

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF: The Solid Waste Management Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Department of Environmental Quality's Permitted Facilities list.

A review of the SWF/LF list, as provided by EDR, and dated 11/21/2024 has revealed that there is 1 SWF/LF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CARILION ROANOKE COM Permit Number: 900000000593 pmt_stat: Revoked	***101 ELM AVENUE SE***	***W 1/4 - 1/2 (0.400 mi.)***	***K45***	***186***

Lists of state and tribal leaking storage tanks

LUST: The Leaking Underground Storage Tank Database.

A review of the LUST list, as provided by EDR, has revealed that there are 16 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
STONEWALL JACKSON MI Database: LUST REG WC, Date of Government Version: 06/04/2015 Date Closed: 1994-08-03 00:00:00 Pollution Control #: 92-1260	1022 9TH ST. SE	SE 1/8 - 1/4 (0.239 mi.)	F27	151

Lower Elevation	Address	Direction / Distance	Map ID	Page
LLOYD ELECTRIC COMPA Database: LUST REG WC, Date of Government Version: 06/04/2015	***605 THIRD ST SE***	***WNW 1/4 - 1/2 (0.264 mi.)***	***30***	***155***

Date Closed: 1998-07-02 00:00:00
Pollution Control #: 98-1142

FORMER COREAST FEDER ***605 CAMPBELL AVENUE*** ***NNW 1/4 - 1/2 (0.284 mi.)*** ***G31*** ***156***
Database: LUST REG WC, Date of Government Version: 06/04/2015
Date Closed: 1994-07-28 00:00:00
Pollution Control #: 94-0039

SUPR NO.1087 421/417 CAMPBELL AVE NW 1/4 - 1/2 (0.309 mi.) 35 179
Database: LUST REG WC, Date of Government Version: 06/04/2015
Pollution Control #: 96-1086

ANTHEM ROANOKE PROPE 302 CAMPBELL AVENUE NW 1/4 - 1/2 (0.343 mi.) H37 181
Database: LUST REG WC, Date of Government Version: 06/04/2015
Pollution Control #: 05-2023N

ANTHEM ROANOKE PROPE 302 CAMPBELL AVENUE, NW 1/4 - 1/2 (0.343 mi.) H39 182
Database: LUST REG WC, Date of Government Version: 06/04/2015
Pollution Control #: 05-2023N

NORFOLK SOUTHERN-EAS 8TH ST. & CAMPBELL A N 1/4 - 1/2 (0.359 mi.) 40 182
Database: LUST REG WC, Date of Government Version: 06/04/2015
Date Closed: 1994-06-09 00:00:00
Pollution Control #: 93-1111A

BLUE CROSS/ BLUE SHI 602 S. JEFFERSON STR W 1/4 - 1/2 (0.392 mi.) I42 184
Database: LUST REG WC, Date of Government Version: 06/04/2015
Date Closed: 1993-02-04 00:00:00
Pollution Control #: 93-0882

JEFFERSON MOTOR LODG ***612 AND 616 JEFFERSO*** ***W 1/4 - 1/2 (0.399 mi.)*** ***J44*** ***185***
Database: LUST REG WC, Date of Government Version: 06/04/2015
Case Status: Closed
Pollution Control #: 20082038

D&G MART ***1219 JAMISON AVE SE*** ***ENE 1/4 - 1/2 (0.417 mi.)*** ***L51*** ***220***
Database: LUST REG WC, Date of Government Version: 06/04/2015
Case Status: Closed
Pollution Control #: 20122069

ALLRIGHT PARKING GAR ***635 S JEFFERSON ST*** ***W 1/4 - 1/2 (0.442 mi.)*** ***J57*** ***236***
Database: LUST REG WC, Date of Government Version: 06/04/2015

HEIRONIMUS WAREHOUSE 3RD & ALBERMARLE ST. SW 1/4 - 1/2 (0.450 mi.) M59 238
Database: LUST REG WC, Date of Government Version: 06/04/2015
Date Closed: 1996-10-07 00:00:00
Pollution Control #: 96-1091N

T & R GARAGE 41 WEST 4TH ST., SAL NNW 1/4 - 1/2 (0.452 mi.) 60 239
Database: LUST REG WC, Date of Government Version: 06/04/2015
Date Closed: 1997-01-23 00:00:00
Pollution Control #: 96-1029

ART MUSEUM FUTURE SI ***100 SALEM AVE SE*** ***NW 1/4 - 1/2 (0.459 mi.)*** ***N62*** ***240***
Database: LUST REG WC, Date of Government Version: 06/04/2015
Case Status: Closed
Pollution Control #: 20062015

YELLOW CAB,ROANOKE 202 SHENANDOAH AVE., NW 1/4 - 1/2 (0.471 mi.) O63 241
Database: LUST REG WC, Date of Government Version: 06/04/2015
Date Closed: 1994-04-22 00:00:00
Pollution Control #: 91-1906

STAR CITY FOOD CENTE ***509 13TH STREET, SE*** ***NE 1/4 - 1/2 (0.497 mi.)*** ***P67*** ***244***
Database: LUST REG WC, Date of Government Version: 06/04/2015

Case Status: Closed
Pollution Control #: 20092004

LTANKS: The Leaking Tanks Database contains current Leaking petroleum tanks. The data comes from the Department of Environmental Quality.

A review of the LTANKS list, as provided by EDR, and dated 11/01/2024 has revealed that there are 23 LTANKS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
806 MOUNTAIN AVE PRO Facility Status: Closed CEDS Facility Id: 200000896294 Pollution Complaint #: 20232155	806 MOUNTAIN AVE SE	SE 1/8 - 1/4 (0.129 mi.)	8	19
APPLE MARKET 1508 Facility Status: Closed CEDS Facility Id: 200000088348 Pollution Complaint #: 20012028 Pollution Complaint #: 19880116	***403 ELM AVENUE SE***	***WSW 1/8 - 1/4 (0.169 mi.)***	***B20***	***109***
SHELOR ALLAN PROPERT Facility Status: Closed CEDS Facility Id: 200000890052 Pollution Complaint #: 20202092	654 HIGHLAND AVE	S 1/8 - 1/4 (0.183 mi.)	21	125
STONEWALL JACKSON MI Facility Status: Closed CEDS Facility Id: 200000082003 Pollution Complaint #: 19921260	***1022 9TH STREET S.W.***	***SE 1/8 - 1/4 (0.239 mi.)***	***F26***	***149***
NINTH STREET CHURCH Facility Status: Closed CEDS Facility Id: 200000894165 Pollution Complaint #: 20222114	745 MONTROSE AVE SE	SE 1/4 - 1/2 (0.310 mi.)	36	180
KETON MARTIN RESIDEN Facility Status: Closed CEDS Facility Id: 200000881341 Pollution Complaint #: 20162106	1139 STEWART AVE	NE 1/4 - 1/2 (0.372 mi.)	41	183
CARILION ROANOKE COM Facility Status: Closed CEDS Facility Id: 200000082524 Pollution Complaint #: 20172180	***101 ELM AVENUE SE***	***W 1/4 - 1/2 (0.400 mi.)***	***K45***	***186***

Lower Elevation	Address	Direction / Distance	Map ID	Page
822 JAMISON AVE PROP Facility Status: Closed CEDS Facility Id: 200000895420 Pollution Complaint #: 20232039	822 JAMISON AVE SE	NE 0 - 1/8 (0.055 mi.)	2	12
LLOYD ELECTRIC COMPA Facility Status: Closed CEDS Facility Id: 200000196409 Pollution Complaint #: 19981142	***605 THIRD ST SE***	***WNW 1/4 - 1/2 (0.264 mi.)***	***30***	***155***
FORMER COREAST FEDER	***605 CAMPBELL AVENUE***	***NNW 1/4 - 1/2 (0.284 mi.)***	***G31***	***156***

Facility Status: Closed CEDS Facility Id: 200000094176 Pollution Complaint #: 19940039				
MR A'S MART Facility Status: Closed CEDS Facility Id: 200000088588 Pollution Complaint #: 19961086 Pollution Complaint #: 20172181	***421 CAMPBELL AVENUE***	***NW 1/4 - 1/2 (0.291 mi.)***	***G33***	***160***
ANTHEM PROPERTY AT C Facility Status: Closed CEDS Facility Id: 200000217124 Pollution Complaint #: 20052023	302 CAMPBELL AVE SE	NW 1/4 - 1/2 (0.343 mi.)	H38	181
SFD RENTAL UNIT Facility Status: Closed CEDS Facility Id: 200000892896 Pollution Complaint #: 20212221	122 10 1/2 ST SW	NNE 1/4 - 1/2 (0.393 mi.)	43	184
JEFFERSON MOTOR LODG Facility Status: Closed CEDS Facility Id: 200000847928 Pollution Complaint #: 20082038	***612 AND 616 JEFFERSO***	***W 1/4 - 1/2 (0.399 mi.)***	***J44***	***185***
D & G MART Facility Status: Closed CEDS Facility Id: 200000095624 Pollution Complaint #: 20022110	***1219 JAMISON AVE SE***	***ENE 1/4 - 1/2 (0.417 mi.)***	***L50***	***208***
D&G MART Facility Status: Closed CEDS Facility Id: 200000095624 Pollution Complaint #: 20122069 Pollution Complaint #: 19981101	***1219 JAMISON AVE SE***	***ENE 1/4 - 1/2 (0.417 mi.)***	***L51***	***220***
HEIRONIMUS WAREHOUSE Facility Status: Closed CEDS Facility Id: 200000081902 Pollution Complaint #: 19961091	***315 ALBEMARLE AVENUE***	***SW 1/4 - 1/2 (0.420 mi.)***	***M52***	***222***
BLUE CROSS-BLUE SHIE Facility Status: Closed CEDS Facility Id: 200000081824 Pollution Complaint #: 19930882	***602 JEFFERSON ST.***	***W 1/4 - 1/2 (0.439 mi.)***	***I56***	***234***
ALLRIGHT PARKING GAR Facility Status: Closed CEDS Facility Id: 200000094143 Pollution Complaint #: 20042091	***635 S JEFFERSON ST***	***W 1/4 - 1/2 (0.442 mi.)***	***J57***	***236***
ART MUSEUM FUTURE SI Facility Status: Closed CEDS Facility Id: 200000221899 Pollution Complaint #: 20062015	***100 SALEM AVE SE***	***NW 1/4 - 1/2 (0.459 mi.)***	***N62***	***240***
GUARD RAIL PROPERTY Facility Status: Closed CEDS Facility Id: 200000889798 Pollution Complaint #: 20202067	1131 4TH ST SE	SW 1/4 - 1/2 (0.475 mi.)	64	241
YELLOW CAB CO OF ROA Facility Status: Closed	200 SHENANDOAH AVE N	NW 1/4 - 1/2 (0.475 mi.)	O65	242

CEDS Facility Id: 200000088598
Pollution Complaint #: 19911906

STAR CITY FOOD CENTE	***509 13TH STREET, SE***	***NE 1/4 - 1/2 (0.497 mi.)***	***P67***	***244***
Facility Status: Closed CEDS Facility Id: 200000081991 Pollution Complaint #: 20092004				

Lists of state and tribal registered storage tanks

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Environmental Quality's Underground Storage Tank Data Notification Information.

A review of the UST list, as provided by EDR, and dated 11/04/2024 has revealed that there are 8 UST sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
P & N 96 Tank Status: CURR IN USE Facility Id: 2007092 CEDS Facility ID: 200000095570	***404 ELM AVE SE***	***WSW 1/8 - 1/4 (0.133 mi.)***	***B9***	***20***
DEVOE & RAYNOLDS COM Tank Status: REM FROM GRD Facility Id: 2022964 CEDS Facility ID: 200000081857	701 FOURTH ST	W 1/8 - 1/4 (0.158 mi.)	B15	100
STAR VALLEY MINUTE M Tank Status: REM FROM GRD Facility Id: 2017636 CEDS Facility ID: 200000081324	831 HIGHLAND AVE	ESE 1/8 - 1/4 (0.167 mi.)	C18	104
APPLE MARKET 1508 Tank Status: REM FROM GRD Tank Status: CURR IN USE Facility Id: 2003698 CEDS Facility ID: 200000088348	***403 ELM AVENUE SE***	***WSW 1/8 - 1/4 (0.169 mi.)***	***B20***	***109***
STONEWALL JACKSON MI Tank Status: REM FROM GRD Facility Id: 2024064 CEDS Facility ID: 200000082003	***1022 9TH STREET S.W.***	***SE 1/8 - 1/4 (0.239 mi.)***	***F26***	***149***

Lower Elevation	Address	Direction / Distance	Map ID	Page
PIC-QUIK Tank Status: REM FROM GRD Facility Id: 2019025 CEDS Facility ID: 200000081953	615 NINTH ST SE	ENE 0 - 1/8 (0.084 mi.)	A4	14
RESCUE MISSION OF RO Tank Status: REM FROM GRD Facility Id: 2027151 CEDS Facility ID: 200000081966	402 FOURTH STREET SE	NW 1/8 - 1/4 (0.209 mi.)	D23	127
RICHARDS GUTTERING &	1024 JAMISON AVE	ENE 1/8 - 1/4 (0.248 mi.)	29	153

Tank Status: REM FROM GRD
Facility Id: 2008385
CEDS Facility ID: 200000094219

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: The EPA's listing of Brownfields properties from the Cleanups in My Community program, which provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

A review of the US BROWNFIELDS list, as provided by EDR, and dated 09/09/2024 has revealed that there are 2 US BROWNFIELDS sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HARTSOOK	***210 MARKET STREET SE***	***WNW 1/4 - 1/2 (0.413 mi.)***	***47***	***202***
HISTORIC FIRE STATIO	13 CHURCH AVE SE	WNW 1/4 - 1/2 (0.426 mi.)	53	227

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 09/16/2024 has revealed that there is 1 RCRA NonGen / NLR site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
WOODKINGS AUTO BODY	***205 8 1/2 ST SE***	***N 1/8 - 1/4 (0.226 mi.)***	***E25***	***146***
EPA ID:: VAD183045053				

PFAS ECHO: Regulators and the public have expressed interest in knowing which regulated entities may be using PFAS. EPA has developed a dataset from various sources that show which industries may be handling PFAS. Approximately 120,000 facilities subject to federal environmental programs have operated or currently operate in industry sectors with processes that may involve handling and/or release of PFAS.

A review of the PFAS ECHO list, as provided by EDR, and dated 12/30/2024 has revealed that there is 1 PFAS ECHO site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PNN MARKET #96		WSW 1/8 - 1/4 (0.134 mi.)	B12	88

EXECUTIVE SUMMARY

UST FINDER RELEASE: US EPA's UST Finder data is a national composite of leaking underground storage tanks. This data contains information about, and locations of, leaking underground storage tanks. Data was collected from state sources and standardized into a national profile by EPA's Office of Underground Storage Tanks, Office of Research and Development, and the Association of State and Territorial Solid Waste Management Officials.

A review of the UST FINDER RELEASE list, as provided by EDR, and dated 06/08/2023 has revealed that there are 11 UST FINDER RELEASE sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CARILION ROANOKE COM	***101 ELM AVENUE***	***W 1/4 - 1/2 (0.400 mi.)***	***K46***	***199***
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
FORMER COREAST FEDER	***605 CAMPBELL AVENUE***	***NNW 1/4 - 1/2 (0.284 mi.)***	***G32***	***158***
MR A'S MART	***421 CAMPBELL AVENUE***	***NW 1/4 - 1/2 (0.291 mi.)***	***G34***	***177***
GETTY MART #31	1219 JAMISON AVE SE	ENE 1/4 - 1/2 (0.417 mi.)	L48	206
D&G MART	1219 JAMISON AVE SE	ENE 1/4 - 1/2 (0.417 mi.)	L49	207
JEFFERSON MOTOR LODG	612 AND 616 JEFFERSO	W 1/4 - 1/2 (0.430 mi.)	I54	232
BLUE CROSS-BLUE SHIE	***602 JEFFERSON ST.***	***W 1/4 - 1/2 (0.434 mi.)***	***I55***	***232***
ALLRIGHT PARKING GAR	635 S JEFFERSON ST	W 1/4 - 1/2 (0.442 mi.)	J58	237
ART MUSEUM FUTURE SI	100 SALEM AVE SE	NW 1/4 - 1/2 (0.459 mi.)	N61	239
YELLOW CAB CO OF ROA	200 SHENANDOAH AVE N	NW 1/4 - 1/2 (0.475 mi.)	O66	243
STAR CITY FOOD CENTE	509 13TH STREET, SE	NE 1/4 - 1/2 (0.497 mi.)	P68	245

UST FINDER: EPA developed UST Finder, a web map application containing a comprehensive, state-sourced national map of underground storage tank (UST) and leaking UST (LUST) data. It provides the attributes and locations of active and closed USTs, UST facilities, and LUST sites from states and from Tribal lands and US territories . UST Finder contains information about proximity of UST facilities and LUST sites to: surface and groundwater public drinking water protection areas; estimated number of private domestic wells and number of people living nearby; and flooding and wildfires.

A review of the UST FINDER list, as provided by EDR, and dated 06/08/2023 has revealed that there are 7 UST FINDER sites within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
P & N 96	404 ELM AVE SE	WSW 1/8 - 1/4 (0.133 mi.)	B10	28
DEVOE & RAYNOLDS COM	701 FOURTH ST	W 1/8 - 1/4 (0.165 mi.)	B16	102
STAR VALLEY MINUTE M	831 HIGHLAND AVE	ESE 1/8 - 1/4 (0.167 mi.)	C17	103
APPLE MARKET 1508	403 ELM AVE	WSW 1/8 - 1/4 (0.169 mi.)	B19	107
STONEWALL JACKSON MI	1022 9TH STREET S.W.	SE 1/8 - 1/4 (0.239 mi.)	F28	152
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
PIC-QUIK	615 NINTH ST SE	ENE 0 - 1/8 (0.084 mi.)	A3	13
RESCUE MISSION OF RO	402 FOURTH STREET SE	NW 1/8 - 1/4 (0.209 mi.)	D22	126

E MANIFEST: EPA established a national system for tracking hazardous waste shipments electronically. This system, known as ?e-Manifest,? will modernize the nation?s cradle-to-grave hazardous waste tracking process while saving valuable time, resources, and dollars for industry and states.

A review of the E MANIFEST list, as provided by EDR, and dated 09/16/2024 has revealed that there are

2 E MANIFEST sites within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CVS PHARMACY #6285	***702 9TH STREET, SE***	***E 1/8 - 1/4 (0.134 mi.)***	***11***	***29***
WOODING'S AUTO BODY	***824 TAZEWELL AVE SE***	***NNE 1/8 - 1/4 (0.219 mi.)***	***E24***	***130***

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

A review of the EDR MGP list, as provided by EDR, has revealed that there is 1 EDR MGP site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
ROANOKE TOWN GAS	NE KIMBALL AND RUTHE	N 1/2 - 1 (0.671 mi.)	69	246

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 2 EDR Hist Auto sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
HERNDON EDWARD P JR	608 9TH ST SE	ENE 0 - 1/8 (0.097 mi.)	A6	18
RAKES CHAS J	522 9TH ST SE	NE 0 - 1/8 (0.107 mi.)	7	19

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and

operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there is 1 EDR Hist Cleaner site within approximately 0.125 miles of the target property.

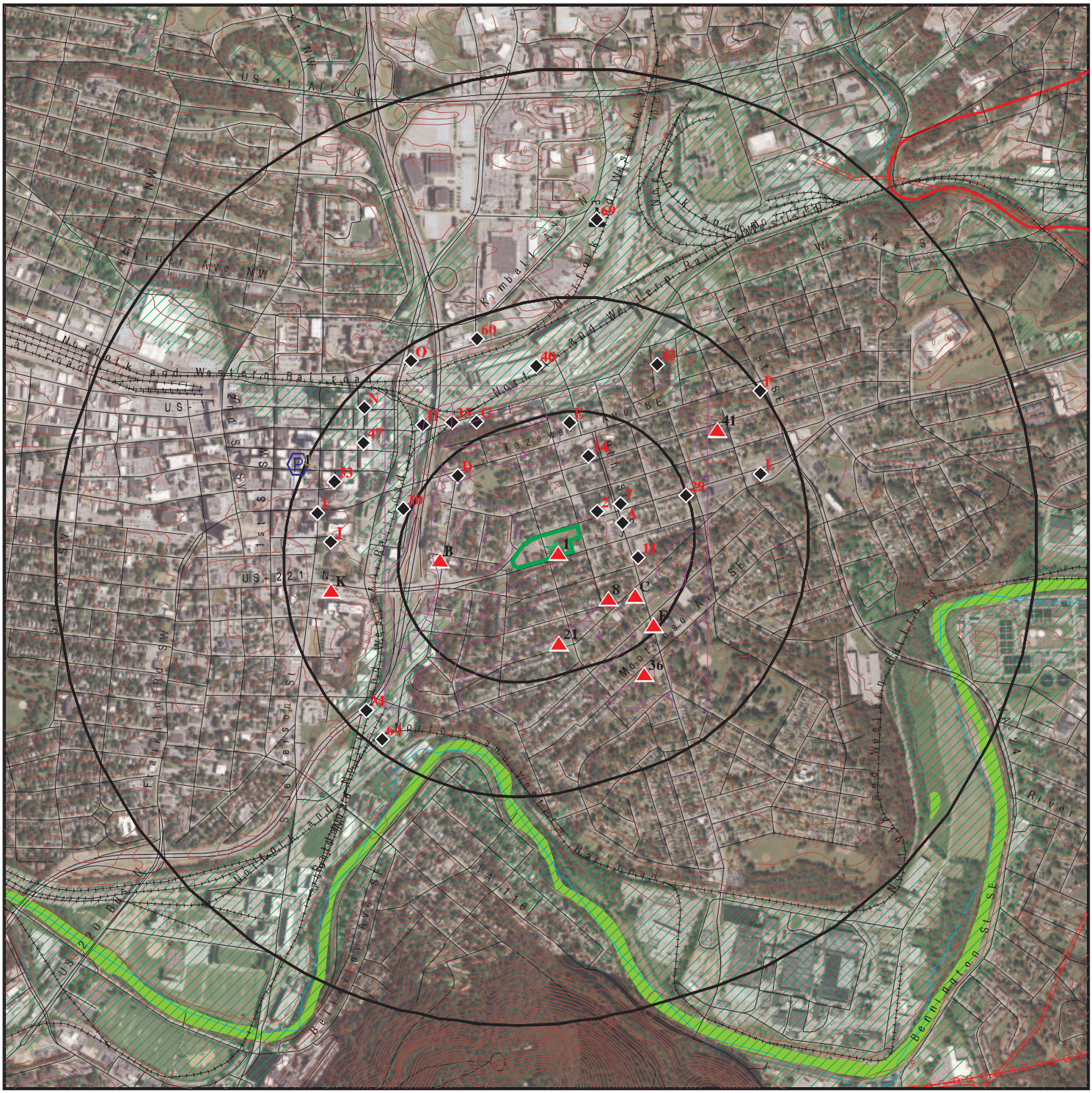
Lower Elevation	Address	Direction / Distance	Map ID	Page
VALLEY CLEANERS	703 9TH STREET SOUTH	E 0 - 1/8 (0.096 mi.)	A5	18

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 8 records.

Site Name	Database(s)
ROANOKE RIVER FLOOD CONTROL	SEMS-ARCHIVE
VIRGINIA ASPHALT AND PAVING	LUST
VACANT LOT (CORNER OF FRANKLIN & E	LUST
VDOT-GEORGE'S ENTERPRISES#	LUST
ROANOKE MEMORIAL HOSPITAL#	LUST
CITY OF ROANOKE STORM WATER PROJEC	LTANKS
FORMER CAMPBELL COURT REDEVELOPMEN	LTANKS
N&W ROANOKE SHOPS	LTANKS

OVERVIEW MAP - 7912252.2S



This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Gateway Project - Homes for America	CLIENT:	Balzer & Associates
ADDRESS:	632 Bullitt Avenue Southeast Roanoke VA 24013	CONTACT:	Tim Sakowski
LAT/LONG:	37.267948 / 79.931249	INQUIRY #:	7912252.2s
		DATE:	February 28, 2025 1:50 pm

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DETAIL MAP - 7912252.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

0 1/16 1/8 1/4 Miles

Indian Reservations BIA

Special Flood Hazard Area (1%)

0.2% Annual Chance Flood Hazard

N

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Gateway Project - Homes for America	CLIENT:	Balzer & Associates
ADDRESS:	632 Bullitt Avenue Southeast Roanoke VA 24013	CONTACT:	Tim Sakowski
LAT/LONG:	37.267948 / 79.931249	INQUIRY #:	7912252.2s
		DATE:	February 28, 2025 1:50 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Lists of Federal NPL (Superfund) sites								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Lists of Federal Delisted NPL sites								
Delisted NPL	1.000		0	0	0	0	NR	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Lists of Federal CERCLA sites with NFRAP								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA facilities undergoing Corrective Action								
CORRACTS	1.000		0	0	0	0	NR	0
Lists of Federal RCRA TSD facilities								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA generators								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	1	NR	NR	NR	1
RCRA-VSQG	0.250		0	3	NR	NR	NR	3
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		1	NR	NR	NR	NR	1
Lists of state- and tribal hazardous waste facilities								
SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
Lists of state and tribal landfills and solid waste disposal facilities								
SWF/LF	0.500		0	0	1	NR	NR	1
Lists of state and tribal leaking storage tanks								
LUST	0.500		0	1	15	NR	NR	16

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
LTANKS	0.500		1	4	18	NR	NR	23
Lists of state and tribal registered storage tanks								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		1	7	NR	NR	NR	8
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
ENG CONTROLS	0.500		0	0	0	NR	NR	0
INST CONTROL	0.500		0	0	0	NR	NR	0
Lists of state and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
Lists of state and tribal brownfield sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	2	NR	NR	2
Local Lists of Landfill / Solid Waste Disposal Sites								
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
SPILLS	0.001		0	NR	NR	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	1	NR	NR	NR	1
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
MINES MRDS	0.250		0	0	NR	NR	NR	0
FINDS	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
PFAS NPL	0.250		0	0	NR	NR	NR	0
PFAS FEDERAL SITES	0.250		0	0	NR	NR	NR	0
PFAS TRIS	0.250		0	0	NR	NR	NR	0
PFAS TSCA	0.250		0	0	NR	NR	NR	0
PFAS RCRA MANIFEST	0.250		0	0	NR	NR	NR	0
PFAS ATSDR	0.250		0	0	NR	NR	NR	0
PFAS WQP	0.250		0	0	NR	NR	NR	0
PFAS PROJECT	0.250		0	0	NR	NR	NR	0
PFAS NPDES	0.250		0	0	NR	NR	NR	0
PFAS ECHO	0.250		0	1	NR	NR	NR	1
PFAS ECHO FIRE TRAIN	0.250		0	0	NR	NR	NR	0
PFAS PT 139 AIRPORT	0.250		0	0	NR	NR	NR	0
AQUEOUS FOAM NRC	0.250		0	0	NR	NR	NR	0
BIOSOLIDS	0.001		0	NR	NR	NR	NR	0
UST FINDER RELEASE	0.500		0	0	11	NR	NR	11
UST FINDER	0.250		1	6	NR	NR	NR	7

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
E MANIFEST	0.250		0	2	NR	NR	NR	2
AIRS	0.001		0	NR	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
ENF	0.001		0	NR	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
TIER 2	0.001		0	NR	NR	NR	NR	0
UIC	0.001		0	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	1	NR	1
EDR Hist Auto	0.125		2	NR	NR	NR	NR	2
EDR Hist Cleaner	0.125		1	NR	NR	NR	NR	1
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		0	7	26	47	1	0	81

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

1 **ERNS** **2016140852**

708 BULLITT AVE SE **N/A**

< 1/8 **ROANOKE, VA 24016**

1 ft.

Relative: Higher

Actual: 965 ft.

Incident Commons:

NRC Report #:	1140852
Description of Incident:	CALLER IS REPORTING THAT A HOUSE IS BEING REHABILITATED AND THE COMPANY HAS NOT CONTAINED LEAD BASED PAINT DUST AND CHIPS THAT ARE GOING INTO THE AIR IN THE SURROUNDING AREA.
Type of Incident:	FIXED
Incident Cause:	OTHER
Incident Date Time:	2016-01-11 12:00:00
Incident DTG:	OCCURRED
Incident Location:	Not reported
Loaction Address:	708 BULLITT AVE SE
Location Street 1:	Not reported
Location Street 2:	Not reported
Location Nearest City:	ROANOKE
Location State:	VA
Location County:	ROANOKE
Location Zip:	24016
Distance From City:	Not reported
Distance Units:	Not reported
Direction From City:	Not reported
Lat Deg:	Not reported
Lat Min:	Not reported
Lat Sec:	Not reported
Lat Quad:	Not reported
Long Deg:	Not reported
Long Min:	Not reported
Long Sec:	Not reported
Long Quad:	Not reported
Location Section:	Not reported
Location Township:	Not reported
Location range:	Not reported
Potential Range:	N

Incidents:

Year:	2016
NRC Report #:	1140852
Aircraft Type:	Not reported
Aircraft Model:	Not reported
Aircraft ID:	Not reported
Aircraft Fuel Capacity:	Not reported
Aircraft Fuel Capacity Units:	Not reported
Aircraft Fuel on Board:	Not reported
Aircraft Fuel on Board Units:	Not reported
Aircraft Spot Number:	Not reported
Aircraft Hanger:	Not reported
Aircraft Runway Number:	Not reported
Road Mile Marker:	Not reported
Building ID:	Not reported
Type of Fixed Object:	PRIVATE RESIDENCE
Power Generating Facility:	N
Generating Capacity:	Not reported
Type of Fuel:	Not reported
NPDES:	Not reported
NPDES Compliance:	U
Pipeline Type:	Not reported

(Continued) **2016140852**

DOT Regulated:	U
Pipeline Above Ground:	ABOVE
Exposed Underwater:	N
Pipeline Covered:	U
Railroad Hotline:	Not reported
Grade Crossing:	U
Location Subdivision:	Not reported
Railroad Milepost:	Not reported
Type Vehicle Involved:	Not reported
Crossing Device Type:	Not reported
Device Operational:	U
DOT Crossing Number:	Not reported
Brake Failure:	U
Description of Tank:	Not reported
Tank Above Ground:	ABOVE
Transportable Container:	U
Tank Regulated:	U
Tank Regulated By:	Not reported
Tank ID:	Not reported
Capacity of Tank:	Not reported
Capacity of Tank Units:	Not reported
Actual Amount:	Not reported
Actual Amount Units:	Not reported
Platform Rig Name:	Not reported
Platform Letter:	Not reported
Location Area ID:	Not reported
Location Block ID:	Not reported
OCSG Number:	Not reported
OCSP Number:	Not reported
State Lease Number:	Not reported
Pier Dock Number:	Not reported
Berth Slip Number:	Not reported
Continuous Release Type:	Not reported
Initial Continuous Release No:	Not reported
Continuous Release Permit:	Not reported
Allision:	U
Type of Structure:	Not reported
Structure Name:	Not reported
Structure Operational:	U
Airbag Deployed:	U
Date Tiem Normal Service:	Not reported
Service Disruption Time:	Not reported
Service Disruption Units:	Not reported
Transit Bus Flag:	Not reported
CR Begin Date:	Not reported
CR End Date:	Not reported
CR Change Date:	Not reported
FBI Contact:	Not reported
FBI Contact Date Time:	Not reported
Sub Part C Testing Req:	XXX
Conductor Testing:	Not reported
Engineer Testing:	Not reported
Trainman Testing:	Not reported
Yard Foreman Testing:	Not reported
RCL Operator Testing:	Not reported
Brakeman Testing:	Not reported
Train Dispatcher Testing:	Not reported

(Continued) **2016140852**

Signalman Testing:	Not reported
Other Employee Testing:	Not reported
Unknown Testing:	Not reported
Passenger Handling:	Not reported
Passenger Route:	XXX
Passenger Delay:	XXX

Incident Details:

Year:	2016
NRC Report #:	1140852
Fire Involved:	N
Fire Extinguished:	U
Any Evacuations:	N
Number Evacuated:	Not reported
Who Evacuated:	Not reported
Radius of Evacuation:	Not reported
Any Injuries:	N
Number Injured:	Not reported
Number Hospitalized:	Not reported
Any Fatalities:	N
Number Fatalities:	Not reported
Any Damages:	N
Damage Amount:	Not reported
Air Corridor Closed:	N
Air Corridor Desc:	Not reported
Air Closure Time:	Not reported
Waterway Closed:	N
Waterway Desc:	Not reported
Waterway Closure Time:	Not reported
Road Closed:	N
Road Desc:	Not reported
Road Closure Time:	Not reported
Closure Direction:	Not reported
Major Artery:	N
Track Closed:	N
Track Desc:	Not reported
Track Closure Time:	Not reported
Media Interest:	NONE
Medium Desc:	AIR
Additional Medium Info:	AIR IN THE LOCAL AREA
Body of Water:	Not reported
Tributary of:	Not reported
Release Secured:	U
Estimated Duration of Release:	Not reported
Release rate:	Not reported
Desc Remedial Action:	Not reported
State Agency on Scene:	Not reported
State Agency Report Number:	Not reported
Other Agency Notified:	Not reported
Weather Conditions:	Not reported
Air Temperature:	Not reported
Wind Speed:	Not reported
Wind Direction:	Not reported
Water Supply Contaminated:	U
Sheen Size:	Not reported
Sheen Color:	Not reported
Direction of Sheen Travel:	Not reported

(Continued) **2016140852**

Sheen Odor Description:	Not reported
Wave Condition:	Not reported
Current Speed:	Not reported
Current Direction:	Not reported
Water Temperature:	Not reported
Track Close Dir:	Not reported
Empl Fatality:	Not reported
Pass Fatality:	Not reported
Community Impact:	Not reported
Wind Speed Unit:	Not reported
Employee Injuries:	Not reported
Passenger Injuries:	Not reported
Occupant Fatality:	Not reported
Current Speed Unit:	Not reported
Road Closure Units:	Not reported
Track CLosure Units:	Not reported
Sheen Size Units:	Not reported
Additional Info:	Not reported
State Agency Notified:	Not reported
Federal Agency Notified:	Not reported
nearest River Mile Marker:	Not reported
Sheen Size Length:	Not reported
Sheen Size Length Units:	Not reported
Sheen Size Width:	Not reported
Sheen Size Width Units:	Not reported
Offshore:	N
Duration Unit:	Not reported
Release Rate Unit:	Not reported
Release Rate Rate:	Not reported
Passengers Transferred:	NO

Calls:

Year:	2016
NRC Report #:	1140852
Site ID:	20161140852
Date Time Received:	2016-02-19 12:34:11
Date Time Complete:	2016-02-19 12:43:38
Call Type:	INC
Responsible Company:	Not reported
Responsible Org Type:	PRIVATE ENTERPRISE
Responsible City:	Not reported
Responsible State:	VA
Responsible Zip:	Not reported
On Behalf:	Not reported
Source:	TELEPHONE

Material Involved:

Year:	2016
NRC Report #:	1140852
Chris Code:	NCC
Case Number:	000000-00-0
UN Number:	Not reported
Amount of Material:	0
Unit of Measure:	UNKNOWN AMOUNT
Name of Material:	LEAD BASED PAINT DUST AND CHIPS
If Reached Water:	NO

(Continued) **2016140852**

Amount in Water: Not reported
Unit of Measure Reach Water: Not reported

2
NE
< 1/8
0.055 mi.
288 ft.

822 JAMISON AVE PROPERTY
822 JAMISON AVE SE
ROANOKE, VA 24013

LTANKS **S129124665**
N/A

Relative:
Lower

Actual:
957 ft.

LTANKS:

Name:	822 JAMISON AVE PROPERTY
Address:	822 JAMISON AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000895420
Case Status:	**Closed**
Pollution Complaint #:	20232039
Reported:	08/24/2022
Case Closed Date:	06/02/2023
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	Yes
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Category 3
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

A3 **PIC-QUIK** **UST FINDER** **1028796562**
ENE **615 NINTH ST SE** **N/A**
< 1/8 **ROANOKE, VA 24013**
0.084 mi.
441 ft. **Site 1 of 4 in cluster A**

Relative: **Lower**

Actual: **956 ft.**

UST FINDER:

Object ID:	508871
Facility ID:	VA2019025
Name:	PIC-QUIK
Address:	615 NINTH ST SE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	0
Closed USTs:	3
TOS USTs:	0
Population 1500ft:	1763
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.92859248
Y Coord:	37.26856164
Latitude:	37.26856164
Longitude:	-79.92859248

UST FINDER:

Object ID:	2064518
Facility ID:	VA2019025
Tank ID:	VA2019025_R3
Tank Status:	Closed
Installation Date:	1981/05/19 16:00:00+00
Removal Date:	1995/08/03 15:59:59+00
Tank Capacity:	6000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2064519
Facility ID:	VA2019025
Tank ID:	VA2019025_R2
Tank Status:	Closed
Installation Date:	1981/05/19 16:00:00+00
Removal Date:	1995/08/03 15:59:59+00
Tank Capacity:	6000
Substances:	GASOLINE
Tank Wall Type:	Single

PIC-QUIK (Continued) **1028796562**

Object ID:	2064520
Facility ID:	VA2019025
Tank ID:	VA2019025_R1
Tank Status:	Closed
Installation Date:	1981/05/19 16:00:00+00
Removal Date:	1995/08/03 15:59:59+00
Tank Capacity:	8000
Substances:	GASOLINE
Tank Wall Type:	Single

A4 **PIC-QUIK** **UST** **U003677049**
ENE **615 NINTH ST SE** **N/A**
< 1/8 **ROANOKE, VA 24013**
0.084 mi.
441 ft. **Site 2 of 4 in cluster A**

Relative:
Lower

Actual:
956 ft.

Facility:

Name:	PIC-QUIK
Address:	615 NINTH ST SE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2019025
Facility Type:	GAS STATION
CEDS Facility ID:	200000081953

Owner:

Owner Id:	37016
Owner Name:	PIC-QUIK INC
Owner Address:	3458 Camino Michelle
Owner Address2:	Not reported
Owner City, State, Zip:	Carlsbad, CA 92009
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	3

UST:

Facility ID:	2019025
Federally Regulated:	Yes
Tank Number:	R1
Tank Capacity:	8000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	5/19/1981
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No

PIC-QUIK (Continued) **U003677049**

Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2019025
Federally Regulated:	Yes
Tank Number:	R2
Tank Capacity:	6000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	5/19/1981
Tank Materials: Bare Steel	Yes

PIC-QUIK (Continued) **U003677049**

Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2019025
Federally Regulated:	Yes

Tank Number:	R3

PIC-QUIK (Continued) **U003677049**

Tank Capacity:	6000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST
Tank Material:	
Install Date:	5/19/1981
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No

PIC-QUIK (Continued) **U003677049**

Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

A5 **VALLEY CLEANERS** **EDR Hist Cleaner** **1018634122**
East **703 9TH STREET SOUTHEAST** **N/A**
< 1/8 **ROANOKE, VA 24013**
0.096 mi.
508 ft. **Site 3 of 4 in cluster A**

Relative: EDR Hist Cleaner
Lower

Actual: **958 ft.**

Year:	Name:	Type:
1987	VALLEY CLEANERS	Garment Pressing And Cleaners' Agents
1988	VALLEY CLEANERS	Garment Pressing And Cleaners' Agents
1989	VALLEY CLEANERS	Garment Pressing And Cleaners' Agents
1990	VALLEY CLEANERS	Garment Pressing And Cleaners' Agents
1991	VALLEY CLEANERS	Garment Pressing And Cleaners' Agents
1992	VALLEY CLEANERS	Garment Pressing And Cleaners' Agents
1993	VALLEY CLEANERS	Garment Pressing And Cleaners' Agents
1995	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
1996	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
1997	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
1998	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
1999	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2000	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2001	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2002	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2003	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2004	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2005	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2006	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2007	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2008	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2009	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2010	VALLEY CLEANERS OF ROANOKE	Laundry And Drycleaner Agents
2011	VALLEY CLEANERS OF ROANOKE	Drycleaning Plants, Except Rugs
2012	VALLEY CLEANERS OF ROANOKE	Drycleaning Plants, Except Rugs
2013	VALLEY CLEANERS OF ROANOKE	Drycleaning Plants, Except Rugs
2014	VALLEY CLEANERS OF ROANOKE	Drycleaning Plants, Except Rugs

---

A6 **HERNDON EDWARD P JR** **EDR Hist Auto** **1020250462**
ENE **608 9TH ST SE** **N/A**
< 1/8 **ROANOKE, VA 24013**
0.097 mi.
513 ft. **Site 4 of 4 in cluster A**

Relative: EDR Hist Auto
Lower

Actual: **955 ft.**

Year:	Name:	Type:
1970	HERNDON EDWARD P JR	Gasoline Service Stations
1971	HERNDON EDWARD P JR	Gasoline Service Stations

7
NE
< 1/8
0.107 mi.
564 ft.

RAKES CHAS J
522 9TH ST SE
ROANOKE, VA 24013

EDR Hist Auto **1022103098**
N/A

Relative:
Lower

Actual:
952 ft.

EDR Hist Auto

Year:	Name:	Type:
1970	RAKES CHAS J	Gasoline Service Stations

8
SE
1/8-1/4
0.129 mi.
680 ft.

806 MOUNTAIN AVE PROPERTY
806 MOUNTAIN AVE SE
ROANOKE, VA 24013

LTANKS **S129369459**
N/A

Relative:
Higher

Actual:
993 ft.

LTANKS:

Name:	806 MOUNTAIN AVE PROPERTY
Address:	806 MOUNTAIN AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000896294
Case Status:	**Closed**
Pollution Complaint #:	20232155
Reported:	02/14/2023
Case Closed Date:	09/11/2023
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	Yes
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Category 1
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported

806 MOUNTAIN AVE PROPERTY (Continued) **S129369459**

Latitude: Not reported
Longitude: Not reported

B9 **P & N 96** **UST** **U003675062**
WSW **404 ELM AVE SE** **Financial Assurance** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.133 mi.
703 ft. **Site 1 of 8 in cluster B**

Relative: Higher

Actual: 979 ft.

Facility:
Name: P & N 96
Address: 404 ELM AVE SE
City,State,Zip: ROANOKE, VA 24013
Facility Id: 2007092
Facility Type: GAS STATION
CEDS Facility ID: 200000095570

Owner:
Owner Id: 36297
Owner Name: PM Properties Inc c/o CrossAmerica Partners
Owner Address: 645 W Hamilton St Suite 400
Owner Address2: Not reported
Owner City, State, Zip: Allentown, PA 18101
Owner Type: COMMERCIAL
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 46151
Owner Name: Elm Avenue LLC
Owner Address: 3416 Darden Place
Owner Address2: Not reported
Owner City, State, Zip: Williamsburg, VA 23188
Owner Type: COMMERCIAL
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 0

Owner Id: 47575
Owner Name: P & N Mkt LLC
Owner Address: 351 Wildwood Rd
Owner Address2: Not reported
Owner City, State, Zip: Salem, VA 24153
Owner Type: COMMERCIAL
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 0

UST:
Facility ID: 2007092
Federally Regulated: Yes

Tank Number: 1
Tank Capacity: 8000
Tank Contents: GASOLINE

P & N 96 (Continued) **U003675062**

Tank Status:	**CURR IN USE**
Tank Type:	UST
Tank Material:	
Install Date:	4/23/1981
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

P & N 96 (Continued) **U003675062**

Facility ID:	2007092
Federally Regulated:	Yes
Tank Number:	2
Tank Capacity:	6000
Tank Contents:	GASOLINE
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	4/23/1981
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Yes
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No

P & N 96 (Continued) **U003675062**

Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2007092
Federally Regulated:	Yes
Tank Number:	3
Tank Capacity:	6000
Tank Contents:	GASOLINE
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	4/23/1981
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Yes
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No

P & N 96 (Continued) **U003675062**

Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

VA Financial Assurance 1:

Name:	P & N 96
Address:	404 ELM AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2007092
Owner Name:	P & N Mkt LLC
ROF Own Id:	47575
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	8000
CEDS Facility Name:	P&N 96
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	P & N 96
Address:	404 ELM AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2007092
Owner Name:	P & N Mkt LLC
ROF Own Id:	47575
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	6000
CEDS Facility Name:	P&N 96
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	P & N 96
Address:	404 ELM AVE SE

P & N 96 (Continued) **U003675062**

Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Insurance
Gallonage: Not reported
Per Occurence: $1,000,000.00
Third Party: $1,000,000.00
Annual Aggregate: $1,000,000.00
In Compliance: Not reported
Total Capacity: 6000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Insurance
Gallonage: 164250
Per Occurence: $20,000.00
Third Party: $20,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 8000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Insurance
Gallonage: 164250
Per Occurence: $20,000.00
Third Party: $20,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 6000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE

P & N 96 (Continued) **U003675062**

Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Insurance
Gallonage: 164250
Per Occurence: $20,000.00
Third Party: $20,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 6000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Letter of Credit
Gallonage: 286793
Per Occurence: $5,000.00
Third Party: $15,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 8000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Letter of Credit
Gallonage: 286793
Per Occurence: $5,000.00
Third Party: $15,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 6000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE

P & N 96 (Continued) **U003675062**

Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Letter of Credit
Gallonage: 286793
Per Occurence: $5,000.00
Third Party: $15,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 6000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Insurance
Gallonage: Not reported
Per Occurence: $1,000,000.00
Third Party: $1,000,000.00
Annual Aggregate: $1,000,000.00
In Compliance: Not reported
Total Capacity: 8000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2007092
Owner Name: P & N Mkt LLC
ROF Own Id: 47575
Tank Type: UST
Mechanism: Insurance
Gallonage: Not reported
Per Occurence: $1,000,000.00
Third Party: $1,000,000.00
Annual Aggregate: $1,000,000.00
In Compliance: Not reported
Total Capacity: 6000
CEDS Facility Name: P&N 96
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: P & N 96
Address: 404 ELM AVE SE

P & N 96 (Continued) **U003675062**

Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2007092
Owner Name:	P & N Mkt LLC
ROF Own Id:	47575
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	6000
CEDS Facility Name:	P&N 96
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

B10 **P & N 96** **UST FINDER** **1028795290**
WSW **404 ELM AVE SE** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.133 mi.
703 ft. **Site 2 of 8 in cluster B**

Relative: **Higher**
Actual: **979 ft.**

UST FINDER:

Object ID:	508837
Facility ID:	VA2007092
Name:	P & N 96
Address:	404 ELM AVE SE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	3
Closed USTs:	0
TOS USTs:	0
Population 1500ft:	1642
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	Yes
SPA PWS Facility ID:	VA2770900_32392
SPA Water Type:	GU - Ground Water Under the Influence of Surcace Water
SPA Facility Type:	SP - Spring
SPA HUC12:	030101010404
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93528534
Y Coord:	37.2670234300001
Latitude:	37.26702343
Longitude:	-79.93528534

UST FINDER:

P & N 96 (Continued) **1028795290**

Object ID:	2062444
Facility ID:	VA2007092
Tank ID:	VA2007092_3
Tank Status:	Open
Installation Date:	1981/04/23 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	6000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2062445
Facility ID:	VA2007092
Tank ID:	VA2007092_2
Tank Status:	Open
Installation Date:	1981/04/23 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	6000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2062446
Facility ID:	VA2007092
Tank ID:	VA2007092_1
Tank Status:	Open
Installation Date:	1981/04/23 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	8000
Substances:	GASOLINE
Tank Wall Type:	Single

11
East
1/8-1/4
0.134 mi.
710 ft.

CVS PHARMACY #6285
702 9TH STREET, SE
ROANOKE, VA 24013

RCRA-VSQG **1014962210**
FINDS **VAR000523696**
ECHO
E MANIFEST

Relative:
Lower

Actual:
958 ft.

RCRA Listings:

Date Form Received by Agency:	20200227
Handler Name:	Cvs Pharmacy #6285
Handler Address:	9th Street, Se
Handler City,State,Zip:	ROANOKE, VA 24013
EPA ID:	VAR000523696
Contact Name:	NICOLE WILKINSON
Contact Address:	CVS DR MC2340
Contact City,State,Zip:	WOONSOCKET, RI 02895
Contact Telephone:	401-770-7132
Contact Fax:	Not reported
Contact Email:	NICOLE.WILKINSON@CVSHEALTH.COM
Contact Title:	DIRECTOR, CORPORATE ENVIRONMENTAL
EPA Region:	03
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	2019
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Va

CVS PHARMACY #6285 (Continued) **1014962210**

State District:		2
Mailing Address:		CVS DR MC2340
Mailing City,State,Zip:		WOONSOCKET, RI 02895
Owner Name:	Roanoke Ninth, Llc	
Owner Type:		Private
Operator Name:	Virginia Cvs Pharmacy, L.L.C.	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
202 GPRA Corrective Action Baseline:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:		Not reported
Handler Date of Last Change:		20200403
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No
Exporter of Spent Lead Acid Batteries:		No
Recycler Activity Without Storage:		No
Manifest Broker:		No
Sub-Part P Indicator:		H

Biennial: List of Years
Year: 2019

Click Here for Biennial Reporting System Data:
Year: 2017

Click Here for Biennial Reporting System Data:
Year: 2015

CVS PHARMACY #6285 (Continued) **1014962210**

Click Here for Biennial Reporting System Data:
Year: 2013

Click Here for Biennial Reporting System Data:

Hazardous Waste Summary:
Waste Code: D001
Waste Description: Ignitable Waste

Waste Code: D002
Waste Description: Corrosive Waste

Waste Code: D004
Waste Description: Arsenic

Waste Code: D005
Waste Description: Barium

Waste Code: D006
Waste Description: Cadmium

Waste Code: D007
Waste Description: Chromium

Waste Code: D008
Waste Description: Lead

Waste Code: D009
Waste Description: Mercury

Waste Code: D010
Waste Description: Selenium

Waste Code: D011
Waste Description: Silver

Waste Code: D016
Waste Description: 2,4-D (2,4-Dichlorophenoxyacetic Acid)

Waste Code: D018
Waste Description: Benzene

Waste Code: D024
Waste Description: M-Cresol

Waste Code: D026
Waste Description: Cresol

Waste Code: D027
Waste Description: 1,4-Dichlorobenzene

Waste Code: D035
Waste Description: Methyl Ethyl Ketone

Waste Code: D039
Waste Description: Tetrachloroethylene

CVS PHARMACY #6285 (Continued) **1014962210**

Waste Code: P001
Waste Description: 2h-1-Benzopyran-2-One, 4-Hydroxy-3-(3-Oxo-1-Phenylbutyl)-, & Salts, When Present At Concentrations Greater Than 0.3% (Or) Warfarin, & Salts, When Present At Concentrations Greater Than 0.3%

Waste Code: P012
Waste Description: Arsenic Oxide As2o3 (Or) Arsenic Trioxide

Waste Code: P042
Waste Description: 1,2-Benzenediol, 4-[1-Hydroxy-2-(Methylamino)Ethyl]-, (R)- (Or) Epinephrine

Waste Code: P075
Waste Description: Nicotine, & Salts (Or) Pyridine, 3-(1-Methyl-2-Pyrrolidinyl)-,(S)-, & Salts

Waste Code: P081
Waste Description: 1,2,3-Propanetriol, Trinitrate (R) (Or) Nitroglycerine (R)

Waste Code: P188
Waste Description: Benzoic Acid, 2-Hydroxy-, Compd. With (3as-Cis)-1,2,3,3a,8,8a-Hexahydro-1,3a,8-Trimethylpyrrolo[2,3-B]Indol-5-Yl Methylcarbamate Ester (1:1) (Or) Physostigmine Salicylate

Waste Code: U002
Waste Description: 2-Propanone (I) (Or) Acetone (I)

Waste Code: U010
Waste Description: Azirino [2',3':3,4]Pyrrolo[1,2-A]Indole-4,7-Dione, 6-Amino-8-[[(Aminocarbonyl)Oxy]Methyl]-1,1a,2,8,8a,8b-Hexahydro-8a-Methoxy-5-Methyl-, [1as-(1aalpha, 8beta, 8aalpha, 8balpha)]- (Or) Mitomycin C

Waste Code: U031
Waste Description: 1-Butanol (I) (Or) N-Butyl Alcohol (I)

Waste Code: U034
Waste Description: Acetaldehyde, Trichloro- (Or) Chloral

Waste Code: U035
Waste Description: Benzenebutanoic Acid, 4-[Bis(2-Chloroethyl)Amino]- (Or) Chlorambucil

Waste Code: U044
Waste Description: Chloroform (Or) Methane, Trichloro-

Waste Code: U058
Waste Description: 2h-1,3,2-Oxazaphosphorin-2-Amine, N,N-Bis(2-Chloroethyl)Tetrahydro-, 2-Oxide (Or) Cyclophosphamide

Waste Code: U059
Waste Description: 5,12-Naphthacenedione, 8-Acetyl-10-[(3-Amino-2,3,6-Trideoxy)-Alpha-L-Lyxo-Hexopyranosyl)Oxy]-7,8,9,10-Tetrahydro-6,8,11-Trihydroxy-1-Methoxy-, (8s-Cis)- (Or) Daunomycin

Waste Code: U070
Waste Description: Benzene, 1,2-Dichloro- (Or) O-Dichlorobenzene

CVS PHARMACY #6285 (Continued) **1014962210**

Waste Code: U072
Waste Description: Benzene, 1,4-Dichloro- (Or) P-Dichlorobenzene

Waste Code: U089
Waste Description: Diethylstilbesterol (Or) Phenol, 4,4'-(1,2-Diethyl-1,2-Ethenediyl)Bis, (E)-

Waste Code: U122
Waste Description: Formaldehyde

Waste Code: U129
Waste Description: Cyclohexane, 1,2,3,4,5,6-Hexachloro-, (1alpha, 2alpha, 3beta, 4alpha, 5alpha, 6beta)- (Or) Lindane

Waste Code: U132
Waste Description: Hexachlorophene (Or) Phenol, 2,2'-Methylenebis[3,4,6-Trichloro-

Waste Code: U150
Waste Description: L-Phenylalanine, 4-[Bis(2-Chloroethyl)Amino]- (Or) Melphalan

Waste Code: U151
Waste Description: Mercury

Waste Code: U154
Waste Description: Methanol (I) (Or) Methyl Alcohol (I)

Waste Code: U165
Waste Description: Naphthalene

Waste Code: U188
Waste Description: Phenol

Waste Code: U200
Waste Description: Reserpine (Or) Yohimban-16-Carboxylic Acid, 11,17-Dimethoxy-18-[(3,4,5-Trimethoxybenzoyl)Oxy]-, Methyl Ester, (3beta, 16beta, 17alpha, 18beta, 20alpha)-

Waste Code: U201
Waste Description: 1,3-Benzenediol (Or) Resorcinol

Waste Code: U204
Waste Description: Selenious Acid (Or) Selenium Dioxide

Waste Code: U205
Waste Description: Selenium Sulfide (Or) Selenium Sulfide Ses2 (R,T)

Waste Code: U206
Waste Description: D-Glucose, 2-Deoxy-2-[[(Methylnitrosoamino)-Carbonyl]Amino]- (Or) Glucopyranose, 2-Deoxy-2-(3-Methyl-3-Nitrosoureido)-,D- (Or) Streptozotocin

Waste Code: U210
Waste Description: Ethene, Tetrachloro- (Or) Tetrachloroethylene

Waste Code: U279
Waste Description: U279

CVS PHARMACY #6285 (Continued) **1014962210**

Waste Code: U411
Waste Description: U411

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: ROANOKE NINTH, LLC
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: 636 OLD YORK RD
Owner/Operator City,State,Zip: JENKINTOWN, PA 19046
Owner/Operator Telephone: 215-885-8383
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: VIRGINIA CVS PHARMACY, L.L.C.
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DR MC2340
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: CORPORATEENVIRONMENTALTEAM@CVSHEALTH.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: VIRGINIA CVS PHARMACY, L.L.C.
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ROANOKE NINTH, LLC
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: JENKINTOWN, PA 19046
Owner/Operator Telephone: 215-885-8383
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ROANOKE NINTH, LLC
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Owner/Operator Address: 636 OLD YORK RD 2ND FL
Owner/Operator City,State,Zip: JENKINTOWN, PA 19046
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ROANOKE NINTH, LLC
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: JENKINTOWN, PA 19046
Owner/Operator Telephone: 215-885-8383
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: VIRGINIA CVS PHARMACY, L.L.C.
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DR
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: CORPORATEENVIRONMENTALTEAM@CVSHEALTH.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: ROANOKE NINTH, LLC
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: 636 OLD YORK RD 2ND FL
Owner/Operator City,State,Zip: JENKINTOWN, PA 19046
Owner/Operator Telephone: 215-885-8383
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: VIRGINIA CVS PHARMACY, L.L.C.
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DR
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: CORPORATEENVIRONMENTALTEAM@CVSHEALTH.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: ROANOKE NINTH, LLC

CVS PHARMACY #6285 (Continued) **1014962210**

Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: 636 OLD YORK RD 2ND FL
Owner/Operator City,State,Zip: JENKINTOWN, PA 19046
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: CORPORATEENVIRONMENTALTEAM@CVSHEALTH.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: VIRGINIA CVS PHARMACY, L.L.C.
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ROANOKE NINTH, LLC
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: 636 OLD YORK RD 2ND FL
Owner/Operator City,State,Zip: JENKINTOWN, PA 19046
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: VIRGINIA CVS PHARMACY, L.L.C.
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: VIRGINIA CVS PHARMACY, L.L.C.
Legal Status: Private
Date Became Current: 19981022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Historic Generators:

Receive Date:	20140429
Handler Name: CVS PHARMACY #6285	
Federal Waste Generator Description:	Large Quantity Generator
State District Owner:	Va
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20160609
Handler Name: CVS PHARMACY #6285	
Federal Waste Generator Description:	Large Quantity Generator
State District Owner:	Va
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20180213
Handler Name: CVS PHARMACY #6285	
Federal Waste Generator Description:	Large Quantity Generator
State District Owner:	Va
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

Receive Date:	20200227
Handler Name: CVS PHARMACY #6285	
Federal Waste Generator Description:	Very Small Quantity Generator (formerly Conditionally-Exempt Small Quantity Generator
State District Owner:	Va
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

Receive Date:	20120419
Handler Name: CVS PHARMACY #6285	
Federal Waste Generator Description:	Very Small Quantity Generator (formerly Conditionally-Exempt Small

CVS PHARMACY #6285 (Continued) **1014962210**

Quantity Generator
State District Owner: Va
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20130508
Handler Name: CVS PHARMACY #6285
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Va
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20191030
Handler Name: CVS PHARMACY #6285
Federal Waste Generator Description: Very Small Quantity Generator (formerly Conditionally-Exempt Small Quantity Generator
State District Owner: Va
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 44611
NAICS Description: Pharmacies And Drug Stores

NAICS Code: 446110
NAICS Description: Pharmacies And Drug Stores

Has the Facility Received Notices of Violations:
Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Pre-transport
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number:Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170619

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Listing - General
Date Violation was Determined:	20140403
Actual Return to Compliance Date:	20170619
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20170619

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170619
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	R7WTN
Enforcement Responsible Sub-Organization:	WC
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Listing - General
Date Violation was Determined:	20140403
Actual Return to Compliance Date:	20170619
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20170801
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Termination of Enforcement Order
Enforcement Responsible Person:	CORFD
Enforcement Responsible Sub-Organization:	BR
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170619

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number:Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Pre-transport
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Pre-transport
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - Pre-transport
Date Violation was Determined:	20140403
Actual Return to Compliance Date:	20140625
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20170619
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person:	CORFD
Enforcement Responsible Sub-Organization:	BR
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	10675
Paid Amount:	10675
Final Count:	1
Final Amount:	10675
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Listing - General
Date Violation was Determined:	20140403
Actual Return to Compliance Date:	20170619
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20170619

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Pre-transport
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number:Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170619

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170619

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Pre-transport
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170801
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Termination of Enforcement Order
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Pre-transport
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170619
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number:Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Pre-transport
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20170619
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: CORFD
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 10675
Paid Amount: 10675
Final Count: 1
Final Amount: 10675

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 002
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Referral to Enforcement
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - Records/Reporting
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20140625
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922

CVS PHARMACY #6285 (Continued) **1014962210**

Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: State Statute or Regulation
Date Violation was Determined: 20140403
Actual Return to Compliance Date: 20170619
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140922
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: R7WTN
Enforcement Responsible Sub-Organization: WC
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20140403
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier: R7WTN
Evaluation Responsible Sub-Organization: SC
Actual Return to Compliance Date: 20140625
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 20140403
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier: R7WTN
Evaluation Responsible Sub-Organization: SC
Actual Return to Compliance Date: 20170619
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 20140403
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier: R7WTN
Evaluation Responsible Sub-Organization: SC
Actual Return to Compliance Date: 20170619
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 20140922
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier: R7WTN
Evaluation Responsible Sub-Organization: SC
Actual Return to Compliance Date: 20140625
Scheduled Compliance Date: Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20170619
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	NO LONGER A SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	CORFD
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN

CVS PHARMACY #6285 (Continued) **1014962210**

Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State

CVS PHARMACY #6285 (Continued) **1014962210**

Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625

CVS PHARMACY #6285 (Continued) **1014962210**

Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN

CVS PHARMACY #6285 (Continued) **1014962210**

Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140922
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	SIGNIFICANT NON-COMPLIER
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20140625
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140403
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R7WTN
Evaluation Responsible Sub-Organization:	SC
Actual Return to Compliance Date:	20170619
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110070749481

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
All generators and treatment, storage, and disposal (TSD) facilities who handle hazardous waste are required to report to the EPA Administrator at least once every two years. The data collected is used to create the National Biennial Resource Conservation and Recovery Act (RCRA) Hazardous Waste Report. This data is processed within the RCRA Information (RCRAInfo) database
Registry ID: 110046409276

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
The Resource Conservation and Recovery Act Information System (RCRAInfo) is EPA's comprehensive information system in support of the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. It tracks many types of information about generators, transporters, treaters, storers, and disposers of hazardous waste.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

CVS PHARMACY #6285 (Continued) **1014962210**

Envid: 1014962210
Registry ID: 110046409276

DFR URL:
Name: CVS PHARMACY #6285
Address: 702 9TH STREET, SE
City,State,Zip: ROANOKE, VA 24013

E MANIFEST:

Manifest Tracking Number:	010197597FLE
Last Updated Date:	20190530
Shipped Date:	20190513
Received Date:	20190524
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St. S.E.
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	INR000110197
Designated Facility Name:	Stericycle Incorporated
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2670 Executive Drive Suite A
Designated Facility Mail City:	Indianapolis
Designated Facility Mail Zip:	46241
Designated Facility Mail State:	IN
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2670 Executive Drive Suite A
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Indianapolis
Designated Facility Location Zip:	46241
Designated Facility Location State:	IN
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	010197598FLE
Last Updated Date:	20190529
Shipped Date:	20190513
Received Date:	20190522
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696

CVS PHARMACY #6285 (Continued) **1014962210**

Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St. S.E.
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	PAD085690592
Designated Facility Name:	Republic Env Sys Inc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2869 Sandstone Drive
Designated Facility Mail City:	Hatfield
Designated Facility Mail Zip:	19440
Designated Facility Mail State:	PA
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2869 Sandstone Drive
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Hatfield
Designated Facility Location Zip:	19440
Designated Facility Location State:	PA
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	010197855FLE
Last Updated Date:	20190814
Shipped Date:	20190729
Received Date:	20190809
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013-1810
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St SE
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013-1810
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	INR000110197
Designated Facility Name:	Stericycle Incorporated
Designated Facility Mail Street Number:	Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2670 Executive Drive Suite A
Designated Facility Mail City:	Indianapolis
Designated Facility Mail Zip:	46241
Designated Facility Mail State:	IN
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2670 Executive Drive Suite A
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Indianapolis
Designated Facility Location Zip:	46241
Designated Facility Location State:	IN
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	010197856FLE
Last Updated Date:	20190829
Shipped Date:	20190729
Received Date:	20190808
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013-1810
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St SE
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013-1810
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	PAD085690592
Designated Facility Name:	Republic Env Sys Inc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2869 Sandstone Drive
Designated Facility Mail City:	Hatfield
Designated Facility Mail Zip:	19440
Designated Facility Mail State:	PA
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2869 Sandstone Drive
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Hatfield
Designated Facility Location Zip:	19440
Designated Facility Location State:	PA
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	018345558FLE
Last Updated Date:	20240215

CVS PHARMACY #6285 (Continued) **1014962210**

Shipped Date:	20240125
Received Date:	20240126
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs Store 6285
Generator Location Street Number:	702
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	1
Generator Mail Street 1:	702 9TH ST. S.E.
Generator Mail Street 2:	Not reported
Generator Mail City:	ROANOKE
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	CVS Store 6285
Designated Facility EPA ID:	NCD000648451
Designated Facility Name:	Clean Harbors Reidsville Llc
Designated Facility Mail Street Number:	208
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	Watlington Industrial Drive
Designated Facility Mail City:	Reidsville
Designated Facility Mail Zip:	27320
Designated Facility Mail State:	NC
Designated Facility Location Street Number:	208
Designated Facility Location Street 1:	Watlington Industrial Drive
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Reidsville
Designated Facility Location Zip:	27320
Designated Facility Location State:	NC
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	019442239FLE
Last Updated Date:	20240501
Shipped Date:	20240411
Received Date:	20240411
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs Store 6285
Generator Location Street Number:	702
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	1
Generator Mail Street 1:	702 9TH ST. S.E.
Generator Mail Street 2:	Not reported
Generator Mail City:	ROANOKE

CVS PHARMACY #6285 (Continued) **1014962210**

Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	CVS Store 6285
Designated Facility EPA ID:	NCD000648451
Designated Facility Name:	Clean Harbors Reidsville Llc
Designated Facility Mail Street Number:	208
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	Watlington Industrial Drive
Designated Facility Mail City:	Reidsville
Designated Facility Mail Zip:	27320
Designated Facility Mail State:	NC
Designated Facility Location Street Number:	208
Designated Facility Location Street 1:	Watlington Industrial Drive
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Reidsville
Designated Facility Location Zip:	27320
Designated Facility Location State:	NC
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	012063384FLE
Last Updated Date:	20190418
Shipped Date:	20190225
Received Date:	20190301
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St. S.E.
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	INR000110197
Designated Facility Name:	Stericycle Incorporated
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2670 Executive Drive Suite A
Designated Facility Mail City:	Indianapolis
Designated Facility Mail Zip:	46241
Designated Facility Mail State:	IN
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2670 Executive Drive Suite A
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Indianapolis
Designated Facility Location Zip:	46241
Designated Facility Location State:	IN

CVS PHARMACY #6285 (Continued) **1014962210**

Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N
Manifest Tracking Number:	012063385FLE
Last Updated Date:	20190321
Shipped Date:	20190225
Received Date:	20190309
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St. S.E.
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	PAD085690592
Designated Facility Name:	Republic Env Sys Inc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2869 Sandstone Drive
Designated Facility Mail City:	Hatfield
Designated Facility Mail Zip:	19440
Designated Facility Mail State:	PA
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2869 Sandstone Drive
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Hatfield
Designated Facility Location Zip:	19440
Designated Facility Location State:	PA
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N
Manifest Tracking Number:	013383914FLE
Last Updated Date:	20191227
Shipped Date:	20191014
Received Date:	20191031
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE

CVS PHARMACY #6285 (Continued) **1014962210**

Generator Location State:	VA
Generator Location Zip:	24013-1810
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St SE
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013-1810
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	INR000110197
Designated Facility Name:	Stericycle Environmental Solutions, Inc. Indianapolis
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2770 Fortune Circle East
Designated Facility Mail City:	Indianapolis
Designated Facility Mail Zip:	46241
Designated Facility Mail State:	IN
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2770 Fortune Circle East
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	Indianapolis
Designated Facility Location Zip:	46241
Designated Facility Location State:	IN
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	013383915FLE
Last Updated Date:	20200106
Shipped Date:	20191014
Received Date:	20191030
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAR000523696
Generator Name:	Cvs
Generator Location Street Number:	Not reported
Generator Location Street 1:	702 9TH ST. S.E.
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013-1810
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	702 9th St SE
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013-1810
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	PAD085690592
Designated Facility Name:	Republic Env Sys Inc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2869 Sandstone Drive
Designated Facility Mail City:	Hatfield
Designated Facility Mail Zip:	19440
Designated Facility Mail State:	PA

CVS PHARMACY #6285 (Continued) **1014962210**

Designated Facility Location Street Number: Not reported
Designated Facility Location Street 1: 2869 Sandstone Drive
Designated Facility Location Street 2: Not reported
Designated Facility Location City: Hatfield
Designated Facility Location Zip: 19440
Designated Facility Location State: PA
Designated Facility Contact Company Name: Not reported
Manifest Residue Indicator: N
Rejection Indicator: N

Manifest Tracking Number: 012063136FLE
Last Updated Date: 20190116
Shipped Date: 20181203
Received Date: 20181231
Manifest Status: Signed
Submission Type: DataImage5Copy
Origin Type: Service
Generator EPA ID: VAR000523696
Generator Name: Cvs
Generator Location Street Number: Not reported
Generator Location Street 1: 702 9TH ST. S.E.
Generator Location Street 2: Not reported
Generator Location City: ROANOKE
Generator Location State: VA
Generator Location Zip: 24013
Generator Mail Street Number: Not reported
Generator Mail Street 1: 1 CVS DR
Generator Mail Street 2: Not reported
Generator Mail City: WOONSOCKET
Generator Mail Zip: 02895-6146
Generator Mail State: RI
Generator Contact Company Name: Not reported
Designated Facility EPA ID: INR000110197
Designated Facility Name: Stericycle Incorporated
Designated Facility Mail Street Number: Not reported
Designated Facility Mail Street 1: Not reported
Designated Facility Mail Street 2: 2670 Executive Drive Suite A
Designated Facility Mail City: Indianapolis
Designated Facility Mail Zip: 46241
Designated Facility Mail State: IN
Designated Facility Location Street Number: Not reported
Designated Facility Location Street 1: 2670 Executive Drive Suite A
Designated Facility Location Street 2: Not reported
Designated Facility Location City: Indianapolis
Designated Facility Location Zip: 46241
Designated Facility Location State: IN
Designated Facility Contact Company Name: Not reported
Manifest Residue Indicator: N
Rejection Indicator: N

Federal Waste:
Manifest Tracking Number: 012063137FLE
Waste Line Number: 1
Federal Waste Code: D001
Federal Waste: IGNITABLE WASTE

Manifest Tracking Number: 012063137FLE

CVS PHARMACY #6285 (Continued) **1014962210**

Waste Line Number: 2
Federal Waste Code: D002
Federal Waste: CORROSIVE WASTE

Manifest Tracking Number: 012063137FLE
Waste Line Number: 3
Federal Waste Code: D001
Federal Waste: IGNITABLE WASTE

Manifest Tracking Number: 012063137FLE
Waste Line Number: 3
Federal Waste Code: U002
Federal Waste: 2-PROPANONE (I) (OR) ACETONE (I)

Manifest Tracking Number: 012063137FLE
Waste Line Number: 4
Federal Waste Code: P001
Federal Waste: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

Manifest Tracking Number: 012063137FLE
Waste Line Number: 5
Federal Waste Code: D007
Federal Waste: CHROMIUM

Manifest Tracking Number: 012063137FLE
Waste Line Number: 5
Federal Waste Code: D010
Federal Waste: SELENIUM

Transporter:
Manifest Tracking Number: 012063137FLE
Transporter Line Number: 1
Transporter EPA ID: PAD982661381
Transporter Name: Republic Environmental Systems Transportation Group Llc

Waste Line:
Manifest Tracking Number: 012063137FLE
Waste Line Number: 1
U.S. DOT Hazardous Indicator: Y
U.S. DOT ID Number: UN1950
U.S. DOT Description: Un1950, Waste Aerosols 2.1, Erg#126
Non-Hazardous Waste Description: Not reported
Number of Containers: 1
Container Type Code: BA
Container Type Description: Burlap, cloth, paper, or plastic bags
Waste Quantity: 6
Quantity Unit of Measure Code: P
Quantity Unit of Measure Description: Pounds
Waste Quantity, in Tons: 0.003
Acute Waste Quantity, in Tons: 0
Non-Acute Waste Quantity, in Tons: 0.003
Waste Quantity, in Kilograms: 2.72109
Acute Waste Quantity, in Kilograms: 0
Non-Acute Waste Quantity, in Kilorgrams: 2.72109

CVS PHARMACY #6285 (Continued) **1014962210**

Management Method Code:	H141
Management Method Description:	STORAGE, BULKING AND/OR TRANSFER OFF SITE
Waste Residue Indicator:	N
Quantity Discrepancy Indicator:	N
Waste Type Discrepancy Indicator:	N
Waste Density:	Not reported
Waste Density Unit of Measure Code:	Not reported
Waste Density Unit of Measure Description:	Not reported
Form Code:	Not reported
Form Code Description:	Not reported
Source Code:	Not reported
Source Code Description:	Not reported
Waste Minimization Code:	Not reported
Waste Minimization Code Description:	Not reported
Consent Number:	Not reported
EPA Waste Indicator:	Y

Manifest Tracking Number:	012063137FLE
Waste Line Number:	2
U.S. DOT Hazardous Indicator:	Y
U.S. DOT ID Number:	UN3266
U.S. DOT Description:	Un3266, Waste Corrosive Liquid, Basic, Inorganic, N.O.S. (Sodium Hydroxide, Potassium Carbonate), 8, Pg Ii, Erg#154
Non-Hazardous Waste Description:	Not reported
Number of Containers:	1
Container Type Code:	BA
Container Type Description:	Burlap, cloth, paper, or plastic bags
Waste Quantity:	11
Quantity Unit of Measure Code:	P
Quantity Unit of Measure Description:	Pounds
Waste Quantity, in Tons:	0.0055
Acute Waste Quantity, in Tons:	0
Non-Acute Waste Quantity, in Tons:	0.0055
Waste Quantity, in Kilograms:	4.988665
Acute Waste Quantity, in Kilograms:	0
Non-Acute Waste Quantity, in Kilorgrams:	4.988665
Management Method Code:	H141
Management Method Description:	STORAGE, BULKING AND/OR TRANSFER OFF SITE
Waste Residue Indicator:	N
Quantity Discrepancy Indicator:	N
Waste Type Discrepancy Indicator:	N
Waste Density:	Not reported
Waste Density Unit of Measure Code:	Not reported
Waste Density Unit of Measure Description:	Not reported
Form Code:	Not reported
Form Code Description:	Not reported
Source Code:	Not reported
Source Code Description:	Not reported
Waste Minimization Code:	Not reported
Waste Minimization Code Description:	Not reported
Consent Number:	Not reported
EPA Waste Indicator:	Y

Manifest Tracking Number:	012063137FLE
Waste Line Number:	3
U.S. DOT Hazardous Indicator:	Y
U.S. DOT ID Number:	UN1993

CVS PHARMACY #6285 (Continued) **1014962210**

U.S. DOT Description:	Un1993, Waste Flammable Liquids, N.O.S. (Alcohols, Acetone), 3, Pg Ii, Erg#128
Non-Hazardous Waste Description:	Not reported
Number of Containers:	1
Container Type Code:	BA
Container Type Description:	Burlap, cloth, paper, or plastic bags
Waste Quantity:	5
Quantity Unit of Measure Code:	P
Quantity Unit of Measure Description:	Pounds
Waste Quantity, in Tons:	0.0025
Acute Waste Quantity, in Tons:	0
Non-Acute Waste Quantity, in Tons:	0.0025
Waste Quantity, in Kilograms:	2.267575
Acute Waste Quantity, in Kilograms:	0
Non-Acute Waste Quantity, in Kilorgrams:	2.267575
Management Method Code:	H141
Management Method Description:	STORAGE, BULKING AND/OR TRANSFER OFF SITE
Waste Residue Indicator:	N
Quantity Discrepancy Indicator:	N
Waste Type Discrepancy Indicator:	N
Waste Density:	Not reported
Waste Density Unit of Measure Code:	Not reported
Waste Density Unit of Measure Description:	Not reported
Form Code:	Not reported
Form Code Description:	Not reported
Source Code:	Not reported
Source Code Description:	Not reported
Waste Minimization Code:	Not reported
Waste Minimization Code Description:	Not reported
Consent Number:	Not reported
EPA Waste Indicator:	Y

Manifest Tracking Number:	012063137FLE
Waste Line Number:	4
U.S. DOT Hazardous Indicator:	Y
U.S. DOT ID Number:	UN3249
U.S. DOT Description:	Un3249, Waste Residue Last Contained, Medicine, Solid, Toxic, N.O.S. (Warfarin), 6.1, Pg Ii, Erg#151
Non-Hazardous Waste Description:	Not reported
Number of Containers:	1
Container Type Code:	BA
Container Type Description:	Burlap, cloth, paper, or plastic bags
Waste Quantity:	1
Quantity Unit of Measure Code:	P
Quantity Unit of Measure Description:	Pounds
Waste Quantity, in Tons:	0.0005
Acute Waste Quantity, in Tons:	0.0005
Non-Acute Waste Quantity, in Tons:	0
Waste Quantity, in Kilograms:	0.45351502
Acute Waste Quantity, in Kilograms:	0.45351502
Non-Acute Waste Quantity, in Kilorgrams:	0
Management Method Code:	H141
Management Method Description:	STORAGE, BULKING AND/OR TRANSFER OFF SITE
Waste Residue Indicator:	N
Quantity Discrepancy Indicator:	N
Waste Type Discrepancy Indicator:	N
Waste Density:	Not reported

CVS PHARMACY #6285 (Continued) **1014962210**

Waste Density Unit of Measure Code: Not reported
Waste Density Unit of Measure Description: Not reported
Form Code: Not reported
Form Code Description: Not reported
Source Code: Not reported
Source Code Description: Not reported
Waste Minimization Code: Not reported
Waste Minimization Code Description: Not reported
Consent Number: Not reported
EPA Waste Indicator: Y

Manifest Tracking Number: 012063137FLE
Waste Line Number: 5
U.S. DOT Hazardous Indicator: Y
U.S. DOT ID Number: UN2811
U.S. DOT Description: Un2811, Waste Toxic Solids, Organic, N.O.S. (Chromium, Selenium), 6.1, Pg Ii, Erg#154
Non-Hazardous Waste Description: Not reported
Number of Containers: 1
Container Type Code: CF
Container Type Description: Fiber or plastic boxes, cartons, cases
Waste Quantity: 4
Quantity Unit of Measure Code: P
Quantity Unit of Measure Description: Pounds
Waste Quantity, in Tons: 0.002
Acute Waste Quantity, in Tons: 0
Non-Acute Waste Quantity, in Tons: 0.002
Waste Quantity, in Kilograms: 1.8140601
Acute Waste Quantity, in Kilograms: 0
Non-Acute Waste Quantity, in Kilorgrams: 1.8140601
Management Method Code: H141
Management Method Description: STORAGE, BULKING AND/OR TRANSFER OFF SITE
Waste Residue Indicator: N
Quantity Discrepancy Indicator: N
Waste Type Discrepancy Indicator: N
Waste Density: Not reported
Waste Density Unit of Measure Code: Not reported
Waste Density Unit of Measure Description: Not reported
Form Code: Not reported
Form Code Description: Not reported
Source Code: Not reported
Source Code Description: Not reported
Waste Minimization Code: Not reported
Waste Minimization Code Description: Not reported
Consent Number: Not reported
EPA Waste Indicator: Y

Manifest Tracking Number: 012063137FLE
Waste Line Number: 6
U.S. DOT Hazardous Indicator: N
U.S. DOT ID Number: Not reported
U.S. DOT Description: Not reported
Non-Hazardous Waste Description: Non-Hazardous, Non-Regulated Liquids & Solids
Number of Containers: 2
Container Type Code: BA
Container Type Description: Burlap, cloth, paper, or plastic bags
Waste Quantity: 28

CVS PHARMACY #6285 (Continued) **1014962210**

Quantity Unit of Measure Code:	P
Quantity Unit of Measure Description:	Pounds
Waste Quantity, in Tons:	0.014
Acute Waste Quantity, in Tons:	0
Non-Acute Waste Quantity, in Tons:	0.014
Waste Quantity, in Kilograms:	12.698421
Acute Waste Quantity, in Kilograms:	0
Non-Acute Waste Quantity, in Kilorgrams:	12.698421
Management Method Code:	H141
Management Method Description:	STORAGE, BULKING AND/OR TRANSFER OFF SITE
Waste Residue Indicator:	N
Quantity Discrepancy Indicator:	N
Waste Type Discrepancy Indicator:	N
Waste Density:	Not reported
Waste Density Unit of Measure Code:	Not reported
Waste Density Unit of Measure Description:	Not reported
Form Code:	Not reported
Form Code Description:	Not reported
Source Code:	Not reported
Source Code Description:	Not reported
Waste Minimization Code:	Not reported
Waste Minimization Code Description:	Not reported
Consent Number:	Not reported
EPA Waste Indicator:	N

Click this hyperlink while viewing on your computer to access
4 additional US EManifest: record(s) in the EDR Site Report.

B12 **PNN MARKET #96** **PFAS ECHO** **1027406941**
WSW **N/A**
1/8-1/4 **ROANOKE, VA**
0.134 mi.
710 ft. **Site 3 of 8 in cluster B**

Relative:
Higher

Actual:
974 ft.

PFAS ECHO:

Name:	Pnn Market #96
Address:	Not reported
City,State,Zip:	ROANOKE, VA
Latitude:	37.267
Longitude:	-79.93527
Count:	1
County:	ROANOKE (CITY)
Status:	Active
Region:	03
Industry:	Metal Coating

ECHO Facility Report:

Facility Percent Minority:	32.976
Facility Derived Tribes:	-
Facility Population:	2410.76
EPA Programs:	CAA
Federal Facility:	No
Federal Agency:	-
Facility FIPS Code:	51770
Facility Indian Country Flag:	N
Facility Collection Method:	ADDRESS MATCHING-HOUSE NUMBER
Facility Derived HUC:	03010101
Facility Derived WBD:	030101010404

PNN MARKET #96 (Continued) **1027406941**

Facility Derived CD113:	06
Facility Derived CB2010:	517700026001064
Facility Major Flag:	-
Facility Active Flag:	Y
Facility Inspection Count:	0
Facility Date Last Inspection:	-
Facility Days Last Inspection:	-
Facility Informal Count:	0
Facility Date Last Informal Action:	-
Facility Formal Action Count:	0
Facility Date Last Formal Action:	-
Facility Total Penalties:	0
Facility Penalty Count:	-
Facility Date Last Penalty:	-
Facility Last Penalty AMT:	-
Facility QTRS With NC:	0
Facility Programs With SNC:	0
Facility Compliance Status:	No Violation Identified
Facility SNC Flag:	N
AIR Flag:	Y
NPDES Flag:	N
SDWIS Flag:	N
RCRA Flag:	N
TRI Flag:	N
GHG Flag:	N
AIR IDS:	VA00000051770G0123
CAA Permit Types:	Minor Emissions
CAA NAICS:	332813
CAA SICS:	5541
NPDES IDS:	-
CWA Permit Types:	-
CWA NAICS:	-
CWA SICS:	-
RCRA IDS:	-
RCRA Permit Types:	-
RCRA NAICS:	-
SDWA IDS:	-
SDWA System Types:	-
SDWA Compliance Status:	-
SDWA SNC Flag:	N
TRI IDS:	-
TRI Releases Transfers:	-
TRI On Site Releases:	-
TRI Off Site Transfers:	-
TRI Reporter:	-
Facility IMP Water Flag:	-
EJSCREEN Flag US:	Y

EJSCREEN Report:

B13 **AMOCO #812-TANKS** **RCRA-SQG** **1000581117**
WSW **401 ELM AVE SE** **FINDS** **VAD988198321**
1/8-1/4 **ROANOKE, VA 24013** **ECHO**
0.150 mi.
794 ft. **Site 4 of 8 in cluster B**

Relative: **Higher**
Actual: **962 ft.**

RCRA Listings:

Date Form Received by Agency:		19910424
Handler Name:		Amoco #812-Tanks
Handler Address:		401 Elm Ave Se
Handler City,State,Zip:		ROANOKE, VA 24013
EPA ID:		VAD988198321
Contact Name:		TONI DOUGHERTY
Contact Address:		401 ELM AVE SE
Contact City,State,Zip:		ROANOKE, VA 24013
Contact Telephone:		301-625-7858
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		03
Land Type:		Not reported
Federal Waste Generator Description:		Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Va
State District:		2
Mailing Address:		STE 1500 ONE N CHARLES ST
Mailing City,State,Zip:		BALTIMORE, MD 21201
Owner Name:	Amoco Oil Company	
Owner Type:		Private
Operator Name:	Opername	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
202 GPRA Corrective Action Baseline:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No

AMOCO #812-TANKS (Continued) **1000581117**

Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	Ignitable Waste
Waste Code:	D018
Waste Description:	Benzene

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: OPERNAME	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	OPERSTREET
Owner/Operator City,State,Zip:	OPERCITY, AK 99999
Owner/Operator Telephone:	215-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name: AMOCO OIL COMPANY	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	STE 1500 ONE N CHARELS ST
Owner/Operator City,State,Zip:	BALTIMORE, MD 21201
Owner/Operator Telephone:	301-625-7856
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19910424
Handler Name: AMOCO #812-TANKS	
Federal Waste Generator Description:	Small Quantity Generator
State District Owner:	Va
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No

AMOCO #812-TANKS (Continued) **1000581117**

Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005244235

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
The Resource Conservation and Recovery Act Information System (RCRAInfo) is EPA's comprehensive information system in support of the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. It tracks many types of information about generators, transporters, treaters, storers, and disposers of hazardous waste.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000581117
Registry ID: 110005244235

DFR URL:
Name: AMOCO #812-TANKS
Address: 401 ELM AVE SE
City,State,Zip: ROANOKE, VA 24013

14
NNE
1/8-1/4
0.154 mi.
814 ft.

NORM'S TRANSMISSIONS **RCRA-VSQG** **1027707725**
818 STEWART AVENUE SE **VAVSQG022302**
ROANOKE, VA 24013

Relative:
Lower

Actual:
943 ft.

RCRA Listings:
Date Form Received by Agency: 20230718
Handler Name: Norm'S Transmissions
Handler Address: Stewart Avenue Se
Handler City,State,Zip: ROANOKE, VA 24013
EPA ID: VAVSQG022302
Contact Name: Not reported
Contact Address: Not reported
Contact City,State,Zip: Not reported

NORM'S TRANSMISSIONS (Continued) **1027707725**

Contact Telephone:		Not reported
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		03
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Va
State District:		2
Mailing Address:		Not reported
Mailing City,State,Zip:		Not reported
Owner Name:	Not reported	
Owner Type:		Not reported
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
202 GPRA Corrective Action Baseline:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:		Not reported
Handler Date of Last Change:		20230718
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No
Exporter of Spent Lead Acid Batteries:		No
Recycler Activity Without Storage:		No

NORM'S TRANSMISSIONS (Continued) **1027707725**

Manifest Broker: No
Sub-Part P Indicator: No

Historic Generators:
Receive Date: 20230718
Handler Name: NORM'S TRANSMISSIONS
Federal Waste Generator Description: Very Small Quantity Generator (formerly Conditionally-Exempt Small Quantity Generator
State District Owner: Va
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Has the Facility Received Notices of Violations:
Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20230525
Actual Return to Compliance Date: 20230526
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: 20230805
Enforcement Identifier: 001
Date of Enforcement Action: 20230705
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: INSPECTOR FACT FINDING LETTER - Warning letter
Enforcement Responsible Person: R2BHM
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported

NORM'S TRANSMISSIONS (Continued) **1027707725**

Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - General
Date Violation was Determined:	20230525
Actual Return to Compliance Date:	20230526
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	20230805
Enforcement Identifier:	001
Date of Enforcement Action:	20230705
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	INSPECTOR FACT FINDING LETTER - Warning letter
Enforcement Responsible Person:	R2BHM
Enforcement Responsible Sub-Organization:	BR
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Used Oil - Fuel Marketers
Date Violation was Determined:	20230525
Actual Return to Compliance Date:	20230526
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	20230805
Enforcement Identifier:	001
Date of Enforcement Action:	20230705
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No

NORM'S TRANSMISSIONS (Continued) **1027707725**

Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: INSPECTOR FACT FINDING LETTER - Warning letter
Enforcement Responsible Person: R2BHM
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Used Oil - Generators
Date Violation was Determined: 20230525
Actual Return to Compliance Date: 20230526
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: 20230805
Enforcement Identifier: 001
Date of Enforcement Action: 20230705
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: INSPECTOR FACT FINDING LETTER - Warning letter
Enforcement Responsible Person: R2BHM
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported

NORM'S TRANSMISSIONS (Continued) **1027707725**

Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Used Oil - Applicability
Date Violation was Determined: 20230525
Actual Return to Compliance Date: 20230526
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: 20230805
Enforcement Identifier: 001
Date of Enforcement Action: 20230705
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number:Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: INSPECTOR FACT FINDING LETTER - Warning letter
Enforcement Responsible Person: R2BHM
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Used Oil - Fuel Marketers
Date Violation was Determined: 20230525
Actual Return to Compliance Date: 20230526
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: 20230805
Enforcement Identifier: 001
Date of Enforcement Action: 20230705
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No

NORM'S TRANSMISSIONS (Continued) **1027707725**

Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: INSPECTOR FACT FINDING LETTER - Warning letter
Enforcement Responsible Person: R2BHM
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20230525
Actual Return to Compliance Date: 20230526
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: 20230805
Enforcement Identifier: 001
Date of Enforcement Action: 20230705
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: INSPECTOR FACT FINDING LETTER - Warning letter
Enforcement Responsible Person: R2BHM
Enforcement Responsible Sub-Organization: BR
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported

NORM'S TRANSMISSIONS (Continued) **1027707725**

Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	20230525
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2BHM
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	20230526
Scheduled Compliance Date:	20230805
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20230525
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2BHM
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	20230526
Scheduled Compliance Date:	20230805
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20230525
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2BHM
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	20230526
Scheduled Compliance Date:	20230805
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20230525
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2BHM
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	20230526
Scheduled Compliance Date:	20230805
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

NORM'S TRANSMISSIONS (Continued) **1027707725**

Evaluation Date:	20230525
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2BHM
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	20230526
Scheduled Compliance Date:	20230805
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20230525
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2BHM
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	20230526
Scheduled Compliance Date:	20230805
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20230525
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2BHM
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	20230526
Scheduled Compliance Date:	20230805
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

B15 **DEVOE & RAYNOLDS COMPANY INC** **UST** **U003677643**
West **701 FOURTH ST** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.158 mi.
835 ft. **Site 5 of 8 in cluster B**

Relative:
Higher

Actual:
970 ft.

Facility:

Name:	DEVOE & RAYNOLDS COMPANY INC
Address:	701 FOURTH ST
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2022964
Facility Type:	COMMERCIAL
CEDS Facility ID:	200000081857

Owner:

Owner Id:	37496
Owner Name:	DEVOE AND RAYNOLDS COMPANY INC
Owner Address:	4000 DUPONT CIRCLE

DEVOE & RAYNOLDS COMPANY INC (Continued) **U003677643**

Owner Address2:	Not reported
Owner City, State, Zip:	LOUISVILLE, KT 40201
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	1

UST:

Facility ID:	2022964
Federally Regulated:	Yes
Tank Number:	R1
Tank Capacity:	1000
Tank Contents:	UNKNOWN
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No

DEVOE & RAYNOLDS COMPANY INC (Continued) **U003677643**

Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	Yes
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

B16 **DEVOE & RAYNOLDS COMPANY INC** **UST FINDER** **1028796933**
West **701 FOURTH ST** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.165 mi.
872 ft. **Site 6 of 8 in cluster B**

Relative: **Higher**
Actual: **968 ft.**

UST FINDER:

Object ID:	508849
Facility ID:	VA2022964
Name:	DEVOE & RAYNOLDS COMPANY INC
Address:	701 FOURTH ST
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	0
Closed USTs:	1
TOS USTs:	0
Population 1500ft:	1485
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93573428
Y Coord:	37.2675618000001
Latitude:	37.2675618
Longitude:	-79.93573428

UST FINDER:

DEVOE & RAYNOLDS COMPANY INC (Continued) **1028796933**

Object ID:	2155704
Facility ID:	VA2022964
Tank ID:	VA2022964_R1
Tank Status:	Closed
Installation Date:	Not reported
Removal Date:	1988/12/01 16:00:00+00
Tank Capacity:	1000
Substances:	UNKNOWN
Tank Wall Type:	Single

C17 **STAR VALLEY MINUTE MART** **UST FINDER** **1028796443**
ESE **831 HIGHLAND AVE** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.167 mi.
880 ft. **Site 1 of 2 in cluster C**

Relative: **Higher**
Actual: **977 ft.**

UST FINDER:

Object ID:	508827
Facility ID:	VA2017636
Name:	STAR VALLEY MINUTE MART
Address:	831 HIGHLAND AVE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	0
Closed USTs:	2
TOS USTs:	0
Population 1500ft:	1713
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.9282251499999
Y Coord:	37.2666637900001
Latitude:	37.26666379
Longitude:	-79.92822515

UST FINDER:

Object ID:	2037956
Facility ID:	VA2017636
Tank ID:	VA2017636_R1
Tank Status:	Closed
Installation Date:	1976/05/06 16:00:00+00
Removal Date:	1999/11/15 15:59:59+00

STAR VALLEY MINUTE MART (Continued) **1028796443**

Tank Capacity:	10000
Substances:	GASOLINE
Tank Wall Type:	Single
Object ID:	2037957
Facility ID:	VA2017636
Tank ID:	VA2017636_R2
Tank Status:	Closed
Installation Date:	1976/05/06 16:00:00+00
Removal Date:	1999/11/15 15:59:59+00
Tank Capacity:	8000
Substances:	GASOLINE
Tank Wall Type:	Single

C18 **STAR VALLEY MINUTE MART** **UST** **U003676870**
ESE **831 HIGHLAND AVE** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.167 mi.
880 ft. **Site 2 of 2 in cluster C**

Relative:
Higher

Actual:
977 ft.

Facility:

Name:	STAR VALLEY MINUTE MART
Address:	831 HIGHLAND AVE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2017636
Facility Type:	GAS STATION
CEDS Facility ID:	200000081324

Owner:

Owner Id:	39040
Owner Name:	CHARLIE PARKER JR
Owner Address:	4956 MERRIMAN RD SW
Owner Address2:	Not reported
Owner City, State, Zip:	ROANOKE, VA 24018
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	2

UST:

Facility ID:	2017636
Federally Regulated:	Yes
Tank Number:	R1
Tank Capacity:	10000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	5/6/1976
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported

STAR VALLEY MINUTE MART (Continued) **U003676870**

Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2017636
Federally Regulated:	Yes

Tank Number:	R2
Tank Capacity:	8000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

STAR VALLEY MINUTE MART (Continued) **U003676870**

Tank Material:

Install Date:	5/6/1976
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

B19 **APPLE MARKET 1508** **UST FINDER** **1028794935**
WSW **403 ELM AVE** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.169 mi.
890 ft. **Site 7 of 8 in cluster B**

Relative:
Higher

Actual:
965 ft.

UST FINDER:

Object ID:	508832
Facility ID:	VA2003698
Name:	APPLE MARKET 1508
Address:	403 ELM AVE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	3
Closed USTs:	4
TOS USTs:	0
Population 1500ft:	1608
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	Yes
SPA PWS Facility ID:	VA2770900_32392
SPA Water Type:	GU - Ground Water Under the Influence of Surcace Water
SPA Facility Type:	SP - Spring
SPA HUC12:	030101010404
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.9354492699999
Y Coord:	37.26682871
Latitude:	37.26682871
Longitude:	-79.93544927

UST FINDER:

Object ID:	2095389
Facility ID:	VA2003698
Tank ID:	VA2003698_1
Tank Status:	Open
Installation Date:	1987/10/01 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	10000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2095593
Facility ID:	VA2003698
Tank ID:	VA2003698_3
Tank Status:	Open
Installation Date:	1987/10/01 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	10000
Substances:	DIESEL
Tank Wall Type:	Single

APPLE MARKET 1508 (Continued) **1028794935**

Object ID:	2095594
Facility ID:	VA2003698
Tank ID:	VA2003698_2
Tank Status:	Open
Installation Date:	1987/10/01 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	10000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2030693
Facility ID:	VA2003698
Tank ID:	VA2003698_R4
Tank Status:	Closed
Installation Date:	1975/03/12 16:00:00+00
Removal Date:	1987/10/01 16:00:00+00
Tank Capacity:	1000
Substances:	USED OIL
Tank Wall Type:	Single

Object ID:	2030694
Facility ID:	VA2003698
Tank ID:	VA2003698_R3
Tank Status:	Closed
Installation Date:	1975/03/12 16:00:00+00
Removal Date:	1987/10/01 16:00:00+00
Tank Capacity:	6000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2030695
Facility ID:	VA2003698
Tank ID:	VA2003698_R2
Tank Status:	Closed
Installation Date:	1975/03/12 16:00:00+00
Removal Date:	1987/10/01 16:00:00+00
Tank Capacity:	6000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2030696
Facility ID:	VA2003698
Tank ID:	VA2003698_R1
Tank Status:	Closed
Installation Date:	1975/03/12 16:00:00+00
Removal Date:	1987/10/01 16:00:00+00
Tank Capacity:	8000
Substances:	GASOLINE
Tank Wall Type:	Single

B20
WSW
1/8-1/4
0.169 mi.
890 ft.

APPLE MARKET 1508
403 ELM AVENUE SE
ROANOKE, VA 24013

Site 8 of 8 in cluster B

LTANKS **U003674504**
UST **N/A**
Financial Assurance

Relative:
Higher

Actual:
965 ft.

LTANKS:

Name:	AMOCO FOOD SHOP 405
Address:	403 ELM AVE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	Not reported
CEDS Facility Id:	200000088348
Case Status:	**Closed**
Pollution Complaint #:	20012028
Reported:	09/19/2000
Case Closed Date:	05/01/2001
Program:	Not reported
Regulated Petroleum UST (1):	Not reported
Excluded UST (1):	Not reported
Deferred UST (1):	Not reported
Partially Deferred UST (1):	Not reported
Exempt 1 UST (2):	Not reported
Exempt 2 Heating Oil UST (2):	Not reported
Small Heating Oil AST (2):	Not reported
Regulated AST (3):	Not reported
Unregulated AST (3):	Not reported
Other Y/N:	Not reported
Unknown Y/N:	Not reported
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	rjweld
Changed Date:	06/19/2009
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	17197
RST Poll Complaint Number:	20012028
Des First Name:	Channon
Des Last Name:	Maycock
RST Rec Code:	WCRO
RST Priority:	3
RST Fed Reg Tank:	Y
RST Responsibility Ind:	RP Lead
RST Suspect Confirm Ind:	Suspected
Facility Location:	Not reported
FIC Description:	Roanoke City
Latitude:	37.2667301018869
Longitude:	-79.9353427777059

Name:	AMOCO OIL CO S/S 812
Address:	403 ELM AVE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000088348
Case Status:	**Closed**

APPLE MARKET 1508 (Continued) **U003674504**

Pollution Complaint #:	19880116
Reported:	08/10/1987
Case Closed Date:	08/16/1994
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

Facility:

Name:	APPLE MARKET 1508
Address:	403 ELM AVENUE SE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2003698
Facility Type:	GAS STATION
CEDS Facility ID:	200000088348

Owner:

Owner Id:	33990
Owner Name:	Amoco Oil Company
Owner Address:	1 W Pennsylvania Ave Suite 900
Owner Address2:	Not reported
Owner City, State, Zip:	Towson, MD 21204
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	3
Number of Inactive AST:	0
Number of Inactive UST:	4

APPLE MARKET 1508 (Continued) **U003674504**

Owner Id:	48748
Owner Name:	Fuel USA LLC
Owner Address:	14680 Forest Rd
Owner Address2:	Not reported
Owner City, State, Zip:	Forest, VA 24551
Owner Type:	PRIVATE
Number of Active AST:	0
Number of Active UST:	3
Number of Inactive AST:	0
Number of Inactive UST:	4

Owner Id:	49168
Owner Name:	"GPM Apple, LLC"
Owner Address:	"8565 Magellan Pkwy, Suite 400"
Owner Address2:	Not reported
Owner City, State, Zip:	Richmond, VA 23227
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	3
Number of Inactive AST:	0
Number of Inactive UST:	4

Owner Id:	36594
Owner Name:	Workman Oil Company
Owner Address:	14680 Forest Road
Owner Address2:	Not reported
Owner City, State, Zip:	Forest, VA 24551
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	3
Number of Inactive AST:	0
Number of Inactive UST:	4

UST:

Facility ID:	2003698
Federally Regulated:	Yes

Tank Number:	1
Tank Capacity:	10000
Tank Contents:	GASOLINE
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	10/1/1987
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No

APPLE MARKET 1508 (Continued) **U003674504**

Tank Materials: Other	No
Tank Materials: Other Note	Stip3

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	Yes
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	Yes
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2003698
Federally Regulated:	Yes

Tank Number:	2
Tank Capacity:	10000
Tank Contents:	GASOLINE
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	10/1/1987
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No

APPLE MARKET 1508 (Continued) **U003674504**

Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Stip3

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	Yes
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	Yes
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2003698
Federally Regulated:	Yes

Tank Number:	3
Tank Capacity:	10000
Tank Contents:	DIESEL
Tank Status:	**CURR IN USE**

APPLE MARKET 1508 (Continued) **U003674504**

Tank Type:	UST
Tank Material:	
Install Date:	10/1/1987
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Stip3
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	Yes
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	Yes
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

APPLE MARKET 1508 (Continued) **U003674504**

Facility ID:	2003698
Federally Regulated:	Yes
Tank Number:	R1
Tank Capacity:	8000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	3/12/1975
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	No
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	Not reported
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No

APPLE MARKET 1508 (Continued) **U003674504**

Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2003698
Federally Regulated:	Yes
Tank Number:	R2
Tank Capacity:	6000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	3/12/1975
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	No
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No

APPLE MARKET 1508 (Continued) **U003674504**

Pipe Release Detection: Other Note	Not reported
Pipe Type:	Not reported
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2003698
Federally Regulated:	Yes
Tank Number:	R3
Tank Capacity:	6000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	3/12/1975
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported

APPLE MARKET 1508 (Continued) **U003674504**

Pipe Release Detection: Leak Deferred	No
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	Not reported
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2003698
Federally Regulated:	Yes
Tank Number:	R4
Tank Capacity:	1000
Tank Contents:	USED OIL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	3/12/1975
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No

APPLE MARKET 1508 (Continued) **U003674504**

Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	No
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	Not reported
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

VA Financial Assurance 1:

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Guarantee
Gallonage:	22537331
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698

APPLE MARKET 1508 (Continued) **U003674504**

Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Guarantee
Gallonage:	22537331
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Guarantee
Gallonage:	22537331
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	Workman Oil Company
ROF Own Id:	36594
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698

APPLE MARKET 1508 (Continued) **U003674504**

Owner Name:	Workman Oil Company
ROF Own Id:	36594
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	Workman Oil Company
ROF Own Id:	36594
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	Fuel USA LLC
ROF Own Id:	48748
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698

APPLE MARKET 1508 (Continued) **U003674504**

Owner Name:	Fuel USA LLC
ROF Own Id:	48748
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	Fuel USA LLC
ROF Own Id:	48748
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Surety Bond
Gallonage:	Not reported
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698

APPLE MARKET 1508 (Continued) **U003674504**

Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Surety Bond
Gallonage:	Not reported
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Surety Bond
Gallonage:	Not reported
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Surety Bond
Gallonage:	Not reported
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698

APPLE MARKET 1508 (Continued) **U003674504**

Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Surety Bond
Gallonage:	Not reported
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Surety Bond
Gallonage:	Not reported
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Guarantee
Gallonage:	22537331
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698

APPLE MARKET 1508 (Continued) **U003674504**

Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Guarantee
Gallonage:	22537331
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	APPLE MARKET 1508
Address:	403 ELM AVE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2003698
Owner Name:	GPM Apple, LLC
ROF Own Id:	49168
Tank Type:	UST
Mechanism:	Guarantee
Gallonage:	22537331
Per Occurence:	$50,000.00
Third Party:	$150,000.00
Annual Aggregate:	$200,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Apple Market 1508
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

21
South
1/8-1/4
0.183 mi.
968 ft.

SHELOR ALLAN PROPERTY
654 HIGHLAND AVE
ROANOKE, VA 24013

LTANKS **S125934376**
N/A

Relative:
Higher

Actual:
1020 ft.

LTANKS:

Name:	SHELOR ALLAN PROPERTY
Address:	654 HIGHLAND AVE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000890052
Case Status:	**Closed**
Pollution Complaint #:	20202092
Reported:	10/31/2019
Case Closed Date:	03/19/2020
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	Yes
Small Heating Oil AST (2):	No

SHELOR ALLAN PROPERTY (Continued) **S125934376**

Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Category 1
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

D22 **RESCUE MISSION OF ROANOKE** **UST FINDER** **1028797186**
NW **402 FOURTH STREET SE** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.209 mi.
1102 ft. **Site 1 of 2 in cluster D**

Relative: UST FINDER:
Lower

Actual:
953 ft.

Object ID:	508904
Facility ID:	VA2027151
Name:	RESCUE MISSION OF ROANOKE
Address:	402 FOURTH STREET SE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	StreetAddress
Open USTs:	0
Closed USTs:	2
TOS USTs:	0
Population 1500ft:	1319
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Closed UST(s)

RESCUE MISSION OF ROANOKE (Continued) **1028797186**

Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93514198
Y Coord:	37.2703449200001
Latitude:	37.27034492
Longitude:	-79.93514198

UST FINDER:

Object ID:	2155780
Facility ID:	VA2027151
Tank ID:	VA2027151_R2
Tank Status:	Closed
Installation Date:	Not reported
Removal Date:	1993/08/17 15:59:59+00
Tank Capacity:	550
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2155781
Facility ID:	VA2027151
Tank ID:	VA2027151_R1
Tank Status:	Closed
Installation Date:	Not reported
Removal Date:	1993/08/17 15:59:59+00
Tank Capacity:	550
Substances:	GASOLINE
Tank Wall Type:	Single

D23 **RESCUE MISSION OF ROANOKE** **UST** **U003678068**
NW **402 FOURTH STREET SE** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.209 mi.
1102 ft. **Site 2 of 2 in cluster D**

Relative:
Lower

Actual:
953 ft.

Facility:

Name:	RESCUE MISSION OF ROANOKE
Address:	402 FOURTH STREET SE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2027151
Facility Type:	UNKNOWN
CEDS Facility ID:	200000081966

Owner:

Owner Id:	28168
Owner Name:	Rescue Mission of Roanoke
Owner Address:	402 Fourth St
Owner Address2:	Not reported
Owner City, State, Zip:	Roanoke, VA 24013
Owner Type:	LOCAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	2

UST:

RESCUE MISSION OF ROANOKE (Continued) **U003678068**

Facility ID:	2027151
Federally Regulated:	Yes
Tank Number:	R1
Tank Capacity:	550
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	Yes
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No

RESCUE MISSION OF ROANOKE (Continued) **U003678068**

Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2027151
Federally Regulated:	Yes
Tank Number:	R2
Tank Capacity:	550
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No

RESCUE MISSION OF ROANOKE (Continued) **U003678068**

Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	Yes
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

E24 **WOODING'S AUTO BODY WORKS, INC.** **RCRA-VSQG** **1000581487**
NNE **824 TAZEWELL AVE SE** **FINDS** **VAD988202156**
1/8-1/4 **ROANOKE, VA 24013** **ECHO**
0.219 mi. **E MANIFEST**
1154 ft. **Site 1 of 2 in cluster E**

Relative: **Lower**

Actual: **936 ft.**

RCRA Listings:

Date Form Received by Agency:		19910626
Handler Name:		Woodings Auto Body Works Inc
Handler Address:		824 Tazewell Ave S E
Handler City,State,Zip:		ROANOKE, VA 24013
EPA ID:		VAD988202156
Contact Name:		NORWOOD WOODING
Contact Address:		824 TAZEWELL AVE S E
Contact City,State,Zip:		ROANOKE, VA 24013
Contact Telephone:		703-345-4871
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		03
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Va
State District:		2
Mailing Address:		824 TAZEWELL AVE S E
Mailing City,State,Zip:		ROANOKE, VA 24013
Owner Name:	Fuller Jack & Iris	
Owner Type:		Private
Operator Name:	Opername	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
202 GPRA Corrective Action Baseline:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D000
Waste Description:	Not Defined
Waste Code:	D001
Waste Description:	Ignitable Waste
Waste Code:	D039
Waste Description:	Tetrachloroethylene
Waste Code:	F002
Waste Description:	The Following Spent Halogenated Solvents: Tetrachloroethylene, Methylene Chloride, Trichloroethylene, 1,1,1-Trichloroethane, Chlorobenzene, 1,1,2-Trichloro-1,2,2-Trifluoroethane, Ortho-Dichlorobenzene, Trichlorofluoromethane, And 1,1,2, Trichloroethane; All Spent Solvent Mixtures/Blends Containing, Before Use, A Total Of Ten Percent Or More (By Volume) Of One Or More Of The Above Halogenated Solvents Or Those Solvents Listed In F001, F004, And F005; And Still Bottoms From The Recovery Of These Spent Solvents And Spent Solvent Mixtures.
Waste Code:	F005
Waste Description:	The Following Spent Nonhalogenated Solvents: Toluene, Methyl Ethyl

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Ketone, Carbon Disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, And 2-Nitropropane; All Spent Solvent Mixtures/Blends Containing, Before Use, A Total Of Ten Percent Or More (By Volume) Of One Or More Of The Above Nonhalogenated Solvents Or Those Solvents Listed In F001, F002, Or F004; And Still Bottoms From The Recovery Of These Spent Solvents And Spent Solvent Mixtures.

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: FULLER JACK & IRIS	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	1001 CAMBELL AVE SE
Owner/Operator City,State,Zip:	ROANOKE, VA 24013
Owner/Operator Telephone:	703-342-7790
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name: OPERNAME	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	OPERSTREET
Owner/Operator City,State,Zip:	OPERCITY, AK 99999
Owner/Operator Telephone:	215-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19910626
Handler Name:	WOODINGS AUTO BODY WORKS INC
Federal Waste Generator Description:	Very Small Quantity Generator (formerly Conditionally-Exempt Small Quantity Generator
State District Owner:	Va
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	811121
NAICS Description:	Automotive Body, Paint, And Interior Repair And Maintenance

Has the Facility Received Notices of Violations:

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20040107
Evaluation Responsible Agency: State

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2WEK
Evaluation Responsible Sub-Organization:	WC
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20240307
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	R2KJT
Evaluation Responsible Sub-Organization:	BR
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	19960912
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION
Evaluation Responsible Person Identifier:	Not reported
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110005246616

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
The Resource Conservation and Recovery Act Information System (RCRAInfo) is EPA's comprehensive information system in support of the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. It tracks many types of information about generators, transporters, treaters, storers, and disposers of hazardous waste.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000581487
Registry ID: 110005246616

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

DFR URL:
Name: WOODINGS AUTO BODY WORKS INC
Address: 824 TAZEWELL AVE S E
City,State,Zip: ROANOKE, VA 24013

E MANIFEST:

Manifest Tracking Number:	007147886SKS
Last Updated Date:	20191015
Shipped Date:	20190826
Received Date:	20190914
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Clean Harbors Deer Park, Llc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	007147990SKS
Last Updated Date:	20200116
Shipped Date:	20191206
Received Date:	20191225
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Wooding's Auto Body Works, Inc.
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Clean Harbors Deer Park, Llc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	007148065SKS
Last Updated Date:	20190924
Shipped Date:	20190731
Received Date:	20190829
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Clean Harbors Deer Park, Llc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	007817831SKS
Last Updated Date:	20210915
Shipped Date:	20210715
Received Date:	20210819
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Wooding's Auto Body Works, Inc.
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Clean Harbors Deer Park, Llc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	007237220SKS
Last Updated Date:	20200217
Shipped Date:	20200110
Received Date:	20200128

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Wooding's Auto Body Works, Inc.
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Clean Harbors Deer Park, Llc
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Not reported
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	006631627SKS
Last Updated Date:	20190510
Shipped Date:	20190315
Received Date:	20190413
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	ARD069748192
Designated Facility Name:	Not reported
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	309 American Circle
Designated Facility Mail City:	El Dorado
Designated Facility Mail Zip:	71730
Designated Facility Mail State:	AR
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	309 American Circle
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	El Dorado
Designated Facility Location Zip:	71730
Designated Facility Location State:	AR
Designated Facility Contact Company Name:	Clean Harbors El Dorado LLC
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	006631739SKS
Last Updated Date:	20190830
Shipped Date:	20190221
Received Date:	20190328
Manifest Status:	Corrected
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Not reported
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Clean Harbors Deer Park, LLC
Manifest Residue Indicator:	N

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Rejection Indicator:	N
Manifest Tracking Number:	006631904SKS
Last Updated Date:	20181031
Shipped Date:	20180917
Received Date:	20181005
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Not reported
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Clean Harbors Deer Park, LLC
Manifest Residue Indicator:	N
Rejection Indicator:	N
Manifest Tracking Number:	006879846SKS
Last Updated Date:	20190102
Shipped Date:	20181119
Received Date:	20181205
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Not reported
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Clean Harbors Deer Park, LLC
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	006879938SKS
Last Updated Date:	20181210
Shipped Date:	20181023
Received Date:	20181114
Manifest Status:	Signed
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Not reported
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Clean Harbors Deer Park, LLC
Manifest Residue Indicator:	N
Rejection Indicator:	N

Manifest Tracking Number:	006880042SKS
Last Updated Date:	20190830
Shipped Date:	20190117
Received Date:	20190204
Manifest Status:	Corrected
Submission Type:	DataImage5Copy
Origin Type:	Service
Generator EPA ID:	VAD988202156
Generator Name:	Wooding'S Auto Body Works, Inc.
Generator Location Street Number:	Not reported
Generator Location Street 1:	824 TAZEWELL AVE SE
Generator Location Street 2:	Not reported
Generator Location City:	ROANOKE
Generator Location State:	VA
Generator Location Zip:	24013
Generator Mail Street Number:	Not reported
Generator Mail Street 1:	824 Tazewell Ave Se
Generator Mail Street 2:	Not reported
Generator Mail City:	Roanoke
Generator Mail Zip:	24013
Generator Mail State:	VA
Generator Contact Company Name:	Not reported
Designated Facility EPA ID:	TXD055141378
Designated Facility Name:	Not reported
Designated Facility Mail Street Number:	Not reported
Designated Facility Mail Street 1:	Not reported
Designated Facility Mail Street 2:	2027 Independence Parkway South
Designated Facility Mail City:	La Porte
Designated Facility Mail Zip:	77571
Designated Facility Mail State:	TX
Designated Facility Location Street Number:	Not reported
Designated Facility Location Street 1:	2027 Independence Parkway South
Designated Facility Location Street 2:	Not reported
Designated Facility Location City:	La Porte
Designated Facility Location Zip:	77571
Designated Facility Location State:	TX
Designated Facility Contact Company Name:	Clean Harbors Deer Park, LLC
Manifest Residue Indicator:	N
Rejection Indicator:	N

Federal Waste:

Manifest Tracking Number:	007223685SKS
Waste Line Number:	1
Federal Waste Code:	D001
Federal Waste:	IGNITABLE WASTE

Manifest Tracking Number:	007223685SKS
Waste Line Number:	1
Federal Waste Code:	D005

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Federal Waste: BARIUM

Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
Federal Waste Code: D006
Federal Waste: CADMIUM

Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
Federal Waste Code: D018
Federal Waste: BENZENE

Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
Federal Waste Code: D035
Federal Waste: METHYL ETHYL KETONE

Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
Federal Waste Code: D039
Federal Waste: TETRACHLOROETHYLENE

Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
Federal Waste Code: D040
Federal Waste: TRICHLORETHYLENE

Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
Federal Waste Code: F003
Federal Waste: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
Federal Waste Code: F005
Federal Waste: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

State Waste:
Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
State Waste Code Owner: TX
State Waste Code: OUTS211H

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

State Waste: Outs211h

Transporter:
Manifest Tracking Number: 007223685SKS
Transporter Line Number: 1
Transporter EPA ID: TXR000081205
Transporter Name: Safety-Kleen Systems, Inc.

Manifest Tracking Number: 007223685SKS
Transporter Line Number: 2
Transporter EPA ID: MAD039322250
Transporter Name: Clean Harbors Environmental Services, Inc.

Manifest Tracking Number: 007223685SKS
Transporter Line Number: 3
Transporter EPA ID: ALD067138891
Transporter Name: Robbie D Wood Incorporated

Waste Line:
Manifest Tracking Number: 007223685SKS
Waste Line Number: 1
U.S. DOT Hazardous Indicator: Y
U.S. DOT ID Number: UN1263
U.S. DOT Description: Rq, Un1263, Waste Un1263 Waste Paint Related Material 3 Pgii Rq (D001)(F003,F005 D005,D006,D018,D035,D039,D040) (Erg#128), 3, Pg Ii (D001)
Non-Hazardous Waste Description: Not reported
Number of Containers: 1
Container Type Code: DM
Container Type Description: Metal drums, barrels, kegs
Waste Quantity: 100
Quantity Unit of Measure Code: P
Quantity Unit of Measure Description: Pounds
Waste Quantity, in Tons: 0.05
Acute Waste Quantity, in Tons: 0
Non-Acute Waste Quantity, in Tons: 0.05
Waste Quantity, in Kilograms: 45.3515
Acute Waste Quantity, in Kilograms: 0
Non-Acute Waste Quantity, in Kilorgrams: 45.3515
Management Method Code: H040
Management Method Description: INCINERATION
Waste Residue Indicator: N
Quantity Discrepancy Indicator: N
Waste Type Discrepancy Indicator: N
Waste Density: Not reported
Waste Density Unit of Measure Code: Not reported
Waste Density Unit of Measure Description: Not reported
Form Code: Not reported
Form Code Description: Not reported
Source Code: Not reported
Source Code Description: Not reported
Waste Minimization Code: Not reported
Waste Minimization Code Description: Not reported
Consent Number: Not reported
EPA Waste Indicator: Y

WOODING'S AUTO BODY WORKS, INC. (Continued) **1000581487**

Click this hyperlink while viewing on your computer to access
6 additional US EManifest: record(s) in the EDR Site Report.

E25 **WOODKINGS AUTO BODY WORKS INC** **RCRA NonGen / NLR** **1000189776**
North **205 8 1/2 ST SE** **FINDS** **VAD183045053**
1/8-1/4 **ROANOKE, VA 24013** **ECHO**
0.226 mi.
1192 ft. **Site 2 of 2 in cluster E**

Relative: **Lower**
Actual: **931 ft.**

RCRA Listings:

Date Form Received by Agency:		19890120
Handler Name:		Woodkings Auto Body Works Inc
Handler Address:		205 8 1/2 St Se
Handler City,State,Zip:		ROANOKE, VA 24013
EPA ID:		VAD183045053
Contact Name:		NORWOOD WOODING
Contact Address:		205 8 1/2 ST SE
Contact City,State,Zip:		ROANOKE, VA 24013
Contact Telephone:		703-345-4871
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		03
Land Type:		Not reported
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Va
State District:		2
Mailing Address:		205 8 1/2 ST SE
Mailing City,State,Zip:		ROANOKE, VA 24013
Owner Name:	Wooding, Norwood	
Owner Type:		Private
Operator Name:	Opername	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
202 GPRA Corrective Action Baseline:		No
Subject to Corrective Action Universe:		No

WOODKINGS AUTO BODY WORKS INC (Continued) **1000189776**

Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20150414
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	Ignitable Waste
Waste Code:	F003
Waste Description:	The Following Spent Nonhalogenated Solvents: Xylene, Acetone, Ethyl Acetate, Ethyl Benzene, Ethyl Ether, Methyl Isobutyl Ketone, N-Butyl Alcohol, Cyclohexanone, And Methanol; All Spent Solvent Mixtures/Blends Containing, Before Use, Only The Above Spent Nonhalogenated Solvents; And All Spent Solvent Mixtures/Blends Containing, Before Use, One Or More Of The Above Nonhalogenated Solvents, And A Total Of Ten Percent Or More (By Volume) Of One Or More Of Those Solvents Listed In F001, F002, F004, And F005; And Still Bottoms From The Recovery Of These Spent Solvents And Spent Solvent Mixtures.
Waste Code:	F005
Waste Description:	The Following Spent Nonhalogenated Solvents: Toluene, Methyl Ethyl Ketone, Carbon Disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, And 2-Nitropropane; All Spent Solvent Mixtures/Blends Containing, Before Use, A Total Of Ten Percent Or More (By Volume) Of One Or More Of The Above Nonhalogenated Solvents Or Those Solvents Listed In F001, F002, Or F004; And Still Bottoms From The Recovery Of These Spent Solvents And Spent Solvent Mixtures.

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: WOODING, NORWOOD	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	OWNERSTREET
Owner/Operator City,State,Zip:	OWNERCITY, AK 99999
Owner/Operator Telephone:	215-555-1212
Owner/Operator Telephone Ext:	Not reported

WOODKINGS AUTO BODY WORKS INC (Continued) **1000189776**

Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: OPERNAME
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: OPERSTREET
Owner/Operator City,State,Zip: OPERCITY, AK 99999
Owner/Operator Telephone: 215-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19890120
Handler Name: WOODKINGS AUTO BODY WORKS INC
Federal Waste Generator Description: Not a generator, verified
State District Owner: Va
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005228404

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
The Resource Conservation and Recovery Act Information System (RCRAInfo) is EPA's comprehensive information system in support of the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. It tracks many types of information about generators, transporters, treaters, storers, and disposers of hazardous waste.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

WOODKINGS AUTO BODY WORKS INC (Continued) **1000189776**

ECHO:
Envid: 1000189776
Registry ID: 110005228404

DFR URL:
Name: WOODKINGS AUTO BODY WORKS INC
Address: 205 8 1/2 ST SE
City,State,Zip: ROANOKE, VA 24013

F26 **STONEWALL JACKSON MIDDLE SCHOOL** **LTANKS** **U003677765**
SE **1022 9TH STREET S.W.** **UST** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.239 mi.
1261 ft. **Site 1 of 3 in cluster F**

Relative:
Higher

Actual:
997 ft.

LTANKS:
Name: STONEWALL JACKSON MIDDLE SCHOOL
Address: 1022 9TH STREET S.W.
City,State,Zip: ROANOKE, VA 24013
City,State,Zip: ROANOKE, VA 24013
Region: BRRO
CEDS Facility Id: 200000082003
Case Status: **Closed**
Pollution Complaint #: 19921260
Reported: 01/17/1992
Case Closed Date: 08/03/1994
Program: RP Lead
Regulated Petroleum UST (1): No
Excluded UST (1): No
Deferred UST (1): No
Partially Deferred UST (1): No
Exempt 1 UST (2): No
Exempt 2 Heating Oil UST (2): Yes
Small Heating Oil AST (2): No
Regulated AST (3): No
Unregulated AST (3): No
Other Y/N: No
Unknown Y/N: No
Other Description: Not reported
Heating Oil Category: Category 3
Changed By: Not reported
Changed Date: Not reported
Inserted By: Not reported
Inserted Date: Not reported
Verified By: Not reported
Verify Date: Not reported
Reference Point: Not reported
RST ID: Not reported
RST Poll Complaint Number: Not reported
Des First Name: Not reported
Des Last Name: Not reported
RST Rec Code: Not reported
RST Priority: Not reported
RST Fed Reg Tank: Not reported
RST Responsibility Ind: Not reported
RST Suspect Confirm Ind: Not reported
Facility Location: Not reported

STONEWALL JACKSON MIDDLE SCHOOL (Continued) **U003677765**

FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

Facility:

Name:	STONEWALL JACKSON MIDDLE SCHOOL
Address:	1022 9TH STREET S.W.
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2024064
Facility Type:	LOCAL
CEDS Facility ID:	200000082003

Owner:

Owner Id:	29801
Owner Name:	Roanoke City School Board
Owner Address:	PO Box 13105
Owner Address2:	Not reported
Owner City, State, Zip:	Roanoke, VA 24031
Owner Type:	LOCAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	1

UST:

Facility ID:	2024064
Federally Regulated:	No
Tank Number:	R1
Tank Capacity:	10000
Tank Contents:	HEATING OIL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	9/1/1973
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No

STONEWALL JACKSON MIDDLE SCHOOL (Continued) **U003677765**

Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

F27 **STONEWALL JACKSON MIDDLE#SCHOOL** **LUST** **S105027836**
SE **1022 9TH ST. SE** **N/A**
1/8-1/4 **ROANOKE, VA -0-**
0.239 mi.
1261 ft. **Site 2 of 3 in cluster F**

Relative: **Higher**

Actual: **997 ft.**

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	01/17/1992
Date Closed:	1994-08-03 00:00:00
Release Reported:	Not reported
Pollution Control #:	92-1260
Case Manager:	Not reported
Owner Name:	ROANOKE CITY PUB. SCHOOLS
Owner Address:	250 RESERVE AVE.
Owner City,St,Zip:	ROANOKE, VA 24016
Owner Phone:	703-981-2851

F28 **STONEWALL JACKSON MIDDLE SCHOOL** **UST FINDER** **1028797014**
SE **1022 9TH STREET S.W.** **N/A**
1/8-1/4 **ROANOKE, VA 24013**
0.239 mi.
1261 ft. **Site 3 of 3 in cluster F**

Relative:
Higher

Actual:
997 ft.

UST FINDER:

Object ID:	508812
Facility ID:	VA2024064
Name:	STONEWALL JACKSON MIDDLE SCHOOL
Address:	1022 9TH STREET S.W.
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	StreetAddress
Open USTs:	0
Closed USTs:	1
TOS USTs:	0
Population 1500ft:	1603
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.9274195199999
Y Coord:	37.26566969
Latitude:	37.26566969
Longitude:	-79.92741952

UST FINDER:

Object ID:	2023786
Facility ID:	VA2024064
Tank ID:	VA2024064_1
Tank Status:	Closed
Installation Date:	1973/09/01 16:00:00+00
Removal Date:	1992/01/15 15:59:59+00
Tank Capacity:	10000
Substances:	HEATING OIL
Tank Wall Type:	Single

29
ENE
1/8-1/4
0.248 mi.
1307 ft.

RICHARDS GUTTERING & SIDING CO
1024 JAMISON AVE
ROANOKE, VA 24013

UST **U003675285**
N/A

Relative:
Lower

Actual:
942 ft.

Facility:

Name:	RICHARDS GUTTERING & SIDING CO
Address:	1024 JAMISON AVE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2008385
Facility Type:	COMMERCIAL
CEDS Facility ID:	200000094219

Owner:

Owner Id:	29782
Owner Name:	LOU ALICE ADAMS
Owner Address:	RT 2; BOX 26-B
Owner Address2:	BEDFORD
Owner City, State, Zip:	BEDFORD, VA 24523
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	2

UST:

Facility ID:	2008385
Federally Regulated:	Yes
Tank Number:	R1
Tank Capacity:	1500
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No

RICHARDS GUTTERING & SIDING CO (Continued) **U003675285**

Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	Yes
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2008385
Federally Regulated:	Yes

Tank Number:	R2
Tank Capacity:	1500
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

RICHARDS GUTTERING & SIDING CO (Continued) **U003675285**

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	Yes
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

30
WNW
1/4-1/2
0.264 mi.
1395 ft.

LLOYD ELECTRIC COMPANY **LUST 1003031139**
605 THIRD ST SE **LTANKS N/A**
ROANOKE, VA 24013

Relative:
Lower

Actual:
937 ft.

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	05/22/1998
Date Closed:	1998-07-02 00:00:00
Release Reported:	Not reported
Pollution Control #:	98-1142
Case Manager:	Not reported
Owner Name:	LLOYD ELECTRIC COMPANY
Owner Address:	605 THIRD STREET
Owner City,St,Zip:	ROANOKE, VA 24013
Owner Phone:	540-982-0135

LLOYD ELECTRIC COMPANY (Continued) **1003031139**

LTANKS:

Name:	LLOYD ELECTRIC COMPANY
Address:	605 THIRD ST SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	Not reported
CEDS Facility Id:	200000196409
Case Status:	**Closed**
Pollution Complaint #:	19981142
Reported:	05/22/1998
Case Closed Date:	07/02/1998
Program:	Not reported
Regulated Petroleum UST (1):	Not reported
Excluded UST (1):	Not reported
Deferred UST (1):	Not reported
Partially Deferred UST (1):	Not reported
Exempt 1 UST (2):	Not reported
Exempt 2 Heating Oil UST (2):	Not reported
Small Heating Oil AST (2):	Not reported
Regulated AST (3):	Not reported
Unregulated AST (3):	Not reported
Other Y/N:	Not reported
Unknown Y/N:	Not reported
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	tgpetrie
Changed Date:	06/30/2009
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	16979
RST Poll Complaint Number:	19981142
Des First Name:	Timothy
Des Last Name:	Petrie
RST Rec Code:	WCRO
RST Priority:	Not reported
RST Fed Reg Tank:	Y
RST Responsibility Ind:	RP Lead
RST Suspect Confirm Ind:	Suspected
Facility Location:	605 Third St SE
FIC Description:	Roanoke City
Latitude:	37.2692552319736
Longitude:	-79.9373342124351

G31 **FORMER COREAST FEDERAL** **LUST S105986877**
NNW **605 CAMPBELL AVENUE** **LTANKS N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.284 mi.
1498 ft. **Site 1 of 4 in cluster G**

Relative:
Lower

Actual:
937 ft.

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	07/28/1993
Date Closed:	1994-07-28 00:00:00

FORMER COREAST FEDERAL (Continued) **S105986877**

Release Reported: Not reported
Pollution Control #: 94-0039
Case Manager: Not reported
Owner Name: BILL GREENHEAD
Owner Address: 5310 MARKEL RD SU 202
Owner City,St,Zip: RICHMOND, VA 23230
Owner Phone: (804)673-6312

LTANKS:

Name:	FORMER COREAST FEDERAL
Address:	605 CAMPBELL AVENUE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000094176
Case Status:	**Closed**
Pollution Complaint #:	19940039
Reported:	07/08/1993
Case Closed Date:	07/29/1994
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

G32 **FORMER COREAST FEDERAL** **UST FINDER** **1028797173**
NNW **605 CAMPBELL AVENUE** **UST FINDER RELEASE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.284 mi.
1498 ft. **Site 2 of 4 in cluster G**

Relative:
Lower

Actual:
937 ft.

UST FINDER:

Object ID:	508973
Facility ID:	VA2026792
Name:	FORMER COREAST FEDERAL
Address:	605 CAMPBELL AVENUE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	0
Closed USTs:	5
TOS USTs:	0
Population 1500ft:	1176
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93440529
Y Coord:	37.2721879200001
Latitude:	37.27218792
Longitude:	-79.93440529

UST FINDER:

Object ID:	1948377
Facility ID:	VA2026792
Tank ID:	VA2026792_R1
Tank Status:	Closed
Installation Date:	1920/01/01 16:00:01+00
Removal Date:	1993/09/22 15:59:59+00
Tank Capacity:	Not reported
Substances:	KEROSENE
Tank Wall Type:	Single

Object ID:	1948378
Facility ID:	VA2026792
Tank ID:	VA2026792_R2
Tank Status:	Closed
Installation Date:	1920/01/01 16:00:01+00
Removal Date:	1993/09/22 15:59:59+00
Tank Capacity:	Not reported
Substances:	DIESEL
Tank Wall Type:	Single

FORMER COREAST FEDERAL (Continued) **1028797173**

Object ID:	2155805
Facility ID:	VA2026792
Tank ID:	VA2026792_6
Tank Status:	Closed
Installation Date:	Not reported
Removal Date:	1993/09/22 15:59:59+00
Tank Capacity:	Not reported
Substances:	UNKNOWN
Tank Wall Type:	Single

Object ID:	2155806
Facility ID:	VA2026792
Tank ID:	VA2026792_5
Tank Status:	Closed
Installation Date:	Not reported
Removal Date:	1993/09/22 15:59:59+00
Tank Capacity:	Not reported
Substances:	UNKNOWN
Tank Wall Type:	Single

Object ID:	2155807
Facility ID:	VA2026792
Tank ID:	VA2026792_4
Tank Status:	Closed
Installation Date:	Not reported
Removal Date:	1993/09/22 15:59:59+00
Tank Capacity:	Not reported
Substances:	UNKNOWN
Tank Wall Type:	Single

UST FINDER RELEASE:

Object ID:	413995
Facility ID:	Not reported
Lust ID:	VA19940039
Name:	FORMER COREAST FEDERAL
Address:	605 CAMPBELL AVENUE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Reported Date:	1993/07/08 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1173
Domestic Wells within 1500ft:	0
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported

FORMER COREAST FEDERAL (Continued) **1028797173**

EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93441
Y Coord:	37.2721900000001
Latitude:	37.27219
Longitude:	-79.93441

G33 **MR A'S MART** **LTANKS U003673893**
NW **421 CAMPBELL AVENUE SE** **UST N/A**
1/4-1/2 **ROANOKE, VA 24013** **Financial Assurance**
0.291 mi.
1537 ft. **Site 3 of 4 in cluster G**

Relative: **Lower**

Actual: **933 ft.**

LTANKS:

Name:	SPUR STATION #1087
Address:	421 CAMPBELL AVENUE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	Not reported
CEDS Facility Id:	200000088588
Case Status:	**Closed**
Pollution Complaint #:	19961086
Reported:	04/24/1996
Case Closed Date:	09/29/2006
Program:	Not reported
Regulated Petroleum UST (1):	Not reported
Excluded UST (1):	Not reported
Deferred UST (1):	Not reported
Partially Deferred UST (1):	Not reported
Exempt 1 UST (2):	Not reported
Exempt 2 Heating Oil UST (2):	Not reported
Small Heating Oil AST (2):	Not reported
Regulated AST (3):	Not reported
Unregulated AST (3):	Not reported
Other Y/N:	Not reported
Unknown Y/N:	Not reported
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	cbdavidson
Changed Date:	08/01/2006
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	16931
RST Poll Complaint Number:	19961086
Des First Name:	Charles
Des Last Name:	Davidson
RST Rec Code:	WCRO
RST Priority:	3
RST Fed Reg Tank:	N
RST Responsibility Ind:	RP Lead

MR A'S MART (Continued) **U003673893**

RST Suspect Confirm Ind:	Suspected
Facility Location:	Not reported
FIC Description:	Roanoke City
Latitude:	37.2721457213029
Longitude:	-79.9341382509959
Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000088588
Case Status:	**Closed**
Pollution Complaint #:	20172181
Reported:	12/19/2016
Case Closed Date:	01/12/2017
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

Facility:

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE SE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2000209
Facility Type:	GAS STATION

MR A'S MART (Continued) **U003673893**

CEDS Facility ID: 200000088588

Owner:

Owner Id: 49458
Owner Name: Nital Patel
Owner Address: 5713 Longridge Drive
Owner Address2: Not reported
Owner City, State, Zip: Roanoke, VA 24018
Owner Type: PRIVATE
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 4

Owner Id: 51562
Owner Name: Haripriya Inc
Owner Address: 5713 Longridge Dr
Owner Address2: Not reported
Owner City, State, Zip: Roanoke, VA 24018
Owner Type: COMMERCIAL
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 4

Owner Id: 29822
Owner Name: Murphy Oil USA Inc
Owner Address: 200 E Peach St
Owner Address2: Not reported
Owner City, State, Zip: El Dorado, AR 71730
Owner Type: COMMERCIAL
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 4

Owner Id: 36113
Owner Name: UNKNOWN
Owner Address: Not reported
Owner Address2: Not reported
Owner City, State, Zip: Not reported
Owner Type: UNKNOWN
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 4

Owner Id: 44206
Owner Name: Hamid Al-Bishah
Owner Address: 4914 Pleasant Hill Dr
Owner Address2: Not reported
Owner City, State, Zip: Roanoke, VA 24018
Owner Type: PRIVATE
Number of Active AST: 0
Number of Active UST: 3
Number of Inactive AST: 0
Number of Inactive UST: 4

MR A'S MART (Continued) **U003673893**

UST:

Facility ID:	2000209
Federally Regulated:	Yes
Tank Number:	1
Tank Capacity:	10000
Tank Contents:	GASOLINE
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	2/1/1996
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	Yes
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes

MR A'S MART (Continued) **U003673893**

Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2000209
Federally Regulated:	Yes
Tank Number:	2
Tank Capacity:	10000
Tank Contents:	GASOLINE
Tank Status:	**CURR IN USE**
Tank Type:	UST
Tank Material:	
Install Date:	2/1/1996
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	Yes
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No

MR A'S MART (Continued) **U003673893**

Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2000209
Federally Regulated:	Yes
Tank Number:	3
Tank Capacity:	5000
Tank Contents:	DIESEL
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	2/1/1996
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	Yes
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No

MR A'S MART (Continued) **U003673893**

Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Yes
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2000209
Federally Regulated:	Yes
Tank Number:	R1
Tank Capacity:	5000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	1/9/1964
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No

MR A'S MART (Continued) **U003673893**

Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2000209
Federally Regulated:	Yes

Tank Number:	R2
Tank Capacity:	15000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	1/9/1964
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

MR A'S MART (Continued) **U003673893**

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2000209
Federally Regulated:	Yes

Tank Number:	R3
Tank Capacity:	15000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	1/9/1964
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No

MR A'S MART (Continued) **U003673893**

Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

Facility ID:	2000209
Federally Regulated:	Yes

Tank Number:	R4
Tank Capacity:	1000
Tank Contents:	KEROSENE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

MR A'S MART (Continued) **U003673893**

Install Date:	1/9/1964
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

VA Financial Assurance 1:

MR A'S MART (Continued) **U003673893**

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Hamid Al-Bishah
ROF Own Id:	44206
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Hamid Al-Bishah
ROF Own Id:	44206
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Hamid Al-Bishah
ROF Own Id:	44206
Tank Type:	UST
Mechanism:	Not reported
Gallonage:	Not reported
Per Occurence:	Not reported
Third Party:	Not reported
Annual Aggregate:	Not reported
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

MR A'S MART (Continued) **U003673893**

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

MR A'S MART (Continued) **U003673893**

Name: MR A'S MART
Address: 421 CAMPBELL AVENUE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2000209
Owner Name: Hamid Al-Bishah
ROF Own Id: 44206
Tank Type: UST
Mechanism: Insurance
Gallonage: Not reported
Per Occurence: $40,000.00
Third Party: $40,000.00
Annual Aggregate: $40,000.00
In Compliance: Not reported
Total Capacity: 10000
CEDS Facility Name: Mr A's Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: MR A'S MART
Address: 421 CAMPBELL AVENUE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2000209
Owner Name: Hamid Al-Bishah
ROF Own Id: 44206
Tank Type: UST
Mechanism: Insurance
Gallonage: Not reported
Per Occurence: $40,000.00
Third Party: $40,000.00
Annual Aggregate: $40,000.00
In Compliance: Not reported
Total Capacity: 5000
CEDS Facility Name: Mr A's Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: MR A'S MART
Address: 421 CAMPBELL AVENUE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2000209
Owner Name: Hamid Al-Bishah
ROF Own Id: 44206
Tank Type: UST
Mechanism: Insurance
Gallonage: Not reported
Per Occurence: $40,000.00
Third Party: $40,000.00
Annual Aggregate: $40,000.00
In Compliance: Not reported
Total Capacity: 10000
CEDS Facility Name: Mr A's Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

MR A'S MART (Continued) **U003673893**

Name: MR A'S MART
Address: 421 CAMPBELL AVENUE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2000209
Owner Name: Haripriya Inc
ROF Own Id: 51562
Tank Type: UST
Mechanism: Insurance
Gallonage: 150000
Per Occurence: $20,000.00
Third Party: $20,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 10000
CEDS Facility Name: Mr A's Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: MR A'S MART
Address: 421 CAMPBELL AVENUE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2000209
Owner Name: Haripriya Inc
ROF Own Id: 51562
Tank Type: UST
Mechanism: Insurance
Gallonage: 150000
Per Occurence: $20,000.00
Third Party: $20,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 5000
CEDS Facility Name: Mr A's Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: MR A'S MART
Address: 421 CAMPBELL AVENUE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2000209
Owner Name: Haripriya Inc
ROF Own Id: 51562
Tank Type: UST
Mechanism: Insurance
Gallonage: 150000
Per Occurence: $20,000.00
Third Party: $20,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 10000
CEDS Facility Name: Mr A's Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

MR A'S MART (Continued) **U003673893**

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

MR A'S MART (Continued) **U003673893**

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2000209
Owner Name:	Nital Patel
ROF Own Id:	49458
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	Mr A's Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

G34
NW
1/4-1/2
0.291 mi.
1537 ft.

MR A'S MART
421 CAMPBELL AVENUE
ROANOKE, VA 24013

Site 4 of 4 in cluster G

UST FINDER **1028794549**
UST FINDER RELEASE **N/A**

Relative:
Lower

Actual:
933 ft.

UST FINDER:

Object ID:	508963
Facility ID:	VA2000209
Name:	MR A'S MART
Address:	421 CAMPBELL AVENUE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	StreetAddress
Open USTs:	3
Closed USTs:	4
TOS USTs:	0
Population 1500ft:	1157
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93516298
Y Coord:	37.27196917
Latitude:	37.27196917
Longitude:	-79.93516298

UST FINDER:

Object ID:	1968876
Facility ID:	VA2000209
Tank ID:	VA2000209_R1
Tank Status:	Closed
Installation Date:	1964/01/09 16:00:01+00
Removal Date:	1996/04/22 15:59:59+00
Tank Capacity:	5000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	1968877
Facility ID:	VA2000209
Tank ID:	VA2000209_R2
Tank Status:	Closed
Installation Date:	1964/01/09 16:00:01+00
Removal Date:	1996/04/22 15:59:59+00
Tank Capacity:	15000
Substances:	GASOLINE
Tank Wall Type:	Single

MR A'S MART (Continued) **1028794549**

Object ID: 1968878
Facility ID: VA2000209
Tank ID: VA2000209_R3
Tank Status: Closed
Installation Date: 1964/01/09 16:00:01+00
Removal Date: 1996/04/22 15:59:59+00
Tank Capacity: 15000
Substances: GASOLINE
Tank Wall Type: Single

Object ID: 1968879
Facility ID: VA2000209
Tank ID: VA2000209_R4
Tank Status: Closed
Installation Date: 1964/01/09 16:00:01+00
Removal Date: 1996/04/22 15:59:59+00
Tank Capacity: 1000
Substances: KEROSENE
Tank Wall Type: Single

Object ID: 2126409
Facility ID: VA2000209
Tank ID: VA2000209_3
Tank Status: Open
Installation Date: 1996/02/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 5000
Substances: DIESEL
Tank Wall Type: Single

Object ID: 2126912
Facility ID: VA2000209
Tank ID: VA2000209_1
Tank Status: Open
Installation Date: 1996/02/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 10000
Substances: GASOLINE
Tank Wall Type: Single

Object ID: 2126913
Facility ID: VA2000209
Tank ID: VA2000209_2
Tank Status: Open
Installation Date: 1996/02/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 10000
Substances: GASOLINE
Tank Wall Type: Single

UST FINDER RELEASE:
Object ID: 413990
Facility ID: Not reported
Lust ID: VA20172181
Name: MR A'S MART
Address: 421 CAMPBELL AVENUE

MR A'S MART (Continued) **1028794549**

City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	StreetAddress
Reported Date:	2016/12/19 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1155
Domestic Wells within 1500ft:	0
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.9351599999999
Y Coord:	37.2719700000001
Latitude:	37.27197
Longitude:	-79.9351599999999

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35 **SUPR NO.1087** **LUST** **S105027954**
NW **421/417 CAMPBELL AVE.,S.E.,RKE.VA 24013** **N/A**
1/4-1/2 **ROANOKE*, VA**
0.309 mi.
1633 ft.

Relative: **Lower**

Actual: **925 ft.**

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	04/24/1996
Date Closed:	Not reported
Release Reported:	Not reported
Pollution Control #:	96-1086
Case Manager:	Not reported
Owner Name:	MURPHY OIL USA
Owner Address:	200 PEACY ST.
Owner City,St,Zip:	ELDORADO, AR 71730
Owner Phone:	501-862-6411

36
SE
1/4-1/2
0.310 mi.
1638 ft.

NINTH STREET CHURCH OF THE BRETHEREN PARSONAGE
745 MONTROSE AVE SE
ROANOKE, VA 24013

LTANKS **S128550609**
N/A

Relative:
Higher

Actual:
1016 ft.

LTANKS:

Name:	NINTH STREET CHURCH OF THE BRETHEREN PARSONAGE
Address:	745 MONTROSE AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000894165
Case Status:	**Closed**
Pollution Complaint #:	20222114
Reported:	01/04/2022
Case Closed Date:	04/07/2022
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	Yes
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Category 3
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

H37 **ANTHEM ROANOKE PROPERTY** **LUST** **S106634526**
NW **302 CAMPBELL AVENUE S.E.** **N/A**
1/4-1/2 **ROANOKE, VA**
0.343 mi.
1809 ft. **Site 1 of 3 in cluster H**

Relative: **Lower**
Actual: **925 ft.**

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	09/10/2004
Date Closed:	Not reported
Release Reported:	Not reported
Pollution Control #:	05-2023N
Case Manager:	Not reported
Owner Name:	ANTHEM HEALTH OF VA
Owner Address:	120 MONUMENT CI
Owner City,St,Zip:	M2NI, IN 46204
Owner Phone:	317-488-6201

H38 **ANTHEM PROPERTY AT CAMPBELL AND 3RD SE** **LTANKS** **S106707258**
NW **302 CAMPBELL AVE SE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.343 mi.
1809 ft. **Site 2 of 3 in cluster H**

Relative: **Lower**
Actual: **925 ft.**

LTANKS:

Name:	ANTHEM PROPERTY AT CAMPBELL AND 3RD SE
Address:	302 CAMPBELL AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000217124
Case Status:	**Closed**
Pollution Complaint #:	20052023
Reported:	09/10/2004
Case Closed Date:	10/12/2004
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	Yes
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported

ANTHEM PROPERTY AT CAMPBELL AND 3RD SE (Continued) **S106707258**

Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

H39 **ANTHEM ROANOKE PROPERTY** **LUST** **S106634531**
NW **302 CAMPBELL AVENUE, S.E.** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.343 mi.
1809 ft. **Site 3 of 3 in cluster H**

Relative: **Lower**
Actual: **925 ft.**

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	09/10/2004
Date Closed:	Not reported
Release Reported:	Not reported
Pollution Control #:	05-2023N
Case Manager:	Not reported
Owner Name:	ANTHEM HEALTH PLANS OF VA
Owner Address:	120 MONUMENT CIR.
Owner City,St,Zip:	INDIANSPOLIS, IN 46204
Owner Phone:	317-488-6201

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40 **NORFOLK SOUTHERN-EAST END SHOP** **LUST** **S105027878**
North **8TH ST. & CAMPBELL AVE.** **N/A**
1/4-1/2 **ROANOKE, VA**
0.359 mi.
1897 ft.

Relative: **Lower**
Actual: **912 ft.**

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	12/06/1992
Date Closed:	1994-06-09 00:00:00
Release Reported:	Not reported
Pollution Control #:	93-1111A
Case Manager:	Not reported
Owner Name:	NORFOLK SOUTHERN CORP.
Owner Address:	110 FRANKLIN RD.
Owner City,St,Zip:	ROANOKE, VA 24047
Owner Phone:	703-981-4739

41
NE
1/4-1/2
0.372 mi.
1963 ft.

KETON MARTIN RESIDENCE
1139 STEWART AVE
ROANOKE, VA 24013

LTANKS **S118368492**
N/A

Relative:
Higher

Actual:
972 ft.

LTANKS:

Name:	KETON MARTIN RESIDENCE
Address:	1139 STEWART AVE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000881341
Case Status:	**Closed**
Pollution Complaint #:	20162106
Reported:	10/07/2015
Case Closed Date:	12/17/2015
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	Yes
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Category 3
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

I42
West
1/4-1/2
0.392 mi.
2071 ft.

BLUE CROSS/ BLUE SHIELD
602 S. JEFFERSON STREET
ROANOKE, VA

Site 1 of 4 in cluster I

LUST **S105986811**
N/A

Relative:
Lower

Actual:
942 ft.

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	10/30/1992
Date Closed:	1993-02-04 00:00:00
Release Reported:	Not reported
Pollution Control #:	93-0882
Case Manager:	Not reported
Owner Name:	BLUE CROSS/BLUE SHIEL
Owner Address:	602 S. JEFFERSON ST.
Owner City,St,Zip:	ROANOKE, VA 24016
Owner Phone:	703-985-5042

43
NNE
1/4-1/2
0.393 mi.
2077 ft.

SFD RENTAL UNIT
122 10 1/2 ST SW
ROANOKE, VA 24013

LTANKS **S127761379**
N/A

Relative:
Lower

Actual:
958 ft.

LTANKS:

Name:	SFD RENTAL UNIT
Address:	122 10 1/2 ST SW
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000892896
Case Status:	**Closed**
Pollution Complaint #:	20212221
Reported:	05/13/2021
Case Closed Date:	09/01/2021
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	Yes
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Category 3
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported

SFD RENTAL UNIT (Continued) **S127761379**

Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

J44 **JEFFERSON MOTOR LODGE** **LUST S108925781**
West **612 AND 616 JEFFERSON ST** **LTANKS N/A**
1/4-1/2 **ROANOKE, VA**
0.399 mi.
2107 ft. **Site 1 of 3 in cluster J**

Relative:
Lower

Actual:
942 ft.

LUST REG WC:

Region:	WC
Case Status:	**Closed**
Date Reported:	Not reported
Date Closed:	Not reported
Release Reported:	11/16/2007
Pollution Control #:	20082038
Case Manager:	Donald M Edge
Owner Name:	Not reported
Owner Address:	Not reported
Owner City,St,Zip:	Not reported
Owner Phone:	Not reported

LTANKS:

Name:	JEFFERSON MOTOR LODGE
Address:	612 AND 616 JEFFERSON ST
City,State,Zip:	ROANOKE, VA
City,State,Zip:	ROANOKE, VA
Region:	BRRO
CEDS Facility Id:	200000847928
Case Status:	**Closed**
Pollution Complaint #:	20082038
Reported:	11/16/2007
Case Closed Date:	11/20/2007
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported

JEFFERSON MOTOR LODGE (Continued) **S108925781**

Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

K45 **CARILION ROANOKE COMMUNITY HOSPITAL** **SWF/LF** **U003676560**
West **101 ELM AVENUE SE** **LTANKS** **N/A**
1/4-1/2 **ROANOKE, VA 24013** **UST**
0.400 mi. **Financial Assurance**
2113 ft. **Site 1 of 2 in cluster K**

Relative:
Higher

Actual:
967 ft.

SWF/LF:

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
Address 3:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Permit Number:	900000000593
Unit Name:	Regulated Medical Waste (RMW) Facility
Unit Status Code:	Not reported
Deq Region:	BRRO
Mailing Address:	101 Elm Ave SE
Mailing Address 2:	Eng & Maint Office
Mailing Address 3:	Not reported
Mailing City,St,Zip:	Roanoke, VA 24013
Facility Telephone:	Not reported
Decimal Longitude:	-79.940170987
Lat/Long (dms):	Not reported
Owner Name:	Not reported
Operator Name:	Not reported
Unit Status Description:	Regulated Medical Waste (RMW) Facility - Storage Facility - Closed
Payment ID:	Not reported

Permit:

Permit Number:	900000000593
Unit Description:	Community Hospital Of Roanoke Valley
FIC Description:	Roanoke City
Permit Event Desc:	Permit issued
Permit Event Complete Date:	1/1/1996

Permit Number:	900000000593
Unit Description:	Community Hospital Of Roanoke Valley
FIC Description:	Roanoke City
Permit Event Desc:	Permit revoked

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Permit Event Complete Date: 12/9/2002

LTANKS:

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000082524
Case Status:	**Closed**
Pollution Complaint #:	20172180
Reported:	12/19/2016
Case Closed Date:	02/08/2017
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

Facility:

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2015981
Facility Type:	COMMERCIAL
CEDS Facility ID:	200000082524

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Owner:

Owner Id:	39028
Owner Name:	Carilion Materials Management
Owner Address:	PO BOX 13851
Owner Address2:	Not reported
Owner City, State, Zip:	ROANOKE, VA 24037
Owner Type:	PRIVATE
Number of Active AST:	0
Number of Active UST:	2
Number of Inactive AST:	0
Number of Inactive UST:	5

Owner Id:	39527
Owner Name:	COMMUNITY HOSPITAL OF ROANOKE
Owner Address:	"101 ELM AVENUE, SE"
Owner Address2:	Not reported
Owner City, State, Zip:	ROANOKE, VA 24029
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	2
Number of Inactive AST:	0
Number of Inactive UST:	5

Owner Id:	46906
Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
Owner Address:	101 Elm Avenue
Owner Address2:	Not reported
Owner City, State, Zip:	Roanoke, VA 24013
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	2
Number of Inactive AST:	0
Number of Inactive UST:	5

UST:

Facility ID:	2015981
Federally Regulated:	Yes
Tank Number:	7
Tank Capacity:	20000
Tank Contents:	EMER GENERATOR
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	11/1/1996
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	Yes
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	Yes
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Em. Gen. & Boiler (heat) usage
Pipe Release Detection: Leak Deferred	Yes
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Emergency Generator and Boiler (heat) usage.

Pipe Type:	VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	Yes
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	Yes
Pipe Materials: Other Note	Changes to Galvanized steel INSIDE building (above grade, visible).

Facility ID:	2015981
Federally Regulated:	Yes

Tank Number:	8
Tank Capacity:	20000
Tank Contents:	EMER GENERATOR
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	11/1/1996
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Tank Materials: Fiberglass	Yes
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	Yes
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	Yes
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Yes
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Em. Gen. & Boiler (heat) usage
Pipe Release Detection: Leak Deferred	Yes
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Emergency Generator and Boiler (heat) usage.

Pipe Type:	VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	Yes
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	Yes
Pipe Materials: Other Note	Changes to Galvanized steel INSIDE building (above grade, visible).

Facility ID:	2015981
Federally Regulated:	Yes

Tank Number:	C1
Tank Capacity:	2000
Tank Contents:	DIESEL

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Tank Status:	**CLS IN GRD**
Tank Type:	UST
Tank Material:	
Install Date:	5/6/1951
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	Yes
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Facility ID:	2015981
Federally Regulated:	Yes
Tank Number:	C2
Tank Capacity:	2000
Tank Contents:	DIESEL
Tank Status:	**CLS IN GRD**
Tank Type:	UST

Tank Material:

Install Date:	5/6/1951
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	Yes
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2015981
Federally Regulated:	Yes
Tank Number:	R3
Tank Capacity:	8000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	5/5/1982
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	Yes
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	Yes
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2015981
Federally Regulated:	Yes
Tank Number:	R4
Tank Capacity:	27000
Tank Contents:	DIESEL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	5/5/1968
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	Yes
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2015981
Federally Regulated:	Yes
Tank Number:	R5
Tank Capacity:	27000
Tank Contents:	DIESEL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	5/5/1968
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	Yes
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

VA Financial Assurance 1:

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981
Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981
Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981
Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981
Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981
Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2015981

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **U003676560**

Owner Name:	Carilion Clinic/Carilion Roanoke Comm Hospital
ROF Own Id:	46906
Tank Type:	UST
Mechanism:	Insurance
Gallonage:	Not reported
Per Occurence:	$1,000,000.00
Third Party:	$1,000,000.00
Annual Aggregate:	$1,000,000.00
In Compliance:	Not reported
Total Capacity:	20000
CEDS Facility Name:	Carilion Roanoke Community Hospital
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

K46 **CARILION ROANOKE COMMUNITY HOSPITAL** **UST FINDER** **1028796275**
West **101 ELM AVENUE** **UST FINDER RELEASE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.400 mi.
2113 ft. **Site 2 of 2 in cluster K**

Relative: **Higher**
Actual: **967 ft.**

UST FINDER:

Object ID:	508829
Facility ID:	VA2015981
Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	2
Closed USTs:	5
TOS USTs:	0
Population 1500ft:	487
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	Yes
SPA PWS Facility ID:	VA2770900_32392
SPA Water Type:	GU - Ground Water Under the Influence of Surcace Water
SPA Facility Type:	SP - Spring
SPA HUC12:	030101010404
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.9396320499999
Y Coord:	37.26675557
Latitude:	37.26675557
Longitude:	-79.93963205

UST FINDER:

Object ID:	2128647
Facility ID:	VA2015981
Tank ID:	VA2015981_7

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **1028796275**

Tank Status: Open
Installation Date: 1996/11/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 20000
Substances: EMER GENERATOR
Tank Wall Type: Double

Object ID: 2128648
Facility ID: VA2015981
Tank ID: VA2015981_8
Tank Status: Open
Installation Date: 1996/11/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 20000
Substances: EMER GENERATOR
Tank Wall Type: Double

Object ID: 2003390
Facility ID: VA2015981
Tank ID: VA2015981_R4
Tank Status: Closed
Installation Date: 1968/05/05 16:00:01+00
Removal Date: 1996/10/29 15:59:59+00
Tank Capacity: 27000
Substances: DIESEL
Tank Wall Type: Single

Object ID: 2003391
Facility ID: VA2015981
Tank ID: VA2015981_R5
Tank Status: Closed
Installation Date: 1968/05/05 16:00:01+00
Removal Date: 1996/10/29 15:59:59+00
Tank Capacity: 27000
Substances: DIESEL
Tank Wall Type: Single

Object ID: 1953720
Facility ID: VA2015981
Tank ID: VA2015981_C1
Tank Status: Closed
Installation Date: 1951/05/06 16:00:01+00
Removal Date: Not reported
Tank Capacity: 2000
Substances: DIESEL
Tank Wall Type: Single

Object ID: 1953721
Facility ID: VA2015981
Tank ID: VA2015981_C2
Tank Status: Closed
Installation Date: 1951/05/06 16:00:01+00
Removal Date: Not reported
Tank Capacity: 2000
Substances: DIESEL
Tank Wall Type: Single

CARILION ROANOKE COMMUNITY HOSPITAL (Continued) **1028796275**

Object ID:	2068374
Facility ID:	VA2015981
Tank ID:	VA2015981_R3
Tank Status:	Closed
Installation Date:	1982/05/05 16:00:00+00
Removal Date:	1999/09/29 15:59:59+00
Tank Capacity:	8000
Substances:	GASOLINE
Tank Wall Type:	Single

UST FINDER RELEASE:

Object ID:	413967
Facility ID:	Not reported
Lust ID:	VA20172180
Name:	CARILION ROANOKE COMMUNITY HOSPITAL
Address:	101 ELM AVENUE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Reported Date:	2016/12/19 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	487
Domestic Wells within 1500ft:	0
Land Use:	Developed, Medium Intensity
Within SPA:	Yes
SPA PWS Facility ID:	VA2770900_32392
SPA Water Type:	GU - Ground Water Under the Influence of Surcace Water
SPA Facility Type:	SP - Spring
SPA HUC12:	30101010404
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93963
Y Coord:	37.26676
Latitude:	37.2667599999999
Longitude:	-79.9396299999999

47
WNW
1/4-1/2
0.413 mi.
2181 ft.

HARTSOOK
210 MARKET STREET SE
ROANOKE, VA 24011

US BROWNFIELDS FINDS **1025994751 N/A**

Relative:
Lower

Actual:
929 ft.

US BROWNFIELDS:

Name:	HARTSOOK
Address:	210 Market Street Se
City,State,Zip:	ROANOKE, VA 24011
Property ID:	239767
Property Alias:	Not reported
Recipient Name:	City of Roanoke
Grant Type:	Hazardous
Property Number:	Not reported
Parcel Size:	0.16
Latitude:	37.2713612
Longitude:	-79.938868
Census Tract:	51770001100
State or Tribal Voluntary Response Program:	Not reported
Program Name:	BF
AA Activity Funded:	Not reported
Start Date:	Not reported
Redev Completition Date:	Not reported
Completed Date:	Not reported
Cleanup Funding:	Not reported
Cleanup Funding Source:	Not reported
Activity Funded:	Phase I
Assessment Funding:	Not reported
Assessment Funding Source:	Not reported
Redevelopment Funding:	Not reported
Contaminants REC:	Not reported
Contaminants Found at Actionable Level:	Not reported
Redev. Funding Source:	Not reported
Redev. Funding Entity Name:	Not reported
Contaminants Found Below Actionable Level:	Not reported
Redevelopment Start Date:	Not reported
Assessment Funding Entity:	Not reported
Cleanup Funding Entity:	Not reported
Climate Adapt Mitig - Planning or Assessment:	Not reported
Cooperative Agreement Number:	96339901
Start Date:	Not reported
Ownership Entity:	Not reported
Additional Institutional Controls Information:	Not reported
Completion Date:	Not reported
Address of Data Sources (URL if available) 1:	Not reported
Cleanup Required:	N
Indicates Cleanup/Treatment Tech Implemented:	Not reported
Institutional Controls Required:	U
IC Category Proprietary Controls:	Not reported
Excavation and Disposal of Soils:	Not reported
Extraction of contaminants:	Not reported
IC Cat. Info. Devices:	Not reported
Removal of materials (tanks and piping, etc.):	Not reported
IC Cat. Gov. Controls:	Not reported
Reduction of Contam Bioremediation/Phytoremediation:	Not reported
IC Cat. Enforcement Permit Tools:	Not reported
Cleanup of structures:	Not reported
IC in place date:	Not reported

HARTSOOK (Continued) **1025994751**

Additional Cleanup/Treatment Tech Info:	Not reported
IC in place:	Not reported
Address of Data Source (URL if available) 2:	Not reported
Indicate whether Engineering Controls are required:	Not reported
State/tribal program ID:	Not reported
Cover Technologies (e.g., Capping):	Not reported
Security (e.g., Guard, Fence):	Not reported
Immobilization Process:	Not reported
Engineering Barriers (e.g., Slurry Walls, Sheet):	Not reported
Other:	Not reported
Additional Engineering Controls Information:	Not reported
Address of Data Source (URL if available) 3:	Not reported
Indicate whether Engineering Controls are in place:	Not reported
Date Engineering Controls put into place:	Not reported
ACRES Cleaned Up:	Not reported
Section 128(a) State/Tribal:	Not reported
Multipurpose - Cost Share Amount:	Not reported
Cleanup - Cost Share Amount:	Not reported
RLF Loan - Total Loan Amount:	Not reported
RLF - Loan Signed Date:	Not reported
RLF Loan - Anticipated Repayment Start Date:	Not reported
RLF Loan - Anticipated Repayment End Date:	Not reported
RLF Loan - Interest Rate:	Not reported
RLF Loan - EPA Funds Used:	Not reported
Contaminant Cleanup:	Not reported
RLF Loan - Cost Share Used:	Not reported
Media Affected:	Not reported
RLF Loan - Program Income Used:	Not reported
Media Cleanup:	Not reported
RLF Loan - Discounted:	Not reported
RLF Loan - Discount Percentage:	Not reported
RLF Subgrant - Total Subgrant Amount:	Not reported
RLF Subgrant - Signed Date:	Not reported
RLF Subgrant - EPA Funds Used:	Not reported
RLF Subgrant - Cost Share Used:	Not reported
RLF Subgrant - Program Income Used:	Not reported
RLF Direct Cleanup - Total Funding Amt:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
RLF Direct Cleanup - Source of Funding:	Not reported
RLF Leveraged - Funding Source Type:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
RLF Leveraged - Entity Providing Funding:	Not reported
RLF Leveraged - Funding Amount:	Not reported
Cleanup Completion Doc - NFA Letter Received:	N
Past use commercial acreage:	0.16
NFA Letter Date Received:	Not reported
Past use industrial acreage:	Not reported
Cleanup Comp Doc - Letter/Signed Rep Qualified Pro:	N
Future use greenspace acreage:	Not reported
Letter/Signed Report Date Received:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Cleanup Completion Doc- Other forms of Doc:	Not reported
Future use industrial acreage:	Not reported
Climate Adapt and Mitiga - Demo or Cleanup:	Not reported
ReDev Activity Funded:	Not reported

HARTSOOK (Continued) **1025994751**

Amount of Funding Expended on this Activity 2:	Not reported
Number of Redevelopment Jobs Leveraged:	Not reported
Climate Adaptation and Mitigation Redevelopment:	Not reported
Radius:	0.5
Below Poverty Number:	825
Below Poverty Percent:	32.43
Meidan Income:	3010
Meidan Income Number:	1220
Meidan Income Percent:	47.96
Vacant Housing Number:	238
Vacant Housing Percent:	22.13
Unemployed Number:	207
Unemployed Percent:	8.14

Name:	HARTSOOK
Address:	210 Market Street Se
City,State,Zip:	ROANOKE, VA 24011
Property ID:	239767
Property Alias:	Not reported
Recipient Name:	City of Roanoke
Grant Type:	Hazardous
Property Number:	Not reported
Parcel Size:	0.16
Latitude:	37.2713612
Longitude:	-79.938868
Census Tract:	51770001100
State or Tribal Voluntary Response Program:	Not reported
Program Name:	BF
AA Activity Funded:	Phase I
Start Date:	Not reported
Redev Completition Date:	Not reported
Completed Date:	Not reported
Cleanup Funding:	Not reported
Cleanup Funding Source:	Not reported
Activity Funded:	Phase I
Assessment Funding:	Not reported
Assessment Funding Source:	Not reported
Redevelopment Funding:	Not reported
Contaminants REC:	Not reported
Contaminants Found at Actionable Level:	Not reported
Redev. Funding Source:	Not reported
Redev. Funding Entity Name:	Not reported
Contaminants Found Below Actionable Level:	Not reported
Redevelopment Start Date:	Not reported
Assessment Funding Entity:	EPA
Cleanup Funding Entity:	Not reported
Climate Adapt Mitig - Planning or Assessment:	Not reported
Cooperative Agreement Number:	96339901
Start Date:	2019-03-21 00:00:00
Ownership Entity:	Not reported
Additional Institutional Controls Information:	Not reported
Completion Date:	2019-07-03 00:00:00
Address of Data Sources (URL if available) 1:	Not reported
Cleanup Required:	N
Indicates Cleanup/Treatment Tech Implemented:	Not reported
Institutional Controls Required:	U
IC Category Proprietary Controls:	Not reported

HARTSOOK (Continued) **1025994751**

Excavation and Disposal of Soils:	Not reported
Extraction of contaminants:	Not reported
IC Cat. Info. Devices:	Not reported
Removal of materials (tanks and piping, etc.):	Not reported
IC Cat. Gov. Controls:	Not reported
Reduction of Contam Bioremediation/Phytoremediation:	Not reported
IC Cat. Enforcement Permit Tools:	Not reported
Cleanup of structures:	Not reported
IC in place date:	Not reported
Additional Cleanup/Treatment Tech Info:	Not reported
IC in place:	Not reported
Address of Data Source (URL if available) 2:	Not reported
Indicate whether Engineering Controls are required:	Not reported
State/tribal program ID:	Not reported
Cover Technologies (e.g., Capping):	Not reported
Security (e.g., Guard, Fence):	Not reported
Immobilization Process:	Not reported
Engineering Barriers (e.g., Slurry Walls, Sheet):	Not reported
Other:	Not reported
Additional Engineering Controls Information:	Not reported
Address of Data Source (URL if available) 3:	Not reported
Indicate whether Engineering Controls are in place:	Not reported
Date Engineering Controls put into place:	Not reported
ACRES Cleaned Up:	Not reported
Section 128(a) State/Tribal:	Not reported
Multipurpose - Cost Share Amount:	Not reported
Cleanup - Cost Share Amount:	Not reported
RLF Loan - Total Loan Amount:	Not reported
RLF - Loan Signed Date:	Not reported
RLF Loan - Anticipated Repayment Start Date:	Not reported
RLF Loan - Anticipated Repayment End Date:	Not reported
RLF Loan - Interest Rate:	Not reported
RLF Loan - EPA Funds Used:	Not reported
Contaminant Cleanup:	Not reported
RLF Loan - Cost Share Used:	Not reported
Media Affected:	Not reported
RLF Loan - Program Income Used:	Not reported
Media Cleanup:	Not reported
RLF Loan - Discounted:	Not reported
RLF Loan - Discount Percentage:	Not reported
RLF Subgrant - Total Subgrant Amount:	Not reported
RLF Subgrant - Signed Date:	Not reported
RLF Subgrant - EPA Funds Used:	Not reported
RLF Subgrant - Cost Share Used:	Not reported
RLF Subgrant - Program Income Used:	Not reported
RLF Direct Cleanup - Total Funding Amt:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
RLF Direct Cleanup - Source of Funding:	Not reported
RLF Leveraged - Funding Source Type:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
RLF Leveraged - Entity Providing Funding:	Not reported
RLF Leveraged - Funding Amount:	Not reported
Cleanup Completion Doc - NFA Letter Received:	N
Past use commercial acreage:	0.16
NFA Letter Date Received:	Not reported
Past use industrial acreage:	Not reported

HARTSOOK (Continued) **1025994751**

Cleanup Comp Doc - Letter/Signed Rep Qualified Pro:	N
Future use greenspace acreage:	Not reported
Letter/Signed Report Date Received:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	Not reported
Cleanup Completion Doc- Other forms of Doc:	Not reported
Future use industrial acreage:	Not reported
Climate Adapt and Mitiga - Demo or Cleanup:	Not reported
ReDev Activity Funded:	Not reported
Amount of Funding Expended on this Activity 2:	Not reported
Number of Redevelopment Jobs Leveraged:	Not reported
Climate Adaptation and Mitigation Redevelopment:	Not reported
Radius:	0.5
Below Poverty Number:	825
Below Poverty Percent:	32.43
Meidan Income:	3010
Meidan Income Number:	1220
Meidan Income Percent:	47.96
Vacant Housing Number:	238
Vacant Housing Percent:	22.13
Unemployed Number:	207
Unemployed Percent:	8.14

FINDS:
Registry ID: 110070616060

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
The Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on Brownfields properties assessed or cleaned up with grant funding, as well as information on Targeted Brownfields Assessments (TBA) performed by EPA Regions.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

L48 **GETTY MART #31** **UST FINDER RELEASE** **1028969952**
ENE **1219 JAMISON AVE SE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.417 mi.
2203 ft. **Site 1 of 4 in cluster L**

Relative:
Lower

Actual:
942 ft.

UST FINDER RELEASE:

Object ID:	414051
Facility ID:	Not reported
Lust ID:	VA19981101
Name:	GETTY MART #31
Address:	1219 JAMISON AVE SE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Reported Date:	1998/03/04 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1628
Domestic Wells within 1500ft:	0
Land Use:	Developed, Medium Intensity
Within SPA:	No

GETTY MART #31 (Continued) **1028969952**

SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	VA2161680_35962
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	030101010404
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.92274
Y Coord:	37.2706000000001
Latitude:	37.2706
Longitude:	-79.92274

L49 **D&G MART** **UST FINDER RELEASE** **1028944220**
ENE **1219 JAMISON AVE SE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.417 mi.
2203 ft. **Site 2 of 4 in cluster L**

Relative: **Lower**
Actual: **942 ft.**

UST FINDER RELEASE:

Object ID:	414052
Facility ID:	Not reported
Lust ID:	VA20122069
Name:	D&G MART
Address:	1219 JAMISON AVE SE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Reported Date:	2011/09/08 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1628
Domestic Wells within 1500ft:	0
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	VA2161680_35962
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	030101010404
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported

D&G MART (Continued) **1028944220**

NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.92274
Y Coord:	37.2706000000001
Latitude:	37.2706
Longitude:	-79.92274

L50 **D & G MART** **LTANKS** **U003674248**
ENE **1219 JAMISON AVE SE** **UST** **N/A**
1/4-1/2 **ROANOKE, VA 24013** **Financial Assurance**
0.417 mi.
2203 ft. **Site 3 of 4 in cluster L**

Relative: **Lower**

Actual: **942 ft.**

LTANKS:

Name:	GETTY MART 71031
Address:	1219 JAMISON AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	Not reported
CEDS Facility Id:	200000095624
Case Status:	**Closed**
Pollution Complaint #:	20022110
Reported:	05/06/2002
Case Closed Date:	06/19/2002
Program:	Not reported
Regulated Petroleum UST (1):	Not reported
Excluded UST (1):	Not reported
Deferred UST (1):	Not reported
Partially Deferred UST (1):	Not reported
Exempt 1 UST (2):	Not reported
Exempt 2 Heating Oil UST (2):	Not reported
Small Heating Oil AST (2):	Not reported
Regulated AST (3):	Not reported
Unregulated AST (3):	Not reported
Other Y/N:	Not reported
Unknown Y/N:	Not reported
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	rjweld
Changed Date:	06/19/2009
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	20360
RST Poll Complaint Number:	20022110
Des First Name:	Channon
Des Last Name:	Maycock
RST Rec Code:	WCRO
RST Priority:	3
RST Fed Reg Tank:	Y
RST Responsibility Ind:	RP Lead
RST Suspect Confirm Ind:	Suspected
Facility Location:	1219 Jamison Ave SE
FIC Description:	Roanoke City

D & G MART (Continued) **U003674248**

Latitude: 37.2703855778434
Longitude: -79.9229825262334

Facility:
Name: D & G MART
Address: 1219 JAMISON AVE SE
City,State,Zip: ROANOKE, VA 24013
Facility Id: 2002317
Facility Type: GAS STATION
CEDS Facility ID: 200000095624

Owner:
Owner Id: 27127
Owner Name: Getty Petroleum Marketing Inc
Owner Address: 1500 Hempstead Tpke
Owner Address2: Not reported
Owner City, State, Zip: East Meadow, NY 11554
Owner Type: PRIVATE
Number of Active AST: 0
Number of Active UST: 4
Number of Inactive AST: 0
Number of Inactive UST: 1

Owner Id: 45680
Owner Name: Jai Jalram Corporation
Owner Address: 3578 Larson Ln
Owner Address2: Not reported
Owner City, State, Zip: Roanoke, VA 24018
Owner Type: COMMERCIAL
Number of Active AST: 0
Number of Active UST: 4
Number of Inactive AST: 0
Number of Inactive UST: 1

UST:
Facility ID: 2002317
Federally Regulated: Yes

Tank Number: 1
Tank Capacity: 12000
Tank Contents: GASOLINE
Tank Status: **CURR IN USE**
Tank Type: UST

Tank Material:
Install Date: 4/9/1985
Tank Materials: Bare Steel No
Tank Materials: Cath Protect Steel Yes
Tank Materials: Epoxy Steel No
Tank Materials: Fiberglass No
Tank Materials: Concrete Not reported
Tank Materials: Composite No
Tank Materials: Double Walled No
Tank Materials: Lined Interior Yes
Tank Materials: Excav Liner No
Tank Materials: Insulated Tank Jacket No
Tank Materials: Repaired No

D & G MART (Continued) **U003674248**

Tank Materials: Unknown	No
Tank Materials: Other	Yes
Tank Materials: Other Note	2/98 Glass Lined 7/98 Impressed Current Added

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	Yes
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	Yes
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	Yes
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	3/98 Piping Removal 11/12 Piping replaced with DW APT

Facility ID:	2002317
Federally Regulated:	Yes
Tank Number:	3
Tank Capacity:	10000
Tank Contents:	GASOLINE
Tank Status:	**CURR IN USE**
Tank Type:	UST

Tank Material:

Install Date:	4/9/1985
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No

D & G MART (Continued) **U003674248**

Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	Yes
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	Yes
Tank Materials: Other Note	2/98 Glass Lined 7/98 Impressed Current Added

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	Yes
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	Yes
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	3/98 Piping Removal 11/12 Piping replaced with DW APT

Facility ID:	2002317
Federally Regulated:	Yes

Tank Number:	4C
Tank Capacity:	5000
Tank Contents:	DIESEL

D & G MART (Continued) **U003674248**

Tank Status:	**CURR IN USE**
Tank Type:	UST
Tank Material:	
Install Date:	4/9/1985
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	Yes
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	Yes
Tank Materials: Other Note	2/98 Glass Lined 7/98 Impressed Current Added
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	Yes
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	Yes
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	3/98 Piping Removal 11/12 Piping replaced with DW APT

D & G MART (Continued) **U003674248**

Facility ID:	2002317
Federally Regulated:	Yes
Tank Number:	5C
Tank Capacity:	5000
Tank Contents:	KEROSENE
Tank Status:	**CURR IN USE**
Tank Type:	UST
Tank Material:	
Install Date:	4/9/1985
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	Yes
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	Yes
Tank Materials: Other Note	2/98 Glass Lined 7/98 Impressed Current Added
Release Detection:	
Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	Yes
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Not reported
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	Yes
Pipe Release Detection: Stat Invent Recon	Yes
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No

D & G MART (Continued) **U003674248**

Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	3/98 Piping Removal 11/12 Piping replaced with DW APT
Facility ID:	2002317
Federally Regulated:	Yes
Tank Number:	R2
Tank Capacity:	12000
Tank Contents:	GASOLINE
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	4/9/1985
Tank Materials: Bare Steel	No
Tank Materials: Cath Protect Steel	Yes
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	Yes
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	Yes
Tank Materials: Other Note	2/98 Glass Lined 7/98 Impressed Current Added

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	Yes
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	Yes
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	Yes
Tank Release Detection: Overfill Install	Yes
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No

D & G MART (Continued) **U003674248**

Pipe Release Detection: Other Note	Not reported
Pipe Type:	PRESSURE
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	Yes
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	3/98 Piping Removal

VA Financial Assurance 1:

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	12000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE

D & G MART (Continued) **U003674248**

Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2002317
Owner Name: Jai Jalram Corporation
ROF Own Id: 45680
Tank Type: UST
Mechanism: Letter of Credit
Gallonage: 150000
Per Occurence: $5,000.00
Third Party: $15,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 5000
CEDS Facility Name: D&G Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: D & G MART
Address: 1219 JAMISON AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2002317
Owner Name: Jai Jalram Corporation
ROF Own Id: 45680
Tank Type: UST
Mechanism: Letter of Credit
Gallonage: 150000
Per Occurence: $5,000.00
Third Party: $15,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 10000
CEDS Facility Name: D&G Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: D & G MART
Address: 1219 JAMISON AVE SE
Address 2: Not reported
City,State,Zip: ROANOKE, VA 24013
Facility ID: 2002317
Owner Name: Jai Jalram Corporation
ROF Own Id: 45680
Tank Type: UST
Mechanism: Certificate of Deposit
Gallonage: 150000
Per Occurence: $5,000.00
Third Party: $15,000.00
Annual Aggregate: $20,000.00
In Compliance: Not reported
Total Capacity: 12000
CEDS Facility Name: D&G Mart
Tank Status: CURR IN USE
Active Federally Regualted UST: Y

Name: D & G MART
Address: 1219 JAMISON AVE SE

D & G MART (Continued) **U003674248**

Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Certificate of Deposit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Certificate of Deposit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Certificate of Deposit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE

D & G MART (Continued) **U003674248**

Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	12000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE

D & G MART (Continued) **U003674248**

Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	12000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	10000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE

D & G MART (Continued) **U003674248**

Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

Name:	D & G MART
Address:	1219 JAMISON AVE SE
Address 2:	Not reported
City,State,Zip:	ROANOKE, VA 24013
Facility ID:	2002317
Owner Name:	Jai Jalram Corporation
ROF Own Id:	45680
Tank Type:	UST
Mechanism:	Letter of Credit
Gallonage:	150000
Per Occurence:	$5,000.00
Third Party:	$15,000.00
Annual Aggregate:	$20,000.00
In Compliance:	Not reported
Total Capacity:	5000
CEDS Facility Name:	D&G Mart
Tank Status:	CURR IN USE
Active Federally Regualted UST:	Y

L51 **D&G MART** **LUST** **S104744352**
ENE **1219 JAMISON AVE SE** **LTANKS** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.417 mi.
2203 ft. **Site 4 of 4 in cluster L**

Relative: **Lower**

Actual: **942 ft.**

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	05/06/2002
Date Closed:	Not reported
Release Reported:	Not reported
Pollution Control #:	Not reported
Case Manager:	Not reported
Owner Name:	GETTY PETROLEUM MARKETING
Owner Address:	86 DOREMUS AVE.
Owner City,St,Zip:	NEWARK, NJ 07105
Owner Phone:	800-487-4388

Region:	WC
Case Status:	**Closed**
Date Reported:	Not reported

D&G MART (Continued) **S104744352**

Date Closed: Not reported
Release Reported: 09/08/2011
Pollution Control #: 20122069
Case Manager: Donald M Edge
Owner Name: Not reported
Owner Address: Not reported
Owner City,St,Zip: Not reported
Owner Phone: Not reported

LTANKS:

Name:	D&G MART
Address:	1219 JAMISON AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000095624
Case Status:	**Closed**
Pollution Complaint #:	20122069
Reported:	09/08/2011
Case Closed Date:	04/18/2012
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

Name:	GETTY MART #31
Address:	1219 JAMISON AVE SE

D&G MART (Continued) **S104744352**

City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000095624
Case Status:	**Closed**
Pollution Complaint #:	19981101
Reported:	03/04/1998
Case Closed Date:	12/03/2003
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

M52 **HEIRONIMUS WAREHOUSE** **LTANKS** **U003678107**
SW **315 ALBEMARLE AVENUE SE** **UST** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.420 mi.
2218 ft. **Site 1 of 2 in cluster M**

Relative: LTANKS:
Lower

Name:	HEIRONIMUS WAREHOUSE
Address:	315 ALBEMARLE AVENUE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000081902
Case Status:	**Closed**
Pollution Complaint #:	19961091

Actual:
930 ft.

HEIRONIMUS WAREHOUSE (Continued) **U003678107**

Reported:	05/08/1996
Case Closed Date:	10/07/1996
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

Facility:

Name:	HEIRONIMUS WAREHOUSE
Address:	315 ALBEMARLE AVENUE SE
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2027715
Facility Type:	COMMERCIAL
CEDS Facility ID:	200000081902

Owner:

Owner Id:	35943
Owner Name:	S.H. HEIRONIMUS CO; INC
Owner Address:	200 GREENLEAF STREET
Owner Address2:	Not reported
Owner City, State, Zip:	FORT WORTH, TX 76107
Owner Type:	PRIVATE
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	3

HEIRONIMUS WAREHOUSE (Continued) **U003678107**

UST:

Facility ID:	2027715
Federally Regulated:	No
Tank Number:	R1
Tank Capacity:	6000
Tank Contents:	HEATING OIL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	Yes
Pipe Materials: Fiberglass	No

HEIRONIMUS WAREHOUSE (Continued) **U003678107**

Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2027715
Federally Regulated:	Yes
Tank Number:	R2
Tank Capacity:	3000
Tank Contents:	HEATING OIL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No

HEIRONIMUS WAREHOUSE (Continued) **U003678107**

Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	Yes
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported
Facility ID:	2027715
Federally Regulated:	Yes
Tank Number:	R3
Tank Capacity:	3000
Tank Contents:	HEATING OIL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	Not reported
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No

HEIRONIMUS WAREHOUSE (Continued) **U003678107**

Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	No
Pipe Materials: Copper	Yes
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

53
WNW
1/4-1/2
0.426 mi.
2247 ft.

HISTORIC FIRE STATION #1
13 CHURCH AVE SE
ROANOKE, VA 24011

US BROWNFIELDS **1025442402**
N/A

Relative:
Lower

Actual:
939 ft.

US BROWNFIELDS:

Name:	HISTORIC FIRE STATION #1
Address:	13 Church Ave Se
City,State,Zip:	ROANOKE, VA 24011
Property ID:	238036
Property Alias:	Not reported
Recipient Name:	City of Roanoke
Grant Type:	Hazardous
Property Number:	4011706
Parcel Size:	0.25
Latitude:	37.270202
Longitude:	-79.93995
Census Tract:	51770001100
State or Tribal Voluntary Response Program:	Not reported
Program Name:	BF
AA Activity Funded:	Not reported
Start Date:	Not reported
Redev Completition Date:	Not reported
Completed Date:	Not reported
Cleanup Funding:	Not reported
Cleanup Funding Source:	Not reported
Activity Funded:	Phase I
Assessment Funding:	Not reported
Assessment Funding Source:	Not reported
Redevelopment Funding:	Not reported
Contaminants REC:	Not reported
Contaminants Found at Actionable Level:	Not reported

HISTORIC FIRE STATION #1 (Continued) **1025442402**

Redev. Funding Source:	Not reported
Redev. Funding Entity Name:	Not reported
Contaminants Found Below Actionable Level:	Not reported
Redevelopment Start Date:	Not reported
Assessment Funding Entity:	Not reported
Cleanup Funding Entity:	Not reported
Climate Adapt Mitig - Planning or Assessment:	Not reported
Cooperative Agreement Number:	96339901
Start Date:	Not reported
Ownership Entity:	Not reported
Additional Institutional Controls Information:	Not reported
Completion Date:	Not reported
Address of Data Sources (URL if available) 1:	Not reported
Cleanup Required:	N
Indicates Cleanup/Treatment Tech Implemented:	Not reported
Institutional Controls Required:	N
IC Category Proprietary Controls:	Not reported
Excavation and Disposal of Soils:	Not reported
Extraction of contaminants:	Not reported
IC Cat. Info. Devices:	Not reported
Removal of materials (tanks and piping, etc.):	Not reported
IC Cat. Gov. Controls:	Not reported
Reduction of Contam Bioremediation/Phytoremediation:	Not reported
IC Cat. Enforcement Permit Tools:	Not reported
Cleanup of structures:	Not reported
IC in place date:	Not reported
Additional Cleanup/Treatment Tech Info:	Not reported
IC in place:	Not reported
Address of Data Source (URL if available) 2:	Not reported
Indicate whether Engineering Controls are required:	N
State/tribal program ID:	Not reported
Cover Technologies (e.g., Capping):	Not reported
Security (e.g., Guard, Fence):	Not reported
Immobilization Process:	Not reported
Engineering Barriers (e.g., Slurry Walls, Sheet):	Not reported
Other:	Not reported
Additional Engineering Controls Information:	Not reported
Address of Data Source (URL if available) 3:	Not reported
Indicate whether Engineering Controls are in place:	Not reported
Date Engineering Controls put into place:	Not reported
ACRES Cleaned Up:	Not reported
Section 128(a) State/Tribal:	Not reported
Multipurpose - Cost Share Amount:	Not reported
Cleanup - Cost Share Amount:	Not reported
RLF Loan - Total Loan Amount:	Not reported
RLF - Loan Signed Date:	Not reported
RLF Loan - Anticipated Repayment Start Date:	Not reported
RLF Loan - Anticipated Repayment End Date:	Not reported
RLF Loan - Interest Rate:	Not reported
RLF Loan - EPA Funds Used:	Not reported
Contaminant Cleanup:	Not reported
RLF Loan - Cost Share Used:	Not reported
Media Affected:	Not reported
RLF Loan - Program Income Used:	Not reported
Media Cleanup:	Not reported
RLF Loan - Discounted:	Not reported
RLF Loan - Discount Percentage:	Not reported

HISTORIC FIRE STATION #1 (Continued) **1025442402**

RLF Subgrant - Total Subgrant Amount:	Not reported
RLF Subgrant - Signed Date:	Not reported
RLF Subgrant - EPA Funds Used:	Not reported
RLF Subgrant - Cost Share Used:	Not reported
RLF Subgrant - Program Income Used:	Not reported
RLF Direct Cleanup - Total Funding Amt:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
RLF Direct Cleanup - Source of Funding:	Not reported
RLF Leveraged - Funding Source Type:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
RLF Leveraged - Entity Providing Funding:	Not reported
RLF Leveraged - Funding Amount:	Not reported
Cleanup Completion Doc - NFA Letter Received:	N
Past use commercial acreage:	Not reported
NFA Letter Date Received:	Not reported
Past use industrial acreage:	Not reported
Cleanup Comp Doc - Letter/Signed Rep Qualified Pro:	N
Future use greenspace acreage:	Not reported
Letter/Signed Report Date Received:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	0.25
Cleanup Completion Doc- Other forms of Doc:	Not reported
Future use industrial acreage:	Not reported
Climate Adapt and Mitiga - Demo or Cleanup:	Not reported
ReDev Activity Funded:	Not reported
Amount of Funding Expended on this Activity 2:	Not reported
Number of Redevelopment Jobs Leveraged:	Not reported
Climate Adaptation and Mitigation Redevelopment:	Not reported
Radius:	0.5
Below Poverty Number:	745
Below Poverty Percent:	28.95
Meidan Income:	2836
Meidan Income Number:	1172
Meidan Income Percent:	45.55
Vacant Housing Number:	252
Vacant Housing Percent:	21.87
Unemployed Number:	207
Unemployed Percent:	8.05

Name:	HISTORIC FIRE STATION #1
Address:	13 Church Ave Se
City,State,Zip:	ROANOKE, VA 24011
Property ID:	238036
Property Alias:	Not reported
Recipient Name:	City of Roanoke
Grant Type:	Hazardous
Property Number:	4011706
Parcel Size:	0.25
Latitude:	37.270202
Longitude:	-79.93995
Census Tract:	51770001100
State or Tribal Voluntary Response Program:	Not reported
Program Name:	BF
AA Activity Funded:	Phase I
Start Date:	Not reported
Redev Completition Date:	Not reported

HISTORIC FIRE STATION #1 (Continued) **1025442402**

Completed Date:	Not reported
Cleanup Funding:	Not reported
Cleanup Funding Source:	Not reported
Activity Funded:	Phase I
Assessment Funding:	Not reported
Assessment Funding Source:	Not reported
Redevelopment Funding:	Not reported
Contaminants REC:	Not reported
Contaminants Found at Actionable Level:	Not reported
Redev. Funding Source:	Not reported
Redev. Funding Entity Name:	Not reported
Contaminants Found Below Actionable Level:	Not reported
Redevelopment Start Date:	Not reported
Assessment Funding Entity:	EPA
Cleanup Funding Entity:	Not reported
Climate Adapt Mitig - Planning or Assessment:	Not reported
Cooperative Agreement Number:	96339901
Start Date:	2018-09-05 00:00:00
Ownership Entity:	Not reported
Additional Institutional Controls Information:	Not reported
Completion Date:	Not reported
Address of Data Sources (URL if available) 1:	Not reported
Cleanup Required:	N
Indicates Cleanup/Treatment Tech Implemented:	Not reported
Institutional Controls Required:	N
IC Category Proprietary Controls:	Not reported
Excavation and Disposal of Soils:	Not reported
Extraction of contaminants:	Not reported
IC Cat. Info. Devices:	Not reported
Removal of materials (tanks and piping, etc.):	Not reported
IC Cat. Gov. Controls:	Not reported
Reduction of Contam Bioremediation/Phytoremediation:	Not reported
IC Cat. Enforcement Permit Tools:	Not reported
Cleanup of structures:	Not reported
IC in place date:	Not reported
Additional Cleanup/Treatment Tech Info:	Not reported
IC in place:	Not reported
Address of Data Source (URL if available) 2:	Not reported
Indicate whether Engineering Controls are required:	N
State/tribal program ID:	Not reported
Cover Technologies (e.g., Capping):	Not reported
Security (e.g., Guard, Fence):	Not reported
Immobilization Process:	Not reported
Engineering Barriers (e.g., Slurry Walls, Sheet):	Not reported
Other:	Not reported
Additional Engineering Controls Information:	Not reported
Address of Data Source (URL if available) 3:	Not reported
Indicate whether Engineering Controls are in place:	Not reported
Date Engineering Controls put into place:	Not reported
ACRES Cleaned Up:	Not reported
Section 128(a) State/Tribal:	Not reported
Multipurpose - Cost Share Amount:	Not reported
Cleanup - Cost Share Amount:	Not reported
RLF Loan - Total Loan Amount:	Not reported
RLF - Loan Signed Date:	Not reported
RLF Loan - Anticipated Repayment Start Date:	Not reported
RLF Loan - Anticipated Repayment End Date:	Not reported

HISTORIC FIRE STATION #1 (Continued) **1025442402**

RLF Loan - Interest Rate:	Not reported
RLF Loan - EPA Funds Used:	Not reported
Contaminant Cleanup:	Not reported
RLF Loan - Cost Share Used:	Not reported
Media Affected:	Not reported
RLF Loan - Program Income Used:	Not reported
Media Cleanup:	Not reported
RLF Loan - Discounted:	Not reported
RLF Loan - Discount Percentage:	Not reported
RLF Subgrant - Total Subgrant Amount:	Not reported
RLF Subgrant - Signed Date:	Not reported
RLF Subgrant - EPA Funds Used:	Not reported
RLF Subgrant - Cost Share Used:	Not reported
RLF Subgrant - Program Income Used:	Not reported
RLF Direct Cleanup - Total Funding Amt:	Not reported
Num. of cleanup and re-dev. jobs:	Not reported
RLF Direct Cleanup - Source of Funding:	Not reported
RLF Leveraged - Funding Source Type:	Not reported
Past use greenspace acreage:	Not reported
Past use residential acreage:	Not reported
RLF Leveraged - Entity Providing Funding:	Not reported
RLF Leveraged - Funding Amount:	Not reported
Cleanup Completion Doc - NFA Letter Received:	N
Past use commercial acreage:	Not reported
NFA Letter Date Received:	Not reported
Past use industrial acreage:	Not reported
Cleanup Comp Doc - Letter/Signed Rep Qualified Pro:	N
Future use greenspace acreage:	Not reported
Letter/Signed Report Date Received:	Not reported
Future use residential acreage:	Not reported
Future use commercial acreage:	0.25
Cleanup Completion Doc- Other forms of Doc:	Not reported
Future use industrial acreage:	Not reported
Climate Adapt and Mitiga - Demo or Cleanup:	Not reported
ReDev Activity Funded:	Not reported
Amount of Funding Expended on this Activity 2:	Not reported
Number of Redevelopment Jobs Leveraged:	Not reported
Climate Adaptation and Mitigation Redevelopment:	Not reported
Radius:	0.5
Below Poverty Number:	745
Below Poverty Percent:	28.95
Meidan Income:	2836
Meidan Income Number:	1172
Meidan Income Percent:	45.55
Vacant Housing Number:	252
Vacant Housing Percent:	21.87
Unemployed Number:	207
Unemployed Percent:	8.05

I54 **JEFFERSON MOTOR LODGE** **UST FINDER RELEASE** **1029005220**
West **612 AND 616 JEFFERSON ST** **N/A**
1/4-1/2 **ROANOKE, VA 0**
0.430 mi.
2269 ft. **Site 2 of 4 in cluster I**

Relative: UST FINDER RELEASE:
Lower

Actual: Object ID: 413964
947 ft. Facility ID: Not reported
Lust ID: VA20082038
Name: JEFFERSON MOTOR LODGE
Address: 612 AND 616 JEFFERSON ST
City,State,Zip: ROANOKE, VA 0
Address Match Type: StreetAddress
Reported Date: 2007/11/16 15:59:59+00
Status: No Further Action
Substance: Not reported
Population within 1500ft: 473
Domestic Wells within 1500ft: 0
Land Use: Developed, High Intensity
Within SPA: No
SPA PWS Facility ID: Not reported
SPA Water Type: Not reported
SPA Facility Type: Not reported
SPA HUC12: Not reported
Within WHPA: No
WHPA PWS Facility ID: Not reported
WHPA Water Type: Not reported
WHPA Facility Type: Not reported
WHPA HUC12: Not reported
Within 100yr Floodplain: No
Tribe: Not reported
EPA Region: 3
NFA Letter 1: Not reported
NFA Letter 2: Not reported
NFA Letter 3: Not reported
NFA Letter 4: Not reported
Closed With Residual Contaminate: Not reported
Coordinate Source: Geocode
X Coord: -79.94058
Y Coord: 37.2688400000001
Latitude: 37.2688399999999
Longitude: -79.9405799999999

I55 **BLUE CROSS-BLUE SHIELD OF VA** **UST FINDER** **1028795093**
West **602 JEFFERSON ST.** **UST FINDER RELEASE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.434 mi.
2289 ft. **Site 3 of 4 in cluster I**

Relative: UST FINDER:
Lower

Actual: Object ID: 508881
945 ft. Facility ID: VA2005116
Name: BLUE CROSS-BLUE SHIELD OF VA
Address: 602 JEFFERSON ST.
City,State,Zip: ROANOKE, VA 24013
Address Match Type: PointAddress
Open USTs: 0
Closed USTs: 1
TOS USTs: 0

BLUE CROSS-BLUE SHIELD OF VA (Continued) **1028795093**

Population 1500ft:	441
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	3
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.94058802
Y Coord:	37.26906297
Latitude:	37.26906297
Longitude:	-79.94058802

UST FINDER:

Object ID:	2062541
Facility ID:	VA2005116
Tank ID:	VA2005116_1
Tank Status:	Closed
Installation Date:	1981/04/22 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	15000
Substances:	HEATING OIL
Tank Wall Type:	Single

UST FINDER RELEASE:

Object ID:	413963
Facility ID:	Not reported
Lust ID:	VA19930882
Name:	BLUE CROSS-BLUE SHIELD OF VA
Address:	602 JEFFERSON ST.
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Reported Date:	1992/10/29 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	441
Domestic Wells within 1500ft:	0
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported

BLUE CROSS-BLUE SHIELD OF VA (Continued) **1028795093**

WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.94059
Y Coord:	37.26906
Latitude:	37.26906
Longitude:	-79.94059

I56 **BLUE CROSS-BLUE SHIELD OF VA** **LTANKS** **U003674775**
West **602 JEFFERSON ST.** **UST** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.439 mi.
2318 ft. **Site 4 of 4 in cluster I**

Relative: LTANKS:
Lower

Name:	BLUE CROSS-BLUE SHIELD OF VA
Address:	602 JEFFERSON ST.
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000081824
Case Status:	**Closed**
Pollution Complaint #:	19930882
Reported:	10/29/1992
Case Closed Date:	02/04/1993
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported

Actual:
946 ft.

BLUE CROSS-BLUE SHIELD OF VA (Continued) **U003674775**

Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

Facility:

Name:	BLUE CROSS-BLUE SHIELD OF VA
Address:	602 JEFFERSON ST.
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2005116
Facility Type:	COMMERCIAL
CEDS Facility ID:	200000081824

Owner:

Owner Id:	28603
Owner Name:	Anthem Health Plans of Virginia Inc
Owner Address:	2015 Staples Mill Rd
Owner Address2:	Not reported
Owner City, State, Zip:	Richmond, VA 23279
Owner Type:	COMMERCIAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	1

UST:

Facility ID:	2005116
Federally Regulated:	Yes
Tank Number:	1
Tank Capacity:	15000
Tank Contents:	HEATING OIL
Tank Status:	**CLS IN GRD**
Tank Type:	UST

Tank Material:

Install Date:	4/22/1981
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not reported

BLUE CROSS-BLUE SHIELD OF VA (Continued) **U003674775**

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No
Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not reported
Pipe Release Detection: Leak Deferred	Not reported
Pipe Release Detection: Autoleak	Not reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not reported

Pipe Type:	UNKNOWN
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not reported

J57 **ALLRIGHT PARKING GARAGE SERVICE PIT** **LUST S106531824**
West **635 S JEFFERSON ST** **LTANKS N/A**
1/4-1/2 **ROANOKE, VA 24011**
0.442 mi.
2334 ft. **Site 2 of 3 in cluster J**

Relative:
Lower

Actual:
956 ft.

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	06/09/2004
Date Closed:	Not reported
Release Reported:	Not reported
Pollution Control #:	Not reported
Case Manager:	Not reported
Owner Name:	C.W. FRANCIS & SONS, INC.
Owner Address:	305 FIRST ST.
Owner City,St,Zip:	ROANOKE, VA 24011
Owner Phone:	540-342-3161

ALLRIGHT PARKING GARAGE SERVICE PIT (Continued) **S106531824**

LTANKS:

Name:	ALLRIGHT PARKING GARAGE SERVICE PIT
Address:	635 S JEFFERSON ST
City,State,Zip:	ROANOKE, VA 24011
City,State,Zip:	ROANOKE, VA 24011
Region:	BRRO
CEDS Facility Id:	200000094143
Case Status:	**Closed**
Pollution Complaint #:	20042091
Reported:	06/09/2004
Case Closed Date:	05/19/2005
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

J58 **ALLRIGHT PARKING GARAGE SERVICE PIT** **UST FINDER RELEASE** **1028915932**
West **635 S JEFFERSON ST** **N/A**
1/4-1/2 **ROANOKE, VA 0**
0.442 mi.
2334 ft. **Site 3 of 3 in cluster J**

Relative: UST FINDER RELEASE:
Lower

Object ID:	413962
Facility ID:	Not reported
Lust ID:	VA20042091
Name:	ALLRIGHT PARKING GARAGE SERVICE PIT

Actual:
956 ft.

ALLRIGHT PARKING GARAGE SERVICE PIT (Continued) **1028915932**

Address:	635 S JEFFERSON ST
City,State,Zip:	ROANOKE, VA 0
Address Match Type:	PointAddress
Reported Date:	2004/06/09 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	491
Domestic Wells within 1500ft:	0
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.94075
Y Coord:	37.2680500000001
Latitude:	37.26805
Longitude:	-79.9407499999999

M59 **HEIRONIMUS WAREHOUSE** **LUST** **S105027952**
SW **3RD & ALBERMARLE ST.,S.E.** **N/A**
1/4-1/2 **ROANOKE*, VA -0-**
0.450 mi.
2378 ft. **Site 2 of 2 in cluster M**

Relative:
Lower

Actual:
932 ft.

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	05/08/1996
Date Closed:	1996-10-07 00:00:00
Release Reported:	Not reported
Pollution Control #:	96-1091N
Case Manager:	Not reported
Owner Name:	HEIRONIMUS, INC.
Owner Address:	200 GREENLEAF ST.
Owner City,St,Zip:	FORT WORTH, TX 76106
Owner Phone:	817-336-4985

60
NNW
1/4-1/2
0.452 mi.
2389 ft.

T & R GARAGE
41 WEST 4TH ST., SALEM, VA 24153
SALEM+, VA

LUST **S105986982**
N/A

Relative:
Lower

Actual:
944 ft.

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	09/25/1995
Date Closed:	1997-01-23 00:00:00
Release Reported:	Not reported
Pollution Control #:	96-1029
Case Manager:	Not reported
Owner Name:	TONY WORRELL
Owner Address:	41 WEST 4TH ST.
Owner City,St,Zip:	SALEM, VA 24153
Owner Phone:	540-389-2379

N61
NW
1/4-1/2
0.459 mi.
2424 ft.

ART MUSEUM FUTURE SITE
100 SALEM AVE SE
ROANOKE, VA 0

Site 1 of 2 in cluster N

UST FINDER RELEASE **1028919640**
N/A

Relative:
Lower

Actual:
925 ft.

UST FINDER RELEASE:

Object ID:	413970
Facility ID:	Not reported
Lust ID:	VA20062015
Name:	ART MUSEUM FUTURE SITE
Address:	100 SALEM AVE SE
City,State,Zip:	ROANOKE, VA 0
Address Match Type:	StreetAddress
Reported Date:	2005/08/19 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	755
Domestic Wells within 1500ft:	0
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	Yes
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.93875
Y Coord:	37.2725100000001

ART MUSEUM FUTURE SITE (Continued) **1028919640**

Latitude: 37.2725099999999
Longitude: -79.9387499999999

N62 **ART MUSEUM FUTURE SITE** **LUST** **S107999126**
NW **100 SALEM AVE SE** **LTANKS** **N/A**
1/4-1/2 **ROANOKE, VA 24011**
0.459 mi.
2424 ft. **Site 2 of 2 in cluster N**

Relative:
Lower

Actual:
925 ft.

LUST REG WC:

Region:	WC
Case Status:	**Closed**
Date Reported:	Not reported
Date Closed:	Not reported
Release Reported:	08/19/2005
Pollution Control #:	20062015
Case Manager:	Charles B Davidson
Owner Name:	Not reported
Owner Address:	Not reported
Owner City,St,Zip:	Not reported
Owner Phone:	Not reported

LTANKS:

Name:	ART MUSEUM FUTURE SITE
Address:	100 SALEM AVE SE
City,State,Zip:	ROANOKE, VA 24011
City,State,Zip:	ROANOKE, VA 24011
Region:	BRRO
CEDS Facility Id:	200000221899
Case Status:	**Closed**
Pollution Complaint #:	20062015
Reported:	08/19/2005
Case Closed Date:	09/20/2006
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported

ART MUSEUM FUTURE SITE (Continued) **S107999126**

Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

O63 **YELLOW CAB,ROANOKE** **LUST** **S105511231**
NW **202 SHENANDOAH AVE., N.E.** **N/A**
1/4-1/2 **ROANOKE, VA**
0.471 mi.
2485 ft. **Site 1 of 3 in cluster O**

Relative: **Lower**
Actual: **941 ft.**

LUST REG WC:

Region:	WC
Case Status:	**Not reported**
Date Reported:	Not reported
Date Closed:	1994-04-22 00:00:00
Release Reported:	Not reported
Pollution Control #:	91-1906
Case Manager:	Not reported
Owner Name:	YELLOW CAB OF ROANOKE,INC
Owner Address:	202 SHENANODOAH
Owner City,St,Zip:	ROANOKE, VA 24016
Owner Phone:	703-345-7711

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64 **GUARD RAIL PROPERTY** **LTANKS** **S125495118**
SW **1131 4TH ST SE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.475 mi.
2507 ft.

Relative: **Lower**
Actual: **929 ft.**

LTANKS:

Name:	GUARD RAIL PROPERTY
Address:	1131 4TH ST SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000889798
Case Status:	**Closed**
Pollution Complaint #:	20202067
Reported:	10/10/2019
Case Closed Date:	07/16/2020
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No

GUARD RAIL PROPERTY (Continued) **S125495118**

Unregulated AST (3):	No
Other Y/N:	Yes
Unknown Y/N:	No
Other Description:	Article 11
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

O65 **YELLOW CAB CO OF ROANOKE INC** **LTANKS** **S108106506**
NW **200 SHENANDOAH AVE NE** **N/A**
1/4-1/2 **ROANOKE, VA 24016**
0.475 mi.
2510 ft. **Site 2 of 3 in cluster O**

Relative: LTANKS:
Lower

Actual: Name:	YELLOW CAB CO OF ROANOKE INC
943 ft. Address:	200 SHENANDOAH AVE NE
City,State,Zip:	ROANOKE, VA 24016
City,State,Zip:	ROANOKE, VA 24016
Region:	BRRO
CEDS Facility Id:	200000088598
Case Status:	**Closed**
Pollution Complaint #:	19911906
Reported:	12/13/1990
Case Closed Date:	04/22/1994
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported

YELLOW CAB CO OF ROANOKE INC (Continued) **S108106506**

Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported
RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

O66 **YELLOW CAB CO OF ROANOKE INC** **UST FINDER RELEASE** **1029133444**
NW **200 SHENANDOAH AVE NE** **N/A**
1/4-1/2 **ROANOKE, VA 24016**
0.475 mi.
2510 ft. **Site 3 of 3 in cluster O**

Relative: **Lower**
Actual: **943 ft.**

UST FINDER RELEASE:

Object ID:	413981
Facility ID:	Not reported
Lust ID:	VA19911906
Name:	YELLOW CAB CO OF ROANOKE INC
Address:	200 SHENANDOAH AVE NE
City,State,Zip:	ROANOKE, VA 24016
Address Match Type:	StreetAddress
Reported Date:	1990/12/13 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	461
Domestic Wells within 1500ft:	0
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported

YELLOW CAB CO OF ROANOKE INC (Continued) **1029133444**

Coordinate Source:	Geocode
X Coord:	-79.93715
Y Coord:	37.2739700000001
Latitude:	37.2739699999999
Longitude:	-79.93715

P67 **STAR CITY FOOD CENTER** **LUST** **S109237087**
NE **509 13TH STREET, SE** **LTANKS** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.497 mi.
2625 ft. **Site 1 of 2 in cluster P**

Relative:
Lower

Actual:
955 ft.

LUST REG WC:

Region:	WC
Case Status:	**Closed**
Date Reported:	Not reported
Date Closed:	Not reported
Release Reported:	07/23/2008
Pollution Control #:	20092004
Case Manager:	Donald M Edge
Owner Name:	Not reported
Owner Address:	Not reported
Owner City,St,Zip:	Not reported
Owner Phone:	Not reported

LTANKS:

Name:	STAR CITY FOOD CENTER
Address:	509 13TH STREET, SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000081991
Case Status:	**Closed**
Pollution Complaint #:	20092004
Reported:	07/23/2008
Case Closed Date:	07/25/2008
Program:	RP Lead
Regulated Petroleum UST (1):	Yes
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not reported
Heating Oil Category:	Not reported
Changed By:	Not reported
Changed Date:	Not reported
Inserted By:	Not reported
Inserted Date:	Not reported
Verified By:	Not reported
Verify Date:	Not reported
Reference Point:	Not reported

STAR CITY FOOD CENTER (Continued) **S109237087**

RST ID:	Not reported
RST Poll Complaint Number:	Not reported
Des First Name:	Not reported
Des Last Name:	Not reported
RST Rec Code:	Not reported
RST Priority:	Not reported
RST Fed Reg Tank:	Not reported
RST Responsibility Ind:	Not reported
RST Suspect Confirm Ind:	Not reported
Facility Location:	Not reported
FIC Description:	Not reported
Latitude:	Not reported
Longitude:	Not reported

P68 **STAR CITY FOOD CENTER** **UST FINDER RELEASE** **1029111186**
NE **509 13TH STREET, SE** **N/A**
1/4-1/2 **ROANOKE, VA 24013**
0.497 mi.
2625 ft. **Site 2 of 2 in cluster P**

Relative: **Lower**
Actual: **955 ft.**

UST FINDER RELEASE:

Object ID:	414049
Facility ID:	Not reported
Lust ID:	VA20092004
Name:	STAR CITY FOOD CENTER
Address:	509 13TH STREET, SE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Reported Date:	2008/07/23 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1403
Domestic Wells within 1500ft:	0
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	3
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-79.92292
Y Coord:	37.27309
Latitude:	37.27309
Longitude:	-79.92292

69
North
1/2-1
0.671 mi.
3541 ft.

ROANOKE TOWN GAS
NE KIMBALL AND RUTHERFORD AVE
ROANOKE, VA 24013

EDR MGP **1008408686**
N/A

Relative:
Lower

Actual:
921 ft.

EDR MGP:

Alternate Name:ROANOKE GAS AND WATER; ROANOKE GAS AND LIGHT CO. No additional information available

Count: 8 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
ROANOKE	S132256705	CITY OF ROANOKE STORM WATER PROJEC	1ST STREET AND SALEM AVE	24011	LTANKS
ROANOKE	S131580837	FORMER CAMPBELL COURT REDEVELOPMEN	APPROXIMATELY 17 CAMPBELL AVE	24011	LTANKS
ROANOKE	S105027996	VIRGINIA ASPHALT AND PAVING	BUCK MOUNTAIN ROAD & PARKWAY		LUST
ROANOKE	S108520991	N&W ROANOKE SHOPS	8 1/2 CAMPBELL AVE	24042	LTANKS
ROANOKE	S106754832	VACANT LOT (CORNER OF FRANKLIN & E	CORNER OF FRANKLIN & ELM	-0-	LUST
ROANOKE	S105986722	VDOT-GEORGE'S ENTERPRISES#	ELM & FRANKLIN RDS.		LUST
ROANOKE	S105986726	ROANOKE MEMORIAL HOSPITAL#	JEFFERSON & BELLVIEW STS.		LUST
ROANOKE/SALEM	1014202437	ROANOKE RIVER FLOOD CONTROL	ALONG ROANOKE RIVER FROM ROA.	24001	SEMS-ARCHIVE

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/19/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 19

Source: EPA
Telephone: N/A
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/19/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 19

Source: EPA
Telephone: N/A
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Lists of Federal Delisted NPL sites

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/19/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 19

Source: EPA
Telephone: N/A
Last EDR Contact: 02/04/2025
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/20/2024
Date Data Arrived at EDR: 12/18/2024
Date Made Active in Reports: 12/20/2024
Number of Days to Update: 2

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 12/18/2024
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 12/19/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 19

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 04/21/2025
Data Release Frequency: Quarterly

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 12/19/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 19

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 04/21/2025
Data Release Frequency: Quarterly

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 80

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

Lists of Federal RCRA TSD facilities

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

Lists of Federal RCRA generators

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 11/11/2024
Date Data Arrived at EDR: 11/25/2024
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 85

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 05/19/2025
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 11/04/2024
Date Data Arrived at EDR: 11/15/2024
Date Made Active in Reports: 02/11/2025
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/18/2025
Next Scheduled EDR Contact: 12/02/2024
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 11/04/2024
Date Data Arrived at EDR: 11/15/2024
Date Made Active in Reports: 02/11/2025
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/18/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/03/2024
Date Data Arrived at EDR: 12/11/2024
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 69

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 12/11/2024
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

Lists of state- and tribal hazardous waste facilities

SHWS: This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: Department of Environmental Quality
Telephone: 804-698-4236
Last EDR Contact: 12/05/2024
Next Scheduled EDR Contact: 03/24/2025
Data Release Frequency: N/A

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF: Solid Waste Management Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 11/21/2024
Date Data Arrived at EDR: 11/25/2024
Date Made Active in Reports: 02/19/2025
Number of Days to Update: 86

Source: Department of Environmental Quality
Telephone: 804-698-4238
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/09/2025
Data Release Frequency: Semi-Annually

Lists of state and tribal leaking storage tanks

LUST REG NO: Leaking Underground Storage Tank Tracking Database

Leaking underground storage tank site locations. Includes: counties of Arlington, Caroline, Culpeper, Fairfax, Fauquier, King George, Loudoun, Louisa, Madison, Orange, Prince William, Rappahannock, Spotsylvania, Stafford; cities of Alexandria, Fairfax, Falls Church, Fredericksburg, Manassas, Manassas Park.

Date of Government Version: 05/18/2004
Date Data Arrived at EDR: 05/22/2004
Date Made Active in Reports: 07/09/2004
Number of Days to Update: 48

Source: Department of Environmental Quality Northern Regional Office
Telephone: 703-583-3800
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG PD: Leaking Underground Storage Tank Sites

Leaking underground storage tank site locaitons. Includes: counties of Amelia, Brunswick, Charles City, Chesterfield, Dinwiddie, Essex, Gloucester, Goochland, Greensville, Hanover, Henrico, King and Queen, King William, Lancaster, Mathews, Middlesex, New Kent, Northumberland, Powhatan, Prince George, Richmond, Surry, Sussex, Westmoreland; cities of Colonial Heights, Emporia, Hopewell, Petersburg.

Date of Government Version: 12/02/2014
Date Data Arrived at EDR: 12/04/2014
Date Made Active in Reports: 01/16/2015
Number of Days to Update: 43

Source: Department of Environmental Quality Piedmont Regional Office
Telephone: 804-527-5020
Last EDR Contact: 08/29/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Quarterly

LUST REG SC: Leaking Underground Storage Tanks

Leaking underground storage tank site locations. Includes: counties of Amherst, Appomattox, Buckingham, Campbell, Charlotte, Cumberland, Halifax, Lunenburg, Mecklenburg, Nottoway, Pittsylvania, Prince Deward; cities of Danville, Lynchburg.

Date of Government Version: 09/06/2013
Date Data Arrived at EDR: 09/06/2013
Date Made Active in Reports: 09/17/2013
Number of Days to Update: 11

Source: Department of Environmental Quality, South Central Region
Telephone: 434-582-5120
Last EDR Contact: 08/29/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: Semi-Annually

LUST REG SW: Leaking Underground Storage Tank Database

Leaking underground storage tank site locations. Includes: counties of Bland, Buchanan, Carroll, Dickenson, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, Wythe; cities of Bristol, Galax, Norton.

Date of Government Version: 07/15/2013
Date Data Arrived at EDR: 07/18/2013
Date Made Active in Reports: 09/16/2013
Number of Days to Update: 60

Source: Department of Environmental Quality Southwest Regional Office
Telephone: 276-676-4800
Last EDR Contact: 10/11/2016
Next Scheduled EDR Contact: 01/23/2017
Data Release Frequency: No Update Planned

LUST REG TD: Leaking Underground Storage Tank Sites

Leaking underground storage tank site locations. Includes: counties of Accomack, Isle of Wight, James City, Northampton, Southampton, York; cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, Williamsburg.

Date of Government Version: 06/30/2013
Date Data Arrived at EDR: 07/05/2013
Date Made Active in Reports: 09/16/2013
Number of Days to Update: 73

Source: Department of Environmental Quality Tidewater Regional Office
Telephone: trofoia@deq.vir
Last EDR Contact: 09/26/2016
Next Scheduled EDR Contact: 01/09/2017
Data Release Frequency: Quarterly

LUST REG VA: Leaking Underground Storage Tank List

Leaking underground storage tank site locations. Includes: counties of Albemarle, Augusta, Bath, Clarke, Fluvanna, Frederick, Greene, Highland, Nelson, Page, Rockbridge, Rockingham, Shenandoah, Warren; cities of Buena Vista, Charlottesville, Harrisonburg, Lexington, Staunton, Waynesboro, Winchester.

Date of Government Version: 12/06/2011
Date Data Arrived at EDR: 12/08/2011
Date Made Active in Reports: 01/16/2012
Number of Days to Update: 39

Source: Department of Environmental Quality Valley Regional Office
Telephone: 540-574-7800
Last EDR Contact: 08/29/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: No Update Planned

LUST REG WC: Leaking Underground Storage Tank List

Leaking underground storage tank site locations. Includes: counties of Alleghany, Bedford, Botetourt, Craig, Floyd, Franklin, Giles, Henry, Montgomery, Patrick, Pulaski, Roanoke; cities of Bedford, Clifton Forge, Covington, Martinsville, Radford, Roanoke, Salem.

Date of Government Version: 06/04/2015
Date Data Arrived at EDR: 06/05/2015
Date Made Active in Reports: 07/07/2015
Number of Days to Update: 32

Source: Department of Environmental Quality West Central Regional Office
Telephone: 540-562-6700
Last EDR Contact: 08/29/2016
Next Scheduled EDR Contact: 12/12/2016
Data Release Frequency: No Update Planned

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/11/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/07/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 05/07/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 05/07/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/07/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 05/07/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 05/07/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/07/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

LTANKS: Leaking Petroleum Storage Tanks
Includes releases of petroleum from underground storage tanks and aboveground storage tanks.

Date of Government Version: 11/01/2024
Date Data Arrived at EDR: 11/18/2024
Date Made Active in Reports: 02/12/2025
Number of Days to Update: 86
Source: Department of Environmental Quality
Telephone: 804-698-4010
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Quarterly

Lists of state and tribal registered storage tanks

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 08/12/2024
Date Data Arrived at EDR: 10/30/2024
Date Made Active in Reports: 01/14/2025
Number of Days to Update: 76
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 12/23/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

UST: Registered Petroleum Storage Tanks
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 11/04/2024
Date Data Arrived at EDR: 11/18/2024
Date Made Active in Reports: 02/12/2025
Number of Days to Update: 86
Source: Department of Environmental Quality
Telephone: 804-698-4010
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Quarterly

AST: Registered Petroleum Storage Tanks
Registered Aboveground Storage Tanks.

Date of Government Version: 11/04/2024
Date Data Arrived at EDR: 11/18/2024
Date Made Active in Reports: 02/12/2025
Number of Days to Update: 86
Source: Department of Environmental Quality
Telephone: 804-698-4010
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/14/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/14/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 05/14/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/11/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 05/14/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/14/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 05/14/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 05/14/2024
Date Data Arrived at EDR: 05/30/2024
Date Made Active in Reports: 08/28/2024
Number of Days to Update: 90

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 07/29/2024
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Controls Sites Listing

A listing of sites with Engineering Controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/26/2024
Date Data Arrived at EDR: 10/03/2024
Date Made Active in Reports: 12/20/2024
Number of Days to Update: 78

Source: Department of Environmental Quality
Telephone: 804-698-4228
Last EDR Contact: 12/17/2024
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

INST CONTROL: Voluntary Remediation Program Database

Sites included in the Voluntary Remediation Program database that have deed restrictions.

Date of Government Version: 09/26/2024
Date Data Arrived at EDR: 10/03/2024
Date Made Active in Reports: 12/20/2024
Number of Days to Update: 78

Source: Department of Environmental Quality
Telephone: 804-698-4228
Last EDR Contact: 12/17/2024
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

Lists of state and tribal voluntary cleanup sites

VRP: Voluntary Remediation Program

The Voluntary Cleanup Program encourages owners of elected contaminated sites to take the initiative and conduct voluntary cleanups that meet state environmental standards.

Date of Government Version: 09/26/2024
Date Data Arrived at EDR: 10/03/2024
Date Made Active in Reports: 12/20/2024
Number of Days to Update: 78

Source: Department of Environmental Quality
Telephone: 804-698-4228
Last EDR Contact: 12/17/2024
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 07/08/2021
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 12/10/2024
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Varies

Lists of state and tribal brownfield sites

BROWNFIELDS: Brownfields Site Specific Assessments

To qualify for Brownfields Assessment, the site must meet the Federal definition of a Brownfields and should have contaminant issues that need to be addressed and a redevelopment plan supported by the local government and community. Virginia's Department of Environmental Quality performs brownfields assessments under a cooperative agreement with the U.S. Environmental Protection Agency at no cost to communities, property owners or, prospective purchasers. The assessment is an evaluation of environmental impacts caused by previous site uses similar to a Phase II Environmental Assessment.

Date of Government Version: 09/19/2024
Date Data Arrived at EDR: 10/17/2024
Date Made Active in Reports: 01/09/2025
Number of Days to Update: 84

Source: Department of Environmental Quality
Telephone: 804-698-4207
Last EDR Contact: 01/15/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 09/09/2024
Date Data Arrived at EDR: 09/11/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 86

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 12/12/2024
Next Scheduled EDR Contact: 03/24/2025
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/23/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land

A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 02/07/2024
Date Data Arrived at EDR: 11/13/2024
Date Made Active in Reports: 11/19/2024
Number of Days to Update: 6

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 12/09/2024
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 05/20/2024
Date Data Arrived at EDR: 08/19/2024
Date Made Active in Reports: 10/09/2024
Number of Days to Update: 51

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 05/20/2024
Date Data Arrived at EDR: 08/19/2024
Date Made Active in Reports: 10/09/2024
Number of Days to Update: 51

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 12/19/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 19

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/10/2024
Date Data Arrived at EDR: 12/11/2024
Date Made Active in Reports: 02/27/2025
Number of Days to Update: 78

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 12/11/2024
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

SPILLS TD: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 09/17/2009
Date Data Arrived at EDR: 09/23/2009
Date Made Active in Reports: 10/06/2009
Number of Days to Update: 13

Source: Department of Environmental Quality, Tidewater Region
Telephone: trofoia@deq.vir
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: Quarterly

SPILLS VA: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 08/08/2012
Date Data Arrived at EDR: 08/09/2012
Date Made Active in Reports: 10/05/2012
Number of Days to Update: 57

Source: Department of Environmental Quality, Valley Regional Office
Telephone: 540-574-7800
Last EDR Contact: 05/06/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Quarterly

SPILLS BRL: Prep/Spills Database Listing

A listing of spills locations located in the Blue Ridge Regional area, Lynchburg.

Date of Government Version: 09/18/2009
Date Data Arrived at EDR: 09/18/2009
Date Made Active in Reports: 10/06/2009
Number of Days to Update: 18

Source: DEQ, Blue Ridge Regional Office
Telephone: 434-582-6218
Last EDR Contact: 11/28/2011
Next Scheduled EDR Contact: 03/12/2012
Data Release Frequency: Varies

SPILLS NO: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 09/23/2009
Date Data Arrived at EDR: 09/29/2009
Date Made Active in Reports: 10/30/2009
Number of Days to Update: 31

Source: Department of Environmental Quality, Northern Region
Telephone: 703-583-3864
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

SPILLS PD: PREP Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 10/20/2009
Date Data Arrived at EDR: 10/29/2009
Date Made Active in Reports: 12/03/2009
Number of Days to Update: 35

Source: Department of Environmental Quality, Piedmont Region
Telephone: 804-527-5020
Last EDR Contact: 02/06/2012
Next Scheduled EDR Contact: 05/21/2012
Data Release Frequency: Quarterly

SPILLS: Prep/Spills Database Listing

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment. PREP staff often work to assist local emergency responders, other state agencies, federal agencies, and responsible parties, as may be needed, to manage pollution incidents. Oil spills, fish kills, and hazardous materials spills are examples of incidents that may involve the DEQ's PREP Program.

Date of Government Version: 11/18/2024
Date Data Arrived at EDR: 11/18/2024
Date Made Active in Reports: 02/12/2025
Number of Days to Update: 86

Source: Department of Environmental Quality
Telephone: 804-698-4287
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Quarterly

SPILLS WC: Prep Database

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 09/21/2009
Date Data Arrived at EDR: 09/29/2009
Date Made Active in Reports: 10/30/2009
Number of Days to Update: 31

Source: Department of Environmental Quality, West Central Region
Telephone: 540-562-6700
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

SPILLS SW: Reportable Spills

The Department of Environmental Quality's POLLUTION RESPONSE PROGRAM, known as PREP, provides for responses to air, water, and waste pollution incidents in order to protect human health and the environment.

Date of Government Version: 01/21/2010
Date Data Arrived at EDR: 01/22/2010
Date Made Active in Reports: 02/16/2010
Number of Days to Update: 25

Source: Department of Environmental Quality, Southwest Region
Telephone: 276-676-4839
Last EDR Contact: 07/13/2012
Next Scheduled EDR Contact: 10/29/2012
Data Release Frequency: No Update Planned

SPILLS PC: Pollution Complaint Database

Pollution Complaints Database. The pollution reports contained in the PC database include the initial release reporting of Leaking Underground Storage Tanks and all other releases of petroleum to the environment as well as releases to state waters. The database is current through 12/1/93. Since that time, all spill and pollution reporting information has been collected and tracked through the DEQ regional offices.

Date of Government Version: 06/01/1996
Date Data Arrived at EDR: 10/22/1996
Date Made Active in Reports: 11/21/1996
Number of Days to Update: 30

Source: Department of Environmental Quality
Telephone: 804-698-4287
Last EDR Contact: 03/08/2010
Next Scheduled EDR Contact: 06/21/2010
Data Release Frequency: No Update Planned

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 09/01/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/15/2013
Number of Days to Update: 43

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 80

Source: Environmental Protection Agency
Telephone: 800-438-2474
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 10/01/2024
Date Data Arrived at EDR: 11/12/2024
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 70

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 02/11/2025
Next Scheduled EDR Contact: 05/26/2025
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 06/07/2021
Date Data Arrived at EDR: 07/13/2021
Date Made Active in Reports: 03/09/2022
Number of Days to Update: 239

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 01/07/2025
Next Scheduled EDR Contact: 04/21/2025
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 12/30/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 07/30/2021
Date Data Arrived at EDR: 02/03/2023
Date Made Active in Reports: 02/10/2023
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 05/19/2025
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/20/2024
Number of Days to Update: 94

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA Watch List

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 01/27/2025
Next Scheduled EDR Contact: 05/12/2025
Data Release Frequency: No Update Planned

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 01/30/2025
Next Scheduled EDR Contact: 05/12/2025
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 06/14/2022
Date Made Active in Reports: 03/24/2023
Number of Days to Update: 283

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 12/12/2024
Next Scheduled EDR Contact: 03/24/2025
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2023
Date Data Arrived at EDR: 02/11/2025
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 7

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/11/2025
Next Scheduled EDR Contact: 05/26/2025
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 10/15/2024
Date Data Arrived at EDR: 10/16/2024
Date Made Active in Reports: 01/14/2025
Number of Days to Update: 90

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/15/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/29/2025
Date Data Arrived at EDR: 02/03/2025
Date Made Active in Reports: 02/27/2025
Number of Days to Update: 24

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 03/10/2025
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 10/01/2024
Date Data Arrived at EDR: 10/23/2024
Date Made Active in Reports: 01/14/2025
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/09/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 09/19/2023
Date Data Arrived at EDR: 10/03/2023
Date Made Active in Reports: 10/19/2023
Number of Days to Update: 16

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 05/12/2025
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 07/01/2024
Date Data Arrived at EDR: 10/02/2024
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 100

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/02/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/23/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/12/2024
Date Data Arrived at EDR: 10/17/2024
Date Made Active in Reports: 11/19/2024
Number of Days to Update: 33
Source: Nuclear Regulatory Commission
Telephone: 301-415-0717
Last EDR Contact: 01/09/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2023
Date Data Arrived at EDR: 10/16/2024
Date Made Active in Reports: 01/14/2025
Number of Days to Update: 90
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 02/24/2025
Next Scheduled EDR Contact: 06/09/2025
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 02/24/2025
Next Scheduled EDR Contact: 06/09/2025
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 01/30/2025
Next Scheduled EDR Contact: 05/12/2025
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 12/17/2024
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 10/04/2024
Date Data Arrived at EDR: 10/16/2024
Date Made Active in Reports: 12/06/2024
Number of Days to Update: 51

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 01/22/2025
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2024
Date Data Arrived at EDR: 10/09/2024
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 93

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 12/30/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2021
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 12/12/2024
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 12/30/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 03/03/2023
Date Data Arrived at EDR: 03/03/2023
Date Made Active in Reports: 06/09/2023
Number of Days to Update: 98

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 01/23/2025
Next Scheduled EDR Contact: 05/12/2025
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 02/12/2025
Date Data Arrived at EDR: 02/12/2025
Date Made Active in Reports: 02/27/2025
Number of Days to Update: 15

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/06/2025
Next Scheduled EDR Contact: 05/26/2025
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 12/19/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/21/2025
Number of Days to Update: 19

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 02/03/2025
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data
Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 10/01/2024
Date Data Arrived at EDR: 10/02/2024
Date Made Active in Reports: 10/09/2024
Number of Days to Update: 7

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Quarterly

US MINES: Mines Master Index File
Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 11/01/2024
Date Data Arrived at EDR: 11/18/2024
Date Made Active in Reports: 02/11/2025
Number of Days to Update: 85

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 02/18/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing
This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/02/2024
Date Data Arrived at EDR: 08/20/2024
Date Made Active in Reports: 10/09/2024
Number of Days to Update: 50

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing
Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Varies

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 06/04/2024
Date Data Arrived at EDR: 11/22/2024
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 88

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 12/10/2024
Date Data Arrived at EDR: 12/11/2024
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 69

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 02/26/2025
Next Scheduled EDR Contact: 06/16/2025
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 11/11/2024
Date Data Arrived at EDR: 11/20/2024
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 90

Source: EPA
Telephone: (215) 814-5000
Last EDR Contact: 02/25/2025
Next Scheduled EDR Contact: 06/09/2025
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/06/2023
Date Data Arrived at EDR: 09/13/2023
Date Made Active in Reports: 12/11/2023
Number of Days to Update: 89

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 01/06/2025
Next Scheduled EDR Contact: 04/21/2025
Data Release Frequency: Varies

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/06/2021
Date Data Arrived at EDR: 05/21/2021
Date Made Active in Reports: 08/11/2021
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 02/12/2025
Next Scheduled EDR Contact: 06/02/2025
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 12/21/2024
Date Data Arrived at EDR: 12/27/2024
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 12/27/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 11/08/2024
Date Data Arrived at EDR: 11/08/2024
Date Made Active in Reports: 01/14/2025
Number of Days to Update: 67

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 02/13/2025
Next Scheduled EDR Contact: 05/26/2025
Data Release Frequency: Quarterly

PFAS NPL: Superfund Sites with PFAS Detections Information

EPA's Office of Land and Emergency Management and EPA Regional Offices maintain data describing what is known about site investigations, contamination, and remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) where PFAS is present in the environment.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 703-603-8895
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS FEDERAL SITES: Federal Sites PFAS Information

Several federal entities, such as the federal Superfund program, Department of Defense, National Aeronautics and Space Administration, Department of Transportation, and Department of Energy provided information for sites with known or suspected detections at federal facilities.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS TSCA: PFAS Manufacture and Imports Information

EPA issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) and requires chemical manufacturers and facilities that manufacture or import chemical substances to report data to EPA. EPA publishes non-confidential business information (non-CBI) and includes descriptive information about each site, corporate parent, production volume, other manufacturing information, and processing and use information.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS TRIS: List of PFAS Added to the TRI

Section 7321 of the National Defense Authorization Act for Fiscal Year 2020 (NDAA) immediately added certain per- and polyfluoroalkyl substances (PFAS) to the list of chemicals covered by the Toxics Release Inventory (TRI) under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) and provided a framework for additional PFAS to be added to TRI on an annual basis.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-566-0250
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS RCRA MANIFEST: PFAS Transfers Identified In the RCRA Database Listing

To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: PFAS, PFOA, PFOS, PERFL, AFFF, GENX, GEN-X (plus the VT waste codes). These keywords were searched for in the following text fields: Manifest handling instructions (MANIFEST_HANDLING_INSTR), Non-hazardous waste description (NON_HAZ_WASTE_DESCRIPTION), DOT printed information (DOT_PRINTED_INFORMATION), Waste line handling instructions (WASTE_LINE_HANDLING_INSTR), Waste residue comments (WASTE_RESIDUE_COMMENTS).

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS ATSDR: PFAS Contamination Site Location Listing

PFAS contamination site locations from the Department of Health & Human Services, Center for Disease Control & Prevention. ATSDR is involved at a number of PFAS-related sites, either directly or through assisting state and federal partners. As of now, most sites are related to drinking water contamination connected with PFAS production facilities or fire training areas where aqueous film-forming firefighting foam (AFFF) was regularly used.

Date of Government Version: 06/24/2020
Date Data Arrived at EDR: 03/17/2021
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 601

Source: Department of Health & Human Services
Telephone: 202-741-5770
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Varies

PFAS WQP: Ambient Environmental Sampling for PFAS

The Water Quality Portal (WQP) is a part of a modernized repository storing ambient sampling data for all environmental media and tissue samples. A wide range of federal, state, tribal and local governments, academic and non-governmental organizations and individuals submit project details and sampling results to this public repository. The information is commonly used for research and assessments of environmental quality.

Date of Government Version: 12/13/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS NPDES: Clean Water Act Discharge Monitoring Information

Any discharger of pollutants to waters of the United States from a point source must have a National Pollutant Discharge Elimination System (NPDES) permit. The process for obtaining limits involves the regulated entity (permittee) disclosing releases in a NPDES permit application and the permitting authority (typically the state but sometimes EPA) deciding whether to require monitoring or monitoring with limits. Caveats and Limitations: Less than half of states have required PFAS monitoring for at least one of their permittees and fewer states have established PFAS effluent limits for permittees. New rulemakings have been initiated that may increase the number of facilities monitoring for PFAS in the future.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/14/2025
Number of Days to Update: 12

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/02/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS PROJECT: NORTHEASTERN UNIVERSITY PFAS PROJECT

The PFAS Contamination Site Tracker records qualitative and quantitative data from each site in a chart, specifically examining discovery, contamination levels, government response, litigation, health impacts, media coverage, and community characteristics. All data presented in the chart were extracted from government websites, such as state health departments or the Environmental Protection Agency, and news articles.

Date of Government Version: 05/19/2023
Date Data Arrived at EDR: 04/05/2024
Date Made Active in Reports: 06/06/2024
Number of Days to Update: 62

Source: Social Science Environmental Health Research Institute
Telephone: N/A
Last EDR Contact: 12/05/2024
Next Scheduled EDR Contact: 03/17/2025
Data Release Frequency: Varies

PFAS ECHO: Facilities in Industries that May Be Handling PFAS Listing

Regulators and the public have expressed interest in knowing which regulated entities may be using PFAS. EPA has developed a dataset from various sources that show which industries may be handling PFAS. Approximately 120,000 facilities subject to federal environmental programs have operated or currently operate in industry sectors with processes that may involve handling and/or release of PFAS.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS ECHO FIRE TRAIN: Facilities in Industries that May Be Handling PFAS Listing

A list of fire training sites was added to the Industry Sectors dataset using a keyword search on the permitted facilitys name to identify sites where fire-fighting foam may have been used in training exercises. Additionally, you may view an example spreadsheet of the subset of fire training facility data, as well as the keywords used in selecting or deselecting a facility for the subset. as well as the keywords used in selecting or deselecting a facility for the subset. These keywords were tested to maximize accuracy in selecting facilities that may use fire-fighting foam in training exercises, however, due to the lack of a required reporting field in the data systems for designating fire training sites, this methodology may not identify all fire training sites or may potentially misidentify them.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PFAS PT 139 AIRPORT: All Certified Part 139 Airports PFAS Information Listing

Since July 1, 2006, all certified part 139 airports are required to have fire-fighting foam onsite that meet military specifications (MIL-F-24385) (14 CFR 139.317). To date, these military specification fire-fighting foams are fluorinated and have been historically used for training and extinguishing. The 2018 FAA Reauthorization Act has a provision stating that no later than October 2021, FAA shall not require the use of fluorinated AFFF. This provision does not prohibit the use of fluorinated AFFF at Part 139 civilian airports; it only prohibits FAA from mandating its use. The Federal Aviation Administration?s document AC 150/5210-6D - Aircraft Fire Extinguishing Agents provides guidance on Aircraft Fire Extinguishing Agents, which includes Aqueous Film Forming Foam (AFFF).

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

AQUEOUS FOAM NRC: Aqueous Foam Related Incidents Listing

The National Response Center (NRC) serves as an emergency call center that fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. The spreadsheets posted to the NRC website contain initial incident data that has not been validated or investigated by a federal/state response agency. Response center calls from 1990 to the most recent complete calendar year where there was indication of Aqueous Film Forming Foam (AFFF) usage are included in this dataset. NRC calls may reference AFFF usage in the ?Material Involved? or ?Incident Description? fields.

Date of Government Version: 12/30/2024
Date Data Arrived at EDR: 01/02/2025
Date Made Active in Reports: 01/10/2025
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-267-2675
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

PCS: Permit Compliance System

PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 12/16/2016
Date Data Arrived at EDR: 01/06/2017
Date Made Active in Reports: 03/10/2017
Number of Days to Update: 63

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 12/23/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: No Update Planned

PCS ENF: Enforcement data
No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29

Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 12/23/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

BIOSOLIDS: ICIS-NPDES Biosolids Facility Data
The data reflects compliance information about facilities in the biosolids program.

Date of Government Version: 10/13/2024
Date Data Arrived at EDR: 10/16/2024
Date Made Active in Reports: 10/23/2024
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 202-564-4700
Last EDR Contact: 01/14/2025
Next Scheduled EDR Contact: 04/28/2025
Data Release Frequency: Varies

UST FINDER RELEASE: UST Finder Releases Database
US EPA's UST Finder data is a national composite of leaking underground storage tanks. This data contains information about, and locations of, leaking underground storage tanks. Data was collected from state sources and standardized into a national profile by EPA's Office of Underground Storage Tanks, Office of Research and Development, and the Association of State and Territorial Solid Waste Management Officials.

Date of Government Version: 06/08/2023
Date Data Arrived at EDR: 10/31/2023
Date Made Active in Reports: 01/18/2024
Number of Days to Update: 79

Source: Environmental Protecton Agency
Telephone: 202-564-0394
Last EDR Contact: 02/06/2025
Next Scheduled EDR Contact: 05/19/2025
Data Release Frequency: Semi-Annually

UST FINDER: UST Finder Database
EPA developed UST Finder, a web map application containing a comprehensive, state-sourced national map of underground storage tank (UST) and leaking UST (LUST) data. It provides the attributes and locations of active and closed USTs, UST facilities, and LUST sites from states and from Tribal lands and US territories . UST Finder contains information about proximity of UST facilities and LUST sites to: surface and groundwater public drinking water protection areas; estimated number of private domestic wells and number of people living nearby; and flooding and wildfires.

Date of Government Version: 06/08/2023
Date Data Arrived at EDR: 10/04/2023
Date Made Active in Reports: 01/18/2024
Number of Days to Update: 106

Source: Environmental Protection Agency
Telephone: 202-564-0394
Last EDR Contact: 02/06/2025
Next Scheduled EDR Contact: 05/19/2025
Data Release Frequency: Varies

E MANIFEST: Hazardous Waste Electronic Manifest System
EPA established a national system for tracking hazardous waste shipments electronically. This system, known as ?e-Manifest,? will modernize the nation?s cradle-to-grave hazardous waste tracking process while saving valuable time, resources, and dollars for industry and states.

Date of Government Version: 09/16/2024
Date Data Arrived at EDR: 09/17/2024
Date Made Active in Reports: 12/20/2024
Number of Days to Update: 94

Source: Environmental Protection Agency
Telephone: 833-501-6826
Last EDR Contact: 02/19/2025
Next Scheduled EDR Contact: 03/31/2025
Data Release Frequency: Varies

PFAS: Per- and Polyfluoroalkyl Substances
PFOS and PFOA stand for perfluorooctane sulfonate and perfluorooctanoic acid, respectively. Both are fluorinated organic chemicals, part of a larger family of compounds referred to as perfluoroalkyl substances (PFASs).

Date of Government Version: 10/01/2024
Date Data Arrived at EDR: 10/09/2024
Date Made Active in Reports: 12/26/2024
Number of Days to Update: 78

Source: Department of Environmental Quality
Telephone: 804-698-4336
Last EDR Contact: 12/27/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

AIRS: Permitted Airs Facility List
A listing of permitted Airs facilities.

Date of Government Version: 06/11/2024
Date Data Arrived at EDR: 09/12/2024
Date Made Active in Reports: 11/26/2024
Number of Days to Update: 75

Source: Department of Environmental Quality
Telephone: 804-698-4000
Last EDR Contact: 12/05/2024
Next Scheduled EDR Contact: 03/24/2025
Data Release Frequency: Annually

CEDS: Comprehensive Environmental Data System
Virginia Water Protection Permits, Virginia Pollution Discharge System (point discharge) permits and Virginia Pollution Abatement (no point discharge) permits.

Date of Government Version: 11/21/2024
Date Data Arrived at EDR: 11/25/2024
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 85

Source: Department of Environmental Quality
Telephone: 804-698-4077
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/09/2025
Data Release Frequency: Quarterly

COAL ASH: Coal Ash Disposal Sites
A listing of facilities with coal ash impoundments.

Date of Government Version: 11/21/2024
Date Data Arrived at EDR: 11/25/2024
Date Made Active in Reports: 02/18/2025
Number of Days to Update: 85

Source: Department of Environmental Protection
Telephone: 804-698-4285
Last EDR Contact: 02/20/2025
Next Scheduled EDR Contact: 06/09/2025
Data Release Frequency: Varies

DRYCLEANERS: Drycleaner List
A listing of registered drycleaners.

Date of Government Version: 09/25/2024
Date Data Arrived at EDR: 10/03/2024
Date Made Active in Reports: 12/20/2024
Number of Days to Update: 78

Source: Department of Environmental Quality
Telephone: 804-698-4407
Last EDR Contact: 12/27/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Varies

ENFORCEMENT: Enforcement Actions Data
A listing of enforcement actions.

Date of Government Version: 09/19/2024
Date Data Arrived at EDR: 09/26/2024
Date Made Active in Reports: 09/30/2024
Number of Days to Update: 4

Source: Department of Environmental Quality
Telephone: 804-698-4031
Last EDR Contact: 12/17/2024
Next Scheduled EDR Contact: 04/07/2025
Data Release Frequency: Quarterly

FIN ASSURANCE 1: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 10/24/2024
Date Data Arrived at EDR: 10/25/2024
Date Made Active in Reports: 01/09/2025
Number of Days to Update: 76

Source: Department of Environmental Quality
Telephone: 804-698-4205
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Varies

FIN ASSURANCE 2: Financial Assurance Information listing
Solid waste financial assurance information.

Date of Government Version: 10/21/2024
Date Data Arrived at EDR: 10/22/2024
Date Made Active in Reports: 01/09/2025
Number of Days to Update: 79
Source: Department of Environmental Quality
Telephone: 804-698-4123
Last EDR Contact: 01/16/2025
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Varies

TIER 2: Tier 2 Information Listing
A listing of facilities which store or manufacture hazardous materials and submit a chemical inventory report.

Date of Government Version: 12/31/2022
Date Data Arrived at EDR: 06/14/2024
Date Made Active in Reports: 09/06/2024
Number of Days to Update: 84
Source: Department of Environmental Quality
Telephone: 804-698-4159
Last EDR Contact: 12/05/2024
Next Scheduled EDR Contact: 03/24/2025
Data Release Frequency: No Update Planned

UIC: Underground Injection Control Wells
A listing of underground injection controls wells.

Date of Government Version: 10/09/2024
Date Data Arrived at EDR: 10/09/2024
Date Made Active in Reports: 10/16/2024
Number of Days to Update: 7
Source: Department of Mines, Minerals and Energy
Telephone: 276-415-9700
Last EDR Contact: 01/23/2025
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A
Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Virgina.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/20/2014
Number of Days to Update: 203

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Quality in Virgina and at the Regional VA Levels.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/15/2014
Number of Days to Update: 198

Source: Department of Environmental Quality
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 11/04/2024
Date Data Arrived at EDR: 11/05/2024
Date Made Active in Reports: 01/27/2025
Number of Days to Update: 83

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 02/04/2025
Next Scheduled EDR Contact: 05/19/2025
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 12/23/2024
Next Scheduled EDR Contact: 04/14/2025
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 11/30/2023
Date Made Active in Reports: 12/01/2023
Number of Days to Update: 1

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 01/23/2025
Next Scheduled EDR Contact: 05/05/2025
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 01/06/2025
Next Scheduled EDR Contact: 04/21/2025
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/18/2022
Number of Days to Update: 80

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 02/06/2025
Next Scheduled EDR Contact: 05/26/2025
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 02/26/2025
Next Scheduled EDR Contact: 06/16/2025
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: Endeavor Business Media
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 804-692-1900

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005, 2010 and 2015 from the U.S. Fish and Wildlife Service.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

GATEWAY PROJECT - HOMES FOR AMERICA
632 BULLITT AVENUE SOUTHEAST
ROANOKE, VA 24013

TARGET PROPERTY COORDINATES

Latitude (North):	37.267948 - 37° 16' 4.61''
Longitude (West):	79.931249 - 79° 55' 52.50''
Universal Tranverse Mercator:	Zone 17
UTM X (Meters):	594762.4
UTM Y (Meters):	4124928.8
Elevation:	962 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	50022782 ROANOKE, VA
Version Date:	2022

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

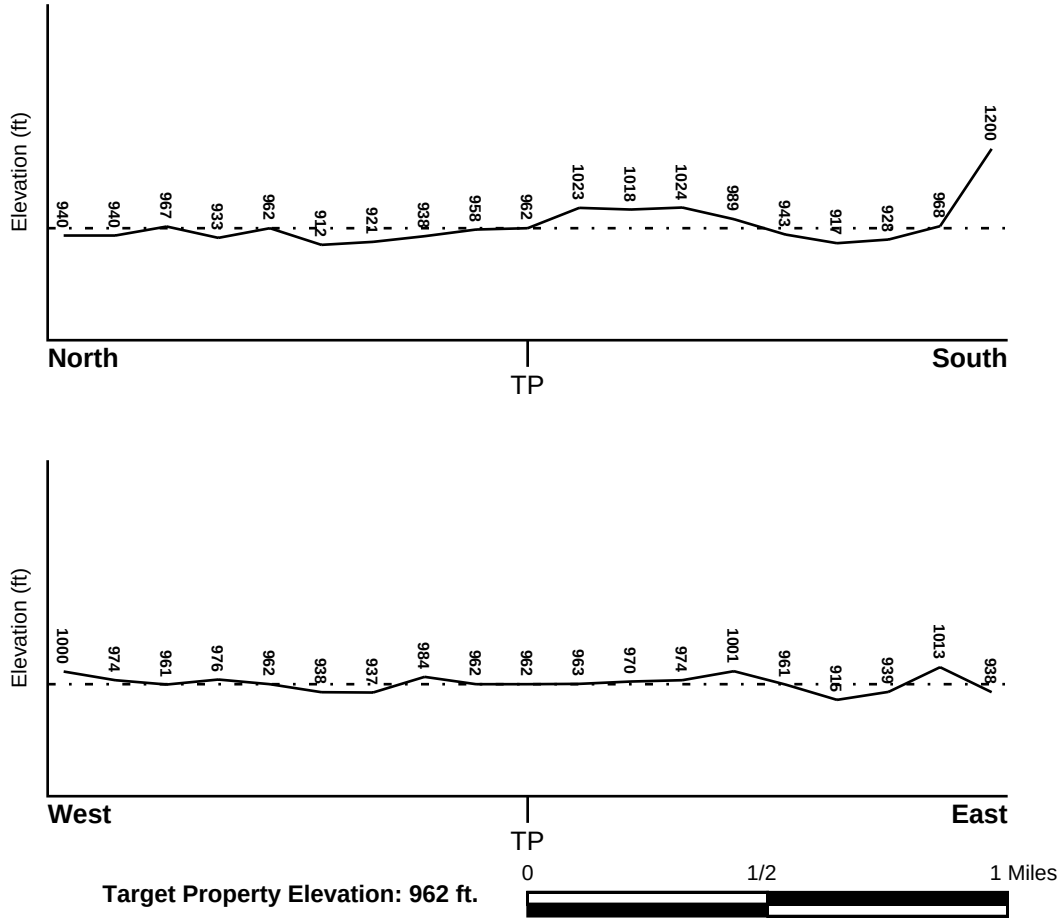
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General North

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Target Property Elevation: 962 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
51161C0168G	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
51161C0162G	FEMA FIRM Flood data
51161C0166G	FEMA FIRM Flood data
51161C0164G	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
ROANOKE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

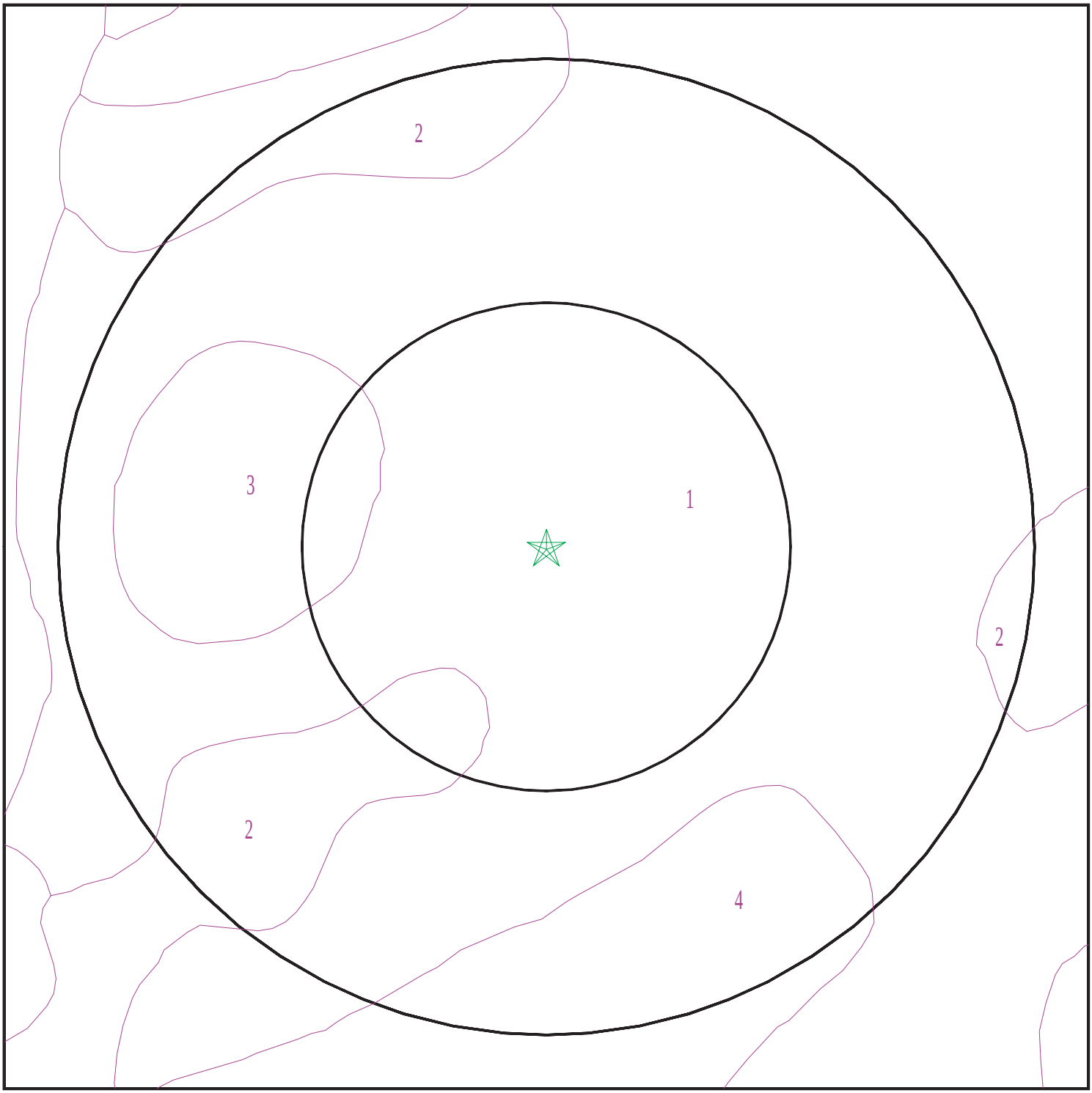
Era:	Paleozoic
System:	Cambrian
Series:	Cambrian
Code:	C *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratified Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 7912252.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Gateway Project - Homes for America	CLIENT:	Balzer & Associates
ADDRESS:	632 Bullitt Avenue Southeast Roanoke VA 24013	CONTACT:	Tim Sakowski
LAT/LONG:	37.267948 / 79.931249	INQUIRY #:	7912252.2s
		DATE:	February 28, 2025 1:51 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Chiswell

Soil Surface Texture: channery silt loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	1 inches	channery silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:
2	1 inches	11 inches	very channery silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:
3	11 inches	21 inches	bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:

Soil Map ID: 2

Soil Component Name: Chiswell

Soil Surface Texture: channery silt loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	1 inches	channery silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:
2	1 inches	11 inches	very channery silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:
3	11 inches	21 inches	bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:

Soil Map ID: 3

Soil Component Name: Chiswell

Soil Surface Texture: channery silt loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	1 inches	channery silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:
2	1 inches	11 inches	very channery silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:
3	11 inches	21 inches	bedrock	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Not reported	Max: 1.4 Min: 0.42	Max: Min:

Soil Map ID: 4

Soil Component Name: Shottower

Soil Surface Texture: loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	18 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6 Min: 3.6
2	18 inches	33 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6 Min: 3.6
3	33 inches	61 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 6 Min: 3.6

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

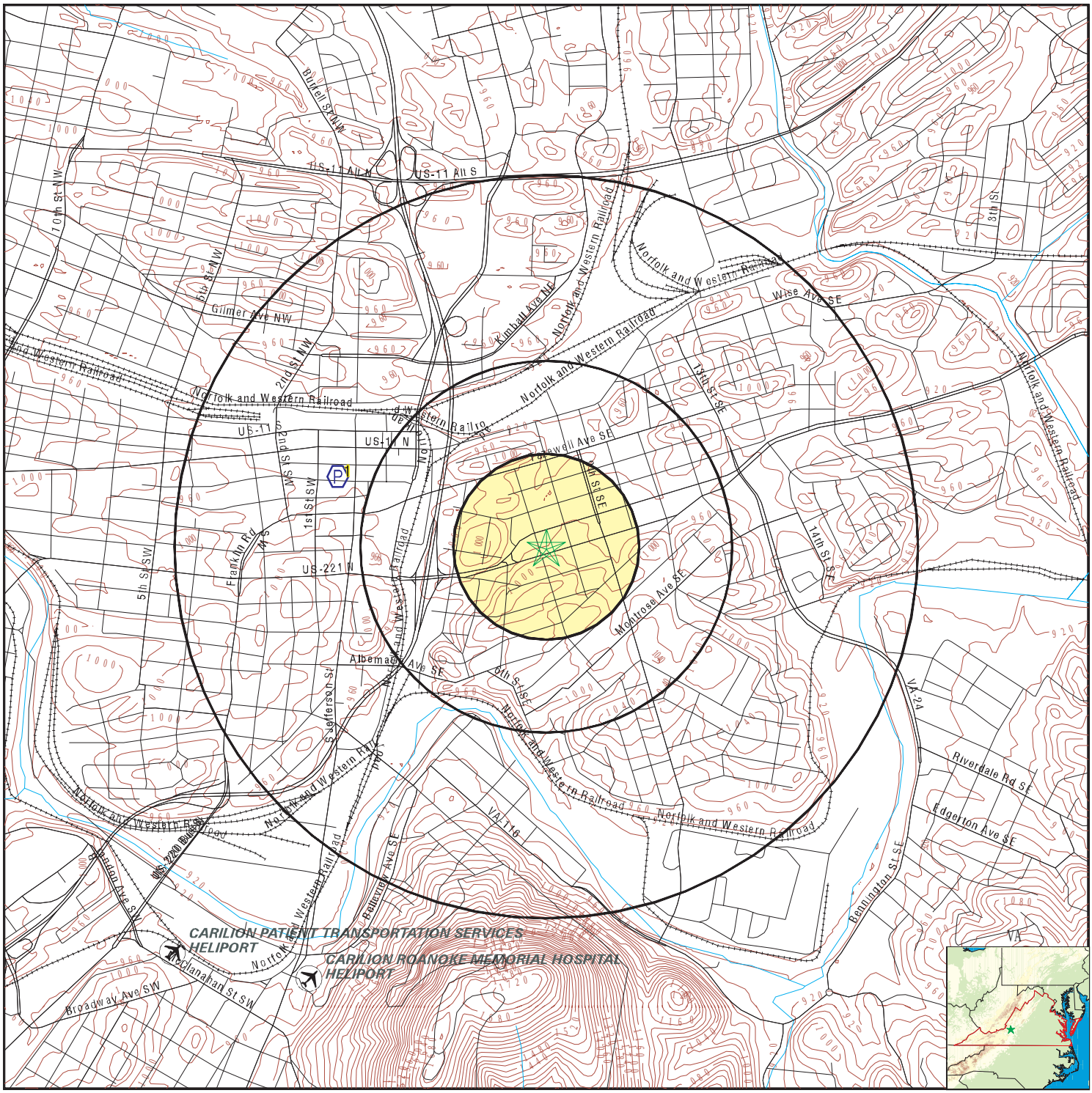
MAP ID	WELL ID	LOCATION FROM TP
1	VA2161920	1/2 - 1 Mile WNW

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 7912252.2s



0 1/4 1/2 1 Miles

- County Boundary
- Major Roads
- Contour Lines
- Airports
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME:	Gateway Project - Homes for America	CLIENT:	Balzer & Associates
ADDRESS:	632 Bullitt Avenue Southeast Roanoke VA 24013	CONTACT:	Tim Sakowski
LAT/LONG:	37.267948 / 79.931249	INQUIRY #:	7912252.2s
		DATE:	February 28, 2025 1:51 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
1 **WNW** **1/2 - 1 Mile** **Lower**	**FRDS PWS**	**VA2161920**

Epa region:	03	State:	VA
Pwsid:	VA2161920	Pwsname:	YMCA TES
Cityserved:	Not Reported	Stateserved:	VA
Zipserved:	Not Reported	Fipscounty:	51161
Status:	Closed	Retpopsrvd:	89
Pwssvcconn:	3	Psource longname:	Groundwater
Pwstype:	TNCWS	Owner:	Private
Contact:	YMCA CAMP ROANOKE FOR BOYS		
Contactorgname:	Not Reported	Contactphone:	Not Reported
Contactaddress1:	ROUTE 3	Contactaddress2:	Not Reported
Contactcity:	SALEM	Contactstate:	VA
Contactzip:	24153	Pwsactivitycode:	I
PWS ID:	VA2161920	PWS type:	System Owner/Responsible Party
PWS name:	YMCA CAMP ROANOKE FOR BOYS		
PWS address:	Not Reported	PWS city:	SALEM
PWS state:	VA	PWS zip:	24153
PWS ID:	VA2161920	Activity status:	Active
Date system activated:	7801	Date system deactivated:	Not Reported
Retail population:	00000089	System name:	YMCA TES
System address:	Not Reported	System address:	425 CHURCH AV
System city:	ROANOKE	System state:	VA
System zip:	24016		
County FIPS:	161	City served:	ROANOKE
Population served:	Under 101 Persons	Treatment:	Untreated
Latitude:	371614	Longitude:	0795630
Latitude:	371247	Longitude:	0800958

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

EPA Region 3 Statistical Summary Readings for Zip Code: 24013

Number of sites tested: 30.

Maximum Radon Level: 11.3 pCi/L.
Minimum Radon Level: 0.9 pCi/L.

pCi/L <4	pCi/L 4-10	pCi/L 10-20	pCi/L 20-50	pCi/L 50-100	pCi/L >100
19 (63.33%)	10 (33.33%)	1 (3.33%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

Federal EPA Radon Zone for ROANOKE CITY County: 1

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005, 2010 and 2015 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Virginia Public Water Supplies
Source: Department of Health, Office of Water Programs
Telephone: 804-786-1756

OTHER STATE DATABASE INFORMATION

Virginia Oil and Gas Wells
Source: Department of Mines, Minerals and Energy
Telephone: 804-692-3200
A listing of oil and gas well locations.

RADON

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

EPA Region 3 Statistical Summary Readings
Source: Region 3 EPA
Telephone: 215-814-2082
Radon readings for Delaware, D.C., Maryland, Pennsylvania, Virginia and West Virginia.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

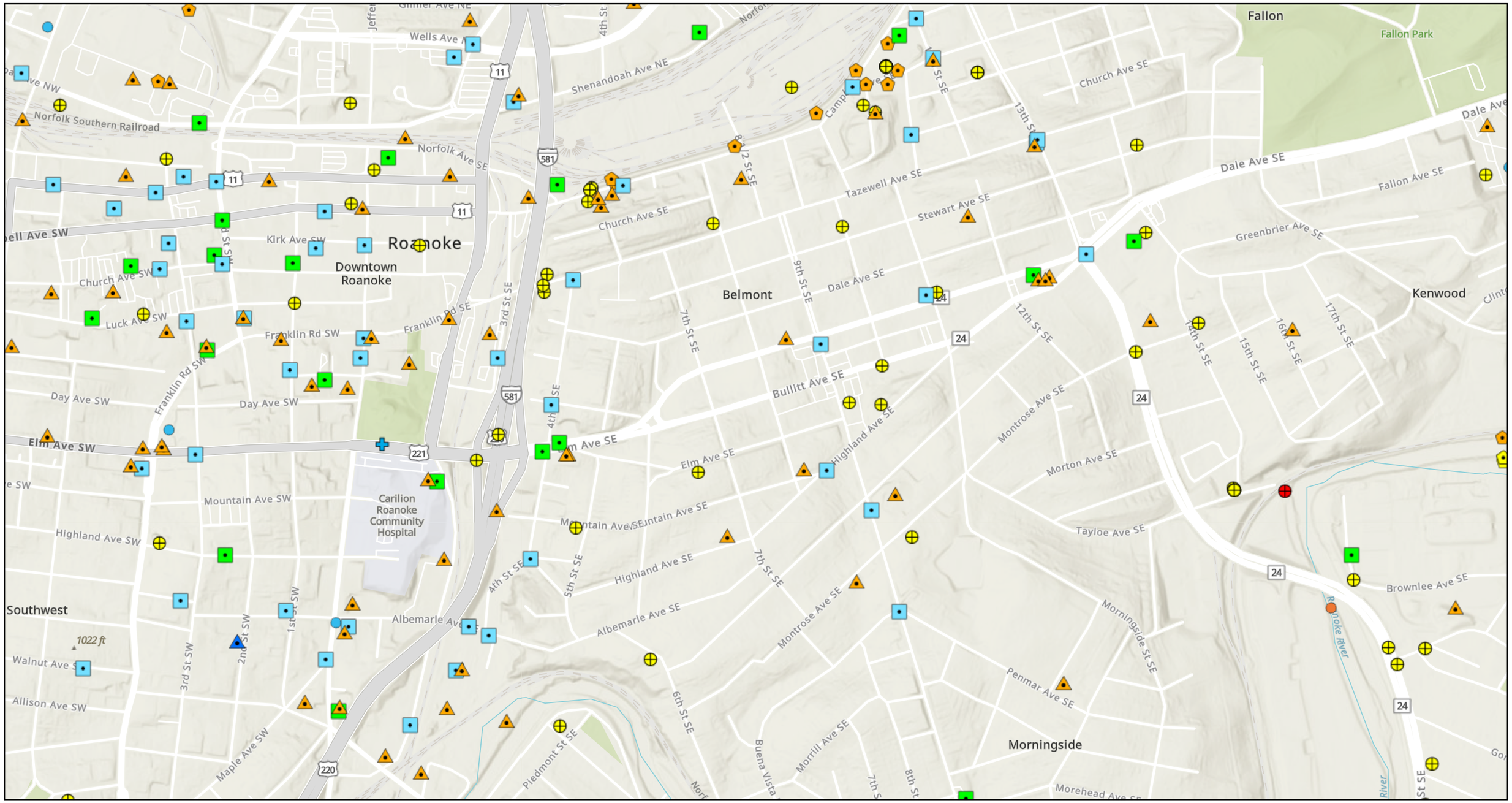
STREET AND ADDRESS INFORMATION

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Appendix E:

Regulatory File Review

Environmental Data Mapper Web Map



2/28/2025, 1:30:23 PM

1:10,944

0 0.1 0.2 0.4 mi

0 0.17 0.35 0.7 km

Petroleum Releases (Daily)
- Closed
- Open

Registered Petroleum Tank Facilities (Daily)
- Not Active
- Active

Solid Waste Permits (Daily)
- Closed

VRP Site Addresses (Daily)
- Certificate Issued
- Potential Site

PREP Reports (Daily)
- Closed
- Under Investigation

VPDES Outfalls (Daily)
- General Permits
- Individual Permits

Virginia County Boundaries

Esri, NASA, NGA, USGS, FEMA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

An official website of the United States government

MENU

Search EPA.gov

ECHO Enforcement and Compliance History Online

<https://echo.epa.gov/>

Search Options | Analyze Trends | Find EPA Cases | Data Services | Help

Login | Contact Us <https://epa.gov/resources/general-info/contact-us>

Facility Search Results

Georgia, Michigan, Nebraska, North Carolina, Pennsylvania, Vermont, Washington, West Virginia, and Wisconsin are working with EPA to fix problems with their Clean Water Act violation data. Read More...

Report Violation

<https://epa.gov/r
environmental-vic

Help

<https://epa.gov/h
search/facility-sea
help>

Map Legend

EJScreen Add EJ Summary Map

Supplemental Indexes (US)

Zoom To: Enter city, state, and/or zip code

Basemap Options

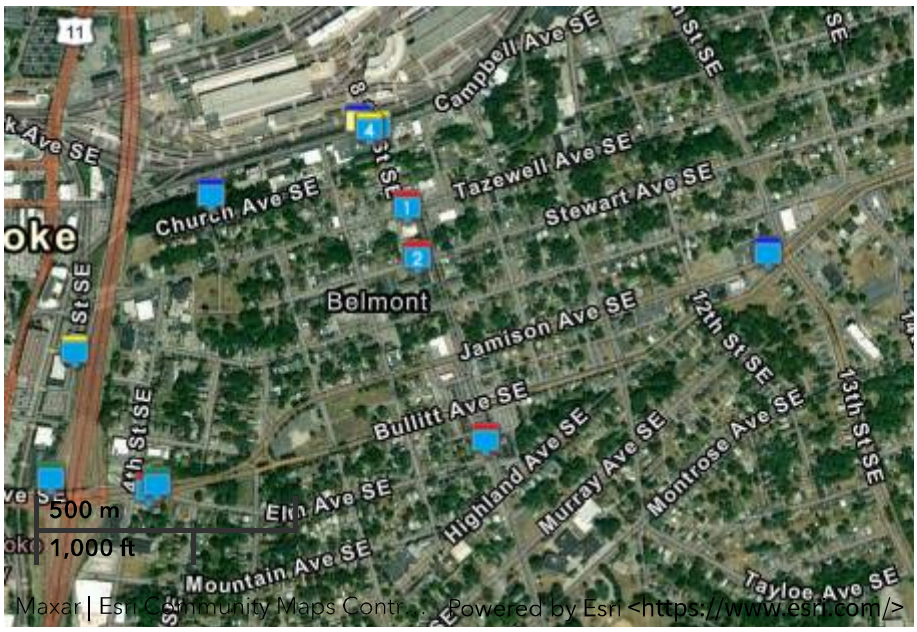
Search as map moves

Facility Summary

Select a facility row from the search results table.

Current Search

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Customize Columns **Download Data** **Quick CSV Download**

Source Data <https://epa.gov/resources/echo-data/about-the-data>

Results Guide <https://epa.gov/help/facility-search/all-data-search-results-help#results>

Reports Legend <https://epa.gov/help/facility-search/search-results-reports-legend>

35 Facilities Found

Selected Criteria

Media Selected: All Media Programs
Active/Operating : Yes

Explore Enforcement and Compliance Criteria

- **3** Facilities with Current Violations
- **0** Facilities with Significant Violations
- **6** Facilities with Violations (3 years)
- **0** Facilities with Formal Enforcement Actions (5 years)
- **7** Facilities with Informal Enforcement Actions (5 years)
- **35** Facilities Flagged as Potential Environmental Justice Concerns

View Search Form for More Criteria...

Filter Facilities

Not Filtering on 35 Facilities

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Facility Name	Mapped	Street Address	City	State
AMOCO #812-TANKS		401 ELM AVE SE	ROANOKE	VA
BAKER PERFORMANCE CHEMICALS INC		401 ALBEMARLE AVE	ROANOKE	VA
CONCRETE SPECIALTIES INC.		1410 16TH ST SE	ROANOKE	VA
CONCRETE SPECIALTIES INCORPORATED		1420 16TH ST SE	ROANOKE	VA
CVS PHARMACY #4161		1022 HARDY ROAD	VINTON	VA
CVS PHARMACY #6285		702 9TH STREET, SE	ROANOKE	VA
D H GRIFFIN WRECKING COMPANY INC		819 THIRD ST	VINTON	VA

☑ Only Show Matches

Facility Characteristics

Facility Type

☐ **2** Major

☐ **33** Non-Major

Facility Permit/ID

☐ **13** Has Water Permit (ICIS-NPDES)

☐ **10** Has ICIS-Air ID

☐ **18** Has RCRA ID

☐ **2** Has TRI Releases

Enforcement and Compliance Characteristics

☐ **4 Facilities with Violations (1 or more quarters within the past 3 years)**

1 2 3 4 5 6 7 8 9 10 11 12

Facilities with Formal Enforcement Actions (5 yrs)

☐ **0 Yes**

☐ **35 No**

1 2 3 4 5

Facilities with Informa Enforcement Actions (5 yrs)

☐ **7 Yes**

☐ **28 No**

1 2 3 4 5

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Facilities with Compliance Monitorin Activities within Date Range

- [ ] **0 Yes**
- [ ] **35 No**

mm/d

mm/d

Community

- [ ] **35 Facilities Located in Areas with Supplemental Indexes At or Above 90th Percentile (US)**

Any 1 or More | 4 or More | 7 or More | 10 or More

Layers

Each map layer requires a specific map scale for display. Layers are only available for selection if the map is zoomed in to a sufficient scale. Zoom in further to enable selection of additional layers. Note that adding multiple overlapping map layers may cause performance issues in the browser and display.

- [ ] Do not show again

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Current Zoom: 72%

▶ EJScreen Maps

▶ Air Maps

▶ Water Maps

▶ Places

▶ Boundaries

▶ Endangered Species Act Critical Habitat

Top of Page

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No FEAR Act Data

<https://www.epa.gov/ocr/whistleblower-protections-epa-and-how-they-relate-non-disclosure-agreements-signed-epa-employees>

Privacy

<https://www.epa.gov/privacy>

Privacy and Security Notice

<https://www.epa.gov/privacy/privacy-and-security-notice>

Open Government

<https://www.epa.gov/data>

Regulations.gov

<https://www.regulations.gov/>

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<https://www.usa.gov/>

White House

<https://www.whitehouse.gov/>

Frequent Questions

<https://www.epa.gov/aboutepa/frequent-questions-specific-epa-programstopics>

Follow.

Last updated on May 13, 2024

Data Refresh Information

<https://epa.gov/resources/echo-data/about-the-data#sources>

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An official website of the United States government

Property Details for Hartsook

On this page:

- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes

Legal Notices <https://www.epa.gov/cleanups/cimc-legal-notices>

Profile Information

Property Alias	
Property Owner	
ACRES Property ID	**239767**
Property Address	**210 Market Street SE ROANOKE, VA 24011**
Size	**.16**
Parcel Numbers	
Latitude/Longitude	**37.2713612 / -79.938868**
Congressional District	**6**
Property Contact	**Fred, Felicia** **Fred.Felicia@epa.gov** **215-814-5524**

Top o

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Property Location

Top o

Property Progress

Assessment	✗
Clean Up	✗
Institutional Controls in Place	✗
Engineering Controls in Place	✗
Ready for Anticipated Use	✓
Redevelopment Underway	✗

Top o

CAs Associated with this Property

CA Name	CA #	State	Type	Announcement Year
City of Roanoke	BF96339901	VA	Assessment	2015

Top o

Assessment Activities at this Property

Activity	EPA Funding	Start Date	Completion Date	CA	Accomplishment Counted?	Count When
Phase I Environmental Assessment	$4,300.00	03/21/2019	07/03/2019	City of Roanoke	Y	FY20

Is Cleanup Necessary? **No**
EPA Assessment Funding: **$4,300.00**
Leveraged Funding:
Total Funding: **$4,300.00**

Top o

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Climate Adaption and Mitigation - Planning or Assessmen

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

Top o

Contaminants and Media

Contaminant Found

Media Affected

Remediating Action for Contaminants

Remediating Action for Media

Top o

Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:

Cleanup/Treatement Categories:

Addl Cleanup/Treatment info:

Address of Data Source:

Top o

Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top o

Institutional and Engineering Controls

Indicate whether Institutional Controls are required	U
Categories of Controls	
Additional Institutional Controls Information	
Address of Data Source (URL if available)	
Are Institutional Controls in Place	
Date Institutional Controls were put in place	

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Indicate whether Engineering Controls are required	
Categories of Controls	
Additional Engineering controls information	
Address of Data Source (URL if available)	
Indicate whether Engineering Controls are in place	
Date Engineering Controls were put in place	

Top o

Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:	
Actual Acreage of Greenspace Created:	
Leveraged Funding:	

Top o

Climate Adaption and Mitigation - Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

Top o

Additional Property Attributes

Property Highlights	
Predominant Past Usage	**Commercial (.16)**
What types of funding are being used on this property?	**Hazardous**
State and Tribal Program Information	
Date No Further Action Letter Received	
Date Letter/Signed Report Received from a Qualified Professional	
Other Cleanup Documentation	

Top o

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An official website of the United States government

Property Details for Historic Fire Station #1

On this page:

- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes

Legal Notices <https://www.epa.gov/cleanups/cimc-legal-notices>

Profile Information

Property Alias	
Property Owner	
ACRES Property ID	**238036**
Property Address	**13 Church Ave SE ROANOKE, VA 24011**
Size	**.25**
Parcel Numbers	**4011706**
Latitude/Longitude	**37.270202 / -79.93995000000001**
Congressional District	**6**
Property Contact	**Fred, Felicia** **Fred.Felicia@epa.gov** **215-814-5524**

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Property Location

Top o

Property Progress

- Assessment ✖
- Clean Up ✖
- Institutional Controls in Place ✖
- Engineering Controls in Place ✖
- Ready for Anticipated Use ✖
- Redevelopment Underway ✖

Top o

CAs Associated with this Property

CA Name	CA #	State	Type	Announcement Year
City of Roanoke	BF96339901	VA	Assessment	2015

Top o

Assessment Activities at this Property

Activity	EPA Funding	Start Date	Completion Date	CA	Accomplishment Counted?	Count When
Phase I Environmental Assessment	$2,800.00	09/05/2018		City of Roanoke	N	

Is Cleanup Necessary? **No**
EPA Assessment Funding: **$2,800.00**
Leveraged Funding:
Total Funding: **$2,800.00**

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Climate Adaption and Mitigation – Planning or Assessmen

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

Top o

Contaminants and Media

Contaminant Found	Remediating Action for Contaminants
Media Affected	Remediating Action for Media

Top o

Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:
Cleanup/Treatement Categories:
Addl Cleanup/Treatment info:
Address of Data Source:

Top o

Climate Adaption and Mitigation – Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top o

Institutional and Engineering Controls

Indicate whether Institutional Controls are required	**No**
Categories of Controls	
Additional Institutional Controls Information	
Address of Data Source (URL if available)	
Are Institutional Controls in Place	
Date Institutional Controls were put in place	

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Indicate whether Engineering Controls are required	**No**
Categories of Controls	
Additional Engineering controls information	
Address of Data Source (URL if available)	
Indicate whether Engineering Controls are in place	
Date Engineering Controls were put in place	

Top o

Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

Top o

Climate Adaption and Mitigation – Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

Top o

Additional Property Attributes

Property Highlights	
Predominant Past Usage	
What types of funding are being used on this property?	**Hazardous**
State and Tribal Program Information	
Date No Further Action Letter Received	
Date Letter/Signed Report Received from a Qualified Professional	
Other Cleanup Documentation	

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<https://www.epa.gov/home/wwwepagov-snapshots>

Grants
<https://www.epa.gov/grants>

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Tim Sakowski

From: FOIARoanoke (DEQ) <FOIARoanoke@deq.virginia.gov>
Sent: Wednesday, March 5, 2025 8:34 AM
To: Tim Sakowski
Subject: 706-25-0463 FOIA Response
Attachments: Gateway Project FOIA.docx

CAUTION: External Sender. Please do not click on links or open attachments from senders you do not trust.

Good morning,

This is in regards to your attached VA FOIA request.

We were not able to locate records based on the address you provided, but if you'd like to search for environmental impacts in the surrounding area, please visit the GIS portion of our website.

Respectfully,

BRRO FOIA
Blue Ridge Regional Office
Virginia Department of Environmental Quality
901 Russell Drive
Salem, VA 24153
(540) 562-6700

From: Tim Sakowski <tim.sakowski@westwoodps.com>
Sent: Saturday, March 1, 2025 12:05 PM
To: FOIARoanoke (DEQ) <foiaroanoke@deq.virginia.gov>
Cc: Emily Salkind <emily.salkind@westwoodps.com>
Subject: Gateway Project FOIA Request

CAUTION: This Email originated from OUTSIDE of the COV. Do not open attachments or click links unless this email comes from a known sender and you know the content is safe..

Good afternoon.

I am submitting a Freedom of Information Act (FOIA) request for the property located at 708 Bullitt Ave SE in Roanoke, Virginia. Please let me know if you have any questions.

Sincerely,

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Tim Sakowski, G.I.T.
Graduate Environmental Scientist
15871 City View Drive, Suite 200, Midlothian, VA 23113
Roanoke / Richmond / New River Valley / Shenandoah Valley
main 804.794.0571
direct 804.707.7166
balzer.cc
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Please note this email address has changed. New email addresses for Balzer and Associates, a Westwood company, are now in effect. Emails sent to our previous addresses will be forwarded to the new ones. During our transition to Westwood Professional Services, you may receive emails from either address. Thank you for your understanding!

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Appendix F:

Vapor Encroachment Evaluation

Gateway Project - Homes for America
632 Bullitt Avenue Southeast
Roanoke, VA 24013

Inquiry Number: 7912252.2s
March 1, 2025

EDR Vapor Encroachment Screen

Prepared using EDR's Vapor Encroachment Worksheet

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	**ES1**
Primary Map	**2**
Secondary Map	**3**
Map Findings	**4**
Record Sources and Currency	**GR-1**

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by EDR. The report was designed to assist parties seeking to meet the search requirements of the ASTM Standard Practice for Assessment of Vapor Encroachment into Structures on Property Involved in Real Estate Transactions (E 2600).

STANDARD ENVIRONMENTAL RECORDS	Default Area of Concern (Miles)*	property	1/10	> 1/10
Lists of Federal NPL (Superfund) sites	1.0	0	0	0
Lists of Federal Delisted NPL sites	1.0	0	0	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders	0.5	0	0	0
Lists of Federal CERCLA sites with NFRAP	0.5	0	0	0
Lists of Federal RCRA facilities undergoing Corrective Action	1.0	0	0	0
Lists of Federal RCRA TSD facilities	0.5	0	0	0
Lists of Federal RCRA generators	0.25	0	0	0
Federal institutional controls / engineering controls registries	0.5	0	0	0
Federal ERNS list	0.001	0	1	-
Lists of state- and tribal (Superfund) equivalent sites	not searched	-	-	-
Lists of state- and tribal hazardous waste facilities	1.0	0	0	0
Lists of state and tribal landfills and solid waste disposal facilities	0.5	0	0	0
Lists of state and tribal leaking storage tanks	0.5	0	0	5
Lists of state and tribal registered storage tanks	0.25	0	0	1
State and tribal institutional control / engineering control registries	0.5	0	0	0
Lists of state and tribal voluntary cleanup sites	0.5	0	0	0
Lists of state and tribal brownfield sites	0.5	0	0	0

ADDITIONAL ENVIRONMENTAL RECORDS				
Local Brownfield lists	0.5	0	0	0
Local Lists of Landfill / Solid Waste Disposal Sites	0.5	0	0	0
Local Lists of Hazardous waste / Contaminated Sites	0.001	0	0	-
Local Lists of Registered Storage Tanks	not searched	-	-	-
Local Land Records	0.001	0	0	-
Records of Emergency Release Reports	0.001	0	0	-
Other Ascertainable Records	1.0	0	0	2

EDR HIGH RISK HISTORICAL RECORDS				
EDR Exclusive Records	1.0	0	0	0
Exclusive Recovered Govt. Archives	0.001	0	0	-

EXECUTIVE SUMMARY

EDR RECOVERED GOVERNMENT ARCHIVES

EDR Exclusive Records	1.0	0	0	0
Exclusive Recovered Govt. Archives	0.001	0	0	-

*The Default Area of Concern may be adjusted by the environmental professional using experience and professional judgement. Each category may include several databases, and each database may have a different distance. A list of individual databases is provided at the back of this report.

EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

GATEWAY PROJECT - HOMES FOR AMERICA
632 BULLITT AVENUE SOUTHEAST
ROANOKE, VA 24013

COORDINATES

Latitude (North):	37.267948 - 37° 16′ 4.6133423″
Longitude (West):	79.931249 - 79° 55′ 52.505493″
Elevation:	962 ft. above sea level

EXECUTIVE SUMMARY

SEARCH RESULTS

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Name	Address	Dist/Dir	Map ID	Page
708 BULLITT AVE SE ERNS: ERNS	708 BULLITT AVE SE	<1/10 ESE	▲ 1	8
806 MOUNTAIN AVE PROPERTY LTANKS: LTANKS	806 MOUNTAIN AVE SE	1/10 - 1/3 SE	▲ 2	13
SHELOR ALLAN PROPERTY LTANKS: LTANKS	654 HIGHLAND AVE	1/10 - 1/3 S	▲ 4	15
STONEWALL JACKSON MIDDLE SCHOOL UST: UST LTANKS: LTANKS	1022 9TH STREET S.W.	1/10 - 1/3 SE	▲ E5	16
STONEWALL JACKSON MIDDLE#SCHOOL LUST: LUST REG NO	1022 9TH ST. SE	1/10 - 1/3 SE	▲ E6	19
NINTH STREET CHURCH OF THE BRETHEREN PARSONAGE LTANKS: LTANKS	745 MONTROSE AVE SE	1/10 - 1/3 SE	▲ 8	21

ADDITIONAL ENVIRONMENTAL RECORDS

Name	Address	Dist/Dir	Map ID	Page
STAR VALLEY MINUTE MART UST FINDER: UST FINDER	831 HIGHLAND AVE	1/10 - 1/3 ESE	▲ 3	14
STONEWALL JACKSON MIDDLE SCHOOL UST FINDER: UST FINDER	1022 9TH STREET S.W.	1/10 - 1/3 SE	▲ E7	20

EDR HIGH RISK HISTORICAL RECORDS

Name	Address	Dist/Dir	Map ID	Page

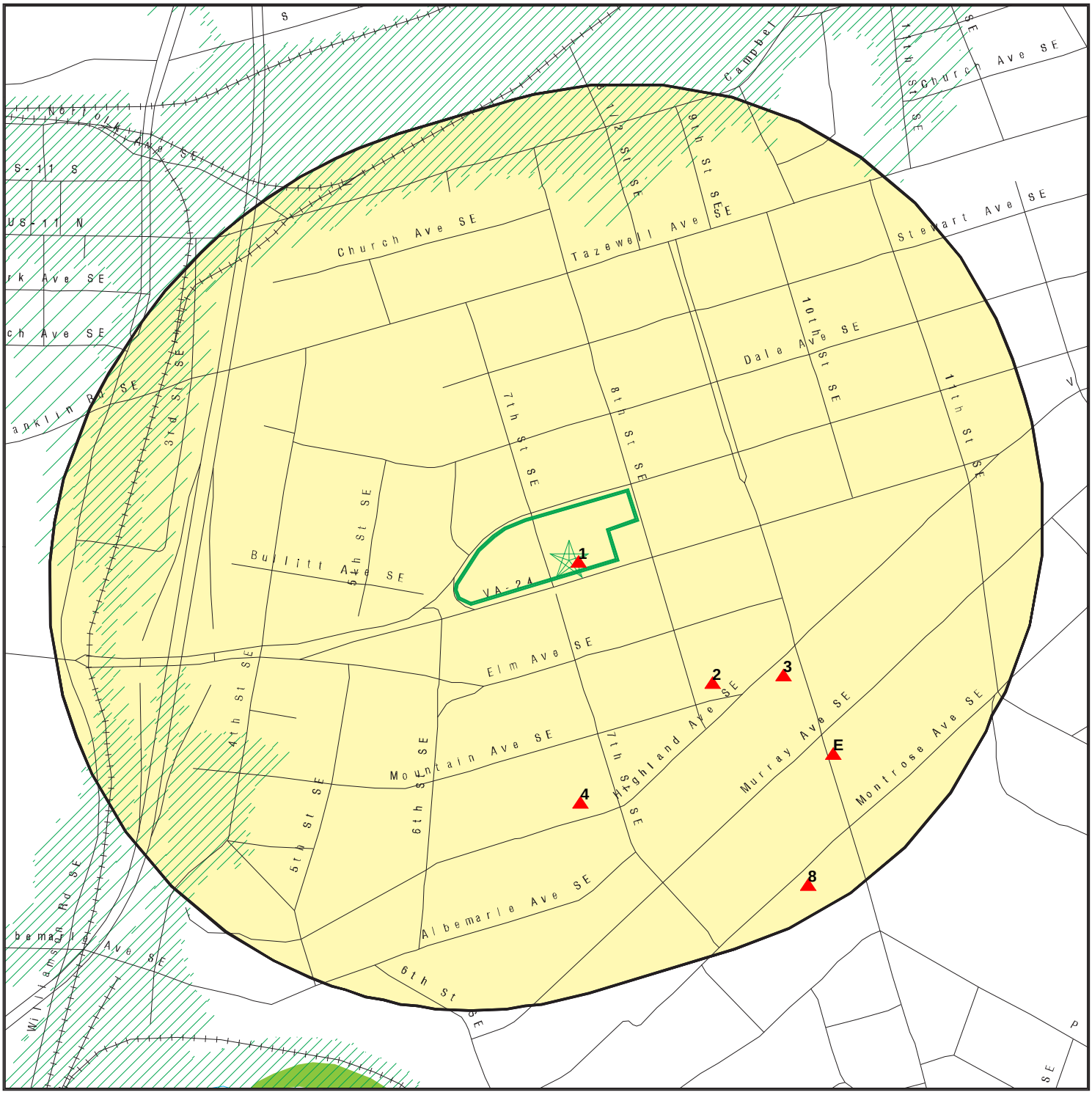
Not Reported

EDR RECOVERED GOVERNMENT ARCHIVES

Name	Address	Dist/Dir	Map ID	Page

Not Reported

PRIMARY MAP - 7912252.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 300 1/3 Miles

Indian Reservations BIA

Special Flood Hazard Area (1%)

0.2% Annual Chance Flood Hazard

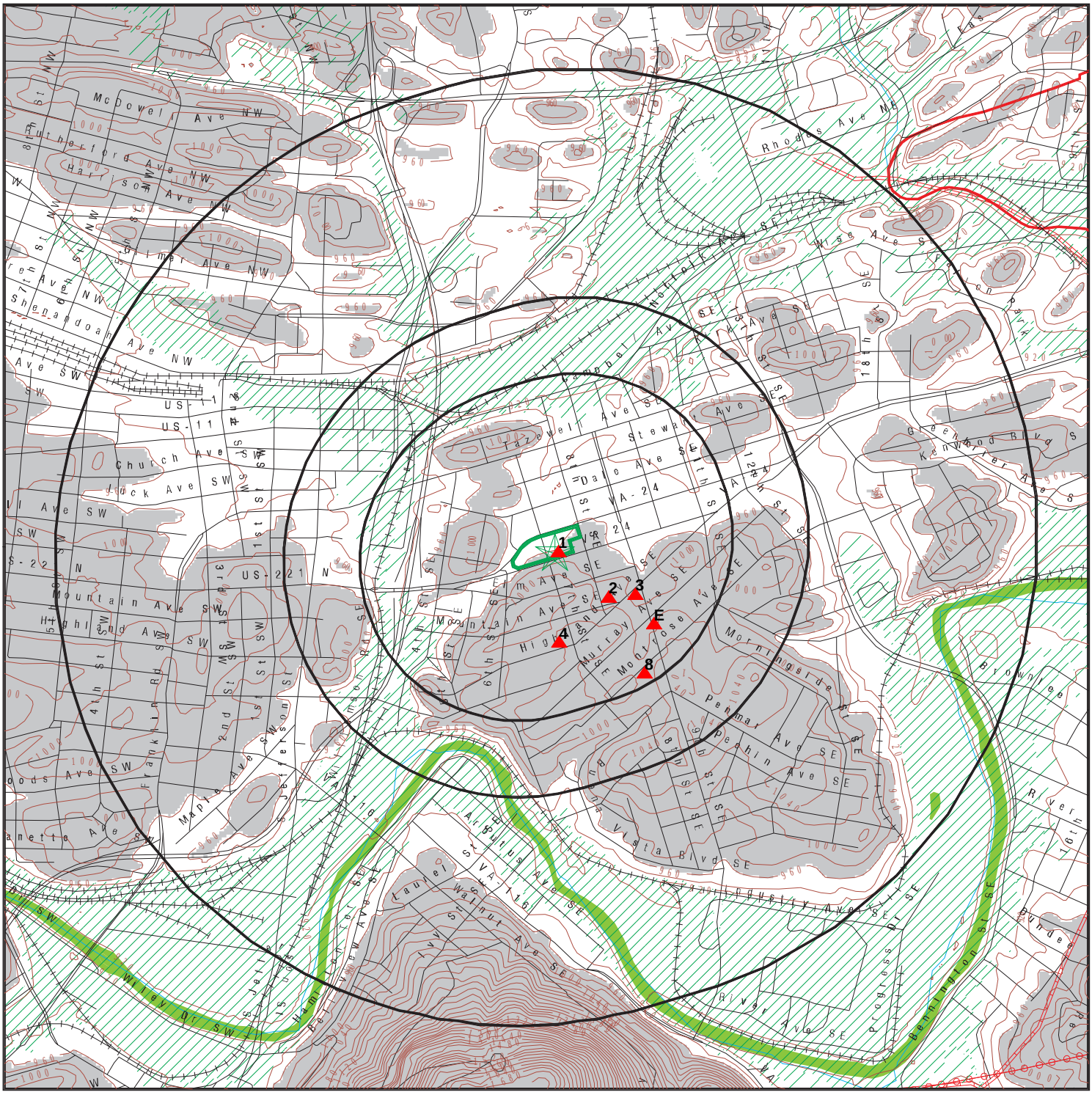
National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Gateway Project - Homes for America	CLIENT:	Balzer & Associates
ADDRESS:	632 Bullitt Avenue Southeast Roanoke VA 24013	CONTACT:	Tim Sakowski
LAT/LONG:	37.267948 / 79.931249	INQUIRY #:	7912252.2s
		DATE:	February 28, 2025 1:50 pm

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SECONDARY MAP - 7912252.2S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Power transmission lines
- Pipelines
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- Upgradient Area

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Gateway Project - Homes for America	CLIENT:	Balzer & Associates
ADDRESS:	632 Bullitt Avenue Southeast Roanoke VA 24013	CONTACT:	Tim Sakowski
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		DATE:	February 28, 2025 1:50 pm

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MAP FINDINGS

LEGEND

FACILITY NAME **FACILITY ADDRESS, CITY, ST, ZIP**		EDR SITE ID NUMBER
◆ MAP ID#	Direction Distance Range (Distance feet / miles) Relative Elevation Feet Above Sea Level	ASTM 2600 Record Sources found in this report. Each database searched has been assigned to one or more categories. For detailed information about categorization, see the section of the report Records Searched and Currency.

Worksheet:

Comments:
Comments may be added on the online Vapor Encroachment Worksheet.

DATABASE ACRONYM: Applicable categories (A hoverbox with database description).

708 BULLITT AVE SE 708 BULLITT AVE SE, ROANOKE, VA, 24016		2016140852
▲ 1	ESE <1/10 (0 ft. / 0 mi.) 3 ft. Higher Elevation 965 ft. Above Sea Level	Federal ERNS list

Worksheet:

Incident Commons: Federal ERNS list

NRC Report #:	1140852
Description of Incident:	CALLER IS REPORTING THAT A HOUSE IS BEING REHABILITATED AND THE COMPANY HAS NOT CONTAINED LEAD BASED PAINT DUST AND CHIPS THAT ARE GOING INTO THE AIR IN THE SURROUNDING AREA.
Type of Incident:	FIXED
Incident Cause:	OTHER
Incident Date Time:	2016-01-11 12:00:00
Incident DTG:	OCCURRED
Incident Location:	Not Reported
Loaction Address:	708 BULLITT AVE SE
Location Street 1:	Not Reported
Location Street 2:	Not Reported
Location Nearest City:	ROANOKE
Location State:	VA
Location County:	ROANOKE
Location Zip:	24016
Distance From City:	Not Reported
Distance Units:	Not Reported
Direction From City:	Not Reported
Lat Deg:	Not Reported
Lat Min:	Not Reported
Lat Sec:	Not Reported
Lat Quad:	Not Reported
Long Deg:	Not Reported

708 BULLITT AVE SE, 708 BULLITT AVE SE, ROANOKE, VA 24016 (Continued)

Long Min:	Not Reported
Long Sec:	Not Reported
Long Quad:	Not Reported
Location Section:	Not Reported
Location Township:	Not Reported
Location range:	Not Reported
Potential Range:	N

Incidents:

Year:	2016
NRC Report #:	1140852
Aircraft Type:	Not Reported
Aircraft Model:	Not Reported
Aircraft ID:	Not Reported
Aircraft Fuel Capacity:	Not Reported
Aircraft Fuel Capacity Units:	Not Reported
Aircraft Fuel on Board:	Not Reported
Aircraft Fuel on Board Units:	Not Reported
Aircraft Spot Number:	Not Reported
Aircraft Hanger:	Not Reported
Aircraft Runway Number:	Not Reported
Road Mile Marker:	Not Reported
Building ID:	Not Reported
Type of Fixed Object:	PRIVATE RESIDENCE
Power Generating Facility:	N
Generating Capacity:	Not Reported
Type of Fuel:	Not Reported
NPDES:	Not Reported
NPDES Compliance:	U
Pipeline Type:	Not Reported
DOT Regulated:	U
Pipeline Above Ground:	ABOVE
Exposed Underwater:	N
Pipeline Covered:	U
Railroad Hotline:	Not Reported
Grade Crossing:	U
Location Subdivision:	Not Reported
Railroad Milepost:	Not Reported
Type Vehicle Involved:	Not Reported
Crossing Device Type:	Not Reported
Device Operational:	U
DOT Crossing Number:	Not Reported
Brake Failure:	U
Description of Tank:	Not Reported
Tank Above Ground:	ABOVE
Transportable Container:	U
Tank Regulated:	U
Tank Regulated By:	Not Reported
Tank ID:	Not Reported
Capacity of Tank:	Not Reported

708 BULLITT AVE SE, 708 BULLITT AVE SE, ROANOKE, VA 24016 (Continued)

Capacity of Tank Units:	Not Reported
Actual Amount:	Not Reported
Actual Amount Units:	Not Reported
Platform Rig Name:	Not Reported
Platform Letter:	Not Reported
Location Area ID:	Not Reported
Location Block ID:	Not Reported
OCSG Number:	Not Reported
OCSP Number:	Not Reported
State Lease Number:	Not Reported
Pier Dock Number:	Not Reported
Berth Slip Number:	Not Reported
Continuous Release Type:	Not Reported
Initial Continuous Release No:	Not Reported
Continuous Release Permit:	Not Reported
Allision:	U
Type of Structure:	Not Reported
Structure Name:	Not Reported
Structure Operational:	U
Airbag Deployed:	U
Date Tiem Normal Service:	Not Reported
Service Disruption Time:	Not Reported
Service Disruption Units:	Not Reported
Transit Bus Flag:	Not Reported
CR Begin Date:	Not Reported
CR End Date:	Not Reported
CR Change Date:	Not Reported
FBI Contact:	Not Reported
FBI Contact Date Time:	Not Reported
Sub Part C Testing Req:	XXX
Conductor Testing:	Not Reported
Engineer Testing:	Not Reported
Trainman Testing:	Not Reported
Yard Foreman Testing:	Not Reported
RCL Operator Testing:	Not Reported
Brakeman Testing:	Not Reported
Train Dispatcher Testing:	Not Reported
Signalman Testing:	Not Reported
Other Employee Testing:	Not Reported
Unknown Testing:	Not Reported
Passenger Handling:	Not Reported
Passenger Route:	XXX
Passenger Delay:	XXX

Incident Details:

Year:	2016
NRC Report #:	1140852
Fire Involved:	N
Fire Extinguished:	U

708 BULLITT AVE SE, 708 BULLITT AVE SE, ROANOKE, VA 24016 (Continued)

Any Evacuations:	N
Number Evacuated:	Not Reported
Who Evacuated:	Not Reported
Radius of Evacuation:	Not Reported
Any Injuries:	N
Number Injured:	Not Reported
Number Hospitalized:	Not Reported
Any Fatalities:	N
Number Fatalities:	Not Reported
Any Damages:	N
Damage Amount:	Not Reported
Air Corridor Closed:	N
Air Corridor Desc:	Not Reported
Air Closure Time:	Not Reported
Waterway Closed:	N
Waterway Desc:	Not Reported
Waterway Closure Time:	Not Reported
Road Closed:	N
Road Desc:	Not Reported
Road Closure Time:	Not Reported
Closure Direction:	Not Reported
Major Artery:	N
Track Closed:	N
Track Desc:	Not Reported
Track Closure Time:	Not Reported
Media Interest:	NONE
Medium Desc:	AIR
Additional Medium Info:	AIR IN THE LOCAL AREA
Body of Water:	Not Reported
Tributary of:	Not Reported
Release Secured:	U
Estimated Duration of Release:	Not Reported
Release rate:	Not Reported
Desc Remedial Action:	Not Reported
State Agency on Scene:	Not Reported
State Agency Report Number:	Not Reported
Other Agency Notified:	Not Reported
Weather Conditions:	Not Reported
Air Temperature:	Not Reported
Wind Speed:	Not Reported
Wind Direction:	Not Reported
Water Supply Contaminated:	U
Sheen Size:	Not Reported
Sheen Color:	Not Reported
Direction of Sheen Travel:	Not Reported
Sheen Odor Description:	Not Reported
Wave Condition:	Not Reported
Current Speed:	Not Reported
Current Direction:	Not Reported
Water Temperature:	Not Reported

708 BULLITT AVE SE, 708 BULLITT AVE SE, ROANOKE, VA 24016 (Continued)

Track Close Dir:	Not Reported
Empl Fatality:	Not Reported
Pass Fatality:	Not Reported
Community Impact:	Not Reported
Wind Speed Unit:	Not Reported
Employee Injuries:	Not Reported
Passenger Injuries:	Not Reported
Occupant Fatality:	Not Reported
Current Speed Unit:	Not Reported
Road Closure Units:	Not Reported
Track CLosure Units:	Not Reported
Sheen Size Units:	Not Reported
Additional Info:	Not Reported
State Agency Notified:	Not Reported
Federal Agency Notified:	Not Reported
nearest River Mile Marker:	Not Reported
Sheen Size Length:	Not Reported
Sheen Size Length Units:	Not Reported
Sheen Size Width:	Not Reported
Sheen Size Width Units:	Not Reported
Offshore:	N
Duration Unit:	Not Reported
Release Rate Unit:	Not Reported
Release Rate Rate:	Not Reported
Passengers Transferred:	NO

Calls:

Year:	2016
NRC Report #:	1140852
Site ID:	20161140852
Date Time Received:	2016-02-19 12:34:11
Date Time Complete:	2016-02-19 12:43:38
Call Type:	INC
Responsible Company:	Not Reported
Responsible Org Type:	PRIVATE ENTERPRISE
Responsible City:	Not Reported
Responsible State:	VA
Responsible Zip:	Not Reported
On Behalf:	Not Reported
Source:	TELEPHONE

Material Involved:

Year:	2016
NRC Report #:	1140852
Chris Code:	NCC
Case Number:	000000-00-0
UN Number:	Not Reported
Amount of Material:	0
Unit of Measure:	UNKNOWN AMOUNT

708 BULLITT AVE SE, 708 BULLITT AVE SE, ROANOKE, VA 24016 (Continued)

Name of Material:	LEAD BASED PAINT DUST AND CHIPS
If Reached Water:	NO
Amount in Water:	Not Reported
Unit of Measure Reach Water:	Not Reported

806 MOUNTAIN AVE PROPERTY 806 MOUNTAIN AVE SE, ROANOKE, VA, 24013			S129369459
▲ 2	SE 1/10 - 1/3	(680 ft. / 0.129 mi.)	Lists of state and tribal leaking storage tanks
	31 ft. Higher Elevation	993 ft. Above Sea Level	

Worksheet:

LTANKS: Lists of state and tribal leaking storage tanks

Name:	806 MOUNTAIN AVE PROPERTY
Address:	806 MOUNTAIN AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000896294
Case Status:	**Closed**
Pollution Complaint #:	20232155
Reported:	02/14/2023
Case Closed Date:	09/11/2023
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	Yes
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not Reported
Heating Oil Category:	Category 1
Changed By:	Not Reported
Changed Date:	Not Reported
Inserted By:	Not Reported
Inserted Date:	Not Reported
Verified By:	Not Reported
Verify Date:	Not Reported
Reference Point:	Not Reported
RST ID:	Not Reported
RST Poll Complaint Number:	Not Reported
Des First Name:	Not Reported

806 MOUNTAIN AVE PROPERTY, 806 MOUNTAIN AVE SE, ROANOKE, VA 24013 (Continued)

Des Last Name:	Not Reported
RST Rec Code:	Not Reported
RST Priority:	Not Reported
RST Fed Reg Tank:	Not Reported
RST Responsibility Ind:	Not Reported
RST Suspect Confirm Ind:	Not Reported
Facility Location:	Not Reported
FIC Description:	Not Reported
Latitude:	Not Reported
Longitude:	Not Reported

STAR VALLEY MINUTE MART 831 HIGHLAND AVE, ROANOKE, VA, 24013		1028796443
▲ 3	ESE 1/10 - 1/3 (880 ft. / 0.167 mi.)	Other Ascertainable Records
	15 ft. Higher Elevation 977 ft. Above Sea Level	

Worksheet:

UST FINDER: Other Ascertainable Records

Object ID:	508827
Facility ID:	VA2017636
Name:	STAR VALLEY MINUTE MART
Address:	831 HIGHLAND AVE
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	PointAddress
Open USTs:	0
Closed USTs:	2
TOS USTs:	0
Population 1500ft:	1713
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not Reported
SPA Water Type:	Not Reported
SPA Facility Type:	Not Reported
SPA HUC12:	Not Reported
Within WHPA:	No
WHPA PWS Facility ID:	Not Reported
WHPA Water Type:	Not Reported
WHPA Facility Type:	Not Reported
WHPA HUC12:	Not Reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not Reported
EPA Region:	3
Tribe:	Not Reported
Coordinate Source:	Geocode
X Coord:	-79.9282251499999

STAR VALLEY MINUTE MART, 831 HIGHLAND AVE, ROANOKE, VA 24013 (Continued)

Y Coord:	37.2666637900001
Latitude:	37.26666379
Longitude:	-79.92822515

UST FINDER:

Object ID:	2037956
Facility ID:	VA2017636
Tank ID:	VA2017636_R1
Tank Status:	Closed
Installation Date:	1976/05/06 16:00:00+00
Removal Date:	1999/11/15 15:59:59+00
Tank Capacity:	10000
Substances:	GASOLINE
Tank Wall Type:	Single

Object ID:	2037957
Facility ID:	VA2017636
Tank ID:	VA2017636_R2
Tank Status:	Closed
Installation Date:	1976/05/06 16:00:00+00
Removal Date:	1999/11/15 15:59:59+00
Tank Capacity:	8000
Substances:	GASOLINE
Tank Wall Type:	Single

SHELOR ALLAN PROPERTY 654 HIGHLAND AVE, ROANOKE, VA, 24013			S125934376
▲ 4	S 1/10 - 1/3	(968 ft. / 0.183 mi.)	Lists of state and tribal leaking storage tanks
	58 ft. Higher Elevation	1020 ft. Above Sea Level	

Worksheet:

LTANKS: Lists of state and tribal leaking storage tanks

Name:	SHELOR ALLAN PROPERTY
Address:	654 HIGHLAND AVE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000890052
Case Status:	**Closed**
Pollution Complaint #:	20202092
Reported:	10/31/2019
Case Closed Date:	03/19/2020
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No

SHELOR ALLAN PROPERTY, 654 HIGHLAND AVE, ROANOKE, VA 24013 (Continued)

Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	Yes
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not Reported
Heating Oil Category:	Category 1
Changed By:	Not Reported
Changed Date:	Not Reported
Inserted By:	Not Reported
Inserted Date:	Not Reported
Verified By:	Not Reported
Verify Date:	Not Reported
Reference Point:	Not Reported
RST ID:	Not Reported
RST Poll Complaint Number:	Not Reported
Des First Name:	Not Reported
Des Last Name:	Not Reported
RST Rec Code:	Not Reported
RST Priority:	Not Reported
RST Fed Reg Tank:	Not Reported
RST Responsibility Ind:	Not Reported
RST Suspect Confirm Ind:	Not Reported
Facility Location:	Not Reported
FIC Description:	Not Reported
Latitude:	Not Reported
Longitude:	Not Reported

STONEWALL JACKSON MIDDLE SCHOOL 1022 9TH STREET S.W., ROANOKE, VA, 24013			U003677765
▲ E5	SE 1/10 - 1/3	(1261 ft. / 0.239 mi.)	Lists of state and tribal leaking storage tanks Lists of state and tribal registered storage tanks
	35 ft. Higher Elevation	997 ft. Above Sea Level	

Worksheet:

LTANKS: Lists of state and tribal leaking storage tanks

Name:	STONEWALL JACKSON MIDDLE SCHOOL
Address:	1022 9TH STREET S.W.
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000082003
Case Status:	**Closed**
Pollution Complaint #:	19921260
Reported:	01/17/1992
Case Closed Date:	08/03/1994

STONEWALL JACKSON MIDDLE SCHOOL, 1022 9TH STREET S.W., ROANOKE, VA 24013 (Continued)

Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	Yes
Small Heating Oil AST (2):	No
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not Reported
Heating Oil Category:	Category 3
Changed By:	Not Reported
Changed Date:	Not Reported
Inserted By:	Not Reported
Inserted Date:	Not Reported
Verified By:	Not Reported
Verify Date:	Not Reported
Reference Point:	Not Reported
RST ID:	Not Reported
RST Poll Complaint Number:	Not Reported
Des First Name:	Not Reported
Des Last Name:	Not Reported
RST Rec Code:	Not Reported
RST Priority:	Not Reported
RST Fed Reg Tank:	Not Reported
RST Responsibility Ind:	Not Reported
RST Suspect Confirm Ind:	Not Reported
Facility Location:	Not Reported
FIC Description:	Not Reported
Latitude:	Not Reported
Longitude:	Not Reported

Facility: Lists of state and tribal registered storage tanks

Name:	STONEWALL JACKSON MIDDLE SCHOOL
Address:	1022 9TH STREET S.W.
City,State,Zip:	ROANOKE, VA 24013
Facility Id:	2024064
Facility Type:	LOCAL
CEDS Facility ID:	200000082003

Owner:

Owner Id:	29801
Owner Name:	Roanoke City School Board
Owner Address:	PO Box 13105
Owner Address2:	Not Reported
Owner City, State, Zip:	Roanoke, VA 24031

STONEWALL JACKSON MIDDLE SCHOOL, 1022 9TH STREET S.W., ROANOKE, VA 24013 (Continued)

Owner Type:	LOCAL
Number of Active AST:	0
Number of Active UST:	0
Number of Inactive AST:	0
Number of Inactive UST:	1

UST:

Facility ID:	2024064
Federally Regulated:	No
Tank Number:	R1
Tank Capacity:	10000
Tank Contents:	HEATING OIL
Tank Status:	**REM FROM GRD**
Tank Type:	UST

Tank Material:

Install Date:	9/1/1973
Tank Materials: Bare Steel	Yes
Tank Materials: Cath Protect Steel	No
Tank Materials: Epoxy Steel	No
Tank Materials: Fiberglass	No
Tank Materials: Concrete	Not Reported
Tank Materials: Composite	No
Tank Materials: Double Walled	No
Tank Materials: Lined Interior	No
Tank Materials: Excav Liner	No
Tank Materials: Insulated Tank Jacket	No
Tank Materials: Repaired	No
Tank Materials: Unknown	No
Tank Materials: Other	No
Tank Materials: Other Note	Not Reported

Release Detection:

Tank Release Detection: Leak Deferred	No
Tank Release Detection: Manual Gauge	No
Tank Release Detection: Auto Gauge	No
Tank Release Detection:Tank Tightness	No
Tank Release Detection: Vapor Monitor	No
Tank Release Detection: Inventory	No
Tank Release Detection: Stat Invent Recon	No
Tank Release Detection: Spill Install	No
Tank Release Detection: Overfill Install	No
Tank Release Detection: Groundwater	No

STONEWALL JACKSON MIDDLE SCHOOL, 1022 9TH STREET S.W., ROANOKE, VA 24013 (Continued)

Tank Release Detection: Int Sec Containment	No
Tank Release Detection: Int Double Walled	No
Tank Release Detection: Other Method	No
Tank Release Detection: Other Note	Not Reported
Pipe Release Detection: Leak Deferred	Not Reported
Pipe Release Detection: Autoleak	Not Reported
Pipe Release Detection: Line Tightness	No
Pipe Release Detection: Stat Invent Recon	No
Pipe Release Detection: Groundwater	No
Pipe Release Detection: Int Sec Containment	No
Pipe Release Det: Interior Double Walled	No
Pipe Release Detection: Other Method	No
Pipe Release Detection: Other Note	Not Reported
Pipe Type:	NO VALVE SUCTION
Pipe Materials: Bare Steel	No
Pipe Materials: Galvanized Steel	Yes
Pipe Materials: Copper	No
Pipe Materials: Fiberglass	No
Pipe Materials: Cath Protect	No
Pipe Materials: Double Walled	No
Pipe Materials: Sec Containment	No
Pipe Materials: Repaired	No
Pipe Materials: Unknown	No
Pipe Materials: Other	No
Pipe Materials: Other Note	Not Reported

STONEWALL JACKSON MIDDLE#SCHOOL 1022 9TH ST. SE, ROANOKE, VA, -0-			S105027836
▲ E6	SE 1/10 - 1/3	(1261 ft. / 0.239 mi.)	Lists of state and tribal leaking storage tanks
	35 ft. Higher Elevation	997 ft. Above Sea Level	

Worksheet:

LUST REG WC: Lists of state and tribal leaking storage tanks

Region:	WC
Case Status:	Not Reported
Date Reported:	01/17/1992
Date Closed:	1994-08-03 00:00:00
Release Reported:	Not Reported
Pollution Control #:	92-1260
Case Manager:	Not Reported

STONEWALL JACKSON MIDDLE#SCHOOL, 1022 9TH ST. SE, ROANOKE, VA -0- (Continued)

Owner Name:	ROANOKE CITY PUB. SCHOOLS
Owner Address:	250 RESERVE AVE.
Owner City,St,Zip:	ROANOKE, VA 24016
Owner Phone:	703-981-2851

STONEWALL JACKSON MIDDLE SCHOOL 1022 9TH STREET S.W., ROANOKE, VA, 24013			1028797014
▲ E7	SE 1/10 - 1/3	(1261 ft. / 0.239 mi.)	Other Ascertainable Records
	35 ft. Higher Elevation	997 ft. Above Sea Level	

Worksheet:

UST FINDER: Other Ascertainable Records

Object ID:	508812
Facility ID:	VA2024064
Name:	STONEWALL JACKSON MIDDLE SCHOOL
Address:	1022 9TH STREET S.W.
City,State,Zip:	ROANOKE, VA 24013
Address Match Type:	StreetAddress
Open USTs:	0
Closed USTs:	1
TOS USTs:	0
Population 1500ft:	1603
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not Reported
SPA Water Type:	Not Reported
SPA Facility Type:	Not Reported
SPA HUC12:	Not Reported
Within WHPA:	No
WHPA PWS Facility ID:	Not Reported
WHPA Water Type:	Not Reported
WHPA Facility Type:	Not Reported
WHPA HUC12:	Not Reported
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not Reported
EPA Region:	3
Tribe:	Not Reported
Coordinate Source:	Geocode
X Coord:	-79.9274195199999
Y Coord:	37.26566969
Latitude:	37.26566969
Longitude:	-79.92741952

UST FINDER:

Object ID:	2023786

STONEWALL JACKSON MIDDLE SCHOOL, 1022 9TH STREET S.W., ROANOKE, VA 24013 (Continued)

Facility ID:	VA2024064
Tank ID:	VA2024064_1
Tank Status:	Closed
Installation Date:	1973/09/01 16:00:00+00
Removal Date:	1992/01/15 15:59:59+00
Tank Capacity:	10000
Substances:	HEATING OIL
Tank Wall Type:	Single

NINTH STREET CHURCH OF THE BRETHEREN PARSONAGE 745 MONTROSE AVE SE, ROANOKE, VA, 24013			S128550609
▲ 8	SE 1/10 - 1/3	(1638 ft. / 0.31 mi.)	Lists of state and tribal leaking storage tanks
	54 ft. Higher Elevation	1016 ft. Above Sea Level	

Worksheet:

LTANKS: Lists of state and tribal leaking storage tanks

Name:	NINTH STREET CHURCH OF THE BRETHEREN PARSONAGE
Address:	745 MONTROSE AVE SE
City,State,Zip:	ROANOKE, VA 24013
City,State,Zip:	ROANOKE, VA 24013
Region:	BRRO
CEDS Facility Id:	200000894165
Case Status:	**Closed**
Pollution Complaint #:	20222114
Reported:	01/04/2022
Case Closed Date:	04/07/2022
Program:	RP Lead
Regulated Petroleum UST (1):	No
Excluded UST (1):	No
Deferred UST (1):	No
Partially Deferred UST (1):	No
Exempt 1 UST (2):	No
Exempt 2 Heating Oil UST (2):	No
Small Heating Oil AST (2):	Yes
Regulated AST (3):	No
Unregulated AST (3):	No
Other Y/N:	No
Unknown Y/N:	No
Other Description:	Not Reported
Heating Oil Category:	Category 3
Changed By:	Not Reported
Changed Date:	Not Reported
Inserted By:	Not Reported
Inserted Date:	Not Reported
Verified By:	Not Reported
Verify Date:	Not Reported

NINTH STREET CHURCH OF THE BRETHEREN PARSONAGE, 745 MONTROSE AVE SE, ROANOKE, VA 24013 (Continued)

Reference Point:	Not Reported
RST ID:	Not Reported
RST Poll Complaint Number:	Not Reported
Des First Name:	Not Reported
Des Last Name:	Not Reported
RST Rec Code:	Not Reported
RST Priority:	Not Reported
RST Fed Reg Tank:	Not Reported
RST Responsibility Ind:	Not Reported
RST Suspect Confirm Ind:	Not Reported
Facility Location:	Not Reported
FIC Description:	Not Reported
Latitude:	Not Reported
Longitude:	Not Reported

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
ENVIRONMENTAL RECORDS						
Federal NPL site list						
US	NPL	National Priority List	EPA	12/19/2024	01/02/2025	01/21/2025
US	Proposed NPL	Proposed National Priority List Sites	EPA	12/19/2024	01/02/2025	01/21/2025
US	NPL LIENS	Federal Superfund Liens	EPA	10/15/1991	02/02/1994	03/30/1994
Federal CERCLIS list						
US	SEMS	Superfund Enterprise Management System	EPA	12/19/2024	01/02/2025	01/21/2025
Federal RCRA CORRACTS facilities list						
US	CORRACTS	Corrective Action Report	EPA	09/16/2024	09/17/2024	12/06/2024
Federal RCRA TSD facilities list						
US	RCRA-TSDF	RCRA - Treatment, Storage and Disposal	Environmental Protection Agency	09/16/2024	09/17/2024	12/06/2024
Federal RCRA generators list						
US	RCRA-LQG	RCRA - Large Quantity Generators	Environmental Protection Agency	09/16/2024	09/17/2024	12/06/2024
US	RCRA-SQG	RCRA - Small Quantity Generators	Environmental Protection Agency	09/16/2024	09/17/2024	12/06/2024
US	RCRA-VSQG	RCRA - Very Small Quantity Generators (Formerly Conditionall	Environmental Protection Agency	09/16/2024	09/17/2024	12/06/2024
Federal institutional controls / engineering controls registries						
US	LUCIS	Land Use Control Information System	Department of the Navy	11/11/2024	11/25/2024	02/18/2025
US	US ENG CONTROLS	Engineering Controls Sites List	Environmental Protection Agency	11/04/2024	11/15/2024	02/11/2025
US	US INST CONTROLS	Institutional Controls Sites List	Environmental Protection Agency	11/04/2024	11/15/2024	02/11/2025
Federal ERNS list						
US	ERNS	Emergency Response Notification System	National Response Center, United States Coast	12/03/2024	12/11/2024	02/18/2025
State and tribal - equivalent CERCLIS						
VA	SHWS	This state does not maintain a SHWS list. See the Federal CE	Department of Environmental Quality			
State and tribal landfill / solid waste disposal						
VA	SWF/LF	Solid Waste Management Facilities	Department of Environmental Quality	11/21/2024	11/25/2024	02/19/2025
State and tribal leaking storage tank lists						
VA	LUST REG SC	Leaking Underground Storage Tanks	Department of Environmental Quality, South Ce	09/06/2013	09/06/2013	09/17/2013
VA	LUST REG NO	Leaking Underground Storage Tank Tracking Database	Department of Environmental Quality Northern	05/18/2004	05/22/2004	07/09/2004
VA	LUST REG PD	Leaking Underground Storage Tank Sites	Department of Environmental Quality Piedmont	12/02/2014	12/04/2014	01/16/2015
VA	LUST REG SW	Leaking Underground Storage Tank Database	Department of Environmental Quality Southwest	07/15/2013	07/18/2013	09/16/2013
VA	LUST REG TD	Leaking Underground Storage Tank Sites	Department of Environmental Quality Tidewater	06/30/2013	07/05/2013	09/16/2013
VA	LUST REG VA	Leaking Underground Storage Tank List	Department of Environmental Quality Valley Re	12/06/2011	12/08/2011	01/16/2012
VA	LUST REG WC	Leaking Underground Storage Tank List	Department of Environmental Quality West Cent	06/04/2015	06/05/2015	07/07/2015
US	INDIAN LUST R6	Leaking Underground Storage Tanks on Indian Land	EPA Region 6	05/07/2024	05/30/2024	08/28/2024
US	INDIAN LUST R5	Leaking Underground Storage Tanks on Indian Land	EPA, Region 5	04/11/2024	05/30/2024	08/28/2024
US	INDIAN LUST R9	Leaking Underground Storage Tanks on Indian Land	Environmental Protection Agency	05/07/2024	05/30/2024	08/28/2024

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	INDIAN LUST R7	Leaking Underground Storage Tanks on Indian Land	EPA Region 7	05/07/2024	05/30/2024	08/28/2024
US	INDIAN LUST R8	Leaking Underground Storage Tanks on Indian Land	EPA Region 8	05/07/2024	05/30/2024	08/28/2024
US	INDIAN LUST R4	Leaking Underground Storage Tanks on Indian Land	EPA Region 4	05/07/2024	05/30/2024	08/28/2024
US	INDIAN LUST R10	Leaking Underground Storage Tanks on Indian Land	EPA Region 10	05/07/2024	05/30/2024	08/28/2024
US	INDIAN LUST R1	Leaking Underground Storage Tanks on Indian Land	EPA Region 1	05/07/2024	05/30/2024	08/28/2024
VA	LTANKS	Leaking Petroleum Storage Tanks	Department of Environmental Quality	11/01/2024	11/18/2024	02/12/2025
State and tribal registered storage tank lists						
VA	UST	Registered Petroleum Storage Tanks	Department of Environmental Quality	11/04/2024	11/18/2024	02/12/2025
VA	AST	Registered Petroleum Storage Tanks	Department of Environmental Quality	11/04/2024	11/18/2024	02/12/2025
US	INDIAN UST R8	Underground Storage Tanks on Indian Land	EPA Region 8	05/14/2024	05/30/2024	08/28/2024
US	INDIAN UST R1	Underground Storage Tanks on Indian Land	EPA, Region 1	05/14/2024	05/30/2024	08/28/2024
US	INDIAN UST R5	Underground Storage Tanks on Indian Land	EPA Region 5	04/11/2024	05/30/2024	08/28/2024
US	INDIAN UST R6	Underground Storage Tanks on Indian Land	EPA Region 6	05/14/2024	05/30/2024	08/28/2024
US	INDIAN UST R10	Underground Storage Tanks on Indian Land	EPA Region 10	05/14/2024	05/30/2024	08/28/2024
US	INDIAN UST R4	Underground Storage Tanks on Indian Land	EPA Region 4	05/14/2024	05/30/2024	08/28/2024
US	INDIAN UST R9	Underground Storage Tanks on Indian Land	EPA Region 9	05/14/2024	05/30/2024	08/28/2024
US	INDIAN UST R7	Underground Storage Tanks on Indian Land	EPA Region 7	05/14/2024	05/30/2024	08/28/2024
US	FEMA UST	Underground Storage Tank Listing	FEMA	08/12/2024	10/30/2024	01/14/2025
State and tribal institutional control / engineering control registries						
VA	ENG CONTROLS	Engineering Controls Sites Listing	Department of Environmental Quality	09/26/2024	10/03/2024	12/20/2024
VA	INST CONTROL	Voluntary Remediation Program Database	Department of Environmental Quality	09/26/2024	10/03/2024	12/20/2024
State and tribal voluntary cleanup sites						
VA	VRP	Voluntary Remediation Program	Department of Environmental Quality	09/26/2024	10/03/2024	12/20/2024
US	INDIAN VCP R1	Voluntary Cleanup Priority Listing	EPA, Region 1	07/27/2015	09/29/2015	02/18/2016
US	INDIAN VCP R7	Voluntary Cleanup Priority Lisitng	EPA, Region 7	03/20/2008	04/22/2008	05/19/2008
State and tribal Brownfields sites						
VA	BROWNFIELDS	Brownfields Site Specific Assessments	Department of Environmental Quality	09/19/2024	10/17/2024	01/09/2025
Other Records						
US	CONSENT	Superfund (CERCLA) Consent Decrees	Department of Justice, Consent Decree Library	09/30/2024	10/09/2024	01/10/2025
US	ROD	Records Of Decision	EPA	01/29/2025	02/03/2025	02/27/2025
US	LIENS 2	CERCLA Lien Information	Environmental Protection Agency	12/19/2024	01/02/2025	01/21/2025
US	DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations	EPA, Region 9	01/12/2009	05/07/2009	09/21/2009
US	EPA WATCH LIST	EPA Watch List	Environmental Protection Agency	08/30/2013	03/21/2014	06/17/2014
US	COAL ASH DOE	Steam-Electric Plant Operation Data	Department of Energy	12/31/2023	10/16/2024	01/14/2025
US	LEAD SMELTER 1	Lead Smelter Sites	Environmental Protection Agency	12/19/2024	01/02/2025	01/21/2025
US	US FIN ASSUR	Financial Assurance Information	Environmental Protection Agency	09/16/2024	09/17/2024	12/20/2024
US	2020 COR ACTION	2020 Corrective Action Program List	Environmental Protection Agency	09/30/2017	05/08/2018	07/20/2018
US	FUSRAP	Formerly Utilized Sites Remedial Action Program	Department of Energy	03/03/2023	03/03/2023	06/09/2023
US	COAL ASH EPA	Coal Combustion Residues Surface Impoundments List	Environmental Protection Agency	01/12/2017	03/05/2019	11/11/2019
US	LEAD SMELTER 2	Lead Smelter Sites	American Journal of Public Health	04/05/2001	10/27/2010	12/02/2010
US	US AIRS (AFS)	Aerometric Information Retrieval System Facility Subsystem (	EPA	10/12/2016	10/26/2016	02/03/2017
US	US AIRS MINOR	Air Facility System Data	EPA	10/12/2016	10/26/2016	02/03/2017

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	PCB TRANSFORMER	PCB Transformer Registration Database	Environmental Protection Agency	09/13/2019	11/06/2019	02/10/2020
US	SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing	Environmental Protection Agency	07/30/2021	02/03/2023	02/10/2023
US	US HIST CDL	National Clandestine Laboratory Register	Drug Enforcement Administration	05/20/2024	08/19/2024	10/09/2024
US	Delisted NPL	National Priority List Deletions	EPA	12/19/2024	01/02/2025	01/21/2025
US	SEMS-ARCHIVE	Superfund Enterprise Management System Archive	EPA	12/19/2024	01/02/2025	01/21/2025
US	RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated	Environmental Protection Agency	09/16/2024	09/17/2024	12/06/2024
US	HMIRS	Hazardous Materials Information Reporting System	U.S. Department of Transportation	12/10/2024	12/11/2024	02/27/2025
US	DOT OPS	Incident and Accident Data	Department of Transporation, Office of Pipeli	10/04/2024	10/16/2024	12/06/2024
US	US CDL	Clandestine Drug Labs	Drug Enforcement Administration	05/20/2024	08/19/2024	10/09/2024
US	US BROWNFIELDS	A Listing of Brownfields Sites	Environmental Protection Agency	09/09/2024	09/11/2024	12/06/2024
US	DOD	Department of Defense Sites	USGS	06/07/2021	07/13/2021	03/09/2022
US	FEDLAND	Federal and Indian Lands	U.S. Geological Survey	04/02/2018	04/11/2018	11/06/2019
US	FUDS	Formerly Used Defense Sites	U.S. Army Corps of Engineers	10/01/2024	11/12/2024	01/21/2025
US	UMTRA	Uranium Mill Tailings Sites	Department of Energy	02/12/2025	02/12/2025	02/27/2025
US	ODI	Open Dump Inventory	Environmental Protection Agency	06/30/1985	08/09/2004	09/17/2004
US	MINES VIOLATIONS	MSHA Violation Assessment Data	DOL, Mine Safety & Health Admi	10/01/2024	10/02/2024	10/09/2024
US	US MINES	Mines Master Index File	Department of Labor, Mine Safety and Health A	11/01/2024	11/18/2024	02/11/2025
US	US MINES 2	Ferrous and Nonferrous Metal Mines Database Listing	USGS	05/02/2024	08/20/2024	10/09/2024
US	US MINES 3	Active Mines & Mineral Plants Database Listing	USGS	04/14/2011	06/08/2011	09/13/2011
US	PRP	Potentially Responsible Parties	EPA	09/19/2023	10/03/2023	10/19/2023
US	TRIS	Toxic Chemical Release Inventory System	EPA	12/31/2023	02/11/2025	02/18/2025
US	TSCA	Toxic Substances Control Act	EPA	12/31/2020	06/14/2022	03/24/2023
US	FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA/Office of Prevention, Pesticides and Toxi	04/09/2009	04/16/2009	05/11/2009
US	FTTS INSP	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA	04/09/2009	04/16/2009	05/11/2009
US	HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HIST FTTS INSP	FIFRA/TSCA Tracking System Inspection & Enforcement Case Lis	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	SSTS	Section 7 Tracking Systems	EPA	10/15/2024	10/16/2024	01/14/2025
US	ICIS	Integrated Compliance Information System	Environmental Protection Agency	11/18/2016	11/23/2016	02/10/2017
US	PADS	PCB Activity Database System	EPA	07/01/2024	10/02/2024	01/10/2025
US	MLTS	Material Licensing Tracking System	Nuclear Regulatory Commission	10/12/2024	10/17/2024	11/19/2024
US	RADINFO	Radiation Information Database	Environmental Protection Agency	07/01/2019	07/01/2019	09/23/2019
US	FINDS	Facility Index System/Facility Registry System	EPA	11/11/2024	11/20/2024	02/18/2025
US	RAATS	RCRA Administrative Action Tracking System	EPA	04/17/1995	07/03/1995	08/07/1995
US	RMP	Risk Management Plans	Environmental Protection Agency	10/01/2024	10/23/2024	01/14/2025
US	BRS	Biennial Reporting System	EPA/NTIS	12/31/2021	03/09/2023	03/20/2023
US	PWS	Public Water System Data	EPA	12/17/2013	01/09/2014	10/15/2014
US	INDIAN RESERV	Indian Reservations	USGS	12/31/2014	07/14/2015	01/10/2017
US	INDIAN ODI	Report on the Status of Open Dumps on Indian Lands	Environmental Protection Agency	12/31/1998	12/03/2007	01/24/2008
US	IHS OPEN DUMPS	Open Dumps on Indian Land	Department of Health & Human Serivces, Indian	02/07/2024	11/13/2024	11/19/2024
US	ABANDONED MINES	Abandoned Mines	Department of Interior	12/10/2024	12/11/2024	02/18/2025
VA	AIRS	Permitted Airs Facility List	Department of Environmental Quality	06/11/2024	09/12/2024	11/26/2024
VA	CEDS	Comprehensive Environmental Data System	Department of Environmental Quality	11/21/2024	11/25/2024	02/18/2025
VA	COAL ASH	Coal Ash Disposal Sites	Department of Environmental Protection	11/21/2024	11/25/2024	02/18/2025
VA	DRYCLEANERS	Drycleaner List	Department of Environmental Quality	09/25/2024	10/03/2024	12/20/2024
VA	ENFORCEMENT	Enforcement Actions Data	Department of Environmental Quality	09/19/2024	09/26/2024	09/30/2024
VA	FIN ASSURANCE 1	Financial Assurance Information Listing	Department of Environmental Quality	10/24/2024	10/25/2024	01/09/2025
VA	FIN ASSURANCE 2	Financial Assurance Information listing	Department of Environmental Quality	10/21/2024	10/22/2024	01/09/2025

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
VA	SPILLS	Prep/Spills Database Listing	Department of Environmental Quality	11/18/2024	11/18/2024	02/12/2025
VA	SPILLS BRL	Prep/Spills Database Listing	DEQ, Blue Ridge Regional Office	09/18/2009	09/18/2009	10/06/2009
VA	SPILLS NO	PREP Database	Department of Environmental Quality, Northern	09/23/2009	09/29/2009	10/30/2009
VA	SPILLS PC	Pollution Complaint Database	Department of Environmental Quality	06/01/1996	10/22/1996	11/21/1996
VA	SPILLS PD	PREP Database	Department of Environmental Quality, Piedmont	10/20/2009	10/29/2009	12/03/2009
VA	SPILLS SW	Reportable Spills	Department of Environmental Quality, Southwes	01/21/2010	01/22/2010	02/16/2010
VA	SPILLS TD	PREP Database	Department of Environmental Quality, Tidewate	09/17/2009	09/23/2009	10/06/2009
VA	SPILLS VA	PREP Database	Department of Environmental Quality, Valley R	08/08/2012	08/09/2012	10/05/2012
VA	SPILLS WC	Prep Database	Department of Environmental Quality, West Cen	09/21/2009	09/29/2009	10/30/2009
VA	SPILLS 90	SPILLS90 data from FirstSearch	FirstSearch	09/01/2012	01/03/2013	02/15/2013
VA	TIER 2	Tier 2 Information Listing	Department of Environmental Quality	12/31/2022	06/14/2024	09/06/2024
VA	UIC	Underground Injection Control Wells	Department of Mines, Minerals and Energy	10/09/2024	10/09/2024	10/16/2024
US	PCS	Permit Compliance System	EPA, Office of Water	12/16/2016	01/06/2017	03/10/2017
US	UST FINDER RELEASE	UST Finder Releases Database	Environmental Protecton Agency	06/08/2023	10/31/2023	01/18/2024
US	UST FINDER	UST Finder Database	Environmental Protection Agency	06/08/2023	10/04/2023	01/18/2024
US	PFAS RCRA MANIFEST	PFAS Transfers Identified In the RCRA Database Listing	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
VA	PFAS	Per- and Polyfluoroalkyl Substances	Department of Environmental Quality	10/01/2024	10/09/2024	12/26/2024
US	PFAS TRIS	List of PFAS Added to the TRI	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
US	PFAS NPL	Superfund Sites with PFAS Detections Information	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
US	E MANIFEST	Hazardous Waste Electronic Manifest System	Environmental Protection Agency	09/16/2024	09/17/2024	12/20/2024
US	PFAS PROJECT	NORTHEASTERN UNIVERSITY PFAS PROJECT	Social Science Environmental Health Research	05/19/2023	04/05/2024	06/06/2024
US	PFAS NPDES	Clean Water Act Discharge Monitoring Information	Environmental Protection Agency	12/30/2024	01/02/2025	01/14/2025
US	FUELS PROGRAM	EPA Fuels Program Registered Listing	EPA	11/08/2024	11/08/2024	01/14/2025
US	PFAS FEDERAL SITES	Federal Sites PFAS Information	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
US	PFAS ECHO FIRE TRAIN	Facilities in Industries that May Be Handling PFAS Listing	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
US	PFAS PT 139 AIRPORT	All Certified Part 139 Airports PFAS Information Listing	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
US	ECHO	Enforcement & Compliance History Information	Environmental Protection Agency	12/21/2024	12/27/2024	01/10/2025
US	PFAS WQP	Ambient Environmental Sampling for PFAS	Environmental Protection Agency	12/13/2024	01/02/2025	01/10/2025
US	PFAS TSCA	PFAS Manufacture and Imports Information	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
US	PFAS ECHO	Facilities in Industries that May Be Handling PFAS Listing	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025
US	MINES MRDS	Mineral Resources Data System	USGS	06/04/2024	11/22/2024	02/18/2025
US	FEDERAL FACILITY	Federal Facility Site Information listing	Environmental Protection Agency	11/20/2024	12/18/2024	12/20/2024
US	DOCKET HWC	Hazardous Waste Compliance Docket Listing	Environmental Protection Agency	05/06/2021	05/21/2021	08/11/2021
US	PFAS ATSDR	PFAS Contamination Site Location Listing	Department of Health & Human Services	06/24/2020	03/17/2021	11/08/2022
US	UXO	Unexploded Ordnance Sites	Department of Defense	09/06/2023	09/13/2023	12/11/2023
US	BIOSOLIDS	ICIS-NPDES Biosolids Facility Data	Environmental Protection Agency	10/13/2024	10/16/2024	10/23/2024
US	AQUEOUS FOAM NRC	Aqueous Foam Related Incidents Listing	Environmental Protection Agency	12/30/2024	01/02/2025	01/10/2025

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
HISTORICAL USE RECORDS						
US	EDR MGP	EDR Proprietary Manufactured Gas Plants	EDR, Inc.			
US	EDR Hist Auto	EDR Exclusive Historical Auto Stations	EDR, Inc.			
US	EDR Hist Cleaner	EDR Exclusive Historical Cleaners	EDR, Inc.			
VA	RGA LF	Recovered Government Archive Solid Waste Facilities List	Department of Environmental Quality		07/01/2013	01/20/2014
VA	RGA LUST	Recovered Government Archive Leaking Underground Storage Tan	Department of Environmental Quality		07/01/2013	01/15/2014

STREET AND ADDRESS INFORMATION

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Appendix G:

Qualifications

BALZER
& ASSOCIATES
PLANNERS / ARCHITECTS
ENGINEERS / SURVEYORS

15871 City View Drive
Suite 200
Midlothian, VA 23113
804.794.0571
www.balzer.cc

Roanoke
Richmond
New River Valley
Shenandoah Valley

Environmental Professional:

Emily Salkind

LPSS, PWD, VSWD, DCA

Environmental Project Manager

Associate

Emily Salkind serves as an Environmental Project Manager for Balzer and Associates, Inc. Ms. Salkind received a B.S. degree in Environmental Science from Virginia Polytechnic Institute and State University in 2014 and has been performing soil science and environmental related studies since joining the firm in 2015. Ms. Salkind became Licensed in the Commonwealth of Virginia as a Professional Soil Scientist in 2019 and as a Certified Professional Wetland Delineator in 2021. In 2023, she received certifications from the Commonwealth as a Virginia State Waters Delineator and as a Dual Combined Administrator in Stormwater and Erosion and Sediment Control. Ms. Salkind's environmental background includes Phase I Environmental Site Assessments (ESA), soil evaluations and classifications, erosion and sediment control inspections, stream assessments, and wetlands delineations and permitting.

Envisioning Tomorrow, Designing Today

Appendix H:

Additional Documentation

The City of Roanoke, VA

Parcel Id: 4013004

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 4 BLK 20 BEL

Zoning: IN

Property Acreage: 0.0956

Property Sq. Footage: 4164

Property Frontage: 40

Property Depth: 100.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS ROANOKE INTERNL FOURSQUARE (Inactive)	070006527
1966-05-09	$0.00	TRS ROANOKE INTERNL FOURSQUARE (Inactive)	CITY OF ROANOKE (Inactive)	
1965-09-23	$7,000.00	CITY OF ROANOKE (Inactive)	VAUGHAN L W & VIRGINIA (Inactive)	
1924-01-31	$0.00	VAUGHAN L W & VIRGINIA (Inactive)	HUDGINS L B (Inactive)	

1912-07-01	$0.00	HUDGINS L B (Inactive)	FIDELITY REALTY CORP (Inactive)	
N/A	$0.00	FIDELITY REALTY CORP (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$6,200.00	$0.00	$6,200.00
2024-01-01	$6,200.00	$0.00	$6,200.00
2023-01-01	$6,200.00	$0.00	$6,200.00
2022-01-01	$6,200.00	$0.00	$6,200.00
2021-01-01	$5,600.00	$0.00	$5,600.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

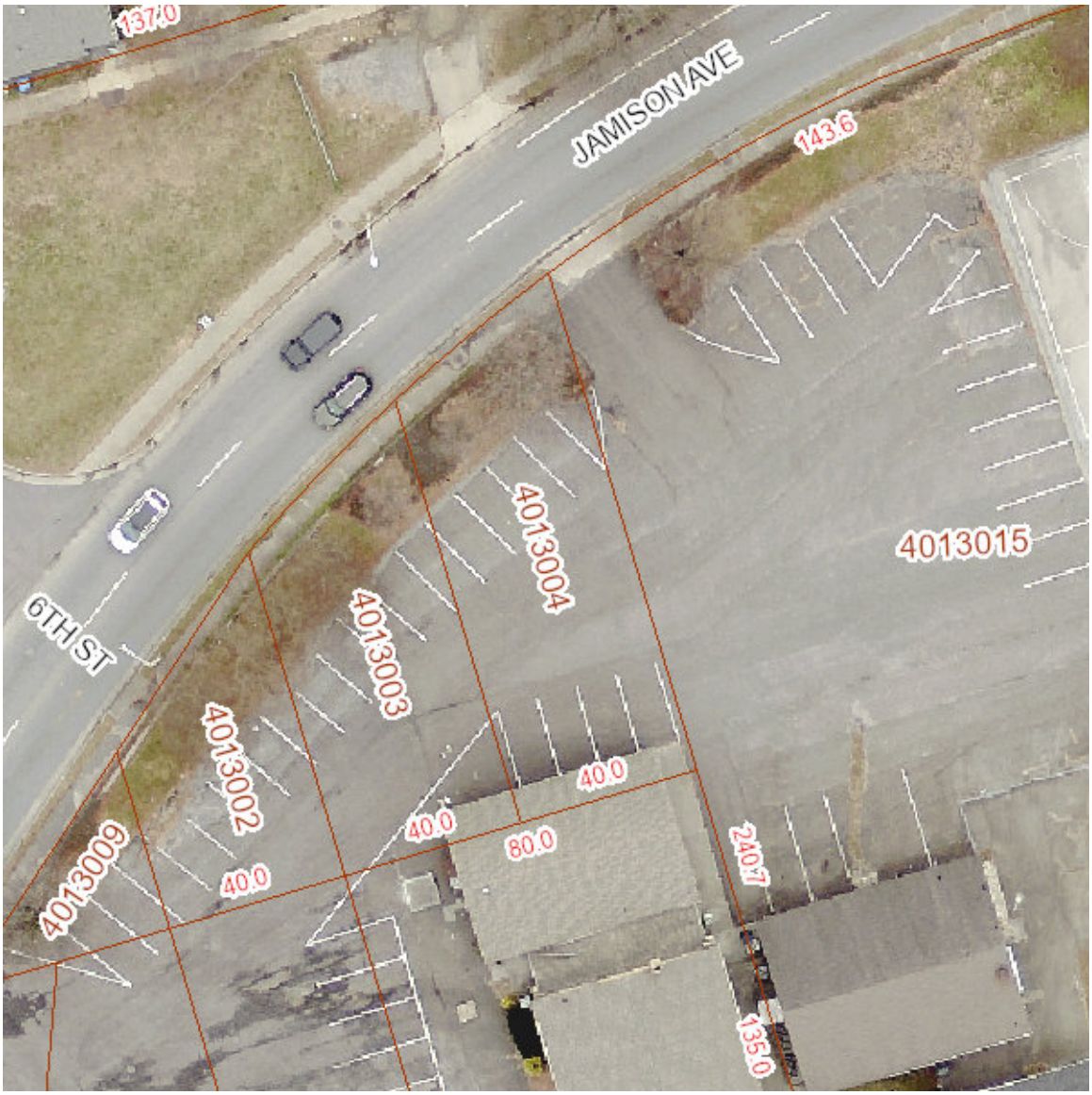


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013003

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOT 3 BLK 20 BELMONT

Zoning: IN

Property Acreage: 0.0787

Property Sq. Footage: 3428

Property Frontage: 40

Property Depth: 80.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS INTERNL FOURSQUARE CHURCH (Inactive)	070006527
1969-01-16	$250.00	TRS INTERNL FOURSQUARE CHURCH (Inactive)	RIFE D L ETAL (Inactive)	
1916-10-30	$0.00	RIFE D L ETAL (Inactive)	THE INVESTMENT CO (Inactive)	
1906-12-03	$0.00	THE INVESTMENT CO (Inactive)	MCCARTY M W ETUX (Inactive)	
N/A	$0.00	MCCARTY M W ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$5,100.00	$0.00	$5,100.00
2024-01-01	$5,100.00	$0.00	$5,100.00
2023-01-01	$5,100.00	$0.00	$5,100.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,700.00	$0.00	$4,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

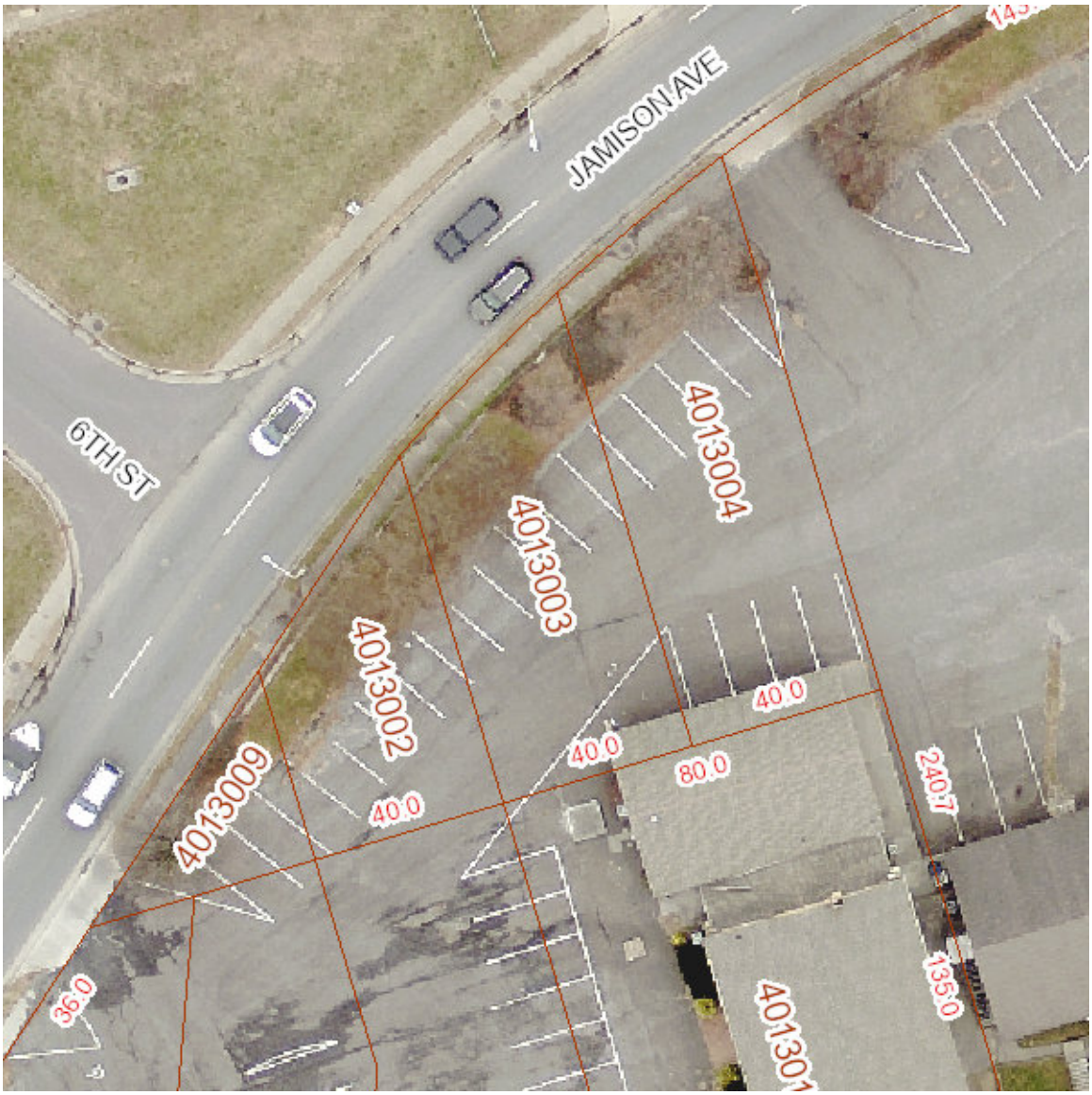


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013002

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOT 2 BLK 20 BELMONT

Zoning: IN

Property Acreage: 0.0528

Property Sq. Footage: 2299

Property Frontage: 50

Property Depth: 40.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED	TRS EVENGEL FOURSQUARE CHURCH (Inactive)	070006527
1977-04-22	$10.00	TRS EVENGEL FOURSQUARE CHURCH (Inactive)	NAFF MILDRED L (Inactive)	
1977-04-08	$0.00	NAFF MILDRED L (Inactive)	NAFF R A & MILDRED L (Inactive)	
1957-09-25	$4,309.00	NAFF R A & MILDRED L (Inactive)	SUTTLES LAWSON R & MAE (Inactive)	
1943-06-09	$0.00	SUTTLES LAWSON R & MAE (Inactive)	DAVENPORT J C (Inactive)	

1933-10-06	$0.00	DAVENPORT J C (Inactive)	HART JAMES P S/COMM (Inactive)	
N/A	$0.00	HART JAMES P S/COMM (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$3,500.00	$0.00	$3,500.00
2024-01-01	$3,500.00	$0.00	$3,500.00
2023-01-01	$3,500.00	$0.00	$3,500.00
2022-01-01	$3,500.00	$0.00	$3,500.00
2021-01-01	$3,100.00	$0.00	$3,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

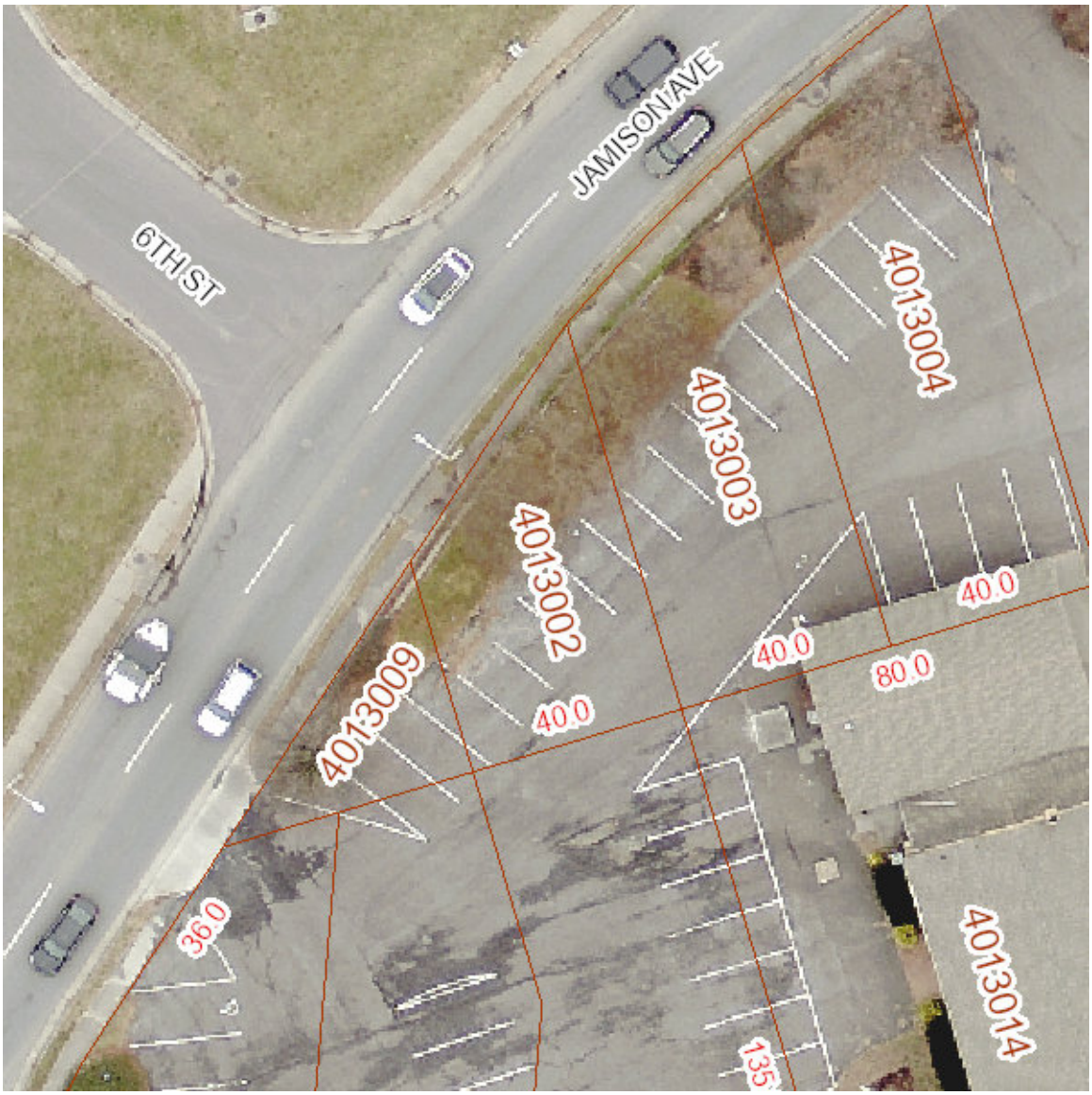


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013009

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT S 1/2 LOT 1 BLK 20 BEL

Zoning: IN

Property Acreage: 0.0215

Property Sq. Footage: 935

Property Frontage: 40

Property Depth: 30.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS ROANOKE INTERNL FOURSQUARE (Inactive)	070006527
1969-01-24	$50.00	TRS ROANOKE INTERNL FOURSQUARE (Inactive)	CITY OF ROANOKE (Inactive)	
1965-07-07	$0.00	CITY OF ROANOKE (Inactive)	HANNA ELIZABETH C (Inactive)	
1958-10-30	$0.00	HANNA ELIZABETH C (Inactive)	FISHER E G & IDA E (Inactive)	

1925-09-04	$0.00	FISHER E G & IDA E (Inactive)	SUTHERLAND S B (Inactive)	
1919-08-27	$0.00	SUTHERLAND S B (Inactive)	MARTIN PAUL D ETUX (Inactive)	
N/A	$0.00	MARTIN PAUL D ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$1,400.00	$0.00	$1,400.00
2024-01-01	$1,400.00	$0.00	$1,400.00
2023-01-01	$1,300.00	$0.00	$1,300.00
2022-01-01	$1,300.00	$0.00	$1,300.00
2021-01-01	$1,300.00	$0.00	$1,300.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

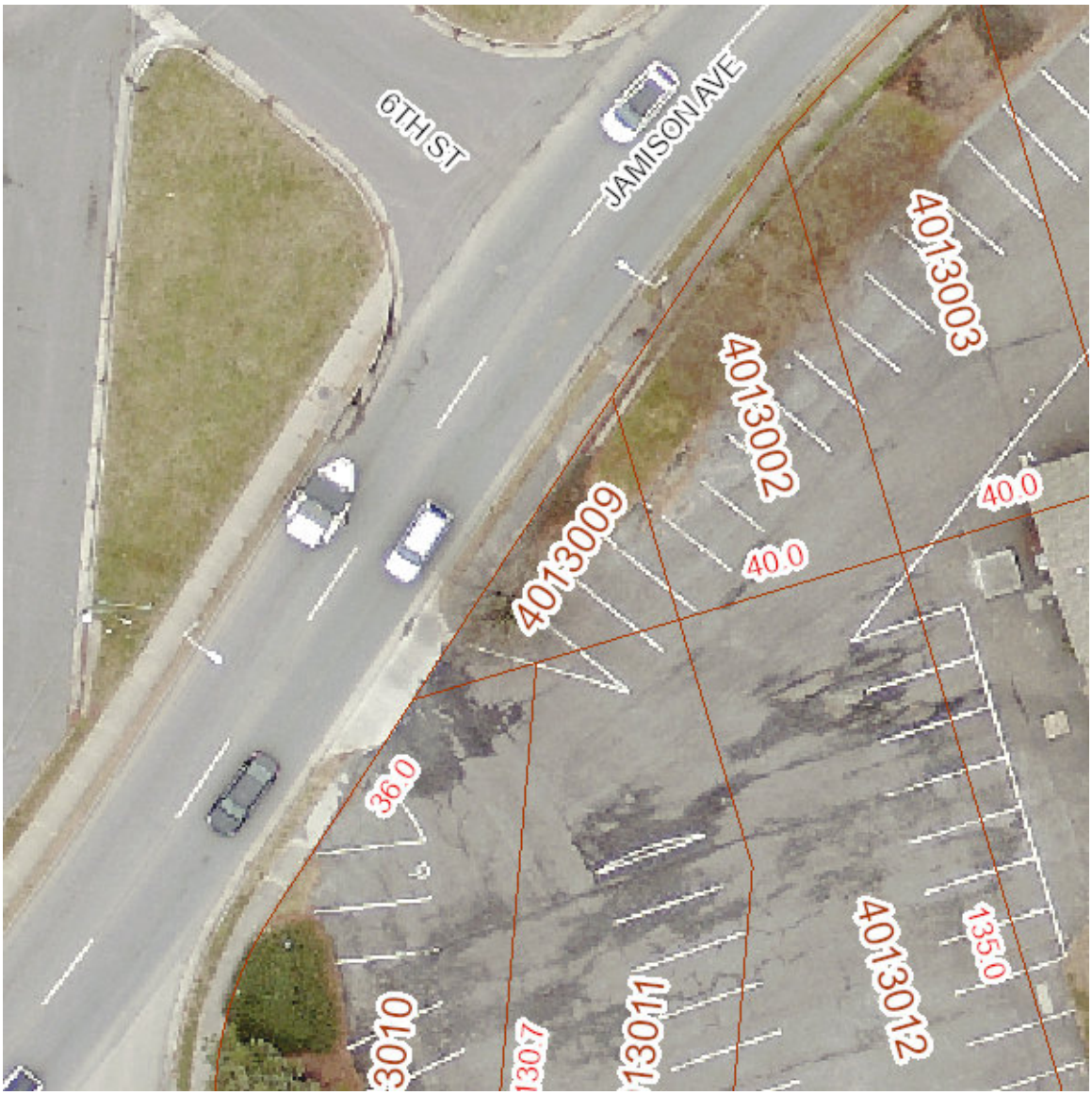


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013018

Property Address:

632 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 17 BLK 20 BEL

Zoning: MX

Property Acreage: 0.1239

Property Sq. Footage: 5397

Property Frontage: 40

Property Depth: 135.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS OF EVANGEL FOURSQUARE CHURCH (Inactive)	070006527
1977-08-25	$0.00	TRS OF EVANGEL FOURSQUARE CHURCH (Inactive)	MAYFIELD A F (Inactive)	
1907-07-16	$0.00	MAYFIELD A F (Inactive)	HIGHLAND CO INC (Inactive)	
N/A	$0.00	HIGHLAND CO INC (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013015

Property Address:

624 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 15B BLK 20 BELMONT

Zoning: MX

Property Acreage: 0.8327

Property Sq. Footage: 36271

Property Frontage: 120

Property Depth: 255.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS RKE INTL CHURCH OF FOURSQUARE (Inactive)	070006527
1959-08-20	$0.00	TRS RKE INTL CHURCH OF FOURSQUARE (Inactive)	INT'L CHURCH OF THE FOURSQUARE (Inactive)	
1955-02-07	$0.00	INT'L CHURCH OF THE FOURSQUARE (Inactive)	MAYFIELD A F (Inactive)	
1906-06-02	$0.00	MAYFIELD A F (Inactive)	BROOKE S S (Inactive)	

N/A	$0.00	BROOKE S S (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$101,700.00	$0.00	$101,700.00
2024-01-01	$98,800.00	$0.00	$98,800.00
2023-01-01	$89,800.00	$0.00	$89,800.00
2022-01-01	$89,800.00	$0.00	$89,800.00
2021-03-01	$81,600.00	$0.00	$81,600.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

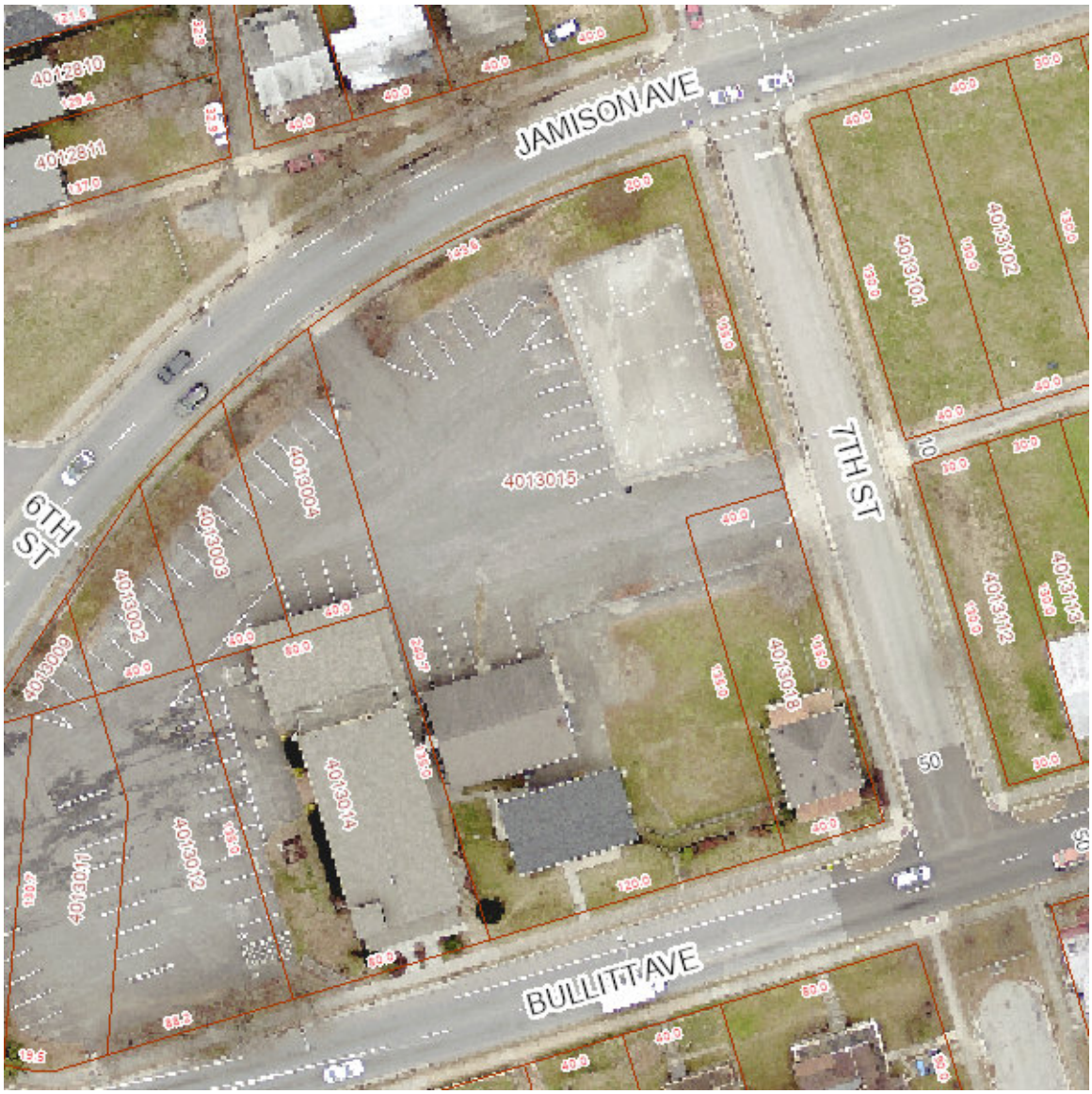


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013014

Property Address:

612 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 12 & 13 BLK 20 BELMONT

Zoning: IN

Property Acreage: 0.2478

Property Sq. Footage: 10793

Property Frontage: 80

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS ROKE INTERNATIONAL CHURCH (Inactive)	070006527
1939-08-28	$0.00	TRS ROKE INTERNATIONAL CHURCH (Inactive)	CARPENTER GENEVA (Inactive)	
1936-10-15	$0.00	CARPENTER GENEVA (Inactive)	HALL I R (Inactive)	
1936-10-09	$0.00	HALL I R (Inactive)	MCDONALD H I ETAL (Inactive)	
1928-06-01	$0.00	MCDONALD H I ETAL (Inactive)	MCDONALD J R (Inactive)	

N/A	$0.00	MCDONALD J R (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$16,100.00	$0.00	$16,100.00
2024-01-01	$16,100.00	$0.00	$16,100.00
2023-01-01	$16,100.00	$0.00	$16,100.00
2022-01-01	$16,100.00	$0.00	$16,100.00
2021-03-01	$14,600.00	$0.00	$14,600.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013012

Property Address:

0 BULLITT AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: PTS 10 & 11 BLK 20 BEL

Zoning: IN

Property Acreage: 0.1609

Property Sq. Footage: 7011

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS EVANGEL FOURSQUARE CHURCH (Inactive)	070006527
1977-04-05	$10,000.00	TRS EVANGEL FOURSQUARE CHURCH (Inactive)	NAFF R A & MILDRED L (Inactive)	
1945-11-02	$5,500.00	NAFF R A & MILDRED L (Inactive)	ULMER HAROLD F & MARY R (Inactive)	
1944-05-05	$0.00	ULMER HAROLD F & MARY R (Inactive)	DILLON C L (Inactive)	
1944-05-05	$0.00	DILLON C L (Inactive)	HYLTON SALLIE H ETAL (Inactive)	

1938-11-01	$0.00	HYLTON SALLIE H ETAL (Inactive)	HOME OWNERS LOAN CORPN (Inactive)	
1937-03-19	$0.00	HOME OWNERS LOAN CORPN (Inactive)	WILSON WILLARD H (Inactive)	
1920-07-01	$0.00	WILSON WILLARD H (Inactive)	UPSON E G ETUX (Inactive)	
N/A	$0.00	UPSON E G ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,400.00	$0.00	$10,400.00
2024-01-01	$10,400.00	$0.00	$10,400.00
2023-01-01	$10,400.00	$0.00	$10,400.00
2022-01-01	$10,400.00	$0.00	$10,400.00
2021-01-01	$9,500.00	$0.00	$9,500.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013011

Property Address:

0 BULLITT AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: WEST PT 10 BLK 20 BEL

Zoning: IN

Property Acreage: 0.1221

Property Sq. Footage: 5319

Property Frontage: 42

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	TRS FIRST FOURSQUARE CHURCH (Inactive)	070006527
1977-03-02	$6,500.00	TRS FIRST FOURSQUARE CHURCH (Inactive)	PROCTOR CHARLES S & SUSIE E (Inactive)	
1950-12-08	$4,750.00	PROCTOR CHARLES S & SUSIE E (Inactive)	JONES H L & DELSIE LEE (Inactive)	
1928-02-03	$0.00	JONES H L & DELSIE LEE (Inactive)	CREWS T L ETUX (Inactive)	
N/A	$0.00	CREWS T L ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$7,900.00	$0.00	$7,900.00
2024-01-01	$7,900.00	$0.00	$7,900.00
2023-01-01	$7,900.00	$0.00	$7,900.00
2022-01-01	$7,900.00	$0.00	$7,900.00
2021-01-01	$7,200.00	$0.00	$7,200.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013010

Property Address:

0 6TH ST SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 840 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 9 BLK 20 BEL

Zoning: IN

Property Acreage: 0.1108

Property Sq. Footage: 4828

Property Frontage: 60

Property Depth: 70.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007024
2007-04-25	$0.00	RESCUE MISSION OF ROANOKE INCORPORATED (THE)	PAULETT IDA R (Inactive)	070006527
2000-04-03	$0.00	PAULETT IDA R (Inactive)	TRS EVANGEL FOURSQUARE CHURCH (Inactive)	
1977-12-15	$600.00	TRS EVANGEL FOURSQUARE CHURCH (Inactive)	CITY OF ROANOKE (Inactive)	
1965-06-22	$3,700.00	CITY OF ROANOKE (Inactive)	CUCKLER CARL & EFFIE M (Inactive)	

1950-08-09	$3,450.00	CUCKLER CARL & EFFIE M (Inactive)	BOWLES JAMES A (Inactive)	
1950-06-19	$3,500.00	BOWLES JAMES A (Inactive)	JOHNSON DELLA B (Inactive)	
1950-06-17	$3,500.00	JOHNSON DELLA B (Inactive)	MAYS R A JR (Inactive)	
1950-05-29	$0.00	MAYS R A JR (Inactive)	PAULETTE RUSSELL ETAL (Inactive)	
N/A	$0.00	PAULETTE RUSSELL ETAL (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$7,200.00	$0.00	$7,200.00
2024-01-01	$7,200.00	$0.00	$7,200.00
2023-01-01	$7,200.00	$0.00	$7,200.00
2022-01-01	$7,200.00	$0.00	$7,200.00
2021-01-01	$6,500.00	$0.00	$6,500.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

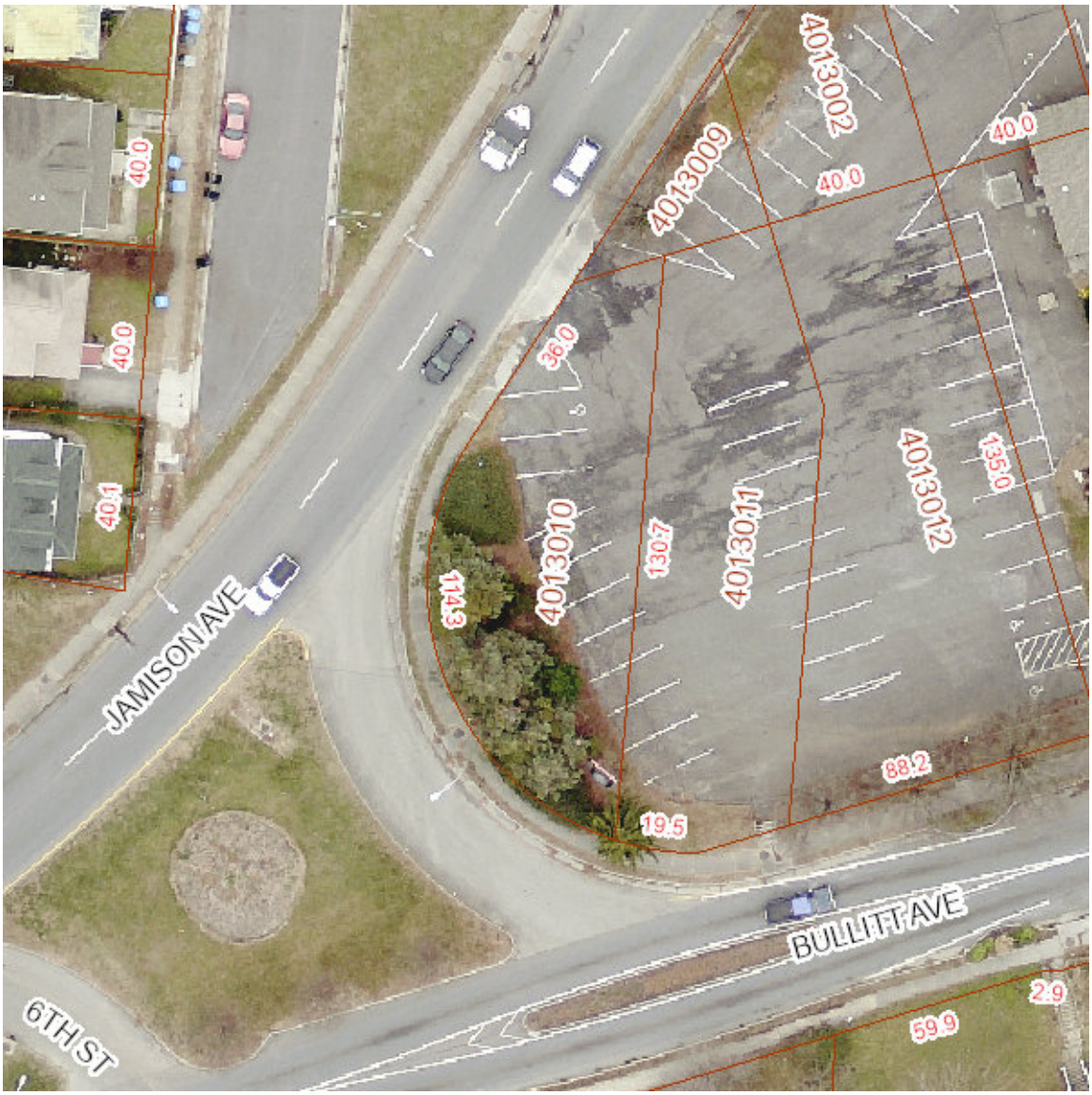


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013111

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 10 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.1194

Property Sq. Footage: 5203

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1994-01-01	$0.00	TRS EVANGEL FOURSQUARE CHURCH	TRS EVANGEL FOURSQUARE CHURCH (Inactive)	
1978-10-20	$10.00	TRS EVANGEL FOURSQUARE CHURCH (Inactive)	J & G INVESTMENTS (Inactive)	
1971-01-15	$5,400.00	J & G INVESTMENTS (Inactive)	VIRGINIA VENTURES INC (Inactive)	
1970-04-17	$2,300.00	VIRGINIA VENTURES INC (Inactive)	PARKER HOWARD D JR & JANEVA R (Inactive)	

1965-08-17	$3,500.00	PARKER HOWARD D JR & JANEVA R (Inactive)	SHIPPLETT GLADYS WERTZ (Inactive)	
1964-06-01	$0.00	SHIPPLETT GLADYS WERTZ (Inactive)	WERTZ MARY MUSSER (Inactive)	
1941-08-11	$0.00	WERTZ MARY MUSSER (Inactive)	MUSSER EMMA W (WILL) (Inactive)	
N/A	$0.00	MUSSER EMMA W (WILL) (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013110

Property Address:

729 JAMISON AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 9 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.1192

Property Sq. Footage: 5194

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1979-09-06	$0.00	TRS OF EVANGEL FOURSQUARE CHURCH OF ROANOKE VA	GRAY ALFRED D & ELSIE S (Inactive)	
1968-08-20	$8,500.00	GRAY ALFRED D & ELSIE S (Inactive)	WILKERSON RAYMOND T & RUBY C (Inactive)	
1954-01-02	$5,000.00	WILKERSON RAYMOND T & RUBY C (Inactive)	HARRIS K S ETUX (Inactive)	

1937-07-01	$0.00	HARRIS K S ETUX (Inactive)	PEOPLE'S BANK OF VINTON (Inactive)	
1929-12-19	$0.00	PEOPLE'S BANK OF VINTON (Inactive)	COMPTON C M (Inactive)	
1922-11-03	$0.00	COMPTON C M (Inactive)	WALDRON E H ETUX (Inactive)	
N/A	$0.00	WALDRON E H ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

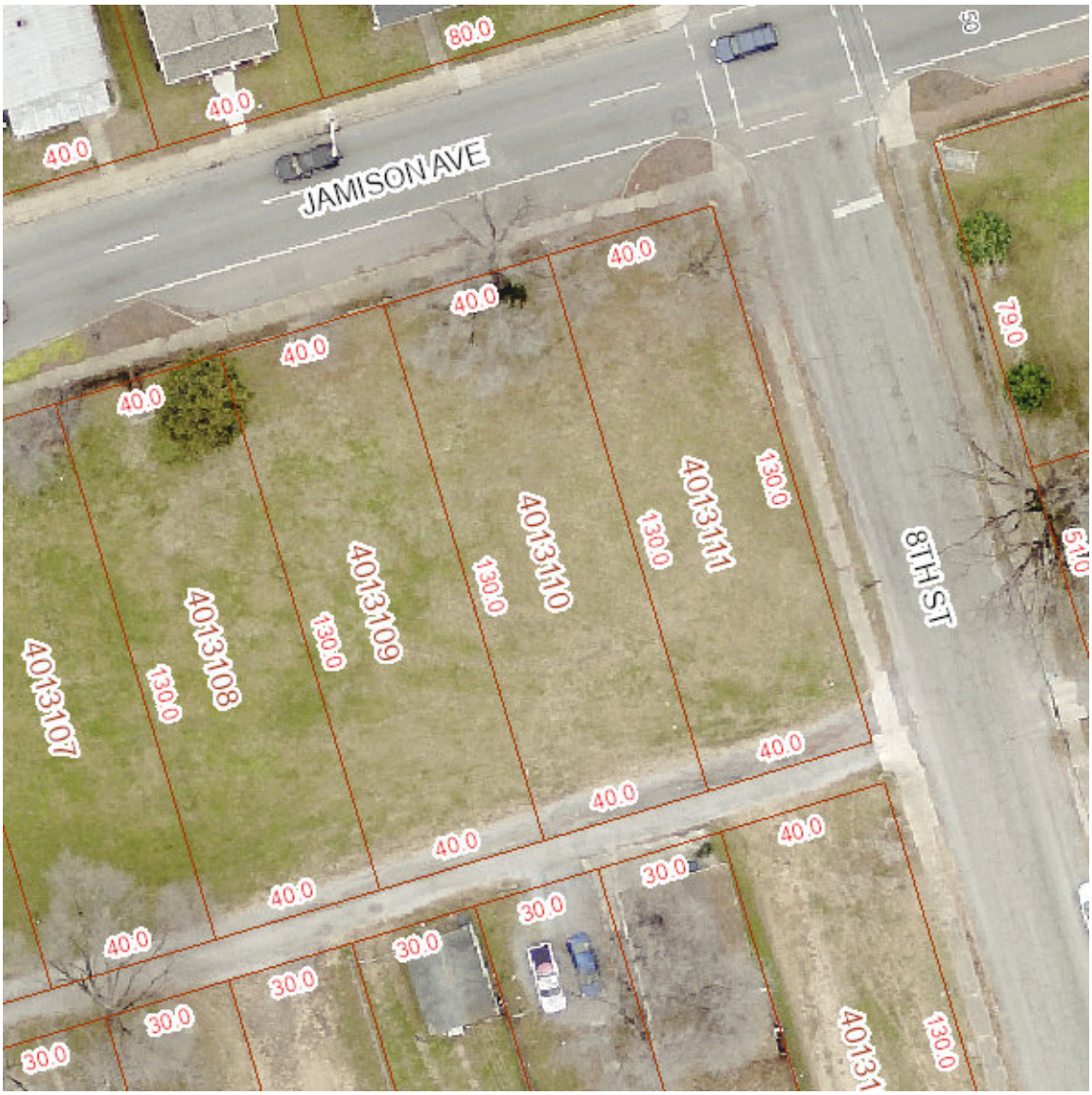


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013109

Property Address:

727 JAMISON AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 8 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.1194

Property Sq. Footage: 5203

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1978-08-10	$20,000.00	TRS EVANGEL FOURSQUARE CHURCH	TRS FIRST UNITED PENTECOSTAL (Inactive)	
1971-05-03	$1,000.00	TRS FIRST UNITED PENTECOSTAL (Inactive)	LUCAS RICHARD P (Inactive)	
1968-08-30	$5,000.00	LUCAS RICHARD P (Inactive)	TRS LIFE TABERNACLE (Inactive)	
1959-12-31	$5,000.00	TRS LIFE TABERNACLE (Inactive)	TRS BRENTWOOD BAPTIST CHURCH (Inactive)	

1959-10-13	$5.00	TRS BRENTWOOD BAPTIST CHURCH (Inactive)	GRACE BAPTIST TEMPLE OF ROKE (Inactive)	
1952-08-18	$0.00	GRACE BAPTIST TEMPLE OF ROKE (Inactive)	GRACE BAPTIST CHURCH (Inactive)	
1947-03-31	$10.00	GRACE BAPTIST CHURCH (Inactive)	HOLST A E ETAL MINISTER (Inactive)	
1920-10-20	$0.00	HOLST A E ETAL MINISTER (Inactive)	HOLST A E ETUX (Inactive)	
N/A	$0.00	HOLST A E ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:

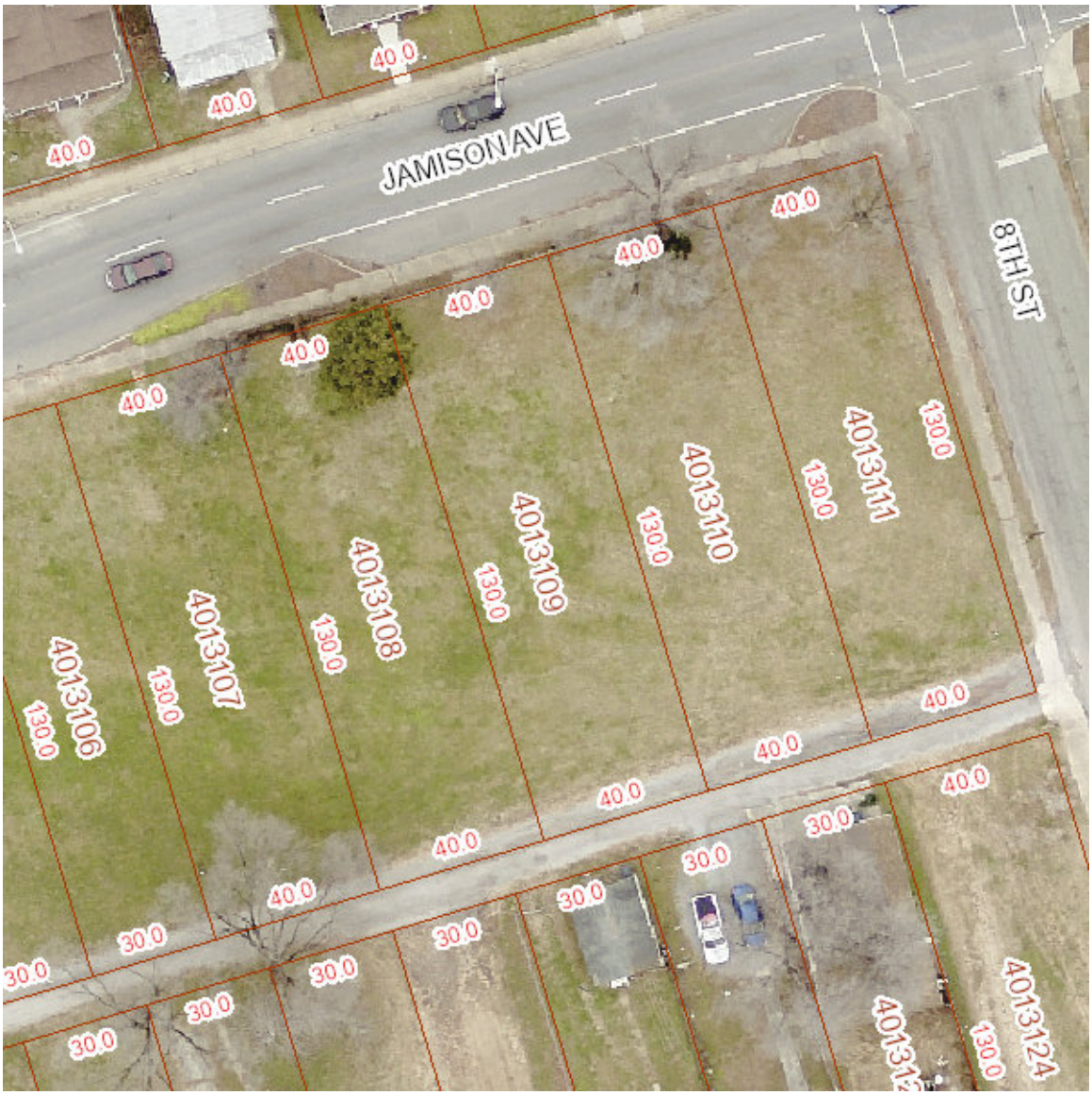


Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013108

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 7 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.1194

Property Sq. Footage: 5203

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1996-09-03	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH	WRIGHT C KENNETH (Inactive)	
1996-05-08	$42,500.00	WRIGHT C KENNETH (Inactive)	MEADOWS PATSY R (Inactive)	
1990-12-18	$0.00	MEADOWS PATSY R (Inactive)	LYLE VIRGINIA (Inactive)	
1971-06-10	$8,000.00	LYLE VIRGINIA (Inactive)	EATON PAULINE MUSSELWHITE ETAL (Inactive)	

1970-01-06	$0.00	EATON PAULINE MUSSELWHITE ETAL (Inactive)	MUSSELWHITE SARAH P (Inactive)	
1959-12-03	$6,500.00	MUSSELWHITE SARAH P (Inactive)	PRITCHETT EMMETT C & CORDIE H (Inactive)	
1955-04-09	$0.00	PRITCHETT EMMETT C & CORDIE H (Inactive)	WEYHMAN HANS V (Inactive)	
1954-09-07	$0.00	WEYHMAN HANS V (Inactive)	WEYHMANN ROSA (Inactive)	
1923-12-01	$0.00	WEYHMANN ROSA (Inactive)	HICKOK CORDELIA (Inactive)	
1921-06-17	$0.00	HICKOK CORDELIA (Inactive)	SHACKLEFORD COLLIE L & S D (Inactive)	
N/A	$0.00	SHACKLEFORD COLLIE L & S D (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013107

Property Address:

715 JAMISON AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 6 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.1194

Property Sq. Footage: 5203

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1979-10-12	$7,500.00	TRS OF EVANGEL FOURSQUARE CHURCH OF ROANOKE VA	SHACKLEFORD S DOUGLAS ETUX (Inactive)	
1962-06-30	$3,500.00	SHACKLEFORD S DOUGLAS ETUX (Inactive)	PENN CALLIE L (SHACKLEFORD) (Inactive)	
1907-10-16	$0.00	PENN CALLIE L (SHACKLEFORD) (Inactive)	PENN ALICE H (Inactive)	

N/A	$0.00	PENN ALICE H (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013106

Property Address:

711 JAMISON AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: E 30 FT L 5 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0898

Property Sq. Footage: 3913

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1996-10-21	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH	VINE AND BRANCH INC (Inactive)	
1991-04-17	$10,000.00	VINE AND BRANCH INC (Inactive)	CRESTAR BANK EXEC (Inactive)	
1989-05-01	$0.00	CRESTAR BANK EXEC (Inactive)	COLONIAL AMERICAN NATL BANK - ADM (Inactive)	0000000000

1988-09-02	$0.00	COLONIAL AMERICAN NATL BANK - ADM (Inactive)	DOOLEY HERBERT C & FLORENCE R (Inactive)	
1979-03-29	$10.00	DOOLEY HERBERT C & FLORENCE R (Inactive)	RAKES LILLIE F ETALS (Inactive)	
1977-11-09	$0.00	RAKES LILLIE F ETALS (Inactive)	RAKES P E (Inactive)	0000000000
1947-04-07	$5,925.00	RAKES P E (Inactive)	LAWHORN ERNEST R & DORA A (Inactive)	
1944-10-04	$3,200.00	LAWHORN ERNEST R & DORA A (Inactive)	SPRAKER EUGENE B & ROSA E (Inactive)	
1943-05-17	$0.00	SPRAKER EUGENE B & ROSA E (Inactive)	SUTTLES L R ETAL (Inactive)	
1940-10-18	$0.00	SUTTLES L R ETAL (Inactive)	DIXIE FINANCE & LOAN CORPN (Inactive)	
1935-04-01	$0.00	DIXIE FINANCE & LOAN CORPN (Inactive)	BROWN A S TRUSTEE (Inactive)	
1931-12-22	$0.00	BROWN A S TRUSTEE (Inactive)	BROWN M MAE (Inactive)	
1930-08-02	$0.00	BROWN M MAE (Inactive)	FUGUA J M (Inactive)	
1919-11-03	$0.00	FUGUA J M (Inactive)	PAYNE FANNIE F (Inactive)	
N/A	$0.00	PAYNE FANNIE F (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013105

Property Address:

709 JAMISON AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOTS 4 & 5 BLK 19 BEL

Zoning: RM-2

Property Acreage: 0.0885

Property Sq. Footage: 3855

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1996-10-21	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH	VINE AND BRANCH INC (Inactive)	
1989-06-02	$21,000.00	VINE AND BRANCH INC (Inactive)	DOUFFAS HOMER M & HELEN POWERS (Inactive)	
1974-08-21	$8,000.00	DOUFFAS HOMER M & HELEN POWERS (Inactive)	KING ELMER S & HELEN M (Inactive)	

1944-12-19	$3,500.00	KING ELMER S & HELEN M (Inactive)	BOLLING WILLIAM R ETUX (Inactive)	
1942-10-08	$0.00	BOLLING WILLIAM R ETUX (Inactive)	WOOD W W ETUX (Inactive)	
1942-08-15	$0.00	WOOD W W ETUX (Inactive)	BROWN B B ETUX (Inactive)	
1941-02-25	$0.00	BROWN B B ETUX (Inactive)	WHITTINGTON G M (Inactive)	
N/A	$0.00	WHITTINGTON G M (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013104

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOTS 3-4 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0900

Property Sq. Footage: 3922

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1987-12-14	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH (THE)	HEDGE ROY W & MAMIE G (Inactive)	
1953-09-24	$6,200.00	HEDGE ROY W & MAMIE G (Inactive)	WINDEL JOHN H & EDITH B (Inactive)	
1952-10-01	$3,000.00	WINDEL JOHN H & EDITH B (Inactive)	KINDRED M C (Inactive)	
1943-12-28	$0.00	KINDRED M C (Inactive)	HATCHER J R (Inactive)	

1921-09-13	$0.00	HATCHER J R (Inactive)	THOMAS C C TR (Inactive)	
1919-04-01	$0.00	THOMAS C C TR (Inactive)	ROBERTSON J A (Inactive)	
N/A	$0.00	ROBERTSON J A (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013103

Property Address:

705 JAMISON AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOT 3 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0900

Property Sq. Footage: 3921

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1996-10-21	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH	VINE AND BRANCH INC (Inactive)	
1989-09-12	$0.00	VINE AND BRANCH INC (Inactive)	MCPHERSON MARY M (Inactive)	
1982-09-24	$0.00	MCPHERSON MARY M (Inactive)	MCPHERSON WILSON O & MARY M (Inactive)	
1949-09-21	$3,500.00	MCPHERSON WILSON O & MARY M (Inactive)	FRINGER RODNEY & GORDON (Inactive)	

1948-06-05	$0.00	FRINGER RODNEY & GORDON (Inactive)	FRINGER ANNIE E (Inactive)	
1918-08-16	$13.00	FRINGER ANNIE E (Inactive)	MATERA AMY W (Inactive)	
1914-04-15	$13.00	MATERA AMY W (Inactive)	RENNER E S (Inactive)	
1910-03-25	$3.00	RENNER E S (Inactive)	MOLLEN C R ETUX (Inactive)	
N/A	$0.00	MOLLEN C R ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013102

Property Address:

703 JAMISON AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 2 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.1194

Property Sq. Footage: 5203

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1996-10-21	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH	VINE AND BRANCH INC (Inactive)	
1989-09-12	$0.00	VINE AND BRANCH INC (Inactive)	MCPHERSON MARY M (Inactive)	
1983-05-05	$9,000.00	MCPHERSON MARY M (Inactive)	MCPHERSON ETHEL MAY (Inactive)	
1982-09-24	$0.00	MCPHERSON ETHEL MAY (Inactive)	MCPHERSON ETHEL MAY ETAL (Inactive)	

1969-09-11	$0.00	MCPHERSON ETHEL MAY ETAL (Inactive)	MCPHERSON WILSON B & MAGGIE T (Inactive)	
1954-12-01	$0.00	MCPHERSON WILSON B & MAGGIE T (Inactive)	MCPHERSON W B (Inactive)	
1917-12-01	$0.00	MCPHERSON W B (Inactive)	UPSON E G ETUX (Inactive)	
N/A	$0.00	UPSON E G ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013101

Property Address:

0 JAMISON AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT 1 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.1179

Property Sq. Footage: 5135

Property Frontage: 40

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1985-08-14	$10,000.00	TRUSTEES EVANGEL FOURSQUARE CHURCH	SOTOS JOHN F (Inactive)	
1967-10-24	$2,000.00	SOTOS JOHN F (Inactive)	CARPER FLORRIE JORDAN (Inactive)	
1940-03-18	$0.00	CARPER FLORRIE JORDAN (Inactive)	CRIPPLED CHILDRENS HOSPITAL (Inactive)	
1939-03-30	$0.00	CRIPPLED CHILDRENS HOSPITAL (Inactive)	MILLER IONA P (Inactive)	

1925-09-08	$0.00	MILLER IONA P (Inactive)	KEFAUVER C F ETUX (Inactive)	
N/A	$0.00	KEFAUVER C F ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$10,200.00	$0.00	$10,200.00
2024-01-01	$9,100.00	$0.00	$9,100.00
2023-01-01	$8,500.00	$0.00	$8,500.00
2022-01-01	$6,700.00	$0.00	$6,700.00
2021-01-01	$5,700.00	$0.00	$5,700.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013120

Property Address:

0 BULLITT AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOT 17 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0898

Property Sq. Footage: 3914

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1978-10-04	$4,100.00	TRS EVANGEL FOURSQUARE CHURCH	C & B OF VIRGINIA INC (Inactive)	
1978-07-13	$1,100.00	C & B OF VIRGINIA INC (Inactive)	BROWN WILLIAM H ETAL (Inactive)	
1978-04-17	$1,100.00	BROWN WILLIAM H ETAL (Inactive)	CARPER HARRY F JR (ALL) (Inactive)	
1975-08-11	$10.00	CARPER HARRY F JR (ALL) (Inactive)	CARPER SARAH D (Inactive)	
1949-07-02	$0.00	CARPER SARAH D (Inactive)	CARPER H F (Inactive)	

1925-02-26	$0.00	CARPER H F (Inactive)	YOUNG B E (Inactive)	
N/A	$0.00	YOUNG B E (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013119

Property Address:

0 BULLITT AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: LOT PT 16-17 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0898

Property Sq. Footage: 3914

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1996-10-21	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH	VINE AND BRANCH INC (Inactive)	
1990-03-08	$22,000.00	VINE AND BRANCH INC (Inactive)	ELLETT J ALBERT EXEC (Inactive)	
1989-02-14	$0.00	ELLETT J ALBERT EXEC (Inactive)	KENNETT VERONA STANLEY (Inactive)	
1985-12-27	$0.00	KENNETT VERONA STANLEY (Inactive)	STANLEY MARY LOUISE ETAL (Inactive)	

1982-06-05	$0.00	STANLEY MARY LOUISE ETAL (Inactive)	STANLEY OLA G (Inactive)	
1949-09-13	$3,750.00	STANLEY OLA G (Inactive)	BONDURANT C R (Inactive)	
1919-05-01	$0.00	BONDURANT C R (Inactive)	TILLETT T R ETUX (Inactive)	
N/A	$0.00	TILLETT T R ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013118

Property Address:

716 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: E PT L 15 W PT L 16 BELMONT BLK 19

Zoning: RM-2

Property Acreage: 0.0898

Property Sq. Footage: 3913

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-04-15	$49,100.00	THE LIFELINE FOUNDATION	GRAYBILL R KEITH	160003482
2007-07-31	$0.00	GRAYBILL R KEITH	GRAYBILL R KEITH & JEANNIE J (Inactive)	070012375
1986-05-30	$25,900.00	GRAYBILL R KEITH & JEANNIE J (Inactive)	DISHMAN WILLIAM A & ETHA V (Inactive)	
1964-04-21	$3,853.00	DISHMAN WILLIAM A & ETHA V (Inactive)	MOSES MARY B (Inactive)	
1959-05-19	$10.00	MOSES MARY B (Inactive)	HARTMAN GORDON G & MATTIE B (Inactive)	

1951-06-08	$4,500.00	HARTMAN GORDON G & MATTIE B (Inactive)	BRUGH HENRY & WIFE (Inactive)	
1923-03-05	$0.00	BRUGH HENRY & WIFE (Inactive)	TILLETT T R ETALS (Inactive)	
N/A	$0.00	TILLETT T R ETALS (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013117

Property Address:

712 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: E PT L 14 & W PT 15 BELMONT BLK 19

Zoning: RM-2

Property Acreage: 0.0887

Property Sq. Footage: 3862

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1979-08-24	$7,800.00	TRS OF EVANGEL FOURSQUARE CHURCH	MYERS L L (Inactive)	
1921-05-10	$0.00	MYERS L L (Inactive)	BISHOP JOHN F ETUX (Inactive)	
N/A	$0.00	BISHOP JOHN F ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013116

Property Address:

710 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOT 14 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0900

Property Sq. Footage: 3921

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-04-06	$31,000.00	THE LIFELINE FOUNDATION	BTF HOLDINGS LLC	160003250
2015-09-09	$323,280.00	BTF HOLDINGS LLC	Multiple Owners	150008777
2013-02-20	$0.00	PATRIARCH INVESTMENT LLC	MONARCH PROPERTY DEVELOPMENT LLC	130002015
2012-04-26	$11,000.00	MONARCH PROPERTY DEVELOPMENT LLC	VINE & BRANCH	120004113
1989-11-01	$0.00	VINE & BRANCH	ROSE & ASSOCIATES (Inactive)	

1984-04-18	$7,000.00	ROSE & ASSOCIATES (Inactive)	SMITH PENDLETON W (Inactive)	
1982-12-29	$7,000.00	SMITH PENDLETON W (Inactive)	ELLIS GILES LANE II ETAL (Inactive)	
1982-11-19	$0.00	ELLIS GILES LANE II ETAL (Inactive)	ELLIS GILES LANE JR (Inactive)	
1950-03-03	$2,150.00	ELLIS GILES LANE JR (Inactive)	ELLIS GILES L & MAYME E (Inactive)	
1927-01-11	$0.00	ELLIS GILES L & MAYME E (Inactive)	ELLIS GILES L & HARRY H (Inactive)	
1926-03-15	$0.00	ELLIS GILES L & HARRY H (Inactive)	ELLIS ROBERT W ETUX (Inactive)	
N/A	$0.00	ELLIS ROBERT W ETUX (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013115

Property Address:

708 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 200-SingleFamily

Legal Description: E PT LOT 13 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0900

Property Sq. Footage: 3922

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-05-31	$62,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160005178
1967-12-12	$1,000.00	ROUPAS FRANK G	CARPER SARAH D (ALL) (Inactive)	
1958-08-01	$10.00	CARPER SARAH D (ALL) (Inactive)	CARPER SARAH D (Inactive)	
1949-07-02	$0.00	CARPER SARAH D (Inactive)	CARPER HARRY F ETAL (Inactive)	
1935-11-26	$0.00	CARPER HARRY F ETAL (Inactive)	CLARK H O (Inactive)	
1931-07-01	$0.00	CLARK H O (Inactive)	PRICHARD I S (Inactive)	

1928-07-01	$0.00	PRICHARD I S (Inactive)	HARTMAN G C ETUX (Inactive)	
N/A	$0.00	HARTMAN G C ETUX (Inactive)		

ASSESSMENTS:

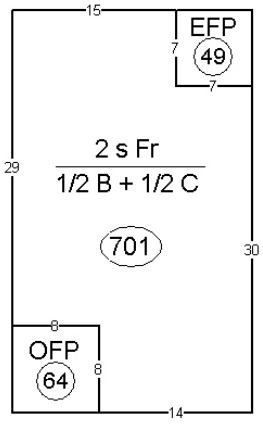
Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$13,000.00	$21,200.00
2024-01-01	$7,300.00	$13,000.00	$20,300.00
2023-01-01	$6,800.00	$13,000.00	$19,800.00
2022-01-01	$5,100.00	$12,000.00	$17,100.00
2021-01-01	$4,100.00	$10,900.00	$15,000.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

IMPROVEMENT 1

2.0 Story

Structure:

Year Built:	1890
Number of Stories:	2.0
Construction Exterior:	Wood siding
Foundation:	1/2 Bsmt, 1/2 Crawl
Structure:	Wood frame

Roof:

Roof Style:	Gable
Roof Cover:	Metal

Plumbing:

2 Fixture:	0
3 Fixture:	1

Size S/F:	1402
Lower Split Level/Foyer:	0
Lower Finished:	0
Total Bedrooms:	3
Total Rooms:	6

Attic:

Attic S/F:	None
Attic Fin S/F:	0

Basement:

Basement S/F:	350
Basement Fin S/F:	0

4 Fixture:	0
5 Fixture:	0

Heating / Air:

Heating Type:	Gravity
Central Air:	N
Fireplaces:	NO

Porches:

Enclosed Porch:	49
Open Porch:	64
Wood Deck:	0

Other Improvements

Garage

Attached Garage:	
Detached Garage:	
Attached Carport:	
Basement Garage:	

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013114

Property Address:

0 BULLITT AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: E PT LOT 12 & W PT LOT 13 BELMONT BLK 19

Zoning: RM-2

Property Acreage: 0.0900

Property Sq. Footage: 3922

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1996-10-21	$0.00	TRUSTEES OF EVANGEL FOURSQUARE CHURCH	VINE AND BRANCH INC (Inactive)	
1988-06-17	$26,900.00	VINE AND BRANCH INC (Inactive)	DUNCAN CECIL D & DOROTHY C (Inactive)	
1966-06-21	$2,700.00	DUNCAN CECIL D & DOROTHY C (Inactive)	CARPER WILMER H & LEONE (ALL) (Inactive)	

1958-08-01	$10.00	CARPER WILMER H & LEONE (ALL) (Inactive)	CARPER SARAH D (Inactive)	
1949-07-02	$0.00	CARPER SARAH D (Inactive)	CARPER HARRY F ETAL (Inactive)	
1937-02-06	$0.00	CARPER HARRY F ETAL (Inactive)	SIGMON H E (Inactive)	
1927-09-01	$0.00	SIGMON H E (Inactive)	ADKINS S G (Inactive)	
N/A	$0.00	ADKINS S G (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013113

Property Address:

704 BULLITT AVE SE

ROANOKE, VA 24013



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: E PT LOT 11 & W PT LOT12 BELMONT BLK 19

Zoning: RM-2

Property Acreage: 0.0885

Property Sq. Footage: 3854

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-05-31	$62,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160005178
1992-03-09	$0.00	ROUPAS FRANK G	ROUPAS FRANK G (Inactive)	
1967-06-06	$1,000.00	ROUPAS FRANK G (Inactive)	CARPER WILMER H (Inactive)	
1935-04-23	$0.00	CARPER WILMER H (Inactive)	HAHN J G ETAL (Inactive)	
N/A	$0.00	HAHN J G ETAL (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



The City of Roanoke, VA

Parcel Id: 4013112

Property Address:

0 BULLITT AV SE

ROANOKE, VA



SUMMARY:

Mailing Address:

PO BOX 11525

ROANOKE, VA 24022

Neighborhood: 110 - Southeast

Property Class: 100-Vacant Land

Legal Description: PT LOT 11 BLK 19 BELMONT

Zoning: RM-2

Property Acreage: 0.0898

Property Sq. Footage: 3913

Property Frontage: 30

Property Depth: 130.00

FLOOD ZONE INFORMATION:

Special Flood Hazard Area:

Firm Panel: 51161C0168G

Floodway:

OWNERSHIP HISTORY:

Sale Date	Sale Amount	Grantee	Grantor	Document Number
2022-06-01	$0.00	GATEWAY PROJECT LLC	Multiple Owners	220007025
2016-08-04	$750,000.00	THE LIFELINE FOUNDATION	Multiple Owners	160007532
1986-06-04	$0.00	EVANGEL FOURSQUARE CHURCH	REYNOLDS FRED B & LEMORA M (Inactive)	
1955-11-22	$6,150.00	REYNOLDS FRED B & LEMORA M (Inactive)	FOLEY K F (Inactive)	
1955-05-16	$5,750.00	FOLEY K F (Inactive)	BLANKENSHIP BENJAMIN M & NINA E (Inactive)	

1952-03-05	$0.00	BLANKENSHIP BENJAMIN M & NINA E (Inactive)	MAYS BOYD R & MYRLE M (Inactive)	
1950-09-21	$3,700.00	MAYS BOYD R & MYRLE M (Inactive)	KENNETT MINNIE M (Inactive)	
1944-08-02	$0.00	KENNETT MINNIE M (Inactive)	LESLIE MADIE B (Inactive)	0070000090
1943-09-30	$0.00	LESLIE MADIE B (Inactive)	LESLIE MADIE BISHOP ETAL (Inactive)	
1939-01-07	$0.00	LESLIE MADIE BISHOP ETAL (Inactive)	BISHOP JOHN F (Inactive)	
1909-05-05	$0.00	BISHOP JOHN F (Inactive)	TROUT P T (Inactive)	
N/A	$0.00	TROUT P T (Inactive)		

ASSESSMENTS:

Valuation Date	Land Value	Improvement Value	Total Value
2025-01-01	$8,200.00	$0.00	$8,200.00
2024-01-01	$7,300.00	$0.00	$7,300.00
2023-01-01	$6,800.00	$0.00	$6,800.00
2022-01-01	$5,100.00	$0.00	$5,100.00
2021-01-01	$4,100.00	$0.00	$4,100.00

RESIDENTIAL DWELLING DETAIL:

Primary Photo:



Primary Sketch:



IMPROVEMENTS:

PROPERTY MAP:



These questions are posed in connection with the completion of a Phase I ESA with the scope of work and limitations of ASTM Standard Practice E 1527-21

- Did any review of land title records identify any environmental liens or Activity/Use Limitations such as an engineering controls, land use restrictions, or institutional controls that have been filed and/or recorded against the Property?

  None that I am aware of.

- Do you know past uses of the Property? Are you aware of any current or prior industrial use or use as a gas station, auto repair facility, printing facility, drycleaners, junkyard, landfill, or waste treatment facility?

  The property was used as a church property with multiple buildings, and as residential housing. I am not aware of any current or prior industrial uses.

- Do you have any specialized knowledge or experience related to the Property or nearby properties?

  No

- Do you know of any specific chemicals that are present or were once present at the Property? This may include industrial drums or sacks of chemicals, automotive or industrial batteries, pesticides, paints, or other chemicals in containers greater than 5 gallons in volume or 50 gallons in aggregate.

  No

- Do you know of spills or other releases of chemicals or petroleum products that have taken place at the Property? Do you know of any environmental cleanups that have taken place at the Property?

  No

- Have you observed evidence or do you have any knowledge of registered or unregistered petroleum tanks (above or underground) on the Property?

  No

- Have you been informed of any current or past existence of hazardous substances, petroleum products, or environmental violations with respect to the Property?

  No

Completed by: Lee Clark

Company: Rescue Mission of Roanoke

Title/Relationship to Property: CEO

Date: 3-3-25

These questions are posed in connection with the completion of a Phase I ESA with the scope of work and limitations of ASTM Standard Practice E 1527-21

- Did any review of land title records identify any environmental liens or Activity/Use Limitations such as an engineering controls, land use restrictions, or institutional controls that have been filed and/or recorded against the Property?

  NO

- Do you know past uses of the Property? Are you aware of any current or prior industrial use or use as a gas station, auto repair facility, printing facility, drycleaners, junkyard, landfill, or waste treatment facility? YES / NO

- Do you have any specialized knowledge or experience related to the Property or nearby properties?

  L Seller purchased properties - assembled them - former church & single family home sites.

- Do you know of any specific chemicals that are present or were once present at the Property? This may include industrial drums or sacks of chemicals, automotive or industrial batteries, pesticides, paints, or other chemicals in containers greater than 5 gallons in volume or 50 gallons in aggregate.

  NO

- Do you know of spills or other releases of chemicals or petroleum products that have taken place at the Property? Do you know of any environmental cleanups that have taken place at the Property?

  NO NO

- Have you observed evidence or do you have any knowledge of registered or unregistered petroleum tanks (above or underground) on the Property?

  NO

- Have you been informed of any current or past existence of hazardous substances, petroleum products, or environmental violations with respect to the Property?

  NO

Completed by: W Andrew Hanson W Andrew Hanson

Company: Homes for America, Inc

Title/Relationship to Property: VP, Contract purchaser

Date: 3/3/2025

© Grimm and Parker Architecture, Inc.

SECTION 02 30 00 - SUBSURFACE DRILLING AND SAMPLING INFORMATION

PART 1 - GENERAL

1.1 The following information is included in the Project Manual for bidders use in preparing bids, but is not part of the Contract Documents, and does not relieve the bidders from doing their own investigation to determine the accuracy of the information.

1.2 STATEMENT CONCERNING THE BORING DATA

A. The test borings and samples of the soils encountered were obtained by the Architect to assist the Architect and his consultants in determining the type and design of the foundation systems.

B. The test borings were made by INSERT NAME OF GEOTECH ENGINEER, in accordance with their system of soils classification and they, INSERT NAME OF GEOTECH ENGINEER, neither the Owner, the Architect, or his consultants guarantee the accuracy or consistency of the information contained within the Geotechnical Report with the actual site conditions.

C. Any radical deviation from the anticipated material, as indicated by the borings, during the excavation for the building should be reported to the Architect immediately and confirmed in writing.

1.3 CONFIRMATION OF BORING DATA

A. Bidders, Contractors, and any others who are concerned with, or are affected by the test borings should make their own borings and tests at the site.

B. No additional compensations will be allowed the Contractor for failure to fully investigate the site or for the neglect of the information contained in the Boring Logs.

1.4 ATTACHMENT

A. INSERT NAME AND DATE OF GEOTECH REPORT

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 02 30 00





ECS Mid-Atlantic, LLC

Geotechnical Engineering Report

Roanoke Gateway Project

614 Bullitt Avenue
Roanoke, Virginia

ECS Project No. 12:20641

April 16, 2026

April 16, 2026

Ms. Denise Fazio
Homes for America
175 Admiral Cochrane Drive
Annapolis, Maryland 21401

ECS Project No. 12:20641

Reference: Geotechnical Engineering Report
Roanoke Gateway Project
614 Bullitt Avenue
Roanoke, Virginia

Dear Ms. Fazio:

ECS Mid-Atlantic, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Homes for America during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS Mid-Atlantic, LLC

Kathryn M Freiberger
Digitally signed by Kathryn M Freiberger
Date: 2026.04.16 15:09:16 -04'00'

COMMONWEALTH OF VIRGINIA
KATHRYN M. FREIBERGER
Lic. No. 033876
PROFESSIONAL ENGINEER

Lance N. Bass
Project Engineer
lbass@ecslimited.com

Kathryn M. Freiberger, PE
Senior Principal Engineer
kfreiberger@ecslimited.com

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APPENDICES

Appendix A – Diagrams & Reports

- Site Location Diagram
- Boring Location Diagram
- Subsurface Cross-Sections

Appendix B – Field Operations

- Reference Notes for Boring Logs
- Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
- Boring Logs B-01 through B-18 and P-01 through P-06

Appendix C – Laboratory Testing

- Laboratory Test Results Summary
- Plasticity Charts
- Grain Size Analyses
- Moisture-Density Relationship Curves
- CBR Test Results

EXECUTIVE SUMMARY

This Executive Summary is intended as a very brief overview of the primary geotechnical conditions that are expected to affect design and construction. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

- The soils encountered at the site generally consisted of CLAYEY SAND (SC), LEAN CLAY (CL), FAT CLAY (CH), SILT (ML), and WEATHERED ROCK (WR) materials. Existing fill consisting of SANDY GRAVEL (GP) was encountered in boring B-08 to a depth of 2 feet. These materials appear to be dense graded aggregate below the existing pavement.

- Based on boring data obtained during the exploration, we anticipate that materials requiring difficult or rock excavation techniques will be encountered during site grading, utility installation, and excavation to planned subgrades, specifically around Building 1 and Building 2. Utility installation may encounter weathered rock and rock conditions depending on their location. The excavation of weathered rock and rock can have a substantial impact on the cost and schedule of the proposed construction.

- The soil strength profiles encountered in the center of Building 2 (borings B-02 and B-04) decrease significantly with depth. Boring B-02 encountered Weight of Hammer (WOH) material from approximately 23 to 35 feet below ground surface before hitting auger refusal at 38 feet below existing grade. These conditions are indicative of residual soils underlain by karst bedrock, which is subject to sinkhole development. For Building 2, we recommend additional exploration to include electrical resistivity imaging (ERI) and verification soil borings to assist in identifying the extent of the poor soil conditions. This study is currently underway and results will be submitted under a separate cover.

- Buildings 1 and 3 may be supported by conventional shallow foundations consisting of column and/or continuous strip footings bearing on natural soil or newly compacted fill soils designed for an allowable bearing pressure of 2,000 psf. The buildings can be designed based on a seismic site classification of D.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design and construction of three (3) proposed multi-family buildings and associated infrastructure. These buildings each have multiple stories with split elevations in some conditions. Below grade walls within the interior of the structure and extended foundation walls are anticipated The recommendations developed for this report are based on project information supplied by you. It is our understanding that Building 1 is to be constructed first and Buildings 2 and 3 are to follow in later phases.

Our services were provided in accordance with our Proposal No. 16605-RP, dated July 24, 2025, as authorized by W. Andrew Hanson on July 29, 2025, which includes our Terms and Conditions of Service.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items:

- A brief review and description of our field and laboratory test procedures and the results of testing conducted
- A review of surface topographical features and site conditions
- A review of area and site geologic conditions
- A review of subsurface soil/rock stratigraphy with pertinent physical properties
- Final soil exploration/test boring logs
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills and identification of potentially unsuitable soils and/or soils exhibiting excessive moisture at the time of sampling
- Recommended foundation type
- Recommendations for design of slabs on grade and construction.
- Recommended lateral earth pressures for below-grade building walls.
- General recommendations for pavement design, including a recommended design CBR value
- Recommendations for seismic site classification in accordance with the International Building Code (IBC 2021)
- An evaluation of soil and rock excavation issues
- Recommendations for additional testing and/or consultation that might be required to complete the geotechnical assessment and related engineering for this project.

The recommendations contained herein were developed from the data obtained in the soil test borings, which indicate subsurface conditions at these specific locations at the time of exploration. Soil conditions may vary between the soil test borings. If during construction, variations appear evident; the Geotechnical Engineer should be informed so that the conditions can be reviewed and addressed.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The site is located at 614 Bullitt Avenue within the corporate city limits of Roanoke, Virginia. At the time of our visit, the ground surface over the site was a mixture of maintained grass, asphalt, and demolition debris. The overall site is bounded to north and west by Jamison Avenue SE, to the east by 9th Street, and to the south by Bullitt Avenue.



Figure 2.1.1. Site Location

Building 1 is proposed to be located on the western portion of the site bounded by Jamison Avenue SE, Bullitt Avenue SE, and 7th Street. Based on our site visit and review of historical imagery, there used to be multiple residential structures located within the proposed Building 1 footprint that were demolished at some point between November 2019 and July 2021. Buildings 2 and 3 are to be located on the eastern portion of the site bounded by Jamison Avenue SE, Bullitt Avenue SE, 7th Street, and 8th Street. Based on our review of historical imagery, there used to be multiple residential structures located within the proposed Building 3 footprint that were demolished at some point between November 2019 and July 2021. There also appeared to be residential structures within the Building 2 footprint that were demolished between March 1995 and December 2002.

During our site layout, we observed surficial demolition debris in the area of Building 1, and an area with surficial sand within the footprint of Building 2. The debris within Building 1 was located in the central part of the proposed building and consisted of concrete and rock fragments. Within Building 2, the surficial sand area was located close to the southwest corner of the proposed footprint. There were also sewage cleanouts observed within the footprints of Building 1 and 3 that pose the possibility of existing utilities

being present beneath the ground surface of these buildings. An existing utility bisects building 2 as well. Below are images of the surficial debris and sand noted above that were encountered during our site reconnaissance:



Figure 2.1.2. Demolition debris observed within Building 1 footprint



Figure 2.1.3. Sand area located at southwest corner of Building 2 footprint.

Rock outcrops were observed within the footprints of Buildings 1 (near B-09), 2 (near B-02), and 3 (near B-02) suggesting shallow rock may be encountered in these areas during grading operations.

It is not known whether any of the previous residential structures had below grade levels.

Based on our site visit and review of the grading plan we were provided that depicts existing grades, the site grades down to the north and northwest with elevations ranging from approximately EL. +944 feet to EL. +964 feet.

2.2 PROPOSED CONSTRUCTION

The following information explains our understanding of the planned development, including proposed buildings and related infrastructure:

Table 2.2.1 Proposed Construction Properties

SUBJECT	DESIGN INFORMATION / ASSUMPTIONS
Usage	Multi-Family Residential
Framing	Wood Framed
Column Loads*	12 kips maximum
Wall Loads*	6 kips per linear foot (klf) maximum

* Loads are based on the values provided by Liz Chapman with Grimm and Parker Architects via email on February 3, 2026. If final design loads exceed our assumed loads, this report needs to be revised to update our foundation recommendations, bearing capacity, and settlement calculations.

Based on the existing grades, Buildings 1 and 2 will have a split where portions of the structure will have a lower (walk-out) elevation on one side and a higher first floor on the other side of the building. This will create below grade walls within the center of the building in some areas. To reduce exterior grading, the exterior foundations of the structure will follow existing grades creating extended foundation walls in some areas.

Table 2.2.2 Building Characteristics

STRUCTURE	# STORIES	BELOW GRADE WALLS	FINISHED FLOOR ELEVATION
Building 1	3 to 4	Interior Wall at split Elevations, and Exterior Foundation Walls to existing grades	1st Floor EL. +954 ft 2nd Floor EL. +966 ft
Building 2	3		Terrace EL. +950 ft 1st Floor EL. +960 ft
Building 3	3 to 4		1st Floor EL. +954 ft 2nd Floor EL. +964 ft

The location and depth of utilities was not known at the time of this report. Site retaining walls and stormwater management were not depicted on the provided plan and are not included in this scope.

Driving entrances to the buildings will be off of 7th and 8th Streets. Parking spaces will be located north of Building 1 and between Buildings 2 and 3. Traffic volumes were not provided.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our exploration procedures are explained in greater detail in Appendix B including the insert titled Subsurface Exploration Procedures. Our scope of work included drilling 24 Standard Penetration Test (SPT) soil borings and four (4) offset borings. Our borings were located with a handheld GPS unit while referencing Google Earth aerial imaging and existing site features. The approximate locations are shown on the Boring Location Diagram in Appendix A.

3.1 SITE GEOLOGY

Based on our review of the “Geology of the Roanoke and Stewartsville Quadrangles, Virginia” (Virginia Division of Mineral Resources, 1981), the project site is located within Virginia’s Blue Ridge Physiographic and Geologic Province.

Specifically, the project site is mapped to be underlain by the Rome Formation (€R) and surrounded by alluvial deposits (al) and terrace deposits. The Rome Formation primarily consists of shale and siltstone with carbonate rock intervals up to approximately 50 feet thick. The carbonate rock formations located in this area typically consist of limestone and dolomite. Alluvial deposits primarily consists of sand, silt, clay, pebbles, cobbles, and boulders of quartzite, sandstone, and chert. Terrace deposits include rounded cobbles and boulders of vein quartz, metaquartzite, quartzose, and felspathic sandstone, and chert.

The boundary between soil and rock is not sharply defined. A transitional zone termed "weathered rock" is normally found overlying the parent bedrock. Weathered Rock (WR) is defined, for engineering purposes, as residual material with Standard Penetration resistance greater than 60 blows per foot (bpf).

Because weathering is facilitated by fractures, joints, and the presence of less resistant rock types, the profile of the WR and hard rock is typically irregular and erratic, even over short horizontal distances. Also, it is not unusual to find lenses and natural floating boulders of hard rock in zones of WR within the soil mantle, well above the general bedrock level. In carbonate rock formations, the transition between soil and rock can be abrupt with little to no weathered rock zone.

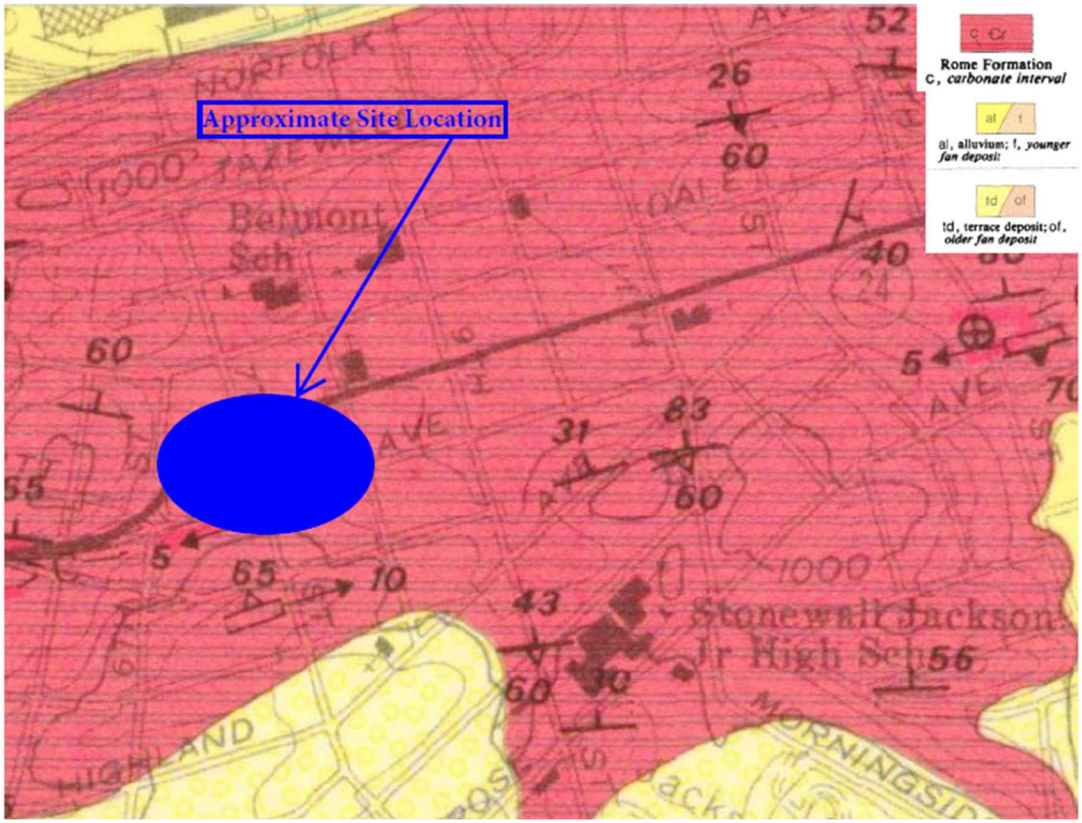


Figure 3.1.1 Site Geology Mapping "Geology of the Roanoke and Stewartsville Quadrangles, Virginia"

3.2 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil strata. Please note that the ground surface elevations were not surveyed by a licensed surveyor; these elevations are approximate based on the grading plan provided to us by you entitled *Roanoke Gateway* prepared by Balzer & Associates and dated January 17, 2025; therefore, elevation ranges are approximate +/- 1 foot. When shallow refusal was encountered, the boring was offset. Please refer to the boring logs in Appendix B for detailed information.

Table 3.2.1 Subsurface Characterization

Approximate Depth (ft)	Stratum	Description	Ranges of SPT(1) N-values (bpf)
0-0.2 (Surface cover)	N/A	Topsoil (2 to 4 inches) Asphalt (2 to 4 inches) Gravel (4 to 6 inches)	N/A
0.2-2.2	I – Existing Fill	FILL, Poorly Graded Sandy GRAVEL (GP)	50+
0-20	II - Residuum	Residuum, Lean Clay (CL); Fat Clay (CH); Silty Sand (SM); Silt (ML); Well-Graded Gravel (GW); Clayey Gravel (GC); Poorly-Graded Gravel (GP)	2 to 50+
13-38	III - Epikarst	Residuum, (Boring B-02) Lean Clay (CL); Fat Clay (CH)	WOH to 2
3-38.3	IV – Weathered Rock	Weathered Rock Sampled as Gravelly Fat Clay With Sand (WR); Well-Graded Gravel With Sand (WR); Clayey Gravel With Sand (WR); Lean Clay With Sand (WR); Fat Clay With Sand (WR); Poorly-Graded Gravel With Sand (WR)	60+

Notes:
(1) Standard Penetration Testing

Based on our subsurface exploration and site history, Existing FILL soils consisting of poorly graded Sandy GRAVEL (GP) was observed in boring B-08 below the existing pavement. Although not identified in the other borings, based on the existing pavements and utilities, and the previous structures, Existing Fill should be anticipated in other areas on the site. The surface materials should be expected to be disturbed due to shallow grading, however, where existing utilities are located, fill soil should be anticipated above the utility in a 1H:1V "V" shape from the utility to the ground surface.

Epikarst materials are typically very soft, saturated zones infilling valleys within the calcareous bedrock formation overlying karst/sinkhole features within the parent bedrock geology (Bakalowicz, 2019)[1]. This is a key indicator of the carbonate rock dissolution process of the underlying bedrock in karst environments. The regional geology supports the presence of epikarst/karst formations. The characteristic nature of these materials are high natural moisture contents/percent saturation, very soft consistency and very loose density, presence of perched water conditions, and interbedded layers of weathered/dissolution rock materials within the soil matrix. Boring B-02 reflected probable epikarst materials at about elevations EL +937 ft to EL +913 feet. Boring B-04 has possible epikarst materials based on the SPT N-values in the lower part of the boring.

Auger refusal materials are indicators of very hard or very dense zones unable to be advanced by the drilling equipment. These are typical indicators of top of rock, boulders, and/or very hard lenses. Auger refusal was encountered in the following locations:

[1] Bakalowicz, M. (2019). Chapter 45: Epikarst. In Encyclopedia of caves. Academic Press. Retrieved from https://catalog.lib.ncsu.edu/catalog/NCSU4706096. P. 394-398

Boring	Approximate Depth to Auger Refusal (ft)	Approximate Elevation of Auger Refusal (ft)
B-01	3.0	942.0
B-01A	7.2	937.8
B-01B	3.1	941.9
B-06	8.8	937.2
B-07	13.1	937.9
B-08	13.8	937.2
B-09	14.8	938.2
B-10	5.8	951.2
B-11	13.6	936.4
B-12	12.7	947.3
B-13	1.2	963.8
B-13A	1.8	963.2
B-13B	0.2	964.8
P-01	3.6	947.4
P-02	11.0	937.0
P-03	8.6	938.4

A graphical presentation of the subsurface conditions is shown on the Subsurface Cross Section Diagrams included in Appendix A.

3.3 GROUNDWATER OBSERVATIONS

Water levels were measured in our borings during drilling and at completion of drilling. In auger drilling operations, water is not introduced into the boreholes, and the groundwater position can often be determined by observing water flowing into or out of the boreholes. Furthermore, visual observation of the soil samples recovered during the auger drilling exploration can often be used in evaluating the groundwater conditions. Groundwater was only encountered in boring B-02 and was measured at the time of drilling at 30 feet below the ground surface, corresponding to EL. +920 feet. No groundwater was encountered in the rest of our borings; however, elevated moisture was noted in borings B-16 and B-17 at approximately 18 feet. It should be expected that elevated moisture and/or perched water will be located above very dense materials, auger refusal and cohesive soils.

Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

> **"**Perched water is typically of limited quantity, replenished or recharged very slowly. When encountered in an excavation, perched water will typically drain off very quickly, with limited continuous flow or bleeding, unless a source of recharge, such as a leaking utility is present."
> From: *Construction Dewatering and Groundwater Control – New Methods and Applications, 3rd Addition*

A water table aquifer is distinguished from a perched groundwater table based on the water table aquifer's recharge ability, which may be limitless but can be lowered temporarily through adequate dewatering techniques such as deep wells and well points. Perched groundwater is often alleviated in excavations by pumping from sump pits and French drains.

The highest groundwater observations are normally encountered in the late winter and early spring. Therefore, earthwork operations in the winter and spring are more likely to encounter difficulties with perched conditions than those operations undertaken in the summer or fall.

3.4 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples. The laboratory testing program included natural moisture content tests (ASTM D2216), grain size analyses tests (ASTM D6913), and Atterberg Limits tests (ASTM D4318). Standard Proctor tests (ASTM D698) and California Bearing Ratio (CBR) tests (D1883) were performed on bulk soil samples. The results of all laboratory testing conducted are included in Appendix C of this report.

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

4.0 DESIGN RECOMMENDATIONS

4.1 KARST RISK COMMENTARY

Based on our site reconnaissance karst features were not observed in close vicinity of the proposed development. However, the site is mapped to be underlain by geologic parent rock which is known to be carbonate in nature. There are mapped karst features within one mile of the site.

The subsurface conditions encountered in the soil test borings consist of residual soils of varying strength and moisture, as well as an erratic karst bedrock surface. The borings for Buildings 1 and 3 (B-06 through B-18) have soil strength profiles that shouldn't pose an issue with shallow foundations. However, the soil strength profiles encountered in Building 2 borings, particularly B-02 and B-04, decrease with depth. Boring B-02 encountered Weight of Hammer (WOH) material from approximately 23 to 35 feet below ground surface before hitting auger refusal at 38 feet below existing grade. These conditions are indicative of the presence of epikarst material. ECS recommends additional exploration in Building 2 to evaluate the

lateral extent of the poor soil conditions and potential for karst conditions. The additional exploration should include Electrical Resistivity Imaging (ERI) and additional soil borings.

General Karst: The local geology includes carbonate rock which is prone to karst activity. As carbonate rock dissolves, the soluble minerals are carried away by the groundwater, leaving behind the insoluble materials (clay minerals and silicates). The process reduces hard rock into soft soil with the consistency of soft paste. The rate of rock solutioning is rapid relative to geologic time (where processes are generally measured in tens of thousands to millions of years), but very slow on a human time scale. Rock solutioning occurs primarily from the surface downward, along the surfaces of fissures (joints, bedding planes, and fracture zones) in the bedrock. The rock fissures are enlarged, creating soil-filled troughs and channels, surrounded by hard rock. The soil filling is often eroded by flowing groundwater and the troughs and channels become open cavities. These cavities can develop and become interconnected to form caves, which in turn, become open conduits for groundwater flow and sediment transport.

As a cavity in the bedrock grows and expands, the tensile stresses in the roof of the cavity increase, and occasionally the roof will spall slabs of rock as the cavity grows upward toward the ground surface. When a cavity in the rock grows to the point that the roof of rock is too thin or weak to span the void and support the overburden, the cavity can collapse and form a depression or sinkhole at the ground surface. This type of sinkhole development is relatively rare because it is a slow process in terms of human time.

The more common mechanism for sinkhole development is through the erosion of soil overburden into cavities in the underlying bedrock. This erosion starts at the soil-rock interface over an opening in the bedrock. As soil is carried into the opening by percolating groundwater, a cavity is formed in the soil. This cavity grows as the result of raveling of soils from the roof, and can eventually collapse, propagating to the surface and causing a sinkhole. Factors that can contribute to or cause such a collapse include: soil overburden weight, new structural loads, vibrations, construction equipment weight, changes in groundwater levels, and changes to surface water infiltration patterns.

Subsurface soil erosion is aggravated by, among others, the following hydrologic factors: increasing the infiltration of water at the ground surface; lowering of the groundwater level so as to increase the vertical flow gradient and erosion potential at the critical rock-soil interface; and alternately, draining and saturating the soil at the critical rock-soil interface by repeatedly fluctuating the groundwater level from above to below the surface.

4.2 FOUNDATIONS

4.2.1 Building 1 and 3 Foundations

Provided subgrades and Structural Fills are prepared as recommended in this report, the proposed structures can be supported by shallow foundations including continuous wall footings and any possible column footings. We recommend the foundation design use the following parameters:

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure(1)	2,000 psf	2,000 psf
Acceptable Bearing Soil Material	Stratum II, IV or Approved Structural Fill	Stratum II, IV or Approved Structural Fill
Minimum Width	24 inches	24 inches
Minimum Interior Footing Embedment Depth (below slab or finished grade) (2)	24 inches	24 inches
Minimum Exterior Footing Depth (below final exterior grade)(2)	30 inches	30 inches
Estimated Total Settlement (3)	Less than 1- inch	Less than 1- inch
Estimated Differential Settlement (4)	Less than ¾ inches between columns	Less than ¾ inches over 30 feet

Notes:

(1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
(2) For bearing considerations, frost penetration requirements or expansive soil concerns.
(3) Based on provided structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
Based on maximum column/wall loads and variability in borings.

Shallow Rock: Early auger refusal was encountered in the center and southeast area of Building 1. Based on the first floor elevation, excavation at this area to reach the subgrade and foundation bearing elevations may be difficult. In addition, excavation for the slab and foundation for the interior below grade wall on the eastern part of the building may also be difficult. The contractor should review the boring logs carefully and be prepared for hard excavation techniques.

The rock is likely to be seamy, with abrupt transitions between soil-supported and rock-supported footings. In such instances, it is recommended to perform isolated undercuts along the footing to reduce the potential for excessive differential settlement across relatively short horizontal distances. Where footings transition from soil-support to rock-support and the length of the rock seam is greater than 4 feet, we recommend that the rock be removed to a depth of 12 inches for a length of 10 feet from the soil/rock interface and be replaced with compacted soil. In instances where the rock pinnacle extends for a distance of less than 4 feet along the trench, the rock pinnacle should be removed to a depth of 12 inches below the design bearing level and replaced with compacted soil.

Potential Undercuts: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut to firm materials. Any undercut should be backfilled with cementitious flowable fill ($f'_c \geq 200$ psi at 28 days), lean concrete, or compacted dense graded aggregate (VDOT No. 21-A) up to the original design bottom of footing elevation; the original footing shall be constructed at the designed footing elevations.

If shallow foundations are subject to lateral loading, the following engineering parameters can be utilized:

SOIL PARAMETER	ESTIMATED VALUE
Coefficient of Passive Earth Pressure (K_p)	2.66
Soil Moist Unit Weight (γ)	110 pcf
Cohesion (C)	0 psf
Interface Friction Angle [Concrete on Soil] (ϕ_f)	18°
Sliding Friction Coefficient [Concrete on Soil] (μ)	0.32
Passive equivalent fluid pressure	200H (psf)*

*The passive equivalent pressure has been reduced since the amount of movement required for full mobilization is not likely.

4.2.2 Building 2

Medium dense to dense soils and weathered rock were encountered at the west and east areas of Building 2; however, very soft soil was encountered in the central area of Building 2, particularly boring B-02 and B-04. Materials that appear to be epikarst are located in B-02 from approximately 8 feet to 24 feet below existing grade. Based on the conditions, it is our recommendation that an additional exploration be performed to help identify the lateral and vertical extent of the soft soil conditions. The additional exploration would consist of additional borings and Electrical Resistivity Imaging (ERI).

4.3 SLABS ON GRADE

Provided subgrades and structural fills are prepared as discussed herein, the proposed floor slabs for Buildings 1 and 3 can be constructed as Ground Supported Slabs (or Slab-On-Grade). It appears that the slabs will bear on newly compacted fill or Stratum II. The following graphic depicts our soil-supported slab recommendations:

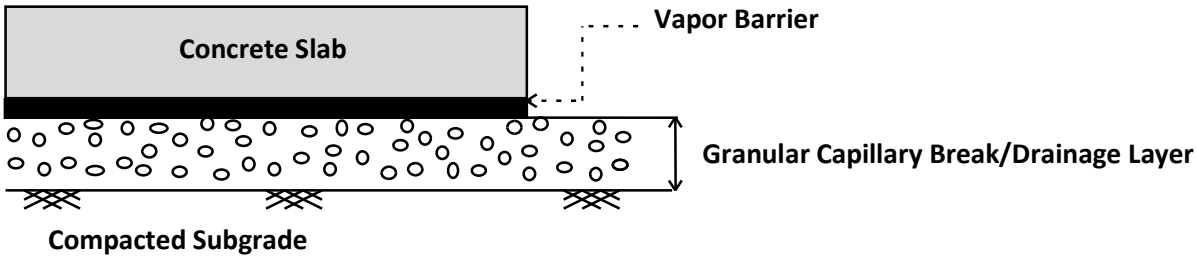


Figure 4.3.1

1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: VDOT 21A/B or 57 stone

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Structural Fill in accordance with the recommendations included in this report.

Subgrade Modulus: Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade

reaction, k_1 of 125 pci (lbs./cu. inch). The modulus of subgrade reaction value is based on a 1 foot by 1 foot plate load test basis.

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

Rock Above Design Bearing Elevation: We recommend that sufficient rock be removed to allow placement of the entire drainage layer. This will serve to cushion the slab and reduce the potential for point loads and subsequent cracking of the concrete. In such cases, additional overexcavation of rock should be considered to allow installation of underslab utilities.

Slab Isolation: Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab such as in a drop down footing/monolithic slab configuration, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

4.4 BELOW GRADE WALLS

Below grade interior walls (at split elevations) and exterior foundations walls are planned in the design. We recommend that below grade walls be designed to withstand at-rest lateral earth pressures and surcharge loads from adjacent building foundations and slabs. These recommendations apply to a “drained” condition which is where there is drainage material behind below grade walls that prevents hydrostatic water pressures on the back of the below grade wall.

To accomplish a drained condition, drainage materials such as a free draining gravel, geocomposite drainage panels, and weep holes should be used. The geocomposite and weepholes are primarily for the construction phase of development. This system should consist of weepholes through the wall and/or a 4-inch perforated closed joint drain line located along the backside of the walls above the top of the footing. The drain line should be surrounded by a minimum of 6 inches of VDOT #57 stone wrapped with an approved non-woven geotextile, such as Mirafi 140-N or equivalent. The drains should daylight or be connected t a sump pump that directs water away from the structure.

We recommend that walls that are restrained from movement at the top be designed for a linearly increasing lateral earth pressure. The following figure depicts our recommended at-rest lateral earth pressure condition for a “drained below-grade wall” with restrained wall top:

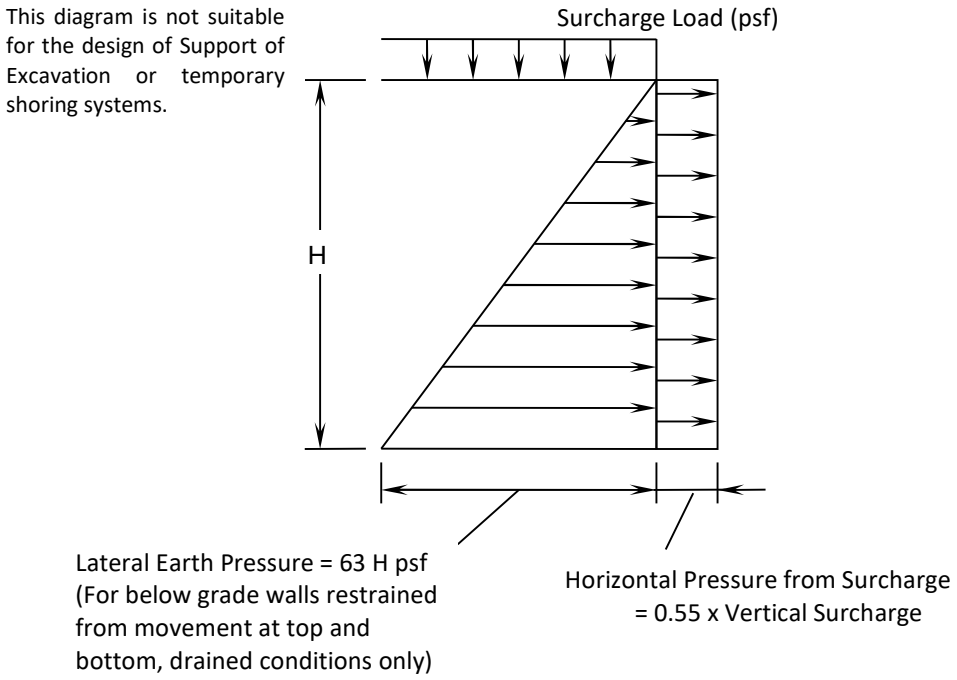


Figure 4.4.1

Surcharge loads imposed within a 45 degree slope from the base of the restrained wall should be considered in the below grade wall design. These surcharge loads should be based on an at-rest pressure coefficient, k_0, of 0.55. Care should be used to avoid the operation of heavy equipment to compact the wall backfill since it may overload and damage the wall; in addition, such loads are not typically considered in the design of below grade walls.

4.5 SEISMIC DESIGN CONSIDERATIONS

The Commonwealth of Virginia has adopted Virginia Construction Code 2021 (VCC) via the Virginia Uniform Statewide Building Code (USBC). The current version of VCC incorporates ASCE 7-22, Minimum Design Loads and Associated Criteria for Building and Other Structures into the building code. This adoption supersedes section 16 of IBC 2021, in respect to seismic site classification.

ASCE 7-22, Chapter 20 has updated the procedure for determining Site Classification. This chapter requires that site classification be conducted based on the average shear wave velocity of the top 100 feet of the site. The shear wave velocity can either be measured or estimated based on established correlations. If site classification is based on estimated values of shear wave velocity (v_s) the site class shall be derived using V_s, $V_s/1.3$ and $V_s(1.3)$. The seismic site class definitions for the weighted average shear wave velocities in the upper 100 feet of the soil profile are presented in Chapter 20 of ASCE 7-22 and in the table below.

SEISMIC SITE CLASSIFICATION		
Site Class	**Soil Profile Name**	**Shear Wave Velocity, Vs, (ft./s)**
A	Hard Rock	Vs > 5,000 ft./s
B	Rock	>3,000 to 5,000 ft./s
BC	Soft Rock	>2,100 to 3,000 ft./s
C	Very Dense Sand or Hard Clay	>1,450 to 2,100 ft./s
CD	Dense Sand or Very Stiff Clay	>1,000 to 1,450 ft./s
D	Medium Dense Sand or Stiff Clay	>700 to 1,000 ft./s
DE	Loose Sand or Medium Stiff Clay	>500 to 700 ft./s
E	Very Loose Sand or Soft Clay	Vs < 500 ft./s

For this project, shear wave velocity of the soil profile was estimated based on the soil densities observed. Based upon our estimate and assumed proposed bearing elevations of the structures we recommend that a **Site Classification D** be used for the design of the structures. This Site Classification is based on a Risk Category of III for the building. This recommendation is in accordance with the procedure outlined in ASCE 7-22.

4.6 PAVEMENTS

Subgrade Characteristics: Based on the results of our borings, it appears that the pavement subgrades in cuts will consist mainly of CLAYEY GRAVEL (GC), LEAN CLAY (CL), POORLY GRADED GRAVEL (GP), and WEATHERED ROCK (WR) material. We anticipate pavement subgrades in fill areas will consist of similar materials from on-site cuts or import material.

California Bearing Ratio (CBR) testing was performed on soil from boring P-05 and P-03. The soils classified as Lean Sandy CLAY (CL) and demonstrated CBR values of 2.9 and 5.0 at approximately 98 and 100% compaction, respectively. Maximum swell was 1.40%. For design purposes, we recommend a design CBR value of 3, approximately two-thirds of the average laboratory value and compact the top 12-inches of pavement subgrade to 100 % of the maximum dry density

Traffic Loading Information: We were provided with traffic loading information by Chris Burns with Westwood via email on January 28, 2026. Based on the information provided, we have utilized 500 ADT for our pavement design with the assumption of no more than 5% trucks. Should traffic loading differ from the data noted, ECS should be contacted to revise our pavement design.

Pavement Design Recommendations: Our pavement design was performed in general accordance with the *VDOT Pavement Design Guide for Subdivision and Secondary Roads in Virginia*. The preliminary pavement sections below are minimum sections. The civil engineer should review potential traffic and contact ECS should the loading be higher.

MATERIAL	FLEXIBLE PAVEMENT		RIGID PAVEMENT
	Heavy Duty	Light Duty	Heavy Duty
Portland Cement Concrete (f'_c = 4000 psi)	-	-	6 in
Asphaltic Concrete Surface Course (SM-12.5)	1.5 in	1.5 in	-
Asphaltic Concrete Base Course (BM-25.0)	3.0 in	2.0 in	-
Graded Aggregate Base Course (AASHTO #21A/21B)	8.0 in	8.0 in	6 in
Pavement Thickness	12.5 in	11.5 in	12 in

In general, heavy duty sections are areas that will be subjected to trucks, buses, or other similar vehicles including main drive lanes of the development. Light duty sections are appropriate for vehicular traffic and parking areas.

Large, front loading trash dumpsters frequently impose concentrated front wheel loads on pavements during loading. This type of loading typically results in rutting of asphalt pavement and ultimately pavement failures. For preliminary design purposes, we recommend that the pavement in trash pickup areas consist of the heavy duty rigid pavement.

Prior to subbase placement and paving, we recommend that CBR testing of the subgrade soils (both natural and fill soils) be performed to determine the soil engineering properties for final pavement design.

Pavement Drainage/Subdrainage: The pavement sections should be designed to mitigate the potential for "bath tub" effects from differential pavement thicknesses. Drainage mechanisms consisting of edge drains should be incorporated into the design to facilitate positive subbase drainage. The onsite ML and CL materials are sensitive to moisture fluctuations and have poor drainage characteristics that can degrade subgrade support over time. Once parking areas and drive lanes have been established to subgrade elevations, it is important to proceed with the placement of all roadway design elements in a timely manner. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrades and other problems related to the deterioration of the pavement can be expected. Curbs should be backfilled as soon as possible to reduce the infiltration of water the pavement subbase and soil subgrade.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

5.1.1 Demolition

All existing structures (including all above and below-ground construction) within these areas to be developed should be removed prior to the initiation of new construction. There was demolition debris observed on site, specifically in the central portion of the Building 1 footprint and the southwest corner of the Building 2 footprint. The debris within Building 1 consisted of concrete and rock fragments and was

surficial. The debris within Building 2 appeared to be an excavation backfilled with sandy material. The demolition debris from the existing structures should be completely removed from the site. Removal should include all concrete, asphalt/gravel, underground pipes, tanks, drain fields and utilities at the site that might interfere with the new construction. For all excavations resulting from the removal of abandoned utilities, provisions should be made in the construction specifications and budget to restore the subgrade to a stable condition with properly compacted Structural Fill. Restoration should include backfilling and compaction of the excavated areas. Abandoning and grouting of utilities is not recommended.

5.1.2 Stripping and Grubbing

The subgrade preparation should consist of stripping all vegetation, rootmat, topsoil, existing fill, existing asphalt, subbase materials, and any soft or unsuitable materials from the 5-foot expanded building and pavement limits. Stripping limits should be extended an additional foot for each foot of fill required to reach the design subgrade elevation.

5.1.3 Proofrolling

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by a representative of ECS. The exposed subgrade should be thoroughly proofrolled with construction equipment having a minimum axle load of 10 tons [e.g. fully loaded tandem-axle dump truck]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying any localized yielding materials.

Where proofrolling identifies areas that are unstable or “pumping” subgrade in those areas should be repaired prior to the placement of any subsequent Structural Fill or other construction materials. Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. The situation should be discussed with ECS to determine the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed unstable materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade.

5.2 EARTHWORK OPERATIONS

5.2.1 Existing Man-Placed Fill

Fill Content: Surficial debris is present on site, specifically within the footprint of Building 1 and 2. The material was located in the central portion of the Building 1 footprint (rock and concrete fragments) and the southwest corner of the Building 3 footprint (sandy backfill material). Although not encountered in our borings, based on the previous developments at the site, Existing Fill soils may be encountered at the site in unexplored areas. The fill may be surficial from shallow surficial grading or backfill for existing utilities or basements of previous residential structures. If materials that appear to be Existing Fill are identified, they should be completely undercut and removed during grading operations as they are not suitable for reuse as structural fill.

5.2.2 High Plasticity Soils

High plasticity soils are those materials classified as FAT CLAY (CH). High plasticity soils were encountered in many of the borings at variable depths. Where high plasticity soils are encountered at design subgrade elevations in slab and pavement areas, the subgrade should be undercut 2 feet and grades restored with approved low plasticity Structural Fill (LL<40, PI<20).

5.2.3 Weathered Rock and Rock

Based on boring data obtained during the exploration, we anticipate that materials requiring difficult or rock excavation techniques may be encountered during site grading, utility installation, and excavation to planned subgrades.

The excavation of weathered rock and rock can have a substantial impact on the cost and schedule of the proposed construction. This discussion considers two general classes of materials for purposes of describing excavatability. Residuum and weathered rock will be used as the terms for the materials to be excavated.

In mass excavations for general site work, overburden soils with standard penetration test N-values of 40 bpf or less can usually be removed with conventional earth excavation equipment. Residual soils or soft weathered (Saprolitic) rock with N-values of 40 to 50 bpf can generally be removed with conventional earth moving equipment after first being loosened with a large single-tooth ripper attached to a large crawler tractor. Harder, less weathered rock will generally require the use of a large single-tooth ripper, dozers, and/or track-mounted backhoes for excavation. However, materials exhibiting N-values of 50 blows or greater for 6 inches of penetration will be more difficult to excavate and generally require hoe ramming, blasting or other rock excavation techniques. The actual excavatability of the bedrock material will be greatly controlled by in-situ jointing and bedding and the type of excavating equipment utilized. The contractor should review the borings and be prepared with appropriate equipment for material removal.

In confined excavations, such as utility trenches, excavation of dense residual soils typically requires the use of large track-mounted backhoes. Excavation of harder phases of weathered rock typically requires the use of large track-mounted backhoes, pneumatic spades, or light blasting. Refusal materials (apparent rock) normally require blasting in trench excavations. Blasting in utility trenches should be done carefully to avoid damage to the surrounding materials. When the material to be excavated requires blasting, the contractor should comply with the jurisdictional requirements. We advise ensuring that any blasting performed adheres to local jurisdicitions and regulations as the karst conditions encountered within Building 2 may inhibit blasting operations.

5.2.4 Structural Fill

Prior to placement of Structural Fill, representative bulk samples (about 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet

project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

Satisfactory Structural Fill Materials: Materials satisfactory for use as Structural Fill should consist of inorganic soils having a USCS classification of CL, ML, SC, SM or more granular free of debris, cobbles or rock fragments greater than 4 inches in diameter. Low plasticity soils consisting of ML or more granular should be used behind below grade walls.

Since import materials are being paid for, we recommend that these materials consist of SM or more granular when possible and have liquid limits and plasticity indices less than 40 and 20, respectively. The onsite and import materials should have the following characteristics and compaction:

STRUCTURAL FILL INDEX PROPERTIES	
Subject	**Property**
Building and Pavement Areas (Borrow Soils)	LL < 40, PI<20
Building and Pavement Areas (On-site Soils)	LL < 50, PI < 25
Max. Particle Size	4 inches

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Subject	**Requirement**
Compaction Standard	Standard Proctor, ASTM D698 or VTM-1
Required Compaction	General: 95% of Max. Dry Density Top 12-inches of Pavement Subgrades: 100% of Max Dry Density
Moisture Content	+/-3 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction

On-Site Borrow Suitability: Onsite soils that meet the definition of Satisfactory Structural Fill are present on the site. These occur mostly at relatively shallow depth below the surface where residual soils are most weathered. It should be expected that the onsite materials will have moisture above optimum and will be moisture sensitive. Onsite materials from cut or taken from utility excavations should be anticipated to be wet of optimum and require drying.

Drying can be achieved by mechanical discing or chemical drying. Depending on the time of year, mechanical drying may not be practical. Chemical drying can be performed using quicklime or Calciment. Typically, 2 to 3% quicklime by dry weight is suitable for drying purposes. A higher percentage will be required using Calciment.

Fill Placement: Fill materials should not be placed on frozen soils, on frost-heaved soils, and/or on excessively wet soils. Borrow fill materials should not contain frozen materials at the time of placement, and all frozen or frost-heaved soils should be removed prior to placement of Structural Fill or other fill soils and aggregates. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

Slab Subgrade Verification: Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in **Section 5.1.3 Proofrolling**.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes with the exception of the central area around Building 2 where materials become soft and wet with depth. The location and inverts of utility structures were not known. The pipe subgrades should be observed and probed for stability by ECS. Any loose or unsuitable materials encountered should be removed and replaced with suitable compacted Structural Fill, or additional pipe stone bedding material.

Shallow weathered rock and auger refusals were encountered on the site. The locations and inverts of proposed utilities were unknown at the time of this report. Depending on the location and depth of utilities, difficult excavation may be encountered. The contractor should review the borings and the proposed utility locations carefully and be prepared for difficult excavation.

Utility Backfilling: The granular bedding material (AASHTO #57 stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Structural Fill and Fill Placement.

Excavation Safety: All excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

5.5 KARST CONSIDERATIONS

Although sinkholes stem from geologic conditions within the underlying rock that have developed over significant time periods, they are often triggered by present day changes in the surface and subsurface drainage patterns. In order to reduce the potential for future sinkhole development which could impact the performance of foundations and other development infrastructure, positive surface drainage should be maintained both during and after construction. We recommend that the following preventative measures be followed (where practical) to reduce the potential inducement of sinkhole formation in proposed development areas.

1. All earthwork operations should be graded to drain away from the ground disturbance areas at all times. Upon completion of daily earthwork operations, the ground surface should be sealed by thorough rolling with a smooth-drum roller to facilitate runoff and reduce infiltration of precipitation.
2. Backfill of grading excavations should be performed in lifts that are compacted to minimize settlement. The top two feet of structural backfill should be low permeability material (CL or ML) and should be compacted to at least 95% of the maximum dry density as determined using ASTM D-698 or VTM-1. This will help to minimize the amount of water that can percolate into the subsurface.
3. During construction, care should be taken to reduce the ponding of surface water.
4. Visual observations during all earthwork operations should be carried out in order to detect any previous unexposed or recently created karst features. Any such feature should be called to the Geotechnical Engineer's attention for remedial improvement.
5. All storm piping should be designed such that joints and structure tie-ins remain watertight with allowance for some settlement. Leaking storm pipes promote subsurface seepage and can instigate sinkhole development in the form of surficial dropouts with little or no warning.

It should be noted that these recommendations are provided on an "as practical" basis. We understand that it is not always cost effective to implement all of the recommendations contained herein. ECS would be happy to discuss the contents of this with you in person should you desire.

Although not anticipated, in the event that a karst feature, such as a soft soil zone or void, is encountered during construction, ECS should be contacted so that our personnel can visit the site and evaluate the conditions encountered. We recommend that budgets be established to cover the costs for such consultation efforts.

Several methods are available to remediate sinkholes such as low mobility grouting, cap grouting, and the creation of a reverse-graded filter. Whenever possible, we recommend that a reverse graded filter be used to stabilize sinkholes as this method allows subsurface water to continue to flow in its original flow path. Grouting in karst areas often blocks subsurface flows, backing water up in the karst groundwater system causing the formation of new sinkholes upstream. The decision to utilize a particular method to remediate karst features should be made after the consultation with an ECS engineer or geologist.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

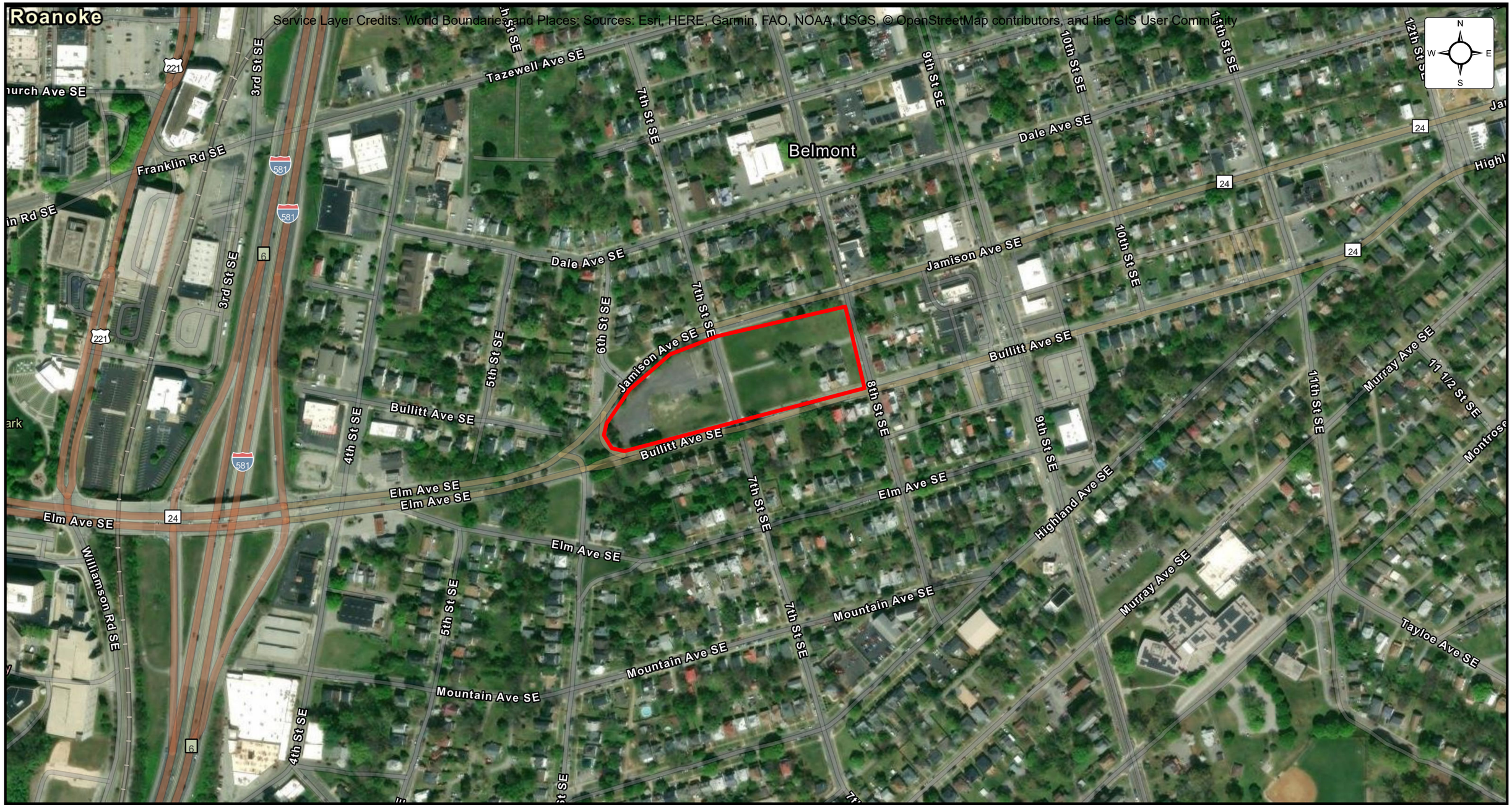
The description of the proposed project is based on information provided to ECS by our client. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction. Additional exploration is required for Building 2.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Diagrams & Reports

Site Location Diagram
Boring Location Diagram
Subsurface Cross-Sections



SITE LOCATION DIAGRAM

Roanoke Gateway Project Phase I

624 Bullitt Ave SE, Roanoke, Virginia
Homes for America

ENGINEER	LNB
SCALE	1" = 300'
PROJECT NO.	12:20641
SHEET	1
DATE	1/13/2026

Service Layer Credits: World Boundaries and Places: Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Building 1

Building 2

Building 3

Legend

Approximate Boring Location

Approximate Cross-Section Location

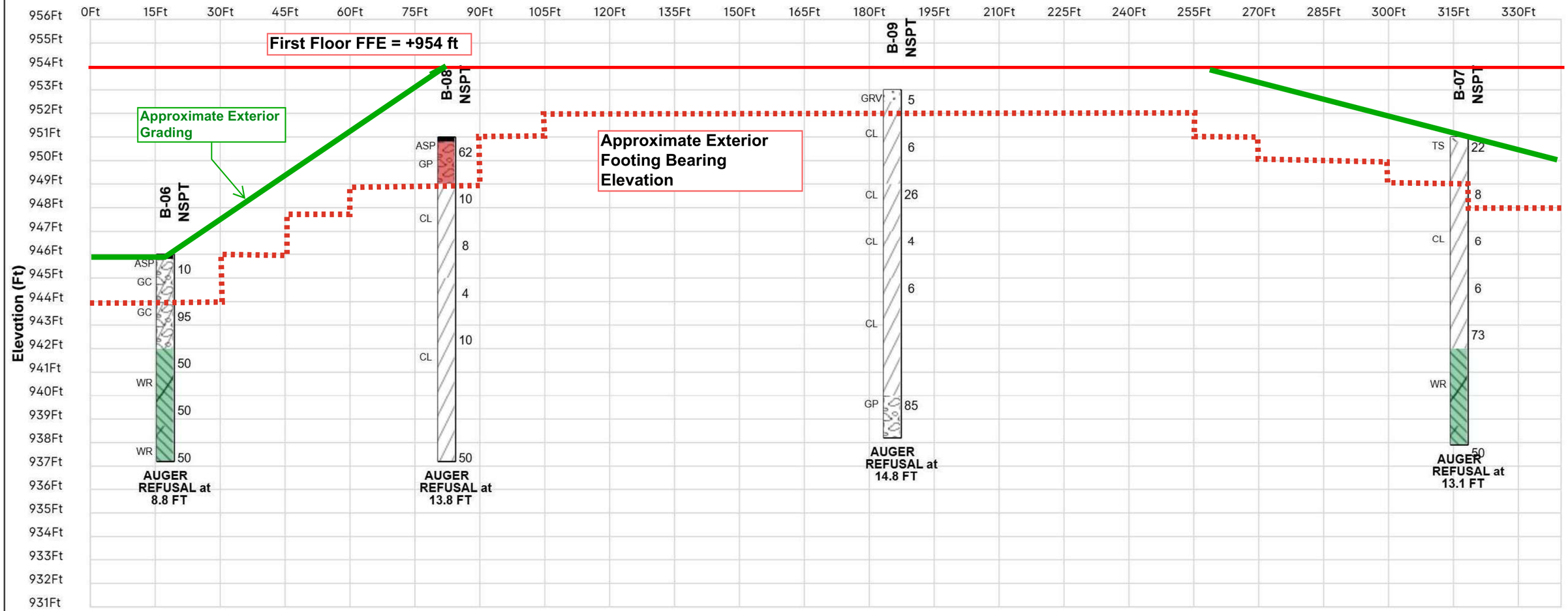
BORING LOCATION DIAGRAM

Roanoke Gateway Project Phase I

624 Bullitt Ave SE, Roanoke, Virginia
Homes for America

ENGINEER	LNB
SCALE	1" = 80'
PROJECT NO.	12:20641
SHEET	2
DATE	4/15/2026

Subsurface Cross Section A-A' (Building 1 North Face)

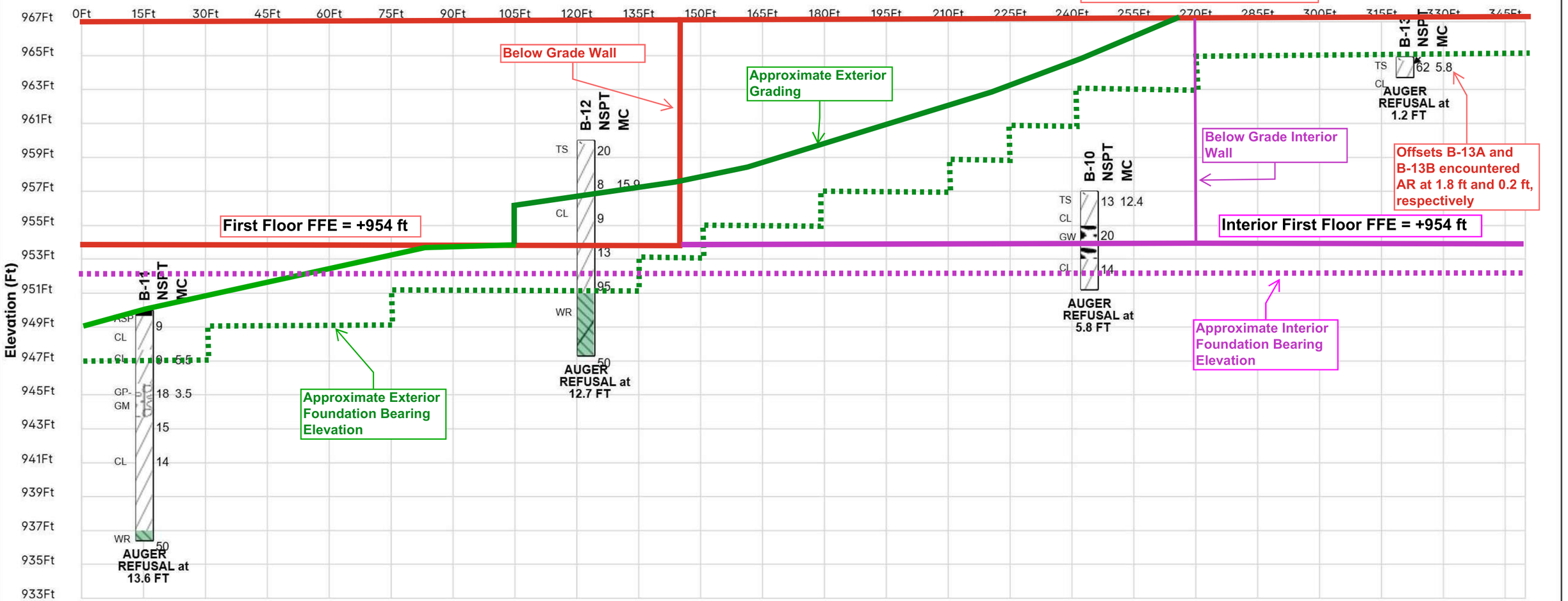


CLIENT:	Homes for America	PROJECT:	Roanoke Gateway Project Phase I
DRAWN DATE:	Apr 13, 2026	PROJECT NO.:	12:20641
CHECKED DATE:	Apr 13, 2026	SCALE:	AS SHOWN

Notes:
1-EOB: END OF BORING AR: AUGER REFUSALSR: SAMPLER REFUSAL
2-SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
3-STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).
4- TOPOGRAPHIC INFORMATION IS BASED ON PUBLICLY AVAILABLE DATA (GOOGLE OR CESIUM).THE TOPOGRAPHIC LINE SHOWN BETWEEN BORINGS IS FOR VISUAL REFERENCE ONLY.PLEASE REFER TO THE REFERENCE NOTES FOR BORING LOGS FOR SYMBOLOGY MEANING AND ADDITIONAL

Plastic Limit Water Content Liquid Limit X—●—△		WL (First Encountered)	Fill
[FINES CONTENT %]		WL (Completion)	Possible Fill
BOTTOM OF CASING		WL (Estimated Seasonal High Water)	Probable Fill
LOSS OF CIRCULATION		WL (Stabilized)	WR/Rock
CALIBRATED PENETROMETER			

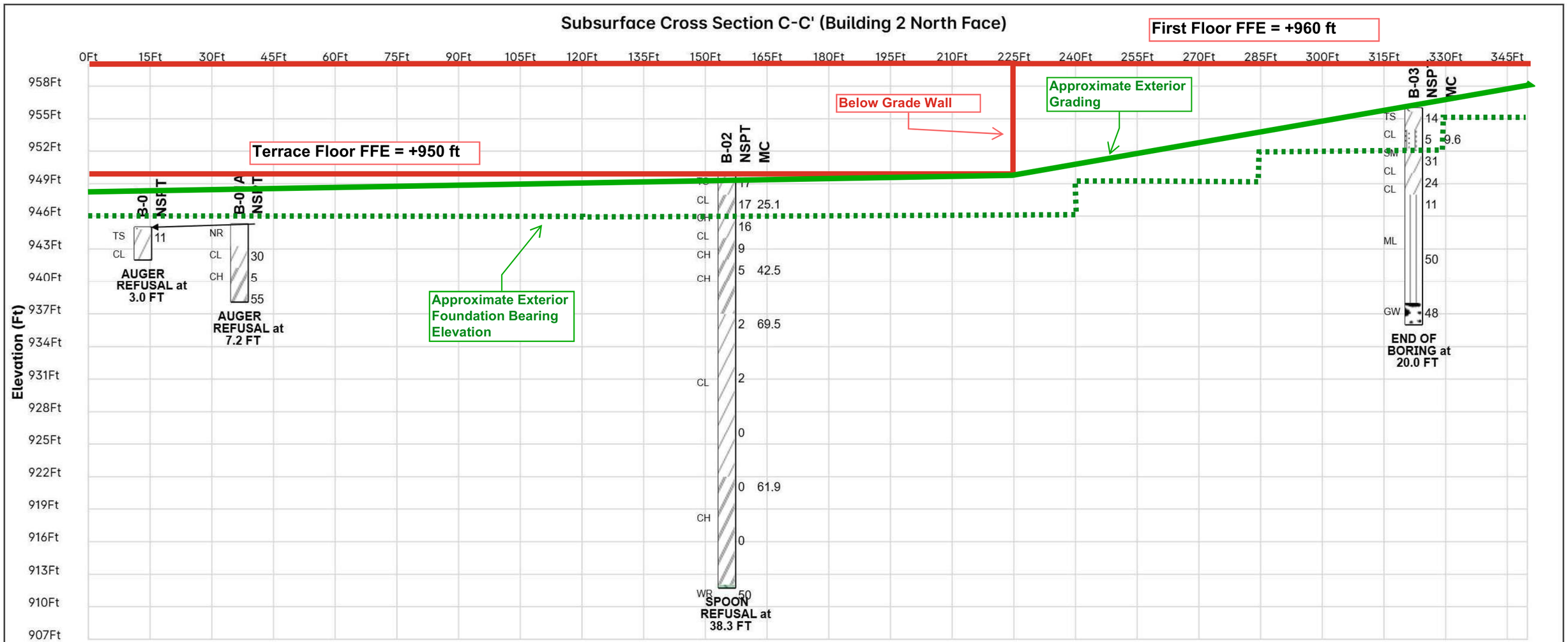
Subsurface Cross Section B-B' (Building 1 South Face)



CLIENT:	Homes for America	PROJECT:	Roanoke Gateway Project Phase I
DRAWN DATE:	Apr 14, 2026	PROJECT NO.:	12:20641
CHECKED DATE:	Apr 14, 2026	SCALE:	AS SHOWN

Notes:
1-EOB: END OF BORING AR: AUGER REFUSALSR: SAMPLER REFUSAL
2-SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
3-STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).
4- TOPOGRAPHIC INFORMATION IS BASED ON PUBLICLY AVAILABLE DATA (GOOGLE OR CESIUM).THE TOPOGRAPHIC LINE SHOWN BETWEEN BORINGS IS FOR VISUAL REFERENCE ONLY.PLEASE REFER TO THE REFERENCE NOTES FOR BORING LOGS FOR SYMBOLOGY MEANING AND ADDITIONAL

Plastic Limit Water Content Liquid Limit X—●—△	WL (First Encountered)		Fill
[FINES CONTENT %]	WL (Completion)		Possible Fill
BOTTOM OF CASING	WL (Estimated Seasonal High Water)		Probable Fill
LOSS OF CIRCULATION	WL (Stabilized)		WR/Rock
CALIBRATED PENETROMETER			

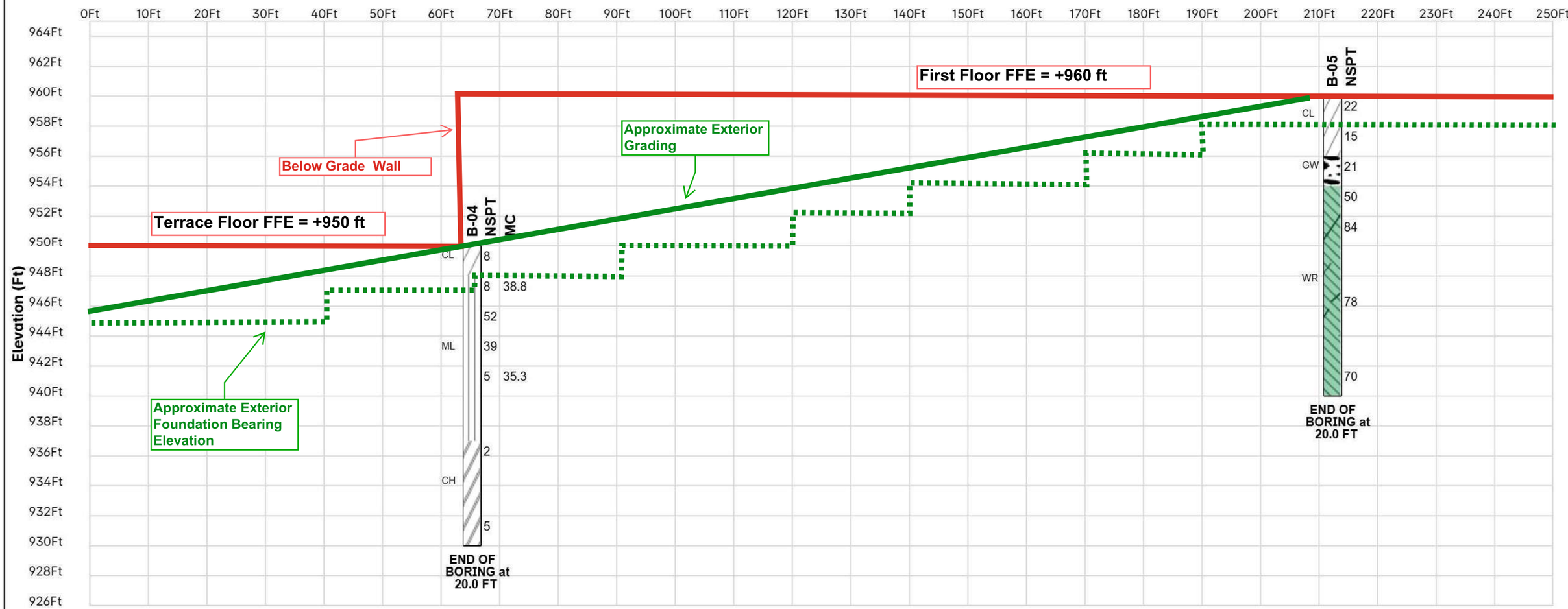


CLIENT:	Homes for America	PROJECT:	Roanoke Gateway Project Phase II
DRAWN DATE:	Apr 15, 2026	PROJECT NO.:	12:20641-A
CHECKED DATE:	Apr 15, 2026	SCALE:	AS SHOWN

Notes:
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2-SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
3-STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).
4- TOPOGRAPHIC INFORMATION IS BASED ON PUBLICLY AVAILABLE DATA (GOOGLE OR CESIUM).THE TOPOGRAPHIC LINE SHOWN BETWEEN BORINGS IS FOR VISUAL REFERENCE ONLY.PLEASE REFER TO THE REFERENCE NOTES FOR BORING LOGS FOR SYMBOLOGY MEANING AND ADDITIONAL

Plastic Limit Water Content Liquid Limit X—●—△	WL (First Encountered)		Fill
[FINES CONTENT %]	WL (Completion)		Possible Fill
BOTTOM OF CASING	WL (Estimated Seasonal High Water)		Probable Fill
100% LOSS OF CIRCULATION	WL (Stabilized)		WR/Rock
CALIBRATED PENETROMETER			

Subsurface Cross Section D-D' (Building 2 South Face)

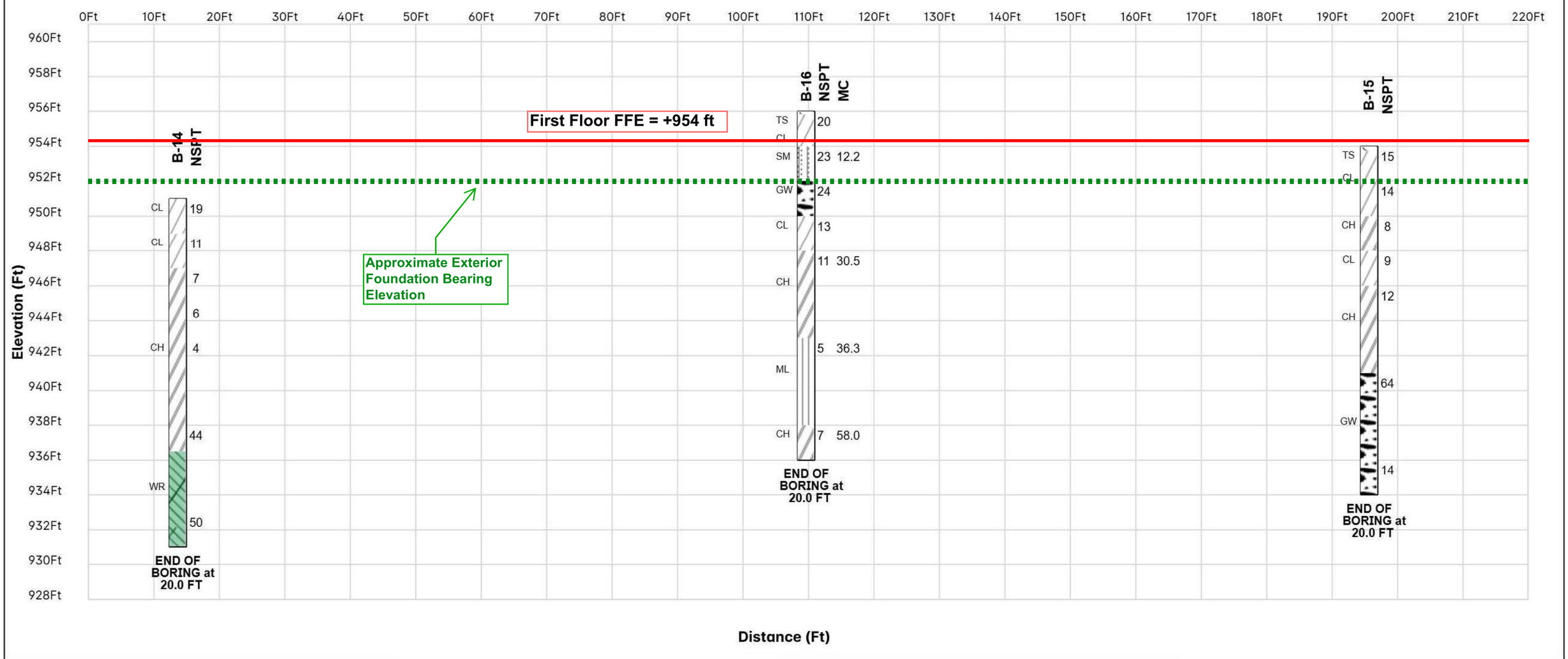


CLIENT:	Homes for America	PROJECT:	Roanoke Gateway Project Phase II
DRAWN DATE:	Apr 15, 2026	PROJECT NO.:	12:20641-A
CHECKED DATE:	Apr 15, 2026	SCALE:	AS SHOWN

Notes:
1-EOB: END OF BORING AR: AUGER REFUSALSR: SAMPLER REFUSAL
2-SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
3-STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).
4- TOPOGRAPHIC INFORMATION IS BASED ON PUBLICLY AVAILABLE DATA (GOOGLE OR CESIUM).THE TOPOGRAPHIC LINE SHOWN BETWEEN BORINGS IS FOR VISUAL REFERENCE ONLY.PLEASE REFER TO THE REFERENCE NOTES FOR BORING LOGS FOR SYMBOLOGY MEANING AND ADDITIONAL

Plastic Limit Water Content Liquid Limit X—●—△		WL (First Encountered)	Fill
[FINES CONTENT %]		WL (Completion)	Possible Fill
BOTTOM OF CASING		WL (Estimated Seasonal High Water)	Probable Fill
100% LOSS OF CIRCULATION		WL (Stabilized)	WR/Rock
○ CALIBRATED PENETROMETER			

Subsurface Cross Section E-E' (Building 3 North Face)



CLIENT:	Homes for America	PROJECT:	Roanoke Gateway Project Phase II
DRAWN DATE:	Apr 15, 2026	PROJECT NO.:	12:20641-A
CHECKED DATE:	Apr 15, 2026	SCALE:	AS SHOWN

Notes:
1-EOB: END OF BORING AR: AUGER REFUSALSR: SAMPLER REFUSAL
2-SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
3-STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).
4- TOPOGRAPHIC INFORMATION IS BASED ON PUBLICLY AVAILABLE DATA (GOOGLE OR CESIUM).THE TOPOGRAPHIC LINE SHOWN BETWEEN BORINGS IS FOR VISUAL REFERENCE ONLY.PLEASE REFER TO THE REFERENCE NOTES FOR BORING LOGS FOR SYMBOLOGY MEANING AND ADDITIONAL

Plastic Limit Water Content Liquid Limit X—●—△		WL (First Encountered)	Fill
[FINES CONTENT %]		WL (Completion)	Possible Fill
BOTTOM OF CASING		WL (Estimated Seasonal High Water)	Probable Fill
100% LOSS OF CIRCULATION		WL (Stabilized)	WR/Rock
CALIBRATED PENETROMETER			

Subsurface Cross Section F-F' (Building 3 South Face)



CLIENT:	Homes for America	PROJECT:	Roanoke Gateway Project Phase II
DRAWN DATE:	Apr 15, 2026	PROJECT NO.:	12:20641-A
CHECKED DATE:	Apr 15, 2026	SCALE:	AS SHOWN

Notes:
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2-SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
3-STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).
4- TOPOGRAPHIC INFORMATION IS BASED ON PUBLICLY AVAILABLE DATA (GOOGLE OR CESIUM).THE TOPOGRAPHIC LINE SHOWN BETWEEN BORINGS IS FOR VISUAL REFERENCE ONLY.PLEASE REFER TO THE REFERENCE NOTES FOR BORING LOGS FOR SYMBOLOGY MEANING AND ADDITIONAL

Plastic Limit Water Content Liquid Limit X—●—△		▽	WL (First Encountered)
[FINES CONTENT %]		▼	WL (Completion)
▰	BOTTOM OF CASING	▽	WL (Estimated Seasonal High Water)
100%	LOSS OF CIRCULATION	▽	WL (Stabilized)
○	CALIBRATED PENETROMETER		

	Fill
	Possible Fill
	Probable Fill
	WR/Rock

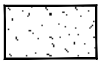
APPENDIX B – Field Operations

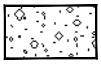
Reference Notes for Boring Logs
Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
Boring Logs B-01 through B-18 and P-01 through P-06

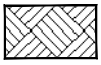
REFERENCE NOTES FOR BORING LOGS

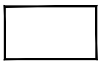
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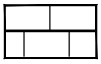

ASPHALT


CONCRETE


GRAVEL

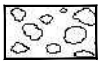

TOPSOIL

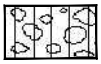

VOID


BRICK

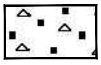

AGGREGATE BASE COURSE

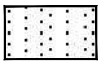

GW **WELL-GRADED GRAVEL**
gravel-sand mixtures, little or no fines

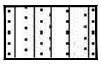

GP **POORLY-GRADED GRAVEL**
gravel-sand mixtures, little or no fines


GM **SILTY GRAVEL**
gravel-sand-silt mixtures

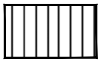

GC **CLAYEY GRAVEL**
gravel-sand-clay mixtures

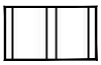

SW **WELL-GRADED SAND**
gravelly sand, little or no fines

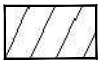

SP **POORLY-GRADED SAND**
gravelly sand, little or no fines


SM **SILTY SAND**
sand-silt mixtures

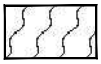

SC **CLAYEY SAND**
sand-clay mixtures

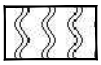

ML **SILT**
non-plastic to medium plasticity

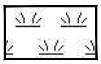

MH **ELASTIC SILT**
high plasticity


CL **LEAN CLAY**
low to medium plasticity


CH **FAT CLAY**
high plasticity


OL **ORGANIC SILT or CLAY**
non-plastic to low plasticity


OH **ORGANIC SILT or CLAY**
high plasticity


PT **PEAT**
highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION		PARTICLE SIZES
Boulders		12 inches (300 mm) or larger
Cobbles		3 inches to 12 inches (75 mm to 300 mm)
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")		<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, Q_P[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective *(ex: "Silty")*	25 - 45	30 - 45

WATER LEVELS[6]

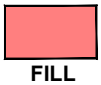

WL (First Encountered)


WL (Completion)


WL (Seasonal High Water)


WL (Stabilized)

FILL AND ROCK


FILL


POSSIBLE FILL


PROBABLE FILL


ROCK

[1]Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2]To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

[3]Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

[4]Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5]Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

[6]The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

[7]Minor deviation from ASTM D 2488-17 Note 14.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

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SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 18-24 inches (in 3 or 4 Increments of 6 inches each)



- Auger is advanced* and an additional SPT is performed
- One SPT typically performed for every two to five feet. An approximate 1.5 inch diameter soil sample is recovered.



**Drilling Methods May Vary*— The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.

CLIENT: **Homes for America**	PROJECT NO.: **12:20641-A**	BORING NO.: **B-01**	SHEET: **1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.2684341**	LONGITUDE: **-79.93137282**	STRUCTURE:	SURFACE ELEVATION: **945**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*	Recovery % ■ RQD % ■ / SPT ⊗	Fines% F MC% ● / PL MC LL / QP
	S-1	SS	24	16	Topsoil [Thickness=2"]. (CL) Residuum, LEAN CLAY WITH SAND - trace gravel, light brown, moist, stiff.				3-5-6-11 (11)	11	
					AUGER REFUSAL at 3.0 FT						

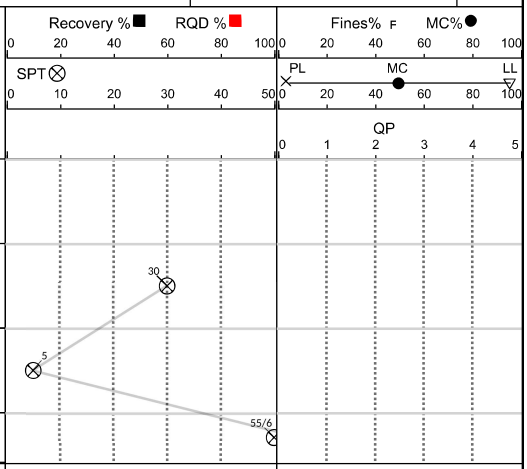
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-3')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-01A**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.2684341**	LONGITUDE: **-79.93137282**	STRUCTURE:	SURFACE ELEVATION: **945**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
					AUGER PROBE.				
	S-1	S-1	S-1	13	(CL) Residuum, LEAN CLAY WITH SAND - trace gravel, light brown, moist, very stiff.				8-19-11-6 (30)
5.0	S-2	S-2	S-2	17	(CH) FAT CLAY WITH SAND - brown, moist, firm.			940	3-2-3-5 (5)
	S-3	S-3	S-3	9					4-5-50/2" (55/6)
					AUGER REFUSAL at 7.2 FT				



NOTE: Offset performed approximately 3 ft S of B-01

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	6FT
WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME 550X	LNB	Hollow Stem Auger (0'-7.2')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-01B**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.2684341**	LONGITUDE: **-79.93137282**	STRUCTURE:	SURFACE ELEVATION: **945**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
					AUGER PROBE.				
	S-1	S-1	S-1	0	**AUGER REFUSAL at 3.1 FT**				50/1" (50/1)

Recovery % ■ RQD % ■ (0 20 40 60 80 100)
SPT ⊗ (0 10 20 30 40 50)
Fines% F MC% ● (0 20 40 60 80 100)
PL × MC ● LL ▽ (0 20 40 60 80 100)
QP (0 1 2 3 4 5)

50/1

NOTE: Offset performed approximately 3 ft E of B-01

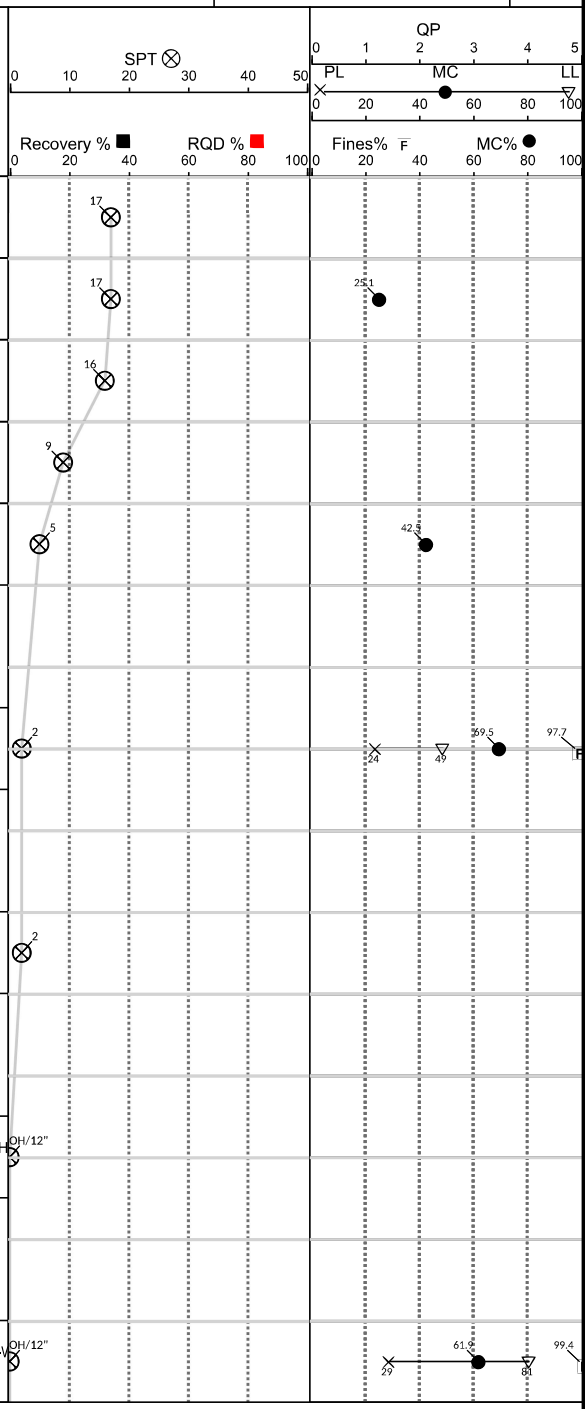
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	Not Observed
▼ WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
▽ WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
▽ WL (Stabilized):		Track CME 550X	LNB	Hollow Stem Auger (0'-3.1')	

GEOTECHNICAL BOREHOLE LOG

CLIENT: **Homes for America**	PROJECT NO.: **12:20641-A**	BORING NO.: **B-02**	SHEET: **1 OF 2**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26853065**	LONGITUDE: **-79.93089813**	STRUCTURE:	SURFACE ELEVATION: **950**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	9	Topsoil [Thickness=3"]. (CL) GRAVELLY LEAN CLAY WITH SAND - reddish brown, moist, very stiff.				3-7-10-11 (17)
	S-2	SS	24	14	(CH) FAT CLAY WITH SAND - trace gravel, reddish brown, moist, very stiff.				7-8-9-14 (17)
5.0	S-3	SS	24	16	(CL) LEAN CLAY WITH SAND - trace gravel, orangish brown, moist, very stiff.			945	8-7-9-13 (16)
	S-4	SS	24	17	(CH) FAT CLAY WITH GRAVEL - trace sand, orangish brown, moist, stiff.				2-4-5-6 (9)
	S-5	SS	24	20	(CH) FAT CLAY - trace sand, light brown, moist, firm.				3-2-3-2 (5)
10.0								940	
	S-6	SS	24	20	(CL) LEAN CLAY - trace sand, orangish brown, wet, very soft to soft.				1-1-1-1 (2)
15.0								935	
	S-7	SS	24	24					1-1-1-1 (2)
20.0								930	
	S-8	SS	24	19					oH-WoH-WoH (WOH/12")
25.0								925	
	S-9	SS	24	24	(CH) FAT CLAY - trace sand, orangish brown, wet, very soft.				H-WoH-WoH-W (WOH/12")



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	30 FT	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	30 FT
WL (Completion):	30 FT	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	Hollow Stem Auger (0'-40')
WL (Stabilized):		Track CME-550X	LNB		

GEOTECHNICAL BOREHOLE LOG

CLIENT: **Homes for America**	PROJECT NO.: **12:20641-A**	BORING NO.: **B-02**	SHEET: **2 OF 2**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26853065**	LONGITUDE: **-79.93089813**	STRUCTURE:	SURFACE ELEVATION: **950**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
35.0	S-10	SS	24	22	(CH) FAT CLAY - trace sand, orangish brown, wet, very soft. (continued)			915	H-WoH-WoH-WOH/12" (WOH/12")
	S-11	SS	3	3	(WR) WEATHERED ROCK sampled as GRAVELLY FAT CLAY WITH SAND - brown, wet, hard. **SPOON REFUSAL at 38.3 FT**			912	50/3" (50/3)

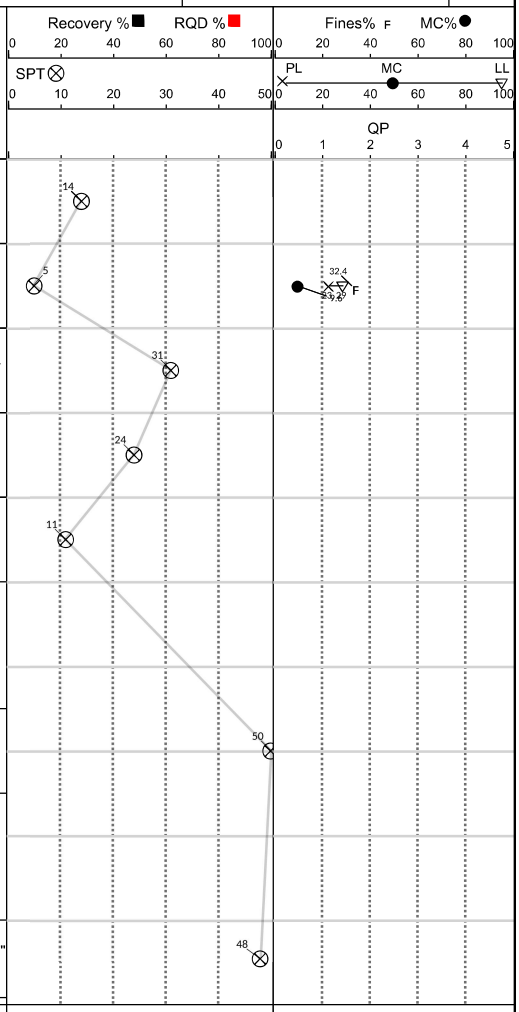
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	30 FT	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	30 FT
WL (Completion):	30 FT	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	Hollow Stem Auger (0'-40')
WL (Stabilized):		Track CME-550X	LNB		

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-03**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26864635**	LONGITUDE: **-79.93034054**	STRUCTURE:	SURFACE ELEVATION: **956**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	10	Topsoil [Thickness=4"]. (CL) Residuum, LEAN CLAY WITH GRAVEL - trace sand, light brown, moist, stiff.			955	4-6-8-7 (14)
	S-2	SS	24	11	(SM) SILTY SAND WITH GRAVEL - light brown, moist, loose.				3-2-3-4 (5)
5.0	S-3	SS	24	11	(CL) GRAVELLY LEAN CLAY WITH SAND - grayish brown, moist, hard.				10-16-15-14 (31)
	S-4	SS	24	19	(CL) LEAN CLAY WITH SAND - trace gravel, orangish brown, moist, very stiff.			950	3-10-14-15 (24)
	S-5	SS	24	14	(ML) SANDY SILT - trace gravel, orangish brown, moist, stiff, medium dense to dense.				4-5-6-10 (11)
10.0								945	
	S-6	SS	24	16					7-20-30-33 (50)
15.0								940	
	S-7	SS	22	8	(GW) WELL-GRADED SANDY GRAVEL - reddish brown, moist, dense.				7-15-33-50/4" (48)
					END OF BORING at 20.0 FT				



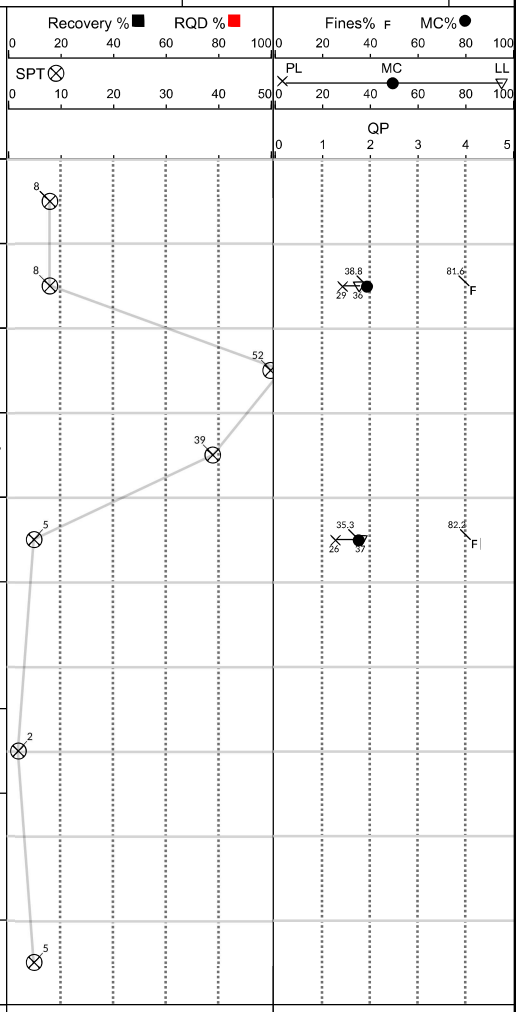
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	18FT
WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME 550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-04**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26830761**	LONGITUDE: **-79.9310621**	STRUCTURE:	SURFACE ELEVATION: **950**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	18	(CL) Residuum, LEAN CLAY WITH SAND - trace gravel, light brown to orangish brown, moist, firm.				2-3-5-5 (8)
	S-2	SS	24	20	(ML) SILT WITH SAND - trace gravel and clay, light brown, moist, loose to very dense.				1-4-4-8 (8)
5.0	S-3	SS	24	20				945	8-27-25-32 (52)
	S-4	SS	24	16					13-24-15-13 (39)
	S-5	SS	24	20					1-2-3-4 (5)
10.0								940	
	S-6	SS	24	22	(CH) FAT CLAY WITH SAND - trace silt, orangish brown, moist, soft to firm.				1-1-1-3 (2)
15.0								935	
	S-7	SS	24	21					1-2-3-3 (5)
					END OF BORING at 20.0 FT			930	



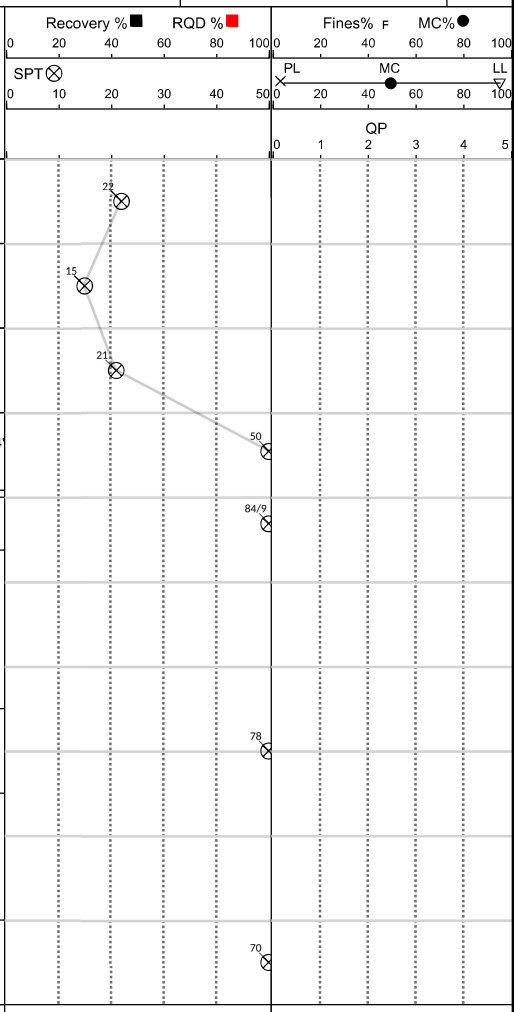
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	16FT
WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-05**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase II	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26841512	**-79.93057425**		**960**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	17	(CL) Residuum, LEAN CLAY WITH SAND - trace gravel and silt, brown to orangish brown, moist, stiff to very stiff.				3-10-12-10 (22)
	S-2	SS	24	17					4-6-9-11 (15)
5.0	S-3	SS	24	20	(GW) WELL-GRADED GRAVEL WITH SAND - trace silt, reddish brown, moist, medium dense.			955	3-3-18-24 (21)
	S-4	SS	22	16	(WR) WEATHERED ROCK sampled as WELL-GRADED GRAVEL WITH SAND - trace clay, reddish brown, moist, dense to very dense.				12-20-30-50/4" (50)
	S-5	SS	15	15					22-34-50/3" (84/9)
10.0								950	
	S-6	SS	24	19					20-40-38-30 (78)
15.0								945	
	S-7	SS	24	4					20-28-42-34 (70)
								940	
					END OF BORING at 20.0 FT				



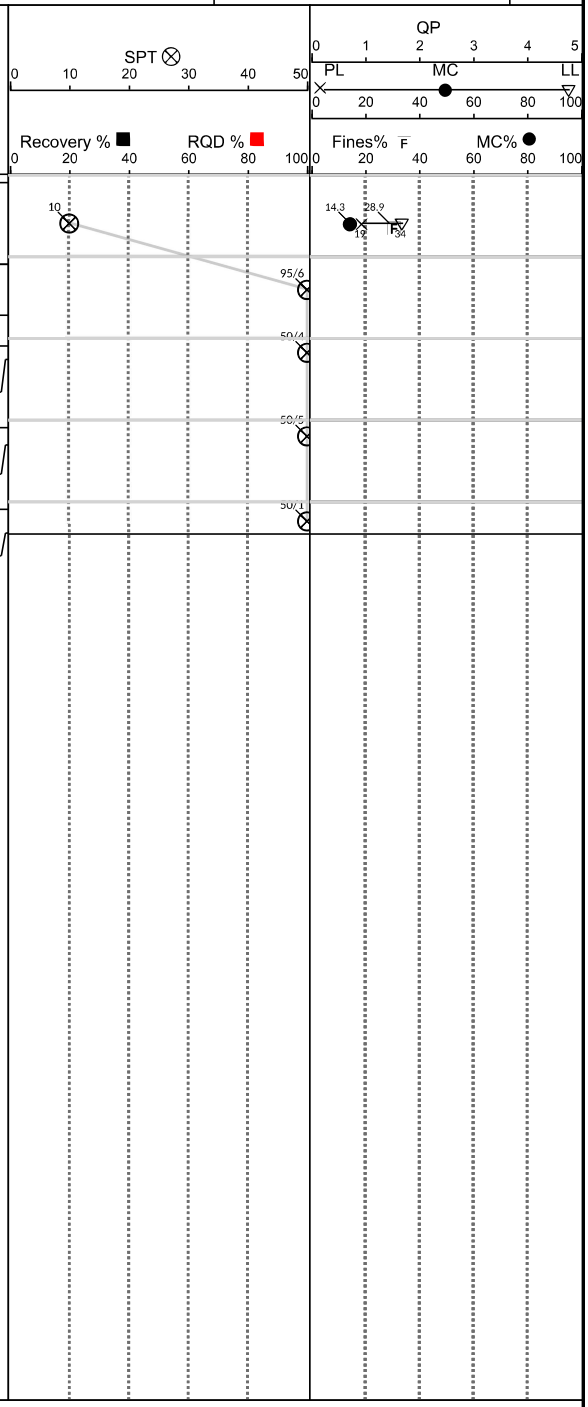
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	18FT
WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-06**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase I**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.2676605**	LONGITUDE: **-79.93281171**	STRUCTURE:	SURFACE ELEVATION: **946**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	10	Asphalt [Thickness=2"]. (GC) Residuum, CLAYEY GRAVEL WITH SAND - orangish brown, moist, loose.			945	9-6-4-4 (10)
	S-2	SS	15	10	(GC) SANDY GRAVEL WITH SILT - light brown, moist.				9-45-50/3" (95/6)
5.0	S-3	SS	4	4	(WR) WEATHERED ROCK sampled as WELL-GRADED GRAVEL WITH SAND - trace clay, gray, moist, very dense.			940	50/4" (50/4)
	S-4	SS	5	5					50/5" (50/5)
	S-5	SS	7	6	(WR) WEATHERED ROCK SAMPLED AS CLAYEY GRAVEL WITH SAND - light brown, moist, very dense.			937	47-50/1" (50/1)
					AUGER REFUSAL at 8.8 FT				



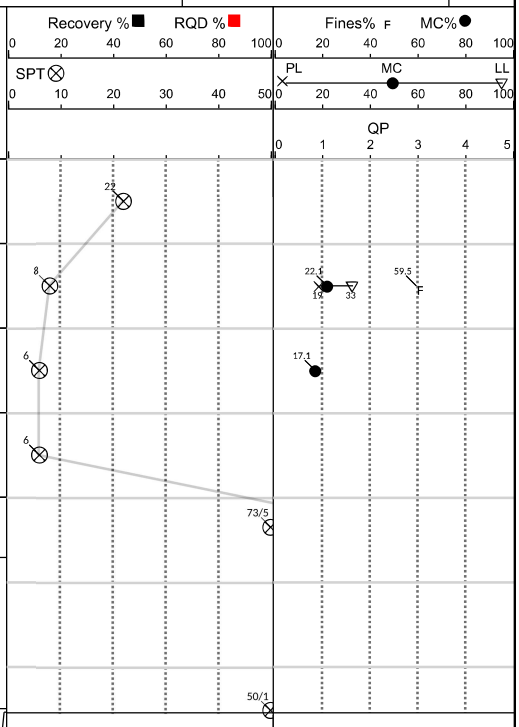
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	7.5 FT
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	Hollow Stem Auger (0'-8.6')
WL (Stabilized):		Track CME 300	LNB		

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-07**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:	BOTTOM OF CASING
37.26792476	**-79.9318359**		**951**	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	12	Topsoil [Thickness=2"]. (CL) Residuum, SANDY LEAN CLAY WITH GRAVEL - brown to orangish brown, moist, firm to very stiff.			950	5-10-12-10 (22)
	S-2	SS	24	14					7-4-4-4 (8)
5.0	S-3	SS	24	15					8-3-3-3 (6)
	S-4	SS	24	16				945	3-3-3-5 (6)
	S-5	SS	17	13					6-23-50/5" (73/5)
10.0					(WR) WEATHERED ROCK sampled as LEAN CLAY WITH SAND - brown, moist, very hard.			940	
	S-6	SS	1	0	**AUGER REFUSAL at 13.1 FT**				50/1" (50/1)



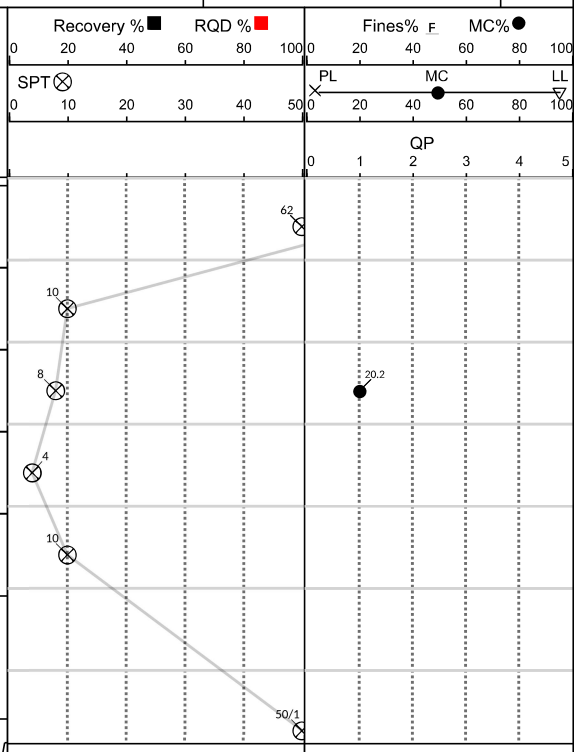
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	**Dry**	**BORING STARTED:**	**11/17/2025**	**CAVE IN DEPTH:**	**9.5FT**
WL (Completion):	**Dry**	**BORING COMPLETED:**	**11/17/2025**	**HAMMER TYPE:**	**Automatic**
WL (Seasonal High Water):		**EQUIPMENT:**	**LOGGED BY:**	**DRILLING METHOD:**	
WL (Stabilized):		**Track CME300**	**LNB**	**Hollow Stem Auger (0'-13.1')**	

GEOTECHNICAL BOREHOLE LOG

CLIENT: **Homes for America**	PROJECT NO.: **12:20641**	BORING NO.: **B-08**	SHEET: **1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase I**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION: 100%
LATITUDE: **37.26762264**	LONGITUDE: **-79.93256714**	STRUCTURE:	SURFACE ELEVATION: **951**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	4	Asphalt [Thickness=2"]. FILL - (GP) POORLY GRADED SANDY GRAVEL - black, moist, very dense.			950	10-45-17-3 (62)
	S-2	SS	24	10	(CL) Residuum, LEAN CLAY WITH GRAVEL - trace sand, orangish brown to brown, moist, firm to stiff.				2-4-6-2 (10)
5.0	S-3	SS	24	18					4-4-4-4 (8)
	S-4	SS	24	8	(CL) LEAN CLAY WITH SAND - trace gravel, reddish brown, moist, soft to stiff.			945	4-3-1-3 (4)
	S-5	SS	24	7					2-3-7-8 (10)
10.0								940	
	S-6	SS	7	6	**AUGER REFUSAL at 13.8 FT**				3-50/1" (50/1)



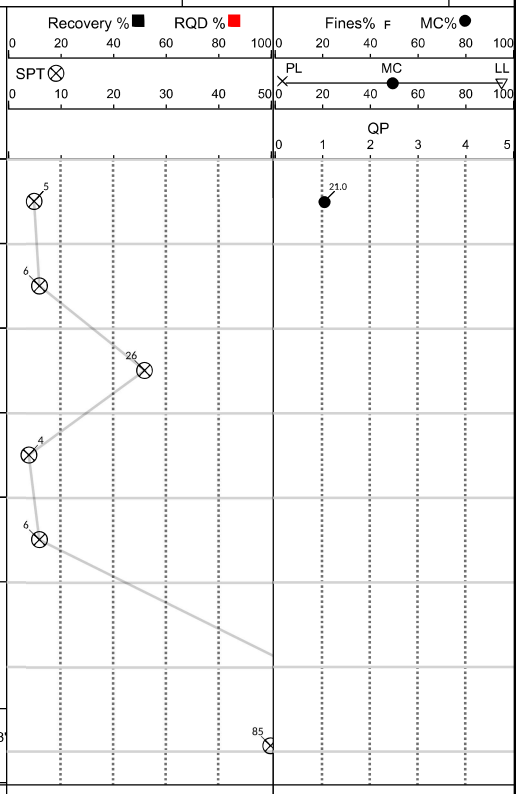
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	10.5FT
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	Hollow Stem Auger (0'-13.6')
WL (Stabilized):		Track CME300	LNB		

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-09**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:	BOTTOM OF CASING
37.2676939	**-79.93222194**		**953**	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	8	Gravel [Thickness=6"]. (CL) Residuum, LEAN CLAY WITH SAND - trace gravel, brown, moist, firm.				6-2-3-2 (5)
	S-2	SS	24	8				950	3-3-3-3 (6)
5.0	S-3	SS	24	18	(CL) LEAN CLAY WITH GRAVEL - trace sand, brown, moist, very stiff.				5-9-17-5 (26)
	S-4	SS	24	18	(CL) LEAN CLAY - trace sand, reddish brown, moist, soft.				2-2-2-2 (4)
	S-5	SS	24	15	(CL) LEAN CLAY WITH SAND - trace gravel, reddish brown, moist, firm.			945	1-2-4-3 (6)
10.0									
	S-6	SS	21	13	(GP) POORLY GRADED SANDY GRAVEL - trace clay, gray and orangish brown, moist, very dense.			940	16-40-45-50/3" (85)
					AUGER REFUSAL at 14.8 FT				



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	11FT
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-14.8')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-10**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:	BOTTOM OF CASING
37.26767217	**-79.93194657**		**957**	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	13	Topsoil [Thickness=2"]. (CL) Residuum, LEAN CLAY WITH SAND - light brown, moist, stiff.				5-6-7-8 (13)
	S-2	SS	24	13	(GW) WELL-GRADED GRAVEL WITH SAND - gray, moist, medium dense.			955	10-11-9-3 (20)
5.0	S-3	SS	21	12	(CL) LEAN CLAY WITH SAND - reddish brown, moist, stiff.				9-7-7-50/3" (14)
					AUGER REFUSAL at 5.8 FT				

Recovery % ■ RQD % ■ (0 20 40 60 80 100)
SPT ⊗ (0 10 20 30 40 50)
Fines% F MC% ● (0 20 40 60 80 100)
PL × MC ● LL ▽ (0 20 40 60 80 100)
QP (0 1 2 3 4 5)

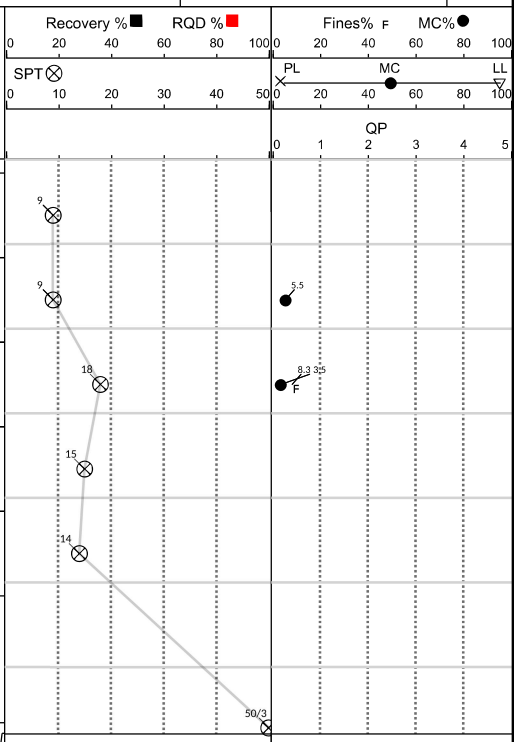
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	4FT
▼ WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
▼ WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
▽ WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-5.8')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-11**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26743365	**-79.93268178**		**950**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
					Asphalt [Thickness=4"].				
	S-1	SS	24	7	(CL) Residuum, LEAN CLAY WITH SAND - trace gravel, orangish brown, moist, stiff.				8-4-5-10 (9)
	S-2	SS	24	2	(CL) LEAN CLAY WITH SAND - light brown, dry, stiff.				13-5-4-4 (9)
5.0	S-3	SS	24	10	(GP-GM) POORLY GRADED GRAVEL WITH SILT AND SAND - reddish brown, moist, medium dense.			945	6-5-13-15 (18)
	S-4	SS	24	19	(CL) LEAN CLAY WITH SAND - reddish brown to light brown, moist, stiff.				8-8-7-7 (15)
	S-5	SS	24	18					4-7-7-11 (14)
10.0								940	
	S-6	SS	3	3	(WR) WEATHERED ROCK sampled as FAT CLAY WITH SAND - trace gravel, reddish brown, moist, very hard.				50/3" (50/3)
					AUGER REFUSAL at 13.6 FT				



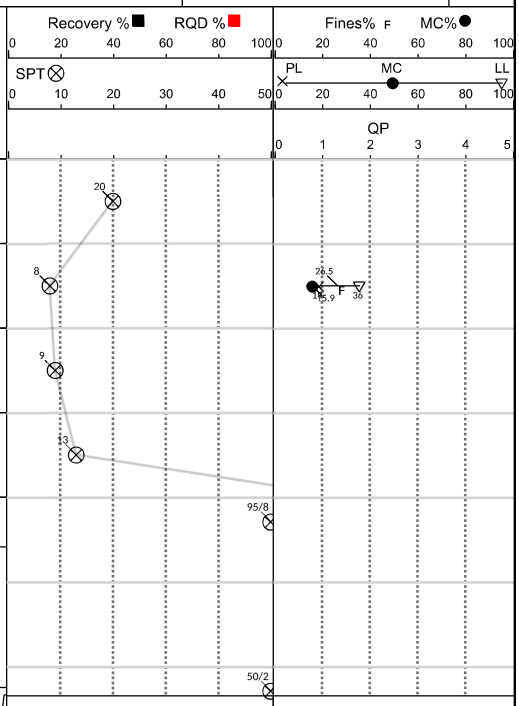
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	11FT
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-13.3')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-12**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.2675629	**-79.93234393**		**960**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	14	Topsoil [Thickness=2"]. (CL) SANDY LEAN CLAY - trace gravel, brown to reddish brown, moist, firm to very stiff.				3-10-10-17 (20)
	S-2	SS	24	15					9-4-4-4 (8)
5.0	S-3	SS	24	5				955	7-5-4-8 (9)
	S-4	SS	24	8					7-7-6-6 (13)
	S-5	SS	14	11					15-45-50/2" (95/8)
10.0					(WR) WEATHERED ROCK sampled as POORLY GRADED GRAVEL WITH SAND - gray and light brown, moist, very dense.			950	
	S-6	SS	2	2	**AUGER REFUSAL at 12.7 FT**				50/2" (50/2)



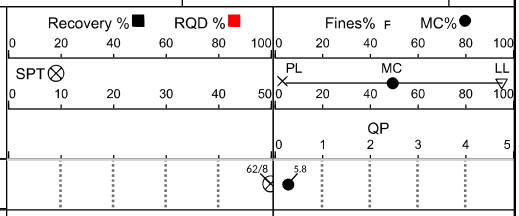
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	10.5FT
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-12.7')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-13**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26769603	**-79.93168374**		**965**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	14	5	Topsoil [Thickness=2"]. (CL) Residuum, LEAN CLAY WITH SAND - brown, contains roots, moist, very hard. **AUGER REFUSAL at 1.2 FT**				3-12-50/2" (62/8)



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-1.2')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-13A**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26769603	**-79.93168374**		**965**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	S-1	S-1	12	Topsoil [Thickness=2"]. (CL) Residuum, LEAN CLAY WITH SAND - brown, moist, very stiff.				3-7-13-50/4" (20)
					AUGER REFUSAL at 1.8 FT				

NOTE: Offset performed approximately 5 ft N of B-13

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-1.8')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**B-13B**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26769603	**-79.93168374**		**965**

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	S-1	S-1	0	Topsoil [Thickness=2"].				50/2" (50/2)
					AUGER REFUSAL at 0.2 FT				

NOTE: Offset performed approximately 7 ft NW of B-13

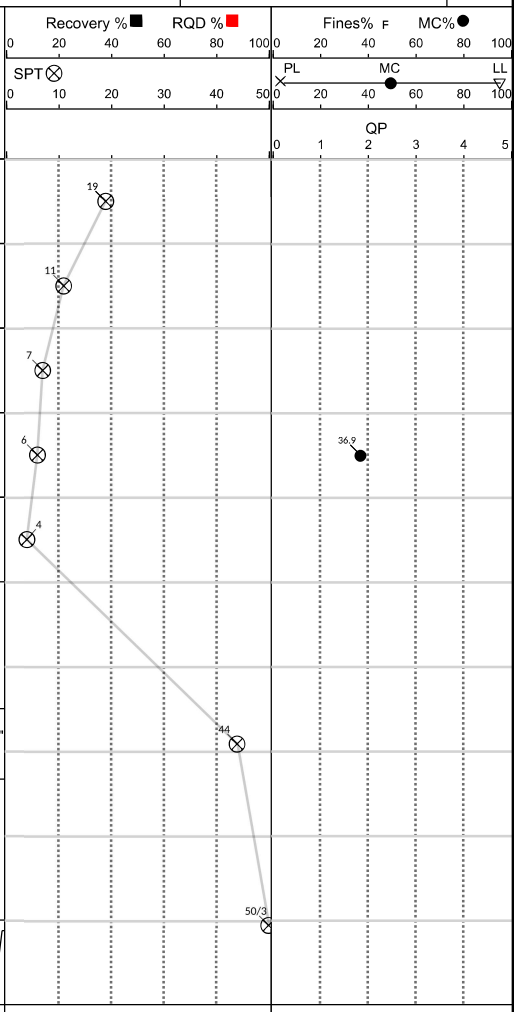
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-0.2')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-14**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26789794**	LONGITUDE: **-79.93147625**	STRUCTURE:	SURFACE ELEVATION: **951**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	15	(CL) Residuum, LEAN CLAY WITH GRAVEL - trace sand, brown, moist, very stiff.			950	2-5-14-5 (19)
	S-2	SS	24	16	(CL) LEAN CLAY WITH SAND - brown, moist, stiff.				5-4-7-9 (11)
5.0	S-3	SS	24	20	(CH) FAT CLAY WITH SAND - orangish brown, moist, soft to hard.				3-3-4-4 (7)
	S-4	SS	24	21				945	2-2-4-5 (6)
	S-5	SS	24	22					2-1-3-3 (4)
10.0								940	
	S-6	SS	20	17					1-14-30-50/2" (44)
15.0					(WR) WEATHERED ROCK sampled as POORLY GRADED GRAVEL WITH SAND - gray, moist, very dense.			935	
	S-7	SS	3	3					50/3" (50/3)
					END OF BORING at 20.0 FT				



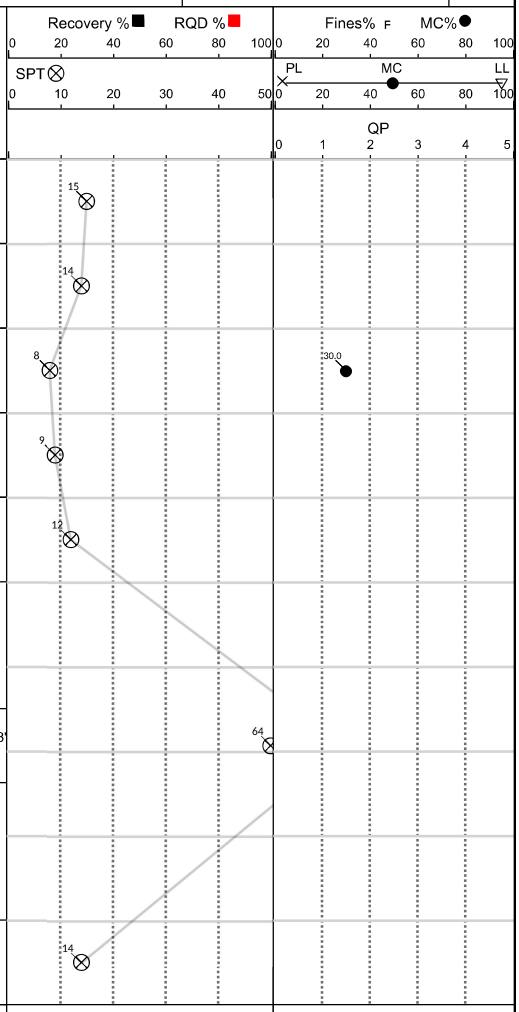
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/04/2025	CAVE IN DEPTH:	17FT
WL (Completion):	Dry	BORING COMPLETED:	12/04/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-15**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase II	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26803323	**-79.93087035**		**954**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	16	Topsoil [Thickness=3"]. (CL) Residuum, LEAN CLAY WITH SAND - brown, moist, stiff.				4-7-8-7 (15)
	S-2	SS	24	12					7-8-6-6 (14)
5.0	S-3	SS	24	17	(CH) FAT CLAY WITH SAND - trace silt, orangish brown, moist, firm.			950	2-3-5-7 (8)
	S-4	SS	24	15	(CL) SANDY LEAN CLAY - trace gravel, light brown, moist, stiff.				2-3-6-13 (9)
	S-5	SS	24	14	(CH) FAT CLAY WITH GRAVEL - trace sand, orangish brown, moist, stiff.			945	8-8-4-5 (12)
10.0									
	S-6	SS	21	17	(GW) WELL-GRADED GRAVEL WITH SAND - trace silt, light gray, moist, very dense.			940	18-26-38-50/3" (64)
15.0									
	S-7	SS	24	16				935	3-7-7-5 (14)
					END OF BORING at 20.0 FT				



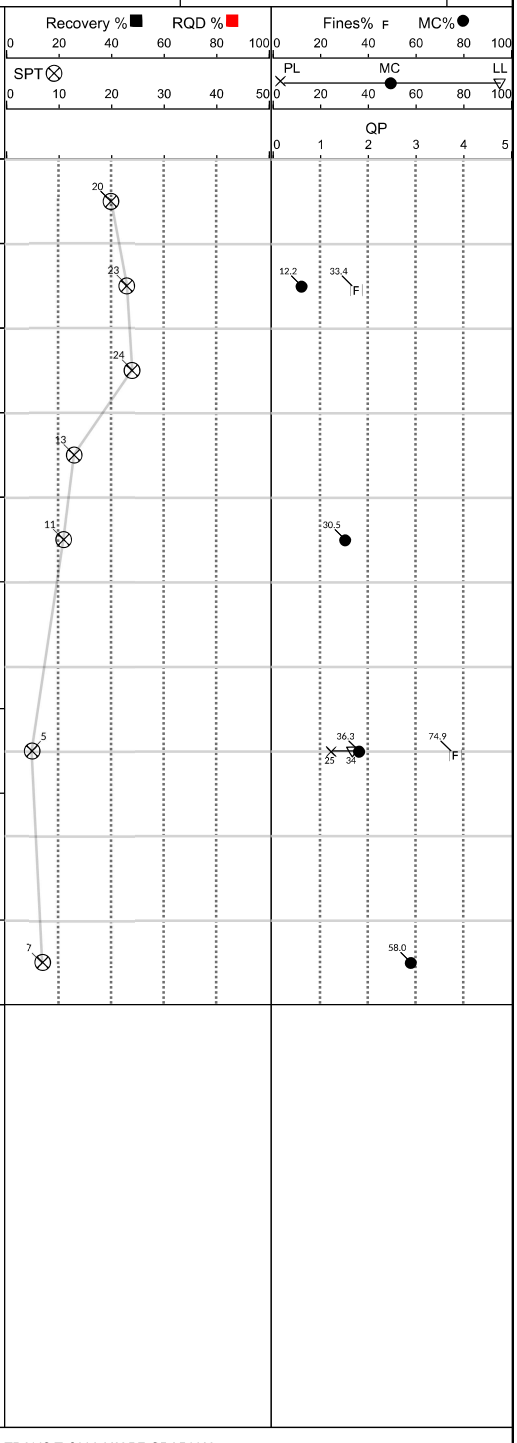
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/04/2025	CAVE IN DEPTH:	17FT
WL (Completion):	Dry	BORING COMPLETED:	12/04/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-16**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26787285**	LONGITUDE: **-79.93112004**	STRUCTURE:	SURFACE ELEVATION: **956**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	14	Topsoil [Thickness=2"]. (CL) Residuum, LEAN CLAY WITH SAND - trace gravel, brown to light brown, moist, very stiff.			955	4-12-8-7 (20)
	S-2	SS	24	16	(SM) SILTY SAND WITH GRAVEL - light brown, moist, medium dense.				4-8-15-22 (23)
5.0	S-3	SS	24	15	(GW) WELL-GRADED GRAVEL WITH SAND - trace clay, reddish brown, moist, medium dense.			950	13-12-12-10 (24)
	S-4	SS	24	15	(CL) GRAVELLY LEAN CLAY WITH SAND - orangish brown, moist, stiff.				4-6-7-11 (13)
	S-5	SS	24	14	(CH) FAT CLAY WITH GRAVEL - trace sand, orangish brown, moist, stiff.				5-6-5-4 (11)
10.0								945	
	S-6	SS	24	20	(ML) SILT WITH SAND - trace gravel, orangish brown, moist, loose.				1-2-3-4 (5)
15.0								940	
	S-7	SS	24	17	(CH) FAT CLAY WITH GRAVEL - trace sand, orangish brown, moist, firm.				16-4-3-2 (7)
					END OF BORING at 20.0 FT				



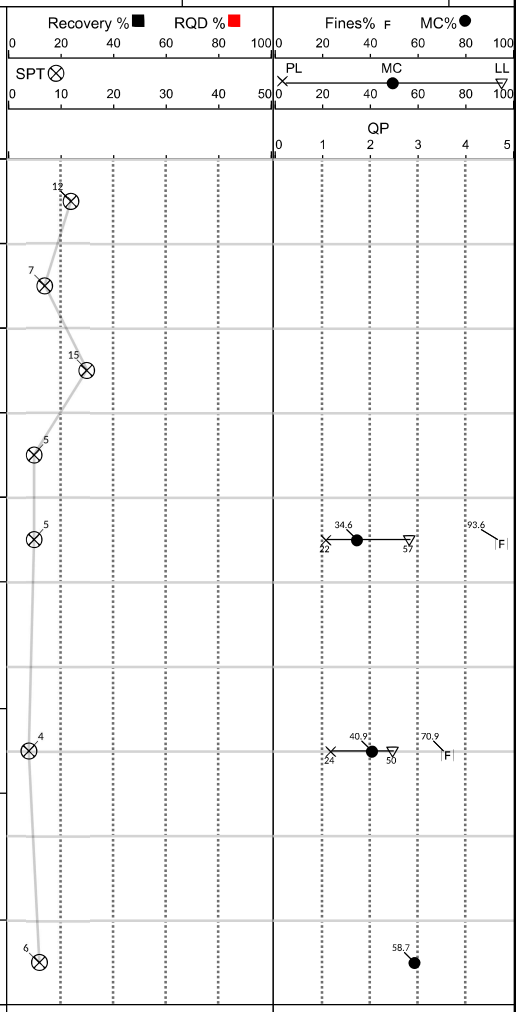
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/04/2025	CAVE IN DEPTH:	17FT
WL (Completion):	Dry	BORING COMPLETED:	12/04/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-17**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase II	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26771686	**-79.93142982**		**962**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	18	Topsoil [Thickness=3"]. (CL) Residuum, LEAN CLAY WITH SAND - trace gravel, brown, moist, firm to stiff.			960	3-5-7-7 (12)
	S-2	SS	24	17					3-2-5-14 (7)
5.0	S-3	SS	24	16					6-7-8-11 (15)
	S-4	SS	24	20	(CH) FAT CLAY - trace sand and silt, orangish brown, moist, firm.			955	2-2-3-4 (5)
	S-5	SS	24	21					1-2-3-3 (5)
10.0								950	
	S-6	SS	24	19	(CH) FAT CLAY WITH SAND - light brown, moist, soft.				1-2-2-3 (4)
15.0								945	
	S-7	SS	24	20					2-3-3-4 (6)
					END OF BORING at 20.0 FT				



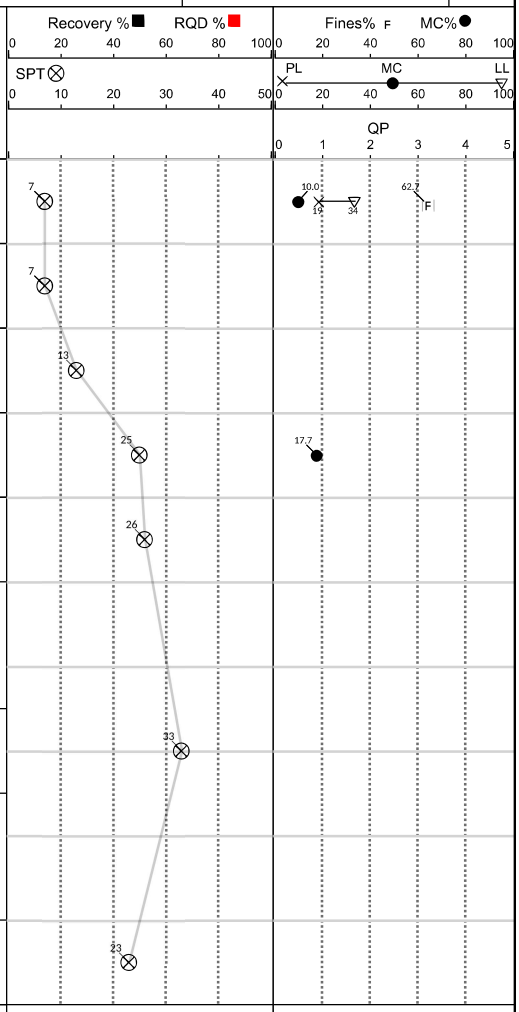
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/04/2025	CAVE IN DEPTH:	16FT
WL (Completion):	Dry	BORING COMPLETED:	12/04/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**B-18**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase II	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26784629	**-79.93081155**		**960**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	16	Topsoil [Thickness=3"]. (CL) Residuum, SANDY LEAN CLAY - trace gravel, brown, moist, firm.				2-3-4-4 (7)
	S-2	SS	24	18					3-3-4-5 (7)
5.0	S-3	SS	24	18	(CL) LEAN CLAY WITH SAND - trace gravel and silt, orangish brown to brown, moist, stiff to very stiff.			955	5-6-7-7 (13)
	S-4	SS	24	19					5-12-13-30 (25)
	S-5	SS	24	17					11-13-13-30 (26)
10.0								950	
	S-6	SS	24	18	(GP) POORLY GRADED GRAVEL WITH SAND - reddish brown, moist, medium dense to dense.				8-12-21-16 (33)
15.0								945	
	S-7	SS	24	13					9-10-13-14 (23)
								940	
					END OF BORING at 20.0 FT				



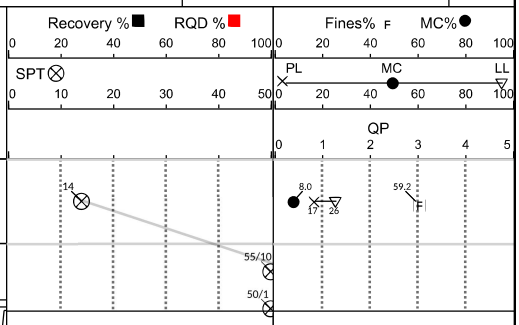
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/04/2025	CAVE IN DEPTH:	18FT
WL (Completion):	Dry	BORING COMPLETED:	12/04/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-20')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**P-01**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:	BOTTOM OF CASING
37.267835	**-79.93239886**		**951**	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	8	Gravel [Thickness=4"]. (GC) Residuum, CLAYEY GRAVEL WITH SAND - reddish brown, moist, medium dense.			950	4-7-7-7 (14)
	S-2	SS	16	7					3-5-50/4" (55/10)
	S-3	SS	1	1	(WR) WEATHERED ROCK sampled as WELL-GRADED GRAVEL WITH SAND - gray and light brown, moist, very dense. **AUGER REFUSAL at 3.6 FT**				50/1" (50/1)



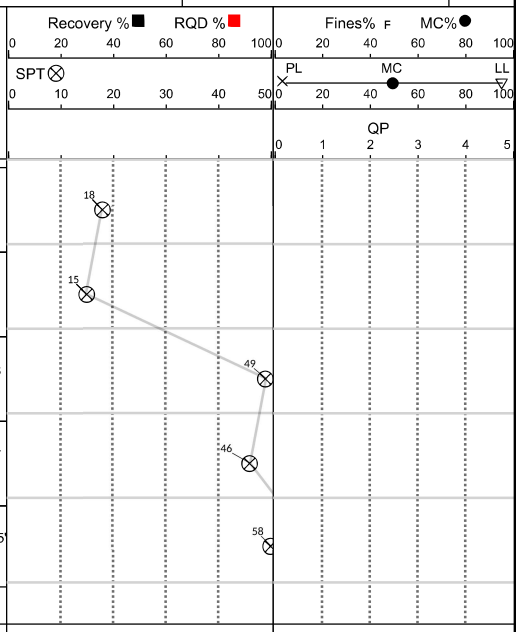
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/18/2025	CAVE IN DEPTH:	Not Observed
WL (Completion):	Dry	BORING COMPLETED:	11/18/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-3.6')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**P-02**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase I	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26806411	**-79.93227908**		**948**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
					Asphalt [Thickness=2"].				
	S-1	SS	24	15	(CL) Residuum, LEAN CLAY WITH GRAVEL - trace sand, brown, moist, very stiff.				10-13-5-4 (18)
	S-2	SS	24	16	(GC) CLAYEY GRAVEL - trace sand, brown, moist, medium dense.			945	2-6-9-10 (15)
5.0	S-3	SS	24	21	(CL) LEAN CLAY WITH SAND - trace silt, orangish brown, moist, hard.				10-21-28-18 (49)
	S-4	SS	24	21	(GW) WELL-GRADED GRAVEL WITH SAND - trace clay, orangish brown, moist, dense.			940	14-23-23-27 (46)
	S-5	SS	23	22					10-25-33-50/5" (58)
10.0					**AUGER REFUSAL at 11.0 FT**				



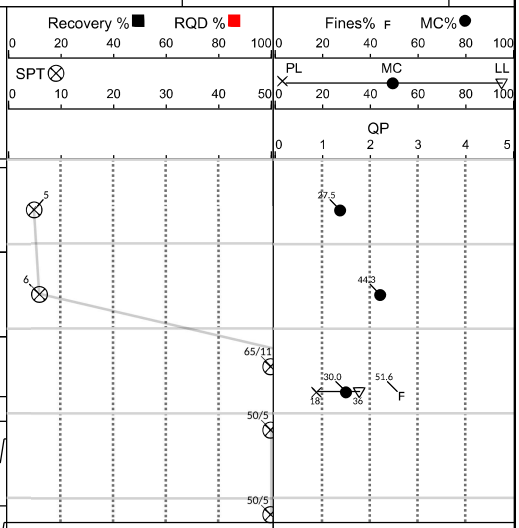
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/17/2025	CAVE IN DEPTH:	10FT
WL (Completion):	Dry	BORING COMPLETED:	11/17/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-11')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641**	**P-03**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase I**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26808314**	LONGITUDE: **-79.93197668**	STRUCTURE:	SURFACE ELEVATION: **947**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
					Asphalt [Thickness=2"].				
	S-1	SS	24	10	(CL) SANDY LEAN CLAY WITH GRAVEL - orangish brown, moist, firm.			945	14-3-2-3 (5)
	S-2	SS	24	21					3-3-3-3 (6)
5.0	S-3	SS	17	17	(WR) WEATHERED ROCK sampled as LEAN CLAY WITH SAND - light brown, moist, very hard.				3-15-50/5" (65/11)
	S-4	SS	5	5	(WR) WEATHERED ROCK sampled as FAT CLAY WITH SAND - light brown, moist, very hard.			940	50/5" (50/5)
	S-5	SS	5	4	(WR) WEATHERED ROCK sampled as WELL-GRADED GRAVEL WITH SAND - gray and light brown, moist, very dense.				50/5" (50/5)
					AUGER REFUSAL at 8.6 FT				



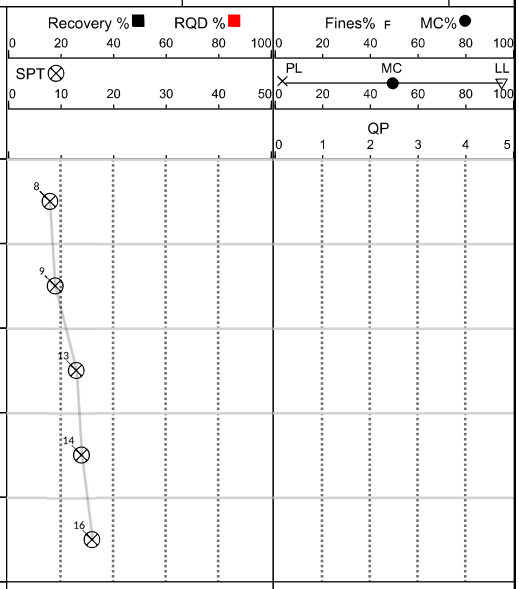
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	11/17/2025	CAVE IN DEPTH:	7FT
WL (Completion):	Dry	BORING COMPLETED:	11/17/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME300	LNB	Hollow Stem Auger (0'-8.6')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**P-04**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase II	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:
37.26820181	**-79.93147677**		**946**

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	16	Topsoil [Thickness=2"]. (CL) Residuum, SANDY LEAN CLAY - trace gravel, light brown, moist, firm.			945	2-4-4-5 (8)
	S-2	SS	24	15	(CL) LEAN CLAY WITH SAND - brown to orangish brown, moist, stiff to very stiff.				3-5-4-7 (9)
5.0	S-3	SS	24	16					3-6-7-9 (13)
	S-4	SS	24	19				940	3-5-9-12 (14)
	S-5	SS	24	20					3-7-9-10 (16)
					END OF BORING at 10.0 FT				



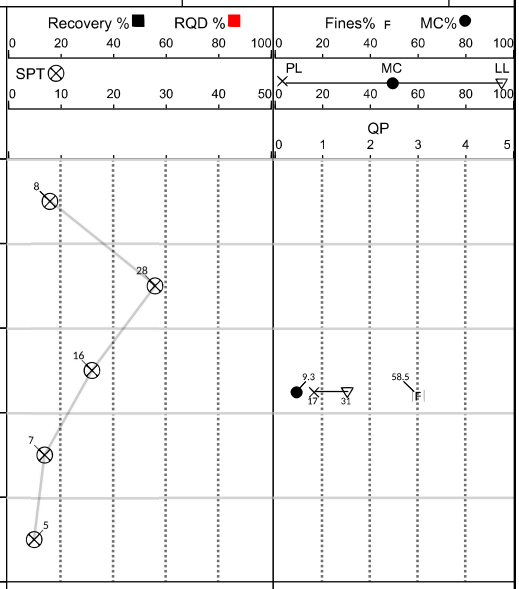
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	7FT
WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-10')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**P-05**	**1 OF 1**
PROJECT NAME: **Roanoke Gateway Project Phase II**	DRILLER/CONTRACTOR: **SEQ Drilling, Inc.**		
SITE LOCATION: **624 Bullitt Ave SE, Roanoke, Virginia, 24022**			LOSS OF CIRCULATION
LATITUDE: **37.26811612**	LONGITUDE: **-79.93077803**	STRUCTURE:	SURFACE ELEVATION: **955**	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	20	Topsoil [Thickness=2"]. (CL) Residuum, SANDY LEAN CLAY - trace gravel, brown, moist, firm to stiff.				2-3-5-8 (8)
	S-2	SS	24	17					5-12-16-20 (28)
5.0	S-3	SS	24	12				950	6-7-9-7 (16)
	S-4	SS	24	14					2-3-4-3 (7)
	S-5	SS	24	7					2-2-3-2 (5)
					END OF BORING at 10.0 FT			945	



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	8FT
WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-10')	

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
Homes for America	**12:20641-A**	**P-06**	**1 OF 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Roanoke Gateway Project Phase II	**SEQ Drilling, Inc.**		
SITE LOCATION:			LOSS OF CIRCULATION
624 Bullitt Ave SE, Roanoke, Virginia, 24022			
LATITUDE:	LONGITUDE:	STRUCTURE:	SURFACE ELEVATION:	BOTTOM OF CASING
37.26837679	**-79.93033181**		**964**	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DISTANCE (IN)	SAMPLE RECOVERY (IN)	DESCRIPTION OF MATERIAL	STRATIGRAPHY	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (TCP/RS/MC/SPT-N VALUE)*
	S-1	SS	24	13	(GP) POORLY GRADED GRAVEL WITH SAND - reddish brown, moist, medium dense to very dense.				4-8-11-15 (19)
	S-2	SS	24	18					10-20-36-40 (56)
	S-3	SS	11	9	(WR) WEATHERED ROCK sampled as POORLY GRADED GRAVEL WITH SAND - reddish brown, moist, very dense.			960	16-50/5" (50/5)
5.0									
	S-4	SS	23	8					18-27-38-50/5" (65)
	S-5	SS	22	8				955	17-25-46-50/4" (71)
					END OF BORING at 10.0 FT				

Recovery % ■ RQD % ■ (0 20 40 60 80 100)
SPT ⊗ (0 10 20 30 40 50)
Fines% F MC% ● (0 20 40 60 80 100)
PL × MC ● LL ▽ (0 20 40 60 80 100)
QP (0 1 2 3 4 5)

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered):	Dry	BORING STARTED:	12/03/2025	CAVE IN DEPTH:	7FT
▼ WL (Completion):	Dry	BORING COMPLETED:	12/03/2025	HAMMER TYPE:	Automatic
▼ WL (Seasonal High Water):		EQUIPMENT:	LOGGED BY:	DRILLING METHOD:	
▽ WL (Stabilized):		Track CME-550X	LNB	Hollow Stem Auger (0'-10')	

GEOTECHNICAL BOREHOLE LOG

APPENDIX C – Laboratory Testing

Laboratory Test Results Summary
Plasticity Charts
Grain Size Analyses
Moisture-Density Relationship Curves
CBR Test Results

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-02	S-2	2.0-4.0	25.1										
B-02	S-5	8.0-10.0	42.5										
B-02	S-6	13.0-15.0	69.5	CL	49	24	25	97.7					
B-02	S-9	28.0-30.0	61.9	CH	81	29	52	99.4					
B-03	S-2	2.0-4.0	9.6	SM	29	23	6	32.4					
B-04	S-2	2.0-4.0	38.8	ML	36	29	7	81.6					
B-04	S-5	8.0-10.0	35.3	ML	37	26	11	82.2					
B-14	S-4	6.0-8.0	36.9										
B-15	S-3	4.0-6.0	30.0										
B-16	S-2	2.0-4.0	12.2	SM		NP		33.4					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Roanoke Gateway Project Phase II
Client: Homes for America

Project No.: 12:20641-A
Date Reported: 1/14/2026



Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received
JHrysenko	JMurphy	JMurphy	1212/2025

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-16	S-5	8.0-10.0	30.5										
B-16	S-6	13.0-15.0	36.3	ML	34	25	9	74.9					
B-16	S-7	18.0-20.0	58.0										
B-17	S-5	8.0-10.0	34.6	CH	57	22	35	93.6					
B-17	S-6	13.0-15.0	40.9	CH	50	24	26	70.9					
B-17	S-7	18.0-20.0	58.7										
B-18	S-1	0.0-2.0	10.0	CL	34	19	15	62.7					
B-18	S-4	6.0-8.0	17.7										
P-05	D3S-88	1.0-10.0	9.3	CL	31	17	14	58.5	108.8	15.8	2.9	2.4	

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Roanoke Gateway Project Phase II
Client: Homes for America

Project No.: 12:20641-A
Date Reported: 1/14/2026



Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received
JHrysenko	JMurphy	JMurphy	1212/2025

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
P-03	D3S-56	1.0-10.0	30.0	CL	36	18	18	51.6	113.8	15.8	5	4.4	

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

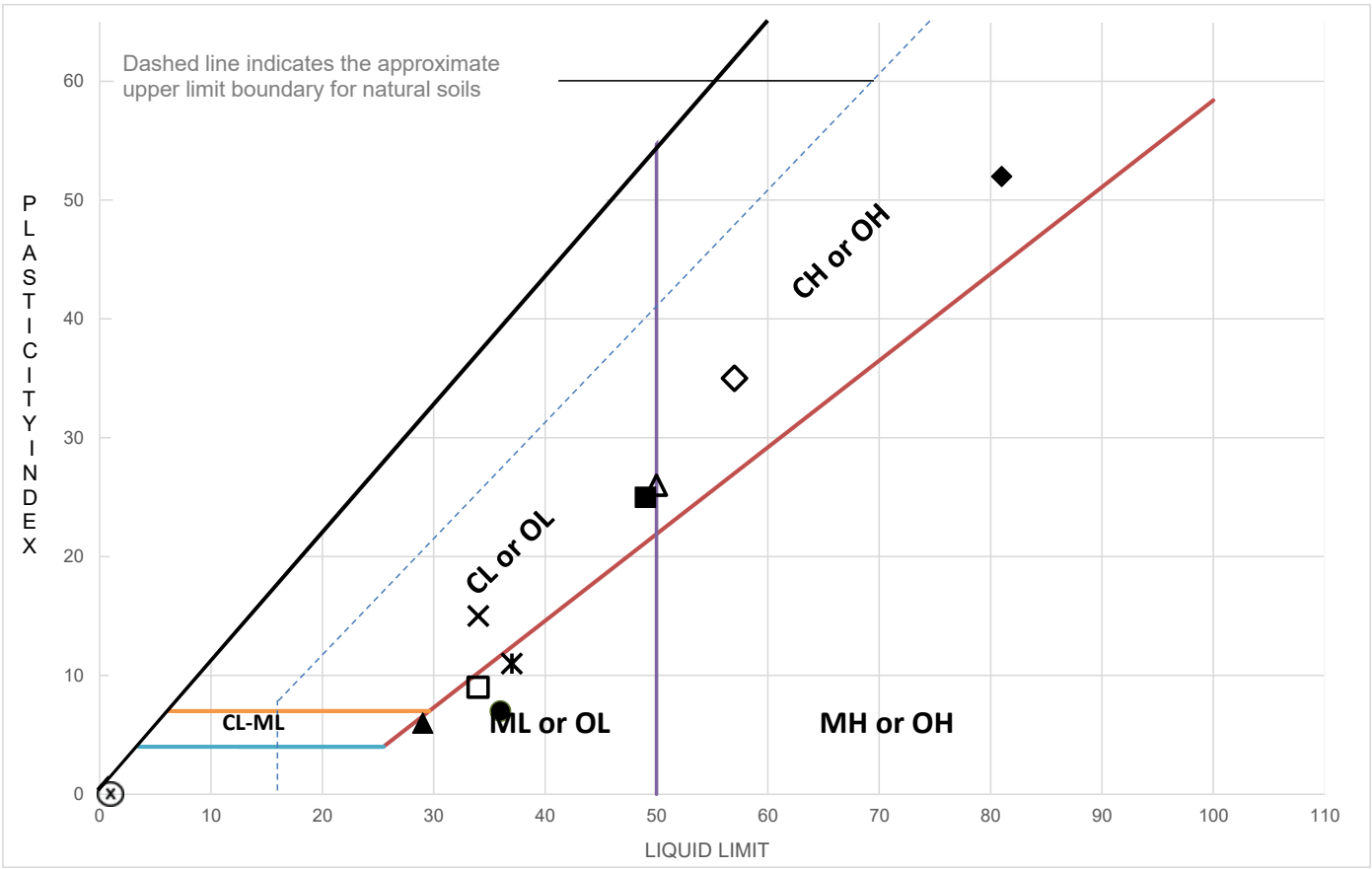
Project: Roanoke Gateway Project Phase I
Client: Homes for America

Project No.: 12:20641
Date Reported: 12/26/2025

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Chantilly	14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232	(703)471-8400 (703)834-5527

Tested by	Checked by	Approved by	Date Received
jvong	MUzun	MUzun	12/16/2025

LIQUID AND PLASTIC LIMITS TEST REPORT



TEST RESULTS (ASTM D4318-10 (MULTIPOINT TEST))

	Sample Location	Sample Number	Sample Depth (ft)	LL	PL	PI	%<#40	%<#200	AASHTO	USCS	Material Description
■	B-02	S-6	13.00-15.00	49	24	25	99.4	97.7	A-7-6	CL	Light Brown LEAN CLAY
◆	B-02	S-9	28.00-30.00	81	29	52	99.9	99.4	A-7-6	CH	Orange Brown FAT CLAY
▲	B-03	S-2	2.00-4.00	29	23	6	42.7	32.4	A-2-4	SM	Brown SILTY SAND with Gravel
●	B-04	S-2	2.00-4.00	36	29	7	93.8	81.6	A-4	ML	Yellow SILT with Sand
✳	B-04	S-5	8.00-10.00	37	26	11	93.3	82.2	A-6	ML	Red Brown SILT with Sand
⊗	B-16	S-2	2.00-4.00	NP	NP	NP	45.5	33.4	A-2-4	SM	Light Brown SILTY SAND with Gravel
□	B-16	S-6	13.00-15.00	34	25	9	85.0	74.9	A-4	ML	Yellow Brown SILT with Sand
◇	B-17	S-5	8.00-10.00	57	22	35	98.6	93.6	A-7-6	CH	Orange Brown FAT CLAY
△	B-17	S-6	13.00-15.00	50	24	26	85.5	70.9	A-7-6	CH	Light Brown FAT CLAY with Sand
×	B-18	S-1	0.00-2.00	34	19	15	84.4	62.7	A-6	CL	Dark Brown SANDY LEAN CLAY

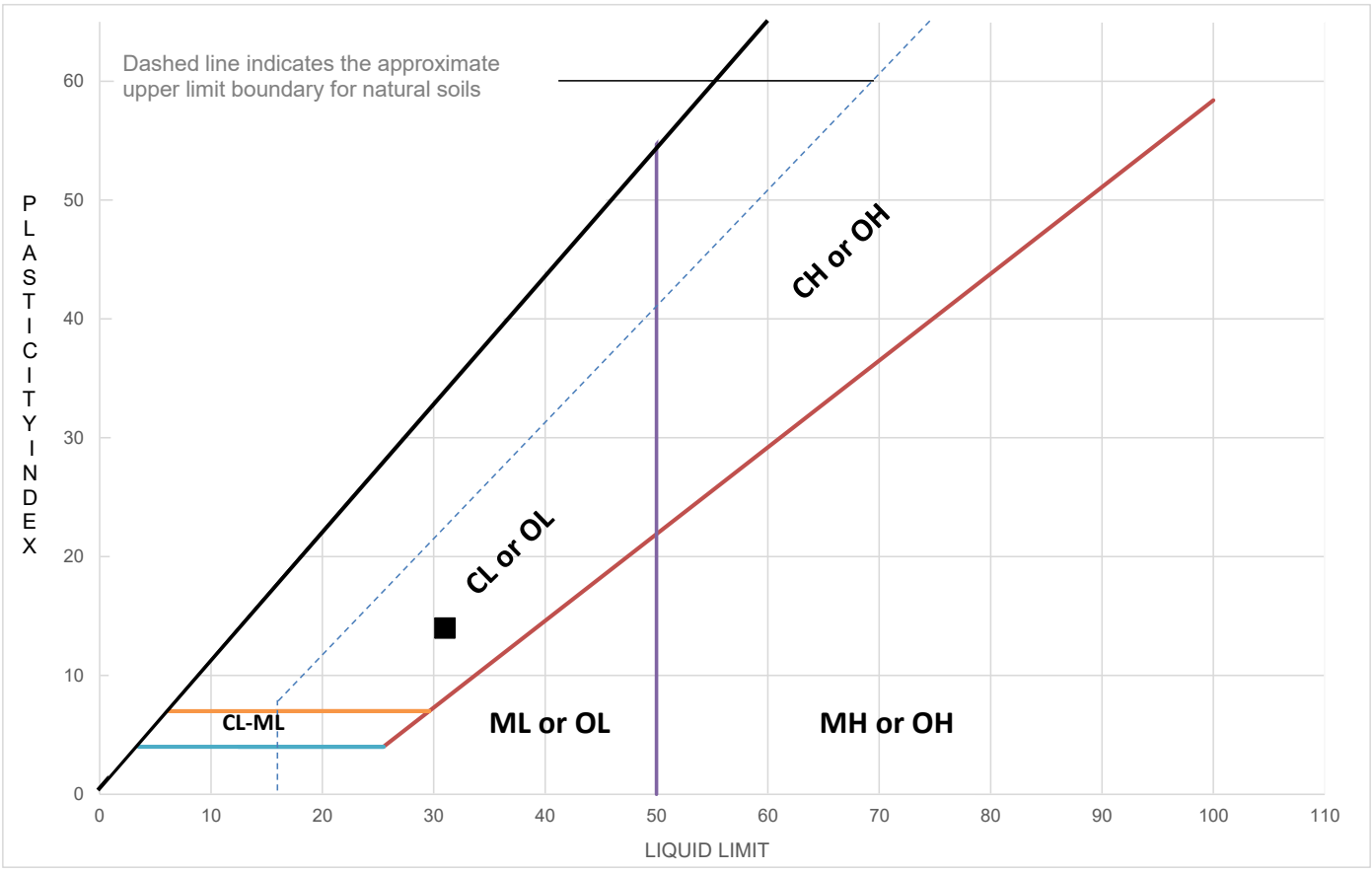
Project: Roanoke Gateway Project Phase II
Client: Homes for America

Project No.: 12:20641-A
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received
JHrysenko	JMurphy	JMurphy	1212/2025

LIQUID AND PLASTIC LIMITS TEST REPORT



TEST RESULTS (ASTM D4318-10 (MULTIPOINT TEST))

	Sample Location	Sample Number	Sample Depth (ft)	LL	PL	PI	%<#40	%<#200	AASHTO	USCS	Material Description
■	P-05	D3S-88	1.00-10.00	31	17	14	71.7	58.5	A-6	CL	Sandy Lean Clay Brown

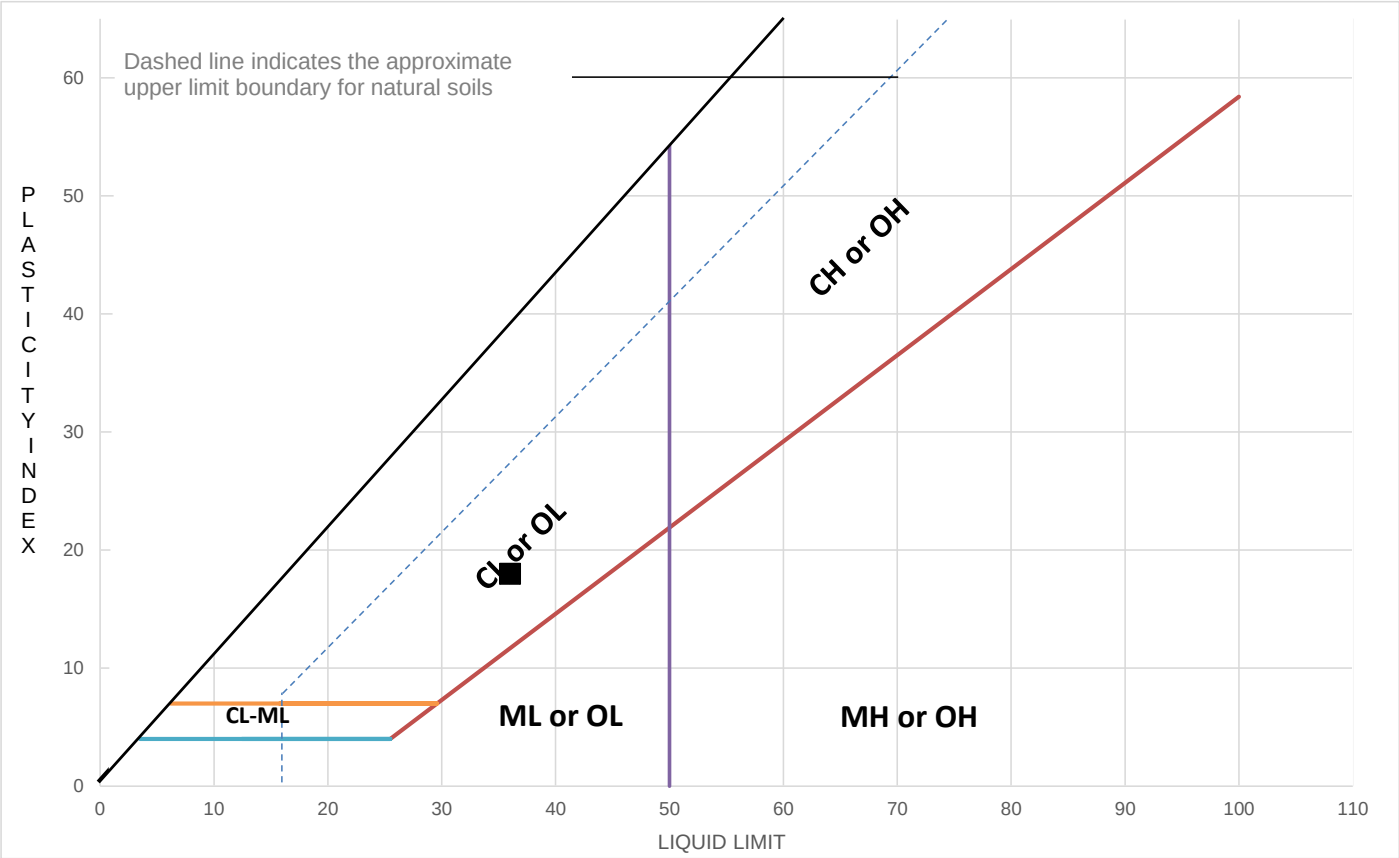
Project: Roanoke Gateway Project Phase II
Client: Homes for America

Project No.: 12:20641-A
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received
jvong	Htran	MUzun	12/16/2025

LIQUID AND PLASTIC LIMITS TEST REPORT



TEST RESULTS (ASTM D4318-10 (MULTIPOINT TEST))

	Sample Location	Sample Number	Sample Depth (ft)	LL	PL	PI	%<#40	%<#200	AASHTO	USCS	Material Description
■	P-03	D3S-56	1.00-10.00	36	18	18	59.5	51.6	A-6	CL	Sandy Lean Clay with Gravel Yellow Brown

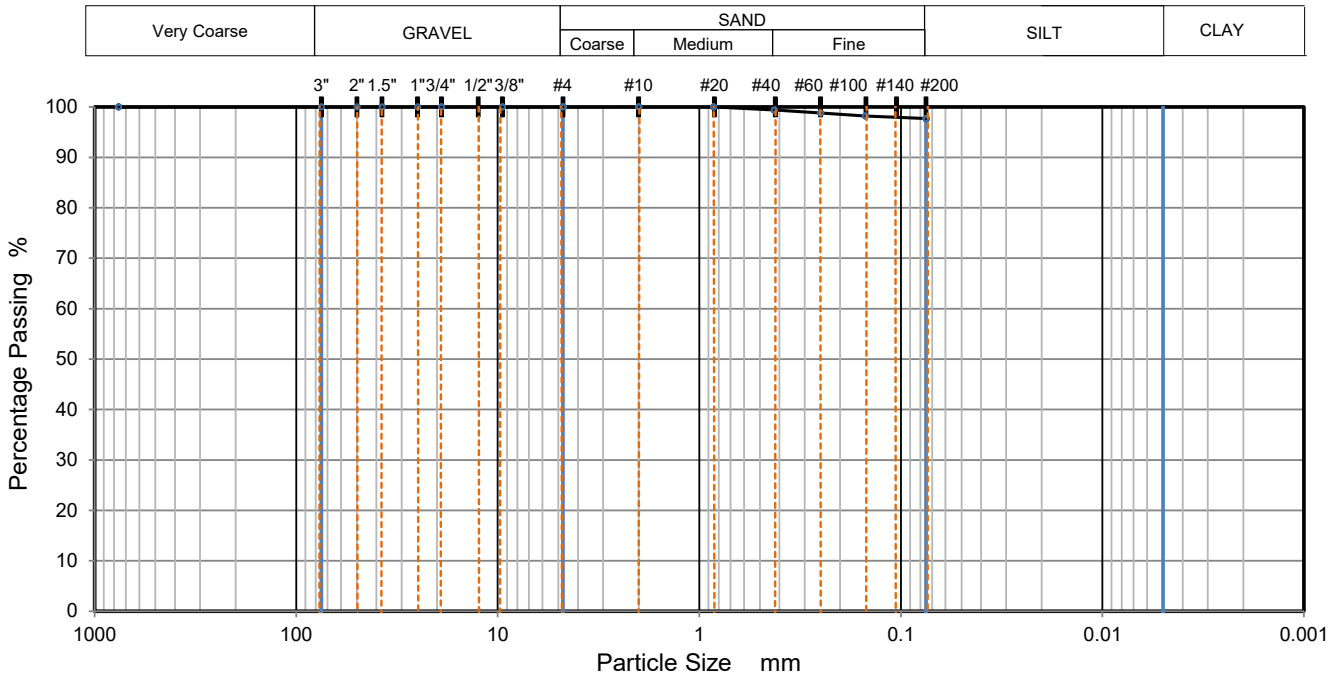
Project: Roanoke Gateway Project Phase I
Client: Homes for America

Project No.: 12:20641
Date Reported: 12/26/2025

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Chantilly	14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232	(703)471-8400 (703)834-5527

Tested by	Checked by	Approved by	Date Received
jvong	MUzun	MUzun	12/16/2025

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	100		
#20	100		
#40	99		
#60	99		
#100	98		
#200	98		

Dry Mass of sample, g: 28.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	1
Fine Sand, #40 to #200	2
Fines <#200	98

USCS	CL	Liquid Limit	49	D90		D50		D10	
AASHTO	A-7-6	Plastic Limit	24	D85		D30		Cu	
USCS Group Name	Lean clay	Plasticity Index	25	D60		D15		Cc	

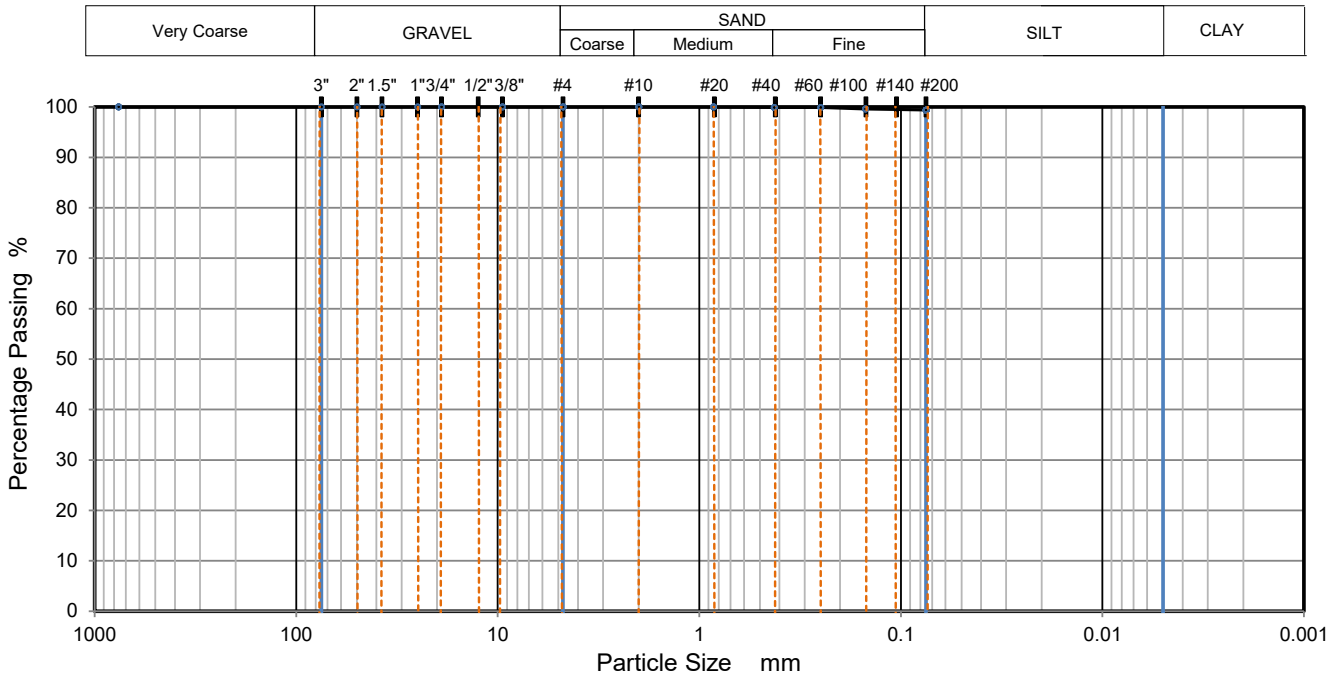
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Light Brown LEAN CLAY
Sample Source: B-02

Project No.: 12:20641-A
Depth (ft): 13.0 - 15.0
Sample No.: S-6
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
JHrysenko	JMurphy	JMurphy	1212/2025	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	100		
#20	100		
#40	100		
#60	100		
#100	100		
#200	99		

Dry Mass of sample, g	9.6

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	0
Fine Sand, #40 to #200	1
Fines <#200	99

USCS	CH	Liquid Limit	81	D90		D50		D10	
AASHTO	A-7-6	Plastic Limit	29	D85		D30		Cu	
USCS Group Name	Fat clay	Plasticity Index	52	D60		D15		Cc	

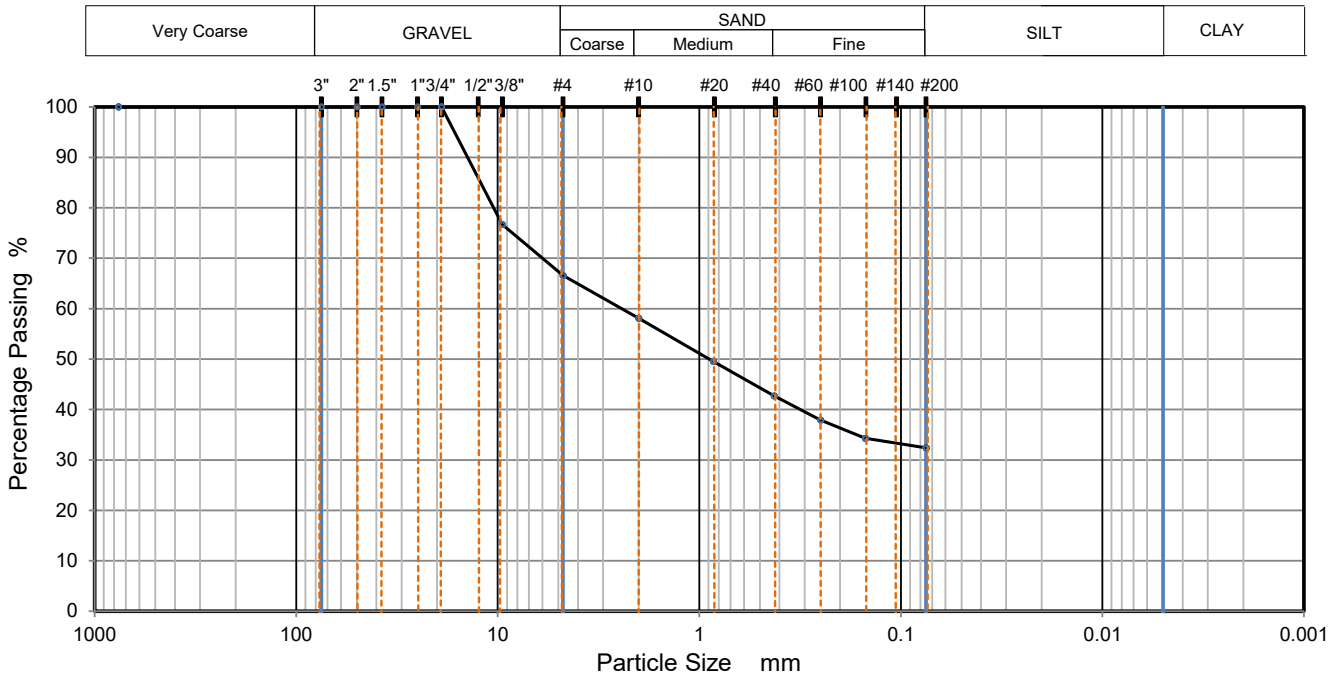
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Orange Brown FAT CLAY
Sample Source: B-02

Project No.: 12:20641-A
Depth (ft): 28.0 - 30.0
Sample No.: S-9
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
JHrysenko	JMurphy	JMurphy	1212/2025	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	77		
#4	67		
#10	58		
#20	50		
#40	43		
#60	38		
#100	34		
#200	32		

Dry Mass of sample, g: 47.6

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	33
Coarse Sand, #4 to #10 sieve	8
Medium Sand, #10 to #40	15
Fine Sand, #40 to #200	10
Fines <#200	32

USCS	SM	Liquid Limit	29	D90	14.110	D50	0.893	D10	
AASHTO	A-2-4	Plastic Limit	23	D85	12.160	D30		Cu	
USCS Group Name	Silty sand with gravel	Plasticity Index	6	D60	2.427	D15		Cc	

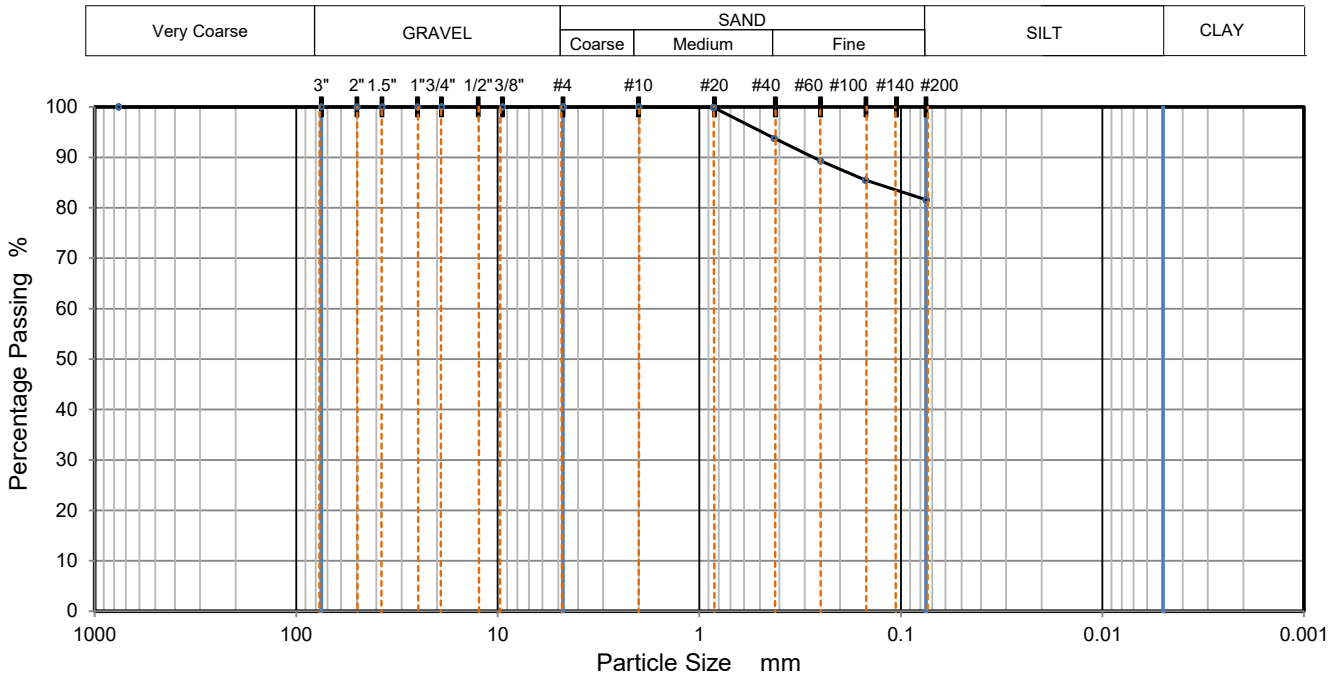
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Brown SILTY SAND with Gravel
Sample Source: B-03

Project No.: 12:20641-A
Depth (ft): 2.0 - 4.0
Sample No.: S-2
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
JHrysenko	JMurphy	JMurphy	1212/2025	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	100		
#20	100		
#40	94		
#60	89		
#100	86		
#200	82		

Dry Mass of sample, g: 37.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	6
Fine Sand, #40 to #200	12
Fines <#200	82

USCS	ML	Liquid Limit	36	D90	0.272	D50		D10	
AASHTO	A-4	Plastic Limit	29	D85	0.137	D30		Cu	
USCS Group Name	Silt with sand	Plasticity Index	7	D60		D15		Cc	

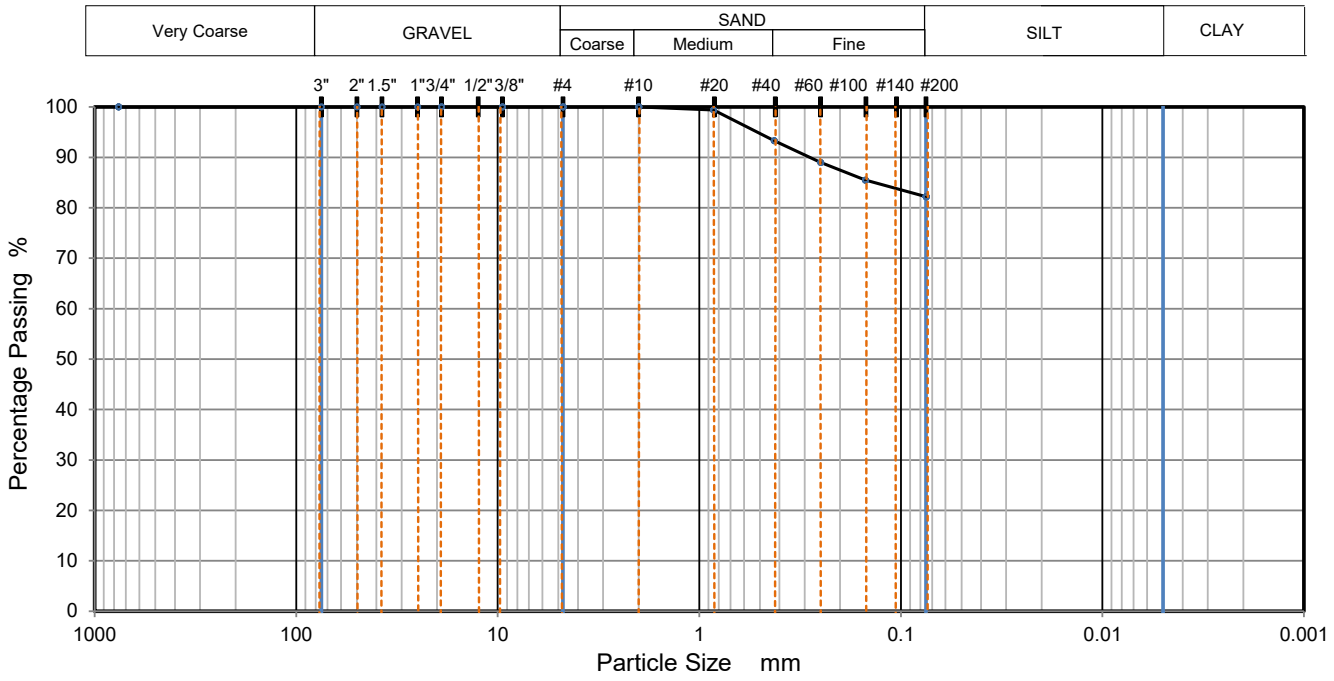
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Yellow SILT with Sand
Sample Source: B-04

Project No.: 12:20641-A
Depth (ft): 2.0 - 4.0
Sample No.: S-2
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
JHrysenko	JMurphy	JMurphy	1212/2025	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	100		
#20	99		
#40	93		
#60	89		
#100	86		
#200	82		

Dry Mass of sample, g: 38.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	7
Fine Sand, #40 to #200	11
Fines <#200	82

USCS	ML	Liquid Limit	37	D90	0.283	D50		D10	
AASHTO	A-6	Plastic Limit	26	D85	0.135	D30		Cu	
USCS Group Name	Silt with sand	Plasticity Index	11	D60		D15		Cc	

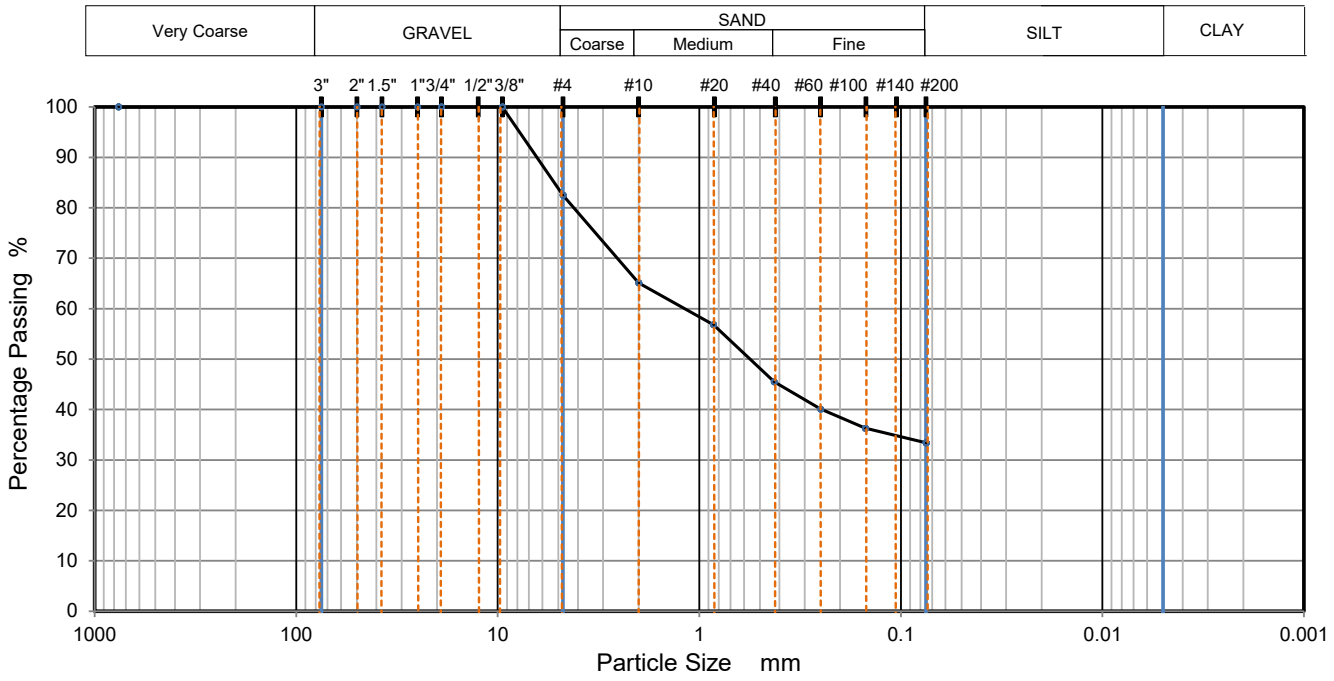
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Red Brown SILT with Sand
Sample Source: B-04

Project No.: 12:20641-A
Depth (ft): 8.0 - 10.0
Sample No.: S-5
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
JHrysenko	JMurphy	JMurphy	1212/2025	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	83		
#10	65		
#20	57		
#40	46		
#60	40		
#100	36		
#200	33		

Dry Mass of sample, g: 44.3

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	18
Coarse Sand, #4 to #10 sieve	17
Medium Sand, #10 to #40	20
Fine Sand, #40 to #200	12
Fines <#200	33

USCS	SM	Liquid Limit		D90	6.393	D50	0.560	D10	
AASHTO	A-2-4	Plastic Limit	NP	D85	5.244	D30		Cu	
USCS Group Name	Silty sand with gravel	Plasticity Index		D60	1.182	D15		Cc	

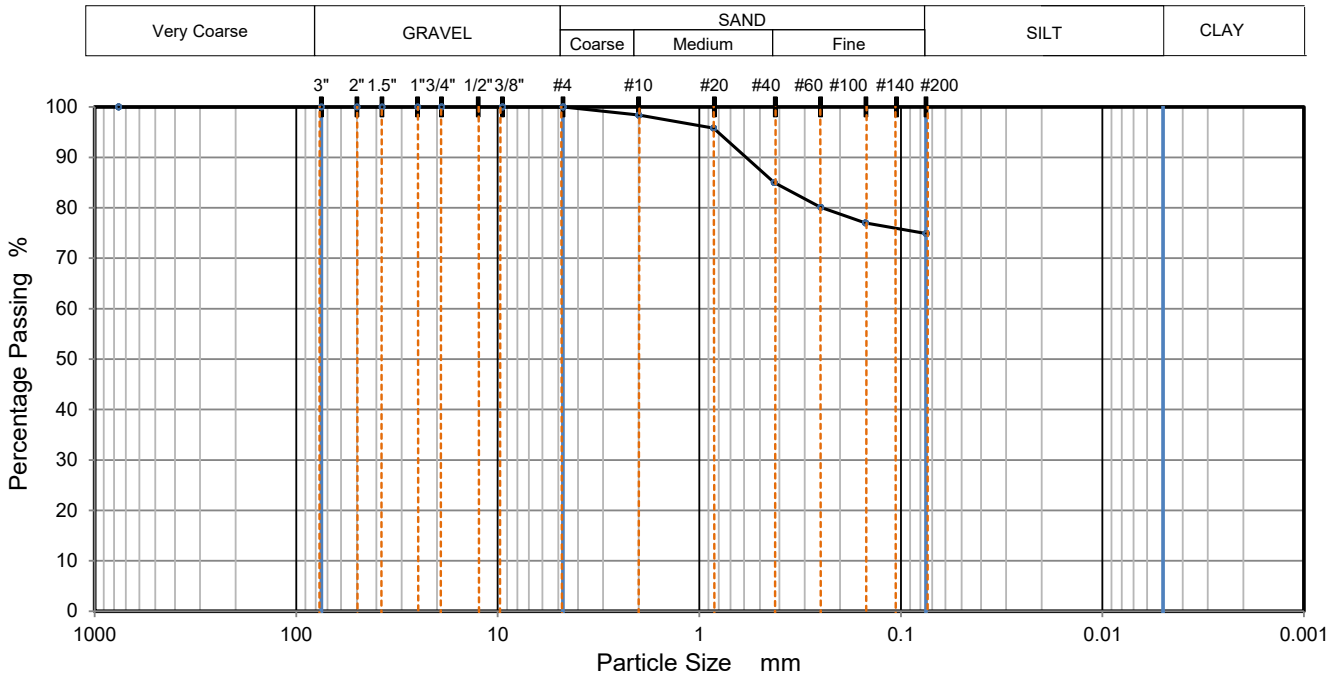
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Light Brown SILTY SAND with Gravel
Sample Source: B-16

Project No.: 12:20641-A
Depth (ft): 2.0 - 4.0
Sample No.: S-2
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
JHrysenko	JMurphy	JMurphy	1212/2025	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	98		
#20	96		
#40	85		
#60	80		
#100	77		
#200	75		

Dry Mass of sample, g	37.4

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	2
Medium Sand, #10 to #40	13
Fine Sand, #40 to #200	10
Fines <#200	75

USCS	ML	Liquid Limit	34	D90	0.586	D50		D10	
AASHTO	A-4	Plastic Limit	25	D85	0.425	D30		Cu	
USCS Group Name	Silt with sand	Plasticity Index	9	D60		D15		Cc	

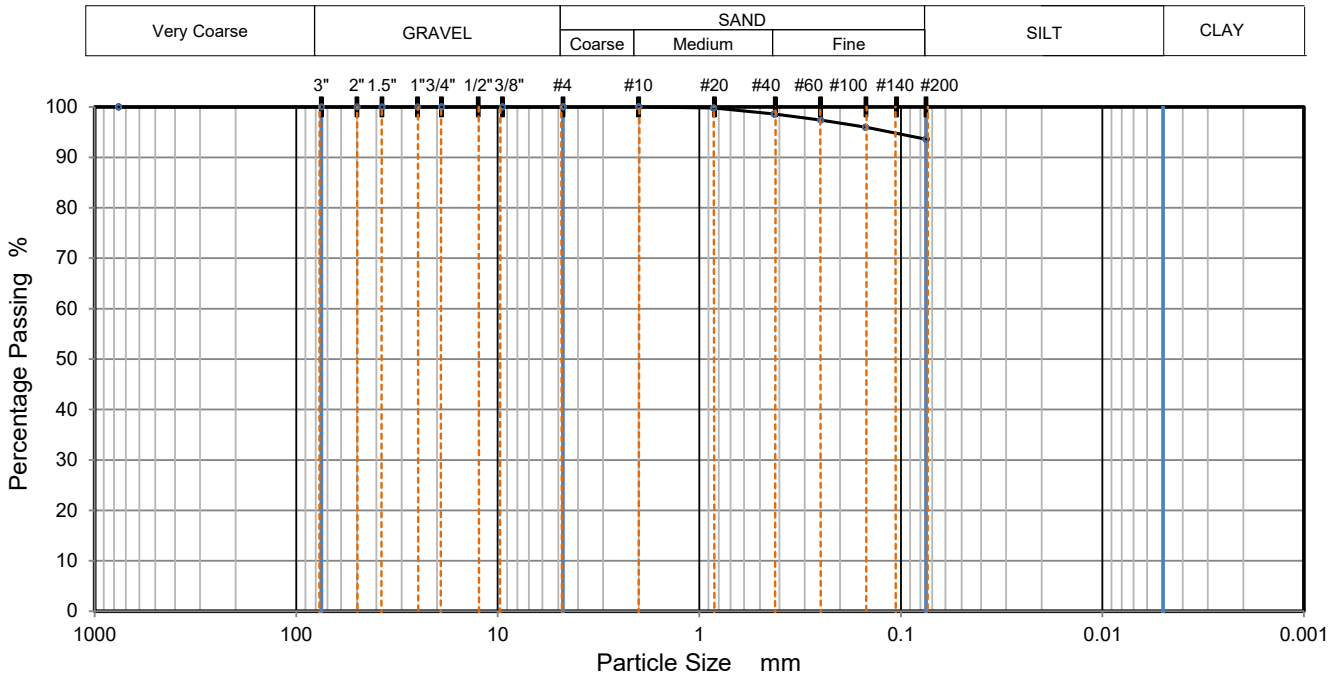
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Yellow Brown SILT with Sand
Sample Source: B-16

Project No.: 12:20641-A
Depth (ft): 13.0 - 15.0
Sample No.: S-6
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	100		
#20	100		
#40	99		
#60	97		
#100	96		
#200	94		

Dry Mass of sample, g: 37.5

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	1
Fine Sand, #40 to #200	5
Fines <#200	94

USCS	CH	Liquid Limit	57	D90		D50		D10	
AASHTO	A-7-6	Plastic Limit	22	D85		D30		Cu	
USCS Group Name	Fat clay	Plasticity Index	35	D60		D15		Cc	

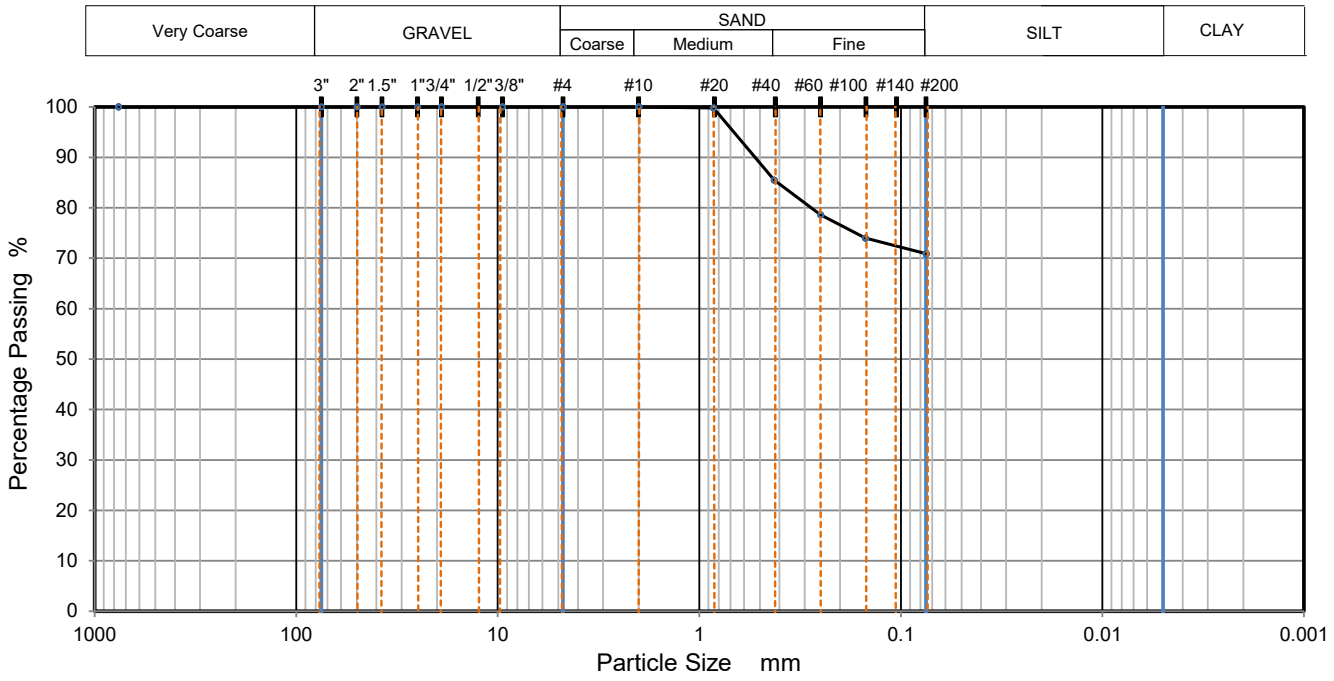
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Orange Brown FAT CLAY
Sample Source: B-17

Project No.: 12:20641-A
Depth (ft): 8.0 - 10.0
Sample No.: S-5
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
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Tested by	Checked by	Approved by	Date Received	Remarks
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	100		
#20	100		
#40	86		
#60	79		
#100	74		
#200	71		

Dry Mass of sample, g: 36.7

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	15
Fine Sand, #40 to #200	15
Fines <#200	71

USCS	CH	Liquid Limit	50	D90	0.529	D50		D10	
AASHTO	A-7-6	Plastic Limit	24	D85	0.409	D30		Cu	
USCS Group Name	Fat clay with sand	Plasticity Index	26	D60		D15		Cc	

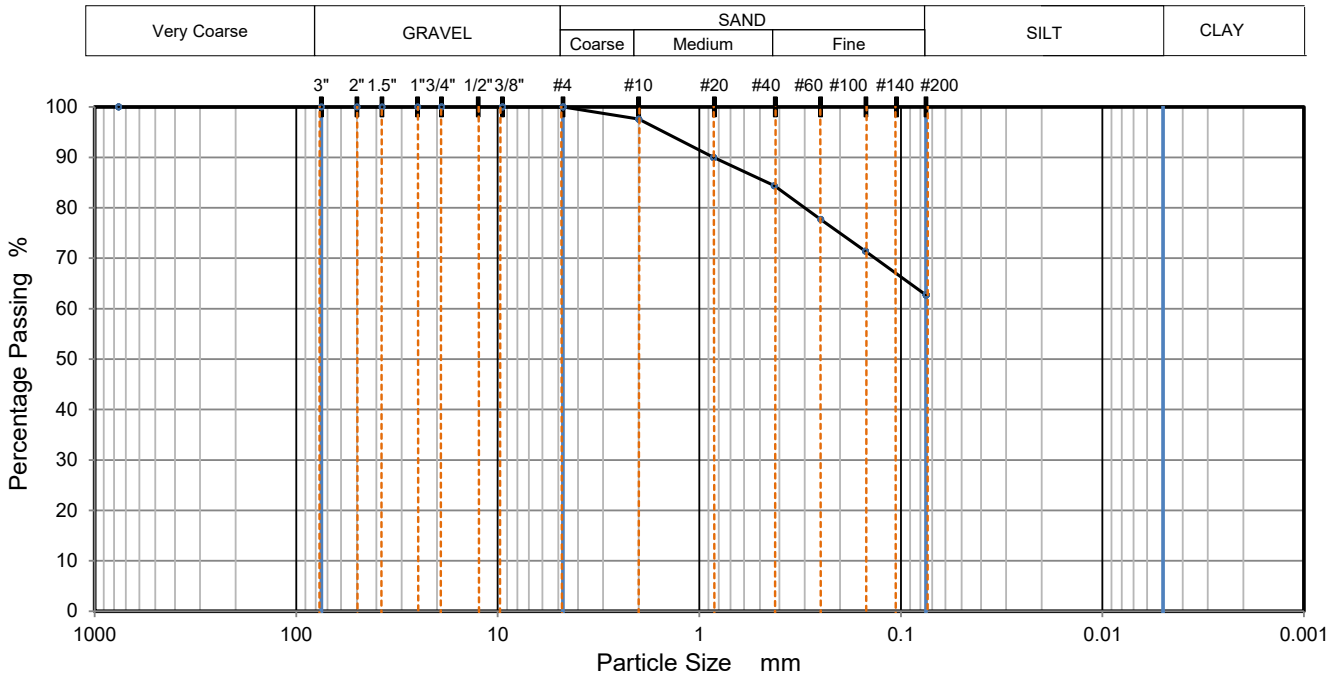
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Light Brown FAT CLAY with Sand
Sample Source: B-17

Project No.: 12:20641-A
Depth (ft): 13.0 - 15.0
Sample No.: S-6
Date Reported: 1/14/2026

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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	100		
#4	100		
#10	98		
#20	90		
#40	84		
#60	78		
#100	71		
#200	63		

Dry Mass of sample, g	33.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	0
Coarse Sand, #4 to #10 sieve	2
Medium Sand, #10 to #40	13
Fine Sand, #40 to #200	22
Fines <#200	63

USCS	CL	Liquid Limit	34	D90	0.850	D50		D10	
AASHTO	A-6	Plastic Limit	19	D85	0.458	D30		Cu	
USCS Group Name	Sandy lean clay	Plasticity Index	15	D60		D15		Cc	

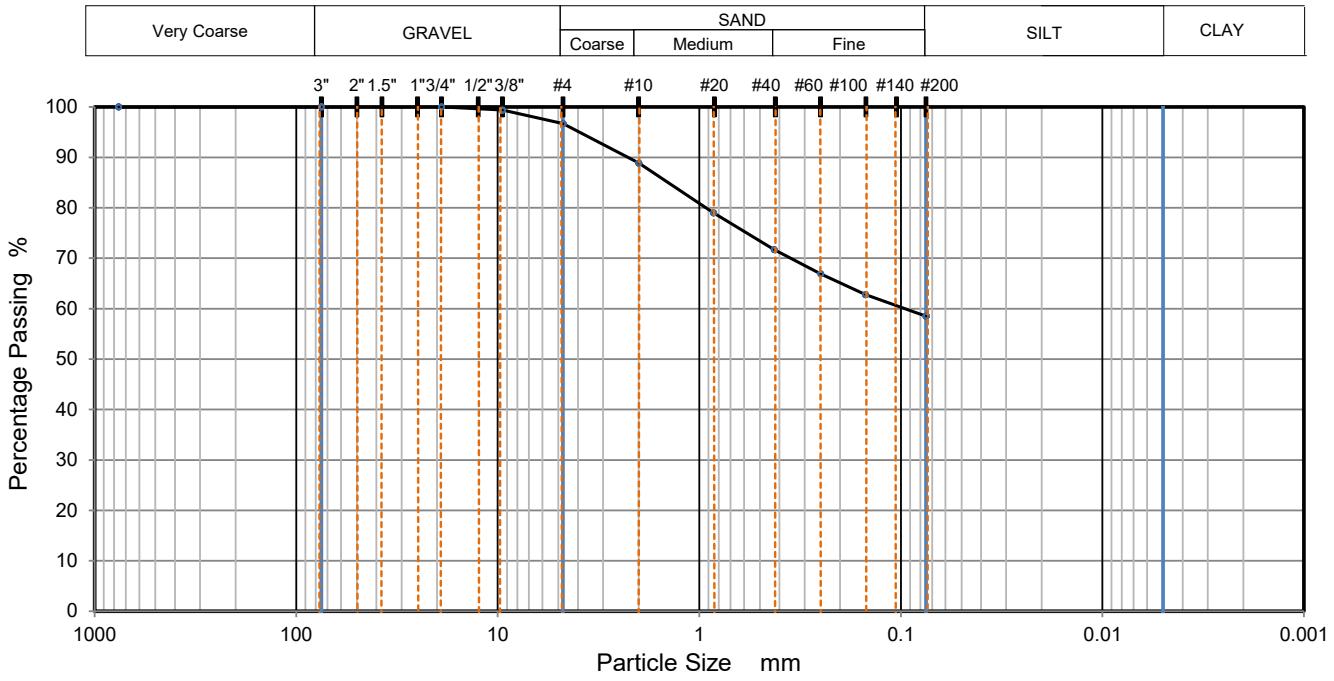
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Dark Brown SANDY LEAN CLAY
Sample Source: B-18

Project No.: 12:20641-A
Depth (ft): 0.0 - 2.0
Sample No.: S-1
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
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Tested by	Checked by	Approved by	Date Received	Remarks
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D422-63(2007))

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
3/4"	100.0		
3/8"	99.4		
#4	96.7		
#10	88.9		
#20	79.0		
#40	71.7		
#60	66.9		
#100	62.8		
#200	58.5		

Dry Mass of sample, g: 12850.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	3.3
Coarse Sand, #4 to #10 sieve	7.8
Medium Sand, #10 to #40	17.2
Fine Sand, #40 to #200	13.2
Fines <#200	58.5

USCS	CL	Liquid Limit	31	D90	2.259	D50		D10	
AASHTO	A-6	Plastic Limit	17	D85	1.428	D30		Cu	
USCS Group Name	Sandy lean clay	Plasticity Index	14	D60	0.096	D15		Cc	

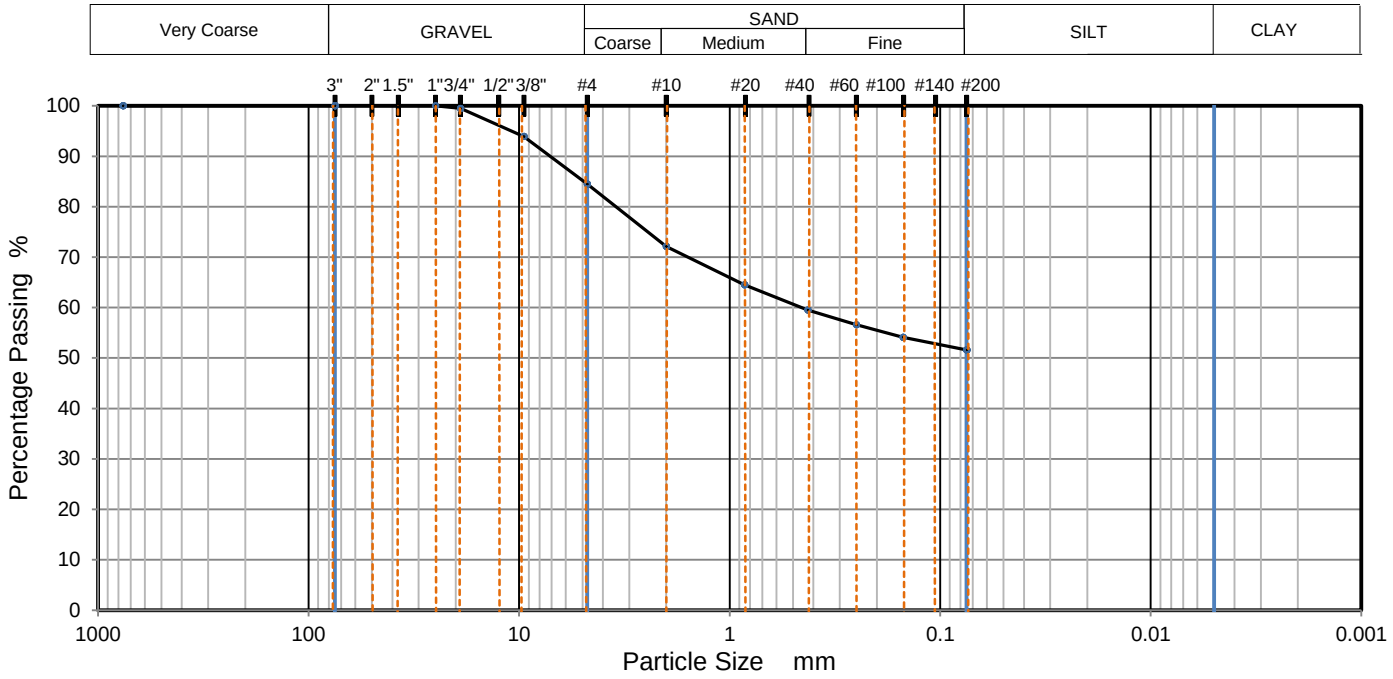
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample Description: Sandy Lean Clay Brown
Sample Source: P-05

Project No.: 12:20641-A
Depth (ft): 1.0 - 10.0
Sample No.: D3S-88
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D422-63(2007))

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100.0		
1"	100.0		
3/4"	99.5		
3/8"	93.9		
#4	84.5		
#10	72.1		
#20	64.5		
#40	59.5		
#60	56.6		
#100	54.1		
#200	51.6		

Dry Mass of sample, g	17222.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0.0
Gravel, 3" to # 4 sieve	15.5
Coarse Sand, #4 to #10 sieve	12.4
Medium Sand, #10 to #40	12.6
Fine Sand, #40 to #200	7.9
Fines <#200	51.6

USCS	CL	Liquid Limit	36	D90	7.126	D50		D10	
AASHTO	A-6	Plastic Limit	18	D85	4.928	D30		Cu	
USCS Group Name	Sandy lean clay with gravel	Plasticity Index	18	D60	0.456	D15		Cc	

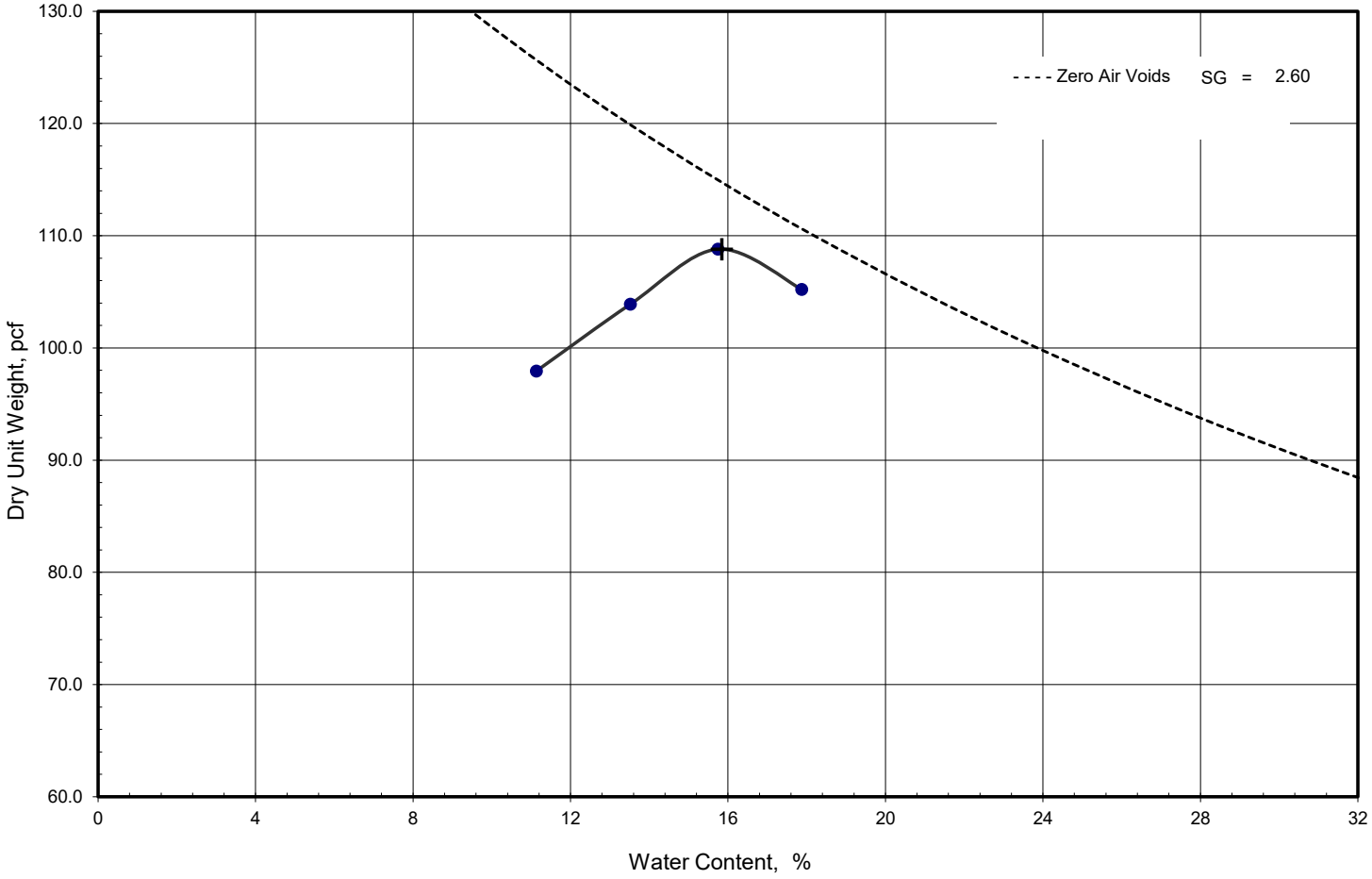
Project: Roanoke Gateway Project Phase I
Client: Homes for America
Sample Description: Sandy Lean Clay with Gravel Yellow Brown
Sample Source: P-03

Project No.: 12:20641
Depth (ft): 1.0 - 10.0
Sample No.: D3S-56
Date Reported: 12/26/2025

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Chantilly	14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232	(703)471-8400 (703)834-5527

Tested by	Checked by	Approved by	Date Received	Remarks
jvong	MUzun	MUzun	12/16/2025	

Laboratory Compaction Characteristics of Soil
Using Standard Effort



Optimum Moisture Content		**15.8**	%
Maximum Dry Unit Weight		**108.8**	pcf
Cumulative material retained on:	3/4 in. sieve	0.0	%
	3/8 in. sieve	0.6	%
	#4 sieve	3.4	%

Preparation	ASTM moist preparation	
Type of rammer	Manual - 5.5lbf (24.5N)	
Test Specfication / Method	ASTM D698-12e2-method A	
Specific gravity - D854 water pycnometer	2.60	Historical
Coarse Aggregate Specific Gravity -		

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Sandy Lean Clay Brown	9.3	31	14	58.5	CL	A-6

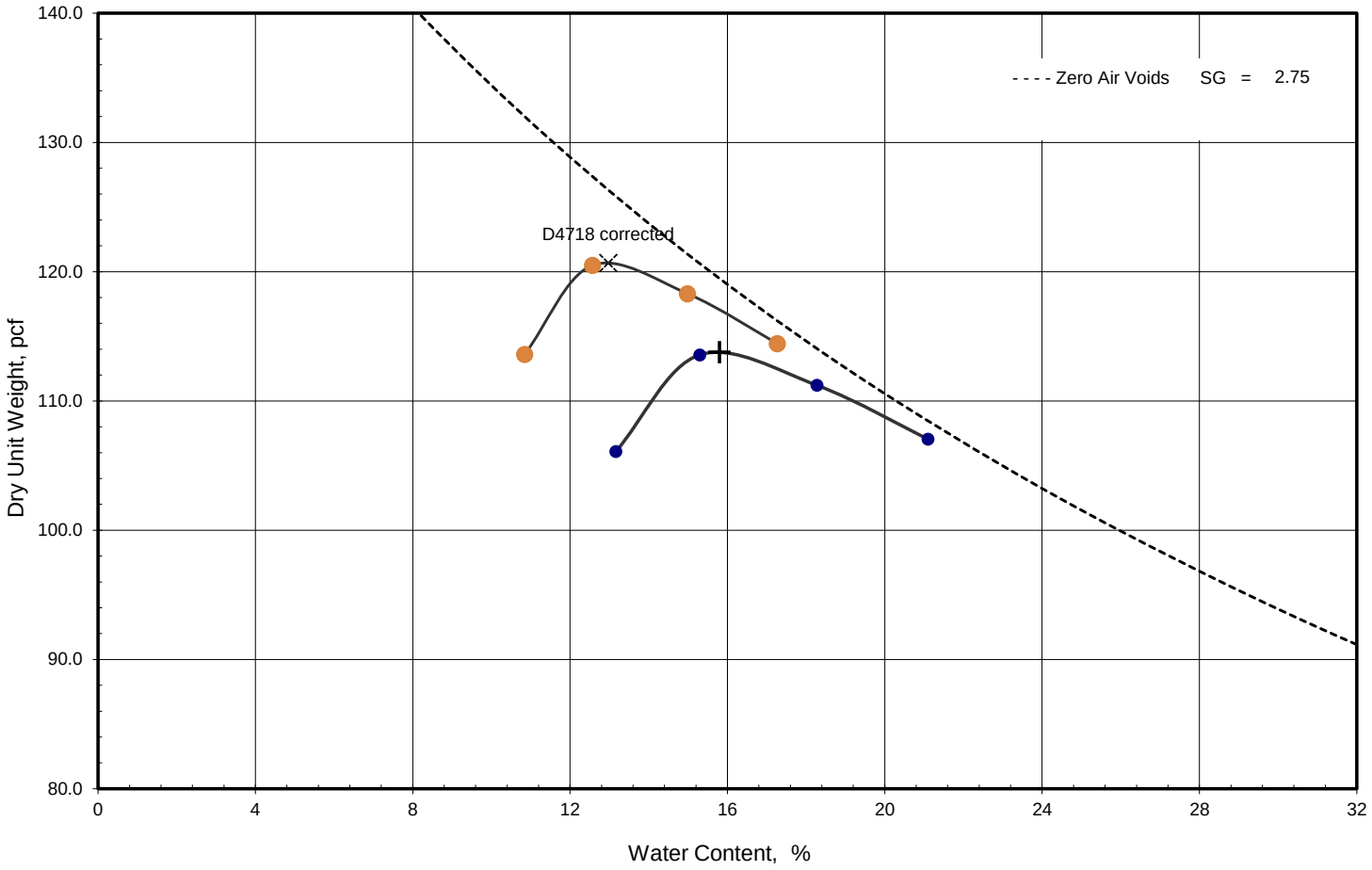
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample / Source: P-05
Test Reference/No.:

Project No.: 12:20641-A
Depth (ft.): 1 - 10
Sample No.: D3S-88
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
jvong	Htran	MUzun	12/16/2025	

Laboratory Compaction Characteristics of Soil Using Standard Effort



Optimum Moisture Content		**15.8**	%
Maximum Dry Unit Weight		**113.8**	pcf
Corrected Opt. Moisture Content		13.0	%
Corrected Max. Dry Density		120.7	pcf
Cumulative material retained on:	3/4 in. sieve	0.5	%
	3/8 in. sieve	6.1	%
	#4 sieve	15.5	%

15.47 % retained on #4 sieve.

Preparation	ASTM moist preparation	
Type of rammer	Manual - 5.5lbf (24.5N)	
Test Specfication / Method	ASTM D698-12e2-method A	
Specific gravity - D854 water pycnometer	2.75	Historical
Coarse Aggregate Specific Gravity - C127 coarse aggregate	2.60	Historical

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
Sandy Lean Clay with Gravel Yellow Brown	30.0	36	18	51.6	CL	A-6

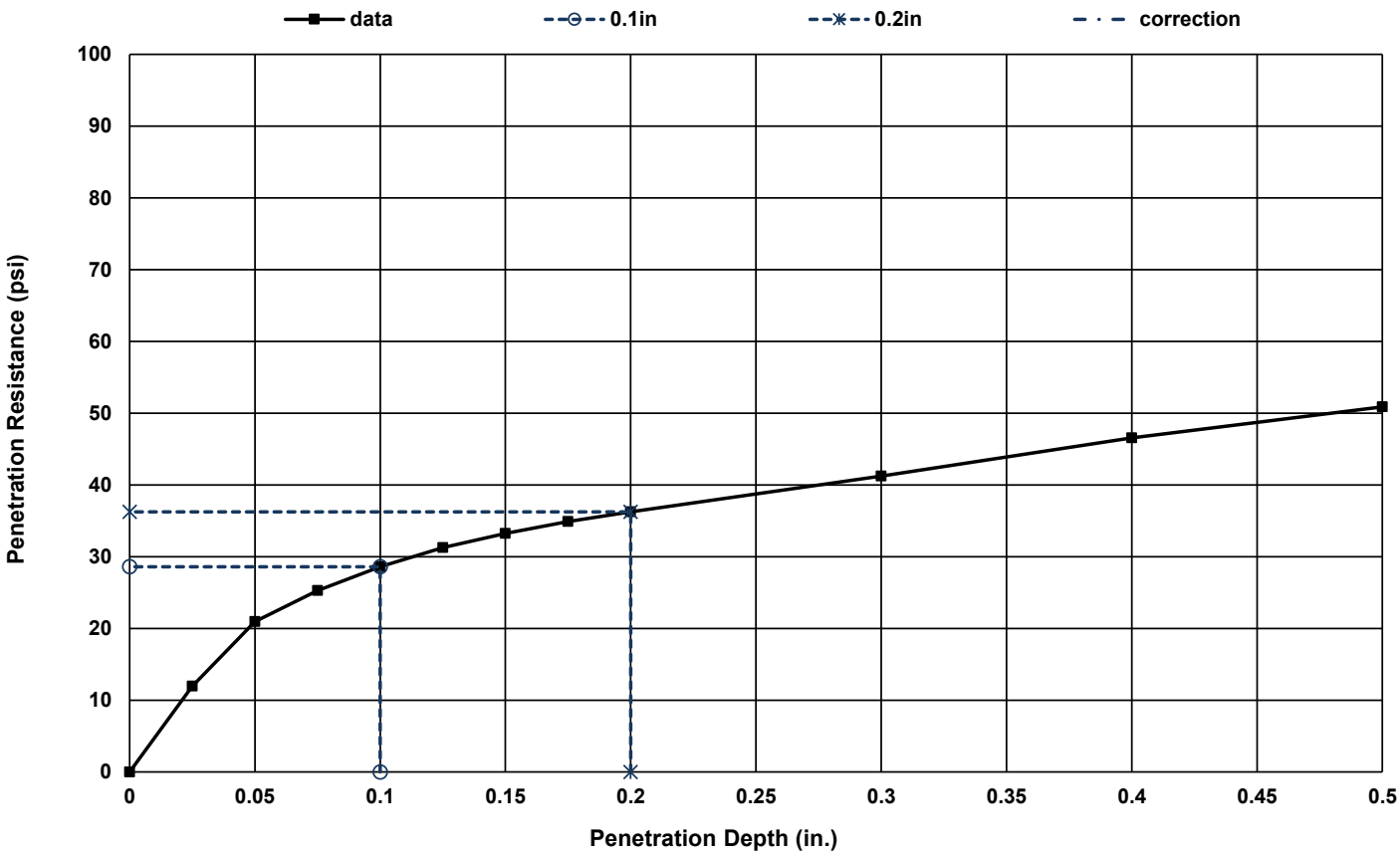
Project: Roanoke Gateway Project Phase I
Client: Homes for America
Sample / Source: P-03
Test Reference/No.:

Project No.: 12:20641
Depth (ft.): 1 - 10
Sample No.: D3S-56
Date Reported: 12/26/2025

Office / Lab	Address	Office Number / Fax
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Tested by	Checked by	Approved by	Date Received	Remarks
jvong	MUzun	MUzun	12/16/2025	

California Bearing Ratios (CBR) of Laboratory-Compacted Soils



TEST RESULTS (ASTM D1883-21)

Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)		Swell (%)	
Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.1 in.	0.2 in.					
106.9	98.3	16.1	98.1	90.2	24.8	2.9	2.4	0.00	10		1.40	
Material Description			AASHTO	USCS	MAX. Dens. (pcf)	Optimum Moisture (%)	LL	PI	% Fines	% Gravel		
Sandy Lean Clay Brown			A-6	CL	108.8	15.8	31	14	58.5	3.3		

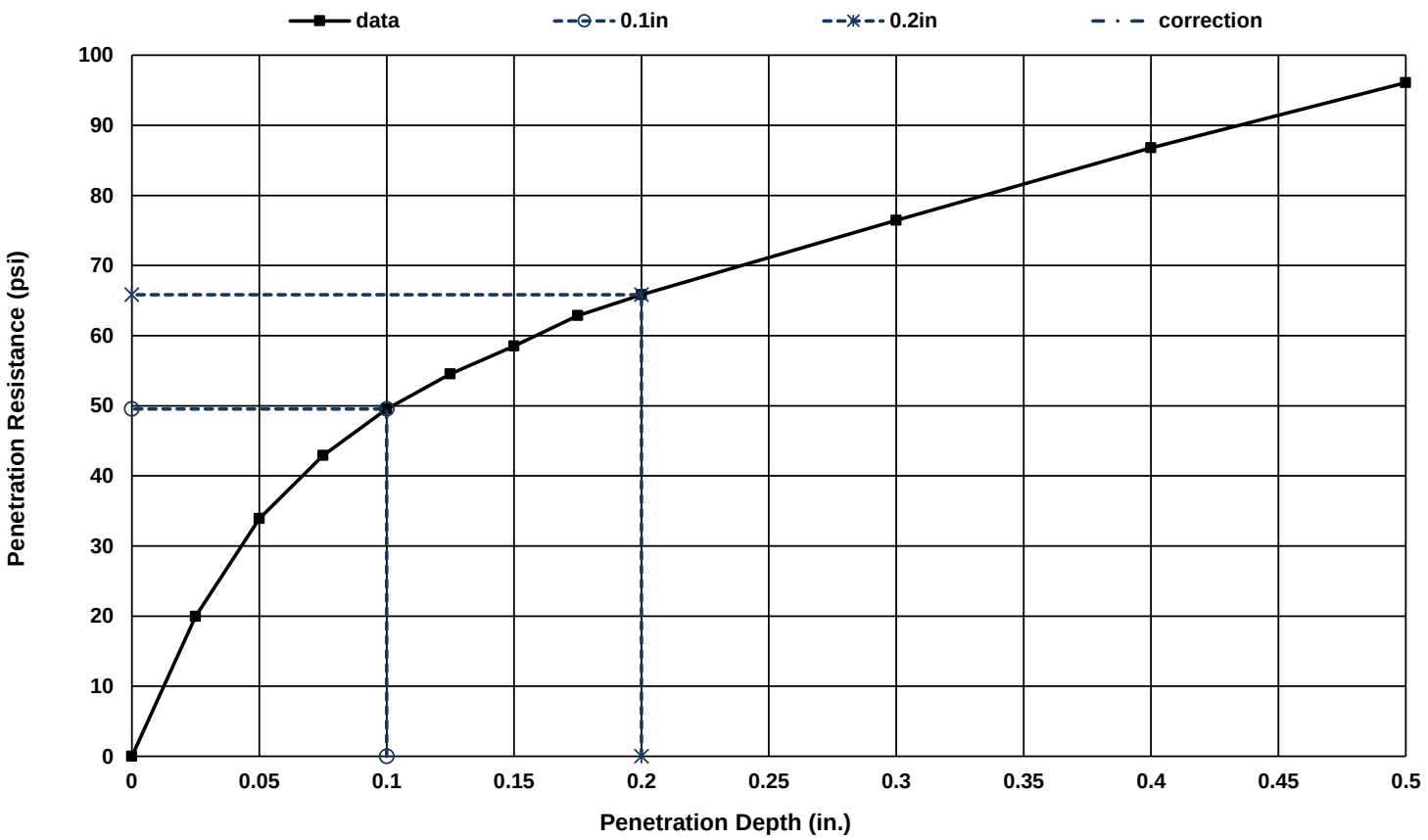
Project: Roanoke Gateway Project Phase II
Client: Homes for America
Sample / Source: P-05
Test Reference/No.: 1

Project No.: 12:20641-A
Depth (ft.): 1 - 10
Sample No.: D3S-88
Date Reported: 1/14/2026

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Roanoke	7670 Enon Drive Suite 101 Roanoke, VA 24019	(540)362-2000 (540)362-1202

Tested by	Checked by	Approved by	Date Received	Remarks
jvong	Htran	MUzun	12/16/2025	

California Bearing Ratios (CBR) of Laboratory-Compacted Soils



TEST RESULTS (ASTM D1883-21)

Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)		Swell (%)	
Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.1 in.	0.2 in.					
120.2	99.6	12.8	113.0	93.6	19.0	5.0	4.4	0.00	10		0.83	
Material Description			AASHTO	USCS	MAX. Dens. (pcf)	Optimum Moisture (%)	LL	PI	% Fines	% Gravel		
Sandy Lean Clay with Gravel Yellow Brown			A-6	CL	120.68	13	36	18	51.6	15.5		

Project: Roanoke Gateway Project Phase I
Client: Homes for America
Sample / Source P-03
Test Reference/No.: 1

Project No.: 12:20641
Depth (ft.): 1 - 10
Sample No.: D3S-56
Date Reported: 12/26/2025

Office / Lab	Address	Office Number / Fax
ECS Mid-Atlantic LLC - Chantilly	14026 Thunderbolt Place Suite 100 Chantilly, VA 20151-3232	(703)471-8400 (703)834-5527

Tested by	Checked by	Approved by	Date Received	Remarks
jvong	MUzun	MUzun	12/16/2025	

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SECTION 02 85 00 - MOLD REMEDIATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This specification covers the removal and disposal of mold. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 SUBMITTALS

A. List of all personnel to be involved in the work with their training and certificates.

B. List of all products and procedures proposed for use in performance of the work.

C. Test reports.

D. Certificates.

1.3 REFERENCES

A. U.S. EPA "Mold Remediation in Schools and Commercial Buildings."

B. U.S. EPA "A Brief Guide to Mold, Moisture, and Your Home."

1.4 QUALITY ASSURANCE

A. Conform to all Federal, State, and Local regulations which govern the handling and disposal of mold materials.

PART 2 - PRODUCTS – (Not Used)

PART 3 - EXECUTION

3.1 ENVIRONMENTAL ASSESSMENT: The presence of mold, water damage, or musty odors shall be addressed immediately. In all instances, any source(s) of water must be stopped and the extent of water damage determined. Water damaged materials shall be dried and repaired. Mold damaged materials shall be remediated in accordance with this document.

A. Visual Inspection: A visual inspection is the most important initial step in identifying a possible contamination problem. The extent of any water damage and mold growth shall be visually assessed. This assessment is important in determining remedial strategies. The use of equipment such as a boroscope, or a moisture meter, to detect moisture in building materials, may be helpful in identifying hidden sources of fungal growth and the extent of water damage.

B. Bulk/Surface Sampling

1. Bulk or surface sampling is not required to undertake a remediation. Remediation of visually identified fungal contamination shall proceed without further evaluation.
2. Bulk or surface samples may need to be collected to identify specific fungal contaminants as part of a medical evaluation if occupants are experiencing symptoms which may be related to fungal exposure or to identify the presence or absence of mold if a visual inspection is equivocal (e.g., discoloration, and staining).
3. An individual trained in appropriate sampling methodology shall perform bulk or surface sampling. Bulk samples shall be collected from visibly moldy surfaces by scraping or cutting materials with a clean tool into a clean plastic bag. Surface samples shall be collected by wiping a measured area with a sterile swab or by stripping the suspect

surface with clear tape. Surface sampling is less destructive than bulk sampling. Other sampling methods may also be available. A laboratory specializing in mycology shall be consulted for specific sampling and delivery instructions.

C. Air Monitoring

1. Air sampling for fungi shall not be part of a routine assessment. This is because decisions about appropriate remediation strategies can usually be made on the basis of a visual inspection. In addition, air-sampling methods for some fungi are prone to false negative results and therefore cannot be used to definitively rule out contamination.
2. Air monitoring may be necessary if there is evidence from a visual inspection or bulk sampling that ventilation systems may be contaminated. The purpose of such air monitoring is to assess the extent of contamination throughout a building. It is preferable to conduct sampling while ventilation systems are operating.
3. Air monitoring may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of such air monitoring is to determine the location and/or extent of contamination.
4. If air monitoring is performed, for comparative purposes, outdoor air samples shall be collected concurrently at an air intake, if possible, and at a location representative of outdoor air. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."
5. Personnel conducting the sampling shall be trained in proper air sampling methods for microbial contaminants. A laboratory specializing in mycology shall be consulted for specific sampling and shipping instructions.

D. Analysis of Environmental Samples

1. Microscopic identification of the spores/colonies requires considerable expertise. These services are not routinely available from commercial laboratories. Documented quality control in the laboratories used for analysis of the bulk/surface and air samples is necessary. The American Industrial Hygiene Association (AIHA) offers accreditation to microbial laboratories (Environmental Microbiology Laboratory Accreditation Program (EMLAP). Accredited laboratories must participate in quarterly proficiency testing (Environmental Microbiology Proficiency Analytical Testing Program (EMPAT)).

E. Evaluation of sulk/surface and air sampling data shall be performed by an experienced health professional. The presence of few or trace amounts of fungal spores in bulk/surface sampling shall be considered background. Amounts greater than this or the presence of fungal fragments (e.g., hyphae, and conidiophores) may suggest fungal colonization, growth, and/or accumulation at or near the sampled location. Air samples shall be evaluated by means of comparison (i.e. indoors to outdoors) and by fungal type (e.g., genera, and species). In general, the levels and types of fungi found should be similar indoors (in non-problem buildings) as compared to the outdoor air. Differences in the levels or types of fungi found in air samples may indicate that moisture sources and resultant fungal growth may be problematic.

3.2 REMEDIATION

A. General

1. In all situations, the underlying cause of water accumulation must be rectified or fungal growth will recur. Any initial water infiltration shall be stopped and cleaned immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. If the source of water is elevated humidity, relative humidity shall be maintained at levels below 60% to inhibit mold growth. Emphasis shall be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur.

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2. Five different levels of abatement are described below. The size of the area impacted by fungal contamination primarily determines the type of remediation. The sizing levels below are based on professional judgment and practicality; currently there is not adequate data to relate the extent of contamination to frequency or severity of health effects. The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of fungi and dust contaminated with fungi from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement. The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. The listed remediation methods are not meant to exclude other similarly effective methods. Any changes to the remediation methods listed in these guidelines, however, shall be carefully considered prior to implementation.
3. Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning shall be done using a detergent solution. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. A professional restoration consultant shall be contacted when restoring porous materials with more than a small area of fungal contamination. All materials to be reused shall be dry and visibly free from mold. Routine inspections shall be conducted to confirm the effectiveness of remediation work.
4. The use of gaseous, vapor-phase, or aerosolized biocides for remedial purposes is not recommended. The use of biocides in this manner can pose health concerns for people in occupied spaces of the building and for people returning to the treated space if used improperly. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."

B. Level 1: Small Isolated Areas (10 sq. ft. or less) – e.g., ceiling tiles, small areas on walls

1. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection shall be worn.
2. The work area shall be unoccupied.
3. Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.
4. Contaminated materials that cannot be cleaned shall be removed from the building in a sealed plastic bag. There are no special requirements for the disposal of moldy materials.
5. The work area and areas used by remedial workers for egress shall be cleaned with a damp cloth and/or mop and a detergent solution.
6. All areas shall be left dry and visibly free from contamination and debris.

C. Level II: Mid-Sized Isolated Areas (10 – 30 sq. ft.) – e.g., individual wallboard panels.

1. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection shall be worn.
2. The work area shall be unoccupied.
3. The work area shall be covered with a plastic sheet(s) and sealed with tape before remediation, to contain dust/debris.
4. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.
5. Contaminated materials that cannot be cleaned shall be removed from the building in sealed plastic bags. There are no special requirements for the disposal of moldy materials.

6. The work area and areas used by remedial workers for egress shall be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air Filter) and cleaned with a damp cloth and/or mop and a detergent solution.
7. All areas shall be left dry and visibly free from contamination and debris.

D. Level III: Large Isolated Areas (30 – 100 sq. ft.) – e.g., several wallboard panels.

1. A health and safety professional with experience performing microbial investigations shall be consulted prior to remediation activities to provide oversight for the project.
2. The following procedures at a minimum are recommended:

   a. Personnel trained in the handling of hazardous materials and equipped with respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection shall be worn.
   b. The work area and areas directly adjacent shall be covered with a plastic sheet(s) and taped before remediation, to contain dust/debris.
   c. Seal ventilation ducts/grills in the work area and areas directly adjacent with plastic sheeting.
   d. The work area and areas directly adjacent shall be unoccupied.
   e. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation are recommended.
   f. Contaminated materials that cannot be cleaned shall be removed from the building in sealed plastic bags. There are no special requirements for the disposal of moldy materials.
   g. The work area and surrounding areas shall be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.
   h. All areas shall be left dry and visibly free from contamination and debris.

3. If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the fungi is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level IV are followed.

E. Level IV: Extensive Contamination (greater than 100 contiguous square feet in an area)

1. A health and safety professional with experience performing microbial investigations shall be consulted prior to remediation activities to provide oversight for the project. The following procedures are recommended:

   a. Personnel trained in the handling of hazardous materials equipped with:

      1) Full-face respirators with high efficiency particulate air (HEPA) cartridges
      2) Disposable protective clothing covering both head and shoes
      3) Gloves

   b. Containment of the affected area:

      1) Complete isolation of work area from occupied spaces using plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings)
      2) The use of an exhaust fan with a HEPA filter to generate negative pressurization
      3) Airlocks and decontamination room

   c. Vacating people from spaces adjacent to the work area is not necessary.
   d. Contaminated materials that cannot be cleaned shall be removed from the building in sealed plastic bags. The outside of the bags shall be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building. There are no special requirements for the disposal of moldy materials.

e. The contained area and decontamination room shall be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.
f. Air monitoring shall be conducted prior to occupancy to determine if the area is fit to reoccupy.

F. Hazard Communication: When fungal growth requiring large-scale remediation is found, the building owner, management, and/or employer shall notify occupants in the affected area(s) of its presence. Notification shall include a description of the remedial measures to be taken and a timetable for completion. Group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals with persistent health problems that appear to be related to bioaerosol exposure should see their physicians for a referral to practitioners who are trained in occupational/environmental medicine or related specialties and are knowledgeable about these types of exposures. Individuals seeking medical attention shall be provided with a copy of all inspection results and interpretation to give to their individual medical practitioners.

END OF SECTION 02 85 00

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SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Form-facing materials.
2. Form liners.
3. Insulating concrete forms.
4. Waterstops.

1.2 DEFINITIONS

A. Form-Facing Material: The temporary form materials that come in direct contact with the concrete as part of the formwork components in supporting the concrete while the concrete is setting and gaining sufficient strength to be self-supporting. The most common materials are steel, aluminum, and wood.

B. Form Lining: Materials used to line the concreting face of formwork to impart a smooth or patterned finish to the concrete surface, to absorb moisture from the concrete, or to apply a set-retarding chemical to the formed surface of the concrete.

C. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction, movement, contraction, and isolation joints
c. Forms and form-removal limitations.
d. Shoring and reshoring procedures.
e. Anchor rod and anchorage device installation tolerances.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.

a. Location of construction joints is subject to approval of Architect.

3. Indicate location of waterstops.
4. Indicate form liner layout and form line termination details.
5. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.
6. Indicate layout of insulating concrete forms, dimensions, course heights, form types, and details.

C. Samples:

1. For waterstops.

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2. For Form Liners: 12- by 12-inch sample, indicating texture.

1.5 INFORMATIONAL SUBMITTALS

A. Research Reports: For insulating concrete forms indicating compliance with ICC's Acceptance Criteria AC353.

B. Field quality-control reports.

C. Minutes of preinstallation conference.

D. Qualification Statements: For testing and inspection agency.

1.6 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Mockups: Formed surfaces to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.

1. Build panel approximately 100 sq. ft. in the location indicated or, if not indicated, as directed by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Form Liners: Store form liners under cover to protect from sunlight.

B. Insulating Concrete Forms: Store forms off ground and under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

a. For architectural concrete specified in Section 03 33 00 "Architectural Concrete," limit deflection of form-facing material, studs, and walers to 0.0025 times their respective clear spans (L/400).

B. Design, engineer, erect, shore, brace, and maintain insulating concrete forms in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

1. Design cross ties to transfer the effects of the following loads to the cast-in-place concrete core:

a. Wind Loads: As indicated on Drawings.

1) Horizontal Deflection Limit: Not more than 1/240 of the wall height.

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2.2 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 03 30 00 "Cast-in-Place Concrete, and as follows:

a. Plywood, metal, or other approved panel materials.
b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

1) APA HDO (high-density overlay).
2) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
3) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
4) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces without spiral or vertical seams not exceeding specified formwork surface class.

1. Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation, with straight or tapered end forms.

E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

2.3 FORM LINERS

A. Form Liners: Architectural finish pattern on the concrete surface can be achieved by attaching form liners to the inside faces of form-facing materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Architectural Polymers, Inc.
b. Fitzgerald Formliners.
c. Sika Corporation.
d. Spec Formliners, Inc.

2. Face Pattern: Smooth.

2.4 INSULATING CONCRETE FORMS

A. Insulating Concrete Forms: Concrete-forming system complying with ASTM E2634, consisting of two panels of insulation connected with cross ties.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amvic Building System.
b. BuildBlock Building Systems, LLC.
c. Nudura Corporation.
d. Fox Blocks; Airlite Plastics Co.

2. Insulation: ASTM C578, Type II, expanded polystyrene.

a. Thickness: Not less than 2-1/2 inches each face.
b. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1) Flame-Spread Index: 25 or less.
2) Smoke-Developed Index: 450 or less.

3. Cross Ties: Polypropylene, with integral reinforcement supports, designed to allow passage of concrete during placement.
4. Core Thickness: 4 inches.

2.5 WATERSTOPS

A. Flexible Rubber Waterstops: U.S. Army Corps of Engineers' CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints, with factory-fabricated corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Williams Products, Inc.

2. Profile: As indicated.
3. Dimensions: 4 by 3/16 inch thick; nontapered.

B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CETCO is a subsidiary of Minerals Technologies Inc.
b. GCP Applied Technologies Inc.
c. Kryton International, Inc.
d. OCM, Inc.
e. Sika Corporation.

2.6 RELATED MATERIALS

A. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Form release agent for form liners to be acceptable to form liner manufacturer.

F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

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2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

G. Sealant: One-part moisture cure silicone sealant used with form liners.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

A. Comply with ACI 301.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 03 30 00 "Cast-in-Place Concrete" for as-cast finishes and Section 03 33 00 "Architectural Concrete."

C. Limit concrete surface irregularities as follows:

1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.

D. Construct forms tight enough to prevent loss of concrete mortar.

1. Minimize joints.
2. Exposed Concrete: Symmetrically align joints in forms.

E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.

1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
3. Install keyways, reglets, recesses, and other accessories, for easy removal.

F. Do not use rust-stained, steel, form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips
2. Use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.

1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
2. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete.

J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

L. Form Liners: Install per manufacturer's written installation instructions and recommended tolerances.

M. Construction and Movement Joints:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.

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2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
3. Place joints perpendicular to main reinforcement.
4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
    a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings.
    a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

N. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

O. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

P. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

Q. Coat contact surfaces of forms with form-release agent, in accordance with manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediately prior to concrete placement.

3.3 INSTALLATION OF WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.
1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 03 30 00 "Cast-in-Place Concrete."
4. Secure waterstops in correct position at 12 inches o.c.
5. Field fabricate joints in accordance with manufacturer's written instructions using heat welding.
    a. Miter corners, intersections, and directional changes in waterstops.
    b. Align center bulbs.
6. Clean waterstops immediately prior to placement of concrete.
7. Support and protect exposed waterstops during progress of the Work.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, in accordance with manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.

1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Protect exposed waterstops during progress of the Work.

3.4 INSTALLATION OF INSULATING CONCRETE FORMS

A. Comply with ACI 301 and manufacturer's written instructions.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Install forms in running bond pattern.

1. Align joints.
2. Align furring strips.

D. Construct forms tight to prevent loss of concrete mortar.

E. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

H. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

I. Shore insulating concrete forms to ensure stability and to resist stressing imposed by construction loads.

3.5 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work.

1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.

2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.6 INSTALLATION OF SHORING AND RESHORING

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.7 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Inspections:

1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

D. Prepare test and inspection reports.

END OF SECTION 03 10 00

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SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction contraction and isolation joints.
c. Steel-reinforcement installation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Epoxy repair coating.
3. Zinc repair material.
4. Bar supports.
5. Mechanical splice couplers.
6. Structural thermal break insulated connection system.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for regional materials.>
3. <Double click here to insert sustainable design text for Type III Environmental Product Declaration.>
4. <Double click here to insert sustainable design text for sourcing of raw materials.>
5. <Double click here to insert sustainable design text for manufacturer inventory.>

C. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

D. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of Architect.

E. Delegated Design Submittal: For structural thermal break insulated connection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For [**delegated design engineer**] [**testing and inspection agency**].

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B. Delegated Design Engineer Qualifications: Include the following:

1. Experience providing delegated design engineering services of the type indicated.
2. Documentation that delegated design engineer is licensed in the [**jurisdiction**] [**state**] in which Project is located.

C. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M.

D. Material Certificates: For each of the following, signed by manufacturers:

1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

E. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

2. Mechanical splice couplers.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency,[**acceptable to authorities having jurisdiction,**] qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

C. Mockups: Reinforcing for cast-concrete formed surfaces, to demonstrate tolerances and standard of workmanship.

1. Build panel approximately [**100 sq. ft. for formed surface**] <**Insert area**> in the location indicated on Drawings or, if not indicated, as directed by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage[**and to avoid damaging coatings on steel reinforcement**].

1. Store reinforcement to avoid contact with earth.
2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
3. Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
4. Do not allow stainless steel reinforcement to come into contact with uncoated reinforcement.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design structural thermal break insulated connection system, including attachment to building construction.

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B. Structural Performance of Structural Thermal Break Insulating Connection System: Structural thermal break insulated connection system to withstand the following loads and stresses:

1. Dead Loads: As indicated on Drawings.

a. Shear Load: As indicated on Drawings.
b. Bending Moment: As indicated on Drawings.

2. Live Loads: As indicated on Drawings.

a. Shear Load: As indicated on Drawings.
b. Bending Moment: As indicated on Drawings.

C. Seismic Performance of Structural Thermal Break Insulated Connection System: Structural thermal break Insulated connection system to withstand the effects of earthquake motions determined according to [**ASCE/SEI 7**] <**Insert requirement**>.

1. Component Importance Factor: <**Insert requirement**>.

2.2 STEEL REINFORCEMENT

A. <Double click here to insert sustainable design text for recycled content.>

1. <Double click to insert sustainable design text for regional materials.>

B. Reinforcing Bars: ASTM A615/A615M, [**Grade 60**] [**Grade 75**] [**Grade 80**] [**Grade 100**], deformed.

C. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.

D. Headed-Steel Reinforcing Bars: ASTM A970/A970M.

E. Galvanized Reinforcing Bars:

1. Steel Bars: [**ASTM A615/A615M, Grade 60**] [**ASTM A615/A615M, Grade 75**] [**ASTM A615/A615M, Grade 80**] [**ASTM A615/A615M, Grade 100**] [**ASTM A706/A706M**], deformed bars.
2. Zinc Coating: ASTM A767/A767M, [**Class I**] [**Class II**] zinc coated after fabrication and bending.

F. Epoxy-Coated Reinforcing Bars:

1. Steel Bars: [**ASTM A615/A615M, Grade 60**] [**ASTM A615/A615M, Grade 75**] [**ASTM A615/A615M, Grade 80**] [**ASTM A615/A615M, Grade 100**] [**ASTM A706/A706M**], deformed bars.
2. Epoxy Coating: [**ASTM A775/A775M**] [**or**] [**ASTM A934/A934M**] with less than 2 percent damaged coating in each 12-inch bar length.

G. Dual-Coated Reinforcing Bars: ASTM A1055/A1055M.

1. Steel Bars: [**ASTM A615/A615M, Grade 60**] [**ASTM A615/A615M, Grade 75**] [**ASTM A615/A615M, Grade 80**] [**ASTM A615/A615M, Grade 100**] [**ASTM A706/A706M**], deformed bars.
2. Zinc Coating: ASTM A1055/A1055M [**Type I**] [**Type II**].
3. Epoxy Coating: [**ASTM A775/A775M**] [**or**] [**ASTM A934/A934M**] with less than 2 percent damaged coating in each 12-inch bar length.

H. Stainless Steel Reinforcing Bars: ASTM A955/A955M, [**Grade 60**] [**Grade 75**], [**Type 304**] [**Type 316L**], deformed.

I. Steel Bar Mats: ASTM A184/A184M, fabricated from [**ASTM A615/A615M, Grade 60**] [**ASTM A615/A615M, Grade 40**] [**ASTM A706/A706M**], deformed bars, assembled with clips.

J. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

K. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

L. Galvanized-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from galvanized-steel wire into flat sheets.

M. Epoxy-Coated Welded-Wire Reinforcement: ASTM A884/A884M, Class A coated, Type 1, [**plain**] [**deformed**] steel.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, ASTM A775/A775M epoxy coated.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
c. For dual-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
d. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
e. For stainless steel reinforcement, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

D. Mechanical Splice Couplers: ACI 318 [**Type 1**] [**Type 2**], same material of reinforcing bar being spliced; [**compression-only type**] [**tension-compression type**] [**dowel-bar type**] [**mechanical-lap type**].

E. Structural Thermal Break Insulated Connection System:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Halfen USA, Inc.

2. Tension Rods: [**Carbon steel with crimped Type 316 stainless steel rods**] [**Carbon steel, welded with ASTM A276/A276M, Type 316 stainless steel**].
3. Shear Reinforcement Rods: [**ASTM A276/A276M, Type 316 stainless steel tube**] [**Carbon steel, welded with ASTM A276/A276M, Type 316 stainless steel bar**].
4. Pressure pads: ASTM A276/A276M, Type 316 stainless steel.
5. Insulation body: Polystyrene.

F. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

1. Finish: [**Plain**] [**Galvanized**] [**ASTM A884/A884M, Class A, Type 1, epoxy coated, with less than 2 percent damaged coating in each 12-inch wire length**].

G. Stainless Steel Tie Wire: ASTM A1022/A1022M, not less than 0.0508 inch in diameter.

H. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.

I. Zinc Repair Material: ASTM A780/A780M.

2.4 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

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PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.
3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

G. Install structural thermal break insulated connection system in accordance with manufacturer's instructions.

H. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

I. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

J. Dual-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

K. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material in accordance with ASTM A780/A780M.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement.

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2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a [**special inspector**] [**and**] [**qualified testing and inspecting agency**] to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel-reinforcement placement.
2. Steel-reinforcement mechanical splice couplers.
3. Steel-reinforcement welding.

D. Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

END OF SECTION 03 20 00

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.
c. Semirigid joint fillers.
d. Vapor-retarder installation.
e. Anchor rod and anchorage device installation tolerances.
f. Cold and hot weather concreting procedures.
g. Concrete finishes and finishing.
h. Curing procedures.
i. Forms and form-removal limitations.
j. Shoring and reshoring procedures.
k. Methods for achieving specified floor and slab flatness and levelness.
l. Floor and slab flatness and levelness measurements.
m. Concrete repair procedures.
n. Concrete protection.
o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
p. Protection of field cured field test cylinders.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement

7. Aggregates.
8. Admixtures:
    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
9. Color pigments.
10. Fiber reinforcement.
11. Vapor retarders.
12. Floor and slab treatments.
13. Liquid floor treatments.
14. Curing materials.
    a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
15. Joint fillers.
16. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
    a. Location of construction joints is subject to approval of the Architect.

D. Samples: For vapor retarder.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

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1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor to be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Field Quality-Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests to be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.

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2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I, gray.
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Silica Fume: ASTM C1240 amorphous silica.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: [**1-1/2 inches**] [**1 inch**] [**3/4 inch**] <**Insert dimension**> nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Lightweight Aggregate: ASTM C330/C330M, [**1-inch**] [**3/4-inch**] [**1/2-inch**] [**3/8-inch**] nominal maximum aggregate size.

E. Air-Entraining Admixture: ASTM C260/C260M.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Euclid Chemical Company (The); a subsidiary of RPM International, Inc.;
2) GCP Applied Technologies Inc.;.
3) MAPEI Corporation;
4) Master Builders Solutions; brand of MBCC Group;.
5) Sika Corporation;.

G. Water and Water Used to Make Ice: ASTM C94/C94M, potable complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.3 FIBER REINFORCEMENT

A. Carbon-Steel-Wire Fiber: ASTM A820/A820M, Type 1, cold-drawn wire, deformed, minimum of 2 inches long, with an aspect ratio of 45 to 50.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bekaert;.
b. Euclid Chemical Company (The); a subsidiary of RPM International, Inc.; .
c. FullForce by ABC Polymer Industries, LLC; .
d. Sika Corporation;.

2.4 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, except with maximum water-vapor permeance of; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Barrier-Bac; Inteplast Group; VB-250.
b. ISI Building Products; Viper® II Under-Slab Vapor Barriers.
c. Raven Industries, Inc; Vapor Block VB10, Class A.
d. Reef Industries, Inc.; <**Insert product designation**>.
e. Stego Industries, LLC; Stego Wrap Vapor Barrier (15-Mil).
f. Tex-Trude; X-TREME 10 Mil.
g. W. R. Meadows, Inc; Perminator 10 mil.

2.5 CURING MATERIALS

A. Water: Potable or complying with ASTM C1602/C1602M.

B. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

1. Products: Subject to compliance with requirements, [**provide the following**] [**provide one of the following**] [**available products that may be incorporated into the Work include, but are not limited to, the following**]:

a. Kaufman Products, Inc; [**DR Cure**] [**ThinFilm 420**].
b. MAPEI Corporation; Mapecure DR.
c. SpecChem, LLC; E Cure.
d. W. R. Meadows, Inc; 1100-CLEAR.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

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2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than [**5000 psi**] <**Insert strength**> at 28 days when tested in accordance with ASTM C109/C109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete,.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Use permeability-reducing admixture in concrete mixtures where indicated.

2.9 CONCRETE MIXTURES

A. Reference structural drawings (sheet S002) for concrete strength and durability requirements.

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2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

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3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

a. Continue reinforcement across construction joints unless otherwise indicated.
b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

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1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

a. Do not use vibrators to transport concrete inside forms.
b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
b. Remove projections larger than 1 inch.

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c. Tie holes do not require patching.
d. Surface Tolerance: ACI 117 Class D.
e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
b. Remove projections larger than 1/4 inch.
c. Patch tie holes.
d. Surface Tolerance: ACI 117 Class B.
e. Locations: Apply to concrete surfaces exposed to public view,.

3. ACI 301 Surface Finish SF-3.0:

a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
b. Remove projections larger than 1/8 inch.
c. Patch tie holes.
d. Surface Tolerance: ACI 117 Class A.
e. Locations: Apply to concrete surfaces exposed to public view,.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

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E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps as indicated on Drawings

1. Apply in accordance with manufacturer's written instructions and as follows:

a. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications.
b. Tamp aggregate flush with surface, but do not force below surface.
c. After broadcasting and tamping, apply float finish.
d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

G. Apply Concrete sealer to janitor and back of house spaces.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 3000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
b. Cast anchor-bolt insert into bases.
c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.

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3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
b. Continuous Sprinkling: Maintain concrete surface continuously wet.
c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

1) Recoat areas subject to heavy rainfall within three hours after initial application.
2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

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a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

d. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

A. Conform to ACI 117.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least [**one**] [**six**] month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

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1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
    a. Limit cut depth to 3/4 inch.
    b. Make edges of cuts perpendicular to concrete surface.
    c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    d. Fill and compact with patching mortar before bonding agent has dried.
    e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
    a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
    a. Correct low and high areas.
    b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
    a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
    a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    b. Feather edges to match adjacent floor elevations.
6. Correct other low areas scheduled to remain exposed with repair topping.
    a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
    b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
    a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
    b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
    c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
    d. Place, compact, and finish to blend with adjacent finished concrete.
    e. Cure in same manner as adjacent concrete.

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8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
    a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    b. Dampen cleaned concrete surfaces and apply bonding agent.
    c. Place patching mortar before bonding agent has dried.
    d. Compact patching mortar and finish to match adjacent concrete.
    e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
        1) Project name.
        2) Name of testing agency.
        3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
        4) Name of concrete manufacturer.
        5) Date and time of inspection, sampling, and field testing.
        6) Date and time of concrete placement.
        7) Location in Work of concrete represented by samples.
        8) Date and time sample was obtained.
        9) Truck and batch ticket numbers.
        10) Design compressive strength at 28 days.
        11) Concrete mixture designation, proportions, and materials.
        12) Field test results.
        13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
        14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.

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3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.
3. Slump Flow: ASTM C1611/C1611M:
    a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for structural lightweight concrete.
    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
    a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C31/C31M:
    a. Cast and laboratory cure two sets of four 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M.
    a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
    b. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:
    a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
        1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.15 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 30 00

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SECTION 03 35 13 - CONCRETE FLOOR FINISHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Finishing slabs on grade and monolithic floor slabs.

B. Surface treatment with concrete hardener and sealer.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Prepared concrete floors ready to receive finish.

B. Section 03 39 00 - Concrete Curing.

1.3 SUBMITTALS

A. Submit floor surface flatness and levelness measurements to determine compliance with specified tolerances.

B. Maintenance Data: Provide data on maintenance renewal of applied coatings.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

1. Maintain one copy on project site.

1.5 DELIVERY, STORAGE, AND HANDLING

1.6 PROJECT CONDITIONS

1.7 FIELD CONDITIONS

A. Maintain ambient temperature of 50 degrees F minimum.

B. Provide ventilation sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

PART 2 - EXECUTION

2.1 TOLERANCES

A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for flatness.

B. Measure for F(F) and F(L) tolerances for floors in accordance with ASTM E1155, within 48 hours after slab installation.

END OF SECTION 03 35 13

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SECTION 03 39 00 - CONCRETE CURING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Initial and final curing of horizontal and vertical concrete surfaces.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

A. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (errata 2007) .

B. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).

1.4 SUBMITTALS

A. Product Data: Provide data on curing compounds, including compatibility of different products and limitations.

1.5 QUALITY ASSURANCE

PART 2 - EXECUTION

2.1 EXAMINATION

2.2 EXECUTION - HORIZONTAL SURFACES

A. Cure floor surfaces in accordance with ACI 308R.

B. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306 for cold-weather protection and ACI 305 for hot-weather protection during curing.

C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq.ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in one coat.

2.3 PROTECTION

END OF SECTION 03 39 00

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SECTION 03 54 13 - GYPSUM CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Self-leveling, gypsum cement underlayment for application below interior floor coverings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum cement underlayment.
2. Reinforcement.
3. Primer.
4. Corrosion-resistant coating.
5. Surface sealer.
6. Sound control mat.

B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Test Reports:

1. For fire-resistant ratings, from a qualified testing agency.
2. For STC-rated assemblies, from a qualified testing agency.
3. For IIC-rated assemblies, from a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

1. Place gypsum cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

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B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

1. STC Rating: As indicated on Drawings.

C. IIC-Rated Assemblies: For IIC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E492 and classified according to ASTM E989 by an independent testing agency.

1. IIC Rating: As indicated on Drawings.

2.2 GYPSUM CEMENT UNDERLAYMENTS

A. Gypsum Cement Underlayment: Self-leveling, gypsum cement product that can be applied in minimum uniform thickness of 7/8 inch to match adjacent floor elevations. The manufacturer recommended minimum is 3/4 inch.

1. Basis-of-Design Products: Subject to compliance with requirements, provide USG Corporation or provide an equivalent product from one of the following:

a. ARDEX Americas;
b. Euclid Chemical Company (The); an RPM company; .
c. Hacker Industries, Inc.;.
d. MAPEI Corporation;.
e. Maxxon Corporation;.
f. Schönox; HPS North America, Inc.;.

2. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C219.
3. Compressive Strength: Not less than 3200 psi at 28 days when tested according to ASTM C472.
4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.

1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

C. Water: Potable and at a temperature of not more than 70 deg F.

D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.

E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

F. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

2.3 ACCESSORIES

A. Sound Control Mat: As required to meet STC and IIC ratings, manufactured by gypsum cement underlayment manufacturer.

1. Basis-of-Design: USG Levelrock SAM-N12.
2. Thickness: 1/8 inch.
3. Minimum Topping: 3/4 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance of the Work.

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B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
2. Fill substrate voids to prevent underlayment from leaking.

B. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.

1. Install underlayment reinforcement recommended in writing by manufacturer.

C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

D. Sound Control Mat: Install sound control materials according to manufacturer's written instructions.

1. Do not install mechanical fasteners that penetrate through the sound control materials.

3.3 INSTALLATION

A. Mix and install underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment installation and for time period after installation recommended in writing by manufacturer.
2. Coordinate installation of components to provide optimum adhesion to substrate and between coats.
3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Install underlayment to produce uniform, level surface.

1. Install a final layer without aggregate to product surface.
2. Feather edges to match adjacent floor elevations.

D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during installation and curing processes.

E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

F. Apply surface sealer at rate recommended by manufacturer.

G. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 INSTALLATION TOLERANCES

A. Finish and measure surface, so gap at any point between gypsum cement underlayment surface and an unleveled, freestanding, 10-foot- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

3.5 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 03 54 13

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SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Clay face brick.
3. Building (common) brick.
4. Stone trim units.
5. Mortar and grout.
6. Steel reinforcing bars.
7. Masonry-joint reinforcement.
8. Ties and anchors.
9. Embedded flashing.
10. Miscellaneous masonry accessories.
11. Masonry-cell fill.

B. Products Installed but not Furnished under This Section:

1. Cast-stone trim in unit masonry.
2. Steel lintels in unit masonry.
3. Steel shelf angles for supporting unit masonry.
4. Cavity wall insulation.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
3. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.[**Show elevations of reinforced walls.**]
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Decorative CMUs, in the form of small-scale units.
2. Pre-faced CMUs.
3. Concrete face brick, in the form of small-scale units.
4. Clay face brick, in the form of straps of five or more bricks.
5. Glazed brick.
6. Glazed structural clay tile.
7. Stone trim.
8. Colored mortar.
9. Weep holes/cavity vents.

D. Samples for Verification: For each type and color of the following:

1. Exposed CMUs.
2. Clay face brick, in the form of straps of five or more bricks.
3. Stone trim.
4. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
5. Weep holes and cavity vents.
6. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C67.

2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 "Quality Requirements" for mockups.

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1. Build sample panels for [**each type of exposed unit masonry construction**] [**typical exterior wall**] [**typical interior wall**] [**typical exterior and interior walls**] in sizes approximately 60 inches long by 48 inches high by full thickness.
2. Build sample panels facing south.
3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
4. Clean one-half of exposed faces of panels with masonry cleaner indicated.
5. Protect approved sample panels from the elements with weather-resistant membrane.
6. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
3. Clean[**one-half of**] exposed faces of mockups with masonry cleaner as indicated.
4. Protect accepted mockups from the elements with weather-resistant membrane.
5. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

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1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such

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defects are exposed in the completed Work[**and will be within 20 feet vertically and horizontally of a walking surface**].

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

a. Products: Subject to compliance with requirements, provide one of the following:

1) ACM Chemistries; RainBloc.
2) BASF Corporation; <**Insert product designation**>.
3) Euclid Chemical Company (The); an RPM company; Eucon Blocktite.
4) GCP Applied Technologies Inc.; Dry-Block.
5) Moxie International; Moxie Shield 1800 Admixture.

C. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.
2. Density Classification: Normal weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.5 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

C. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 03 20 00 "Concrete Reinforcing," and with reinforcing bars indicated.

D. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

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2.6 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing brick complying with ASTM C216.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Grade: SW.
3. Type: FBS.
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C67.
5. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
6. Size (Actual Dimensions): 3-5/8 inches wide by 2-5/8 inches high by 7-5/8 inches long.
7. Application: Use where brick is exposed unless otherwise indicated.
8. Color and Texture: As selected by Architect.

C. Building (Common) Brick: ASTM C62, Grade SW.

1. Size: Match size of face brick.
2. Application: Use where brick is indicated for concealed locations. Face brick complying with requirements for grade, compressive strength, and size indicated for building brick may be substituted for building brick.

2.7 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Colored Cement Products: Packaged blend made from portland cement and hydrated lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Colored Portland Cement-Lime Mix:

a. Products: Subject to compliance with requirements, provide one of the following:

1) Essroc; Riverton Portland Cement Lime Custom Color.
2) Holcim (US) Inc; Rainbow Mortamix Custom Color Cement/Lime.
3) Lafarge North America Inc.; Eaglebond Portland & Lime.
4) Lehigh Hanson; HeidelbergCement Group; Lehigh Custom Color Portland/Lime Cement.

2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.

3. Pigments shall not exceed 10 percent of portland cement by weight.
4. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

E. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C404.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation;.
b. Euclid Chemical Company (The); an RPM company;
c. GCP Applied Technologies Inc..

H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ACM Chemistries; RainBloc for Mortar.
b. BASF Corporation; MasterPel 240MA (Pre-2014: Rheopel Plus Mortar Admixture) or MasterPel 210D (Pre-2014: Rheopel Plus D).
c. Euclid Chemical Company (The); an RPM company; Hydrapel System 2.0/2.5 Mortar Admixture.
d. GCP Applied Technologies Inc.; Dry-Block Mortar Admixture.

I. Water: Potable.

2.8 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dur-O-Wal; a Hohmann & Barnard company; D/A 810, D/A 812 or D/A 817.
b. Heckmann Building Products, Inc.; No. 376 Rebar Positioner..
c. Hohmann & Barnard, Inc; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; Core Lock Rebar Positioner.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Mill- galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: [**0.148-inch**] [**0.187-inch**] diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

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1. Products: Subject to compliance with requirements, provide the following:
    a. Wire-Bond; Ladder 2 Wire Series 200.

E. Masonry-Joint Reinforcement for Multiwythe Masonry:

1. Products: Subject to compliance with requirements, provide the following:
    a. Wire-Bond; Ladder Hook & Eye Series 800 Tab Lock Ladder.
2. Ladder type with one side rod at each face shell of hollow masonry units more than 4 inches wide, plus one side rod at each wythe of masonry 4 inches wide or less.
3. Tab type, either ladder or truss design, with one side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe, but with at least 5/8-inch cover on outside face.
4. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.

F. Masonry-Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, hot-dip galvanized carbon steel continuous wire.

2.9 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
2. Stainless Steel Wire: ASTM A580/A580M, Type 316.
3. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.
4. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
5. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 316.
6. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
7. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.

C. Provide anchors as shown on structural drawings.

D. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
2. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
3. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire ties may be used in interior walls unless otherwise indicated.

2.10 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

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a. Products: Subject to compliance with requirements, provide one of the following:

1) Cheney Flashing Company; Cheney 3-Way Flashing (Sawtooth).
2) Hohmann & Barnard, Inc; MFL-STF Metal Sawtooth Flashing.
3) Keystone Flashing Company, Inc; Keystone 3-Way Interlocking Thruwall Flashing.

4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
7. Fabricate metal drip edges for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam sheds water.
8. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
9. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
10. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
11. Solder metal items at corners.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch.

a. Products: Subject to compliance with requirements, provide one of the following:

1) DuPont de Nemours, Inc.; DuPont Flashing Tape.
2) GCP Applied Technologies Inc.; Vycor Butyl Self Adhered Flashing.
3) Protecto Wrap Company; BT-25 XL.
4) Raven Industries, Inc; Fortress Flashshield.
5) Wire-Bond; Rhino Bond Flashing #4123.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal drip edge.
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

1. Products: Subject to compliance with requirements, provide the following:

a. Mortar Net Solutions; Blok-Flash.

E. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

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1. Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

F. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

G. Termination Bars for Flexible Flashing: Aluminum bars 0.075 inch by 1 inch.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Weep/Cavity Vent Products: Use one of the following unless otherwise indicated:

1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
2. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
    a. Products: Subject to compliance with requirements, provide one of the following:
        1) Advanced Building Products Inc.; Mortar Maze Cell Vent.
        2) Heckmann Building Products, Inc.; No. 85 Cell Vent.
        3) Hohmann & Barnard, Inc; QV Quadro-Vent.
        4) Wire-Bond; Cell Vent (#3601).

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, provide one of the following:
    a. Advanced Building Products Inc.; Mortar Break Mortar Break II.
    b. CavClear/Archovations, Inc.;.
    c. Heckmann Building Products, Inc.; Weep-Thru Mortar Deflector.
    d. Hohmann & Barnard, Inc; Mortar Trap.
    e. Mortar Net Solutions; Mortar Net with Insect Barrier.
    f. Wire-Bond; Cavity Net Cavity Net II.
2. Configuration: Provide one of the following:
    a. Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.
    b. Strips, not less than 1-1/2 inches thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

2.12 MASONRY-CELL FILL

A. Loose-Fill Insulation: Perlite complying with ASTM C549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

B. Lightweight-Aggregate Fill: ASTM C331/C331M.

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2.13 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Diedrich Technologies, Inc.; a Hohmann & Barnard company;.
b. EaCo Chem, Inc.;.
c. PROSOCO, Inc; Sure Klean® 600.

2.14 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.
4. For reinforced masonry, use portland cement-lime mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type S.
4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.
3. Mix to match Architect's sample.
4. Application: Use pigmented mortar for exposed mortar joints with the following units:

a. Clay face brick.
b. Stone trim units.
c. Cast-stone trim units.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:

a. Clay face brick.
b. Stone trim units.
c. Cast-stone trim units.

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F. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

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1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

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I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors [**48 inches**] <**Insert spacing**> o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 43 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.
4. Rake out mortar joints for pointing with sealant.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

E. Cut joints flush where indicated to receive cavity wall insulation unless otherwise indicated.

3.6 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.

B. Provide not less than 1 inch of airspace between back of masonry veneer and face of [**sheathing**] [**insulation**].

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1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.7 MASONRY-CELL FILL

A. Pour lightweight-aggregate fill into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet.

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.8 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at[**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
4. Form open joint full depth of brick wythe and of width indicated, but not less than [**3/8 inch**] [**1/2 inch**] <**Insert minimum width**> for installation of sealant and backer rod specified in Section 07 92 00 "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than [**3/8 inch**] <**Insert minimum width**>.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

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3.10 LINTELS

A. Install steel lintels where indicated.

B. Provide concrete or masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.11 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of [**4 inches**] [**8 inches**], and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.
3. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under water-resistive barrier, lapping at least 4 inches. Fasten upper edge of flexible flashing to sheathing through termination bar.
4. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
5. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 07 92 00 "Joint Sealants" for application indicated.
6. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 07 92 00 "Joint Sealants" for application indicated.
7. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

E. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use specified weep/cavity vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.

4. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

F. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

G. Install cavity vents in head joints in exterior wythes at spacing indicated. Use specified weep/cavity vent products to form cavity vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.12 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level [**B**] [**C**] in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

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3.14 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
8. Clean stone trim to comply with stone supplier's written instructions.
9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.15 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 31 20 00 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 20 00

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING - FROM CATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
3. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
4. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.
5. Division 05 Section "Metal Stairs."
6. Division 13 Section "Metal Building Systems" for structural steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.
3. Column base plates thicker than 2 inches.

D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.

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2. Use ASD; data are given at service-load level.

B. Moment Connections: None.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.
8. For structural-steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. Qualification Data: For qualified Installer and fabricator.

E. Welding certificates.

F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

G. Mill test reports for structural steel, including chemical and physical properties.

H. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

I. Source quality-control reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement [P1] or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

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D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles, M and, S-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B , structural tubing.

F. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.

G. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

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1. Weight Class: Standard, Extra strong, Double-extra strong as indicated on drawings.
2. Finish: Black except where indicated to be galvanized.

H. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

I. Steel Forgings: ASTM A 668/A 668M.

J. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating.

E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Unheaded Anchor Rods: ASTM F 1554, Grade 36

1. Configuration: Straight or Hooked as shown on drawings.
2. Nuts: ASTM A 563 heavy-hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

G. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

H. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: [Plain] [Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

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I. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

J. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

K. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER – Architect to provide paint information

A. Primer: Comply with [Division 09 painting Sections.] [Division 09 Section "High-Performance Coatings."] [Division 09 painting Sections and Division 09 Section "High-Performance Coatings."]

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to either [SSPC-SP 1, "Solvent Cleaning] [SSPC-SP 2, "Hand Tool Cleaning] [SSPC-SP 3, "Power Tool Cleaning]."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.

H. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure

removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.

I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pretensioned, or Slip critical as indicated on drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

C. Fire-Resistance Ratings: Provide prefabricated building column listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for ratings indicated, based on testing according to ASTM E 119.

1. Fire-Resistance Rating: As indicated.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

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2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize all lintels and shelf angles attached to structural-steel.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pretensioned, or Slip critical as indicated on drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

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2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.7 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 05 12 00

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SECTION 05 50 00 - METAL FABRICATIONS

Content Requests:

<Double click here to submit questions, comments, or suggested edits to this Section.>

Access Manufacturer-Provided, AIA MasterSpec-Based Sections:

PART 1 - <Double click here for this Section based on specific manufacturer's products set as Basis-of-Design at ProductMasterSpec.com.>GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Metal ladders.
3. Miscellaneous steel trim.
4. Metal bollards.
5. Downspout guards.
6. Loose bearing and leveling plates.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
3. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Fasteners.
2. Shop primers.
3. Shrinkage-resisting grout.
4. Slotted channel framing.
5. Manufactured metal ladders.
6. Manufactured metal bollards.
7. Downspout guards.

B. Shop Drawings: Show fabrication and installation details.[**Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.**] Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
2. Elevator machine beams, hoist beams, and divider beams.
3. Steel shapes for supporting elevator door sills.
4. Shelf angles.
5. Metal ladders.
6. Elevator pit sump covers.
7. Miscellaneous steel trim including steel edgings and loading-dock edge angles.
8. Metal bollards.
9. Loose steel lintels.
10. Suspended **[pipe] [channel]** grid.

C. Delegated Design Submittals: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for coaxial cable.>
3. <Double click to insert sustainable design text for regional materials.>
4. <Double click here to insert sustainable design text for Health Product Declaration.>
5. <Double click here to insert sustainable design text for sourcing of raw materials.>

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

C. Research Reports: For post-installed anchors.

D. Delegated design engineer qualifications.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design ladders.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

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2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Domestic Origin: Consistent with State Finance and Procurement Article 12-101 and 17-301-17-306, Maryland Annotated Code of Maryland, known as the “Buy American Steel” Act of the General Assembly of Maryland, provide steel manufactured in the United States of America.

C. <Double click here to insert sustainable design text for recycled content.>

D. <Double click to insert sustainable design text for regional materials.>

E. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

F. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.

G. Stainless Steel Bars and Shapes: ASTM A276/A276M, [**Type 304**] [**Type 316L**].

H. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

I. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: [**1-5/8 by 1-5/8 inches**] [**As indicated**] <**Insert size**>.
2. Galvanized Steel: ASTM A653/A653M, [**commercial steel, Type B**] [**structural steel, Grade 33**], with G90 coating; [**0.108-inch**] [**0.079-inch**] [**0.064-inch**] nominal thickness.
3. Cold-Rolled Steel: ASTM A1008/A1008M, [**commercial steel, Type B**] [**structural steel, Grade 33**]; [**0.0966-inch**] [**0.0677-inch**] [**0.0528-inch**] minimum thickness; [**unfinished**] [**coated with rust-inhibitive, baked-on, acrylic enamel**] [**hot-dip galvanized after fabrication**].

K. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

L. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

M. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

N. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

O. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide [**Type 304**] [**Type 316**] stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening aluminum or stainless steel.
2. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.

D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy [**Group 1**] [**Group 2**].

E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

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1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

H. Post-Installed Anchors: chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy [**Group 1**] [**Group 2**] stainless steel bolts, ASTM F593, and nuts, ASTM F594.

I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Division 9 painting specifications.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

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I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.

C. Galvanize miscellaneous framing and supports at exterior locations and interior locations where indicated.

D. Prime miscellaneous framing and supports with primer meeting Division 9 painting specifications.

2.7 METAL LADDERS

A. General:

1. Comply with ANSI A14.3.

B. Steel Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch- diameter, steel bars spaced 12 inches on center.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
    a. Products: Subject to compliance with requirements, provide one of the following:
        1) IKG.
        2) SlipNOT Metal Safety Flooring, division of Traction Technologies Holdings, LLC.
7. Source Limitations: Obtain nonslip surfaces from single source from single manufacturer.
8. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
9. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
    a. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
    b. Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.
10. Galvanize and prime ladders, including brackets.

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11. Prime exterior ladders, including brackets and fasteners, with primer specified in Section 09 96 00 "High-Performance Coatings."

2.8 ELEVATOR PIT SUMP COVERS

A. Fabricate from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.

B. Provide steel angle supports unless otherwise indicated.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim.

D. Prime exterior miscellaneous steel trim with primer specified in Section 09 96 00 "High-Performance Coatings."

2.10 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

1. Cap bollards with 1/4-inch- thick, steel plate with [**flat**] [**sloped**] [**domed**] top.

B. Fabricate bollards with 3/8-inch- thick, steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.

1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Fabricate sleeves for bollard anchorage from steel or stainless steel pipe or tubing with 1/4-inch- thick, steel or stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.

D. Fabricate internal sleeves for removable bollards from Schedule 80 [**steel**] [**stainless steel**] pipe or 1/4-inch wall-thickness [**steel**] [**stainless steel**] tubing with an OD approximately 1/16 inch less than ID of bollards. Match drill sleeve and bollard for 3/4-inch [**steel**] [**stainless steel**] machine bolt.

E. Prime steel bollards with [**zinc-rich primer.**] [**primer specified in Section 09 96 00 "High-Performance Coatings."**]

2.11 DOWNSPOUT GUARDS

A. Fabricate downspout guards from 3/8-inch- thick by 12-inch- wide, steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.

B. Galvanize and prime steel downspout guards.

C. Prime steel downspout guards with primer specified in Section 09 96 00 "High-Performance Coatings."

2.12 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

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B. Galvanize bearing and leveling plates.

C. Prime plates with primer compliant with Division 9 painting specifications.

2.13 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize and prime loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with primer specified in Section 09 96 00 "High-Performance Coatings."

2.14 SUSPENDED CHANNEL GRID

A. Products: Subject to compliance with requirements, provide one of the following:

1. Unistrut Building Systems; Unistrut.
2. Van Huffel Tube Corporation; Power-Strut.
3. Metal Products Division, United States Gypsum; Globe-Strut.
4. Elcen Metal Products Company; Speed-Strut.

B. Materials: Minimum 12 gage galvanized steel channels and fittings to form a grid capable of adequately supporting equipment indicated.

C. Fabrication: Provide suspended grid system complete with all required framing members, fittings, fasteners, threaded rods, closure strips, etc., and designed to accommodate all stationary and rolling loads of equipment.

1. Consult with equipment supplier(s) to determine structural requirements and design system to meet those requirements.
2. When requested by Architect, submit design calculations by suspended grid manufacturer that have been prepared by a licensed structural engineer.

2.15 SUSPENDED PIPE GRID

A. Provide pipe grid where indicated.

B. Pipe grid consists of a set of pipe battens installed (in plan) perpendicular to the joists.

C. Individual pipe battens in each set to be located on 6-foot centers.

D. Rest end of pipe battens on a shelf angle (3 inches x 2 inches) on sides that have masonry wall and secure in place by means of “U” bolts at ends of all pipes.

E. Rigidly support pipe grid by means of 1/2 inch threaded rods located on centers that shall not exceed 8 feet.

F. Assemble entire grid into a unit structure.

G. Pipe battens that compose the grid consist of 1-1/2 inch Schedule 40 black pipe with battens spanning from wall to wall or spanning dimensions indicated on the drawings.

H. Connect hangers to the overhead structure; hangers provide at each joist where joist crosses the line of the pipe batten.

I. Finish: Field primed and painted, color as selected by the Architect.

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2.16 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.17 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.18 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items[**not indicated to be galvanized**] unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime according to appropriate system in Division painting specifications.

D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Uncoated Steel Items Indicated to Receive Primers: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
4. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.19 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

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1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for [**ceiling hung toilet partitions**] [**operable partitions**] [**overhead doors**] [**and**] [**overhead grilles**] securely to, and rigidly brace from, building structure.

C. Anchor shelf angles securely to existing construction with anchor bolts.

D. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

3.3 INSTALLATION OF SHELF ANGLES

A. Install shelf angles as required to keep masonry level, at correct elevation, and flush with vertical plane.

3.4 INSTALLATION OF METAL LADDERS

A. Secure ladders to adjacent construction with the clip angles attached to the stringer.

B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

3.5 INSTALLATION OF ELEVATOR PIT SUMP COVERS

A. Install tops of elevator sump pit cover plates and frames flush with finished surface. Adjust as required to avoid lippage that could present a tripping hazard.

3.6 INSTALLATION OF MISCELLANEOUS STEEL TRIM

A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.7 INSTALLATION OF METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

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B. Anchor bollards to existing construction with anchor bolts. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.

1. Embed anchor bolts at least 4 inches in concrete.

C. Anchor bollards in concrete in formed or core-drilled holes not less than 42 inches deep and 3/4 inch larger than OD of bollard. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

3.8 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.9 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

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SECTION 05 51 13 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs.

1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
2. Deliver such items to project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.

1.3 ACTION SUBMITTALS

A. Product Data: For metal pan stairs and the following:

1. Prefilled metal-pan-stair treads.
2. Shop primer products.
3. Grout.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.

C. Delegated Design Submittal: For stairs,, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the State of Maryland in which Project is located.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

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1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design stairs,, including attachment to building construction.

B. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

C. Seismic Performance of Stairs: Metal stairs withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Galvanized Steel Sheet: ASTM A653/A653M, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls.

1. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts.

D. Post-Installed Anchors: chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

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1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Shop Primers: Provide primers that comply with Division 9 painting specifications.

C. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

D. Prefilled Concrete Treads:

1. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with minimum 28-day compressive strength of 3000 psi and maximum aggregate size of 1/2 inch unless otherwise indicated.
2. Plain Steel Welded-Wire Reinforcement: ASTM A1064/A10645M, steel, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated on Drawings.
3. Reinforcement Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening welded-wire reinforcement in place.

    a. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish # 3 - Partially dressed weld with spatter removed.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

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1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that will be exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.6 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Stringers: As indicated on Drawings.
    a. Stringer Size: As required to comply with "Performance Requirements" Article.
    b. Provide closures for exposed ends of channel and rectangular tube stringers.
    c. Finish: Galvanized; field painted.
2. Platforms: Construct steel channel headers and miscellaneous framing members as indicated on Drawings.
    a. Provide closures for exposed ends of channel and rectangular tube framing.
    b. Finish: Galvanized; field painted.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.
    a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

1. Galvanized Steel Sheet: Galvanized steel sheet.
2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
4. Shape metal pans to include nosing integral with riser.
5. Provide stair assemblies with metal pan subtreads filled with reinforced concrete during fabrication.

2.7 FINISHES

A. Finish metal stairs after assembly.

B. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to surfaces of metal stair components. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF METAL PAN STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.

1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.

a. Clean bottom surface of plates.
b. Set plates for structural members on wedges, shims, or setting nuts.
c. Tighten anchor bolts after supported members have been positioned and plumbed.
d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.

1) Neatly finish exposed surfaces; protect grout and allow to cure.
2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Comply with requirements for welding in "Fabrication, General" Article.

F. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete.
2. Center nosings on tread width.

3.3 REPAIR

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

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a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 05 51 13

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SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel railings.
2. Stainless steel handrails.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of mechanically connected railings.
2. Fasteners.
3. Post-installed anchors.
4. Handrail brackets.
5. Shop primer.
6. Intermediate coats and topcoats.
7. Bituminous paint.
8. Nonshrink, nonmetallic grout.
9. Metal finishes.
10. Paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

a. Show method of connecting and finishing members at intersections.

E. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For delegated design professional engineer and testing agency.

B. Welding certificates.

C. Mill Certificates: Signed by manufacturers of stainless steel products, certifying that products furnished comply with requirements.

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D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

E. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

F. Research Reports: For post-installed anchors, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

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2.3 STEEL RAILINGS

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Tubing: ASTM A500/A500M (cold formed).

C. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

D. Plates, Shapes, and Bars: ASTM A36/A36M.

E. Cast Iron Fittings: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.4 STAINLESS STEEL HANDRAILS

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Tubing: ASTM A554, Grade MT 304.

C. Pipe: ASTM A312/A312M, Grade TP 304.

D. Castings: ASTM A743/A743M, Grade CF 8 or CF 20.

E. Plate and Sheet: ASTM A240/A240M or ASTM A666, Type 304.

2.5 FASTENERS

A. Fastener Materials:

1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
3. Stainless Steel Railing Components: Type 304 stainless steel fasteners.
4. Finish exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.6 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Cast stainless steel, center of handrail 3-1/4 inches from wall.

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1. Basis-of-Design: Wagner RB34130.4 Handrail Bracket or equal.

B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

D. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Shop Primers: Provide primers that comply with Division 9 painting specifications.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.7 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.
2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water.

1. Provide weep holes where water may accumulate.
2. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with spring hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.

H. Welded Connections - Steel Railing and Guardrails: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. Open Stairs:

    a. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint

5. Enclosed Stairs:

    a. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 welds; good appearance, completely sanded joint, some undercutting and pinholes okay.

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6. Nonwelded Connections - Stainless Steel Handrail: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
7. Fabricate splice joints for field connection, using an epoxy structural adhesive, if this is manufacturer's standard splicing method.

I. Form changes in direction as follows:

1. As detailed.
2. By bending to smallest radius that will not result in distortion of railing member.

J. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
2. Coordinate anchorage devices with supporting structure.

O. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.8 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
4. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner and as follows.

1. Comply with SSPC-SP 16.

D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, hot-dip galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:

1. Exterior Railings: SSPC-SP 6/NACE No. 3.
2. Railings Indicated To Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3.

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3. Railings Indicated To Receive Primers Specified in Section 09 96 00 "High-Performance Coatings": SSPC-SP 6/NACE No. 3.
4. Other Railings: SSPC-SP 3.

F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

G. Field paint galvanized railings with coatings specified in Section 09 96 00 “High Performance Coatings”.

2.9 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces.
3. Remove embedded foreign matter and leave surfaces chemically clean.

C. Stainless Steel Pipe and Tubing Finishes:

1. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.

D. Stainless Steel Sheet and Plate Finishes:

1. Directional Satin Finish: ASTM A480/A480, No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

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3.3 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.

C. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

A. Anchor railing ends to concrete and masonry with sleeves concealed within railing ends and anchored to wall construction with anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and connected to railing ends, using nonwelded connections.

C. Attach handrails to walls with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

D. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed partitions, fasten brackets directly to concealed steel reinforcements, using self-tapping screws of size and type required to support structural loads; refer to Division 9 Section 09 22 16, “Non-Structural Metal Framing,” for engineered metal backing plates.

3.6 REPAIR

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

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3.7 CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 13

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SECTION 05 73 00 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Railing and guardrail assemblies.

B. Playground fencing.

1.2 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Supports.

1.3 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2010.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2012.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2012.

D. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements; 2010.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver railing materials in factory provided protective coverings and packaging.

B. Protect railing materials against damage during transit, delivery, storage, and installation at site.

PART 2 - PRODUCTS

2.1 RAILING SYSTEMS

A. Railings - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.

1. Design Criteria: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
4. Field Connections: Provide sleeves to accommodate site assembly and installation.

2.2 MATERIALS

A. Aluminum Components: ASTM B221/B221M.

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1. High Performance Organic Finish: AAMA 2604; multiple coats, thermally cured fluoropolymer system.

2.3 ACCESSORIES

A. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

1. For anchorage to stud walls, provide backing plates for bolting anchors.
2. Posts: Provide adjustable flanged brackets.
3. Exposed Fasteners: No exposed bolts or screws.

B. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 0.015 inch dry film thickness per coat..

C. Finish Touch-Up Materials: As recommended by manufacturer for field application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate and site conditions are acceptable and ready to receive work.

B. Verify field dimensions of locations and areas to receive work.

C. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates and supports for attachment of anchors.

3.2 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.

B. Anchor securely to structure.

C. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

D. Isolate dissimilar materials with bituminous coating, bushings, grommets or washers to prevent electrolytic corrosion.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.4 PROTECTION

A. Protect installed components and finishes from damage after installation.

B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.

END OF SECTION 05 73 00

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood products.
2. Wood-preservative-treated lumber.
3. Fire-retardant-treated lumber.
4. Dimension lumber framing.
5. Miscellaneous lumber.
6. Plywood backing panels.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

D. Lumber grading agencies, and abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

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1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
4. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 19 percent.
2. See Structural drawings for more information.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1, Use categories as follows:

1. UC1: Interior construction not in contact with ground or subject to moisture. Include the following items:

    a. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
    b. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
    c. Wood floor plates that are installed over concrete slabs-on-grade.
    d. Wood furniture.
    e. Wood millwork.

2. UC2: Interior construction not in contact with ground but may be subject to moisture. Include the following items:

    a. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
    b. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
    c. Wood floor plates that are installed over concrete slabs-on-grade.
    d. Wood millwork.
    e. Wood flooring.
    f. <**Insert item**>.

3. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
4. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
5. After treatment, redry dimension lumber to 19 percent maximum moisture content.

B. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

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2.3 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions by Grade: Construction, Stud, or No. 3 grade.

1. Application: All interior partitions.
2. Species:

a. Hem-fir (north); NLGA.
b. Southern pine or mixed southern pine; SPIB.
c. Spruce-pine-fir; NLGA.
d. Hem-fir; WCLIB, or WWPA.
e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
f. Northern species; NLGA.
g. Eastern softwoods; NeLMA.
h. Western woods; WCLIB or WWPA.

B. Load-Bearing Partitions by Grade: See structural drawings.

C. Load-Bearing Partitions by Performance: See structural drawings.

2.4 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine or southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. Roofing Nailers: Structural- or No. 2-grade lumber or better; kiln-dried Douglas fir, southern pine, or wood having similar decay-resistant properties.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, in thickness indicated or, if not indicated, not less than [**1/2-inch**] [**3/4-inch**] nominal thickness.

2.6 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

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1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on [**ICC-ES AC01**] [**ICC-ES AC58**] [**ICC-ES AC193**] [**or**] [**ICC-ES AC308**] as appropriate for the substrate.

2.7 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets:

1. Self-adhering sheet consisting of 64 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not

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inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.

3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

M. Securely attach roofing nailers to substrates by anchoring and fastening to withstand bending, shear, or other stresses imparted by Project wind loads and fastener-resistance loads as designed in accordance with ASCE/SEI 7.

N. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Attach wood roofing nailers securely to substrate to resist the designed outward and upward wind loads indicated on Drawings and in accordance with ANSI/SPRI ED-1, Tables A6 and A7.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 INSTALLATION OF WOOD FURRING

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Gypsum Board or Plaster Lath: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

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3.4 INSTALLATION OF WALL AND PARTITION FRAMING

A. Follow structural drawings.

3.5 INSTALLATION OF FLOOR JOIST FRAMING

A. See structural drawings.

3.6 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

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SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Subflooring and underlayment.
5. Sheathing joint-and-penetration treatment materials.

B. Related Requirements: Refer to Section 06 16 43 “Gypsum Sheathing” for non-structural exterior wall sheathing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.3 ACTION SUBMITTALS

A. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

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1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Emissions: Products are to meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

C. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
3. Design Value Adjustment Factors: Treated lumber plywood is to be tested in accordance with ASTM D5516 and design value adjustment factors are to be calculated in accordance with ASTM D6305. Span ratings after treatment are to be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment

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is indicated, span ratings for temperatures up to 170 deg F are to be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Product: FRT sheathing provided must comply with UL listing shown in drawings.

F. Application: Treat plywood indicated on Drawings.

1. .
2.

2.5 WALL SHEATHING

A. Plywood Sheathing, Walls: As shown on structural drawings. Oriented-Strand-Board Sheathing, Walls: As shown on structural drawings. Cementitious Backer Units, Walls: ASTM C1325, Type A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C-Cure.
b. Custom Building Products.
c. Fin Pan.
d. US Gypsum Company.

2. Thickness: As indicated.

2.6 ROOF SHEATHING

2.7 Plywood Sheathing, Roofs: As shown on structural drawings. Oriented-Strand-Board Sheathing, Roofs: As shown on structural drawings. PARAPET SHEATHING

2.8 Plywood Sheathing, Parapets: As shown on structural drawings. SUBFLOORING AND UNDERLAYMENT

2.9 Plywood Subflooring: As shown on structural drawings. Oriented-Strand-Board Subflooring: As shown on structural drawings. FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
2. For [**roof**] [**parapet**] [**and**] [**wall**] sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of

sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

2.10 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

2.11 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall parapet and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Combination Subfloor-Underlayment:

a. Glue and nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

2. Subflooring:

a. Glue and nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

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3. Wall and Roof Sheathing:

   a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch apart at edges and ends.

4. Underlayment:

   a. Nail to subflooring.
   b. Space panels 1/32 inch apart at edges and ends.
   c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

3.3 INSTALLATION OF CEMENTITIOUS BACKER UNITS

A. Install panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

END OF SECTION 06 16 00

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SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood products.
2. Preservative-treated lumber.
3. Fire-retardant-treated lumber.

1.2 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For wood-preservative-treated lumber, metal-plate connectors, metal truss accessories, and fasteners.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification from treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.

B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
6. Show splice details and bearing details.

C. Delegated Design Submittals: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For metal connector-plate manufacturer.

B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.

C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.

D. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated lumber.
2. Fire-retardant-treated wood.
3. Metal-plate connectors.
4. Metal truss accessories.

1.5 QUALITY ASSURANCE

A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
3. Provide for air circulation around stacks and under coverings.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design metal-plate-connected wood trusses.

B. Structural Performance: Metal-plate-connected wood trusses are to be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

1. Design Loads: As indicated.
2. Maximum Deflection under Design Loads: refer to structural drawings.

C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.

D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 WOOD PRODUCTS

A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S.
4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for bottom chords.

C. Minimum Specific Gravity for Top Chords: 0.50.

D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 06 10 00 "Rough Carpentry."

2.3 PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed trusses indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat trusses where indicated on Drawings.

2.4 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products according to test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201 at 92 percent relative humidity. Use for interior locations where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber is to be tested in accordance with ASTM D5664, and design value adjustment factors is to be calculated in accordance with ASTM D6841. For enclosed roof framing and framing in attic spaces, and where high-temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.

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D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

E. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:

1. Floor trusses.
2. Roof trusses.

2.5 METAL CONNECTOR PLATES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpine, a division of ITW Inc.
2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
3. Eagle Metal Products.
4. MiTek Industries, Inc.

B. Fabricate connector plates to comply with TPI 1.

C. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

1. Use for interior locations unless otherwise indicated.

D. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, [**Type 304**] [**Type 316**], and not less than 0.035 inch thick.

1. Use for exterior locations[**, wood-preservative-treated lumber,**] [**fire-retardant treated lumber,**] and where indicated.

2.6 FASTENERS

A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners [**with hot-dip zinc coating complying with ASTM A153/A153M**] [**of Type 304 stainless steel**].

B. Nails, Brads, and Staples: ASTM F1667.

2.7 METAL FRAMING ANCHORS AND ACCESSORIES

A. Allowable design loads, as published by manufacturer, are to comply with or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

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C. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 316.

1. Use for exterior locations and where indicated.

E. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to one side of truss, top plates, and side of stud below.

F. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, top plates, and one side of stud below.

G. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

H. Floor Truss Hangers: U-shaped hangers, full depth of floor truss, with 1-3/4-inch- long seat; formed from metal strap 0.062 inch thick with tabs bent to extend over and be fastened to supporting member.

I. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

J. Drag Strut Connectors: Angle clip with one leg extended for fastening to the side of girder truss.

1. Angle clip is 3 by 3 by 0.179 by 8 inches with extended leg 8 inches long. Connector has galvanized finish.
2. Angle clip is 3 by 3 by 0.239 by 10-1/2 inches with extended leg 10-1/2 inches long. Connector has painted finish.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

2.9 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.10 SOURCE QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.

1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.

2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.

B. Correct deficiencies in Work that special inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

1. Install bracing to comply with Section 06 10 00 "Rough Carpentry."
2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

J. Install wood trusses within installation tolerances in TPI 1.

K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

L. Replace wood trusses that are damaged or do not comply with requirements.

1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

C. Repair damaged galvanized coatings on exposed surfaces in accordance with ASTM A780/A780M and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections to verify that temporary installation restraint/bracing and the permanent individual

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truss member restraint/bracing are installed in accordance with the approved truss submittal package.

END OF SECTION 06 17 53

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SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim, door frames, casings, moldings.

1.2 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

C. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
3. Provide data on fire retardant treatment materials and application instructions.
4. Provide instructions for attachment hardware and finish hardware.

B. Samples: For each exposed product and for each color and texture specified.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom grade.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

C. Protect work from moisture damage.

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1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

C. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated adjacent components.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber, mark grade stamp on end or back of each piece.

B. Hardboard: ANSI A135.4.

C. Hardwood Plywood: HPVA HP-1, Grade AA, Type II; Veneer core, type of glue recommended for application; Maple face species, rotary cut.

D. MDF: ANSI A208.2, Grade 130.

E. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

1. Color: As selected by Architect from manufacturer's full range.

F. Plastic Laminate Materials:

1. Plastic Laminate: NEMA LD 3, HGS; color as selected by Architect; textured, low gloss finish.
2. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.
3. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.

G. Quality Grade: Unless otherwise indicated, provide products of quality specified by AWI/AWMAC/WI Architectural Woodwork Standards for Custom Grade.

H. Composite Wood and Agrifiber Products (installed within the building envelope): No added urea formaldehyde.

I. Laminating Adhesives (installed within the building waterproofing envelope): No added urea formaldehyde.

J. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

K. Wood fabricated from old growth timber is not permitted.

2.2 INTERIOR TRIM

A. Lumber Trim for Opaque Finish (Painted Finish):

1. Species and Grade:
    a. Eastern white pine; NeLMA or NLGA D Select.
    b. Idaho white, lodgepole, ponderosa, radiata, or sugar pine; NLGA or WWPA D Select (Quality).
    c. Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; NeLMA, NLGA, or WWPA D Select (Quality).
    d. White woods; WWPA D Select.
    e. Douglas fir-larch or Douglas fir south; NLGA, WCLIB, or WWPA Prime or D finish.
    f. Spruce-pine-fir; NeLMA, NLGA, WCLIB, or WWPA 2 Common.
    g. Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; NHLA A Finish.
2. Maximum Moisture Content for Softwoods: 19 percent with at least 85 percent of shipment at 12 percent or less.
3. Maximum Moisture Content for Hardwoods: 13 percent.
4. Finger Jointing: Not allowed.
5. Face Surface: Surfaced (smooth).
6. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

B. Moldings for Opaque Finish (Painted Finish): Made to patterns included in MMPA's "WM/Series Softwood Moulding Patterns."

1. Softwood Moldings: MMPA WM 4, P grade.
    a. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
    b. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
2. Hardwood Moldings: MMPA WM 4, P-grade.
    a. Species: Aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar.
    b. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Allowed.
4. Optional Material: Primed MDF.
5. Base Pattern: WM 750, 9/16-by-4-1/4-inch beaded-edge base at units. WM-750, 9/16-by-5-1/4 inch beaded-edge base at common areas.
6. Shoe-Mold Pattern: WM 129, 7/16-by-11/16-inch quarter-round shoe mold.
7. Casing Pattern: WM 472, 9/16-by-2-1/4-inchbeaded-edge casing.

2.3 PANELING

A. Board Paneling, MMPA: Interior wood-board paneling complying with MMPA WM 9.

1. Species: PFJ board.
2. Grade: Finger jointed.
3. Maximum Moisture Content: 9 percent.
4. Pattern: As indicated in drawings. Batten to be ½-by-3-1/2 inch PFJ board.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Comply with VOC limits in Section 01 61 16.

C. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

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D. Primer: Alkyd primer sealer.

E. Wood filler: Solvent base, tinted to match surface finish color.

2.5 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:

1. Interior standing and running trim, except shoe and crown molds.
2. Wood-board paneling.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

C. Shop assemble work for delivery to site, permitting passage through building openings.

D. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

E. Cap exposed plastic laminate finish edges with 3mm polyvinylchloride (PVC) machine applied with hot melt adhesive inside/outside length radiused corner radiused and buffed.

1. Color selection for PVC edging will be made at a later date; Architect reserves the right to select colors manufactured and offered by Woodtape Edge Banding (at no additional cost to the Owner), when a standard selection offered by the casework manufacturer does not provide a suitable color in the Architect's opinion.

F. Shop prepare and identify components for book match grain matching during site erection.

G. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

H. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

I. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

2.6 SHOP FINISHING

A. Apply wood filler in exposed nail and screw indentations.

B. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 – Finishing for grade specified and as follows:

1. Transparent: Conversion varnish (formerly TR-4).
2. Opaque: Catalyzed polyurethane (formerly OP-6).

D. Back prime woodwork items to be field finished, prior to installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

D. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

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E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

C. Install work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards requirements for grade indicated.

D. Set and secure materials and components in place, plumb and level.

E. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.4 INSTALLATION OF INTERIOR TRIM

A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.

1. Do not use pieces less than 24 inches long, except where necessary.
2. Stagger joints in adjacent and related standing and running trim.
3. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
4. Use scarf joints for end-to-end joints.
5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
7. Install trim after gypsum-board joint finishing operations are completed.
8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements.

1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

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B. Adjust joinery for uniform appearance.

3.6 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Before installation, prime pain surfaces of items or assemblies to be in contact with cementitious materials.

3.7 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces.

B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.8 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.9 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 06 20 23

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SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim.
2. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
3. Millwork.
4. Shop priming of interior architectural woodwork indicated for opaque finish.
5. Shop finishing of interior architectural woodwork, including millwork; it is the intent that all exposed work of this section including, but not limited, to trim and filler panels be shop finished and not field finished.
6. Upholstered seating.

B. Definition: Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation and includes items referred to as "millwork."

1.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.
4. Cabinet hardware and accessories.
5. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
6. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for regional materials.>
3. <Double click to insert sustainable design text for certified wood.>
4. <Double click to insert sustainable design text for adhesives.>
5. <Double click to insert sustainable design text for composite wood.>

C. Shop Drawings:

1. Include the following:

   a. Dimensioned plans, elevations, and sections.
   b. Attachment details.

2. Show large-scale details.

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3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
4. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in architectural woodwork.
5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
6. Apply AWI Quality Certification Program label to Shop Drawings.

D. Samples: For each exposed product and for each shop-applied color and finish specified.

1. Size:

a. Panel Products: 12 inches by 12 inches.
b. Lumber Products: Not less than 5 inches wide by 24 inches long, for each species and cut, finished on one side and one edge.

E. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 5 inches wide by 24 inches long, for each species and cut, finished on one side and one edge.
2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished interior architectural woodwork.
3. Plastic laminates, 8 by 10 inches (), for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
4. Solid-surfacing materials, 6 inches () square.
5. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For architectural woodwork manufacturer.

B. Product Certificates: For the following:

1. Composite wood and agrifiber products.
2. Adhesives.

C. Evaluation Reports: For fire-retardant-treated wood materials, from ICC-ES.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
2. Installer Qualifications: Manufacturer of products.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical interior architectural woodwork as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Upholstered Seating Mockup: Complete one section of upholstered seating for approval before continuing production of remaining sections.

D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Architectural Woodwork Standards, Section 2.

B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.

C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.

a. This project has been registered with AWI as AWI Quality Certification Program Number <**Insert number**>.

B. <Double click to insert sustainable design text for regional wood materials.>

C. <Double click to insert sustainable design text for certified wood.>

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2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: Custom.

B. Hardwood Lumber:

1. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork or flush doors located in same area of building unless otherwise indicated.
2. Wood Moisture Content: 5 to 10 percent.
3. For trim items other than base wider than available lumber, use veneered construction. Do not glue for width.

2.3 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Architectural Woodwork Standards Grade: Custom.

1. Wood Species: Any closed-grain hardwood.
2. Wood Moisture Content: 5 to 10 percent.

2.4 HARDWOOD SHEET MATERIALS

A. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of the Architectural Woodwork Standards for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.5 FIRE-RETARDANT-TREATED WOOD MATERIALS

A. Fire-Retardant-Treated Wood Materials: Where fire-retardant-treated materials are indicated, use materials complying with requirements that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products according to test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of the Architectural Woodwork Standards. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. For items indicated to receive a stained, transparent, or natural finish, use organic resin chemical formulation.
3. Mill lumber before treatment, and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.

2.6 SURFACING MATERIALS

A. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Available Manufacturers: Subject to compliance with requirements, provide products from one of the following:
    a. Formica Corporation.
    b. Lamin-Art, Inc.
    c. Nevamar Company, LLC; Decorative Products Div.
    d. Wilsonart International; Div. of Premark International, Inc.
2. Colors and Patterns: As indicated by manufacturer's designations in Finish Schedule on Drawings.

B. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Available Manufacturers: Subject to compliance with requirements, provide products from one of the following:
    a. E. I. du Pont de Nemours and Company.
    b. Formica Corporation.
    c. LG Hausys.
    d. Meganite Inc.; a division of the Pyrochem Group.
    e. Nevamar Company, LLC; Decorative Products Div.
    f. Wilsonart International; Div. of Premark International, Inc.
2. Colors and Patterns: As indicated by manufacturer's designations in Finish Schedule on Drawings.

2.7 MISCELLANEOUS MATERIALS

2.8 FABRICATION

A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

1. Ease edges to radius indicated for the following:
    a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
    b. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
    a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
    b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.9 WOOD-VENEER-FACED ARCHITECTURAL CABINETS FOR TRANSPARENT FINISH

A. AWI Grade: Premium for reception desks; custom for other millwork.

B. Cabinet and Door and Drawer Front Interface Style: Flush overlay unless otherwise indicated on Drawings.

C. Type of Construction: Type B, Face Frame.

D. Wood Species and Cut for Exposed Surfaces:

1. Species: Northern White Maple.
2. Cut: Quarter cut/quarter sawn.

3. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
4. Matching of Veneer Leaves: Book match.
5. Vertical Matching of Veneer Leaves: End match.
6. Veneer Matching within Panel Face: Center-balance match.
7. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.

E. Semi-Exposed Surfaces: Provide surface materials indicated below:

1. Surfaces Other Than Drawer Bodies: Compatible species to that indicated for exposed surfaces, stained to match.
2. Drawer Sides and Backs: Solid-hardwood lumber, same species indicated for exposed surfaces Solid-hardwood lumber, stained to match species indicated for exposed surfaces.
3. Drawer Bottoms: Hardwood plywood.

2.10 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Grade: Custom.

B. Cabinet, Door, and Drawer Front Interface Style: Flush overlay unless otherwise indicated on Drawings.

C. Type of Construction: Face Frame.

D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Vertical Surfaces: Grade HGL.
3. Edges: PVC edge banding, 0.12-inch () thick, matching laminate in color, pattern, and finish.

E. Materials for Semi-Exposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
    a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12-inch () thick, matching laminate in color, pattern, and finish.
    b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
2. Drawer Sides and Backs: Thermoset decorative panels.
3. Drawer Bottoms: Thermoset decorative panels.

F. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces (If required): High-pressure decorative laminate, Grade BKL.

G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from laminate manufacturer's full range.

2.11 SHOP PRIMING

A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.

B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 09 91 23 "Interior Painting."

1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

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2.12 SHOP FINISHING

A. Finish interior architectural woodwork with transparent finish at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Same as item to be finished.
2. Finish: System - 10, UV Curable, Water Based.
3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
4. Staining: Match Architect's sample.
5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
6. Filled Finish for Open-Grain Woods: After staining, apply wash-coat sealer and allow to dry. Apply paste wood filler and wipe off excess. Tint filler to match stained wood.
7. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter according to ASTM D523.

D. Opaque Finish:

1. Architectural Woodworking Standards Grade: Same as item to be finished.
2. Finish: System - 10, UV Curable, Water Based.
3. Color: As selected by Architect from manufacturer's full range.
4. Sheen: Semigloss, 46-60 gloss units measured on 60-degree gloss meter according to ASTM D523.

2.13 UPHOLSTERED SEATING

A. A. Regulatory Requirements:

1. Upholstered furniture shall meet the requirements of Sections 805.2.1.1 through 805.2.1.3.

a. Upholstered furniture shall be shown to resist ignition by cigarettes as determined by tests conducted in accordance with one of the following: (a) mocked-up composites of the upholstered furniture shall have a char length not exceeding 1.5 inches (38 mm) when tested in accordance with NFPA 261 or (b) the components of the upholstered furniture shall meet the requirements for Class I when tested in accordance with NFPA 260.

b. Upholstered furniture shall have limited rates of heat release when tested in accordance with ASTM E 1537 or California Technical Bulletin 133, as follows:

1) The peak rate of heat release for the single upholstered furniture item shall not exceed 80 kW.

a) Exception: Upholstered furniture in rooms or spaces protected by an approved automatic sprinkler systeminstalled in accordance with Section 903.3.1.1.

2) The total energy released by the single upholstered furniture item during the first 10 minutes of the test shall not exceed 25 MJ.

a) Exception: Upholstered furniture in rooms or spaces protected by an approved automatic sprinkler systeminstalled in accordance with Section 903.3.1.1.

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c. Upholstered furniture shall bear the label of an approved agency, confirming compliance with the requirements of Sections 805.2.1.1 and 805.2.1.2.

B. Construction:

1. Padding: Upholstered polyurethane foam and Dacron over removable panel.
2. Upholstery: Refer to Finish Schedule for selection.
3. Attachment: Velcro type.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.

B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.

C. Install interior architectural woodwork level, plumb, true in line, and without distortion.

1. Shim as required with concealed shims.
2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.

F. Fire-Retardant-Treated Wood: Install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.

1. Secure with countersunk, concealed fasteners and blind nailing.
2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
3. For shop-finished items, use filler matching finish of items being installed.

H. Standing and Running Trim:

1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
2. Do not use pieces less than 60 inches long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with latex sealant, painted to match wall.
5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

I. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

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1. Install cabinets with no more than 1/8 inch in 96-inch () sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches () o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish or toggle bolts through metal backing or metal framing behind wall finish.

3.3 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

1. Inspection entity shall prepare and submit report of inspection.

3.4 REPAIR

A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade.

B. Where not possible to repair, replace defective woodwork.

C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.

1. Fill nail holes with matching filler where exposed.
2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.5 CLEANING

A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

B. Clean, lubricate, and adjust hardware.

END OF SECTION 06 40 23

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SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modified bituminous sheet waterproofing.
2. Molded-sheet drainage panels.
3. Insulation drainage panels.

B. Locations:

1. Exterior face of foundation/building walls where finished grade is above finished floor elevation; waterproofing installed from top of footing to finished grade elevation.
2. Concealed vertical face of separation of stepped floor elevations.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
2. Review transitions within waterproofing system and between waterproofing and adjacent air barrier.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written installation instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, air barrier, and other termination conditions.

1. Include setting drawings that indicate layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Qualification Statements: For installer.

C. Sample warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to frozen, damp, or wet substrates.

1. Do not apply waterproofing when snow, rain, fog, or mist is present.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 COORDINATION

A. Coordinate Work under this Section with adjacent concrete foundation work, including fill , under-slab vapor retarders.

B. Coordinate requirements for concrete formwork to provide suitable substrate for waterproofing and to minimize penetrations through waterproofing.

1.8 WARRANTY

A. Manufacturer's Warranty:

1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

a. Warranty Period: Ten (10) years from date of Substantial Completion. Ten year warranty required by funding agency and is non-negotiable.

B. Installer's Special Warranty: Form, signed by Installer, covering Work of this Section, for warranty period of two years.

1. Warranty includes removing and reinstalling protection board, drainage panels, insulation.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Waterproofing System: Obtain waterproofing materials molded-sheet drainage panels from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet Waterproofing: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Coatings & Waterproofing Inc; CCW MiraDRI 860/861.
b. GCP Applied Technologies Inc.; Bituthene 4000 or Bituthene Low Temperature.
c. Henry Company; a Carlisle company; Blueskin WP 200.
d. MAPEI Corporation; Planiseal Membrane SA.
e. Polyglass U.S.A., Inc.; Mapethene™ HT60 or Mapethene™ LT60.
f. Polyguard Products, Inc.; Polyguard 650 Membrane.
g. Soprema, Inc.; COLPHENE 3000.
h. W. R. Meadows, Inc; MEL-ROL LT, Mel-Rol or Mel-Rol XLT.

2. Physical Properties:

a. Tensile Strength, Membrane: 250 psi minimum; ASTM D412, Die C, modified.
b. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D1970/D1970M.
d. Puncture Resistance: 40 lbf minimum; ASTM E154/E154M.
e. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D570.
f. Water Vapor Permeance: 0.05 perm maximum; ASTM E96/E96M, Water Method.
g. Hydrostatic-Head Resistance: 200 ft. minimum; ASTM D5385/D5385M.

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3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 ACCESSORIES FOR WATERPROOFING

A. Furnish accessory materials as recommended in writing by waterproofing manufacturer for intended use and compatibility with sheet waterproofing.

1. Furnish liquid-type accessory materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne primer as recommended in writing for substrate by sheet waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner as recommended in writing for substrate by sheet waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

F. Metal Termination Bars: Aluminum or stainless steel bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.

2.4 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel with Polymeric Film, Nonwoven-Geotextile Faced: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of9 to 15 gpm per ft.

2.5 INSULATION DRAINAGE PANELS

A. Insulation Drainage Panels, Unfaced, Type IV: ASTM C578, Type IV, 25 psi minimum compressive strength; unfaced extruded-polystyrene board insulation; fabricated with shiplap or channel edges and with one side having grooved drainage channels.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kingspan Insulation LLC.
b. Owens Corning.
c. Soprema, Inc.
d. The Dow Chemical Company.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.

1. Verify that concrete has cured and aged for minimum time recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written installation instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections.

E. Fill form tie holes, honeycomb, aggregate pockets, holes, and other voids.

F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks in accordance with ASTM D4258.

1. Install sheet strips of width in accordance with manufacturer's written installation instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

G. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths in accordance with manufacturer's written installation instructions.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

H. Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's written installation instructions.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:

a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

I. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.3 INSTALLATION OF MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Install modified bituminous sheets in accordance with waterproofing manufacturer's written installation instructions.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

D. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.

E. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

F. Seal edges of sheet waterproofing terminations with mastic.

G. Install sheet waterproofing and accessory materials to tie into adjacent waterproofing.

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H. Roll waterproofing membrane to firmly adhere to substrate. Roll seams and terminations.

I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

3.4 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, in accordance with manufacturer's written installation instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. For vertical applications, install board insulation before installing drainage panels.

3.5 INSTALLATION OF INSULATION DRAINAGE PANELS

A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.

B. Ensure that drainage channels are aligned vertically and free of obstructions.

C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied in accordance with manufacturer's written installation instructions.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

3.7 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 13 26

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SECTION 07 13 54 - THERMOPLASTIC SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. PVC sheet waterproofing.
2. Drainage panels.
3. Plaza-deck pavers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for moisture control>

C. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

D. Samples: For each exposed product and for each color and texture specified, including the following products:

1. 8-by-8-inch square of waterproofing and flashing sheet.
2. 4-by-4-inch square of drainage panel.
3. Plaza-deck paver, full sized, in each color and texture required.
4. Paver pedestal assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality-control reports.

C. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

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1.6 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Do not permit asphaltic materials or polystyrene insulation to contact PVC materials.

C. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer and installer agree to repair or replace waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.

1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, and drainage panels from single source from single manufacturer.

B. Source Limitations for Plaza-Deck Paving: Obtain plaza-deck pavers and paver pedestals from single source from single manufacturer.

2.2 SUBSTRATE BOARDS

A. Substrate Board: ASTM C1396/C1396M, Type X gypsum board.

1. Thickness: 5/8 inch.

B. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Georgia-Pacific Gypsum LLC; Dens Deck Prime.
b. National Gypsum Company; DEXcell® Glass Mat Roof Board.
c. USG Corporation; USG SECUROCK® BRAND GLASS-MAT ROOF BOARD.

2. Thickness: Type X, 5/8 inch thick.

C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof

2.3 PVC SHEET WATERPROOFING

A. Self-Adhered PVC Sheet: 120-mil- thick, composite sheet composed of 60-mil- thick, PVC membrane with integral pigments, stabilizers, biocide, and nonwoven fiberglass reinforcement; a 60-mil- thick, nonpermeable, closed-cell-foam backing layer; and a pressure-sensitive adhesive coating; with the following properties measured according to standard test methods referenced:

1. Basis-of-Design Product:

a. Sika Sarnafil.

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2. Tensile Strength: 1500 psi minimum; ASTM D638.
3. Elongation at Break: 240 percent minimum, machine direction; ASTM D638.
4. Seam Strength: 90 percent minimum of tensile strength; ASTM D638.
5. Retention of Properties after Heat Aging: 95 percent minimum retention of tensile strength and elongation; ASTM D638 after 168 hours at 194 deg F; ASTM D3045.
6. Tear Resistance: 21 lbf minimum; ASTM D1004.
7. Linear Dimension Change: 0.002 percent maximum after 6 hours at 176 deg F; ASTM D1204.
8. Dynamic Puncture Resistance: 949.2 ft. pdl minimum; ASTM D5635/D5635M.

2.4 AUXILIARY MATERIALS

A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Concealed Sheet Flashing: Same material, construction, and thickness as sheet waterproofing.

C. Exposed PVC Sheet Flashing: PVC-sheet flashing 60 mils thick; PVC with integral pigments, stabilizers, UV absorbers, and biocide; reinforced with nonwoven fiberglass.

D. Preformed Flashing Shapes: As needed to suit Project requirements including, but not limited to, detail corners, level changes, stop ends, and other similar special applications

E. Surface Conditioner: Manufacturer's standard waterborne surface treatment to bind residual surface dust and efflorescence to substrate.

F. Bonding Adhesives: For bonding waterproofing sheets and sheet flashings to substrates.

G. Separation Layer: Manufacturer's standard 0.16-inch- thick, nonwoven polypropylene fabric.

H. Waterproofing and Sheet-Flashing Accessories: Sealants, pourable sealers, termination reglets, clamps, compression bars, tapes, preformed cone and stack flashings, and other accessories recommended by waterproofing manufacturer for intended use.

I. Metal Termination Bars: Manufacturer's standard stainless steel or aluminum bars, prepunched, with noncorrosive fasteners.

2.5 DRAINAGE PANELS

A. Composite Drainage Panels: Drainage panel acceptable to waterproofing manufacturer and consisting of a nonbiodegradable core of fused, entangled filaments or a three-dimensional drainage net; with a geotextile facing on both sides.

1. Basis-of-Design Product:

a. Sika Sarnafil.

2.6 roof insulation

A. Extruded-Polystyrene Board Insulation: ASTM C578, Type V, 3.00-lb/cu. ft., minimum density, 100-psi minimum compressive strength, square edged.

1. Thermal Resistance: R-value of 5.0 per inch.
2. Size: 48 by 48 inches.
3. Thickness:

a. Base Layer: 1-1/2 inches.
b. Upper Layer:As required for overall thickness indicated.

2.7 PLAZA-DECK PAVERS

A. Concrete Plaza-Deck Pavers: Solid, hydraulically pressed, standard-weight concrete units, with top edges beveled 3/16 inch, manufactured for use as plaza-deck pavers; 7500 psi minimum

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compressive strength, ASTM C140/C140M; absorption not greater than 5 percent, ASTM C140/C140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance in accordance with ASTM C67.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Hanover Architectural Products.
    b. Wausau Tile, Inc.
    c. Westile Roofing Products; Oldcastle APG, Inc.; CRH Americas, Inc.
2. <Double click to insert sustainable design text for regional concrete materials.>
3. Thickness: 2 inches.
4. Face Size: 24 inches square.
5. Color and Texture: As selected by Architect from manufacturer's full range.
    a. Basis-of-Design: Hanover Architectural Products; Hanover Prest Pavers Custom Color with Tudor Finish.

B. Paver Pedestals: Paver-support assembly,, including adjustable or stackable pedestals, shims, and spacer tabs for joint spacing of 1/8 to 3/16 inch.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Hanover Architectural Products.
    b. Wausau Tile, Inc.
    c. Westile Roofing Products; Oldcastle APG, Inc.; CRH Americas, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION OF SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.

1. At steel roof decks, install substrate board at right angle to flutes of deck.
    a. Locate end joints over crests of steel roof deck.
2. Tightly butt substrate boards together.
3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to waterproofing system manufacturers' written instructions.

3.2 EXAMINATION OF SUBSTRATE

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the waterproofing.

1. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Prepare, treat, and seal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

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3.4 INSTALLATION OF FULLY ADHERED SHEET WATERPROOFING

A. Install self-adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions.

1. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
2. Install laps shingled with slope of deck where possible.
3. Install flashings concurrently with deck sheet.
4. Perform hot-air welding to ensure a watertight seam installation. Inspect outside edge of seams with pointed metal probe and ensure completed laps lay flat and are free of voids, fishmouths, or wrinkles.
5. Install temporary cut-offs if work is interrupted. Remove the cut-offs completely before proceeding with the installation.
6. Install sheets and auxiliary materials to tie into adjoining air barrier transition membranes.

B. Apply surface conditioner, at required rate, to substrates to receive waterproofing. Apply only at temperatures greater than 25 deg F and rising.

C. Install flashing at deck drains. Spread sealant bed over deck drain flange, lap flashing membrane into drain flange and over deck sheet according to membrane manufacturer's written instructions, and hot-air-weld flashing to deck sheet; securely seal flashing sheet in place with clamping ring.

D. Perform field quality-control testing before subsequent work.

E. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.

3.5 INSTALLATION OF SHEET FLASHING

A. Form wall flashings exposed in final construction using exposed sheet flashing.

B. Lap sheet flashings over deck sheet. Flash penetrations and field-formed inside and outside corners with sheet flashing.

C. Extend flashings a minimum of 8 inches above the overburden unless otherwise indicated on Drawings and acceptable to waterproofing manufacturer.

D. Hot-air weld joints with deck sheet and end laps of overlapping sheet flashings and accessories to ensure a watertight seam installation.

E. Hot-air weld three-way overlaps or T-joints with a 4-inch- round or square patch.

F. Secure flashings along top edge with mechanically anchored metal termination bar or with mechanically anchored metal reglet for subsequent metal counterflashing. Seal top of termination with sealant.

G. Terminate deck sheet at expansion joints and discontinuous deck-to-wall or deck-to-deck joints. Bridge and cover joints with sheet flashing and joint accessories according to manufacturer's written instructions for each type of joint.

3.6 INSTALLATION OF DRAINAGE PANELS

A. Install drainage panels immediately after waterproofing-membrane manufacturer's inspection and acceptance of the waterproofing installation.

B. Place and secure drainage panels directly over the waterproofing membrane, according to waterproofing manufacturer's written instructions.

C. Trim drainage panels to fit closely around penetrations and at the base of drains to ensure that water flows freely from composite into drain openings.

D. Cover cut edges of drainage panels to protect waterproofing membrane from damage.

E. Protect installed drainage panels during subsequent construction.

3.7 installation of roof insulation

A. Loosely lay base layer of insulation with joints staggered not less than 24 inches in adjacent rows and with long joints continuous at right angle to drainage panel joints.

B. Lay upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

C. Make joints between adjacent insulation boards not more than 1/4 inch in width.

D. Fill gaps exceeding 1/4 inch with insulation.

E. Install separation layer over insulation with placement of plaza-deck pavers.

3.8 INSTALLATION OF PLAZA-DECK PAVERS

A. Install pavers according to manufacturer's written instructions.

B. Install paver pedestals and accessories to required elevations. Adjust for final level and slope of paved surfaces.

C. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.

1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.

D. Install pavers to vary no more than 1/16 inch in elevation between adjacent pavers and no more than 1/16 inch from surface plane elevation of individual paver.

E. Limit variation in paving installation to within 1/4 inch in 10 feet of surface plane in any direction; noncumulative.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests.

B. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

C. Electronic Leak-Detection Testing:

1. Testing agency is to test each deck area for leaks using an electronic leak-detection method that locates discontinuities in the waterproofing membrane.
2. Testing agency is to perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.
3. Testing agency is to create a conductive electronic field over the area of waterproofing to be tested and electronically determine locations of discontinuities or leaks, if any, in the waterproofing.
4. Testing agency is to provide survey report indicating locations of discontinuities, if any.

D. Waterproofing will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection report.

3.10 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

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END OF SECTION 07 13 54

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SECTION 07 14 16 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyurethane waterproofing.
2. Cold-applied rubberized asphalt waterproofing.

B. Contractor may select either waterproofing type indicated within this section, for applications indicated as Fluid-Applied Waterproofing; selection appropriate for application temperature.

C. Contractor and manufacturer are accountable to ensure proper product selection for temperatures at time of installation, or providing the temporary measures for application acceptable to the particular manufacturer.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:

1. Indicate locations and extent of waterproofing.

C. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for regional materials.>

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranties: For special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.

1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
2. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

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B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain waterproofing materials from single source and from single manufacturer.

2.2 COLD-APPLIED RUBBER HIGH-BUILD WATERPROOFING

A. Base Layer shall be a cementitious waterproofing membrane applied directly to the deck.

1. Products: Subject to compliance with requirements, provide the following:

a. Basis-of-Design Product: Pli-Dek Services, Inc.; GU80-1 Gray Base Mix and GU80-1 Liquid Admixture.

B. Fluid Applied waterproofing membrane shall be:

1. Basis-of-Design Product: Pli-Dek Cold Rubber High Build. The waterproofing system consists of the following:

a. Base Coat:

1) GU80-1 Gray Base Mix: A Portland cement and silicon dioxide composition that is to be mixed with GU80-1 Liquid Admixture.
2) GU80-1 Liquid Admixture: Water based acrylic emulsion.

b. Fluid Applied waterproofing membrane with the following characteristics:

1) Hardness: 30 ±5 Shore A ASTM D-2240
2) Tensile Strength: 500 ± 50 psi, 2.1 ± 0.3 Mpa ASTM D-412
3) Total Solids by Weight: 95 ± 1% ASTM D-236
4) Maximum VOC: <60 g/l ASTM D-2369-81

C. Accessory Products

1. Galvanized Metal Lath: 2.5 lbs/sq. yd. G60, an expanded metal lath that is hot dipped not electro-galvanized.
2. PD Seam Paper
3. Fabric Reinforcement Mesh: PD-2014 Reemay Fabric
4. Polyscrim
5. Pli-Dek Drain Board: Use board recommended by manufacturer.
6. Galvanized “L” metal as recommended by manufacturer.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated.

C. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.

D. Flexible Flashings: Type recommended by membrane manufacturer.

E. Sealant for Joints and Cracks in Substrate: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Condition of Plywood Surfaces:

a. Ensure that the substrate is of sound and dry exposure 1 sheathing.
b. Refer to ICC-ES Legacy Report for framing requirements.
c. Slope base coat ¼” per linear foot at areas indicated in plan to allow drainage to bi-level drains.
d. Bi-level drain by manufacturer must be installed in areas indicated in plan.
e. All plywood seams shall be staggered an 1/” space between all sheet shall exist.
f. Faming or blocking must support all plywood edges, except as per APA guidelines, blocking is not required when tongue and groove plywood is used. Joists to be spaced 16” on center.
g. Maximum deflection of the deck shall not exceed L/360th of the span.
h. Minimum thickness of plywood shall be 5/8”, ¾” thick exposure 1 sheeting recommended.
i. All adjacent edges of the plywood sheets shall not be more than 1/32” out of plane (i.e.: above or below each other).
j. Flashing shall be a minimum 26 gauge galvanized bonderized sheet metal.
k. Proper flashing must be installed at all doors, walls, and penetrations.
l. Flashing must be installed to accommodate all exterior wall coating applications from coming in contact with the deck surface. Exterior siding and finishes must be held off the deck a minimum of 2”.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Delaminated plywood shall be replaced with sound plywood.

C. All seams in plywood shall be gapped 1/8” and covered with a maximum of 2” wide flashing paper approved by the manufacturer and tacked in place.

D. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

3.3 INSTALLATION OF WATERPROOFING

A. Apply waterproofing in accordance with manufacturer's written instructions and to recommendations in ASTM C1471/C1471M.

B. Apply primer/base coat over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.

C. Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.

1. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft..

D. Cure waterproofing, taking care to prevent contamination and damage during application and curing.

3.4 INSTALLATION OF DRAINAGE BOARD

A. Place manufacturer recommended drainage board, in accordance with manufacturer's written instructions. Butt the side and roll ends together and overlap the filter fabric on the adjacent roll

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to provide a continuous mat for separation of soils or overburden. Tape seams to prevent debris from getting into the drainage system.

3.5 PROTECTION

A. Allow membrane to dry thoroughly. Protect from rain until fully cured. Allow membrane to fully cure before installing drainage composite.

B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair flashings.

END OF SECTION 07 14 16

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SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Molded (expanded) polystyrene foam-plastic board insulation.
3. Polyisocyanurate foam-plastic board insulation.
4. Glass-fiber blanket insulation.
5. Mineral-wool blanket insulation.
6. Loose-fill insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Extruded polystyrene foam-plastic board insulation.
2. Molded (expanded) polystyrene foam-plastic board insulation.
3. Polyisocyanurate foam-plastic board insulation.
4. Glass-fiber blanket insulation.
5. Mineral-wool blanket insulation.
6. Loose-fill insulation.

1.3 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. For blown-in or sprayed fiberglass and cellulosic-fiber loose-fill insulation, indicate initial installed thickness, settled thickness, settled R-value, installed density, coverage area, and number of bags installed.
2. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For foam-plastic insulation, from ICC-ES.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type IV <For use as continuous insulation>: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. DuPont de Nemours, Inc.; Styrofoam™ Brand Tongue and Groove Extruded Polystyrene Foam Insulation.
   b. Kingspan Insulation Limited; GreenGuard GG25-LG XPS.
   c. Owens Corning; Foamular 250.
2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.

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4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 MOLDED (EXPANDED) POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Molded (Expanded) Polystyrene Board Insulation, Type IX For use in below grade foundation walls: ASTM C578, Type IX, 25-psi minimum compressive strength.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Atlas Molded Products; a Division of Atlas Roofing Corporation; ThermalStar X (25 psi).
   b. Henry a Carlisle Company; Insulfoam, Type IX.
   c. Western Sales Co.; Blueboard Type IX Foam Insulation Sheets.
2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. See Section 07 54 23 Thermoplastic-Polyolefin Roofing for polyisocyanurate foam-plastic board insulation required with roofing.

2.4 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Unfaced; used in exterior walls: ASTM C665, Type I; passing ASTM E136 and complies with BZJZ category for batts and blankets for combustion characteristics. Contractor to price as an ad. Alternate to Mineral-Wool Blanket.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. CertainTeed Insulation; Sustainable Insulation.
   b. Johns Manville; a Berkshire Hathaway company; Formaldehyde-free™ Unfaced Fiberglass Insulation.
   c. Knauf Insulation; Performance+® EcoBatt® Insulation.
   d. Owens Corning; Pink Next Gen Fiberglas Insulation.
2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.5 MINERAL-WOOL BLANKET INSULATION

A. Mineral-Wool Blanket Insulation, Unfaced; < For use in exterior walls where fiberglass batt complyingwiht BZJZ requirements cannot be found>: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Johns Manville; a Berkshire Hathaway company; JM CladStone Water & Fire Block Mineral Wool.
   b. Rockwool International; Cavityrock.
   c. Thermafiber, Inc.; an Owens Corning company; SAFB (Sound Attenuation Fire Blankets).
2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

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2.6 LOOSE-FILL INSULATION

A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C739, chemically treated for flame-resistance, processing, and handling characteristics.

1. Products: Subject to compliance with requirements, provide one of the following:

a. GreenFiber;.
b. Hamilton Manufacturing Inc.;.
c. Nu-Wool Co., Inc.;.

2.7 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the following:

a. AGM Industries, Inc; Series T TACTOO Insul-Hangers.
b. Gemco; Spindle Type.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Products: Subject to compliance with requirements, provide one of the following:

a. AGM Industries, Inc; CH12.
b. Gemco; R-150, S-150.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

1. Products: Subject to compliance with requirements, provide one of the following:

a. AGM Industries, Inc; TACTOO Adhesive.
b. Gemco; Tuff Bond Hanger Adhesive.

2.8 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
3. Polyurethane Pour-In-Place Insulation: Closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84, specifically formulated for pour-in-place applications.

a. Products: Subject to compliance with requirements, provide the following:

1) Demilec (USA) LLC; [**Eco-Pur PIP B 325**] [**Eco-Pur PIP B 352-6**] [**Eco-Pur PIP B 517**].

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

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3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement. Install cavity insulation to meet Grade 1 installation standards.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions.
2. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
3. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
4. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
5. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.5 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.

1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 20 00 "Unit Masonry."

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3.6 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. For wood-framed construction, install blankets according to ASTM C1320 and as follows:

a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

4. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

a. Exterior Walls: Set units with facing placed toward interior of construction.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

C. Loose-Fill Insulation: Apply according to ASTM C1015 and manufacturer's written instructions.

1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."

D. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation according to manufacturer's written instructions.

1. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.
2. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.7 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

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SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam.
2. Open-cell spray polyurethane foam.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of 1.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Spray Foam Insulation; SealTite PRO Closed Cell.
b. Demilec (USA) LLC; Heatlok HFO Proor Heatlok XT High Yield.
c. Icynene-Lapolla; Icynene; Premium Icynene HFO 200.
d. Johns Manville; a Berkshire Hathaway company; JM Corbond IV.

2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2.2 OPEN-CELL SPRAY POLYURETHANE FOAM

A. Open-Cell Spray Polyurethane Foam: Spray-applied polyurethane foam using water as a blowing agent. Minimum density of 0.4 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 3.4 deg F x h x sq. ft./Btu at 75 deg F.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation; ENERTITE Max.
b. Carlisle Spray Foam Insulation; SealTite PRO High Yield.
c. Demilec (USA) LLC; Sealection 500.
d. Johns Manville; a Berkshire Hathaway company; High Yield Open-Cell.

2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2.3 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.

B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.

E. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 07 21 19

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SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wrap.
2. Flexible flashing.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Building wrap.
2. Flexible flashing.

B. Product Data Submittals: For building wrap, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

C. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Basis-of-Design: DuPont de Nemours, Inc.; Tyvek CommercialWrap.
b. Alpha ProTech;.
c. Barricade Building Products;.
d. Dorken Systems Inc.;.
e. Kingspan Insulation LLC; .
f. Typar Geosynthetics; a PGI brand; .

2. Water-Vapor Permeance: Minimum 23 perms (Method A) per ASTM E96/E96M, Desiccant Method (Procedure A).
3. Air Permeance: Maximum 0.004 cfm/sq. ft. at 0.3-inch wg when tested in accordance with ASTM E2178.
4. Allowable UV Exposure Time: Not more than 180 days.
5. Flame Propagation Test: Materials and construction to be as tested in accordance with NFPA 285.

B. Acrylic Seam Tape: Composite tape consisting of a pressure-sensitive acrylic adhesive, bonded to a polyethylene or polypropylene film for sealing joints and penetrations in building wrap. Provide tape from same manufacturer as approved wrap product.

1. Products: Subject to compliance with requirements, provide one of the following:

a. DuPont de Nemours, Inc.; DuPont Tyvek Tape.
b. Alpha ProTech; REX™ Premium Seam Tape.
c. Barricade Building Products;.

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2. Width: 3 inches.

2.2 FLEXIBLE FLASHING

A. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.

B. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F1667.

2.3 DRAINAGE MATERIAL

PART 3 - EXECUTION

3.1 INSTALLATION OF WATER-RESISTIVE BARRIER

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.

C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.2 INSTALLATION OF FLEXIBLE FLASHING

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.3 INSTALLATION OF DRAINAGE MATERIAL

A. Install drainage material over building wrap and flashing to comply with manufacturer's written instructions.

END OF SECTION 07 25 00

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SECTION 07 41 13.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vertical-rib, snap-joint, standing-seam metal roof panels.
2. Vapor retarder.
3. Roof insulation.
4. Underlayment.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written installation instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review loading limitations of supporting structure during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.
9. Review procedures for repair of metal panels damaged after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For standing-seam metal roof panels. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: Manufacturer's standard color charts, showing full range of available colors for each type of exposed finish.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: Actual sample of finished products for each type of exposed finish for metal panels, clips, fasteners, closures, and other metal panel accessories.

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1. Size: [**Manufacturers' standard size**] <**Insert size**>.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates for portable roll-forming equipment.

B. Product Test Reports: For standing-seam metal roof panels, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Qualification Statements: For roof installers.

E. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels.

1.6 QUALITY ASSURANCE

A. Roof Installer Qualifications: Entity that employs a supervisor who is an NRCA ProCertified Roofing Foreman or installers who are NRCA ProCertified Metal Panel Roof Systems Installers.

B. Portable Roll-Forming Equipment Certification: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of Work.

1.7 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof area and eave, including fascia, and soffit as shown on Drawings; approximately [**48 inches**] [**12 ft.**] <**Insert dimension**> square by full thickness, including attachments, underlayment, and accessories.
2. Build mockups for typical roof area only, including accessories.
    a. Size: 12 ft. long by 6 ft..
    b. Each type of exposed seam and seam termination.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

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1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written installation instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metal and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
4. .

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested in accordance with ASTM E1680 or ASTM E283/E283M at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E1646[**or ASTM E331**] at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

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D. Watertightness: No water penetration when tested in accordance with ASTM E2140 for hydrostatic-head resistance.

E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS, GENERAL

A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.

B. Roof panels shall be Snap On Standing Seam in 12" widths with 1" high seams.

C. Panels to be produced Smooth - Factory Standard.

D. Panels to be designed for attachment with concealed fastener clips, spaced as required by the manufacturer to provide for both positive and negative design loads, while allowing for the expansion and contraction of the entire roof system resulting from variations in temperature.

E. Forming: Use continuous end rolling method. No end laps on panels. No portable rollforming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.

2.3 VERTICAL-RIB, SNAP-JOINT, STANDING-SEAM METAL ROOF PANELS

A. The Basis-of-Design Product subject to compliance with requirements, provide Snap On Standing Seam Metal Roof by PAC-CLAD, a Petersen Aluminum Corporation; a Carlisle Company, or provide an equivalent product by one of the following:

1. ATAS International, Inc..
2. Drexel Metals;.
3. Englert, Inc.
4. McElroy Metal, Inc; <**Insert product designation**>.

B. Panels: Formed with vertical ribs at panel edges; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Structural Support: Over solid deck.
2. Material: Metallic-coated steel.
3. Panel Profile: Flat pan.
4. Panel Coverage: 12 inches.
5. Panel Height: 1.75 inches.
6. Clips: Two piece, floating, designed to accommodate thermal movement.
    a. Steel Clips:, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
    b. Clip Spacing: As indicated on approved Shop Drawings.

2.4 UNDERLAYMENT

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 milsthick, consisting of slip-resistant, polyethylene-film top

surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970/D1970M.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970/D1970M.
3. Products: Subject to compliance with requirements, provide one of the following:
   a. ATAS International, Inc.;.
   b. Carlisle WIP Products; a brand of Carlisle Construction Materials;.
   c. GCP Applied Technologies Inc.;.
   d. Polyglass U.S.A., Inc.;.
4. Provide underlayment on all surfaces to receive standing-seam metal roof.

2.5 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with minimum ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with minimum ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

1. Nominal Thickness: 0.040 inch.
2. Surface: Smooth, flat finish.

2.6 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, minimum ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 coating designation. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness in accordance with manufacturer's recommendations. Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10 ft. long sections, complete with formed elbows and offsets, of size and metal thickness in accordance with manufacturer's recommendations. Finish downspouts to match gutters.

F. Panel Fasteners: Self-tapping screws designed to withstand design loads.

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G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.7 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for other than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with manufacturer's recommendations.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not permitted on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

a. Size: As recommended by metal panel manufacturer for application, but not less than thickness of metal being secured.

2.8 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[**for seacoast and severe environments**].

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and metal panel manufacturer's written installation instructions.

3.3 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated [**below**] [**on Drawings**], wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches.[**Extend underlayment into gutter trough.**] Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.
2. Apply over the roof area indicated below:

a. Roof perimeter for a distance up from eaves of [**24 inches**] [**36 inches**] <**Insert dimension**> beyond interior wall line.
b. Valleys, from lowest point to highest point, for a distance on each side of [**18 inches**] <**Insert dimension**>. Overlap ends of sheets not less than 6 inches.
c. Rake edges for a distance of [**18 inches**] <**Insert dimension**>.
d. Hips and ridges for a distance on each side of [**12 inches**] <**Insert dimension**>.
e. Roof-to-wall intersections for a distance from wall of [**18 inches**] <**Insert dimension**>.
f. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of [**18 inches**] <**Insert dimension**>.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF STANDING-SEAM METAL ROOF PANELS

A. Install metal panels in accordance with manufacturer's written installation instructions and approved Shop Drawings in orientation, sizes, and locations indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.

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4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners in accordance with manufacturers' written installation instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Watertight Installation:

    a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommended in writing by manufacturer as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements and manufacturer's written installation instructions. Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

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H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 ft. on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13.16

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SECTION 07 42 13.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concealed-fastener, lap-seam metal wall panels.
2. Metal liner panels.

B. Related Requirements:

1. Section 07 42 13.16 "Metal Plate Wall Panels" for solid metal plate wall panels.
2. Section 07 42 13.19 "Insulated Metal Wall Panels" for foamed-in-place, laminated and honeycomb insulated metal wall panels.
3. Section 07 42 13.23 "Metal Composite Material Wall Panels" for metal-faced composite wall panels.
4. Section 07 42 93 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review of procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

1. Exposed-fastener, lap-seam metal wall panels.
2. Concealed-fastener, lap-seam metal wall panels.
3. Metal liner panels.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

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2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.

1. Include Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For concealed-fastener, lap-seam metal wall panels, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical metal panel assembly as shown on Drawings, including corner, soffits, supports, attachments, and accessories.
2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

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E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Insert serviceability requirements.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide PAC-CLAD | Petersen Aluminum; Pac-Clad Flush Panels or comparable product by one of the following:

a. ATAS International.
b. Berridge Manufacturing Company.
c. Drexel Metals.

2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

a. Thickness: 0.032 inch.
b. Surface: Smooth, flat finish.
c. Exterior Finish: Two-coat fluoropolymer .
d. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage: 12 inches.
4. Panel Height: 1.0 inch.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

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D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

2.4 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF resin by weight in color coat. Prepare, pretreat,

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and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[**for seacoast and severe environments**].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF METAL PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

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1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

E. Metal Liner Panels: Install panels on [**exterior side of girts, with girts exposed to the interior**] [**interior side of girts with flush appearance on the inside**].

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

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B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13.13

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SECTION 07 46 46 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fiber-cement siding and panel.

1.2 COORDINATION

A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Fiber-cement siding.

B. Product Data Submittals: For each type of fiber-cement siding and panel. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Samples for Initial Selection: For fiber-cement siding including related accessories.

D. Samples for Verification: For each type, color, texture, and pattern required.

1. 24-inch- wide-by-36-inch- high Sample panel of siding assembled on plywood backing.
2. 12-inch- long-by-actual-width Samples of trim and accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of fiber-cement siding and panel.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of fiber-cement siding, including related accessories, to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of fiber-cement siding including related accessories, in a quantity equal to 2 percent of amount installed.

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.

2. Build mockups for fiber-cement siding including accessories.
    a. Size: 48 inches long by 60 inches high.
    b. Include outside corner on one end of mockup and inside corner on other end.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with labels intact until time of use.

B. Store materials on elevated platforms, under cover, and in a dry location.

C. Carry planks on edge. Protect edges and corners from breakage.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    a. Structural failures including cracking and deforming.
    b. Deterioration of materials beyond normal weathering.
2. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT LAP SIDING (TYPE 1)

A. Fiber-Cement Siding (Solid Color): ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested in accordance with ASTM E136; with a flame-spread index of 25 or less when tested in accordance with ASTM E84.
1. Basis-of-design (solid colors): Subject to compliance with requirements, provide James Hardie Building Products, Inc. or comparable product by one of the following:
    a. Certainteed; SAINT-GOBAIN.
    b. Allura USA.
    c. Nichiha USA, Inc.

B. Labeling: Provide fiber-cement siding that is tested and labeled in accordance with ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Nominal Thickness: Not less than 5/16 inch.

D. Siding Texture: 8.25-inch wide sheets with smooth texture and 7-inch exposure.

E. Panel Texture: 48-inch- wide sheets with smooth texture.

F. Finish: Factory applied solid color.
1. Color to be selected by Architect from manufacturer’s full range of colors.

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2.3 FIBER-CEMENT PANEL SIDING

A. Fiber-Cement Panel (Solid Color): ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested in accordance with ASTM E136; with a flame-spread index of 25 or less and a smoke-developed index of 5 when tested in accordance with ASTM E84.

1. Basis-of-design (solid colors): Subject to compliance with requirements, provide Hardie Panel by James Hardie Building Products, Inc. or comparable product by one of the following:

   a. Certainteed; SAINT-GOBAIN.
   b. Allura USA.
   c. Nichiha USA, Inc.

B. Labeling: Provide fiber-cement siding that is tested and labeled in accordance with ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Nominal Thickness: Not less than 5/16 inch.

D. Panel Texture: 48-inch- wide sheets with smooth texture.

E. Finish: Factory applied solid color.

1. Color to be selected by Architect from manufacturer’s full range of colors.

2.4 ACCESSORIES

A. Fiber Cement Trim Boards

1. Basis-of-Design Product: HardieTrim Trim Boards
2. Type A, Grade I, ASTM C1186.
3. Flame Spread Index: 0, ASTM E84.
4. Smoke Development Index: ,5, ASTM E84.
5. Sizes: As indicated in the drawings.
6. Color: To match the adjacent siding, to be selected by Architect from manufacturer’s standard line.
7. Texture: Smooth.
8. Thickness: 3/4-inch and 1-inch. See drawings for location of each trim type.

B. Siding Accessories, General (Type 1 Siding): Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.

C. Panel Accessories: Auxiliary installations materials recommended by fiber cement siding manufacturer for intended use and compatible with Rain Screen Exterior Siding System.

1. Provide drainage plane with 90% drainage efficiency behind siding.
2. Furring strips: material and location as indicated on drawings.

D. Flashing: Provide aluminum flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: Factory-prime coating.

E. Fasteners:

1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
3. For fastening fiber cement, use hot-dip galvanized fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and soffit and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Do not install damaged components.
2. Use blind nailing technique recommended by manufacturer. Fasteners shall be no closer than 3/8 inch from the ends of the plank.
3. Install fasteners no more than 16 inches o.c.
4. Fiber cement panel must be installed over furring strips. See drawings for spacing, type and location of the furring strips.

B. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and to produce a weathertight installation.

C. CAUTION: Siding panels contain silica. When drilling, cutting, or abrading siding panels during installation or handling. Observe the following precautions:

1. Work outdoors in a well-ventilated area.
2. Wear a dust mask or use a respirator.
3. Warn other workers and building occupants in the area.
4. Advise building occupants to close windows in the immediate area of work.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 46

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SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Roof insulation.
3. Cover board.
4. Walkways.

B. Section includes installation of sound-absorbing insulation strips in ribs of roof deck. Sound-absorbing insulation strips are furnished under Section 05 31 00 "Steel Decking."

C. Perimeter Edge System: Refer to Section 07 71 00 “Roof Specialties” and Section 07 71 29 “Manufactured Roof Expansion Joints”; products and installation must be accepted within roofing warranty defined by this section.

D. Wood Nailers: Refer to Division 6.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at project site.

1. Meet with Owner, Architect, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Copies of specification; if deviations from Contract Specifications are required by the roofing system manufacturer, clearly indicate such deviations.

B. Shop Drawings: Include dimensioned roof plans, sections, details, and attachments to other work; indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation layout.

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1. Outline of roof areas with dimensions.
2. Layout and thickness of insulation.
3. Base flashings and membrane termination details.
4. Flashing details at penetrations.
5. Plan locations and profile details of flashing methods for penetrations and terminations.
6. Typical and special details, including those that differ greatly from the published documents.
7. Tapered insulation layout, thickness, and slopes; high and low elevations, drain locations, etc.
8. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
9. Tie-in with adjoining air barrier.
10. Technical acceptance from roofing system manufacturer.

C. Samples for Verification: For the following products:

1. Roof membrane and flashings, of color required.
2. Walkway pads or rolls, of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1. Submit plan with engineered system attachment plan to comply with wind uplift requirements for indicated criteria and windstorm resistance classification.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of compliance with performance requirements.
b. Include wind uplift design specific to this project, with uplift pressures indicated on roof plan and manufacturer’s certification of the system’s capability to perform to the requirements; indicate product names in certification.
c. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.
d. Research/Evaluation Reports: For components of membrane roofing system.
e. Manufacturer's product data including Energy Star certificate and emissivity data.
f. Associated Products Certificate: Provide a letter, on the roofing manufacturer's letterhead and signed by representative of the roofing manufacturer, accepting the products selected by the installer for prefabricated metal edge systems, prefabricated expansion joints, insulation and cover board to be covered within the total system warranty.
g. Provide letter from roofing manufacturer providing materials and warranty for this project, indicating installer is qualified under the program listed under the Quality Assurance provisions of this section.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

D. Evaluation Reports: For components of roofing system, from ICC-ES.

E. Field Quality-Control Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.

F. Sample Warranties: For manufacturer's special warranties.

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G. Emergency Response Plan:

1. Any damage to the building caused by the Work, leaks or accidents must be addressed immediately by the Contractor as an emergency.
2. The Contractor must respond to leaks or problems at the site during construction with a repair crew within three hours of phone notification.
3. Provide a complete emergency telephone list for at least three responsible company representatives that will be on call during the course of the Project; include cell phone numbers, pager numbers and home phone numbers.
4. Designate one emergency contact in writing to Owner on a weekly basis.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer specializing in manufacturing the products specified in this section with minimum 20 years of documented experience.

B. Installer Qualifications:

1. A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

   a. Firm experienced in installation of system to be provided for this Project.
   b. Firm having successful completion of minimum 5 projects of comparable scale and complexity within three years of bid date, with same roofing manufacturer proposed for this Project.
   c. Firm having adequate number of skilled workmen experienced with the specified requirements and the methods needed for proper performance of the work in this section.

2. Maintain full-time supervisor/foreman, not workman/foreman, on job site during times that roofing work is in progress. Supervisor must have minimum of three years' experience in roofing work comparable to scale and complexity of this project.
3. Installer must have a repair crew or shall contract with a repair crew within a 100 mile radius of the project.

C. Installer Certification:

1. Installer must be certified by the manufacturer providing product for this project, within that manufacturer's quality or training program listed below:

   a. Certified Applicator; Carlisle Syntec.
   b. Certified Contractor; GAF.
   c. Gold Medal Quality Contractor; Versico.
   d. NRCA PRO Certification Program is acceptable in place of a manufacturer's program.

2. The installer's ability to purchase materials to perform the Work of this Project is not acceptable instead of official standing in one of the named programs.
3. Proposed alternative programs based on volume of work instead of performance or training are not acceptable.

D. Source Limitations:

1. Obtain components for membrane roofing system from roofing membrane manufacturer.
2. Obtain roof system components through sources acceptable to roofing manufacturer providing total system warranty. Provide a letter, on the roofing manufacturer's letterhead and signed by representative of the roofing manufacturer, accepting the products selected by the installer.

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E. Should there be any deviation from the Contract Documents without the prior written consent of the roofing material manufacturer and the Architect; the Contractor must do all necessary corrective work to make the roof acceptable to the Architect at no additional cost to the Owner.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. The installer shall take care during application and storage that overloading of the deck and structure does not occur.

C. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surface, and equipment movement. Where such access is absolutely required, the installer must provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas in accordance with roofing system manufacturer's recommendations.

D. Prior to and during applications, all dirt, debris and dust must be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.

E. Liquid materials such as solvents and adhesives must be stored and used away from open flames, sparks and excessive heat.

F. Contaminants, such as petroleum products, acids, grease, fats, oils, and solvents must not be allowed to come into contact with the roofing membrane; any such contact must be reported to roofing system manufacturer's representative.

G. Contractor must verify that all roof drain lines are unblocked before starting work; report any blockages to the Architect immediately.

H. All landscaped areas damaged by construction activities shall be raked clean and restored to original condition.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, membrane accessories, roof insulation, fasteners, cover boards, and other components of roofing system; include perimeter metal, metal trim and expansion joints.
2. Warranty Type: Manufacturer's No-Dollar-Limit (NDL) form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing

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system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

a. The warranty will be a total system warranty; no exclusion of any materials including perimeter metal, metal trim and expansion joints.
b. Warranty cannot exclude damage resulting from wind; warranty must cover roof damage resulting from wind speeds up to and including 60 mph.
c. Manufacturer's roof system warranty must include repair of damages caused by winds less than the wind speed used for Design Velocity Pressure Calculation submitted with shop drawings.

3. Warranty Period: 30 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period; include perimeter metal, metal trim and expansion joints.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, TPO sheet.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle SynTec Incorporated.

1) TPO Sure-Weld SAT Reinforced (80 mil) on glass mat faced gypsum panel cover board; or,

b. Holcim Elevate.

1) UltraPly TPO on glass mat faced gypsum panel cover board; or,

c. GAF.

1) EverGuard Extreme® 80 mil TPO on glass mat faced gypsum panel cover board; or,

d. Versico Roofing Systems.

1) VersiWeld TPO Membrane on glass mat faced gypsum panel cover board; or,

2. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.
3. Thickness: 80 mils, nominal;.
4. Exposed Face Color: White.

B. Membrane must retain 90% of the published initial reflectivity on 90% of the exposed membrane when the project is complete. Reflectivity can be maintained during installation, with the use of a pre-applied protective film, or accomplished through pressure-washing the membrane after installation is complete.

1. Locations: Roof surface to remain exposed and without overburden; if protective film product is chosen by contractor for entire project, film must be removed prior to placing any overburden.
2. Protective Film: Product APEEL; offered by Carlisle SynTec Incorporated and Versico Roofing Systems.

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2.2 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Roof Vents: As recommended by roof membrane manufacturer.

1. Size: Not less than 4-inch diameter.

E. Bonding Adhesive: Manufacturer's standard, water based.

F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

G. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.3 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roof membrane manufacturer.

B. Insulation Performance Across Roof Areas: U = 0.032 or better, using LTTR values; taper to drain cannot be less than 1-inch below minimum insulation thickness determined by performance requirement.

C. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 2, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Compressive Strength: 20 psi.
2. Size: 48 by 48 inches.
3. Thickness: Maximum single layer to be 2.6 inches.

D. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch.
3. Slope:

a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

4. Fabrication of Tapered Insulation:

a. Factory pre-cut boards not to exceed 4' x 4' with top surface cut to provide a continuous slope indicated on Drawings.
b. Tapered insulation exceeding 4 inches shall be in two layers, to include starter and filler blocks fabricated to assure staggering of all vertical joints both ways between layers.
c. All miters shall be factory cut, consisting of two diagonally cut abutting blocks with matching edges and thickness.
d. Each piece shall be identified in accordance with reviewed shop drawings.

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2.4 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

1. The same brand fastener is to be used throughout the Work.
2. Number of fasteners and layout must be as recommended by the manufacturer and as per engineered wind uplift resistance design.
3. Length of fastener to vary with the thickness of the insulation.

a. Fasteners must be of appropriate length to achieve a consistent 1-inch penetration in areas of exposed metal deck; Contractor will be required to cut exposed fasteners of obvious varied lengths.
b. [Fasteners in areas of cellular roof deck or roof decks with dovetail flute design must be of length to remain concealed in design of steel deck; exposed fasteners in these areas will not be permitted.]

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
2. Full-spread, spray-applied, low-rise, two-component urethane adhesive.

D. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Georgia-Pacific Gypsum LLC; Dens Deck Prime.
b. National Gypsum Company; DEXcell FA Glass Mat Roof Board.
c. USG Corporation; Securock Glass-Fiber Roof Board.

2. Thickness: 1/2 inch.
3. Surface Finish: [**Factory primed**] [**Unprimed**].

E. Cover Board: ASTM C1289 Type II, Class 4, Grade 1, 1/2-inch- thick polyisocyanurate, with a minimum compressive strength of 100 psi.

1. Products:

a. Carlisle; SecurShield HD Cover Board.
b. Holcim Elevate; ISOGARD HD Cover Board.
c. Hunter Panels; H-Shield HD.
d. Soprema; Sopra-ISO HD.
e. Versico; SecurShield HD Cover Board.

2. Applications: Assemblies with fleeceback membranes.

2.5 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

1. Size: Approximately 36 by 60 inches.
2. Color: Contrasting with roof membrane.

B. TPO Walkpad, welded:

1. Provide TPO walkpad compatible with roof membrane.
2. Thickness: 150 mil, textured non-reinforced TPO.
3. Install textured side up.
4. Provide walkpad where indicated on drawings.
5. Minimum width: 24 inches.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 31 00 "Steel Decking."

B. It is the intent of this specification that the roofing system be installed as a complete assembly. Installation shall not proceed until all nailers and blocking are in place, all openings in the roof deck are permanently supported with steel framing, all curbs, skylights, smoke vents, and similar equipment are on the project site ready for installation, and all work of other trades on the roof is completed to the extent practical.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 STANDARDS FOR INSTALLATION OF FULLY ADHERED MEMBRANE

A. Manufacturer’s requirements and recommendations shall be followed in all respects for installation of membrane materials. In addition to membrane manufacturer’s requirements, the following standards and remedial actions are specified for installation of membrane materials as part of the work:

B. Miscellaneous Mechanical Fasteners: Mechanical fasteners for securing insulation to roof decking shall in all cases be driven tight. Loose, overdriven, or backed-out fasteners will not be acceptable. If a straightedge is placed over a fastener and that fastener is greater than 1/8-inch above the surface of the surrounding membrane, that fastener shall be considered to be backed out. Loose, overdriven, or backed-out fasteners will be repaired in accordance with specification TS 18 in the ARMA/NRCA/SPRI Repair Manual for Low-Slope Roof Systems. Each such repair shall be considered a patch.

C. Field Lap Seams: Field lap seams and/or seam cover tape shall be installed along straight lines. A four foot straightedge shall be placed along any given section of lap seam or seam cover tape; a variance of more than ¼-inch in either direction, or a total of ¼-inch in both directions, shall constitute failure to meet the standards of good workmanship. Sections of membrane with seams not complying with this standard shall be removed and replaced.

D. Wrinkles in Membrane: Field membrane shall be adhered with a minimum of wrinkling. Wrinkles greater than 24 inches in length, or groups of wrinkles which contain a total of 30 inches, shall constitute failure to meet the standards of good workmanship. Wrinkles not complying with this standard shall be repaired in accordance with specification TS 7 in the ARMA/NRCA/SPRI Repair Manual for Low-Slope Roof Systems. Each such repair shall be considered a patch.

E. Cuts and Holes: All cuts and holes in the membrane shall be repaired in accordance with specification TS 3 or 5, as applicable, in the ARMA/NRCA/SPRI Repair Manual for Low-Slope Roof Systems. Each such repair shall be considered a patch.

F. Replacement of Deficient Field Membrane: Areas of roof membrane containing more than 3 patches in any area of 100 square feet shall be considered defective and shall be removed and replaced at the direction of the Architect.

3.3 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.4 INSTALLATION OF ROOFING, GENERAL

A. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.

B. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 07 27 26 "Fluid-Applied Membrane Air Barriers."

C. Wood Nailers:

1. Install continuous treated wood nailers as detailed.
2. Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot in any direction. Fastener spacing shall be a maximum of 3 feet on center. Fasteners shall be installed within 6 inches of each end. Spacing and fastener embedment shall conform to Factory Mutual Loss Prevention Data Sheet 1-49.
3. Allow a 1/2 inch open space between adjacent lengths of nailers.
4. Thickness shall be as required to match substrate or insulation height.
5. Woodwork that is questionable must be removed and replaced with suitable new materials.

3.5 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.

    a. Locate end joints over crests of decking.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

        1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
        2) Fasteners in areas of cellular roof deck or roof decks with dovetail flute design must be of length to remain concealed in design of steel deck; exposed fasteners in these areas will not be permitted.

2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

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a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch with insulation.
f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
g. Adhere each layer of insulation to substrate using adhesive. according approved submittals.

3.6 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to substrate using adhesive. according to approved submittals.

3.7 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technician or independent consultant.

C. Unroll roof membrane and allow to relax before installing.

D. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

E. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

F. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

G. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.

H. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

I. Apply roof membrane with side laps shingled with slope of roof deck where possible.

J. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

K. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

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L. Perimeter Metal Work including Expansion Joints:

1. Complete all metalwork in conjunction with roofing and flashings so that a watertight condition exists daily.
2. Metal shall be installed to provide adequate resistance to bending and to allow for normal thermal expansion and contraction.
3. Metal joints shall be watertight.

3.8 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.9 INSTALLATION OF WALKWAYS

A. Flexible Walkways:

1. Install flexible walkways at the following locations:

    a. Retain one or more subparagraphs below. Revise to suit Project.
    b. Perimeter of each rooftop unit.
    c. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
    d. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
    e. Top and bottom of each roof access ladder.
    f. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
    g. Locations indicated on Drawings.
    h. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

A. Manufacturer Inspection Service:

1. Keep the Architect and Owner informed as to the progress and quality of the Work as observed.
2. Provide job site inspections:

    a. Refer to Quality Assurance subsection of this section.
    b. Provide a written report when onsite indicating the exact hours present.

3. Report to the Architect in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.

B. Testing Agency: Engage a qualified testing agency to perform tests and to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.

C. Perform the following tests:

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1. Infrared Thermography: Testing agency shall survey entire roof area using infrared color thermography according to ASTM C1153.
    a. Perform tests before overlying construction is placed.
    b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection tests.
    c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
        1) Cost of retesting is Contractor's responsibility.
    d. Testing agency shall prepare survey report of initial scan indicating locations of entrapped moisture, if any.
2. Low-Voltage Electrical Conductance Testing: Testing agency shall survey entire roof area and flashings to locate discontinuity in the roof membrane using an exposed metal electrical loop to create an electrical field tested with handheld probes or a scanning platform with integral perimeter electrical loops creating a complete electrical field.
    a. Perform tests before overlying construction is placed.
    b. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
        1) Cost of retesting is Contractor's responsibility.
    c. Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.

D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
2. There will be no deviation from this Section, without prior written consent of the Architect and manufacturer, who will have the option of refusing to accept the installation.
3. Confirm that the manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.
4. Repair of Deficiencies: Installations or details noted as deficient during Final Inspection must be repaired and corrected by applicator, and made ready for reinspection, within five working days.
5. Warranty will be issued upon approval of the installation.

E. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.
1. Permit free drainage.
2. Round all edges and corners of wood bearing on roof surface.
3. Receive review and approval of manufacturer’s technician or independent consultant before any traffic is permitted over roofing.

C. Inspect roofing for deterioration and damage, describing its nature and extent in a written report copied to Architect and Owner, at removal of protection.

D. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

F. Clean roofing membrane to restore 90 percent of published initial reflectivity; either remove pre-applied protective film or pressure wash membrane as allowed by manufacturer.

G. Protection of Property:

1. Provide protection of property during course of roofing Work.
2. Protect lawns, shrubbery, paved areas, and building from damage; necessary repair of damages will be at no extra cost to Owner.

3.12 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner**>.
2. Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: _____.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

a. lightning;
b. peak gust wind speed exceeding 74 mph;
c. fire;
d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. vapor condensation on bottom of roofing; and
g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become

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null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 07 54 23

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Low-slope roof sheet metal fabrications.
2. Wall sheet metal fabrications.
3. Miscellaneous sheet metal fabrications.

1.2 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Roof-drainage sheet metal fabrications.
2. Low-slope roof sheet metal fabrications.
3. Steep-slope roof sheet metal fabrications.
4. Wall sheet metal fabrications.
5. Miscellaneous sheet metal fabrications.

B. Product Data Submittals:

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

C. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.

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9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

D. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

E. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

F. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.

E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge, including fascia trim, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install copings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. As-Milled Finish: Standard two-side bright.

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2. Factory Prime Coating: Where painting after installation is required, pretreat metal with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil.
3. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

C. Stainless Steel Sheet: ASTM A240/A240M, Type 316, dead soft, fully annealed; with smooth, flat surface.

1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).

a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1) Run grain of directional finishes with long dimension of each piece.
2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.3 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
4. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329/F2329M.

C. Solder:

1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
2. For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

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F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

H. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cheney Flashing Company.
b. Fry Reglet Corporation.
c. Heckmann Building Products, Inc.
d. Hohmann & Barnard, Inc.
e. Keystone Flashing Company, Inc.
f. Metal-Era, Inc.

2. Source Limitations: Obtain reglets from single source from single manufacturer.
3. Material: Stainless steel, 0.0188 inch thick.
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
7. Accessories:

a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

8. Finish: With manufacturer's standard color coating.

2.4 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

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1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.5 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum 96-inch- long sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness.
4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Gutter Profile: Style G in accordance with cited sheet metal standard.
6. Expansion Joints: Lap type.
7. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:

    a. Aluminum: 0.032 inch thick.

B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.

1. Fabricated Hanger Style: Fig. 1-35E in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Profile: SMACNA rectangular
3. Size: 4 x 5 inches
4. Fabricate from the following materials:

    a. Aluminum: 0.024 inch thick.

C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim,. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

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2. Style: SMACNA Fig. 1-25F or similar.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, solder or weld watertight. Shop fabricate interior and exterior corners.

1. Coping Profile: Fig. 3-4A in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate .
3. Fabricate from the following materials:

a. Aluminum: 0.050 inch thick.

B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.
2. .

C. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.

D. Flashing Receivers: Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.

F. Roof-Drain Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.
2.

2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.0188 inch thick.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:

1. Stainless Steel: 0.0250 inch thick.

C. Aluminum Pre-Finished Fascia Systems

1. Provide pre-finished aluminum fascia meeting the following requirements:
2. Cover material: 0.040-inch aluminum.

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3. Finish: Mill finish.
4. Color: Architect to select from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

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E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch into sealant.
b. Form joints to completely conceal sealant.
c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
2. Do not solder aluminum sheet.
3. Do not use torches for soldering.
4. Heat surfaces to receive solder, and flow solder into joint.

a. Fill joint completely.
b. Completely remove flux and spatter from exposed surfaces.

5. Stainless Steel Soldering:

a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
b. Promptly remove acid-flux residue from metal after tinning and soldering.
c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters:

1. Join sections with [**riveted and soldered joints**] [**or**] [**joints sealed with sealant**].
2. Provide for thermal expansion.
3. Attach gutters at eave or fascia to firmly anchor them in position.
4. Provide end closures and seal watertight with sealant.
5. Slope to downspouts.
6. Fasten gutter spacers to front and back of gutter.
7. Anchor and loosely lock back edge of gutter to continuous [**cleat**] [**eave or apron flashing**].
8. Anchor gutter with gutter brackets spaced not more than 24 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.
9. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspouts:

1. Join sections with 1-1/2-inch telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches o.c.
4. Provide elbows at base of downspout to direct water away from building.

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5. Connect downspouts to underground drainage system.

D. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
3. Loosely lock front edge of scupper with conductor head.

E. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper discharge.

F. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches in direction of water flow.

3.4 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.

C. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

C. Reglets: Installation of reglets is specified in Section 04 20 00 "Unit Masonry."

3.6 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans:

1. Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings.
2. Pipe and install drain line to plumbing waste or drainage system.

3.7 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

3.9 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 62 00

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SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Roof hatches.
3. Pipe and duct supports.
4. Pipe portals.

1.2 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported and roof penetrations associated with pipe portals and roof penetration housings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
2. Identify locations for pipe portals and roof penetration housings.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

D. Delegated-Design Submittal: For roof curbs indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Sample Warranties: For manufacturer's special warranties.

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1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to be included in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design roof curbs and equipment supports to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF CURBS

A. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
3. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
6. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
8. Nailer: Factory-installed wood nailer along top flange of curb, continuous around curb perimeter.
9. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
10. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
11. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 EQUIPMENT SUPPORTS

A. Equipment Supports: Internally reinforced perimeter metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed structure-mounting flange at bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Curbs Plus, Inc.
b. Custom Solution Roof and Metal Products.
c. Greenheck Fan Corporation.

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d. LMCurbs.
e. Milcor; a division of Hart & Cooley, Inc.
f. Pate Company (The).
g. Roof Curb Systems.
h. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.
i. Roof Products, Inc.
j. Thybar Corporation.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.

D. Material: Zinc-coated (galvanized) steel sheet, 0.079 inch thick.

1. Finish: Factory prime coating.

E. Construction:

1. Curb Profile: Manufacturer's standard compatible with roofing system.
2. Insulation: Factory insulated with 1-1/2-inch- thick glass-fiber board insulation.
3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
4. Nailer: Factory-installed continuous wood nailers on top flange of equipment supports, continuous around support perimeter.
5. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.
6. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
7. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.

2.4 ROOF HATCHES

A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing,and integrally formed deck-mounting flange at perimeter bottom.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Acudor Products, Inc;.
b. Babcock-Davis.
c. BILCO Company.
d. Milcor; a division of Hart & Cooley, Inc.
e. Nystrom.

B. Type and Size: Single-leaf lid, 30 by 36 inches. Coordinate size and location with drawings.

C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material: Aluminum sheet.

1. Thickness: Manufacturer's standard thickness for hatch size indicated.
2. Finish: Two-coat fluoropolymer or provide manufacturer’s standard finish.
3. Color: As selected by Architect from manufacturer's full range.

E. Construction:

1. Insulation: 2-inch- thick minimum, polyisocyanurate board.

a. R-Value: 12.0 or better according to ASTM C1363.

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2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
4. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features a metal flashing system, including stamped tabs, 6” (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
5. Curb Insulation: Shall be 3” (75mm) thick polyisocyanurate with an R-value = 20.3 (U=0.279 W/m2K).

F. Hardware: Spring operators, hold-open arm, stainless steel spring latch with turn handles, stainless pintle-type hinge system, and padlock hasps inside and outside.

1. Provide two-point latch on lids larger than 84 inches.
2. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
3. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Height: 42 inches above finished roof deck.
2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
3. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
4. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
5. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
6. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
7. Fabricate joints exposed to weather to be watertight.
8. Fasteners: Manufacturer's standard, finished to match railing system.
9. Finish: Manufacturer's standard.

    a. Color: As selected by Architect from manufacturer's full range.

2.5 LADDER SAFETY POST

A. Furnish and install at all roof hatch ladders a ladder safety post. The ladder safety post shall be pre-assembled from the manufacturer.

1. Basis-of-Design: Bilco Model LU-1.

B. Performance characteristics:

1. Tubular post shall lock automatically when fully extended.
2. Safety post shall have controlled upward and downward movement.
3. Release lever shall disengage the post to allow it to be returned to its lowered position.
4. Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14” on center and clamp brackets to accommodate ladder rungs up to 1-3/4” in diameter.

C. Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.

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D. Material of construction: Shall be steel.

E. Provide fall protection compliant with OSHA 1910.28 and Z359.1.

F. Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.

G. Hardware: All mounting hardware shall be Type 316 stainless steel.

H. Finishes: Factory finish shall be yellow powder coat.

2.6 PIPE AND DUCT SUPPORTS

A. Pipe Supports - Typical: Provide engineered, prefabricated pipe supports; sizing and spacing of specified products to be determined by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Eberl Iron Works, Inc./RTS Rooftop Support Systems; Product PUC Strut Support or PUC Elevated Bridge Support as applicable.
b. MIFAB; Product CW or CESHW as applicable.
c. OMG Roofing Products; Product Strut Model or Height Adjustable Strut Model as applicable.

2. Product design to install without roof penetrations or damage to roofing; sits freely on roof or set in adhesive certified as compatible to roof. Use of adhesive to be determined by support manufacturer.
3. Product to be weather and UV-resistant.

B. Curb-Mounted Pipe Supports: Galvanized steel support with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom; with adjustable-height roller-bearing pipe support accommodating up to 20-inch- diameter pipe or conduit and with provision for pipe retainer; as required for quantity of pipe runs and sizes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. MIRO Industries.
b. Pate Company (The).
c. PHP Systems/Design.
d. Thaler Metal Industries Ltd.

C. Duct Supports: Extruded-aluminum, urethane-insulated supports, 2 inches in diameter; with manufacturer's recommended hardware for mounting to structure or structural roof deck.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Thaler Metal Industries Ltd.

2. Finish: Manufacturer's standard.

2.7 PIPE PORTALS

A. Curb-Mounted Pipe Portal: Insulated roof-curb units with welded or mechanically fastened and sealed corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom; with weathertight curb cover with single or multiple collared openings and pressure-sealed conically shaped EPDM protective rubber caps sized for piping indicated, with stainless steel snaplock swivel clamps.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.

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B. Flashing Pipe Portal: Formed aluminum membrane-mounting flashing flange and sleeve with collared opening and pressure-sealed conically shaped EPDM protective rubber cap sized for piping indicated, with stainless steel snaplock swivel clamps.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.

2.8 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation and mill phosphatized for field painting.

1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

B. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

C. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

D. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.

E. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.

F. Steel Pipe: ASTM A53/A53M, galvanized.

2.9 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.

C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Underlayment:

1. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

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F. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

G. Gaskets: Manufacturer's standard tubular or fingered design of EPDM or silicone or a flat design of foam rubber.

H. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

I. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

J. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.10 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.

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2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
2. Attach safety railing system to roof-hatch curb.
3. Attach ladder-assist post according to manufacturer's written instructions.

F. Heat and Smoke Vent Installation:

1. Install heat and smoke vent so top perimeter surfaces are level.
2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.

G. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.

1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

H. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 96 00 “High-Performance Coatings.”

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

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SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:

a. Penetrations in fire-resistance-rated walls.
b. Penetrations in horizontal assemblies.
c. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors" and been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1. Where applicable, licensed by the State where the Project is located or local Authority Having Jurisdiction (AHJ).
2. Qualifications include having necessary experience, staff, and training to install penetration firestopping system in accordance with specified requirements.
3. Manufacturer’s willingness to sell its penetration firestopping systems to Contractor or installer engaged by Contractor does not in itself constitute approval.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

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B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

C. Notify testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.

1) UL in its "Fire Resistance Directory."

B. Penetration Firestopping Assembly Standard: Provide tested penetration firestopping assemblies that comply with and are installed in accordance with penetration firestopping assembly manufacturer’s installation instructions and all written and graphic requirements in test assembly documentation.

1. If penetration firestopping assemblies do not comply with requirements, research testing agency documents such as UL Online Certifications Directory or UL Fire Resistance Directory for assemblies that comply.
2. If no penetration firestopping assemblies that comply can be identified, submit proposed “Engineering Judgement” as specified in Submittals article in Part 1 of this Section.

2.3 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. A/D Fire Protection Systems Inc.
c. Hilti, Inc.
d. RectorSeal Firestop; a CSW Industrials Company.
e. Specified Technologies, Inc.
f. Tremco, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479

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1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
3. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
2. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:

    a. Those within the cavity of a wall.
    b. Floor, tub, or shower drains within a concealed space.
    c. 4-inch (200-mm) or smaller metal conduit penetrating directly into metal-enclosed electrical switchgear.

4. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.4 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

K. Fire-Rated Cable Sleeve Kits: Complete kits designed for new or existing cable penetrations through walls to accept standard accessories.

L. Thermal Wrap: Flexible protective wrap tested and listed for up to 2-hour fire ratings in accordance with ASTM E814/UL 1479 for membrane penetrations or ASTM E1725/UL 1724 for thermal barrier and circuit integrity protection.

M. Fire-Rated Cable Pathways: Single or gangable device modules composed of a steel raceway with integral intumescent material and requiring no additional action in the form of plugs, twisting closure, putty, pillows, sealant, or otherwise to achieve fire and air-leakage ratings.

N. Retrofit Device for Cable Bundles: Factory-made, intumescent, collar-like device for firestopping existing over-filled cable sleeves and capable of being installed around projecting sleeves and cable bundles.

O. Wall-Opening Protective Materials: Intumescent, non-curing putty pads or self-adhesive inserts for protection of electrical switch and receptacle boxes.

P. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use around rectangular steel HVAC ducts without fire dampers.

Q. Firestop Plugs: Flexible, re-enterable, intumescent, foam-rubber plug for use in blank round openings and cable sleeves.

R. Fire-Rated Cable Grommet: Molded two-piece grommet made of plenum-grade polymer and foam inner core for sealing small cable penetrations in gypsum walls up to 1/2 inch diameter.

S. Closet Flange Gasket: Molded, single-component, flexible, intumescent gasket for use beneath a water closet (toilet) flange in floor applications.

T. Endothermic Wrap: Flexible, insulating, fire-resistant, endothermic wrap for protecting membrane penetrations of utility boxes, critical electrical circuits, communications lines, and fuel lines.

2.5 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION OF PENETRATION FIRESTOPPING SYSTEMS

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

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3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 07 84 13

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SECTION 07 84 46 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fire-resistive joint systems for the following:

1. Floor-to-floor joints.
2. Floor-to-wall joints.
3. Head-of-wall joints.
4. Wall-to-wall joints.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities indicated as determined by UL 2079.

C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated on Drawings, as determined by NFPA 285 and UL 2079.

1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.

C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.

D. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

A. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

B. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.

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C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:

a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

C. VOC content not to exceed 250 g/L.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

B. Accessories:

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1. Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article.
2. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.
3. Holding Clips: Minimum 30 gage by 1 inch wide galvanized sheet steel Z-shaped clips to support safing insulation.

2.2 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER BOARD INSULATION

A. Available Manufacturers:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Thermafiber.

B. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics.

1. Nominal minimum density of 4 lb/cu. ft
2. Fiber Color: Regular color, unless otherwise indicated.
3. Fiber Color: Darkened, where indicated.
4. Uses: Where indicated and as fire safing insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of work.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.

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B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner may engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.

B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.

1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.

C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.

D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.5 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 84 46

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.
5. Latex joint sealants.
6. Semi-rigid joint fillers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product; identify each product consistent with Types used within this Section.

1. Sealant Products:

a. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
b. List of backing materials approved for use with the specific product.
c. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
d. Substrates the product should not be used on.
e. Substrates for which laboratory adhesion and/or compatibility testing is required.
f. Sample product warranty.
g. Certification by manufacturer indicating that product complies with specification requirements.

2. Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation; designations must be consistent with Types used within this Section.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Installation Plan: Submit at least four weeks prior to start of installation.

B. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

C. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

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D. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

1. Joint-sealant location and designation.
2. Manufacturer and product name.
3. Type of substrate material.
4. Proposed test.
5. Number of samples required.

E. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

F. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

G. Field-Adhesion-Test Reports: For each sealant application tested.

H. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

I. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Manufacturers' special warranties.

B. Installer's special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three ten years documented experience.

1. Manufacturer must designate a representative authorized to prepare a manufacturer’s certificate, indicating compatibility of materials intended for each application.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

C. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

D. Installation Plan: Include schedule of sealed joints, including the following.

1. Installation Log Form: Include the following data fields, with known information filled out.

a. Substrates.
b. Sealant used.
c. Stated movement capability of sealant.
d. Confirmation that primer was used.
e. Size and actual backing material used.
f. Date of installation.
g. Name of installer.
h. Actual joint width; provide space to indicate maximum and minimum width.
i. Actual joint depth to face of backing material at centerline of joint.
j. Air temperature.

E. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.

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1. Identification of testing agency.
2. Name(s) of sealant manufacturers' field representatives who will be observing
3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.

    a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
    b. Test date.
    c. Sealant used.
    d. Stated movement capability of sealant.
    e. Test method used.
    f. Date of installation of field sample to be tested.
    g. Date of test.
    h. Copy of test method documents.
    i. Age of sealant upon date of testing.
    j. Test results, modeled after the sample form in the test method document.
    k. Indicate use of photographic record of test.

F. Field Quality Control Plan:

1. Visual inspection of entire length of sealant joints.
2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.

    a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
    b. If any failures occur in the first 10 linear feet, continue testing at 12 inch intervals at no extra cost to Owner.

3. Field testing agency's qualifications.
4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

1.7 MOCKUPS

A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C1248 to determine stain potential of sealant when in contact with masonry substrates.
4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials, but no less than 8 pieces.
5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

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B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
5. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

    a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

6. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.9 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.10 WARRANTY

A. General: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

B. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

C. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period:

    a. Silicone Sealants: Twenty years from date of Substantial Completion for vertical applications.
    b. Silicone sealants for horizontal applications and other sealant types: Five years from date of substantial Completion.

D. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.

2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Prohibit Methylene chloride and perchloroethylene in sealants.

B. Minimum movement joint width 1/4-inch; minimum non-moving joint 1/8-inch.

C. Installer must use primer for exterior assembly applications, including interior face of exterior wall joints, regardless if the manufacturer may otherwise relieve the installer of primer use under conditions within acceptable parameters; installer will only be relieved of primer use when manufacturer documents the application to be non-compliant to tested assembly.

D. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

F. Colors of Exposed Joint Sealants: Custom color to be provided by Architect or as director to match adjacent materials.

2.3 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.

    a. Wall expansion and control joints.
    b. Joints between door, window, and other frames and adjacent construction.
    c. Joints between different exposed materials.
    d. Openings below ledge angles in masonry.
    e. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.

    a. Joints between door, window, and other frames and adjacent construction.
    b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.

        1) Exception: Such gaps and openings in gypsum board finished stud walls and suspended ceilings.
        2) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.

    c. Other joints indicated below.

3. Do not seal the following types of joints.:

    a. Intentional weepholes in masonry.

b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
d. Joints where installation of sealant is specified in another section.
e. Joints between suspended panel ceilings/grid and walls.

B. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.4 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.

B. Type A - Nonstaining Silicone Sealant: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920.

1. Products: Subject to compliance with requirements, provide one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.; Silpruf NB.
b. Pecora Corporation; Pecora 890NST.
c. Sika Corporation; Joint Sealants; Sikasil WS-295.
d. The Dow Chemical Company; DOWSIL 795.
e. Tremco Incorporated; Spectrem 1.

2. Joint Locations:

a. Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
b. Construction joints in cast-in-place concrete.
c. Joints between plant-precast architectural concrete units.
d. Control and expansion joints in unit masonry.
e. Openings below ledge angles in masonry.
f. Joints between metal panels.
g. Joints between different materials.
h. Perimeter joints between materials listed above and frames of doors, frames and louvers.
i. Control and expansion joints in soffits and other overhead surfaces.

3. Interior joints.

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings where indicated.

2.5 URETHANE JOINT SEALANTS

A. Type B - Hybrid Urethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 35 percent, minimum.
2. Hardness Range: 20 to 40, Shore A, when tested in accordance with ASTM C661.
3. Color: Match adjacent finished surfaces.
4. Manufacturers:

a. Master Builder Solutions; MasterSeal NP 100.
b. Franklin International Inc; Titebond WeatherMaster ULTIMATE MP Sealant.
c. Sherwin-Williams Company; Stampede 100 Low-Modulus Hybrid Urethane Sealant.
d. Sherwin-Williams Company; Stampede 1H Hybrid Sealant.
e. Tremco Commercial Sealants and Waterproofing; Dymonic FC.

5. Joint Locations: As indicated for Type A sealant; Contractor may use this type of sealant or Type A at their discretion - remain consistent throughout project.

B. Type C - Non-Sag "Traffic-Grade" Polyurethane Sealant: Single or multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic-use, urethane joint sealant; ASTM C920, Grade NS, explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.

1. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.
2. Joint Locations: Interior joints in horizontal traffic surfaces.

C. Type D - Self-Leveling Polyurethane Sealant: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade P, Class 25, Uses T and NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Master Builder Solutions; MasterSeal SL 2 (Pre-2014: Sonolastic SL2) or SL 100.
b. The QUIKRETE Companies; QUIKRETE® Polyurethane Self-Leveling Sealant.
c. Sherwin-Williams Company (The); S-W Loxon SL2 Self-Leveling Smooth Polyurethane Sealant.
d. Sika Corporation; Joint Sealants; Sikaflex 2c SL.
e. Tremco Incorporated; THC 901 or Vulkem 445SSL.

2. Joint Locations:

a. Exterior joints in horizontal traffic surfaces.
b. Exterior expansion joints in horizontal traffic surfaces.

2.6 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Type E - Mildew Resistant Silicone Sealant: Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
b. Pecora Corporation; Pecora 860.
c. The Dow Chemical Company; DOW CORNING® 786 SILICONE SEALANT -.
d. Tremco Incorporated; Tremsil 200 Sanitary.

2. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints.
c. Other joints as indicated.

2.7 BUTYL JOINT SEALANTS

A. Type F - Butyl-Rubber-Based Joint Sealants: ASTM C1311.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Bostik, Inc; Chem-Calk 300.
b. Pecora Corporation; BC-158.

2. Locations: Where indicated.

2.8 LATEX JOINT SEALANTS

A. Type G - Acrylic Emulsion Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following:

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a. Master Builder Solutions; MasterSeal NP 520.
b. Bostik, Inc.; Chem-Calk 600.
c. Momentive Performance Materials; RCS 20 Siliconized Acrylic Sealant.
d. Pecora Corporation; AC-20.
e. Sherwin-Williams Company (The); S-W Sher-Max Acrylic Sealant.
f. Tremco Incorporated; Tremflex 834.

2. Joint Locations: Interior joints in vertical surfaces and horizontal non-traffic surfaces.

a. Vertical joints on exposed surfaces of interior unit masonry or concrete walls and partitions.
b. Perimeter joints between interior wall surfaces and frames of interior doors, lites and elevator entrances.
c. Exposed joints in sound rated construction and exposed flanking sound paths, to be painted.

B. Acoustical Sealant: Refer to Division 7 Section, “Acoustical Joint Sealants.”

2.9 SEMI-RIGID JOINT FILLERS

A. Type H - Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.

1. Composition: Multi-component, 100 percent solids by weight.
2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
3. Color: Concrete gray.
4. Joint Width, Minimum: 1/8 inch.
5. Joint Width, Maximum: 1/4 inch.
6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
7. Manufacturers:

a. Master Builder Solutions; MasterSeal CR 190.
b. Dayton Superior Corporation; Pro-Poxy P606.
c. Euclid Chemical Company; EUCO 700.
d. Nox-Crete; DynaFlex 502.
e. W.R. Meadows, Inc; Rezi-Weld Flex.

B. Type I - Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.

1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
2. Color: Concrete gray.
3. Joint Width, Minimum: 1/8 inch.
4. Joint Width, Maximum: 3/4 inch.
5. Joint Depth: Provide product suitable for joints from 1/8 inch to 1 inch in depth excluding space for backer rod.
6. Manufacturers:

a. Adhesives Technology Corporation; Crackbond JF-311.
b. ARDEX Engineered Cements; ARDEX ARDISEAL RAPID PLUS.
c. Master Builder Solutions; MasterSeal CR 100.
d. Euclid Chemical Company; EUCO QWIKjoint UVR.
e. Nox-Crete; DynaFlex JF-85.
f. SpecChem, LLC; Rapid Flex CJ.

2.10 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330; Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin). or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Open cell must remain dry at all times.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.11 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.

1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
3. Arrange for sealant manufacturer's technical representative to be present during tests.
4. Record each test on Preinstallation Adhesion Test Log as indicated.
5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

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2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.

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2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.

B. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

a. Whether sealants filled joint cavities and are free of voids.
b. Whether sealant dimensions and configurations comply with specified requirements.
c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

C. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

D. Prepare test and inspection reports.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

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END OF SECTION 07 92 00

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.5 ACTION SUBMITTALS

A. Product Data Submittals: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

C. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.

D. Samples for Verification:

1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
2. Fabrication: Prepare Samples approximately 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:

a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.

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b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

E. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Qualification Data: For fabrication of frames outside of manufacturer's plant.

C. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly and thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.

D. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.

E. Field quality control reports.

1.7 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.8 QUALITY ASSURANCE

A. The Hollow Metal Supplier shall maintain at the location which will be managing the project, a credentialed Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) as a full-time employee.

B. The Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) shall supervise any other individuals employed by the Door and Frame Supplier who work on the project and be available throughout the project to meet with the Contractor, Architect or Owner as needed.

C. The Supplier shall be experienced and have completed projects with material, design and scope similar to that specified for this project. If requested by the Owner or Architect, submit a list of projects completed in the last five years with the project name, location, Owner, Architect and Contractor.

D. As a requirement, the Door and Frame Supplier shall maintain an office and warehouse complete with a hardware inventory within a one hundred mile radius of the jobsite. The Supplier shall further have a qualified field service staff available to service the project.

E. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

F. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies shall meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

G. Fabricator Qualifications: Frames not fabricated by the manufacturer specifically for this project must be fabricated by a distributor/agent within their shop, according to ANSI/SDI standards listed within this specification.

1. Provide written documentation of manufacturer's acceptance for fabrication outside of manufacturer's plant; similar to 2nd Location Certified program of the Assa Abloy brands.
2. Fabricator of fire-rated frames must provide proof of UL or Intek/Warnock Hersey license.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

1. At no time are the spreaders to be left in during installation.

C. Inspect hollow metal products for damage upon delivery.

1. All surface scratches and scuffs must be immediately cleaned, finished smooth and repair painted with a direct-to-metal (DTM) rust inhibitive primer approved by hollow metal products manufacturer; primer to be accepted in writing, as compatible with Division 9 finish paint system.

D. Store hollow-metal doors and frames vertically under cover at project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1. Cardboard and other wrappings are to be promptly removed to promote air circulation and allow for inspections and repairs.
2. Hollow metal products must be stored in dry area and not exposed to moisture.
3. Place no more than 5 doors or 3-sided welded frames in a group to minimize the likelihood of damage due to excess handling. Special care and consideration must be given to multi-opening frames, transom, sidelight window assemblies and frames with special profiles.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; ASSA ABLOY.
2. Curries Company; ASSA ABLOY.
3. Custom Metal Products.
4. DCI Hollow Metal.
5. DE LA FONTAINE.
6. Fleming Door Products Ltd.; Assa Abloy Group Company.
7. Mesker Door Inc.
8. Pioneer Industries.
9. Republic Doors and Frames; Allegion Brand.
10. Security Metal Products Corp.
11. Basis-of-Design: Steelcraft; Allegion Brand.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

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1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
3. Temperature-Rise Limit: Where indicated on Drawings and at vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.

1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with NFRC 102 and/or ASTM C1363 and meet or exceed the following requirements:

    a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.374, R-Value 2.53, including insulated door and thermal-break frame.

2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with NFRC 400 and/or ASTM E283 to meet or exceed the following requirements:

    a. Rate of leakage of the door assembly shall not exceed 0.1 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).

3. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

D. Acoustical Doors:

1. Acoustical Doors shall conform to the American National Standard Acoustical Performance Criteria, Design Requirements and Guidelines for Schools, ANSI/ASA, S12.60.
2. These spaces include, but are not limited to, classrooms, instructional pods or activity areas, group instruction rooms, conference rooms, libraries, offices, speech clinics, offices used for educational purposes and music rooms for instruction, practice and performance.
3. The STC rating for hollow metal interior entry doors into multi-purpose, dining, gym, classrooms and other core learning spaces shall conform to the requirements of S12.60, with a minimum STC 30 operable rating. Doors between classrooms and music rooms shall be a minimum STC 40 operable rating. Comply with additional requirements as noted on the door schedule drawings.
4. Provide vision lite system consisting of acoustic glass, lite kit and glazing tape of the proper size and thickness to meet or exceed the STC acoustical rating of the door and frame assembly.
5. Provide gasketing and door bottoms as specified under 08 71 00.
6. Gasketing and door seals are not to be painted.
7. The door manufacturer shall provide a letter of certification from an independent testing laboratory accredited as an acoustical laboratory, verifying that conformance to the STC acoustical performance has been met with the specified gasketing, under 08 71 00. Testing shall be performed at laboratories that are accredited under the National Voluntary Laboratory Accreditation Program (NVLAP).
8. Doors shall have a 3/8” undercut.

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9. Coordinate adjustable mortise door bottom as specified in Section 08 71 00 with bottom door channel and undercuts.

E. Electrical Requirements:

1. General: Make provisions for installation of electrical items specified elsewhere.
2. Provide all cutouts and reinforcements required for hollow metal doors to accept electrical door hardware and security system components.
3. Provide welded UL listed junction back boxes with metal conduit or raceway to permit wiring from electrical door hardware.
4. Junction /grout guard cover boxes must be caulked by installation contractor.
5. Refer to 08 71 00 for electrified hardware.

F. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound or thermally-rated must comply with the requirements specified for exterior doors and for sound or thermally-rated doors; where two requirements conflict, comply with the most stringent.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A..

1. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40.
d. Edge Construction: Model 2, Seamless.
e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
f. Core: Vertical steel stiffener.
g. Fire-Rated Core: Manufacturer's standard vertical steel stiffener core for fire-rated and temperature-rise-rated doors.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40.
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded; face welded not acceptable.

3. Exposed Finish: Prime.

a. Doors to be painted on all sides prior to installation.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. .

1. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.

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d. Edge Construction: Model 2, Seamless.
e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
h. Core: Polyurethane.
i. Fire-Rated Core: Manufacturer's standard vertical steel stiffener with insulation core for fire-rated doors.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
b. Construction: Kerf type; thermal break.
c. Thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400.
d. Fabricate with 1/16-inch positive thermal break and integral vinyl weatherstripping, matching tested assembly.
e. Fabricate with mitered corners; profile as indicated on drawings.
f. Metal: Minimum 0.081-inch (2.7-mm) thick steel sheet.
g. Products:

1) Assa Abloy brands; Mercury Thermal Break TQB Series.
2) DE LA FONTAINE; Thermal Break Profile.
3) Fleming Door Products; TB Series Frames.
4) Pioneer: Thermal Break Frames.
5) Equivalent product of other manufacturers named within this Section.

3. Exposed Finish: Prime.

2.5 EXTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

A. Commercial Doors and Frames: NAAMM-HMMA 861; ANSI/SDI A250.4, Physical Performance Level A. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 or A60 coating.
d. Edge Construction: Continuously welded with no visible seam.
e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
f. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
g. Core: Steel stiffened.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide; with minimum G60 or A60 coating.
b. Construction: [**Face**] [**Full profile**] welded.

3. Exposed Finish: Prime.

B. Commercial Laminated Doors and Frames: NAAMM-HMMA 867; ANSI/SDI A250.4, Physical Performance Level A. [**At locations indicated in the Door and Frame Schedule on Drawings**] <**Insert locations**>.

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1. Doors:
    a. Type: As indicated in the Door and Frame Schedule on Drawings.
    b. Thickness: 1-3/4 inches.
    c. Face: Metallic-coated steel sheet, minimum thickness of [**0.053 inch**] [**0.042 inch**], with minimum G60 or A60 coating.
    d. Edge Construction: [**Continuously welded with no visible seam**] [**Interlocking with visible seam**] [**Interlocking with no visible seam**] [**Projection, spot, or tack welded with or without visible seams**].
    e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
    f. Bottom Edges: Close bottom edges of doors[**where required for attachment of weather stripping**] with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
    g. Core: [**Kraft-paper honeycomb**] [**Polyisocyanurate**] [**Polystyrene**] [**Polyurethane**] [**Vertical steel stiffener**].
2. Frames:
    a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 or A60 coating.
    b. Construction: [**Knocked down**] [**Face welded**] [**Full profile welded**].
3. Exposed Finish: [**Prime**] [**Unprimed**].

2.6 BORROWED LITES

A. Fabricate of metallic-coated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Full profile welded.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.7 FRAME ANCHORS

A. Jamb Anchors:
1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
    a. Wire type anchors are not permitted.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor; shims must be used if floor is not level.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

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1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

2.8 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

H. Primer Repair Paints:

1. Type: Rust inhibitive zinc-rich primer approved by hollow metal products manufacturer; primer to be accepted in writing, as compatible with Division 9 finish paint system.
2. Products installed in building interior:

a. Certificate stating compliance with California Department of Public Health (CDPH) Standard Method including TVOC range.
b. Include product data stating VOC content in grams per Liter (g/L).

2.9 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

4. Frames fabricated outside of manufacturer's plant, by authorized agent/distributor:

a. Comply with applicable fire-rating and ANSI/SDI requirements.
b. Re-prime entire frame with zinc-rich DTM primer (all surfaces) in addition to ANSI/SDI requirements, following fabrication.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

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1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.10 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

A. The area of the floor on which the frame is to be installed and the path of the door swing to be checked for flatness and levelness. Permissible tolerance is +/- 1/16 in. (1.5mm). If the floor exceeds this, it is the Contractor’s responsibility to correct the area that is out of tolerance before the frame is installed.

B. Frame is to be checked for correct opening number, size, swing, material thickness, fire rating and hardware requirements. If product does not comply with contract documents do not install and contact supplier.

C. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

1. At no time are the spreaders to be left in during installation.

D. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Immediately clean and repaint effected area with

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direct to metal (DTM) zinc-rich rust inhibitive primer compatible with specified Division 9 paint system.

b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
b. Shims must be used if floor is not level.

4. Solidly pack mineral-fiber insulation inside frames.
5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: During the installation of the frame, check the opening width, opening height, squareness, alignment, twist and plumbness. Permissible frame product installation tolerances are to be maintained within the following limits:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from the head to the floor.
e. Opening Width: Plus 1/16 inch or minus 1/32 inch, measured horizontally from rabbet to rabbet at top, middle and bottom of frame.
f. Opening Height: Plus 1/16 inch or minus 1/32 inch, measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension at each jamb and across the head.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

E. Primed or painted surfaces which have been scratched or otherwise marred during installation (including field welding) or cleaning, are to be promptly finished smooth, cleaned and touched up with a direct to metal (DTM) rust inhibitive primer compatible with specified Division 9 paint system.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, Section 7.2.1.15.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

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D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

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SECTION 08 14 23
STEEL-CLAD PANEL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes steel-clad panel doors and adjusta-fit steel frames at residential unit entries.

1.2 SUBMITTALS

A. Product Data: Door manufacturer's technical data for each type of door required, including details of construction relative to materials, dimensions of individual components, profiles and finishes.

B. Shop Drawings: Indicate location and size of each door; elevation of each door; construction details not covered in product data including those for stiles, rails, panels, and moldings (sticking); location and extent of hardware cutouts; fire ratings; and factory finishing requirements.

C. Product Certificate: Signed by manufacturer.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain steel panel doors from a single manufacturer.

B. Fire-Rated Steel Panel Doors and Frames: Provide panel doors and frames which are identical in materials and construction to units tested in door and frame assemblies and which are labeled and listed for fire ratings indicated by UL, Warnock Hersey or other testing and inspection agency acceptable to authorities having jurisdiction.

C. Product Certification: Require door manufacturer to certify that doors comply with specified requirements including those of referenced door standard.

1. FHA materials release No. 1011.
2. Fire endurance test.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration.

B. Identify each door with individual opening numbers which correlate with shop drawing designation system for doors, frames and hardware, using temporary, removable or concealed markings.

1.5 PROJECT CONDITIONS

A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with requirements of the quality standards applicable to project's geographical location.

PART 2 - PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide metal-clad panel steel doors manufactured by one of the following:

1. Steel Entrance Doors and Frames.

    a. Benchmark HSW.
    b. Ceco Door Products Division.
    c. Jeld-Wen, Inc.
    d. Therma-Tru

2.2 MATERIALS

A. Steel: ASTM A 653; galvanealled A40 zinc-coated steel door and frame.

B. Core: Foamed in place polyurethane with insulating value of core: R-11.

2.3 STEEL PANEL DOORS AND FRAMES

A. Fabricate doors with single piece panel and lock seam edge design. Provide reinforced cutouts for hardware.

1. Panel Thickness: 24 gage.
2. Hinge Reinforcing: 10 gage steel.
3. Lockset Reinforcing: 18 gage steel.
4. Other Surface Reinforcements: 16 gage steel.
5. Door Style: 2-panel type as indicated on Drawings.
6. Sound Transmission Class (STC): 28.
7. Door Sizes: As indicated on Drawings.

    a. Basis-of-Design: Multi-Family Steel Door by Therma-Tru.

B. Fire-Rated Doors: Comply with the following requirements:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as required to provide fire rating indicated.

    a. Fire Rating: As indicated on Drawings.
    b. Basis-of-Design: Fire Rated Multi-Family Steel Door by Therma-Tru.

C. Door Frames: Comply with the following requirements:

1. Steel Frames: 18-gage galvanized steel jamb with wood trim.

    a. Basis-of-Design: Adjusta-Fit Frames by Benchmark Therma-Tru.
    b. Fire Rating: As indicated on Drawings

D. Factory-prefit doors to fit frames with uniform clearances and bevels as indicated below:

1. Fitting Clearances for Fire-rated Doors: Comply with NFPA 80.
2. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Accessories:

1. Viewers: Provide viewer in each door. Provide 2 viewers in doors to Handicapped units as shown on Drawings.
2. Weatherstripping.
3. Provide narrow threshold with weatherstripping.

2.4 SHOP PRIMING

A. Factory prime faces and edges of doors and frames with one coat of manufacturer’s standard white primer.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify door opening conditions for compliance with the Drawings. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation see Division 8 Section "Door Hardware".

B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Prefit Doors: Fit doors to frames for uniform clearance at each edge.

D. Field-Finished Doors: Refer to Division 9 Section “Painting” for finishing requirements.

3.3 ADJUSTING AND PROTECTION

A. Operation: Rehang or replace doors which do not swing or operate freely.

B. Finish Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that doors are without damage at time of Substantial Completion.

PART 4 - END OF SECTION

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SECTION 08 14 80
RESIDENTIAL WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Molded solid core raised panel wood doors with hardboard faces, prehung on wood frames.
2. Molded hollow-core raised panel wood doors with hardboard faces, prehung on wood frames or field hung on pocket door hardware.

1.2 QUALITY ASSURANCE

A. General: Comply with requirements of the following standards unless otherwise indicated.

1. NWWDA Quality Standards.
2. ANSI/AHA 135.4; Basic Hardboard Product Standard.

1.3 SUBMITTALS

A. Product Data: Submit door manufacturer's product data, specifications and installation instructions for each type of wood door.

1. Include details of core and edge construction, trim for openings and similar components.
2. Include certifications as may be required to show compliance with specifications.

B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

C. Specific Product Warranty: Submit written agreement in door manufacturer's standard form signed by Distributor, Installer and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show photographing of construction below in face veneers, or do not conform to tolerance limitations of industry standards.

1. Interior Wood Doors: One year from date of Substantial Completion.

D. Green Communities Submittals:

1. Product Data for Credit HLE 7.3: For composite wood products, documentation indicating compliance with ANSI A208.1 and A208.2.

a. Alternative Compliance: For composite wood products not in compliance with ANSI, documentation indicating all exposed edges and sides are shop-sealed with low-VOC sealants.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect wood doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 RAISED PANEL SOLID CORE MOLDED WOOD DOORS

A. Interior Molded Panel Doors:

1. Face Panels: High density fiberboard, 1/8-inch nominal thickness, grain finish.

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2. Construction: Face panels glued directly to core.
3. Edge Banding: Manufacturer’s standard.
4. Basis-of-Design: Molded Panel Series 2 Panel Roman Smooth Door "Safe'N Sound" solid core by Masonite.

B. Provide raised panel solid core molded wood doors at apartment mechanical closets.

2.2 RAISED PANEL HOLLOW CORE MOLDED WOOD DOORS

A. Interior Molded Panel Doors:

1. Face Panels: High density fiberboard, 1/8-inch nominal thickness, grain finish.
2. Construction: Face panels glued directly to core.
3. Edge Banding: Manufacturer’s standard.
4. Basis-of-Design: Molded Panel Series 2 Panel Roman Smooth Door by Masonite.

B. For all interior apartment doors, including closet doors (except mechanical closets).

2.3 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 3/8 inch from bottom of door to top of threshold.
2. Bevel doors 1/8 inch in 2 inches at lock and hinge edges.

B. Frames: Solid finger-joint pine split jamb, rabbited and screwed with profile stops and fiber style rails, W376.

C. Provide doors with standard lockset bore and hinges in accordance with Division 8 Section “Door Hardware.”

2.4 SHOP PRIMING

A. Doors Primer Finish: Shop prime exposed portions of doors for paint finish with one coat of wood primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Field-Finished Doors: Refer to the following for finishing requirements:

1. Division 9 Section "Interior Painting."

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3.3 ADJUSTING AND PROTECTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

PART 4 - END OF SECTION

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SECTION 08 16 14 – RESIDENTIAL FIBERGLASS DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fiberglass entry door system including door frame and sidelite.

1.2 SUBMITTALS

A. Reference Section 01 30 00 – Administrative Requirements; submit following items:

1. Product Data:

a. Manufacturer’s data sheets on each product to be used.
b. Preparation instructions and recommendations.
c. Storage and handling requirements and recommendations.
d. Typical installation methods.
e.

2. Shop Drawings: Include dimensions, construction, component connections, anchorage methods and locations, accessories, hardware locations, and installation details.
3. Samples: Submit selection samples for verification, include the following:
4. Two representative units of each type, size, pattern and color.

1.3 Quality Assurance

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.4 DELIVERY, STORAGE and HANDLING

A. Comply with Manufacturer’s/Dealer’s ordering instructions and lead time requirements to avoid construction delays.

B. Delivery: Deliver materials in Manufacturer’s standard packaging for protection of product.

C. Storage & Protection: Store products away from exposure to environmental conditions that may be harmful to materials.

D. Store materials off ground in an upright position. Provide cover from weather and construction activity.

E. Follow Manufacturer’s instructions on label applied to units.

1.5 WARRANTY

A. Commercial Warranty:

1. Provide 10 Year Warranty from Date of Substantial Completion.
2. Manufacturer's standard limited warranty for fiberglass door product and genuine manufacturer components, including rot-resistant frames, mullions, and brickmould sourced from manufacturer (excluding primed pine door frames and oak door frames, and non-rot resistant mullions and brickmould) used in commercial and multi-residential

projects will be free from material and workmanship defects for a period of three years subject to certain limitations and restrictions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Smooth-Star by Therma-Tru Corp or provide equivalent product.

2.2 FIBERGLASS ENTRY DOORS

A. Performance Requirements:

1. Standards Compliance: Energy Star Rated.
2. Door Unit Air Leakage, NFRC 400 at 1.57 psf (75 Pa): Maximum 0.50 cfm (14 L/min) per square foot (0.09 square meter) of frame.
3. Door Unit Water Penetration, ASTM E331 or ASTM E547: No water penetration through door unit with water applied at rate of 5 gallons (19 Liters) per hour per square foot (0.09 square meters) at 0 psf (0 Pa).
4. Maximum U-Factor (NFRC 100): 0.23
5. Maximum SHGC - Solar Heat Gain Coefficient (NFRC 200): 0.10
6. STC: 26
7. OITC: 24

B. Fiberglass: AAMA 305 glass fiber reinforced thermoset profile.

C. Basis of Design: Smooth-Star; as manufactured by Therma-Tru Corp.

1. Construction: Proprietary fiberglass-reinforced thermoset composite:

a. Thickness: 1/16-inch (1.6 mm) minimum.
b. Surface: Lightly textured.
c. Door Edges: Machinable kiln-dried pine, primed, lock edge reinforced with engineered lumber core, lockset area reinforced with solid blocking for hardware backup.
d. Door Edges: Moisture and decay resistant composite.
e. Door Bottom Edge: Moisture- and decay-resistant composite.

1) Core: Foamed-in-place polyurethane, density 1.9 pcf (30 kg/cu.m.) minimum

f. Door Style: Smooth-Star
g. Style No. S4810XN | Craftsman Lite 2 Panel Shaker Flush-Glazed

1) Size: As indicated on Drawings.
2) Sidelite: Style S2000SL-XN

D. Factory Glazed:

1. Type: Double-pane.
2. Type: Privacy glass, Granite.

E. Weatherstripping:

1. Vinyl compression bulb seal

F. Finish: To be selected from manufacturer’s full line of standard finishes.

2.3 FRAMES:

A. Basis-of-Design: Adjusta-Fit 2 Steel Frames as manufactured by Dunbarton Door and Entry Systems, distributed by Therma-Tru. Complete knock down frame kits for field assembly. Frame may be cased out with steel, wood or composite casing.

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1. Frame member: ASTM A40 hot dipped galvanized in 0.4 oz class conforming to ASTM A924 and ASTM A653.
2. Fitted Frame: Adjustable two piece fabricated 18 gauge steel.
    a. Base Profile: Rabbeted for doors.
    b. Stop Kerf: 5/8 inch (mm) high to receive foam weather-strip.
    c. Interlocking base and closure with 1 inch (25 mm) adjustability.
    d. Fire Rating: Up to 90 minutes for positive and neutral pressure rating.

B. Hardware Preparation: Frames to be mortised, reinforced, drilled, and tapped to receive specified mortise hardware and reinforced only for specified surface hardware.

C. Exposed Surfaces: Manufacturer's standard baked-on synthetic enamel applied over a cleaned and phosphate coated surfaces.

D. Sill: Barrier free ADA compliant extruded aluminum mill finish

2.4 GLAZING

A. Insulated Glass Units: ASTM E 774, Class A, fully tempered.

1. Glazing Type: Dual Glaze
    a. SunCoat® Low-E/Clear
    b. Gas Filled:
        1) Argon
    c. Glass Thickness:
        1) Per Manufacturer’s Specifications
2. Glass: Minimum 1/8 inch (3 mm) tempered, two panes with sealed airspace between, airspace typically 1/4 to 3/4 inch (6 to 13 mm).

2.5 FABRICATION

A. Fabricate frames and panels with milled and mitered joints and mechanically joined corners.

B. Trim and finish corners and welds to match adjacent surfaces.

C. Factory exterior wet silicone glaze with snap-on glazing stops matching exterior panel and frame finish. Insulated glass units shall be reglazable without dismantling panel framing.

1. Note: Field glazing is required for large window units (over 40 sq. ft).

2.6 FINISH

A. Frame and Panel Color:

1. Exterior (baked-on enamel): [Frost] [Sand] [Harmony] [Fern] [Cinnamon] [Bark] [Black Bean].
2. Interior: Painted finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly constructed and prepared.

B. Coordinate with responsible entity to correct unsatisfactory conditions.

C. Commencement of work by installer is acceptance of substrate conditions.

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3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

1. Install 20 minute doors with permanent fire door certification label in compliance with the requirements of the labeling agency and NFPA.
2. Maintain alignment and compatibility with adjacent work.
3. Steel Frame Installation: To be plumb, straight and true, rigidly secured in place, and properly braced.
4. Comply with the Following:

a. Manufacturer's installation instructions
b. ANSI/DHIA115-IG installation guide.
c. Door and Hardware Institute (DHI) installation standards.
d. Steel Door Institute (SDI) installation and maintenance standards.

3.3 CLEANING AND FINISHING

A. Clean products in accordance with the manufacturer's recommendations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Protect installed products until completion of project.

END OF SECTION

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SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames.
2. Fire-rated access doors and frames.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

B. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspecting agency.

1. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

1.4 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

1.5 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies meets the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES - NON-PUBLIC SPACES

A. Flush Access Doors with Exposed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Activar Construction Products Group, Inc. - JL Industries.
b. ACUDOR Products, Inc.
c. Babcock-Davis.
d. Karp Associates, Inc.
e. Larsens Manufacturing Company.
f. MIFAB, Inc.
g. Milcor; a division of Hart & Cooley, Inc.

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h. Nystrom.
i. Williams Bros. Corporation of America (The).

2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory [**primed**] [**finished**].
4. Frame Material: Same material, thickness, and finish as door.
5. Latch and Lock:

a. Provide door panel with cylinder lock for doors within 8 feet of finished floor.
b. Provide cam latch, screwdriver operated other locations.

B. Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Activar Construction Products Group, Inc. - JL Industries.
b. ACUDOR Products, Inc.
c. Babcock-Davis.
d. Karp Associates, Inc.
e. Larsens Manufacturing Company.
f. MIFAB, Inc.
g. Milcor; a division of Hart & Cooley, Inc.
h. Nystrom.
i. Williams Bros. Corporation of America (The).

2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory [**primed**] [**finished**].
4. Latch and Lock:

a. Provide door panel with cylinder lock for doors within 8 feet of finished floor.
b. Provide cam latch, screwdriver operated other locations.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Activar Construction Products Group, Inc. - JL Industries.
b. ACUDOR Products, Inc.
c. Babcock-Davis.
d. .
e. Karp Associates, Inc.
f. Larsens Manufacturing Company.
g. MIFAB, Inc.
h. Milcor; a division of Hart & Cooley, Inc.
i. Nystrom.
j. Williams Bros. Corporation of America (The).

2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with exposed flange, self-closing door, and concealed hinge.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage, factory [**primed**] [**finished**].
5. Frame Material: Same material, thickness, and finish as door.
6. Latch and Lock: Self-latching door hardware; provide with cylinder lock for doors within 8 feet of finished floor.

B. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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a. Activar Construction Products Group, Inc. - JL Industries.
b. ACUDOR Products, Inc.
c. Babcock-Davis.
d. Karp Associates, Inc.
e. MIFAB, Inc.
f. Milcor; a division of Hart & Cooley, Inc.
g. Nystrom.
h. Williams Bros. Corporation of America (The).

2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage, factory [**primed**] [**finished**].
5. Frame Material: Same material, thickness, and finish as door.
6. Latch and Lock: Self-closing, self-latching door hardware; provide with cylinder lock for doors within 8 feet of finished floor.

2.4 FLUSH ACCESS DOORS FOR WALLS AND CEILINGS SET IN GYPSUM BOARD - PUBLIC SPACES

A. Basis-of-Design Products:

1. Bauco Plus Access Doors/Acudor Products, Inc.
2. RDWPD Series by Karp

B. Description: Face of the door contains factory installed drywall to match the texture of the surrounding gypsum board; pan type unit for field fitting gypsum board is not acceptable. The door frame shall include a drywall bead so that drywall cement can be applied to conceal the flange.

C. Door: Aluminum with gypsum board inserted into door panel.

D. Frame: Recessed aluminum provides similar edge to drywall bead against which wall or ceiling surface can be finished.

E. Hinge: Concealed non corroding two point pin hinge. Hinge allows door panel to open to 120 degrees, and also allows for door panel to be removed

F. Latch: Self-latching device; provide with cylinder lock for doors within 8 feet of finished floor; also allows for door panel to be removed.

G. Finish: Mill Finish. Drywall is ready to be finished to match surrounding wall or ceiling surface.

2.5 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

C. Aluminum Extrusions: ASTM B221, Alloy 6063.

D. Aluminum Sheet: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

E. Frame Anchors: Same material as door face.

F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.6 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

D. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.
3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 08 71 00 "Door Hardware."

2.7 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated access door in accordance with NFPA 80, Section 5.2.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated access door indicating compliance with each item listed in NFPA 80.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 08 31 13

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SECTION 08 53 13 - VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes vinyl-framed windows with integral nailing fins.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review, discuss, and coordinate the interrelationship of vinyl windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for vinyl windows.

B. Shop Drawings: For vinyl windows.

1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.

D. Samples for Initial Selection: For units with factory-applied finishes.

1. Include Samples of hardware and accessories involving color selection.

E. Samples for Verification: For vinyl windows and components required, prepared on Samples of size indicated below:

1. Exposed Finishes: 2 by 4 inches.
2. Exposed Hardware: Full-size units.

F. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of vinyl window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

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B. Installer Qualifications: An installer acceptable to vinyl window manufacturer for installation of units required for this Project.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain vinyl windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: WDMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: LC.
2. Minimum Performance Grade: 35.

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.25 Btu/sq. ft. x h x deg. F or lower.

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40 or lower.

E. Sound Transmission Class (STC): Rated for not less than 37 STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.

F. Outside-Inside Transmission Class (OITC): Rated for not less than 30 OITC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E1332.

G. NFRC-Certification: All windows to bear label by NFRC.

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2.3 VINYL WINDOWS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. VPI Quality Windows; Endurance Series.
2. Approved Equal, subject to Owner and Architect review for performance requirements.

B. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Casement: Project in.
2. Single hung.
3. Fixed/Picture.

C. Frames and Sashes: ~~Impact-resistant~~, UV-stabilized PVC complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Finish: Integral color, white .
2. Gypsum Board Returns: Provide at interior face of frame.
3. Integral nailing fins.

D. Insulating-Glass Units: ASTM E2190.

1. Glass: ASTM C1036, Type 1, Class 1, q3.

a. Tint: Clear.
b. Kind: Fully tempered where indicated on Drawings.

2. Lites: Two.
3. Filling: Fill space between glass lites with argon.
4. Low-E Coating: Pyrolytic on second surface.
5. Provide translucent glazing at panes where indicated in Drawings.

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

1. Dual Glazing System:

a. Interior Lite: Insulating-glass unit.
b. Exterior Lite: Insulating-glass unit.

F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.

G. Projected Window Hardware:

1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.

a. Type and Style: As selected by Architect from manufacturer's full range of types and styles.

2. Hinges: Manufacturer's standard type for sash weight and size indicated.
3. Single-Handle Locking System: Operates positive-acting arms that pull sash into locked position. Provide one arm on sashes up to 29 inches tall and two arms on taller sashes.
4. Limit Devices: Concealed support arms with adjustable, limited, hold-open limit devices designed to restrict sash opening.

a. Limit clear opening to 4 inches for ventilation; with custodial key release.

5. Provide all operable hardware at a maximum of 48 inches above the finish floor.

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H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location: Full, inside for project-out sashes.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
2. Finish for Exterior Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range.

C. Glass-Fiber Mesh Fabric: 18-by-14 or 18-by-16 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.

1. Mesh Color: Manufacturer's standard.

2.5 FABRICATION

A. Fabricate vinyl windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze vinyl windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Mullions: Provide mullions and cover plates, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units. Provide manufacturer's standard finish to match window units.

E. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.

F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
2. Air-Infiltration Testing:

a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.

3. Water-Resistance Testing:

a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Windows will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 53 13

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SECTION 08 71 00

DOOR HARDWARE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide finish hardware for aluminum, standard and custom steel and wood door openings.

B. Related Sections

1. Section 06 10 00 – Rough Carpentry
2. Section 06 20 00 – Finished Carpentry
3. Section 07 92 00 – Joint Sealers – Exterior Thresholds
4. Section 08 11 00 – Metal Doors and Frames
5. Section 08 14 00 – Wood Doors
6. Section 08 41 00 – Entrances and Storefront
7. Section 09 90 00 – Painting and Coating
8. Section 26 20 00 – Low Voltage Electrical Distribution
9. Section 28 00 00 – Electronic Safety and Security

1.02 REFERENCES

A. American National Standard Institute (ANSI) ANSI A117.1 2009 Accessible and Useable Buildings and Facilities.

B. ANSI/BHMA A156.18 – 2006 Materials and Finishes

C. National Fire Protection Association (NFPA)

1. *NFPA-80 Fire Doors and Other Opening Protective* – 2013
2. *NFPA 101 Life Safety Code*, 2012

D. Door and Hardware Institute (DHI)

1. *Installation Guide for Doors and Hardware*, 1984
2. *Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames*, 1996
3. *Keying Systems and Nomenclature*, April 1999

4. *Sequence and Format for the Hardware Schedule*, 2016

1.03 SUBMITTALS

A. General Requirements: Coordinate and furnish Submittals under provisions of Section 01 33 00 – Administrative Requirements for Submittal Procedures.

B. Schedules:

1. Furnish submittal electronically in a vertical, searchable, and portable document format (PDF) conforming to the DHI publication *Sequence and Format for Hardware Schedule* using the Architect's door and hardware set numbers, index, and abbreviation list. Combine identical openings in hardware headings.
2. In the furnished submittal, provide the project name, date, name of the Contractor, the entity that prepared the submittal and the name of the person who prepared the submittal.
3. Before submission, stamp each page of the hardware schedule with the seal from an Architectural Hardware Consultant (AHC) or Architectural Opening Consultant (AOC) enrolled in the DHI Continuing Education Program to demonstrate correctness and compliance with specification and project requirements.

C. Product Data: Furnish the manufacturer's data sheets on each product, including preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods. Also, provide BHMA finish codes per ANSI A156.18 for each item, along with the name, part number, and manufacturer. Be sure to include fasteners and fastening requirements. Provide hardware mounting locations for door and frame sizes, handing, materials, fire rating and degrees of swing.

D. Templates: Upon receipt of the approved hardware schedule, furnish the manufacturer's hardware template information in electronic format to the door and frame supplier(s) upon request. Include requirements for internal reinforcements required for surface-mounted hardware.

E. Wiring Diagrams: Furnish a copy of the finish hardware schedule submission on paper (11 x 17 inch) and in electronic format. Provide operation description,

elevation and riser wiring diagrams for door openings with electrified hardware or access control devices. Elevation drawings will include an operational description and approximate placement of components. Once the finish hardware schedule is approved, provide point-to-point wiring diagrams for each application.

F. Keying Schedules: Upon approval of the finished hardware schedule, meet with the Owner's representative to determine the project keying requirement. Format the keying information per DHI publication *Keying Systems and Nomenclature*, 1999.

G. Samples:
   1. Furnish the following with the hardware submittal:
      a. A sample of each product the Architect requests.
      b. One of each lock and lever style.
      c. An exit device with trim lever style in the finish as specified in the hardware submittal.
   2. Once approved, samples will be given to the Contractor for use on the project.

H. Operations and Maintenance Manuals: Furnish operations and maintenance manual per Section 01 78 23 - Operations and Maintenance Data as follows:
   1. Furnish one copy of the manual on the date of Substantial Completion in a binder labeled with project information, including the date, name of the furnishing contractor, and entity contact information for the hardware supplier.
   2. Include in the manual:
      a. Copy of approved hardware schedule, including door number and locations. Identify fire-rated doors to aid in annual fire door inspection.
      b. Copy of approved keying schedule.
      c. Catalog data for each product.
      d. As-installed "wiring diagrams" for each opening connected to power.
      e. Parts list for locksets, exit devices, door closers, and auto door operations.
      f. Installation templates and instructions.
      g. Warranty information.

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1.04 QUALITY ASSURANCE

A. Supplier shall employ a certified Architectural Hardware Consultant (AHC) who shall be available during work for project hardware consultation to the project team and to administer and supervise the project. The AHC will be enrolled in the DHI Continuing Education Program to demonstrate correctness and compliance with specification requirements.

B. The installer shall be competently skilled in the installation methods and procedures for commercial doors, frames and hardware. Use appropriate tools, accessories and techniques to install finish hardware items.

C. Pre-Installation Meeting: Before installing hardware, meet with the installer and hardware supplier to review the project's door, frame and hardware requirements. Provide the installer with a copy of the approved finish hardware schedule. Review the manufacturers' installation instructions for each hardware item. Send a compliance letter, with the meeting date and who was in attendance, to the Architect.

D. Fire-Rated Door Openings:

1. Hardware items installed on fire-rated door assemblies shall comply with *NFPA 80* as tested and listed by the door, frame and hardware manufacturers.
2. Latch bolt projections and assemblies, door closing devices, and fire exit hardware shall bear labels or marks from testing as proof of compliance with fire-rated door assembly requirements. Fasteners used to attach hardware items to fire-rated door assemblies shall be of the types and sizes tested and recommended by the hardware manufacturer for each application.
3. Provide fire exit hardware on door leaves bearing the label stating, "Fire Door to be Equipped with Fire Exit Hardware."

1.05 SHIPPING, HANDLING, AND DELIVERY

A. Marking and Packaging:

1. Deliver hardware to the job site per Section 01 60 00 (Products) in one shipment in the manufacturer's original packaging marked to correspond with

the approved hardware schedule with the Architect's door numbers and hardware sets.

2. Mark locksets, exit devices, cylinders, auxiliary hardware and key switches with keyset numbers.

B. JSN Site Delivery: With the hardware supplier, jointly check and inspect hardware upon delivery to the job site, inspecting against the approved hardware schedule. Correct discrepancies or shortages to meet the construction schedule. Discrepancies or shortages to be corrected to meet the construction schedule. Replace wet or damaged packaging with new products to meet the construction schedule.

C. Storage: Provide a securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc. Damaged material, including degraded finishes, shall be replaced with new material. Store hardware items off the floor on shelving. Store large hardware items (exit devices, door operators, thresholds, and seals) on wooden pallets. Arrange locksets and keyed cylinders by door opening number. Arrange all remaining hardware by hardware set number.

1.06 WARRANTY

A. See Section 01 78 00 - Warranty & Closeout Submittals for additional warranty requirements. Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrently with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Warranty Period: The written warranty, executed by the manufacturer(s), agrees to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within the specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures, including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.

3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the system's operation.

C. Standard Warranty Period: Unless otherwise indicated, one year from the date of Substantial Completion.

1.07 MAINTENANCE AND SERVICE CONTRACTS

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and instructions as needed for the Owner's continued adjustment, maintenance, and door hardware removal and replacement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The following manufacturers are acceptable for use on the project. Provide hardware items from one of the manufacturers listed.

1. Hinges	Pamex
2. Power Transfer Device	Pamex
3. Flush Bolts	Pamex
4. Magnetic Catches	Pamex
5. Locksets and Levers	Pamex
6. Deadbolts	Pamex
7. Exit Devices	Pamex
8. Cylinders	Pamex
9. Door Pulls	Don Jo
10. Push/Pull Plates	Pamex
11. Surface Door Closers	Pamex
12. Overhead Stops	Pamex
13. Doorstops	Pamex
14. Magnetic Door Holder	Pamex
15. Protection Plates	Pamex
16. Silencers	Pamex

17.	Door Viewers	Pamex
18.	Perimeter Seal & Thresholds	Pamex
19.	Latch Guard Protector	Pamex
20.	Credential Reader	By Others
21.	Power Supply	By Others

2.02 SUBSTITUTIONS

A. Submit requests for substitution per Section 01 25 13 Product Substitution.

2.03 MATERIALS

A. SCREWS AND FASTENERS

1. Provide the manufacturer's recommended means of fastening for each application. Attach surface-mounted hardware items to door leaves with the appropriate fasteners without sex or grommet nuts. Exposed fasteners shall match the finish of the hardware item.

B. HINGES

1. Conventional Hinges
   a. Provide five-knuckle, steel base, full mortise, and ball-bearing hinges. Size hinges for height and weight per manufacturer's recommendations for appropriate applications and frequency of use. Size hinges for width to minimally clear trim. Include a non-removable pin (NRP) at locking doors with a reverse bevel. Provide two hinges for doors up to 5 feet in height, with one additional hinge for every 2'6" in height or a fraction thereof.
   b. Provide hinges manufactured by Pamex

Function	**Part Number**
Heavy Weight NRP	H45-04N
Standard Weight NRP	H45-02N
Standard Weight	H45-02R

C. BORED LOCKS

1. Cylindrical Lever Locks (Grade 1)
   a. Cylindrical locks and latches shall be heavy-duty models, handed for each opening, and made of brass base material.

Provide latch bolts with appropriate latch or bolt throw dimensions for fire-rated openings per manufacturers' listings.

Function	Part Number
Electrified, Fail-Secure	FYSP5CE-SE
Privacy	FYSP1C
Passage	FYSP3C
Storeroom	FYSP5C
Entry	FYSP0C

2. Cylindrical Lever Locks (Grade 2)
    a. Cylindrical locks and latches shall be medium-duty models, handed for each opening, and made of brass base material. Provide latch bolts with appropriate latch or bolt throw dimensions for fire-rated openings per manufacturers' listings.

Function	Part Number
Privacy	FLFP1C
Passage	FLFP3B
Dummy	FLFP4B

D. EXIT DEVICES
1. Provide fire exit and panic hardware devices properly handed and sized for each door application. Non-fire-rated exit devices shall have a cylinder-dogging feature. Include appropriate strikes to suit door, frame and floor conditions. Where the application requires, include the manufacturer's recommended shims for proper installation, sized appropriately for application, and door width, height, and thickness.

Single doors are to receive the rim exit device, and pairs of doors are to receive the surface vertical rod exit device. For less-bottom-rod (LBR) applications at fire-rated openings, use auxiliary fire bolts with less-bottom-rod (LBR) devices. Match the trim to the cylindrical lever lock trim unless otherwise specified.

Function	**Part Number**
Rim Exit Device	E9000/EO3
Narrow Stile Rim Exit	E9100/EO3
CVR Exit Device	E9020V/EO3X7
Narrow Stile CVR Device	E9120V/EO3X7

E. SURFACE DOOR CLOSERS

1. Surface-mounted door closers shall be properly handed, sized and have appropriate arms, auxiliary mounting brackets, spacers and fasteners to permit installation on the room side of the door opening out of public view as recommended by manufacturers for the applications used. Provide arms of the appropriate length for regular arm and top jamb applications. Closers shall have full covers. Closers installed on interior non-fire-rated openings shall have reduced opening spring power to meet accessibility requirements. Closers installed on fire-rated and exterior openings shall have the minimum spring power necessary to properly close and overcome latch-bolt friction and building stack pressures. Provide closers with a hydraulic back-check feature and delayed action. Wire closers at corridor dual egress or cross-corridor doors into the fire alarm system are to release the hold open upon fire alarm, smoke alarm or fire sprinkler activation or loss of building power.

Function	Part Number
Surface Closer	GC5900BF

F. DOORSTOPS

1. Overhead Stops and Holders
    a. Provide overhead stops and holders as scheduled in hardware sets, sized for door width and application. Include applicable mounting accessories and brackets to accommodate the frame profile, the top rail of the door, and hardware.

Function	Part Number
Medium-duty surface stop	DD08-13S36SS

2. Wall Bumpers
    a. Provide wall stops with convex or concave bumper as needed.

Function	Part Number
Wall stop, Concave	DD02-53

3. Roller Bumper
    a. Provide roller bumper with padding.

Function	Part Number
Roller Bumper	DD02-25

4. Hinge Pin Stops
    a. Provide hinge pin stops to be used with hinges as needed.

Function	Part Number
Hinge Pin Stop	DD02-41

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5. Spring Stops
    a. Provide spring stops for doors as needed.

Function	Part Number
Spring Stop	DD02-31

G. MISCELLANEOUS HARDWARE
1. Door Viewer
    a. Provide a Pamex door viewer for all unit entry doors. Provide additional Pamex door viewers at ADA-accessible units.

Function	Part Number
UL Door Knocker Viewer	DD01-K180ULSN

2.04 FINISHES

A. Provide hardware with finishes conforming to BHMA A156.18:
1. Exterior & Interior Hinges — 630, 646
2. Interior Dwelling Unit Hinges — 646 (or Pre-hung by Door Supplier)
3. Residential Latches — 619
4. Common Area Locks and Latches — 619
5. Closers — 689
6. Hardware — 619, 626, 630, 646, 689, 719, BRN, GRY

2.05 KEYING

A. Factory key locks and cylinders must have a new Schlage 6-Pin Conventional Cylinder, which can expand to 10 master keys and 150 change keys. Mark the keyset number on the core body and key bow. Furnish a visual key control stamp on the key bow with the keyset symbol and "Do Not Duplicate." Deliver master keys and bitting list to Owner via Certified Mail with return receipt requested. Provide the following minimum number of keys: Three (3) Grand Master Keys, three (3) Master Keys per Master Key Group, and ten (10) Construction Keys.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Before installing door hardware, verify that the conditions are satisfactory for installing finish hardware. Before installing hardware, wash the masonry and paint/stain the doors and frames. Verify that the door frames are level, plumb, square, and true. Rectify any incorrect door frame installation before proceeding with the installation of finish hardware.

3.02 INSTALLATION

A. Fasteners: Install hardware using only fasteners from the manufacturer. Drill and countersink items that are not factory-prepared for fasteners.

B. Hardware Mounting Heights: Install hardware compliant with the DHI publication, *Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames,* with the following exceptions:

1. Kick plates installed flush to the bottom of the door.

C. Clearances: Install fire door and non-rated door assemblies with clearances at the door edge to frame and meeting edge of pairs of doors in compliance with NFPA 80.

D. Door Closers: Mount closers out of site and public view using arms and brackets to suit the application.

E. Thresholds and Saddles: Install weatherstrip before installation of door closers and exit devices without cutting or notching weatherstrip. Trim, cut and notch thresholds and saddles neatly to minimally fit the profile of the door frame. Install thresholds and saddles in a bed of silicon caulking, completely sealing the underside from water and air penetration.

F. Seals: Install a continuous seal around the perimeter of the opening.

G. Wall Stops: Provide wall blocking at wall stop locations.

3.03 FIELD QUALITY CONTROL

A. Prior to Substantial completion, secure the services of

1. An AHC

a. to inspect openings.

b. to replace or repair door hardware found to be defective, inoperable, or not compliant with submittals.

c. to verify that the door opens and closes smoothly without rubbing or catching and has positive latching where scheduled.

2. a Fire Door Assembly Inspector (FDAI)

a. to inspect fire-rated openings to ensure compliance with NFPA 80 Inspections and Testing.

b. to replace or repair door hardware found to be defective, inoperable, or not compliant with NFPA 80 Inspection and Testing.

c. to verify that the door opens and closes smoothly without rubbing or catching and has positive latching as scheduled.

B. Test electrified hold-open devices tied into the fire alarm system to confirm release upon alarm activation. Test delayed egress systems to ensure the time delay and the release follow local code requirements. Test electrified hardware and access control to verify systems operate as directed in the mode of operation. Repair or replace inoperable door hardware.

3.04 DEMONSTRATION

A. Demonstrate mechanical hardware and electrical, electrical and pneumatic hardware systems function correctly and to the Owner's intended design.

1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Defects shall be corrected by adjusting doors or hardware or replacing defective material at no expense to the Owner.

3.05 ADJUSTING AND CLEANING

A. Upon substantial completion, after the balance of heating and ventilation equipment, make final adjustments to the hardware and door opening so that the door opens, closes, and properly latches, free of binding, bowing, or any other way that damages the door or hardware.

1. Adjust door control devices to compensate for the HVAC system's final operation and comply with ANSI117.1 accessibility requirements.
2. Clean pencil or tool marks from adjacent surfaces damaged or soiled by work of this Section following the manufacturer's recommended procedures.
3. Clean and polish exposed hardware per the manufacturer's recommended procedures so that hardware shall be free from disfigurement. Replace any disfigured hardware at no cost to the Owner. Recycle cardboard boxes and paper products used in packaging and transporting finish hardware.

3.06 PROTECTION

A. Remove hardware before painting; finish and modify door and frame, then reinstall once complete. Wrap or mask exposed hardware with Kraft paper or bubble wrap to avoid exposure to paint, solvents, and abuse.

B. Protect fire labels on hardware with plastic or Kraft paper to prevent voiding labels.

C. Remove field and factory-applied paper, plastic, and film at Substantial Completion.

D. Repair or replace hardware damaged during construction at least two weeks before the date of substantial completion.

UNITS

QTY	UOM	DESCRIPTION	MODEL	FINISH	MFG
SET: RU-01		**UNIT ENTRY CORRIDOR (UE1)**			
		3'0" X 7'0" MCD X MTLF 45MINS			
2	EA	SPRING HINGE	H45S-00SN OR BY DOOR SUPPLIER (PRE-HUNG)	646	PAMEX
1	EA	BALL BEARING HINGE (TOP)	H45-02RSN OR BY DOOR SUPPLIER (PRE-HUNG)	646	PAMEX
1	EA	SINGLE CYLINDER DEADBOLT	FD861UL	619	PAMEX

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1	EA	PASSAGE LATCHSET	FYSP3C	619	PAME X
1	EA	SPRING STOP/HINGE PIN STOP/ROLLER BUMPER	DD02-31SN/DD02-48SN/DD02-25SN (AS REQ'D)	619	PAME X
1	EA	KNOCKER VIEWER	DD01-K1809ULSN	619	PAME X
1	EA	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
**		**NOTE: TWO DOOR VIEWERS REQUIRED AT ADA UNITS. ADD DOOR BELL AT "VHI" UNITS.**			

SET: RU-02

BEDROOM/BATHROOM (U1, U2)

2'10" X 6'8" WDD X WDF

3'0" X 6'8" WDD X WDF

3	EA	PLAIN BEARING HINGES	BY DOOR SUPPLIER (PRE-HUNG)	646	PAME X
1	EA	PRIVACY LEVERSET	FLFP1C	619	PAME X
1	EA	SPRING STOP/HINGE PIN STOP	DD02-31SN/DD02-41SN (AS REQ'D)	619	PAME X

SET: RU-03

W.I.C, W/D, LINEN, MP (U3, U4, U5, U7, U8)

3'0" X 6'8" WDD X WDF

2'10" X 6'8" WDD X WDF

2'8" X 6'8" WDD X WDF

2'6" X 6'8" WDD X WDF

2'0" X 6'8" WDD X WDF

1'6" X 6'8" WDD X WDF

3	EA	PLAIN BEARING HINGES	BY DOOR SUPPLIER (PRE-HUNG)	646	PAME X
1	EA	PASSAGE LATCHSET	FLFP3B	619	PAME X
1	EA	SPRING STOP/HINGE PIN STOP	DD02-31SN/DD02-41SN (AS REQ'D)	619	PAME X

SET: RU-04

W/D, CLOSET, MP (U9, U10)

2'6" X 6'8" PAIR WDD X WDF

2'0" X 7'0" PAIR WDD X WDF

6	EA	PLAIN BEARING HINGES	BY DOOR SUPPLIER (PRE-HUNG)	646	PAME X
2	EA	DUMMY LEVER	FLFP4B	619	PAME X
1	SET	MAG CATCH	DD05-22WH	WHT	PAME X
1	EA	SPRING STOP/HINGE PIN STOP	DD02-31SN/DD02-41SN (AS REQ'D)	619	PAME X

SET: RU-05

MECH FROM UNIT (U6)

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		2'8" X 6'8" SCWDD X WDF			
3	EA	PLAIN BEARING HINGES	BY DOOR SUPPLIER (PRE-HUNG)	646	PAME X
1	EA	SINGLE CYLINDER DEADBOLT	FD861	619	PAME X
1	EA	SPRING STOP/HINGE PIN STOP	DD02-31SN/DD02-41SN (AS REQ'D)	619	PAME X
SET: RU-06		**WH, MECH FROM CORRIDOR (UM1)**			
		3'0" X 7'0" HMD X HMF 45MIN			
3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	WEATHERSTRIPPING	DD13-WS313684AL	719	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
SET: RU-07		**WH, MECH FROM CORRIDOR (UM2)**			
		3'0" X 7'0" PAIR HMD X HMF 45MIN			
6	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	SET	CONSTANT FLUSH BOLT W/ FIRE BOLT	DD05-67FSC	626	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	COORDINATOR	E4000/DC52-AL	626	PAME X
1	EA	FILLER BAR	E4000/FB18-AL	626	PAME X
1	EA	MOUNTING BRACKET	E4000/MB3	BLK	PAME X
2	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
2	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	EA	ASTRAGAL SEAL	BY OTHERS	---	---
1	SET	WEATHERSTRIPPING	DD13-WS317284AL	719	PAME X
2	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12872AL	719	PAME X

SET: RU-08 **UNIT ENTRY EXTERIOR (1-E119, 1-E207, 1-E209, 1-E211, 2-E100, 2-E102, 2-E104, 2-E106, 2-E108, 2-E216, 3-E205, 3-E207, 3-E209)**

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		3'0" X 7'0" FGD/GLS X FGF			
3	EA	SPRING HINGE	H45S-00SS OR BY DOOR SUPPLIER (PRE-HUNG)	630	PAME X
1	EA	SINGLE CYLINDER DEADBOLT	FD861	619	PAME X
1	EA	PASSAGE LATCHSET	FYSP3C	619	PAME X
1	EA	OVERHEAD STOP/FLOOR STOP	DD08-13S36SS/DD02-613SN (AS REQ'D)	630/619	PAME X
1	EA	WEATHERSTRIPPING	BY DOOR SUPPLIER (PRE-HUNG)	---	---
1	EA	DOOR BOTTOM	BY DOOR SUPPLIER (PRE-HUNG)	---	---
1	EA	THRESHOLD	BY DOOR SUPPLIER (PRE-HUNG)	---	---
**		**ADD DOOR BELL AT "VHI" UNITS AS REQUIRED.**			

** **NOTE: OLD DOOR TAGS SUCH AS AC4, AC2, AB2, AM2, AM3 ETC USED ON UNIT PLANS. A FEW UNIT INTERIOR DOOR TAGS MISSING FROM UNIT PLANS**

COMMONS & AMENITIES

SET: B01		**CORRIDOR, LOBBY FROM UNCONDITIONED CORRIDOR (1-C100, 2-C209)**			
		3'0" X 7'0" HMD/GLS X HMF 45MIN			
3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	RIM FIRE EXIT HARDWARE	EF9000/EO3-AL	626	PAME X
1	EA	EXIT TRIM, PASSAGE	E9000/LFPA-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	FLOOR STOP	DD02-613SN	619	PAME X
1	EA	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
SET: B02		**LOBBY FROM CORRIDOR (1-C100B)**			
		3'0" X 7'0" HMD/GLS X HMF 45MIN			
3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	RIM FIRE EXIT HARDWARE	EF9000/EO3-AL	626	PAME X
1	EA	EXIT TRIM, PASSAGE	E9000/LFPA-AL	626	PAME X

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1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	EA	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X

SET: B03 **VESTIBULE INTERIOR (1-C101)**

3'0" X 7'0" ALD/GLS X ALF

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	RIM PANIC HARDWARE, ELR	E910E/EO3-AL	626	PAME X
1	EA	RIM CYLINDER, NIGHT LATCH	E9100/NLRCSC-AL	626	PAME X
1	EA	OFFSET PULL	1158	630	DON JO
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	EA	DROP BRACKET	GFDB590-AL (AS REQ'D)	689	PAME X
1	EA	BLADE STOP SPACER	GBSS590-AL	689	PAME X
1	EA	PERIMETER SEAL	BY STOREFRONT DOOR MFG	---	---
1	EA	CREDENTIAL READER W/ PHONE SYSTEM	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

SET: B04 **LEASING OFFICE, ADMIN OFFICE, SUPPORTIVE HOUSING ADMIN, MAINT. OFFICE (1-C103, 1-C105, 1-C106, 2-C211)**

3'0" X 7'0" HMD/GLS X HMF

3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	OFFICE ENTRY LEVERSET	FYSP0C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL (AS REQ'D)	689	PAME X
1	EA	WALL STOP	DD02-53SN	619	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B05 **OFFICE MECH/STORAGE, STORAGE (1-C103A, 1-C105A, 1-C106A, 1-C117A)**

2'8" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X

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3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B06 **WORKROOM (1-C104A)**

3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	CLASSROOM LEVERSET	FYSP8C	619	PAME X
1	EA	FLOOR STOP	DD02-613SN	619	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B07 **WORKROOM (1-C104B)**

3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	CLASSROOM LEVERSET	FYSP8C	619	PAME X
1	EA	OVERHEAD STOP	DD08-13S36SS	630	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B08 **PACKAGE, FITNESS, MEETING/FLEX OFFICE, WELLNESS CENTER (1-C107, 1-C116, 2-C208, 2-C210)**

3'0" X 7'0" HMD/GLS X HMF

3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	ELECTRIFIED LEVERSET, FAIL-SECURE	FYSP5CE-SE	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

** **Verify if EAC is required for the doors. If not, use mechanical leversets instead.**

SET: B09 **FILE ROOM (1-C108)**

3'0" X 7'0" HMD/GLS X HMF

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3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL (AS REQ'D)	689	PAME X
1	EA	FLOOR STOP	DD02-613SN	619	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B10 **MECH, STORAGE (1-C108A, 1-C112, 2-C108B, 2-C204A)**
3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	OVERHEAD STOP	DD08-13S36SS	630	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B11 **LAUNDRY ROOM(1-C109)**
3'0" X 7'0" HMD/GLS X HMF 45MIN

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	PASSAGE LATCHSET	FYSP3C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X

SET: B12 **MECH (1-C109B, 1-C116A, 3-C105)**
3'0" X 7'0" HMD X HMF 45MIN

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X

SET: B13 **UNISEX BATH (1-C110, 1-C111)**
3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	PRIVACY LEVERSET	FYSP1C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL (AS REQ'D)	689	PAME X

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1	EA	KICK PALTE	DD09-301034SS	630	PAME X
1	EA	MOP PLATE	DD09-30434SS	630	PAME X
1	EA	WALL STOP	DD02-53SN	619	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B14 **WATER ROOM, MAINT. STORAGE (1-C113, 3-C103)**
3'0" X 7'0" HMD/GLS X HMF 45MIN

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	WALL STOP	DD02-53SN	619	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X

SET: B15 **ELECTRICAL ROOM FROM CORRIDOR (1-C114)**
3'0" X 7'0" HMD X HMF 45MIN

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	RIM FIRE PANIC HARDWARE	EF9000/EO3-AL	626	PAME X
1	EA	EXIT TRIM, STOREROOM	E9000/LFS-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X

SET: B16 **BIKE STORAGE INTERIOR (1-C117)**
3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	ELECTRIFIED LEVERSET, FAIL-SECURE	FYSP5CE-SE	619	PAME X
1	EA	SURFACE CLOSER, DELAYED ACTION	GC5900BFDA-AL	689	PAME X

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1	EA	OVERHEAD STOP	DD08-13S36SS	630	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

** **Verify if EAC is required for the doors. If not, use mechanical leversets instead.**

SET: B17 **COMMUNITY ROOM INTERIOR (1-C118)**

3'0" X 7'0" HMD/GLS X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	RIM PANIC HARDWARE, ELR	E900E/EO3-AL	626	PAME X
1	EA	EXIT TRIM, STOREROOM	E9000/LFS-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	FLOOR STOP	DD02-613SN	619	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

** **Verify if EAC is required for the doors. If not, use mechanical hardware instead.**

SET: B18 **STORAGE (1-C118B, 2-C206)**

3'0" X 7'0" PAIR HMD X HMF

6	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	MANUAL FLUSH BOLT (TOP)	DD05-63SN	619	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	OVERHEAD STOP	DD08-13S36SS	630	PAME X
1	EA	FLOOR STOP	DD02-613SN	619	PAME X
2	EA	SILENCERS	DD02-81	GRY	PAME X

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SET: B19		**UTILITY/STORAGE, WATER ROOM, MAINT. STORAGE (1-C119, 1-C201, 1-C301, 1-C401, 2-C104, 2-C205)**			
		3'0" X 7'0" HMD X HMF 45MIN			
3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	WALL STOP	DD02-53SN	619	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
SET: B20		**TRASH ROOM, SERVICE CORRIDOR (1-C120, 1-C202, 1-C302, 1-C402, 2-C101, 2-C201, 2-C301, 2-C401, 3-C104)**			
		3'0" X 7'0" HMD X HMF 45MIN			
3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	PASSAGE LATCHSET	FYSP3C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
SET: B21		**VESTIBULE EXTERIOR, LOBBY EXTERIOR (1-EC101, 1-EC205)**			
		3'0" X 7'0" ALD/GLS X ALF			
3	EA	HW BALL BEARING HINGES X NRP	H45-04NSS	630	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	RIM PANIC HARDWARE, ELR	E910E/EO3-AL	626	PAME X
1	EA	RIM CYLINDER, NIGHT LATCH	E9100/NLRCSC-AL	626	PAME X
1	EA	OFFSET PULL	1158	630	DON JO
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	EA	DROP BRACKET	GFDB590-AL (AS REQ'D)	689	PAME X
1	EA	BLADE STOP SPACER	GBSS590-AL	689	PAME X
1	EA	PERIMETER SEAL	BY STOREFRONT DOOR MFG	---	---

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1	EA	DOOR BOTTOM - U SHAPE	DD13-DB5836AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED DURING SCHEDULED HOURS. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

SET: B22 **CORRIDOR EXIT, COMMUNITY ROOM EXTERIOR, STAIR EXTERIOR, LOBBY EXTERIOR (1-EC102A, 1-EC102B, 1-EC118, 1ESTA1, 1ESTB1, 2ESTB1, 2-EC209, 2ESTA2, 3ESTA1, 3ESTB2)**

3'0" X 7'0" HMD/GLS X HMF

3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSS	630	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	RIM PANIC HARDWARE, ELR	E900E/EO3-AL	626	PAME X
1	EA	EXIT TRIM, STOREROOM	E9000/LFS-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	WEATHERSTRIPPING	DD13-WS313684AL	719	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB5836AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

** **Verify if EAC is required for 1-EC102A. If not, use mechanical hardware instead.**

SET: B23 **CORRIDOR EXIT (3-EC100A, 3-EC100B)**

3'0" X 7'0" STLD X HMF STEEL GRATE

3	EA	BALL BEARING HINGES X NRP	H45-02NSS	630	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	RIM PANIC HARDWARE, ELR	E900E/EO3-AL	626	PAME X
1	EA	EXIT TRIM, STOREROOM	E9000/LFS-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X

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1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL (AS REQ'D)	719	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

SET: B24 **LOBBY EXTERIOR (2-EC109, 3-EC110)**

3'0" X 7'0" STLD X HMF STEEL GRATE

3	EA	BALL BEARING HINGES X NRP	H45-02NSS	630	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	RIM PANIC HARDWARE, ELR	E900E/EO3-AL	626	PAME X
1	EA	EXIT TRIM, STOREROOM	E9000/LFS-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL (AS REQ'D)	719	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

SET: B25 **WATER ROOM EXTERIOR (1-EC113, 2-EC104, 3-EC101)**

3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSS	630	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X

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1	SET	WEATHERSTRIPPING	DD13-WS313684AL	719	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB5836AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
1	EA	LATCH GUARD PROTECTOR	DD10-11SS	630	PAME X

SET: B26 **ELECTRICAL ROOM EXTERIOR (1-EC114, 2-EC103, 3-EC108)**

3'6" X 7'0" HMD X HMF

3	EA	HW BALL BEARING HINGES X NRP	H45-04NSS	630	PAME X
1	EA	RIM PANIC HARDWARE	E9000/EO4-AL	626	PAME X
1	EA	EXIT TRIM, STOREROOM	E9000/LFS-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	WEATHERSTRIPPING	DD13-WS314896AL	719	PAME X
1	EA	DOOR BOTTOM - U SHAPE	SP DD13-DB5848AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	SP DD13-TH12848AL	719	PAME X
1	EA	LATCH GUARD PROTECTOR	DD10-11SS	630	PAME X

SET: B27 **BIKE STORAGE EXTERIOR (1-EC117, 2-EC108)**

3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES X NRP	H45-02NSS	630	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	ELECTRIFIED LEVERSET, FAIL-SECURE	FYSP5CE-SE	619	PAME X
1	EA	SURFACE CLOSER, DELAYED ACTION	GC5900BFDA-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	WEATHERSTRIPPING	DD13-WS313684AL	719	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB5836AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
1	EA	LATCH GUARD PROTECTOR	DD10-11SS	630	PAME X

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1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---
**		**DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**			

SET: B28 **TRASH COMPACTOR ROOM, MAINT. WORKSHOP, MAINTENANCE EQUIPMENT STORAGE (1-EC121, 2-EC102, 2-EC214, 3-EC112)**

2'6" X 7'0" PAIR HMD X HMF

6	EA	BALL BEARING HINGES X NRP	H45-02NSS	630	PAME X
2	EA	MANUAL FLUSH BOLT	DD05-63SN	619	PAME X
1	EA	DUST PROOF STRIKE	DD05-604SN	619	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	HANDLE CONTROL HOLD OPEN ARM	GHCHA590-AL	689	PAME X
1	EA	FLOOR STOP (field verify)	DD02-613SN	619	PAME X
1	SET	SECURITY ASTRAGAL	BY OTHERS	---	---
1	SET	WEATHERSTRIPPING	DD13-WS317284AL	719	PAME X
2	EA	DOOR BOTTOM - U SHAPE	DD13-DB5836AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12872AL	719	PAME X

SET: B29 **JANITOR CLOSET, MECH, WATER ROOM (1-C203, 1-C303, 1-C403, 2-C105, 2-C212, 2-C213, 3-C101)**

3'0" X 7'0" HMD X HMF 45MIN

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	SMOKE SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X

SET: B30 **LOBBY (1-C205)**

3'0" X 7'0" ALD/GLS X ALF 45MIN

3	EA	HW BALL BEARING HINGES	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---

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1	EA	RIM FIRE EXIT DEVICE	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---
1	EA	EXIT TRIM, PASSAGE	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---
1	EA	SURFACE CLOSER	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---
1	EA	DROP BRACKET	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---
1	EA	DOOR STOP	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---
1	SET	PERIMETER SEAL	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---
1	EA	DOOR BOTTOM	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---
1	EA	THRESHOLD	BY ALUM STOREFRONT FIRE ASSEMBLY SUPPLIER	---	---

SET: B31 **STAIR INTERIOR (1STA1)**

3'0" X 7'0" HMD X HMF 90MIN

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	RIM FIRE EXIT HARDWARE	EF9000/EO3-AL	626	PAME X
1	EA	EXIT TRIM, PASSAGE	E9000/LFPA-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X
1	EA	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X

SET: B32 **STAIR INTERIOR (1STA2, 1STA3, 1STA4, 1STB1, 1STB2, 1STB3, 1STB4, 2STA2, 2STA3, 2STA4, 2STB1, 2STB2, 2STB3, 2STB4, 3STA1, 3STA2, 3STA3, 3STA4, 3STB1, 3STB2, 3STB3, 3STB4)**

3'0" X 7'0" HMD X HMF 90MIN

3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	RIM FIRE EXIT HARDWARE	EF9000/EO3-AL	626	PAME X
1	EA	EXIT TRIM, PASSAGE	E9000/LFPA-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X
1	EA	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X

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SET: B33		**ELECTRICAL ROOM FROM UNCONDITIONED CORRIDOR (2-C103, 3-C108)**			
		3'0" X 7'0" HMD X HMF 45MIN			
3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	RIM FIRE PANIC HARDWARE	EF9000/EO3-AL	626	PAME X
1	EA	EXIT TRIM, STOREROOM	E9000/LFS-AL	626	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
SET: B34		**UTILITY/STORAGE, TELE/DATA, JANITOR CLOSET, ELEC. CLOSET (2-C106, 2-C107, 2-C202, 2-C203, 2-C302, 2-C303, 2-C402, 2-C403, 3-C107, 3-C201, 3-C202, 3-C301, 3-C302, 3-C401, 3-C402)**			
		3'0" X 7'0" PAIR HMD X HMF 45MIN			
6	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	SET	CONSTANT FLUSH BOLT W/ FIRE BOLT	DD05-67FSC	626	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	COORDINATOR	E4000/DC52-AL	626	PAME X
1	EA	FILLER BAR	E4000/FB18-AL	626	PAME X
1	EA	MOUNTING BRACKET	E4000/MB3	BLK	PAME X
2	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
2	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	EA	ASTRAGAL SEAL	BY OTHERS	---	---
1	SET	WEATHERSTRIPPING	DD13-WS317284AL	719	PAME X
2	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12872AL	719	PAME X

** **LIKELY UM2 IN UNIT DOOR SCHEDULE.**

** **For electrical closets housing critical equipment rated at or over 800 amps or 1,000 volts, provide two fire exit devices (EF9020V/LBR37-AL) and one storeroom exit trim (E9000/LFS-AL) in lieu of the flush bolts, lever set, coordinator, and associated accessories.**

SET: B35		**BIKE STORAGE FROM UNCONDITIONED CORRIDOR (2-C108)**			
		3'0" X 7'0" HMD X HMF 45MIN			
3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X
1	EA	ELECTRIFIED LEVERSET, FAIL-SECURE	FYSP5CE-SE	619	PAME X
1	EA	SURFACE CLOSER, DELAYED ACTION	GC5900BFDA-AL	689	PAME X
1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X
1	SET	WEATHERSTRIPPING	DD13-WS313684AL	719	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---
**		**DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**			
**		**Verify if EAC is required for the door. If not, use mechanical hardware instead.**			

SET: B36		**LAUNDRY ROOM FROM UNCONDITIONED CORRIDOR (2-C204, 3-C106)**			
		3'0" X 7'0" HMD/GLS X HMF 45MIN			
3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	PASSAGE LATCHSET	FYSP3C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X
1	SET	PERIMETER SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12836AL	719	PAME X

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SET: B37 **RESTROOM (2-C207)**

3'0" X 7'0" HMD X HMF

3	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	PRIVACY LEVERSET	FYSP1C	619	PAME X
1	EA	SURFACE CLOSER	GC5900BF-AL (AS REQ'D)	689	PAME X
1	EA	KICK PALTE	DD09-301034SS	630	PAME X
1	EA	MOP PLATE	DD09-30434SS	630	PAME X
1	EA	WALL STOP/FLOOR STOP	DD02-53SN/DD02-613SN (AS REQ'D)	619	PAME X
3	EA	SILENCER	DD02-81	GRY	PAME X

SET: B38 **MAINT. WORKSHOP (2-C214)**

3'0" X 7'0" PAIR HMD X HMF 45MIN

6	EA	BALL BEARING HINGES	H45-02RSN	646	PAME X
1	EA	CONSTANT FLUSH BOLT W/ FIRE BOLT	DD05-67FSC	626	PAME X
1	EA	STOREROOM LEVERSET	FYSP5C	619	PAME X
1	EA	DOOR COORDINATOR	E4000/DC52-AL	626	PAME X
1	EA	FILLER BAR	E4000/FB18-AL	626	PAME X
2	EA	SURFACE CLOSER	GC5900BF-AL	689	PAME X
2	EA	FLOOR STOP	DD02-613SN	619	PAME X
1	SET	ASTRAGAL SEAL	BY OTHERS	---	---
1	SET	PERIMETER SEAL	DD13-SS3821BR	BRN	PAME X
2	EA	DOOR BOTTOM - U SHAPE	DD13-DB6936AL	719	PAME X
1	EA	THRESHOLD - 8" WIDE	DD13-TH12872AL	719	PAME X

SET: B39 **BIKE STORAGE INTERIOR (3-C102)**

3'0" X 7'0" HMD X HMF 45MIN

3	EA	BALL BEARING HINGES X NRP	H45-02NSN	646	PAME X
1	EA	POWER TRANSFER DEVICE	EPT-L5SS	630	PAME X

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1	EA	ELECTRIFIED LEVERSET, FAIL-SECURE	FYSP5CE-SE	619	PAME X
1	EA	SURFACE CLOSER, DELAYED ACTION	GC5900BFDA-AL	689	PAME X
1	EA	CUSH-N-STOP ARM	GCNSA590-AL	689	PAME X
1	SET	SMOKE SEAL	DD13-SS3817BR	BRN	PAME X
1	EA	CREDENTIAL READER	BY ACCESS CONTROL CONTRACTOR	---	---
1	EA	POWER SUPPLY	BY ACCESS CONTROL CONTRACTOR	---	---

** **DOOR IS LOCKED AND LATCHED AT ALL TIMES. ENTRY BY VALID CREDENTIAL OR BY KEY OVERRIDE. DOOR WILL REMAIN LOCKED WHEN FIRE ALARM IS TRIGGERED OR LOSS OF POWER (FAIL-SECURE). FREE EGRESS AT ALL TIMES.**

** **Verify if EAC is required for the door. If not, use mechanical hardware instead.**

** **Door tags 1STB5-1STB12, 3-C109, 3-C113, 3-C123, 3-C124, 3-C125, 3-C131, 3-C135, 3-C165, 3-C166, 3-C167, 3-C174, 3STA6, 3STA7 are not located on floor plans. Battery storage door hardware not specified per request.**

END OF SECTION

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.2 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

D. ASTM C1036 - Standard Specification for Flat Glass.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants.

H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

J. GANA (GM) - GANA Glazing Manual.

K. GANA (SM) - GANA Sealant Manual.

L. ICC (IBC) - International Building Code.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples: Submit two samples 12 x 12 inch in size of glass units.

E. Certificates: Certify that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual, GANA Sealant Manual and 2012 IBC Table 716.5 for glazing installation methods.

1.5 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.6 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

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B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 - PRODUCTS

2.1 GLAZING TYPES

2.2 EXTERIOR GLAZING ASSEMBLIES

A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with (IBC) Inernational Building code.

1. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
3. Thicknesses listed are minimum.

2.3 GLASS MATERIALS

A. Float Glass Manufacturers:

1. AGC Flat Glass North America: www.afgglass.com.
2. Oldcastle Glass.
3. Pilkington North America Inc: www.pilkington.com/na.
4. PPG Industries, Inc: www.ppgideascapes.com.

B. Float Glass: All glazing is to be float glass unless otherwise indicated.

1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
3. Tinted Types: Color and performance characteristics as indicated.
4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

C. Laminated Glass: Float glass laminated in accordance with ASTM C1172.

1. Plastic Interlayer: 0.030 inch thick, minimum.
2. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.

D. Fire-Protection-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.

1. VCC Fire Protection Rating: Per requirements of 2021 VCC Table 716.1 (2) and 716.1(3). .
2. Labeling: Provide permanent label on each piece giving the IBC rating and other information required by the applicable code.
3. "T-Rated" Products: Where D-H-T-90 or D-H-T-60 rating is indicated, provide one of the following products:

a. Technical Glass Products; Pilkington Pyrostop: www.fireglass.com.
b. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite II-XL: www.safti.com.
c. Vetrotech Saint-Gobain North America; Contraflam: www.vetrotechusa.com.
d. Vetrotech Saint-Gobain North America; Keralite ULTRA: www.vetrotechusa.com.

4. "NT-Rated" Products: Where D-H-90 (or D-H-NT-90), D-H-60 (or D-H-NT-60), D-H-45 (or D-H-NT-45), D-H-20 (or D-H-NT-20), or any OH- rating is indicated, provide one of the following products or any specified T-rated product of equal or higher numerical rating:

a. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite I-W: www.safti.com.
b. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite X-45/60/90: www.safti.com.
c. SCHOTT North America Inc; Pyran Platinum: www.us.schott.com.
d. SCHOTT North America Inc; Pyran Platinum F (film): www.us.schott.com.
e. SCHOTT North America Inc; Pyran Platinum L: www.us.schott.com.
f. Technical Glass Products; Firelite: www.fireglass.com.
g. Technical Glass Products; Firelite Plus: www.fireglass.com.
h. Technical Glass Products; Firelite NT: www.fireglass.com.
i. Technical Glass Products; Firelite IGU: www.fireglass.com.
j. Vetrotech Saint-Gobain North America; Keralite R: www.vetrotechusa.com.
k. Vetrotech Saint-Gobain North America; Keralite F (film): www.vetrotechusa.com.
l. Vetrotech Saint-Gobain North America; Keralite L: www.vetrotechusa.com.

5. "Not-Hose-Stream-Rated" Products: Where D-20 (or D-NH-NT-20) rating is indicated, provide one of the following products or any T-rated or NT-rated product specified above:

a. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite I: www.safti.com.
b. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite I-XL: www.safti.com.
c. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite I-XL IGU: www.safti.com.
d. Vetrotech Saint-Gobain North America; Pyroswiss US: www.vetrotechusa.com.

E. Fire-Protection-Rated Glazing:

1. IBC Fire Protection Rating: D-H-T-90 or W-90, minimum.
2. Safety Certification: 16 CFR 1201 Category II.
3. Products:

a. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite I-W: www.safti.com.
b. SAFTI FIRST, a division of O'Keeffe's Inc; SuperLite X-90: www.safti.com.
c. SCHOTT North America Inc; Pyran Platinum F (film): www.us.schott.com.
d. SCHOTT North America Inc; Pyran Platinum L: www.us.schott.com.
e. Vetrotech Saint-Gobain North America; Keralite F (film): www.vetrotechusa.com.
f. Vetrotech Saint-Gobain North America; Keralite L: www.vetrotechusa.com.
g. Vetrotech Saint-Gobain North America; Keralite ULTRA: www.vetrotechusa.com.
h. Vetrotech Saint-Gobain North America; Contraflam: www.vetrotechusa.com.

F. Clear Float Glass : Clear, annealed.

1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
2. 6 mm minimum thick.

G. Safety Glass : Clear; fully tempered with horizontal tempering.

1. Comply with 16 CFR 1201 test requirements for Category II.
2. 6 mm minimum thick.
3. Provide this type of glazing in the locations indicated on the drawings.

2.4 SEALED INSULATING GLASS UNITS

A. Manufacturers:

1. Any of the manufacturers specified for float glass.

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2. Cardinal Glass Industries: www.cardinalcorp.com.
3. Guardian Industries Corp: www.guardian.com.
4. Viracon, Apogee Enterprises, Inc: www.viracon.com.

B. Sealed Insulating Glass Units: Types as indicated.

1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Edge Spacers: Aluminum, bent and soldered corners.
3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
4. Purge interpane space with dry hermetic air.

C. Insulated Glass Units (Type G-X): Double pane with glass to elastomer edge seal.

1. Durability: Certified by an independent testing agency to comply with ASTM E 2190.
2. Purge interpane space with dry hermetic air.
3. Total unit thickness of 1 inch .
4. Basis-of-Design - Clear Insulating Units: Guardian SuperNeutral 54 or equal or better product of other named manufacturers.

a. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
b. Interspace Content: Air.
c. Outdoor Lite: Class 1 (clear) float glass; Kind FT (fully tempered).
d. Indoor Lite: Class 1 (clear) laminated glass; Kind FT (fully tempered).
e. Low-E Coating: Second or third surface.
f. Visible Light Transmittance: 54 percent minimum.
g. Winter Nighttime U-Factor: 0.28 or better.
h. Summer Daytime U-Factor: 0.27 or better.
i. Solar Heat Gain Coefficient: 0.28 maximum.
j. Outdoor Visible Reflectance: 13 percent maximum.

D. Sealing System: Dual seal, with primary and secondary sealants as follows:

1. Primary seal shall be extruded polyisobutylene continuously bonded to glass surfaces and desiccant filled metal spacer, including corners.
2. Minimum width of primary seal shall be 0.125 inch (3.2 mm). Secondary seal shall be General Electric IGS 3723 or Dow Corning 982.
3. Secondary seal shall completely cover spacer with no gaps or voids, and shall be continuously bonded to both plates of glass.
4. Where insulating glass is supported by structural silicone, secondary seal shall be designed to transfer specified pressures from outdoor glass to indoor glass.

E. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

1. Spacer Material: Stainless steel or thermally jacketed stainless steel.
2. Desiccant: Molecular sieve or silica gel, or blend of both.
3. Corner Construction: Manufacturer's standard corner construction.

2.5 GLAZING COMPOUNDS

A. Butyl Sealant : Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A; Shore A hardness of 10 to 20; black color; non-skinning.

B. Silicone Sealant : Single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected.

C. Sealants applied within the building waterproofing envelope: Comply with low-emitting requirements specified in Section 01 61 16.

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2.6 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products as follows:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

E. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C 864 Option I; black color.

F. Glazing Clips: Manufacturer's standard type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Prime surfaces scheduled to receive sealant.

C. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

D. Install sealant in accordance with manufacturer's instructions.

3.3 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

A. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

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3.4 INSTALLATION - EXTERIOR DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

D. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

E. Trim protruding tape edge.

3.5 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

D. Place glazing tape on free perimeter of glazing in same manner described above.

E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

F. Knife trim protruding tape.

3.6 MANUFACTURER'S FIELD SERVICES

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.7 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.8 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

PART 4 - END OF SECTION

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SECTION 08 87 53 - ARCHITECTURAL WINDOW FILMS

PART 1 - General

1.1 SUMMARY

A. Section includes architectural window film placed on glass surfaces for decorative purposes.

1.2 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI Z97.1, Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

1.3 SUBMITTALS

A. Test Reports:

1. Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.

B. Closeout Submittals:

1. Provide operation and maintenance data for window film for incorporation into manual.
2. Follow manufacturers written instructions for care and maintenance of security and safety film.

1.4 DELIVERY, STORAGE AND HANDLING

A. Provide and maintain dry, off-ground weatherproof storage.

B. Store rolls of film flat on cross supports. Do not stand rolls of film on end.

C. Remove from storage, in quantities required for same day use.

D. Store materials in accordance with manufacturers written instructions.

E. Waste Management and Disposal: Place materials defined as hazardous or toxic waste in designated containers.

1.5 WARRANTY

A. Ensure warranty includes items as follows:

1. Maintaining adhesion properties without blistering, bubbling or delaminating from glass surface.
2. Maintaining appearance without discolouration.
3. Removing, replace and reapply defective materials.
4. In event of product failure under warranty terms, remove and re-apply film without glass replacement at no cost to Owner.

B. Film must be installed by qualified installer for valid warranty.

PART 2 - Products

2.1 MATERIALS

A. Architectural Window Film - General: Glass and plastic finishes field-applied application to glass or plastic material as visual opaque or decorative film.

1. Material Properties:

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a. Film: Polyester.
b. Decorative Pattern: Printed.
c. Adhesive: Acrylic, Pressure Sensitive, Permanent.
d. Liner: Silicone-coated Polyester.
e. Thickness (Average): 3.2 mils (80 microns).
f. Fire Performance: Surface burning characteristics when tested in accordance with ASTM E84: Class A:

1) Flame Spread: 25 maximum.
2) Smoke Developed: 450 maximum.

2. Basis-of-Design: 3M; Fasara Frost Matte SH2FRMAX.

a. Visible Light Transmission: 89%
b. Shading Coefficient: 0.95
c. UV Rejection: 99%
d. Full Roll Size: 50” x 98.4’
e. Film Thickness: 5.31 mils

2.2 FABRICATION

A. Installation of film to glass panels:

1. Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.
2. Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems.

a. Install security film to glass panels ensuring no blisters, bubbles, scratches, edge defects or distortions.
b. Cut film edges straight and square to within 3 mm of edge of panel.

PART 3 - Execution

3.1 PREPARATION

A. Clean glass before beginning installation using neutral cleaning solution.

B. Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors.

C. Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

D. Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate or cause vision transparency or distortion problems. Report findings to Architect.

E. Proceed with Work only after receipt of written approval from Architect.

3.2 INSTALLATION

A. Apply and attach film to glass in accordance with manufacturer's written instructions.

B. Splicing:

1. Splice film only when glass is greater in width than film.
2. Use butt or overlapped factory edges as tested and approved by manufacturer.

C. Use only water and film slip solution on glass to facilitate positioning of film.

D. Ensure removal of excess water from between film and glass.

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E. Remove left over material form work area and return work area to original condition.

F. Ensure film is installed behind window stops.

3.3 INSTALLER'S INSPECTION

A. Remove and replace glass panel that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 5 feet minimum after 30 day period.

3.4 FINAL CLEANING

A. Wash interior and exterior of each glass panel and film using cleaning solution recommended by film manufacturer.

END OF SECTION 08 87 33

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SECTION 08 91 00 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Louvers, frames and accessories.

B. Bathroom and Dryer exhaust wallcaps.

C. Kitchen exhaust wallcaps.

1.2 REFERENCE STANDARDS

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

C. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating.

D. AMCA 511 - Certified Ratings Program for Air Control Devices.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).

H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.

D. Louver Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior surfaces.

E. Exhaust Vent (wallcaps) Samples: Provide full size sample of each exhaust vent specified illustrating finish and color of exterior surfaces.

F. Test Reports: Independent agency reports showing compliance with specified performance criteria.

G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

H. Maintenance Data: Include lubrication schedules, adjustment requirements.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

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1.5 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.

1. Finish: Include twenty year coverage against degradation of exterior finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Bath, Kitchen and Dryer Exhaust Wallcaps:

1. Aluminum Wallcaps custom finished to match adjacent material color.
2. Manufacturers:

a. Seiho.
b. Basis-of-Design: In-O-Vate Tecnologies, Inc.; www.dryerwallvent.com.
c. Deflecto; www.deflecto.com.
d. Builders Best; www.buildersbest.com.
e. Broan; www.broan.com.
f. FAMCO

3. Color: To be selected by Architect from manufacturer’s standard line.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.

1. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.
2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
3. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

B. Stationary Louvers: Horizontal blade, formed galvanized steel sheet construction, with intermediate mullions matching frame.

1. Free Area: 50 percent, minimum.
2. Pressure Drop: 0.03 inches of water gauge maximum per square foot of free area at velocity of 358 fpm, when tested in accordance with AMCA 500-L, test unit size 48 inch by 48 inch.
3. Blades: Drainable.
4. Frame: Depth as indicated on drawings, channel profile; corner joints mitered and , with continuous recessed caulking channel each side.
5. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.
6. Aluminum Finish: High performance organic coatings; finished after fabrication.
7. Color: Custom colors to match adjacent exterior siding colors.

2.3 WALLCAPS

A. Wallcaps: Factory fabricated and assembled, complete with backdraft dampers and bird / insect screens as required.

1. Kitchen Exhaust Wallcap:

a. Basis-of-Design: DryerWallVent 6WVC by In-O-Vate Dryer Products; 6 inch steel wallcap with screen.

2. Bathroom Exhaust Wallcap:

   a. Basis-of-Design: DryerWallVent by In-O-Vate Dryer Products; 4 inch steel wallcap with screen. .

3. Dryer Exhaust Wallcap:

   a. Basis-of-Design: DryerWallVent by In-O-Vate Dryer Products; 4 inch steel wallcap.

4. Finish: Polyester TGIC Weather Resistant Powder Coating.
5. Color: Custom colors to match adjacent exterior siding colors. Architect to select from Manufacturer's full line of custom colors. If contractor elects to paint in field to match the adjacent finish then contractor will ensure that vent operates as intended and is not painted shut.
6. Coordinate sizes, accessories, and requirements with Mechanical Drawings.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Formed Aluminum: Formed sheet, ASTM B209 (ASTM B209M).

C. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

D. Provide blocking required by siding manufacturer for installation in fiber cement siding and panel.

E. Bird Screen: Interwoven wire mesh of steel, 0.063 inch diameter wire, 1/2 inch open weave, diagonal design.

F. Insect Screen: 18 x 16 size aluminum mesh.

2.5 LOUVER ACCESSORIES

A. Louver Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

   1. Bird screens to be minimum 5/8 inch mesh, 0.050 inch thick expanded and flattened aluminum bird screen secured within minimum 0.055 inch thick extruded aluminum frames; frames to have mitered corners and corner locks.
   2. Insect screens to be 18 by 16 aluminum mesh minimum 0.011 inch diameter wire insect screens secured within 0.055 inch thick extruded aluminum frames; frames to have mitered corners and corner locks.

B. Glazing Adapter: Provide where louvers are glazed into storefront or curtainwall frames; minimum 0.090 inch thick extruded aluminum.

C. Fasteners and Anchors: Stainless steel.

D. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.

E. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

F. Sealant: ES-1 or ES-4 type, as specified in Section 07 90 05.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

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3.2 INSTALLATION

A. Install louver assembly and wallcaps in accordance with manufacturer's instructions.

B. Install louvers and wallcaps level and plumb.

C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louver and wallcap in openings with concealed fasteners.

E. Install perimeter sealant and backing rod in accordance with Section 07 90 05.

F. Coordinate with installation of mechanical ductwork.

3.3 ADJUSTING

A. Adjust operable louvers for freedom of movement of control mechanism. Lubricate operating joints.

3.4 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

END OF SECTION

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SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each specified product.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

D. Samples for Initial Selection: For each type of trim accessory indicated.

E. Samples for Verification: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.3 MOCKUPS

A. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.
b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. When the construction schedule proposed by the Contractor requires materials to be installed prior to reaching and maintaining manufacturer's required environmental conditions. provide the following:

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1. A letter from the material manufacturer acknowledging the deviation from manufacturer's requirements and the manufacturer's acknowledgement of one of the following:
    a. Agreement with conditions present for installation of materials, including a letter from the manufacturer stating that applicable warranties will not be compromised by these conditions.
    b. Provide alternative materials and installation procedures accompanied by material samples, written detailed procedures for any materials deviating from contract requirements, and a letter from the material manufacturer acknowledging the changed conditions and confirming all material warranties will remain intact.
        1) Any additional cost of alternative solutions, for the benefit of scheduling, is at the Contractor’s expense.
        2) Use of glass-mat-faced panel products is one possible solution, including the proper joint treatment and finishing.
2. If an alternate approach is reviewed and preliminarily accepted by the Architect, present the approach to the Owner during a regular project meeting with trade contractor and manufacturer’s technical representative present. If the Owner agrees to the change, make formal submittals in accordance with requirements specified in the Project Manual and obtain Architect's review of submittals prior to proceeding installation.
3. All other provisions of the Contract Documents must be met.

D. Do not install panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
1. Marking Fire-Resistance-Rated Assemblies: Apply hourly rating text in 4-inch high red numbers and black Arial font letters at maximum 10 feet between rating text applications as measured from beginning of one text application to end of next text application extending from one end of fire-resistance-rated wall to opposite end of fire-resistance-rated wall, located 6 inches above finished ceiling to bottom of text. Provide following hourly rating text as applicable to wall:
    a. 1 HR
    b. 2 HR
    c. 3 HR
    d. 4 HR
    e. 1 HR Fire/Smoke
    f. 2 HR Fire/Smoke

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

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2.3 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Products: Subject to compliance with requirements, provide one of the following:

a. American Gypsum; 5/8” M-Bloc® Type X with Mold & Moisture Resistance FireBloc® Type X Gypsum Wallboard.
b. CertainTeed Gypsum; CertainTeed Type X Gypsum Board.
c. Continental Building Products, LLC; Firecheck Type X.
d. National Gypsum Company; Gold Bond® Fire-Shield® Gypsum Board.
e. USG Corporation; USG Sheetrock® Brand EcoSmart Panels Firecode® X.

2. Thickness: 5/8 inch.

B. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Products: Subject to compliance with requirements, provide one of the following:

a. American Gypsum; 1/2” Interior Ceiling Board.
b. CertainTeed Gypsum; CertainTeed Interior Ceiling Gypsum Board.
c. Continental Building Products, LLC; Sagcheck.
d. National Gypsum Company; Gold Bond® Ceiling Board.
e. USG Corporation; USG Imperial® Sag-Resistant Interior Ceiling Gypsum Base.

2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

C. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Products: Subject to compliance with requirements, provide one of the following:

a. American Gypsum; 5/8" M-Bloc® AR Type X with Mold & Moisture Resistance.
b. CertainTeed Gypsum; CertainTeed Extreme Abuse Resistant Type X Gypsum Board with M2Tech Mold and Moisture Technology.
c. Continental Building Products, LLC; Protecta AR 100 Type X with Mold Defense.
d. National Gypsum Company; Gold Bond® Hi-Abuse® XP® Gypsum Board.
e. PABCO Gypsum; PABCO ABUSE CURB®.
f. USG Corporation; USG Sheetrock® Brand Mold Tough® Abuse-Resistant Firecode®.

2. Core: 5/8 inch, Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

D. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Products: Subject to compliance with requirements, provide one of the following:

a. American Gypsum; 5/8" M-Bloc® IR Type X with Mold & Moisture Resistance.
b. CertainTeed Gypsum; CertainTeed Extreme Impact Resistant Type X Gypsum Board with M2Tech Mold and Moisture Technology.
c. Continental Building Products, LLC; Protecta HIR 300 Type X with Mold Defense.
d. National Gypsum Company; Gold Bond® Hi-Impact® XP® Gypsum Board.
e. PABCO Gypsum; PABCO® Impact Resistant.

f. USG Corporation; USG Sheetrock® Brand Mold Tough® VHI (Very High Impact) Firecode® Core.

2. Core: 5/8 inch, Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.
6. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements according to test in Annex A1.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

E. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Products: Subject to compliance with requirements, provide one of the following:

a. American Gypsum; 5/8” M-Bloc® Type X with Mold & Moisture Resistance.
b. CertainTeed Gypsum; CertainTeed M2Tech Mold and Moisture Resistant Type X Gypsum Board.
c. Continental Building Products, LLC.
d. National Gypsum Company; Gold Bond® XP® Fire-Shield® Gypsum Board.
e. USG Corporation; USG Sheetrock® Brand Mold Tough® Gypsum Panels.

2. Core: 5/8 inch, Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 SPECIALTY GYPSUM BOARD

A. Glass-Mat Interior Gypsum Board: ASTM C1658/C1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Continental Building Products, LLC; Weather Defense Platinum Interior Type X.
b. Georgia-Pacific Gypsum LLC; DensArmour Plus.
c. National Gypsum Company; eXP Interior Extreme.
d. Panel Rey SA; Glass Rey Interior.
e. USG Corporation; USG Sheetrock® Brand Glass-Mat Panels Mold Tough®.

2. Core: 5/8 inch, Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.6 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C1177/C1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:

a. American Gypsum; 5/8" M-GLASS® Type X Exterior Gypsum Sheathing.
b. CertainTeed Gypsum; GlasRoc Sheathing.
c. Continental Building Products, LLC; Weather Defense Platinum Type X.
d. Georgia-Pacific Gypsum LLC; Dens-Glass Gold.
e. National Gypsum Company; Gold Bond® eXP® Sheathing.
f. USG Corporation; Securock Glass Mat Sheathing.

2. Core: 5/8 inch, Type X.

2.7 TILE BACKING PANELS

A. Locations: Allowable only within spaces without plumbing or high-humidity conditions.

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B. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corporation; GlasRoc Tile Backer.
b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
c. National Gypsum Company;.
d. USG Corporation; USG Durock™ Glass-Mat Tile Backerboard.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.8 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Expansion (control) joint.
g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Exterior Trim: ASTM C1047.

1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fry Reglet Corporation.
b. Gordon, Inc..
c. Pittcon Industries.
d. Tamlyn.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.9 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:

1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

F. Acrylic Finish System for Exterior Ceilings/Soffits:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, stone particles and fillers, equivalent to USG Exterior Textured Finish-Fine Finish. Color as selected by Architect from manufacturer is available selection.

2.10 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."

F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Attach gypsum panels to framing provided at openings and cutouts.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

L. Fire-Resistance-Rated Assemblies: Provide marking of fire-resistance-rated assemblies as specified in Performance Requirements article in Part 2 of this Section.

M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

1. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c., unless otherwise recommended by manufacturer or referenced standards.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Flexible Type: Apply in double layer at curved assemblies.
2. Ceiling Type: Ceiling surfaces.
3. Abuse-Resistant Type: As indicated on Drawings.
4. Impact-Resistant Type: As indicated on Drawings.
5. Mold-Resistant Type: Vertical surfaces not indicated as other types.
6. Acoustically Enhanced Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLATION OF EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile outside of areas or walls with plumbing. Install with 1/4-inch gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.

1. Install where a partition, wall, or ceiling traverses a construction joint (expansion, seismic or building control element) in the base building structure.

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2. Install where movement may occur at joints in a wall or partition supported by building systems that move differentially.
3. Install where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear ft .
4. Install in interior ceilings with perimeter relief so that linear dimensions between control joints do not exceed 50 ft and total area between control joints does not exceed 2500 sq ft .
5. Install in interior ceilings without perimeter relief so that linear dimensions between control joints do not exceed 30 ft and total area between control joints does not exceed 900 sq ft .
6. Install in exterior ceilings and soffits so that linear dimensions between control joints do not exceed 30 ft and total area between control joints does not exceed 900 sq ft .
7. Install where ceiling framing members change direction.
8. Install at one side of door frames. Full height door frames shall be considered equivalent to a control joint.
9. Install all control joints at specific locations approved by the Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use at exposed panel edges.
6. Curved-Edge Cornerbead: Use at curved openings.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

E. Aluminum Trim: Install in locations indicated on Drawings.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
4. Level 5: Public gathering spaces with wall lengths greater than 25 feet (including but not limited to corridors and lobbies), surface to receive wall coverings or murals.
    a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

1. Apply Level 5 finish (ASTM C 840) to backing panel surfaces receiving painted finish.

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3.8 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

1. Notify Architect seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:

a. Installation of 80 percent of lighting fixtures, powered for operation.
b. Installation, insulation, and leak and pressure testing of water piping systems.
c. Installation of air-duct systems.
d. Installation of air devices.
e. Installation of mechanical system control-air tubing.
f. Installation of ceiling support framing.
g.

3.9 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

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SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glazed wall tile.
2. Floor Tile.
3. Stone thresholds.
4. Tile backing panels.
5. Waterproof membrane for thinset applications.
6. Crack isolation membrane.
7. Metal edge strips.

1.2 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Face Size: Actual tile size, excluding spacer lugs.

D. Module Size: Actual tile size plus joint width indicated.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 128 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required.
4. Stone thresholds in 6-inch lengths.
5. Metal edge strips in 6-inch lengths.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Company specializing in performing tile installation, with minimum of five years of documented experience.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

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1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.2 TILE PRODUCTS

A. Ceramic Tile Type: Factory-mounted unglazed ceramic mosaic tile (for common areas):Basis-of-Design: Daltile Color Wheel

1. Thickness: 5/16 inch.
2. Installation: Horizontal brick installation at Laundry Rooms and Restrooms.
3. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
4. Grout Color: As selected by Architect from manufacturer's full range.
5. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable[and matching characteristics of adjoining flat tile]. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Matching bullnose, cove, and base shapes in sizes coordinated with field tile.

B. Ceramic Tile Type: Factory-mounted unglazed ceramic tile (for community room): Basis-of-Design: Creative Materials Corp, BrickArt.

1. Thickness: 5/16 inch.
2. Size: 2 x 10 inches
3. Installation: Vertical stack.
4. Tile Color and Pattern: As selected by Architect from manufacturer's full range .
5. Grout Color: As selected by Architect from manufacturer's full range.
6. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable[and matching characteristics of adjoining flat tile]. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Matching bullnose, cove, and base shapes in sizes coordinated with field tile.
    b.

C. Ceramic Tile Type: Porcelain floor tile (for common area floors):.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. American Olean; a division of Dal-Tile Corporation;
    b. Daltile; Daltile Portfolio (Basis-of-Design).
    c. Crossville Ceramics
    d. Summitville Tiles, Inc.
    e. United States Ceramic Tile Co.

2. Face Size: 12 x 24 inches.
3. Thickness: 5/16 inch.
4. Face: Plain with square or cushion edges.
5. Tile Color and Pattern: As selected by Architect from manufacturer's full range.

D. Ceramic Tile Type: Glazed wall tile (for tub and shower surrounds).

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Basis-of-Design: Daltile; Portfolio.
    b. American Olean; a division of Dal-Tile Corporation;
    c. Crossville Ceramics
    d. Summitville Tiles, Inc.
    e. United States Ceramic Tile Co.

2. Module Size: 6 by 24 inches.
3. Thickness: 5/16 inch.
4. Face: Plain with modified square edges or cushion edges.
5. Finish: Bright, opaque glaze.
6. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
7. Grout Color: As selected by Architect from manufacturer's full range.

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8. Mounting: Factory, back mounted.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Matching bead, bullnose, cove, and base shapes in sizes coordinated with field tile.

E. Ceramic Tile Type: Unglazed ceramic mosaic floor tile (for unit bathrooms with roll-in showers):

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Basis-of-Design: Daltile Portfolio.
    b. Crossville Ceramics.
    c. Summitville Tiles, Inc.

2. Module Size: 2 by 2 inches.
3. Thickness: ¼ inch.
4. Finish: Matte.
5. Tile Color and Pattern: Dove Grey or Ash Grey.
6. Grout Color: As selected by Architect from manufacturer's full range.
7. Mounting: Factory, back mounted.
8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Matching bead, bullnose, cove, and base shapes in sizes coordinated with field tile.

9. Provide sloped bathroom floor at roll-in showers. Coordinate with details on Drawings.

F. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as used for adjoining wall tile.

1. One soap holder designed for corner installation, cast strength sufficient to resist lateral pull force of 75 lbs. for each shower and tub indicated.

    a. Basis-of-Design: Daltile Ceramic 7” Medium Corner Caddy Model Number BA765.
    b. Dimensions: 6 ¾ inches by 6 ¾ inches by 2 3/8 inches.

2. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.

    a. Applications:

        1) Open Edges: Bullnose.
        2) Inside Corners: Jointed.
        3) Floor to Wall Joints: Cove base.

    b. Manufacturers: Same as for tile.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inchabove adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 12 according to ASTM C1353 or ASTM C241/C241M and with honed finish. Provide at doorways where tile terminates, unless indicated otherwise.

1. Description: Uniform, fine- to medium-grained white stone with gray veining.
2. Description: Match Architect's sample.
3. 4 inches wide.

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4. Basis-of-Design: Daltile; Double Hollywood Bevel.
5. Color: Carrara White, M701.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.

1. Products: Subject to compliance with requirements, provide the following:

a. USG Corporation; DUROCK Cement Board.

2. Thickness: 1/2 inch.

2.5 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ARDEX Americas; ARDEX 8+9™ Rapid Waterproofing and Crack Isolation Compound.
b. Custom Building Products; RedGard® Waterproofing and Crack Prevention Membrane.
c. H.B. Fuller Construction Products Inc. / TEC; TEC HydraFlex Waterproofing Crack Isolation Membrane.
d. LATICRETE SUPERCAP, LLC; Laticrete Hydro Ban.
e. Merkrete; a Parex USA, Inc. brand; Hydro-Guard SPI.

2.6 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following:

a. LATICRETE SUPERCAP, LLC; Laticrete Blue 92 Anti-Fracture Membrane.
b. Merkrete; a Parex USA, Inc. brand; Hydro-Guard 2000.

2.7 SETTING MATERIALS

A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Bonsal American, an Oldcastle company;
b. Bostik, Inc;
c. Custom Building Products; VersaBond® Professional Thin-Set Mortar.
d. H.B. Fuller Construction Products Inc. / TEC;
e. MAPEI Corporation;

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.8 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7. Provide sanded grout for joints 1/8 inch wide and larger. Provide unsanded grout for joints less than 1/8 inch wide.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ARDEX Americas; ARDEX FG-C™ MICROTEC® Unsanded Grout or ARDEX FL™ Rapid Set, Flexible, Sanded Grout.
b. Custom Building Products; Prism® Ultimate Performance Grout.
c. H.B. Fuller Construction Products Inc. / TEC; TEC Power Grout.
d. LATICRETE SUPERCAP, LLC; LATICRETE PERMACOLOR.
e. MAPEI Corporation;
f. Merkrete, by Parex USA, Inc.: Merkrete Pro Grout.

2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

2.9 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils thick.

C. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Schluter Systems L.P; 1.1 Schluter-SCHIENE Edge-protecting profile where tile surface is similar height to adjacent finish. 1.2 Schluter-RENO-U Reducer Profile where tile surface is higher than adjacent finish (ADA complaint profile).

2.10 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.

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b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

a. Tile floors in wet areas.
b. Tile floors consisting of tiles 8 by 8 inches or larger.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/8 inch.
2. Pressed Floor Tile: 1/4 inch.

3. Glazed Wall Tile: 1/8 inch.
4. Porcelain Tile: 1/4 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in improved modified dry-set mortar (thinset).
2. Do not extend waterproof membrane or crack isolation membrane under thresholds set in improved modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on waterproof membrane or crack isolation membrane with elastomeric sealant.

K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

L. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 INSTALLATION OF TILE BACKING PANEL

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 INSTALLATION OF WATERPROOF MEMBRANE

A. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

B. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 INSTALLATION OF CRACK ISOLATION MEMBRANE

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

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3.8 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 30 13

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SECTION 09 54 23 ENGINEERED POLYMER CEILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Ceiling Panels

B. Suspension System

1.2 REFERENCES

A. ASTM E 84 - Title; 2001.

B. ASTM C636 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels

C.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Suspension System: Install in accordance with ASTM C636 and manufacturer’s instructions and shop drawings.

B. Linear ceilings will undergo changes with variations in the environment. Therefore, all dimensional tolerances are plus or minus 1/8 inch (3 mm).

C. Fire Performance Characteristics: Suspended ceilings shall conform to Class 1, or A flame spread rating, tested according to ASTM E 84; Flame Spread: 25 or less. Smoke Developed: 450 or less.

D. Panel finish must be UV resistant to prevent fade or discoloration.

E.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Provide layout of linear ceiling coordinated with other trades that will penetrate the linear ceiling or interfere with the installation and recessed or surface mounted devices located within the ceiling panels. Indicate method of suspension where interference exists.

D. Selection Samples: For each finish product specified, two complete sets of color brochures representing the manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 12 inches (305 mm) square, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment and periodic cleaning and maintenance of all components.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

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B. Installer Qualifications: Minimum 2 years documented experience installing projects of similar size and complexity.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.
4. Accepted mock-ups shall be comparison standard for remaining Work

D. Pre-Installation Conference: Convene minimum two weeks prior to starting work of this section. Agenda shall include project conditions, coordination with work of other trades, and layout of items that penetrate ceilings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in the manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store products off the floor in manufacturer's unopened packaging protected from exposure to harmful environmental conditions and at temperature and humidity conditions as recommended by the manufacturer.

C. A minimum of 12 hours prior to ceiling installation, suspended linear ceilings shall be stored in the room in which they will be installed. Temperature and humidity of the room during this period shall closely approximate those conditions that will exist when the building is occupied.

D. Handle materials to avoid damage.

1.7 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Plenums have proper ventilation, especially in high moisture areas with no excessive buildup of heat in the ceiling areas.

C. Indoor installation space shall be fully enclosed with all exterior windows and doors in place, glazed, and weather-stripped. Roof is to be watertight, and all wet trades' work is to be completed, and thoroughly dry.

D. Mechanical, electrical, and other utility services above the ceiling plane shall be completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers with the exception of acoustical insulation.

E. Interior Installation: Install only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. Heating and cooling systems shall be operating before, during, and after installation, with the humidity of the interior spaces maintained between 25 and 55 percent, and a temperature between 60 to 90 degrees F.

F.

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1.9 COORDINATION

A. Coordinate layout and installation of the linear ceiling systems with other work penetrating the ceiling including light fixtures, HVAC equipment, and fire suppression system components.

B. Coordinate installation to limit exposure to direct radiant heat sources including heaters or equipment that operate above normal ambient temperatures. Such conditions may exceed the product's design limits and compromise performance or stability.

1.10 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements.

B. Deliver materials for Owner's use in maintenance.

1. Provide 5 percent of each type actually installed for use by owner in building maintenance and repair.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Rulon International, which is located at: 2000 Ring Way Rd.; St Augustine, FL 32092; Toll Free Tel: 800-227-8566; Tel: 904-584-1400; Fax: 904-584-1499; Email: request info (info@rulonco.com); Web:rulonco.com

B. Other Acceptable Manufacturers:

1. Armstrong World Industries, Inc.
2. Ceilings Plus.

2.2 MATERIALS - GENERAL

A. Linear ceilings will undergo changes with variations in the environment. Therefore, all dimensional tolerances are plus or minus 1/8 inch (3 mm).

2.3 CEILING PANELS

A. Provide suspended linear systems are fabricated with strips that are nearly inert to harsh, moist weather conditions. Strips are completely recyclable.

B. Module Size:

1. Ceiling pans are provided with integral spacers between the edges of each strip, with the flat face visible.
2. Ceiling pans are 3-1/4 inches (83 mm) wide with an integral 3/4 inch (19 mm spacer and placed into a design module of 4 inches (102 mm) with square sides.
3. Basis-of-Design: 900 Series Engineered Polymer Strips by Rulon.

C. See drawings for locations.

D. Trim and Border Treatment: Provide end caps or junction trims as indicated.

E. Finish:

1. As selected by Architect from manufacturers full range.

2.4 SUSPENSION SYSTEMS

A. Suspension Rail: Standard suspension carrier shall be manufacturer's standard, and consist of commercial grade galvanized steel. In swimming pool and other corrosive environments, use the Rulon suspension carrier coated with black protective coating system.

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2.5 FABRICATION

A. Edges, borders, and perimeter trims shall be indicated on the Drawings in accordance with the manufacturer's standard design details. All suspended wood ceiling products specified shall be supplied by the wood slat ceiling manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that the manufacturer’s carriers are in place, suspended and leveled in a direction perpendicular to the strip direction of the linear panels.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Work shall not begin until the space is fully enclosed and glazed and all wet work is completed and dried out to the satisfaction of the manufacturer.

C. Temperature shall be at least 65 degrees Fahrenheit during the installation and thereafter.

D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction, including the following:

1. Comply with ASTM C 636 and seismic design requirements indicated.
2. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
3. Additional Hanger Wires: Wrapped tightly 3 full turns to structure and component at locations where imposed loads could cause deflection exceeding 1/360 span or tolerances specified below.

B. Use a laser leveling device to lay out and install the perimeter trim as specified.

C. Suspension System: Suspension rail shall be placed perpendicular to the desired linear strip direction and positioned on 3' (915mm) or 2’ (610mm) centers - as specified by the manufacturer. Carriers shall be suspended from specified hangers - starting 6" (152mm) from one wall, then on specified centers, with the last carrier positioned within 6" (152mm) of the other wall. Specified hangers shall be attached directly to structure, or to inserts, screw eyes, or other devices that are secure, and that will not deteriorate or fail with age or elevated temperatures.

D. Linear Strips: Linear strips shall be fully mechanically attached to the carrier by snapping one side of the strip into position first, followed by the second side. When properly installed, the strips shall be firmly secured, and fully level. When spacers and acoustical blankets are specified, they shall be fitted as the installation of strips progresses. End cuts are butted tight together by snapping a connector behind the strips to create a secure, aligned joint.

E. Make final adjustments to level or contours as required.

3.4 FIELD QUALITY CONTROL

A. Technical Service: Manufacturer shall provide a local Technical Service Representative for on-site training and assistance during the installation process.

B. Environmental Monitoring: Manufacturer shall provide a temperature and humidity sensor to actively monitor the room in which the wood slats shall be installed for a minimum of one week before and up to two weeks after installation has been completed including all of the weeks in between.

C. Upon completion of ceiling installation, the owner's representative shall inspect all finished surfaces to ensure that the work has been completed in a manner satisfactory to the owner. Any deficiencies in the install of the ceiling shall be corrected prior to substantial completion.

3.5 ADJUSTMENTS AND CLEANING

A. Clean exposed surfaces of ceiling panel in accordance with manufacturer's instructions.

B. Remove and replace panels and tiles, which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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SECTION 09 54 26 ACOUSTICAL BEAMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Sound absorptive beams

1.2 SUBMITTALS

A. Comply with Section 013300 – Submittal Procedures

B. Product Data: Manufacturer’s technical data and installation instructions for each type of ceiling beam required.

C. Certifications: Certified test reports showing compliance with performance requirements specified.

D. Samples: Submit a minimum of three (3) samples of each veneer type and finish type required. Include samples that show the range of variation expected in grain, texture and color.

E. Shop Drawings: Submit shop drawings, including details, for all ceilings. Coordinate ceiling beam layout, installation and suspension system components. Show overall layout with dimensions and details of penetrations and intersections with other materials or building components.

F. Submit operation and maintenance data for installed products. Include precautions relating to harmful cleaning materials and methods that would affect the service life of the beams.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Provide acoustic beams from a single manufacturer with at least 5 years of prior experience fabricating projects of similar size and complexity.

B. Installer: Installation shall be done by qualified carpenters with at least 2 years experience in the installation of architectural woodwork or acoustical ceilings. Installers must receive training on handling, cutting, machining and field finishing the specified product prior to receiving materials on site.

C. Fire Performance Characteristics: Class A as tested by an independent accredited testing facility. Tests: ASTM E84.

1. Flame spread: 25 or less.
2. Smoke developed: 450 or less as specified by state or local codes.

D. Coordination of Work: Installing contractor shall organize and conduct a pre-installation survey of temperature, humidity and construction elements attaching, penetrating or concealed behind the acoustic beams.

E. Acoustic ceiling beams to be manufactured from no less than 67 percent post-industrial recycled materials by weight.

1.4 REFERENCES

A. Test Methods:

1. ASTM C423 Sound absorption and sound absorption coefficients by the reverberation room method performed by an independent testing agency.
2. ASTM E84 Standard test method for surface burning characteristics of building materials.

1.5 ASTM D1037 Linear expansion with change in moisture content.DELIVERY, STORAGE AND HANDLING

A. A. Deliver beams to the project in original, unopened packages. Inspect containers for visible damage and report any questionable condition to the shipper and manufacturer immediately.

B. Store products in a fully enclosed, clean, dry space out of direct sunlight and protected from damage with temperature controlled between 50 and 86 degrees F.

C. Handle products carefully to avoid damaging beam surfaces or chipping edges. Report any damage immediately. Installation of damaged beams is not covered by the manufacturer's warranty.

1.6 PROJECT CONDITIONS

A. Do not install acoustic ceiling beams until space is enclosed and weather-proofed, wet work is completely dry and ambient temperature and humidity conditions are maintained at the levels indicated for the project when occupied for its intended use.

B. Permit beams to reach room temperature, 50 to 86 degrees F, and stabilized moisture content of 25% to 55% RH for at least 72 hours before installation per AWI standards. Building should be enclosed and HVAC systems functioning in continuous operation with relative humidity maintained between 25 and 55 percent.

1.7 WARRANTY

A. Provide manufacturer's standard one-year written product warranty per Section 01770 – Closeout Procedures

B. Manufacturer's warranty is limited to decorative or acoustical beam materials only. Other components used in the ceiling system are excluded. Refer to the appropriate provisions in the related specification section.

1.8 MAINTENANCE

A. Maintenance Instructions: Provide manufacturer's standard maintenance and cleaning instructions for finishes provided.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Product: Subject to compliance with requirements, provide SoundPly® acoustic panels manufactured by Navy Island Inc.

2.2 MATERIALS

A. Provide SOUNDPLY® Sero LR Beams for Interior Installation:

1. Beams are constructed of SoundPly® LR-M25 (1") acoustical panels on three sides with an open top. Beams are composed of real wood veneer laminated to a fiberglass reinforced polymer skin or a painted surface applied to an MDF skin. Corners to be miter-folded with applied endcap. A particle board mounting cleat is to be provided to attach beam to.

B. Beam End Treatment: Beam ends will be finished with the same veneer and finish as the sides of the beam or as specified by the architect. Beam Weight: LR-M25 = 2.3 lbs./ft^2 of surface area

C.

D. Reference drawings for beam dimensions and locations.

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E. Flame Resistance: Sero LR Beams are composed of SoundPly® LR panels which have a Class 1(A) rating based on ASTM E84 standard test method for surface burning characteristics in building materials. Depending on the use and the type of veneer selected, Sero Beams can be used in Class A environments (IBC Chapter 8 Section 803).

F. Perforations: Beams will be furnished with perforated faces consisting of 0.5mm (0.02”) diameter holes in an offset pattern. The perforations must be clean without rounded edges or grain pull out between perforations. A minimum of 99.5% of the perforations must be acoustically functional, providing unobstructed passage into the core. Perforations must maintain consistent diameter through the face material and backer with no tapering or roughness.

G. Acoustic Performance: To generate the standing sound waves required for resistive absorption, each exposed side of the beam must be comprised of a SoundPly® LR panel with a sealed back of a specific thickness to achieve the required NRC: Sero LR-M25 (1” thick) .80 NRC per side

H. Beam Stability: Linear contraction or expansion to not exceed 0.4% maximum variation in width or height per ASTM D1037.

I. Finish for Veneer Faced Beams:

1. Species as selected by the architect.
2. Cut: plain sliced, quartered/rift, or rotary.
3. Matching between beams: no sequencing *(endmatching on specific veneers, check with manufacturer).*
4. Finishes shall be applied in the shop: clear, stained, or painted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect installation area and conditions under which work is to be performed for compliance with all manufacturer’s environmental requirements. All wet work in the installation area must be complete, cured and dry prior to installation. Do not proceed until all unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Installation must be done by qualified carpenters with 2 years experience in the installation of architectural woodwork or acoustic ceilings. The firm must demonstrate successful experience installing materials of similar type and quality of those required for this project. The use of proper carpentry tools and techniques will be required for the installation.

B. Comply with manufacturer’s instructions and recommendations for hanging beams.

C. Confirm all field dimensions are coordinated with shop drawings.

3.3 ADJUSTING AND CLEANING

A. Clean soiled surfaces of beams per manufacturer’s instructions.

Remove and replace damaged or discolored materials not in compliance with manufacturer’s tolerances.END OF SECTION 09 54 26

B.

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SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermoset-rubber base.
2. Thermoplastic-rubber base.
3. Rubber stair accessories.
4. Rubber molding accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

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PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexco.
2. Johnsonite; a Tarkett company.
3. Roppe Corporation, USA.

B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style and Location:

a. Style A, Straight: Provide in areas with carpet.
b. Style B, Cove: Provide in areas with resilient floor coverings.

C. Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed; preformed at exposed ends.

G. Inside Corners: Job formed.

H. Colors: Match Architect's sample.

2.2 THERMOPLASTIC-RUBBER BASE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
2. Flexco.
3. Basis-of-Design: Johnsonite; a Tarkett company.
4. Nora Systems, Inc.
5. Roppe Corporation, USA.

B. Product Standard: ASTM F1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style A, Straight: Mandalay Profile.

C. Thickness: 0.375 inch.

D. Height: 4.5 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed; preformed at exposed ends.

G. Inside Corners: Job formed.

H. Colors: Match Architect's sample.

2.3 RUBBER STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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1. American Biltrite.
2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
3. Flexco.
4. Johnsonite; a Tarkett company.
5. Nora Systems, Inc.
6. Roppe Corporation, USA.

C. Stair Treads: ASTM F2169.

1. Type: TS (rubber, vulcanized thermoset) or TP (rubber, thermoplastic).
2. Class: 1 (smooth, flat).
3. Group: 1 (embedded abrasive strips).
4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
5. Nosing Height: 1-1/2 inches.
6. Thickness: Minimum 1/4 inch and tapered to back edge.
7. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, in equal-length units.
8. Integral Risers: Smooth, flat; in height that fully covers substrate.

D. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

E. Locations: Provide rubber stair accessories in areas indicated.

F. Colors and Patterns: Match Architect's sample.

2.4 RUBBER MOLDING ACCESSORY

A. Locations: Provide rubber molding accessories in areas indicated or required for complete installation.

B. Colors and Patterns: Match Architect's sample.

2.5 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: Extruded aluminum with mill finish, nominal 2 inches wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

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3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter corners to minimize open joints.

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3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

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SECTION 09 65 16 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Unbacked vinyl sheet flooring.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review methods and procedures related to resilient sheet flooring installation including, but not limited to, the following:

a. Delivery, storage, and handling procedures.
b. Ambient conditions and ventilation procedures.
c. Subfloor preparation procedures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation instructions for each type of substrate.

B. Shop Drawings: For each type of resilient flooring type required.

1. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples: For each resilient flooring product and for each color, texture, and pattern specified, in manufacturer's standard size, but not less than 6-by-9-inch sections.

1. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

D. Samples for Initial Selection: For each type of resilient flooring product required.

E. Samples for Verification: For each type of resilient flooring product, in manufacturer's standard size, but not less than 6-by-9-inch sections of each color, texture, and pattern required.

1. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

F. Welded-Seam Samples: For seamless-installation technique indicated and for each resilient flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

G. Product Schedule: For each type of resilient flooring product required. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For resilient sheet flooring, for tests performed by a qualified testing agency.

B. Qualification Data: For Installer.

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1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient sheet flooring to include:

1. Methods for maintaining resilient sheet flooring, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to resilient sheet flooring.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming methods indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturers' labels indicating brand name and directions for storing.

B. Store resilient sheet flooring and accessory materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install resilient flooring until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

B. Do not install resilient flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended in writing by resilient flooring manufacturer.

C. Adhesively Applied Products:

1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
2. After postinstallation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
3. Close spaces to traffic during flooring installation.
4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products in accordance with ASTM E648 or ASTM E662 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RESILIENT SHEET FLOORING

A. Unbacked Vinyl Sheet Flooring : Resilient sheet flooring product with wear layer that is printed or decorated, composed of fillers, pigments, and vinyl binders, and protected by a clear specialty performance top layer.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Basis-of-Design: Cushion Step by Armstrong Flooring, Inc.
    b. Congoleum Corporation.
    c. Gerflor.
    d. Mannington Mills, Inc.
    e. Polyflor, Ltd.; distributed by Gerbert Limited.
2. Classification: ASTM F1913.
3. Thickness: 0.080 inch.
4. Wearing Surface: Smooth.
5. Sheet Width: As standard with manufacturer.
6. Seamless Installation Method: Heat welded.
7. Colors and Patterns: Venetian Marble - Alabaster.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended in writing by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.

C. Seamless Installation Accessories:
    1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
        a. Colors: As selected by Architect from manufacturer's full range to contrast with flooring.

D. Integral-Flash-Cove-Base Accessories:
    1. Cove Strip: 1-inch radius provided or approved by resilient sheet flooring manufacturer.
    2. Corners: Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.

E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient sheet flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
    1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
    1. Installation of resilient flooring products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates in accordance with resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.

B. Concrete Substrates: Prepare in accordance with ASTM F710.
    1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

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2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient sheet flooring until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 INSTALLATION OF RESILIENT SHEET FLOORING

A. Comply with manufacturer's written installation instructions.

B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.

C. Lay out resilient sheet flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.

G. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

H. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to fuse sections permanently into a seamless flooring installation. Prepare seams and apply

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compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.

B. Perform the following operations immediately after completing resilient sheet flooring installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.

1. Apply two coat(s).

E. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 09 65 16

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SECTION 09 65 19 - RESILIENT TILE AND PLANK FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Commercial luxury vinyl floor tiles.
2. Vinyl composition floor tiles.

1.2 DEFINITIONS

A. LVP: Luxury vinyl planks. A marketing term that is applied to modular resilient floor plank products.

B. LVT: Luxury vinyl tiles. A marketing term that is applied to modular resilient floor tile products.

C. VCT: Vinyl composition tiles. A modular resilient floor tile product composed of binder, fillers, and pigments.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review methods and procedures related to resilient tile and plank flooring installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturers' written data on physical characteristics, durability, and fade resistance.
2. Include manufacturers' written installation instructions for each type of substrate.

B. Shop Drawings: For each type of resilient flooring type required.

1. Include flooring layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples: Full-size units of each color, texture, and pattern of resilient flooring type required.

D. Samples for Initial Selection: For each type of resilient flooring product required.

E. Samples for Verification: Full-size units of each color and pattern of resilient flooring type required.

F. Product Schedule: For each type of resilient flooring product required. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For resilient flooring, for tests performed by a qualified testing agency.

B. Qualification Data: For Installer.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient flooring product type to include:

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1. Methods for maintaining resilient flooring, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to resilient flooring.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Resilient Tile and Plank Flooring: Furnish no fewer than 1 box for each 50 boxes or fraction thereof, of each type, color, pattern, and size of resilient flooring product installed.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for resilient flooring installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by resilient flooring manufacturer for installation techniques required.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturers' labels indicating brand name and directions for storing.

B. Store resilient flooring and accessory materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store resilient flooring on flat surfaces.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install resilient flooring until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

B. Do not install resilient flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended in writing by resilient flooring manufacturer.

C. Adhesively Applied Products:

1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
2. After postinstallation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
3. Close spaces to traffic during flooring installation.
4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.

1.11 WARRANTY

A. Special Warranty for Resilient Flooring Products: Manufacturer agrees to repair or replace components of flooring installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of flooring due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Warranty Period: 10 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products in accordance with ASTM E648 or ASTM E662 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RESILIENT TILE AND PLANK FLOORING

A. Commercial Luxury Vinyl Floor Tiles : Solid, resilient tile flooring product composed of binder, fillers, and pigments compounded with suitable stabilizers and processing aids; marketed as luxury vinyl tiles (LVT).

1. Basis-of-Design: Petrous by Cobalt.
2. Classification: ASTM F1700, Class III, Printed Film Vinyl Tile.
    a. Type: B, Embossed Surface.
3. Overall Thickness: 5mm including manufacturer's standard clear wear layer and UV-cured polyurethane topcoat.
4. Nominal Size: 7 by 48 inches.
5. Colors and Patterns: Match Architect's samples.

B. Vinyl Composition Floor Tiles: Resilient flooring product composed of binder, fillers, and pigments compounded with suitable stabilizers and processing aids.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Basis-of-Design: AVA, 2TRZO.
    b. Armstrong World Industries, Inc.
    c. Johnsonite; a Tarkett company.
2. Classification: ASTM F1066, Class 1, solid color.
3. Wearing Surface: Embossed.
4. Thickness: 0.125 inch.
5. Size: 36 by 36 inches.
6. Colors and Patterns: Match Architect's samples.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended in writing by floor tile and adhesive manufacturers for substrate and conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient flooring products indicates acceptance of surfaces and conditions.

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3.2 PREPARATION

A. Prepare substrates in accordance with manufacturer's written installation instructions to ensure adhesion of flooring.

B. Concrete Substrates: Prepare in accordance with ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient flooring manufacturer. Do not use solvents.
3. Alkalinity Testing: Perform pH testing in accordance with ASTM F710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.

1. Do not install flooring until it is the same temperature as space where it is to be installed.

E. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF RESILIENT TILE AND PLANK FLOORING

A. Comply with manufacturer's written installation instructions.

B. Discard broken, cracked, chipped, or deformed tiles.

C. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated.

D. Tile Matching: Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered.

1. Lay tiles in pattern of colors and sizes indicated.

E. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

F. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

H. Adhered Floor VCT Tile: Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written installation instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times, to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

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I. Floating Floor Tile: Install LVT floor tiles in accordance with flooring manufacturer's written installation instructions.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting flooring.

B. Perform the following operations immediately after completing flooring installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient flooring until Substantial Completion.

END OF SECTION 09 65 19

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SECTION 09 65 66 - RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient athletic sheet flooring.

1.2 COORDINATION

A. Coordinate layout and installation of flooring with floor inserts and junction boxes for gymnasium and fitness equipment.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review methods and procedures related to resilient athletic flooring installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation instructions for each type of substrate.

B. Shop Drawings: Show installation details and locations of the following:

1. Border tiles.
2. Floor patterns.
3. Layout, colors, widths, and dimensions of game lines and markers.
4. Locations of floor inserts for athletic equipment installed through flooring.
5. Locations of junction boxes for fitness equipment installed through flooring.
6. Seam locations for resilient athletic sheet flooring.

C. Samples: For each exposed product and for each type, color, and pattern specified, 6-inch-square in size and of the same thickness indicated for the Work.

1. Seam Samples: For each type of resilient athletic sheet flooring color and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

D. Samples for Initial Selection: For each type of resilient athletic flooring.

E. Samples for Verification: For each type, color, and pattern of flooring specified, 6-inch- square in size and of same thickness and material indicated for the Work.

1. Seam Samples: For each type of resilient athletic sheet flooring color and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

F. Product Schedule: For resilient athletic flooring. Use same designations indicated on Drawings.

G. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for flooring.>

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3. <Double click to insert sustainable design text for Floor Finish Submittal (PR2)>
4. <Double click to insert sustainable design text for adhesives.>

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For resilient athletic flooring, for tests performed by a qualified testing agency.

B. Qualification Statements: For Installer.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resilient athletic flooring.

1. Methods for maintaining resilient athletic flooring, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to resilient athletic flooring.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Resilient Athletic Tile Flooring: Furnish no fewer than 1 box for each 50 boxes or fraction thereof, of each type, color, pattern, and size of tile flooring installed.
2. Resilient Athletic Sheet Flooring: Furnish full-width rolls of not less than 10 linear feet for each 500 linear feet or fraction thereof, of each type, color, and pattern of sheet flooring installed.

1.8 QUALITY ASSURANCE

A. Resilient Athletic Sheet Flooring Installer Qualifications: An experienced installer who has completed resilient athletic sheet flooring installations using seaming methods indicated for this Project and similar in material, design, and extent to that indicated for this Project; who is acceptable to manufacturer; and whose work has resulted in installations with a record of successful in-service performance.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.

B. Store materials to prevent deterioration.

1. Store tiles on flat surfaces.
2. Store rolls upright.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install resilient athletic flooring until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

B. Do not install resilient athletic flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended in writing by resilient athletic flooring manufacturer.

C. Adhesively Applied Products:

1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive

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flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.

2. After postinstallation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
3. Close spaces to traffic during flooring installation.
4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.

PART 2 - PRODUCTS

2.1 RESILIENT ATHLETIC SHEET FLOORING

A. Rubber Sheet Flooring: Rubber athletic flooring provided as rolled goods for adhered installation.

1. Basis-of-Design: Capri by Spartan Surfaces.
2. Material: Recycled-rubber compound.
3. Traffic-Surface Texture: Textured.
4. Roll Size: Not less than 48 inches wide by longest length that is practical to minimize splicing during installation.
5. Thickness: 0.315 inch.
6. Color and Pattern: As selected by Architect from manufacturer's full range. Basis-of-Design: Galaxy RTL4021
7. Border: Interlocking, beveled-edge tiles, of same material as sheet flooring; with bevels that transition from thickness of sheet flooring to surface below it; with straight outside edges; for use where flooring corners and edges do not abut vertical surfaces.

2.2 ACCESSORIES

A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.

B. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates in accordance with manufacturer's written installation instructions to ensure adhesion of flooring.

B. Concrete Substrates: Prepare in accordance with ASTM F710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity Testing: Perform pH testing in accordance with ASTM F710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

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a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.

1. Do not install flooring until it is the same temperature as space where it is to be installed.

F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF RESILIENT ATHLETIC FLOORING, GENERAL

A. Comply with manufacturer's written installation instructions.

B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.

C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

3.4 INSTALLATION OF RESILIENT ATHLETIC SHEET FLOORING

A. Unroll sheet flooring and allow it to stabilize before cutting and fitting.

B. Lay out sheet flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Locate seams in accordance with approved Shop Drawings.

C. Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written installation instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.5 FIELD-APPLIED FINISHES

3.6 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing flooring installation:

1. Remove adhesive and other blemishes from flooring surfaces.
2. Sweep and vacuum flooring thoroughly.
3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.

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B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 09 65 66

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SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modular carpet tile.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

E. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

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1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

1.9 FIELD CONDITIONS

A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

    a. More than 10 percent edge raveling, snags, and runs.
    b. Dimensional instability.
    c. Excess static discharge.
    d. Loss of tuft-bind strength.
    e. Loss of face fiber.
    f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE As indicated in Interior Design Drawings.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis-of-Design: Interface; Heartstrings. Coordinate types and locations with Interior Design Drawings.
2. J&J Invision; J&J Industries, Inc.
3. Mannington Mills, Inc.
4. Milliken & Company.
5. Mohawk Group (The); Mohawk Carpet, LLC.
6. Patcraft; a division of Shaw Industries, Inc.
7. Shaw Contract Group; a Berkshire Hathaway company.

B. Color: As selected by Architect from manufacturer's full range. Basis-of-Design: Rhapsody.

C. Pattern: Match Architect's samples.

D. All carpet tile and accessories to be certified low or no VOC per NGBS and EGC requirements.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum with Interior Designer’s selected finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

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SECTION 09 72 00 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood-veneer wall covering.
2. Plaster Wall covering.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.

B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.

C. Samples for Initial Selection: For each type of wall covering.

D. Samples for Verification: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36 inches long in size.

1. Wall-Covering Sample: From same production run to be used for the Work, with specified treatments applied.

a. Show complete pattern repeat.
b. Mark top and face of fabric.

E. Product Schedule: For wall coverings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each wall covering, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wall-Covering Materials: For each type, color, texture, and finish, full width by length to equal to 5 percent of amount installed.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.

1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F1141 for appearance shading characteristics.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

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3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.

1. Wood-Veneer Wall Coverings: Condition spaces for not less than 48 hours before installation.

B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates in accordance with test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 50 or less.

2.2 WOOD-VENEER WALL COVERING

A. Refer to Interior Design Drawings for more information.

B. Description: Provide wood-veneer wall covering in rolls from same production run.

C. Finish: Factory applied using wall-covering manufacturer's standard stain and polyurethane system.

1. Colors: As selected by Architect from manufacturer's full range.

D. Basis-of-Design: Armstrong Forte (WD1); White River Tambour Panel (WD2).

2.3 PLASTER WALL COVERING

A. Refer to Interior Design Drawings for more information.

B. Finish: As selected by Interior Design.

C. Color: As selected by Interior Design.

D. Wall Panels:

1. Substrate panels are made from medium density fiber board containing pre-consumer recycled wood fiber.

2.4 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.

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B. Seam Tape: As recommended in writing by wall-covering manufacturer.

C. Z clip fixing system, manufacturer’s standard.

D. Trim System: Aluminum reveals and edge trims directly fixed to the wall surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation surfaces being true in plane and vertical and horizontal alignment, maximum moisture content, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, and mildew.

C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
2. Plaster: Allow plaster to cure for at least 90 days. Neutralize areas of high alkalinity. Apply primer/sealer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
3. Metals: If not factory primed, clean and apply metal primer as recommended in writing by metal-primer manufacturer and wall-covering manufacturer.
4. Gypsum Board: Apply primer/sealer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
5. Painted Surfaces:
    a. Check for pigment bleeding. Apply primer/sealer to areas susceptible to pigment bleeding as recommended in writing by primer/sealer manufacturer.
    b. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.

D. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

E. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 INSTALLATION OF WALL COVERING

A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.

B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.

C. Install strips in same order as cut from roll.

1. For solid-color, even-texture, or random-match wall coverings, reverse every other strip.

D. Install wall covering without lifted or curling edges and without visible shrinkage.

E. Match pattern 72 inches above the finish floor.

F. Install seams vertical and plumb at least 6 inches from outside corners and 3 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.

G. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.

H. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.4 CLEANING

A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended in writing by wall-covering manufacturer.

C. Replace strips that cannot be cleaned.

D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 09 72 00

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SECTION 09 77 20 - FIBERGLASS REINFORCED WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Prefinished polyester glass reinforced plastic sheets and adhered to unfinished gypsum wallboard in janitor's closets.

1.2 REFERENCES

A. American Society for Testing and Materials: Standard Specifications (ASTM)

1. ASTM D 256 - Izod Impact Strengths (ft #/in)
2. ASTM D 570 - Water Absorption (%)
3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
5. ASTM D 2583- Barcol Hardness
6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.

C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.

D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.

1. Submit complete with specified applied finish.
2. For selected patterns show complete pattern repeat.
3. Exposed Molding and Trim: Provide samples of each type, finish, and color.

E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives and sealants prior to their delivery to the site.

1.4 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:

1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)

a. Wall Required Rating – Class A.

B. Sanitary Standards: System components and finishes to comply with:

1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

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1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials factory packaged on strong pallets.

B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (70°) for 48 hours prior to installation.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work

B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.

1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.7 WARRANTY

A. Furnish one year guarantee against defects in material and workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Standard FRP by Marlite; .

B. Crane Composites.

C. Kal-Lite.

2.2 PANELS

A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.

1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
2. Dimensions:

a. Thickness – 0.090 inch nominal.
b. Width – 48 inches nominal.
c. Length – As indicated on the drawings.

3. Tolerance:

a. Length and Width: +/-1/8 inch.
b. Square - Not to exceed 1/8 inch for 8 foot panels or 5/32 inch for 10 foot panels.

B. Properties: Resistant to rot, corrosion, staining, denting, peeling, and splintering.

1. Flexural Strength - 1.0 x 104 psi per ASTM D 790.
2. Flexural Modulus - 3.1 x 105 psi per ASTM D 790.
3. Tensile Strength - 7.0 x 103 psi per ASTM D 638.
4. Tensile Modulus - 1.6 x 105 psi per ASTM D 638.
5. Water Absorption - 0.72% per ASTM D 570.
6. Barcol Hardness (scratch resistance) of 35 55 as per ASTM D 2583.
7. Izod Impact Strength of 72 ft. lbs./in ASTM D 256

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Finish: To be selected from manufacturer’s standard finishes.

1. Color: To be selected from manufacturer’s standard colors.
2. Surface: Pebbled.

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3. Fire Rating: Class A (I).
4. Size: As indicated on drawings.

2.3 ACCESSORIES

A. Fasteners: Non-staining nylon drive rivets.

1. Match panel colors.
2. Length to suit project conditions.

B. Adhesive: Construction adhesives complying with ASTM C 557.

C. Sealant:

1. Clear Silicone Sealant.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.

1. Verify that stud spacing does not exceed 24 inch on-center.

B. Repair defects prior to installation.

1. Level wall surfaces to panel manufacturer’s requirements. Remove protrusions and fill indentations.

3.2 INSTALLATION

A. Comply with manufacturer's recommended procedures and installation sequence.

B. Cut sheets to meet supports allowing 1/8” inch clearance for every 8 foot of panel.

1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
2. Pre-drill fastener holes 1/8 inch oversize with high speed drill bit.
    a. Space at 8 inches maximum on center at perimeter, approximately 1 inch from panel edge.
    b. Space at in field in rows 16 inches on center, with fasteners spaced at 12 inches maximum on center.

C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.

1. Install panels with manufacturer's recommended gap for panel field and corner joints.
    a. Adhesive trowel and application method to conform to adhesive manufacturer’s recommendations.
    b. Drive fasteners for snug fit. Do not over-tighten.

D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.

1. All moldings must provide for a minimum 1/8 inch of panel expansion at joints and edges, to insure proper installation.
2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.3 CLEANING

A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.

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B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION

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SECTION 09 91 13
EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Concrete masonry units (CMU).
2. Exposed to view piping.
3. Plastic trim fabrications.

1.2 DEFINITIONS

A. Gloss Ranges:

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.3 REFERENCE STANDARDS

A. ASTM D 3359 - Standard Test Methods for Mearsuring Adhesion by Tape.

B. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product indicated..

C. Samples for Initial Selection: For each type of topcoat product indicated.

D. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

F. Maintenance Materials: Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 2 gal. of each material and color applied.

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1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F, and a maximum 90 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.8 WARRANTY

A. Manufacturer’s standard warranty for each product.

B. Exterior steel warranty: All exterior steel products (unless galvanized) to be coated with a product with a minimum 10-year warranty for replacement and touching up of the product, including labor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Sherwin-Williams Company.

B. Benjamin Moore & Co.

C. Glidden Professional.

D. PPG Industries.

E. McCormick.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors:

1. As selected by Architect from manufacturer's full range.
2. Dark tints may be used on metal frames that may require more coats than that indicated on paint schedule for proper coverage; apply as many coats as necessary for complete hide.

3. Use OSHA Safety Colors as follows:

   a. Safety Red - Piping that is used for Fire Fighting, Fire Protection and Sprinkler Systems including Standpipes.
   b. Safety Yellow - Unfinished treads of Stairways, Piping that is used for Hazardous, Flammable, High Temperature or High Pressure Materials, Exposed Edges of Walls and Platforms.
   c. Safety Yellow - Steel Bollards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

   1. Concrete: 12 percent.
   2. Masonry (Clay and CMU): 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

   1. Use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
   2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

   1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Seal surfaces that might cause bleed through or staining of topcoat.

D. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

E. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

F. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

G. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

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H. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

I. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

J. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

K. Passivated Galvanized Steel: Clean with a water-based industrial strength cleaner, and/or “Brush Blast” in accordance with SSPC-SP7. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the “cross-hatch adhesion tape test” method in accordance with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.

L. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

M. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

N. Exterior Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

B. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, covers, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

3. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
5. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.

C. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

D. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

E. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

F. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

G. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

H. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels; materials and products having factory-applied primers are not considered prefinished.

1. Prefinished items include the following factory-finished components:

   a. Finished mechanical and electrical equipment.
   b. Light fixtures.

2. Finished metal surfaces include the following:

   a. Anodized aluminum.
   b. Stainless steel.
   c. Chromium plate.
   d. Copper and copper alloys.
   e. Bronze and brass.

3. Operating parts include moving parts of operating equipment and the following:

   a. Valve operators.

4. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
5. Non-metallic roofing and flashing.
6. Brick, architectural concrete or cast stone.
7. Exterior insulation and finish system (EIFS).
8. Stucco.
9. Glass.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

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C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. High-Build Elastomeric Waterborne System - Smooth:

a. Apply Elastomeric Patching Compound as needed.
b. Prime Coat: As recommended in writing by topcoat manufacturer.

1) MOORE'S Acrylic Masonry Sealer 066; Benjamin Moore & Co.
2) Hydrosealer Primer Sealer 6001-1200; Glidden Professional.
3) PERMA-CRETE 4-603 Interior/Exterior Alkali Resistant Primer; PPG Industries.
4) Loxon Masonry Primer A24-300; Sherwin-Williams Company (The).

c. Intermediate Coat: As recommended in writing by topcoat manufacturer.

1) MOORLASTIC 100% Acrylic Elastomeric Waterproof Coating - Low Lustre 055; Benjamin Moore & Co.
2) Decra-Flex 300 Exterior Elastomeric Coating Smooth 2260 Series; Glidden Professional.
3) PERMA-CRETE PITT-FLEX 4-110 series Elastomeric Coating; PPG Industries.
4) Conflex XL High Build Elastomeric Coating, A5 Series; Sherwin-Williams Company (The).

d. Topcoat:

1) MOORLASTIC 100% Acrylic Elastomeric Waterproof Coating - Low Lustre 055; Benjamin Moore & Co.
2) Decra-Flex 300 Exterior Elastomeric Coating Smooth 2260 Series; Glidden Professional.
3) PERMA-CRETE PITT-FLEX 4-110 series Elastomeric Coating; PPG Industries.
4) Conflex XL High Build Elastomeric Coating, A5 Series; Sherwin-Williams Company (The).

2. High-Build Elastomeric Waterborne Aggregate System - Textured:

a. Prime Coat: As recommended in writing by topcoat manufacturer.

1) MOORE'S Acrylic Masonry Sealer 066; Benjamin Moore & Co.
2) Hydrosealer Primer Sealer 6001-1200; Glidden Professional.
3) PERMA-CRETE 4-603 Interior/Exterior Alkali Resistant Primer; PPG Industries.
4) Loxon Masonry Primer A24-300 (as required); Sherwin-Williams Company (The).

b. Intermediate Coat: As recommended in writing by topcoat manufacturer.

1) Acrylic Elastomeric - Fine Texture 060; Benjamin Moore & Co.
2) Decra-Flex 300 Exterior Elastomeric Coating Fine 2270 Series; Glidden Professional.
3) PERMA-CRETE 4-210 series PITT-FLEX Textured Elastomeric Coating; PPG Industries.
4) Conflex XL High Build Elastomeric Coating, A5 Series; Sherwin-Williams Company (The).

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c. Topcoat: Textured by aggregate.

1) Acrylic Elastomeric - Fine Texture 060; Benjamin Moore & Co.
2) 2270 Decra-Flex Elastomeric Coating System Fine Texture; Glidden Professional Decra-Flex 300 Exterior Elastomeric Coating Fine 2270 Series; Glidden Professional.
3) PERMA-CRETE 4-210 series PITT-FLEX Textured Elastomeric Coating; PPG Industries.
4) Conflex XL High Build Elastomeric Coating, A5 Series; Sherwin-Williams Company (The).

B. CMU Substrates:

1. High-Build Elastomeric Waterborne Latex System - Smooth:

a. Prime Coat: As recommended in writing by topcoat manufacturer.

1) MOORE'S Acrylic Masonry Sealer 066; Benjamin Moore & Co
2) Concrete Coatings Block Filler Interior/Exterior Primer 3010-1200; Glidden Professional.
3) PERMA-CRETE LTC 4-100 Concrete Block & Masonry Surface/Filler; PPG Industries.
4) S-W Loxon Block Surfacer, A24W200; Sherwin-Williams Company (The).

b. Intermediate Coat: As recommended in writing by topcoat manufacturer.

1) MOORLASTIC 100% Acrylic Elastomeric Waterproof Coating - Low Lustre 055; Benjamin Moore & Co.
2) Decra-Flex 300 Exterior Elastomeric Coating Smooth 2260 Series; Glidden Professional.
3) PERMA-CRETE PITT-FLEX 4-110 series Elastomeric Coating; PPG Industries.
4) Conflex XL High Build Elastomeric Coating, A5 Series; Sherwin-Williams Company (The).

c. Topcoat:

1) MOORLASTIC 100% Acrylic Elastomeric Waterproof Coating - Low Lustre 055; Benjamin Moore & Co.
2) Decra-Flex 300 Exterior Elastomeric Coating Smooth 2260 Series; Glidden Professional.
3) PERMA-CRETE PITT-FLEX 4-110 series Elastomeric Coating; PPG Industries.
4) Conflex XL High Build Elastomeric Coating, A5 Series; Sherwin-Williams Company (The).

2. High-Build Elastomeric Waterborne Aggregate System - Textured:

a. Prime Coat: As recommended in writing by topcoat manufacturer.

1) MOORE'S Acrylic Masonry Sealer 066; Benjamin Moore & Co
2) Concrete Coatings Block Filler Interior/Exterior Primer 3010-1200; Glidden Professional.
3) PERMA-CRETE LTC 4-100 Concrete Block & Masonry Surface/Filler; PPG Industries.
4) S-W Loxon Block Surfacer, A24W200; Sherwin-Williams Company (The).

b. Intermediate Coat: As recommended in writing by topcoat manufacturer.

1) Acrylic Elastomeric - Fine Texture 060; Benjamin Moore & Co.
2) Decra-Flex 300 Exterior Elastomeric Coating Fine 2270 Series; Glidden Professional.
3) PERMA-CRETE 4-210 series PITT-FLEX Textured Elastomeric Coating; PPG Industries.

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4) Conflex XL High Build Elastomeric Coating, A5-400 Series; Sherwin-Williams Company (The).

c. Topcoat: Textured by aggregate.

1) Acrylic Elastomeric - Fine Texture 060; Benjamin Moore & Co.
2) Decra-Flex 300 Exterior Elastomeric Coating Fine 2270 Series; Glidden Professional.
3) PERMA-CRETE 4-210 series PITT-FLEX Textured Elastomeric Coating; PPG Industries.
4) Conflex XL High Build Elastomeric Coating, A5-800 Series; Sherwin-Williams Company (The).

C. Galvanized-Metal Substrates:

1. Latex Over Water-Based Primer System:

a. Prime Coat: Waterborne galvanized-metal primer.

1) SUPER SPEC HP Acrylic Metal Primer P04(52 g/l); Benjamin Moore & Co.
2) Devflex 4020PF Direct to Metal Flat Primer & Finish; Glidden Professional.
3) Pitt-Tech Plus 90-912 Interior/Exterior DTM Industrial Primer; PPG Industries.
4) DTM Acrylic Primer/Finish B66W1; Sherwin-Williams Company (The).

b. Intermediate Coat: Exterior latex matching topcoat.

1) MOORGLO Acrylic Semi-Gloss House Paint N096 (149 g/l); Benjamin Moore & Co.
2) Devflex 4216HP Waterborne Acrylic Semi-Gloss Enamel 4216L Series; Glidden Professional.
3) Pitt-Tech Plus 90-1210 Interior/Exterior Semi Gloss DTM WB Industrial Enamel; PPG Industries.
4) DTM Acrylic Gloss Coating B66W100 Series; Sherwin-Williams Company (The).

c. Topcoat: Exterior latex.

1) MOORGLO Acrylic Semi-Gloss House Paint N096 (149 g/l); Benjamin Moore & Co.
2) Devflex 4216HP Waterborne Acrylic Semi-Gloss Enamel 4216L Series; Glidden Professional.
3) Pitt-Tech Plus 90-1210 Interior/Exterior Semi Gloss DTM WB Industrial Enamel; PPG Industries.
4) DTM Acrylic Gloss Coating B66W100 Series; Sherwin-Williams Company (The).

D. Wood Panel Substrates:

1. Latex System:

a. Prime Coat: Exterior latex wood primer.

1) Fresh Start 100% Acrylic Primer Sealer 023 (49 g/l); Benjamin Moore &Co.
2) Hydrosealer Primer Sealer 6001-1200; Glidden Professional.
3) SPEEDHIDE 6-609 Exterior House and Trim Wood Primer Flat; PPG Industries.
4) A-100 Exterior Latex Wood Primer B42W41 or Chek-Gard Primer B42W10; Sherwin-Williams Company (The).

b. Intermediate Coat: Exterior latex matching topcoat.

1) Super Spec 100 % Acrylic Semi-Gloss House Paint 170; Benjamin Moore & Co.
2) Fortis 350 Exterior Satin Paint 2402V Series; Glidden Professional.

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3) SPEEDHIDE 6-900 series Exterior Semi Gloss 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex (A82 Series); Sherwin-Williams Company (The).

c. Topcoat: Exterior latex (satin).

1) Super Spec 100 % Acrylic Semi-Gloss House Paint 170; Benjamin Moore & Co.
2) Fortis 350 Exterior Satin Paint 2402V Series; Glidden Professional.
3) SPEEDHIDE 6-900 series Exterior Semi Gloss 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex (A82 Series); Sherwin-Williams Company (The).

E. Dimension Lumber Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Exterior latex wood primer.

1) Fresh Start 100% Acrylic Primer Sealer 023 (49 g/l); Benjamin Moore & Co.
2) Hydrosealer Primer Sealer 6001-1200; Glidden Professional.
3) SPEEDHIDE 6-609 Exterior House and Trim Wood Primer Flat; PPG Industries.
4) A-100 Exterior Latex Wood Primer B42W41 or Chek-Gard Primer B42W10; Sherwin-Williams Company (The).

b. Intermediate Coat: Exterior latex matching topcoat.

1) Super Spec 100 % Acrylic Semi-Gloss House Paint 170; Benjamin Moore & Co.
2) Fortis 350 Exterior Satin Paint 2402V Series; Glidden Professional.
3) SPEEDHIDE 6-2045 series Exterior Satin 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex (A82 Series); Sherwin-Williams Company (The).

c. Topcoat: Exterior latex (satin).

1) Super Spec 100 % Acrylic Semi-Gloss House Paint 170; Benjamin Moore & Co.
2) Fortis 350 Exterior Satin Paint 2402V Series; Glidden Professional.
3) SPEEDHIDE 6-2045 series Exterior Satin 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex (A82 Series); Sherwin-Williams Company (The).

F. Dimension Lumber Substrates, Traffic Surfaces:

1. Acrylic Floor Enamel System:

a. Prime Coat: Exterior/interior acrylic floor enamel (gloss).

1) MOORE'S Latex Floor & Patio Enamel 122; Benjamin Moore & Co.
2) Concrete Coatings Acrylic Floor Enamel 3018N Series; Glidden Professional.
3) Pittsburgh Paints 3-510 Floor, Porch & Deck Satin Latex; PPG Industries.
4) ArmorSeal Tread-Plex Primer; Sherwin-Williams Company (The).

b. Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).

1) MOORE'S Latex Floor & Patio Enamel 122; Benjamin Moore & Co.
2) Concrete Coatings Acrylic Floor Enamel 3018N Series; Glidden Professional.
3) Pittsburgh Paints 3-510 Floor, Porch & Deck Satin Latex; PPG Industries.
4) ArmorSeal Tread-Plex Acrylic Floor Coating B90 Series; Sherwin-Williams Company (The).

c. Topcoat: Exterior/interior alkyd floor enamel (gloss); with additive to increase skid resistance of painted surface.

1) MOORE'S Latex Floor & Patio Enamel 122; Benjamin Moore & Co.
2) Concrete Coatings Acrylic Floor Enamel 3018N Series; Glidden Professional.
3) Pittsburgh Paints 3-510 Floor, Porch & Deck Satin Latex; PPG Industries.
4) ArmorSeal Tread-Plex Acrylic Floor Coating B90 Series; Sherwin-Williams Company (The).

G. Plastic Trim Fabrication Substrates:

1. Latex System:

a. Prime Coat: Bonding primer (water based).

1) Fresh Start 100% Acrylic Primer Sealer 023 (49 g/l); Benjamin Moore & Co.
2) Hydrosealer Primer Sealer 6001-1200; Glidden Professional.
3) SEAL GRIP 17-921 Interior/Exterior 100% Acrylic Universal Primer/Sealer; PPG Industries.
4) Adhesion Primer B51W50; Sherwin-Williams Company (The).

b. Intermediate Coat: Exterior latex matching topcoat.

1) MOORGLO Acrylic Semi-Gloss House Paint N096 (149 g/l); Benjamin Moore & Co.
2) Fortis 350 Exterior Semi-Gloss Paint 2406V Series; Glidden Professional.
3) SPEEDHIDE 6-900 series Exterior Semi Gloss 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex (A8 Series); Sherwin-Williams Company (The).

c. Topcoat: Exterior latex (semigloss).

1) MOORGLO Acrylic Semi-Gloss House Paint N096 (149 g/l); Benjamin Moore & Co.
2) Fortis 350 Exterior Semi-Gloss Paint 2406V Series; Glidden Professional.
3) SPEEDHIDE 6-900 series Exterior Semi Gloss 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex (A8 Series); Sherwin-Williams Company (The).

H. Exterior Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Exterior latex matching topcoat.

1) Fresh Start 100% Acrylic Primer Sealer 023 (49 g/l); Benjamin Moore & Co.
2) Hydrosealer Primer Sealer 6001-1200; Glidden Professional.
3) SEAL GRIP 17-921 Interior/Exterior 100% Acrylic Universal Primer/Sealer; PPG Industries.
4) A-100 Exterior Latex Primer B42W41; Sherwin-Williams Company (The).

b. Intermediate Coat: Exterior latex matching topcoat.

1) Super Spec 100 % Acrylic Semi-Gloss House Paint 170; Benjamin Moore & Co.
2) Fortis 350 Exterior Semi-Gloss Paint 2406V Series; Glidden Professional.
3) SPEEDHIDE 6-900 series Exterior Semi Gloss 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex Satin A82; Sherwin-Williams Company (The).

c. Topcoat: Exterior latex (semigloss).

1) Super Spec 100 % Acrylic Semi-Gloss House Paint 170; Benjamin Moore & Co.
2) Fortis 350 Exterior Semi-Gloss Paint 2406V Series; Glidden Professional.

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3) SPEEDHIDE 6-900 series Exterior Semi Gloss 100% Acrylic Latex; PPG Industries.
4) A-100 Exterior Latex Satin A82; Sherwin-Williams Company (The).

END OF SECTION

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SECTION 09 91 23
INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete masonry units (CMU).
2. Galvanized metal.
3. Gypsum board.
4. Exposed to view PVC and metal piping.
5. Doors.
6. Wood trim.

1.2 DEFINITIONS

A. Gloss Ranges:

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..

b. Other Items: Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 5 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis-of-Design: Sherwin-Williams Company (The).
2. Benjamin Moore.
3. ICI Paints.
4. McCormick Paints.
5. PPG Paints.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

B. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.

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2. Nonflat Paints and Coatings: VOC content of not more than 50 g/L.
3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
4. Restricted Components: Paints and coatings shall not contain any of the following:
    a. Acrolein.
    b. Acrylonitrile.
    c. Antimony.
    d. Benzene.
    e. Butyl benzyl phthalate.
    f. Cadmium.
    g. Di (2-ethylhexyl) phthalate.
    h. Di-n-butyl phthalate.
    i. Di-n-octyl phthalate.
    j. 1,2-dichlorobenzene.
    k. Diethyl phthalate.
    l. Dimethyl phthalate.
    m. Ethylbenzene.
    n. Formaldehyde.
    o. Hexavalent chromium.
    p. Isophorone.
    q. Lead.
    r. Mercury.
    s. Methyl ethyl ketone.
    t. Methyl isobutyl ketone.
    u. Methylene chloride.
    v. Naphthalene.
    w. Toluene (methylbenzene).
    x. 1,1,1-trichloroethane.
    y. Vinyl chloride.
5. All paint products are to meet Earthcraft requirements for low VOC materials.

C. Colors:

1. As selected by Architect from manufacturer's full range.
2. Different colors may be used in the same room.
3. Colors of frames may be different than doors.
4. Colors for ceilings and trim may be different from walls, and walls may be more than one color or striped.
5. Dark tints may be used on metal frames that may require more coats than that indicated on paint schedule for proper coverage.
6. Use OSHA Safety Colors on exposed to view materials as follows:
    a. Safety Red - Piping that is used for Fire Fighting, Fire Protection and Sprinkler Systems including Standpipes.
    b. Safety Yellow - Unfinished treads of Stairways, Piping that is used for Hazardous, Flammable, High Temperature or High Pressure Materials, Exposed Edges of Walls and Platforms.
    c. Safety Yellow - Steel Bollards and Steel Corner Guards on columns in parking garages.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Masonry: 12 percent.
2. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

E. Ensure all sides of the doors painted with the color selected by the architect.

3.2 PREPARATION

A. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

F. Passivated Galvanized Steel: Clean with a water-based industrial strength cleaner, and/or “Brush Blast” in accordance with SSPC-SP7. After the surface has been prepared, apply recommended primer to a small area. Allow primer to cure for 7 days, and test adhesion using the “cross-hatch adhesion tape test” method in accordance with ASTM D 3359. If the adhesion of the primer is positive, proceed with a recommended coating system for galvanized metal.

G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

H. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended

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by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

B. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

    a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
5. Finish doors on tops, bottoms, and side edges the same as faces.

C. Block Fillers:

1. Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
2. Perform a squeegee operation on second coat to fill all crevices and produce a smooth surface; do not remove filler material from surface with the squeegee operation.

D. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

F. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

G. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

H. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

I. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

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1. Mechanical Work:

    a. Uninsulated metal piping.
    b. Uninsulated plastic piping.
    c. Pipe hangers and supports.
    d. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
    e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    f. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

    a. Electrical equipment that is indicated to have a factory-primed finish for field painting.
    b. Exposed wiremold and conduit in finished spaces to match color of wall.

J. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

    a. Architectural woodwork.
    b. Acoustical wall panels.
    c. Metal toilet enclosures.
    d. Metal lockers.
    e. Unit kitchens.
    f. Finished mechanical and electrical equipment.
    g. Light fixtures.

2. Finished metal surfaces include the following:

    a. Anodized aluminum.
    b. Stainless steel.
    c. Chromium plate.
    d. Copper and copper alloys.
    e. Bronze and brass.

3. Operating parts include moving parts of operating equipment and the following:

    a. Valve and damper operators.
    b. Linkages.
    c. Sensing devices.
    d. Motor and fan shafts.

4. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

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3.5 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. Institutional Low-Odor/VOC Latex System: *Semi-Gloss*.
    a. Prime Coat: Interior/exterior latex block filler.
        1) S-W PrepRite Block Filler, B25W25; Sherwin-Williams Company (The).
    b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
        1) S-W Pro Mar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company (The).
    c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).
        1) S-W Pro Mar 200 Zero VOC Semi-Gloss, B31-2600; Sherwin-Williams Company (The).
2. Institutional Low-Odor/VOC Latex System: *Eggshell*.
    a. Prime Coat: Interior/exterior latex block filler.
        1) S-W PrepRite Block Filler, B25W25; Sherwin-Williams Company (The).
    b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
        1) S-W Pro Mar 200 Zero VOC Eg-Shel B20-2600; Sherwin-Williams Company (The).
    c. Topcoat: Institutional low-odor/VOC interior latex.
        1) S-W ; Pro Mar 200 Zero VOC Eg-Shel B20-2600 Sherwin-Williams Company (The).

B. Spot Prime for Field Connections and Touch Up for Structural Elements:

1. Thoroughly examine structural elements for bare spots and abraded surface; spot prime for full coverage.
2. Extend spot prime minimum 6 inches beyond edge of field connections.
3. Waterborne Enamel System:
    a. Prime Coat:
        1) Pro Industrial Pro-Cryl® Universal Primer, B66-1310 Series; Sherwin-Williams Company (The).

C. Steel Substrates:

1. Water-Based Dry-Fall System: Three-coat; *Eggshell*.
    a. Prime Coat: Waterborne dry fall.
        1) S-W ProCryl Universal Primer, B66-1310 Series; Sherwin-Williams Company (The).
    b. Intermediate Coat:
        1) S-W Waterborne Acrylic Dry Fall, B42W00082 Eg-Shel; Sherwin-Williams Company (The).
    c. Topcoat: Waterborne dry fall.
        1) S-W Waterborne Acrylic Dry Fall, B42W00082 Eg-Shel; Sherwin-Williams Company (The).
2. Institutional Low-Odor/VOC Latex System: *Semi-gloss*.
    a. Prime Coat - Field Applied: (shop prime with Quick-Drying Enamel System)

1) S-W Pro Industrial Pro-Cryl® Universal Primer, B66-1310 Series; Sherwin-Williams Company (The).

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.

1) S-W Pro Mar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company (The).

c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).

1) S-W Pro Mar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company (The).

3. Waterborne Urethane System: Provide for interior railing systems and exposed steel stair risers.

a. Prime Coat - Field Applied: (shop prime with Quick-Drying Enamel System).

1) S-W ProCryl Universal Primer, B66-1310 Series; Sherwin-Williams Company (The).

b. Intermediate Coat: Interior latex matching topcoat.

1) S-W Waterbased Acrolon 100 Urethane, B65W720 Series; Sherwin-Williams Company (The).

c. Topcoat: Interior latex (eggshell).

1) S-W Waterbased Acrolon 100 Urethane, B65W720 Series; Sherwin-Williams Company (The).

D. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System: Semi-gloss finish: Kitchen Walls and Bath Walls / Doors / Wood Trim.

a. Prime Coat: Interior latex primer/sealer.

1) S-W Pro Mar 200 Zero VOC Primer B28W02600; Sherwin-Williams Company (The).

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.

1) S-W Pro Mar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company (The).

c. Topcoat: Institutional low-odor/VOC interior latex.

1) S-W Pro Mar 200 Zero VOC Semi-Gloss, B31-2600 Series; Sherwin-Williams Company (The).

2. Institutional Low-Odor/VOC Latex System: Flat finish: All Ceilings.

a. Prime Coat: Interior latex primer/sealer.

1) S-W ; Pro Mar 200 Zero VOC Primer B28W02600; Sherwin-Williams Company (The).

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.

1) S-W Pro Mar 200 Zero VOC Flat, B30-2600 Series; Sherwin-Williams Company (The).

c. Topcoat: Institutional low-odor/VOC interior latex (flat).

1) S-W ; Pro Mar 200 Zero VOC Flat, B30-2600 Series; Sherwin-Williams Company (The).

3. Institutional Low-Odor/VOC Latex System: Satin Sheen finish: All walls except bathrooms and kitchens:

a. Prime Coat: Interior latex primer/sealer.

1) S-W; Pro Mar 200 Zero VOC Primer B28W02600.

b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.

1) S-W; Pro Mar 200 Zero VOC Velvet (Gloss level G2, between flat and eggshell).

c. Topcoat: Institutional low-odor/VOC interior latex.

1) S-W; Pro Mar 200 Zero VOC (Gloss level G2, between flat and eggshell).

E. Concrete Floor Substrates (Janitor's Closet and Trash Room on first floor):

1. Basis-of-Design: Sherwin Williams ArmorSeal HS.
2. Refer to Interior Design drawings for more information.
3. Provide product compatible with floor substrate.

F. Exposed Gypsum Cement Underlayment Substrates (Janitor's Closets and Trash Rooms on upper floors):

1. Basis-of-Design: Sherwin Williams ArmorSeal HS.
2. Provide product compatible with floor substrate.

END OF SECTION

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SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior primers/sealers.
2. Metal primers.
3. Epoxy coatings.
4. Polyurethane coatings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of coating system and each color and gloss of topcoat. Submit paint manufacturer's standard printed cards for verification Samples.

1. Submit Samples on actual substrate material to be coated, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in High-Performance Coating Schedules. Include color designations and production runs (batch numbers).

E. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for paints and coatings.>
2. <Double click to insert sustainable design text for EPDs and HPDs.>

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same production run (batch number), that match coating system products applied and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.4 MOCKUPS

A. Apply mockups of each coating system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
    a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
    b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
    a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

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3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each coating system per substrate from single source from single manufacturer.

2.2 HIGH-PERFORMANCE COATING PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each coating system must be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a coating system, provide products recommended in writing by topcoat manufacturer for use in system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.3 METAL PRIMERS

A. Zinc-Rich Inorganic Primer: Corrosion-resistant, inorganic-based, zinc-rich primer; formulated for use on prepared ferrous metal substrates that will be exposed to severe industrial or marine environments.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Epoxy Zinc-Rich Primer: Solvent-based, multi-component, epoxy-type anti-corrosive primer; formulated for use on cleaned ferrous metal substrates that will be exposed to moderate industrial or marine environments.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

C. Water-Based, Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer; formulated for resistance to flash rusting when applied to cleaned, ferrous metal substrates subject to mildly corrosive environments.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

D. Epoxy, Anticorrosive Primer: Solvent-based, two-component, epoxy, anti-corrosive primer; formulated for use on ferrous and galvanized metal substrates.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMUs): 12 percent.
3. Gypsum Board: 12 percent. Verify that finishing compound is dry and sanded smooth.

C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove loose rust, loose mill scale, loose shop primer, and other foreign matter. Clean using methods recommended in writing by coating manufacturer but not less than the following:

1. SSPC-SP 6/NACE No. 3.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized Metal Substrates: Remove grease and oil residue from galvanized metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION OF HIGH-PERFORMANCE COATINGS

A. Apply coating system products in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for coating and substrate indicated.

2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written instructions, apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written instructions.
3. Cost of retesting is Contractor's responsibility.

3.5 CLEANING AND PROTECTION

A. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

1. Pigmented Polyurethane over Epoxy System (Gloss):

a. Benjamin Moore & Company:

1) Prime Coat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L
3) Topcoat - Gloss: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Aquapon Hi Build Polyamide Epoxy 97-137.
2) Intermediate Coat: Amerlock 2 VOC Epoxy Coating.
3) Topcoat - Gloss: Amershield VOC Acrylic Polyurethane.

c. Sherwin-Williams Company:

1) Prime Coat: Macropoxy 646 Fast Cure Epoxy B58W610.

2) Intermediate Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy Finish, B73- 300 Series.
3) Topcoat - Gloss: Hi Solids Poly 250 B65 Series.

B. CMU Substrates:

1. Pigmented Polyurethane over High-Build Epoxy System - Gloss:

a. Benjamin Moore & Company:

1) Block Filler: Ultra Spec Masonry Int/ Ext High-Build Block Filler (571); VOC: <50 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L
3) Topcoat: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Permacrete 4-603.
2) Intermediate Coat: Amerlock 2 VOC Epoxy Coating.
3) Topcoat: Amershield VOC Acrylic Polyurethane.

c. Sherwin-Williams Company:

1) Prime Coat: S-W Pro Industrial Heavy Duty Block Filler B42W150.
2) Intermediate Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy B73-300 Series.
3) Topcoat - Gloss: S-W Acrolon Waterbased Acrolon 100 WB Urethane.

C. Steel Substrates: All exposed steel including, but not limited to, **[canopy steel,] [steel hand and guardrails,] [angle lintels and hung plate]** substrates**[; steel deck plates]**.

1. Pigmented Polyurethane System:

a. Benjamin Moore & Company:

1) Prime Coat: Benjamin Moore HP Bonding Primer (HP1750); VOC: <100 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L
3) Topcoat: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Amercoat 68HS VOC Zinc Rich Epoxy Primer.
2) Intermediate Coat: Amerlock 2 VOC Epoxy Coating.
3) Topcoat: Amershield VOC Acrylic Polyurethane.

c. Sherwin-Williams Company:

1) Prime Coat: Macropoxy 646.
2) Intermediate Coat: S-W Pro Industrial Waterbased Catalyzed Epoxy B73-300 Series.
3) Topcoat: S-W Acrolon Waterbased Acrolon 100 WB Urethane Gloss Enamel.

D. Galvanized-Metal Substrates: All exposed galvanized metal including, but not limited to, **[canopy steel,] [steel hand and guardrails,] [angle lintels and hung plate]** substrates**[; steel deck plates]**.

1. Pigmented Polyurethane over Epoxy Primer System:

a. Benjamin Moore & Company:

1) Prime Coat: Benjamin Moore HP Bonding Primer (HP1750); VOC: <100 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

3) Topcoat: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Amerlock 2 VOC.
2) Intermediate Coat: Amerlock 2 VOC.
3) Topcoat: Amershield VOC Acrylic Polyurethane.

c. Sherwin-Williams Company:

1) Prime Coat: Macropoxy 646.
2) Intermediate Coat: S-W Acrolon Waterbased Acrolon 100 WB Urethane Gloss Enamel.
3) Topcoat: S-W Acrolon Waterbased Acrolon 100 WB Urethane Gloss Enamel.

3.7 SPECIAL interior FLOOR COATING

A. Concrete Floor Surfaces - Drawing Designation **[_____]**;

1. Water-Based Epoxy Primer and Basecoat with Water-Based Aliphatic Polyurethane Topcoat Containing Powdered Aggregate:

a. Benjamin Moore and Company:

1) Base Coat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L
2) Topcoat Satin: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L cast with powdered white aluminum oxide at minimum 8 pounds per 4 gallon unit ratio.

b. Sherwin-Williams Company (Basis-of-Design): HTS (formerly HardTop) WB Coating System.

1) Base Coat: ArmorSeal 8100.
2) Topcoat Satin: 4409 with 5240 White Aluminum Oxide at 8 pounds per 4 gallon unit.

3.8 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

1. Epoxy-Modified Latex System:

a. Benjamin Moore & Company:

1) Prime Coat: Ultra Spec Masonry Int/ Ext High-Build Block Filler (571); VOC: <50 g/L squeegee into bugholes without removal of filler material from wall.
2) Intermediate Coat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L
3) Topcoat - Semi-gloss: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Epoxy block filler; squeegee into bugholes without removal of filer material from wall.
2) Intermediate Coat: Amerlock 2 VOC
3) Topcoat - Semi-Gloss: Pitt Glaze WB1 16-1520 Series Pre-catalyzed Water Based Acrylic Epoxy.

c. Sherwin-Williams Company:

1) Prime Coat: S-W Pro Industrial Heavy Duty Block Filler B42W150; squeegee into bugholes without removal of filler material from wall.
2) Intermediate Coat: Epoxy-modified latex, matching topcoat.

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3) Topcoat - Gloss: Pro Industrial Pre-Catalyzed Waterbased Epoxy.

B. CMU Substrates:

1. Epoxy-Modified Latex System:

a. Benjamin Moore & Company:

1) Prime Coat: Benjamin Moore Block Filler (244); VOC: <50 g/L squeegee into pores without removal of filler material from wall.
2) Intermediate Coat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L
3) Topcoat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Compatible epoxy filler or mastic; squeegee into pores without removal of filler material from wall.
2) Intermediate Coat: Amerlock 2 VOC Epoxy Coating.
3) Topcoat - Semi-Gloss: Pitt Glaze WB1 16-1520 Series Pre-catalyzed Water Based Acrylic Epoxy.

c. Sherwin-Williams Company:

1) Prime Coat: S-W Pro Industrial Heavy Duty Block Filler B42W150; squeegee into pores without removal of filler material from wall.
2) Intermediate Coat: Epoxy-modified latex, matching topcoat.
3) Topcoat - Gloss: Pro Industrial Pre-Catalyzed Waterbased Epoxy.

C. Steel Substrates:

1. Epoxy-Modified Latex System: Low contact/low traffic areas such as, but not limited to exposed structural steel, overhead decking, pipes, ducts, etc.

a. Benjamin Moore & Company:

1) Prime Coat: Benjamin Moore HP Acrylic Metal Primer (HP1100); VOC: <50 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Amine Epoxy Satin (HP4420); VOC: <50 g/L
3) Topcoat: Benjamin Moore HP Waterborne Amine Epoxy Satin (HP4420); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Amerlock 2 VOC Epoxy
2) Intermediate Coat: Amerlock 2 VOC Epoxy
3) Topcoat - Semi-gloss: Amershield VOC Acrylic Urethane.

c. Sherwin-Williams Company:

1) Prime Coat: S-W Pro Cryl Universal Metal Primer B66W1310.
2) Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
3) Topcoat - Gloss: AS8100.

2. Pigmented Polyurethane and Epoxy System: High contact/high traffic areas such as, but not limited to doors, frames (including exterior side of exterior doors and frames) railing pipes, etc.

a. Benjamin Moore & Company:

1) Prime Coat: Note: Benjamin Moore HP Bonding Primer (HP1750); VOC: <100 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

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3) Topcoat - Gloss: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Amercoat 68HS VOC Zinc Rich Epoxy Primer.
2) Intermediate Coat: Amerlock 2 VOC Epoxy Coating.
3) Topcoat: Amershield VOC Acrylic Polyurethane.

c. Sherwin-Williams Company:

1) Prime Coat: DTM Wash Primer B71Y1.
2) Intermediate Coat: Macropoxy 646.
3) Topcoat: S-W Acrolon Waterbased Acrolon 100 WB Urethane.

D. Galvanized-Metal Substrates:

1. Epoxy over Epoxy Primer System: Low contact/low traffic areas such as, but not limited to structural steel, overhead decking, pipes, ducts, etc.

a. Benjamin Moore & Company:

1) Prime Coat: Benjamin Moore HP Bonding Primer (HP1750); VOC: <100 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L
3) Topcoat - Gloss: Benjamin Moore HP Waterborne Amine Epoxy Gloss (HP4400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Amerlock 2 VOC Epoxy
2) Intermediate Coat: Amerlock 2 VOC Epoxy
3) Topcoat - Semi-gloss: Amershield VOC Clear Acrylic Urethane.

c. Sherwin-Williams Company:

1) Prime Coat: Epolon II RIP B67A400.
2) Intermediate Coat: Epoxy, matching topcoat.
3) Topcoat - Gloss: Tile Clad HS Epoxy B62WZ100.

2. Pigmented Polyurethane over Epoxy Primer System: High contact/high traffic areas such as, but not limited to doors, frames (including exterior side of exterior doors and frames) railing pipes, etc.

a. Benjamin Moore & Company:

1) Prime Coat: Benjamin Moore HP Bonding Primer (HP1750); VOC: <100 g/L
2) Intermediate Coat: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L
3) Topcoat - Gloss: Benjamin Moore HP Waterborne Aliphatic Urethane Gloss (HP5400); VOC: <50 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: Amercoat 68HS VOC Zinc Rich Epoxy Primer.
2) Intermediate Coat: Amerlock 2 VOC Epoxy Coating.
3) Topcoat: Amershield VOC Acrylic Polyurethane.

c. Sherwin-Williams Company:

1) Prime Coat: DTM Wash Primer B71Y1.
2) Intermediate Coat: Macropoxy 646.
3) Topcoat - Gloss: Acrolon Waterbased Acrolon 100 WB Urethane.

E. Gypsum Board Substrates:

1. Epoxy-Modified Latex System:

a. Benjamin Moore & Company:

1) Prime Coat: INSL-X Aqua Lock Plus Acrylic Primer/ Sealer (AQ-0XXX); VOC: <50 g/L
2) Intermediate Coat: Benjamin Moore HP Pre-Catalyzed Waterborne Epoxy Semi-Gloss (HP3410); VOC: <100 g/L
3) Topcoat: Benjamin Moore HP Pre-Catalyzed Waterborne Epoxy Semi-Gloss (HP3410); VOC: <100 g/L

b. Pittsburgh Paints Company:

1) Prime Coat: SEAL GRIP® Int/Ext Primer
2) Intermediate Coat: Epoxy-modified latex, matching topcoat.
3) Topcoat - Semi-Gloss: Pitt Glaze WB1 16-1520 Series Pre-catalyzed Water Based Acrylic Epoxy.

c. Sherwin-Williams Company:

1) Prime Coat: Pro Mar 200 Zero VOC Interior Latex Primer.
2) Intermediate Coat: Epoxy-modified latex, matching topcoat.
3) Topcoat - Gloss: Pro Industrial Pre-Catalyzed Waterbased Epoxy.

END OF SECTION 09 96 00

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SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Interior signs.
2. Exterior signs.

PART 2 - PRODUCTS

2.1 SIGNS

A. General: Signs to be furnished and installed by Contractor. All interior signs to have Braille in addition to letters.

PART 3 - INTERIOR SIGNS

3.1 Apartment Signs:

A. Material: Plastic.

B. Perimeter: Unframed, rounded corners.

C. Copy: Tactile and Braille.

D. Character Style: All Caps - CG Omega Black (a.k.a. Optima).

E. Message: Fixed.

F. Sizes: See below.

G. Characters: Minimum 3/4-inch high.

H. Colors: As selected by Architect from manufacturer’s standard color range.

I. Panel Sign Schedule:

1. Room Number Signs - 2-1/4 inches H x 6 inches W.
2. Room Number Directional Signs - 5 inches H x 10 inches W at elevator lobbies.
3. Exit Signs - 3 inches H x 8 inches W.
4. Rest Room Signs Men's and Women's - 8 inches H x 6 inches W with handicapped logo.
5. Other signs for Miscellaneous Rooms - 2.35 inches H x 6, 8, 10 or 12 inches W.

3.2 Directional Signs:

A. Material: Cast-acrylic sheet

B. Perimeter: Unframed

C. Copy: Tactile and Braille.

D. Character Style: Helvetica

E. Size: 8 inches H by 14 inches W

F. Message: Fixed

G. Quantities and Message:

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1. Provide three (3) signs at the first floor indicating apartment numbers located in that corridor.
2. Provide three (3) signs at each upper floor indicating apartment numbers located in that corridor.
3. Provide one sign at first floor of each building lobby indicating direction to accessible toilet rooms.

3.3 Stairway Identification Signs:

A. Material: 0.080-inch aluminum

B. Perimeter: Unframed

C. Panel Finish: Baked enamel

D. Copy: Silk-screened

E. Character Style: Helvetica

F. Size: 8 inches H by 14 inches W

G. Message: As indicated on Drawings

H. Quantity: Provide one sign at each stair landing beside door and as indicated on Drawings

3.4 Evacuation Plan Signs and Holders:

A. Materials: Clear acrylic holder to receive printed card stock sign.

B. Size: 11” x 17”

C. Mounting: Wall mount holder with adhesive tape

D. Quantity: One (1) holder at each elevator lobby and three (3) additional holders for each floor.

E. Signs and holders to be provided by Contractor. Floor plan backgrounds can be provided by the Architect for the Contractor's use.

PART 4 - EXTERIOR SIGNS

4.1 Building Mounted Signage

A. Provide shop drawings for exterior blade signage mounted to the building.

1. See drawings for location and details.

PART 5 - END OF SECTION

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SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - PART 1 GENERAL

1.1 SECTION INCLUDES

A. Public-use washroom accessories.

B. Private-use bathroom accessories.

C. Custodial accessories.

PART 2 - PART 2 PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser:

1. Basis-of-Design Product: Bradley Corporation; Model 5A10-11.
2. Description: Roll in reserve roll dispenser.
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with standard spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

B. Paper Towel Dispenser / Waste Receptacle:

1. Basis-of-Design Product: Bradley Corporation; Model 229-10.
2. Mounting: Semi-Recessed.
3. Minimum Capacity: 100 C-fold paper towels. 1.25 gallon waste.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.

C. Liquid-Soap Dispenser: Designed for dispensing soap in liquid or lotion form.

1. Wall-mounted:

a. Basis-of-Design Product: Bradley Corporation; Model 6563.
b. Capacity: 16 fl. oz.
c. Materials: Stainless steel plunger and spout and polyethylene soap container.
d. Lockset: Tumbler type.
e. ADA Compliant.

D. Grab Bars:

1. Basis-of-Design Product: Bradley Corporation; Model 812-2.
2. Outside Diameter: 1-1/2 inches.
3. Configuration and Length: As indicated on Drawings.
4. Material: Satin stainless steel; concealed mounting and Safety Grip finish.
5. Install to withstand a downward load of at least 300 lbf, when tested according to method in ASTM F 446.

E. Sanitary Napkin Disposal:

1. Basis-of-Design Product: Bradley Corporation; Model 4722-10-15.
2. Description: ADA-compliant sanitary napkin disposal.
3. Mounting: Semi-recessed.
4. Operation: Self-closing push flap door.
5. Capacity: 1.5 gal.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

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7. Lockset: Tumbler type.

F. Baby Changing Station:

1. Basis-of-Design Product: KB200-11 KOALA Horizontal Earth Baby Changing Station.
2. Mounting: Wall surface mounted.
3. Size: Folded - 35-3/16"W x 22-1/4"H x 4"D.
4. ADA Compliant.
5. Changing Surface Area: 450 sq. in.
6. Sanitary Liners: Two (2) built-in dispensers for 50 liners.

G. Framed Mirror:

1. Basis-of-Design Product: Bradley Corporation; Model 781.
2. Mounting: Concealed mounting.
3. Size: 36”W x 36”H.
4. Frame: one-piece stainless steel with mitered corners.
5. Mirror: 1/4” Tempered glass.
6. Mounting Brackets: 18 ga. Cold rolled steel.

2.2 PRIVATE-USE BATHROOM ACCESSORIES

A. Toilet Tissue Dispenser:

1. Basis-of-Design Product: Seal Beach Collection by PAMEX.
2. Finish: Satin Nickel.

B. Curved Curtain Rod:

1. Basis-of-Design Product: Moen Curved Shower Rod DN2160CH.
2. Concealed flange.
3. Finish: Satin Nickel.

C. Straight Curtain Rod for Showers:

1. Basis-of-Design Product: Moen 58-5 Donner Straight Shower Rod.
2. Concealed flange.
3. Finish: Satin Stainless.

D. Shower Curtain:

1. Size: Minimum 6 inches wider than opening by: 72 inches high (at tubs), 78 inches high (at showers).
2. Material: Vinyl, minimum 0.006-inch-thick, opaque, matte.
3. Color: White.
4. Grommets: Corrsion resistant at minimum 6 inches o.c. through top hem.
5. Shower Curtain Hooks: Stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

E. Medicine Cabinet:

1. Basis-of-Design Product: American Pride; Harmony Model 9622WBAR12 with bevel edge mirror.
2. Mounting: Recessed.
3. Size: 16-3/16 inch x 22-1/4 inch.
4. Shelves: Three, 2 adjustable, 1 fixed.

F. Robe Hook: Single-prong hook.

1. Basis-of-Design Product: Seal Beach Collection by PAMEX.
2. Finish: Satin Nickel.

G. Towel Bar:

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1. Basis-of-Design Product: Seal Beach Collection by PAMEX.
2. Finish: Satin Nickel.
3. Mounting: Flanges with concealed fasteners.
4. Length: 24 inches.

H. Bathtub Transfer Bench - ADA Compliant:

1. Basis-of-Design Product: Moen Tool-Free Transfer Bench DN7065.
2. Color: White.

I. Fold-Up Shower Seat - ADA Compliant:

1. Basis-of-Design Product: Reversible Phenolic Shower Seat 9569 by Bradley.
2. Frame: Satin Finish Stainless Steel, 18 gauge.
3. Mounting Flanges: Satin Stainless Steel, 7 gauge.
4. Lower Support Bracket: Satin Stainless Steel, 16 gauge.
5. Seat: 1/2 inch thick solid phenolic, white matte finish.

J. Grab Bars:

1. Basis-of-Design Product: InPro Corp. Color Grab Bars.
2. Outside Diameter: 1-1/4 inches.
3. Configuration and Length: As indicated on Drawings.
4. Finish: PVC Glossy soft finish, white.
5. Install to withstand a downward load of at least 300 lbf, when tested according to method in ASTM F 446.

K. Mirrors: Frameless three sides, with stainless steel bottom frame, size as indicated on drawings.

2.3 CUSTODIAL ACCESSORIES

A. Mop and Broom Holder:

1. Basis-of-Design Product: Bradley Corporation; Model 9953.
2. Description: Unit with mop and broom holders.
3. Length: 24 inches.
4. Mop/Broom Holders: Spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

PART 3 - END OF SECTION

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SECTION 10 50 01
ELECTRONIC PACKAGE LOCKER SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electronically Controlled Package Locker System consisting of steel digital lockers and locker control software. Designed to interface with a web-based operating system.

1.2 RELATED SECTIONS

A. Section 05 50 00 - Metal Fabrications: Metal anchors.

B. Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

A. ASTM A240 - Specification for Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.

B. ASTM A1008 - Specification for Steel, Sheet Cold-Rolled, Carbon, Structural High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.

C. ASTM B209 - Specification Aluminum and Aluminum Alloy Sheet and Plate.

D. ASTM B221 - Specification Aluminum and Aluminum Alloy Extruded Bar, Rods, Wire, Shapes, and Tubes.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Provide manufacturer's standard catalog data for specified products.

1.5 SEQUENCING/SCHEDULING

A. Ordering: Comply with Manufacturer’s ordering instructions and lead-time requirements to avoid delays.

B. Storage: Store materials at temperature and in humidity conditions recommended by manufacturer and protect from exposure to harmful weather conditions.

C. Handling: Handle materials to prevent damage or marring of finish.

D. Installation: Except as otherwise indicated herein, sequencing or scheduling for performance of work of this section in relation with other work is Contractor's option.

1.6 REGULATORY REQUIREMENTS

A. Comply with Accessibility Guidelines of the Fair Housing Act. Compliance will be accomplished via software designed to appropriately manage system to accommodate requisite accessibility requirements of registered users.

B. Complies with the Standards and requirements of UL-2361 and is identified with the ETL Listed Mark.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have a Quality System in place to ensure and be able to substantiate that manufactured units conform to requirements and match the approved design and must be ISO 9001:2008 certified.

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B. Installer Qualifications: Installer should be highly experienced in performing work of this section, having been previously certified by Manufacturer and having done work similar to that required for this project. Installation is to be completed by Package Concierge authorized installer only.

1.8 PART 2 PRODUCTS

1.9 2.1 MANUFACTURERS

A. Acceptable Manufacturer:

1. Basis-of-Design: Standard Outdoor Locker System by Parcel Pending.
2. Substitutions: See Section 01 60 00 - Product Requirements.

1.10 2.2 ELECTRONIC LOCKER SYSTEM

A. Outdoor Locker System: Consisting of a kiosk control module and one or more locker columns referred to as “modules.” Each locker module consists of multiple individual lockers controlled by electronic locking system engaged or released by the kiosk control module. The Outdoor Locker System is designed by combining desired number of locker modules in conjunction with a single kiosk control module. The system is configurable and scalable to meet the needs of the desired application. The system requires electrical and Ethernet connection (CAT 5e compatible) both located within 5ft of the kiosk and use of Package Concierge proprietary software to operate the locker system.

1. Compartments: As indicated on Drawings.
2. Compartment Identification: None - user compartment identification and use managed via software interface.
3. Compartment Door Locks: Each compartment door equipped with electronic lock managed by kiosk control module.
4. Optional Installation Accessories for Package Concierge System
5. Corner Channel: For " L" or " U" shaped installations ONLY
6. Locker Module Materials:

    a. Compartment Doors: Steel (ASTM A1008 CS Type B)
    b. Frames: Steel (ASTM A1008 CS Type B) & 6063-T6 Aluminum (ASTM B221)
    c. Interior Shelves: 5052-H32 Aluminum (ASTM B209)
    d. Cabinet: Steel (ASTM A1008 CS Type B)
    e. Latching Components: 300 Series Stainless Steel (ASTM A240)
    f. Locker System Base Materials:

        1) Steel (ASTM A1008 CS Type B)

    g. Kiosk Module includes the following electronic components:

        1) Computer (Windows-based industrial)
        2) Touch Screen Monitor (12 inch)
        3) Scanner (1D & 2D image capture type)
        4) RFID Reader (125kHz / 13.56 MHz)
        5) Camera (digital still image capture)

    h. Finishes:

        1) Locker System Exterior Finish:

            a) To be selected from manufacturer' s full line of available finishes.

    i. Branding: Vinyl Decal on Kiosk Module - Package Concierge Logo

        1) Color – For Branding and other Decorative Decals on Kiosk Module:

            a) Custom Decal Color: To be specified.

j. Mounting:

1) Foundation Mounted: System is a free-standing structure designed to be mounted to floor/foundation as outlined in manufacturer's installation instructions. Mounts will be set to a depth of 3.5" into the concrete slab.
2) Wall-Bracket Mounted: System is a free-standing structure designed to be mounted to floor/foundation – this installation requires alternative mounting option using wall-brackets as outlined in manufacturer's installation instructions.

k. Locker Control Software: Package Concierge locker control software installed on kiosk control module.

1.11 PART 3 EXECUTION

1.12 3.1 EXAMINATION

A. Verify that foundation/floor is adequate for weight of system and for proper mounting for security of system and safe user access.

B. Verify that openings in wall are correctly located, aligned and sized if locker system is to be fully or semi-recessed (set back) in wall.

C. Verify that Power and Ethernet are installed and enabled: 120 AC grounded receptacle on a 15A circuit and Ethernet connection (CAT 5e compatible) both within 5 ft. of the kiosk.

D. Installer's Examination:

1. Examine conditions under which construction activities of this section are to be performed; submit written notification if such conditions are unacceptable.
2. Ensure that electrical and Ethernet connection are installed and enabled before beginning installation.
3. Beginning installation indicates acceptance of conditions.

1.13 3.2 INSTALLATION

A. Install Package Concierge System™ in accordance with shop drawings and manufacturer's installation instructions.

B. Align, plumb, and level; anchor in accordance with manufacturer's requirements.

C. For recessed applications allow wall clearance on the left and right sides of the system of two (2) inches and above the system of six (6) inches.

D. Once internet connection is confirmed by Package Concierge remote access, the system may be trimmed into recess after installation.

E. System must be installed indoors or in a location fully protected from impact of weather. For optimum operation of the locker system, ambient temperature is between 32°F - 95°F / 0°C - 35°C).

1.14 3.3 COMMISSIONING

A. Locker control system to be commissioned and tested with operating system software by Package Concierge authorized installer only.

1.15 3.4 CLEANING

A. See Package Concierge System Cleaning & Maintenance Instructions.

B. Generally, clean surfaces with mild dish detergent. Do not use harsh abrasive cleaners. In event of graffiti, commercially available "KrudKutter" solution may be used.

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1.16 3.5 PROTECTION OF INSTALLED PRODUCTS

A. Protect finishes from damage by construction activities. System should only be installed after construction is completed, including all flooring and painting.

PART 2 - END OF SECTION

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SECTION 10 55 00 POSTAL SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Tenant mailboxes.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of postal specialty.

B. Shop Drawings: For each type of postal specialty. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required, prepared on 6-by-6-inch square Samples.

D. Product Certificates: For each type of postal specialty required to comply with USPS regulations, signed by product manufacturer. Include written approval by Postmaster General.

E. Maintenance Data: For postal specialties and finishes to include in maintenance manuals.

F. Other Informational Submittals: Final USPS local postmaster approval for installed postal specialties to be served by USPS.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative of postal specialty manufacturer for installation of units required for this Project.

B. Source Limitations: Obtain postal specialties through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of postal specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.4 COORDINATION

A. Coordinate layout and installation of recessed postal specialties with wall construction.

B. Templates: Obtain and distribute to parties involved templates for installing postal specialties.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of hardware, except door locks.

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c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by USPS approved manufacturers.

B. Basis-of-Design: Florence 1570-8T6 Cluster Box Unit with pedestal.

1. Color: To be selected from manufacturer's full line

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, and as follows:

1. Sheet and Plate: ASTM B 209.
2. Extruded Shapes: ASTM B 221.

B. Stainless-Steel Anchor Bolts, Nuts, and Washers: ASTM A 193/A 193M, Grade B8M, Type 316.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.3 FRONT-LOADING EXTERIOR CLUSTER BOX UNITS

A. Cluster Box Units: Must be an officially licensed product of the USPS. Consisting of multiple compartments enclosed within freestanding, pedestal-mounted aluminum cabinet. Provide access to compartments for distributing incoming mail and collecting outgoing mail from front of unit by unlocking master lock and swinging pair of side-hinged master doors to provide accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door. Provide slot for outgoing mail collection with weather protection hood. Comply with USPS-B-1118 (“F” Specification).

1. Florence Vital Series 1570.
2. See architectural drawings for door layout and total tenant and parcel counts.

2.4 ACCESSORIES

A. General: Unless otherwise indicated, provide accessories fabricated by same manufacturer as apartment mailboxes.

B. Key Keepers: Consisting of single compartment with door size not less than 4-3/4 inches wide by 2-1/4 inches high by 1-1/2 inches deep. Exposed surfaces fabricated from same material and finish as adjacent apartment mailboxes.

1. Mounting: Recessed.
2. Style: Compartment door set within face frame.
3. Mail Delivery: USPS.
4. Door Lock: Door prepared to receive lock furnished by local postmaster.
5. Key Retractor: Provide retractable reel and 20-inch- long chain.

C. Key Cabinets: Wall-mounted, steel cabinet with pivoting, key-holding panels and side-hinged door equipped with five-pin tumbler, cylinder door lock and concealed, full-length flush hinge. Finish cabinet, panels, and door with baked-enamel finish. Provide key control system

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consisting of key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers.

1. Capacity: Keys for 150 percent of the number of apartment mailbox locks.
2. Cross-Index System: Consisting of index cards for recording key information. Include three receipt forms for each key-holding hook.

2.5 FABRICATION

A. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs, and safe to touch.

B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.

C. Drill or punch holes required for fasteners and remove burrs. Use security fasteners where fasteners are exposed. If used, seal external rivets before finishing.

D. Comply with AWS for recommended practices in shop welding. Provide welds behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.

E. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

F. Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish postal specialties after assembly.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, roughing-in openings, clearances, and other conditions affecting performance of work.

B. Examine walls for suitable conditions where recessed units will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install postal specialties level and plumb, according to manufacturer's written instructions and roughing-in drawings.

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1. Metal Protection: Where aluminum and copper alloys will contact grout, concrete, masonry, wood, or dissimilar metals, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.
2. Final acceptance depends on compliance with USPS requirements.

B. Horizontal Apartment Mailboxes: Install horizontal apartment mailboxes with center of tenant-door lock cylinder not more than 48 inches above finished floor and bottom of lowest compartment not less than 12 inches above finished floor.

1. Arrange compartments in groups, with not more than 35 and not less than 4 compartments operated by 1 master lock.

C. Collection Boxes: Install collection boxes with top of mail slots not more than 48 inches above finished floor.

3.3 FIELD QUALITY CONTROL

A. Arrange for USPS personnel to test collection boxes after installation according to USPS regulations.

B. Obtain written final approval from USPS postmaster that authorizes mail collection.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as postal specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of postal specialty installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace postal specialties that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by postal specialty manufacturer.

E. Replace postal specialties that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 10 56 23
WIRE STORAGE SHELVING

PART 1 - GENERAL

1.1 SUMMARY

A. Wire shelves and coat rod in every clothes closet.

B. Wire shelves in pantries and linen closets.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

C. Maintenance Data: To include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain closet shelving through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of closet shelving and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver closet shelving until spaces to receive them are clean, dry, and ready for installation. Project closet shelving from damage during delivery, handling, storage, and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Rubbermaid.
2. ClosetMaid Corporation.
3. Schulte.

2.2 MATERIALS

A. Steel Wire: Basic cold drawn, Grade C-1006.

B. Wire Coating: One of the following:

1. Epoxy painted finish.
2. Proprietary heavy-duty polyvinyl chloride (PVC) formula resin, plasticizers, stabilizers, pigments, and other additives.

    a. Thickness: 9 to 11 mils.
    b. Classification: No ingredients listed as hazardous per OSHA 29CFR1910.0017.

3. Color: White.

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2.3 UNIT CLOSET SHELVING

A. Wire Shelving: Coated steel wire, maximum 1 inch incremental cross-deck spacings; sizes as indicated below:

1. Shelving Basis-of-Design: Rubbermaid Tightmesh shelving, white epoxy coated steel rod shelving, 12" wide by length of the closet.
2. Closet Basis-of-Design: Rubbermaid FreeSlide shelving, white epoxy coated steel rod shelving, including shelves and rods, 12" wide by length of the closet.

a. Wardrobe Closets: 12 inches deep; provide prefabricated, curved corner sections for joining perpendicular sections.

2.4 ACCESSORIES

A. Inserts and Anchorages: Furnish inserts and anchoring devices for installing units to substrate.

B. Fasteners: Provide suitable screws and other fastening devices of same material as items being fastened.

C. Additional Accessories: Provide manufacturer’s standard wall clips, end brackets, support brackets, poles, standards, shelf brackets, and pole clips as required for complete installation to support a load of 50 psf.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls for suitable conditions where closet shelving will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Cut shelves 1/2 inch to 1-3/8 inches shorter than actual wall measurements; cap all exposed ends.

B. Install shelving plumb and level at heights indicated in accordance with approved shop drawings and manufacturer’s printed installation instructions.

C. Place wall clips every 10 to 12 inches on level line.

D. Install end brackets on same level line as wall clips, centered on front rods of shelves. Support shelves 36 inches maximum with end brackets, support brackets, or poles.

E. Drill holes where required using sharp bit; do not punch.

F. Gypsum Board: Drill 1/4-inch hole, insert wall clip. Use pin to expand anchor.

G. Concrete and Masonry: Drill 1/4-inch hole with masonry bit, insert wall clip, secure with screws.

H. Shelf Supports:

1. Place shelf support brackets vertically to the shelf, attach with wall anchors sized for 1-inch penetration into wood framing or blocking.
2. Install down clips or cable clips with 1/4-inch anchor on back rod behind every support bracket.
3. Space supports as required to comply with load capacity requirement.
4. Provide wall blocking where required for installing wall mounted cabinets, rods, fixtures, etc.

I. Attach pole clips at same elevations as wall clips for a given shelf; use with poles.

J. For wall-to-wall installation, use lightning end bracket; drill 1/4-inch holes, and secure with fasteners.

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3.3 CLEANING AND PROTECTION

A. Thoroughly clean all shelving units before Substantial Completion. Protect shelving units from damage, abuse, dust, dirt, stain, and paint. Do not permit closet shelving to be used during construction.

B. Touch up marred finishes or replace shelving components that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by wire shelving manufacturer.

END OF SECTION

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SECTION 10 73 10 - PROTECTIVE COVERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Engineering design, fabrication and installation of complete welded, extruded aluminum canopies.

1.2 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

B. AWS D1.1/D1.1M - Structural Welding Code - Steel.

C. AWS D1.2 - Structural Welding Code - Aluminum.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories.

C. Shop Drawings: Submit detailed drawings, all mechanical joint locations with complete details, connections, jointing and accessories.

D. Certification: Submit design calculations signed by a Registered Professional Engineer, licensed in the jurisdiction where project is located. Design calculations shall state that the protective cover system design complies with the wind requirements of ASCE 7, the stability criteria of applicable building code, and all other governing criteria.

E. Samples for Initial Selection: For each colored or finished component of each type of protective cover indicated.

1. Include similar Samples of accessories involving color selection.

F. Welding certificates.

G. Sustainable Design Submittals: As required by Division 1 - Sustainable Design Requirements.

H. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Protective cover shall be wholly produced by a recognized manufacturer with at least five years experience in the design and fabrication of extruded aluminum protective cover systems. Components shall be assembled in shop to greatest extent possible to minimize field assembly. Protective cover shall be installed by manufacturer. Third party installation is not acceptable.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2, "Structural Welding Code - Aluminum."

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of awnings in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Where awning installation is indicated to fit to other work, verify dimensions of other work by field measurements before fabrication and indicate measurements

on Shop Drawings. Allow clearances for fenestration operation throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and fabricator agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 5 years from date of Substantial Completion.

B. 20-year warranty on finish including checking, crazing, peeling, chalking, fading and/or adhesion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Mapes Architectural Canopies; Super Lumideck Hanger Rod Canopy, www.mapescanopies.com.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering covers that may be incorporated into the Work include, but are not limited to, the following:

1. Dittmer Architectural Aluminum; www.dittdeck.com.
2. MASA Architectural Canopies; www.architecturalcanopies.com.
3. Perfection Architectural Systems, LLC.; www.perfectionarch.com.

2.2 MATERIALS

A. Aluminum Members: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.

B. Fasteners: Fasteners shall be aluminum, 18-8 stainless steel or 300 series stainless steel.

C. Gaskets: Gaskets shall be dry seal santoprene pressure type.

D. Sealants: Single component silicone, in color to match sheets and extrusions; refer to Section 07 90 05 - Joint Sealants.

2.3 COMPONENTS

A. Beams: Beams shall be open-top tubular extrusion of size and shape shown on drawings, top edges thickened for strength and designed to receive deck members in self-flashing manner. Structural ties shall be installed in tops of all beams.

B. Deck: Deck shall be extruded self-flashing sections interlocking into a composite unit. Closures at deck ends shall be welded plates.

C. Hanger Rods: Galvanized/zinc plated; minimum 3/4 inch diameter pipe with attachment hardware.

D. Fascia:

1. Fascia shall be extruded aluminum; manufacturer's custom 12 inch shape.
2. Provide on all sides of protective cover, including side against exterior wall construction.

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E. Flashing: Flashing shall be 0.040 aluminum (min.). All thru-wall flashing by others.

F. Accessories: Flashings, brackets and other items necessary for a complete installation.

1. Connect to adjacent downspouts draining into storm drain system, as available to location; perforated drainage at other locations.

2.4 FABRICATION

A. Bent Construction: Beams shall be factory welded with neatly mitered corners into one-piece rigid bents. All welds shall be smooth and uniform using an inert gas shielded arc. Suitable edge preparation shall be performed to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints shall be used when shipping limitations prohibit the shipment of fully welded bents.

B. Deck Construction: Deck shall be manufactured of extruded modules that interlock in a self-flashing manner. Interlocking joints shall be positively fastened at 8" O.C. creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.

C. Concealed Drainage: Water shall drain from covered surfaces into integral fascia gutter and directed to indicated discharge.

D. Form exposed field connections with hairline joints, flush and smooth, using concealed fasteners where possible.

2.5 FINISHES

A. Flouropolymer Finish: AAMA 605.2, two coat; color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.

1. Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for supporting members, inserts, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Erection:

1. Installation to be in strict accordance with manufacturer's shop drawings.
2. Protect the finish of components during handling and erection.
3. Protective cover shall be erected true to line, level and plumb.

B. Protective cover components shall be cleaned promptly after installation.

C. Extreme care shall be taken to protect materials during and after installation.

END OF SECTION 10 73 10

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SECTION 11 11 36 - VEHICLE CHARGING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. AC Level 2 electric vehicle supply equipment.

1.2 DEFINITIONS

A. EV: Electric vehicle.

B. EVSE: Electric vehicle supply equipment. This term refers to AC Level 2 charging equipment that depends on the built-in charger located onboard the vehicle.

C. Fastened in Place: Does not require tools to be removed and replaced.

D. Fixed in Place: Requires tools to be removed and replaced.

E. OCPP: Open Charge Point Protocol; an application protocol for communication between EVs and a central management system.

1.3 ACTION SUBMITTALS

A. Product Data:

1. AC Level 2 EVSE.

B. Shop Drawings:

1. Routing and attachment of permanent wiring for AC Level 2 EVSE.

C. Field quality-control reports.

D. Sustainable design submittals.

1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction test reports.

B. Manufacturers' Published Instructions:

1. AC Level 2 EVSE.

C. Manufacturer's Field Reports:

1. Manufacturer's field reports for field quality-control support.
2. Manufacturer's field reports for system startup support.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Contracts:

1. Software and firmware service agreement.

B. Warranty documentation.

C. Sustainable design closeout documentation.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts:

1. UL FFWA - AC Level 2 EV supply equipment (EVSE).

B. Special Tools:

1. UL FFWA - AC Level 2 EV supply equipment (EVSE).

1.7 PRECONSTRUCTION TESTING

A. Wireless Survey: Complete wireless survey to determine if wireless provider signals meet or exceed manufacturer's recommended minimum values.

B. Preconstruction Test Reports: Collect, assemble, and submit test reports prepared by qualified testing agency.

1.8 WARRANTY

A. Special Installer Extended Warranty: Installer warrants that fabricated and installed vehicle charging equipment performs in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.

1. Extended-Warranty Period: Two years from date of Substantial Completion; full coverage for labor, materials, and equipment.

B. Special Manufacturer Extended Warranty: Manufacturer warrants that vehicle charging equipment performs in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within extended-warranty period.

1. Initial Extended-Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 AC LEVEL 2 ELECTRIC VEHICLE SUPPLY EQUIPMENT

A. Description: EVSE with input rated up to 600 V(ac) for AC Level 2 charging of vehicle batteries using the EV's onboard charger.

B. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria:

a. EV Supply Equipment: UL CCN FFWA; including UL 2594.
b. Personnel Protection: UL CCN FFUQ2; including UL 2231-1 and UL 2231-2.

3. General Characteristics: Complying with Article 625 of NFPA 70.

C. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, diagrams, schedules, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

a. Include sample warranty language.

D. UL FFWA - AC Level 2 EV Supply Equipment (EVSE):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Basis-of-Design: Blink Charging.

1) IQ 200 01-0211 Rectangle Dual configuration for dual chargers (coordinate types with parking shown on site plan).

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2) IQ 200 01-0210 Rectangle Single configuration for single chargers (coordinate types with parking shown on site plan).

b. Bosch Automotive Service Solutions.
c. ChargePoint, Inc.; subsidiary of ChargePoint Holdings, Inc.
d. ClipperCreek, Inc.
e. EVBox Group; subsidiary of EVBox B.V.
f. Enel X North America, Inc.; Enel Group.
g. EvoCharge.
h. FLO (FLO Services USA Inc. in USA, and Services FLO Inc. in Canada)/AddÉnergie Technologies Inc.
i. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
j. Leviton Manufacturing Co., Inc.
k. SemaConnect, Inc.; subsidiary of Blink Charging Co.
l. Siemens Industry, Inc.; Energy and Automation Division.

2. Source Limitations: Obtain products from single manufacturer.
3. Options:

a. Location Rating: Indoor/outdoor.
b. Input Feeder Rating:

1) 208 to 240 V(ac), single phase, 60 Hz, 50 A.

c. Input Feeder Type: Hard wired.
d. Output Quantity: 1; 2. Coordinate with various types shown on Drawings.
e. Output Wiring: Flexible cord.

1) Output Cable Nominal Length: 23 ft (7.0 m).
2) Cable management system.
3) Output Attachment Plug: Type 1 (SAE J1772).

f. Mounting: Pole mount As indicated on Drawings.
g. Metering: Nonrevenue grade meter.
h. Networking:

1) Protocol: OCPP.
2) WAN Communications: Cellular LTE.
3) LAN Communications: 802.11 b/g/n WiFi.
4) Capable of remote configuration and reporting.

i. Authorization or Payment System:

1) NFC reader
2) PCI compliant.
3) Capable of remote control and authorization.

j. Touch screen; interface at 48 inches above finish.

4. Accessories:

a. Special Tools: Furnish to Owner proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to vehicle charging equipment, that are packaged with protective covering for storage on-site and identified with labels describing contents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and bollards or posts for suitable conditions where vehicle charging equipment will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

A. Shop Drawings: Prepare and submit the following:

1. Routing and attachment of permanent wiring for EVSE.

a. Include plans, elevations, sections, details, and attachments to other work.
b. .

3.3 INSTALLATION OF VEHICLE CHARGING EQUIPMENT

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with Article 625 of NFPA 70 and with NECA NEIS 413.
2. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Hard-Wired Connection: Provide fusible safety switch, that is lockable in "Off" position, in readily accessible location for termination of input cable.
2. Fastened in Place: Comply with manufacturer's published instructions for installing mounting hardware. Provide manufacturer's recommended seismic controls when required for compliance with Section 26 00 11 "Facility Performance Requirements for Electrical."
3. Fixed in Place: Comply with manufacturer's published instructions for installation and torqueing of hardware fasteners. Provide manufacturer's recommended seismic controls when required for compliance with Section 26 00 11 "Facility Performance Requirements for Electrical."
4. Base Mounting: When indicated on Drawings or in manufacturer's published instructions, provide housekeeping pad for installing base for vehicle charging equipment.
5. Identification: Provide labels for vehicle charging equipment and associated electrical equipment.

a. Identify field-installed conductors, interconnecting wiring, and components.
b. Provide warning signs.
c. Label each enclosure with engraved metal or laminated-plastic nameplate.

D. Cybersecurity:

1. Software:

a. Coordinate security requirements with Property Management Company and/or Owner.
b. Ensure that latest stable software release is installed and properly operating.
c. Disable or change default passwords to password of at least eight characters in length, using a combination of uppercase and lower letters, numbers, and symbols. Record passwords and turn over to party responsible for system operation and administration.

2. Hardware:

a. Coordinate location and access requirements with Property Management Company and/or Owner .
b. Enable highest level of wireless encryption that is compatible with Owner's information and communications technology network.
c. Disable dual network connections.

E. Interfaces with Other Work:

1. Coordinate installation of new vehicle charging equipment with existing conditions.
2. Coordinate with Section 26 05 73.13 "Short-Circuit Studies" for determining available fault current on input feeder.

3. Coordinate with Section 26 05 73.19 "Arc-Flash Hazard Analysis" for determining arc-flash hazard on input feeder.
4. Coordinate with Section 26 28 16 "Enclosed Switches and Circuit Breakers" for installation of fusible safety switches for vehicle charging equipment.

3.4 FIELD QUALITY CONTROL OF VEHICLE CHARGING EQUIPMENT

A. Field tests and inspections must be witnessed by authorities having jurisdiction & Property Management Company and/or Owner .

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.
2. For each unit of vehicle charging equipment, perform the following tests and inspections:

a. Unit self-test.
b. Operation test with load bank.
c. Network communications test.

C. Nonconforming Work:

1. Unit will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

E. Manufacturer Services: Engage factory-authorized service representative to supervise field tests and inspections.

1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare report after each visit by factory-authorized service representative, documenting activities performed at Project site.

3.5 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.

B. Manufacturer Services: Engage factory-authorized service representative to supervise system startup.

1. Manufacturer's Field Reports for System Startup Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

3.6 PROTECTION

A. After installation, protect vehicle charging equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.7 MAINTENANCE

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software and firmware support for two years.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within two years from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.

a. Upgrade Notice: No fewer than 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

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3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION 11 11 36

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SECTION 11 31 00 APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cooking appliances.
2. Refrigeration appliances.
3. Cleaning appliances.
4. All appliances to be CFC-Free, HCFC-Free and Halon-free.
5. All appliances to be Energy Star®.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include operating characteristics, dimensions of individual appliances, and finishes for each appliance.

B. Appliance Schedule: For appliances; use same designations indicated on Drawings.

C. Maintenance Data: For each product to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain residential appliances through one source; from a single manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

C. Regulatory Requirements: Comply with provisions of the following product certifications:

1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. UL and NEMA: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.
3. NAECA: Provide residential appliances that comply with NAECA standards.

D. Regulatory Requirements, Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

E. Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the FTC Appliance Labeling Rule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Basis-of-Design Product: The design for each appliance is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product of the following:

    a. General Electric.
    b. Hotpoint Appliances.
    c. Whirlpool.

2.2 PRODUCTS

A. Refrigerator at Standard Units:

1. 17.5 cubic feet GE Model GTE18ISHBB
2. Energy Star
3. ADA compliant
4. Top-Freezer refrigerator
5. Finish: Black

B. Refrigerator at Universal Design Units:

1. 21.4 cubic feet Whirlpool Model WRS331SDHB
2. Energy Star
3. ADA compliant
4. Side-by-side refrigerator
5. Finish: Black

C. Dishwasher at Standard Units:

1. GE Model GDT670SGVBB, 24" wide
2. Energy Star
3. Quiet package: 45 dBA
4. Finish: Black

D. Dishwasher at H.C. Units:

1. GE Model GDT226SGLBB, 24" wide
2. ADA Compliant
3. Energy Star
4. Quiet Package: 51dBA
5. Finish: Black

E. Range at Standard Units:

1. GE Model GRF400SVBB, Free-standing, 30" wide
2. Self-cleaning oven, 5.3 cu ft
3. Top controls
4. Finish: Black

F. Range at Accessible Units:

1. GE Model GRS500PVBB, Free-standing, 30" wide
2. Self-cleaning oven, 5.3 cu ft
3. ADA Compliant
4. Front controls
5. Finish: Black

G. Over-the-Range Microwave at Standard Units:

1. GE Model JVM7195DKBB
2. 1.9 cu. ft. microwave oven, 1000 watts
3. Exhaust ducted to outdoors
4. Finish: Black

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H. Countertop Microwave at Accessible Units:

1. GE Model PCHK11S1WBB
2. 1.1 cu. ft. microwave oven, 800 watts
3. Finish: Black

I. Garbage Disposal at all Units:

1. GE Model GFC520V with insulated jacket at handicapped units.
2. ½ H.P.

J. Refrigerator at Pantry Kitchen:

1. 25.3 cu.ft. GE Model GSH25JSDSS
2. Energy Star
3. ADA compliant
4. Frost-free, Factory-installed icemaker
5. Side-by-side refrigerator
6. Finish: Stainless Steel

K. Dishwasher at Pantry Kitchen:

1. GE Model GLDT696DSS, 24" wide
2. ADA Compliant
3. Quiet Package: 57dBA
4. Finish: Stainless Steel

L. Microwave Oven Combination at Pantry:

1. Basis-of-Design Product: KitchenAid Model KEHU309SSS.
2. 30" Built-in Microwave/Oven Combination
    a. Oven Capacity: 4.3 Cubic Feet
    b. Microwave Capacity: 1.4 Cubic Feet
    c. Power/Rating Requirement: 140V/40 amps
    d. Provide trim kit as for built-in finish
    e. Install to meet ADA requirements for reach ranges to controls and ovens

M. Garbage Disposal at Pantry Kitchen:

1. GE Model GFC250V with insulated jacket
2. ½ H.P.

N. Automatic Icemaker at Pantry Kitchen:

1. Marvel Model 30iMAT-BS-F-R
2. Daily ice production up to 30 lbs
3. Finish: Stainless Steel
4. ADA Compliant.

O. Laundry Room Washer / Dryers:

1. Washer / Dryers are N.I.C.
2. Provide plumbing and electrical rough-ins only.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of Work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before equipment installation.

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C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: Refer to Divisions 15 and 16 for plumbing and electrical requirements.

3.3 CLEANING AND PROTECTION

A. Test each item of residential appliances to verify proper operation. Make necessary adjustments.

B. Verify that accessories required have been furnished and installed.

C. Remove packing material from residential appliances and leave units in clean condition, ready for operation.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances. Refer to Division 1 Section "Demonstration and Training."

PART 4 - END OF SECTION

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SECTION 11 82 26 - FACILITY WASTE COMPACTORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Facility waste compactors.
2. Discharge containers for recycling.
3. Motorized dumpster mover.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Inspect and discuss electrical, plumbing, and sprinkler roughing-in; equipment bases; and other preparatory work specified elsewhere.
2. Review coordination of chute locations with waste compactors.
3. Review sanitary requirements for water bibs, floor drains, and grease traps if required for Project to reduce decomposition and odors.
4. Review haul routes of waste to the compactor, route of hauler's equipment, and protections along these routes that are specified elsewhere.
5. Review required testing, inspection, and certification procedures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties and accessories, and finishes.

B. Shop Drawings: For each waste compactor and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Dimension chute locations that interface with waste compactors.
4. Include location and installation details of automatic sprinkler in hopper of each chute-fed compactor.
5. Indicate equipment access points and required space for equipment service and operation.
6. Include setting drawings, templates, and instructions for installing anchor bolts and other anchorages.
7. Include diagrams for power, signal, and control wiring.
8. Indicate machine location, rough-in and anchor placement dimensions and tolerances, clearances required.

C. Operation Data: Include description of system operation, adjusting and testing required.

D. Maintenance Data: Identify system maintenance requirements, servicing cycles, lubrication types required and local spare part sources.

E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner’s name and registered with manufacturer.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of waste compactor.

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C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For waste compactors to include in operation and maintenance manuals.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard five-year maintenance agreement, starting on date maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1. Maintenance Proximity: Not more than two hour(s') normal travel time from Installer's place of business to Project site.

B. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.7 WARRANTY

A. Manufacturer’s standard warranty.

B. Warranty Period for Compactor and accessories: Correct defective Work within a five year period after Date of Substantial Completion.

C. Warranty Period for Motorized Dumpster Mover: Manufacturer’s standard one year warranty.

PART 2 - PRODUCTS

2.1 FACILITY WASTE COMPACTORS

A. Waste Compactor: Manufacturer's standard compactor-container (combination-container) -type stationary compactor, complying with requirements; liquidtight; and with components, options, and accessories needed to provide a complete, functional system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Auto-Pak.
b. Compactors, Inc.
c. DuraPak.
d. Marathon Equipment Company; a Dover company; Mini-MAC Apartment Compactor Model 5A (Basis-of-Design).
e. Precision Machinery Systems LLC.
f. Wilkinson Hi-Rise, LLC.

2. Source Limitations: Obtain from single source from single manufacturer.
3. Waste-Compactor Standards: ANSI Z245.21 including appendices and NFPA 82.
4. Waste-Container Standards: ANSI Z245.30 and ANSI Z245.60.

a. Manufacturer’s standard of fabricated steel, enamel finish.
b. Capacity: 2 cu. yds.

5. Rated Size (Volume): Minimum 0.30 cu. yd..
6. Clear Top Opening (Length by Width): Minimum 22 1/2 by 28 inches.
7. Cycle Time: Maximum 14 seconds.
8. Ram Penetration: Minimum 4 inches.
9. Normal/Maximum Resultant Ram Forces: 23.2 / 27.3 psi.
10. Electrical Characteristics:

a. Horsepower: 5 hp.

b. Voltage: **[115 V ac single phase, 60 Hertz] [230 V ac single phase, 60 Hertz] [208 V ac, three phase, 60 Hertz] [230 V ac, three phase, 60 Hertz] [460 V ac three phase, 60 Hertz] [208/230/460/575 3-phase]**.

11. Controls: .
    a. Fully automatic.
    b. Three-push button station.
        1) Start/Stop/Reverse.
        2) Keylock.
12. Finish: Manufacturer's standard.
13. Construction: Steel, welded.
14. Service Location: Interior.
15. Cycling: Governed by electric eye connected to signal light to indicate discharge container is full.
16. Provide second timer which will automatically shut off machine after an adjustable period of time (20-30 minutes). After another set period of time (30-60 minutes), machine will automatically reset and start-up when photoelectrically activated.

B. Number of Extra Storage Containers: Two.

2.2 MOTORIZED DUMPSTER MOVER

A. Manufacturer:

1. DJ Products; WasteCaddy – Dumpster Tow (Basis-of-Design).

B. Battery powered dumpster / waste container mover that can push or pull heavy trash containers over asphalt and through ice and snow.

1. Unit to be able to maneuver trash containers from 500 lbs to 10,000 lbs.
2. Rechargeable 36v(3) 105 Amp Batteries.
3. Tubular steel frame.
4. 1500 lb. differential / transaxle.
5. High tech speed controller.
6. Neutral throttle braking.
7. Adjustable acceleration / braking.
8. Variable speed twist grip.
9. 0-3 mph forward / reverse.
10. Non-marking tires.
11. Battery discharge indicator.
12. Automatic charger.
13. High output motor and controller package.
14. 5th wheel arm.
15. Safety stop switch and guard kit.
16. Maintenance-free batteries (set of 3).
17. Onboard charger.

2.3 FABRICATION

A. Fabricate waste compactors with smooth, eased, exposed edges to prevent injury to persons in vicinity of the equipment.

B. Fabricate containers, hoppers, compaction chambers, unit bodies, and similar components of steel with welded joints. Reinforce with steel members sized and spaced to withstand impacts and pressures of normal operations and to prevent deformation.

C. Fabricate equipment with replaceable parts at points of normal wear.

D. Fabricate liquid tight compactor baffles to stop liquid from leaking out.

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PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, clearances, service rough-ins, and other conditions affecting performance of the Work.

B. Examine walls, floors, and chutes for suitable conditions where each waste compactor will be installed.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF FACILITY WASTE COMPACTORS

A. Install each waste compactor according to manufacturer's written instructions, ANSI Z245.2, and ANSI Z245.21, including appendices.

B. Install automatic sprinkler in hopper of each chute-fed compactor according to NFPA 82.

C. Set waste compactors level, plumb, properly aligned, and securely in place. Anchor as required for secure operation.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform installation and startup checks according to ANSI Z245.21, Appendix D, "Tests for Evaluation of Equipment and Performance," and manufacturer's written instructions.
2. Test and adjust controls, alarms, and safeties. Replace damaged and malfunctioning controls and equipment.
3. Verify unrestricted access to each firefighting access door or hose connection required by ANSI Z245.21 and NFPA 82 for compactor container(s).
4. Verify correct locations, color coding, and legibility of caution, warning, and danger markings.
5. Certify compliance with test parameters.

B. A waste compactor will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, initial maintenance service shall include 12 months' full maintenance by skilled employees of waste-compactor Installer. Include monthly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper waste-compactor operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain waste compactors according to manufacturer's written instructions and ANSI Z245.2.

END OF SECTION 11 82 26

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SECTION 12 21 13 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal louver blinds, vinyl slats.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Horizontal louver blinds, vinyl slats.

B. Product Data Submittals: For each product.

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Rated capacities, operating characteristics, and furnished accessories.

C. Shop Drawings: For horizontal louver blinds.

1. Fabrication and installation details.
2. .

D. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type and color of horizontal louver blind.

1. Include Samples of accessories involving color selection.

E. Samples for Verification: Actual sample of finished products for each type and color of horizontal louver blind.

1. Size: Manufacturers' standard size.

F. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For horizontal louver blinds with polymer slats that have been tested for compliance with NFPA 701, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For horizontal louver blinds.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each size, color, texture, pattern, and gloss indicated, but no fewer than two units. Include brackets.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

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1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of motorized products that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of motorized operating system components.

2. Warranty Period: 5 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain horizontal louver blinds from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Window Covering Safety Standard: Provide horizontal louver blinds that comply with WCMA A100.1[**and are listed and labeled as "Best for Kids" by a qualified testing agency**].

2.3 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Levolor Inc.; BASICS White Cordless Light Filtering Vinyl Blinds.
2. Springs Window Fashions; SWFcontract; 1” M-Series Vinyl Blinds.
3. Graber; Cordless Vinyl Lift Blinds.

B. <Double click to insert sustainable design text for recycled content of aluminum.>

C. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.

1. Width: 1 inch.
2. Thickness: Not less than 0.008 inch.
3. Spacing: Allowing no less than 13.8 slats per foot of drop.
4. Finish: Ionized antistatic, dust-repellent, baked polyester finish.

D. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.

1. Type: Braided cord.

E. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.

1. Capacity: One blind per headrail unless otherwise indicated.
2. Ends: Manufacturer's standard.

F. Manual Cordless Operation:

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1. Lift Mechanism: Manufacturer's standard lift- or tension-control mechanism that allows blinds to be raised or lowered into position by manually pushing the bottom rail up or pulling it down.
2. Lift Operator: Manufacturer's standard.
3. Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
4. Tilt Position:
    a. Full.
    b. Two-direction, positive stop or lockout limited at an angle of 80 degrees from horizontal, both directions.
5. Tilt Operator: Clear-plastic wand.
6. Tilt Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over-rotation of gear.
7. Tilt-Operator Length: Manufacturer's recommended length based on blind height .
8. Tilt-Operator Location: Manufacturer's standard unless otherwise indicated.

G. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and inner lift cords and has plastic- or metal-capped ends.

1. Type: Manufacturer's standard.

H. Valance: Manufacturer's standard.

I. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.

1. Type: Overhead.
2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by horizontal louver blind manufacturer for weight and size of blind.

J. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.

K. Colors, Textures, Patterns, and Gloss:

1. Slats: As selected by Architect from manufacturer's full range.
2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.4 FABRICATION OF HORIZONTAL LOUVER BLINDS

A. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.
2. Outside of Jamb Installation: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

C. Mounting Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind mounting method indicated.

D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

E. Color-Coated Finish:

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1. Metal: For components exposed to view, unless anodized or plated finish is indicated, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.

1. Install mounting brackets to prevent deflection of headrails.
2. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

a. Fabricate blinds to fit within openings with uniform edge clearance of 3/8 inch.
b. At openings requiring multiple blind units, fabricate separate blind assemblies with space of 1/4 inch between assemblies, occurring at window mullion centers.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

3.4 CLEANING AND PROTECTION

A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

END OF SECTION 12 21 13

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SECTION 12 24 13 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated, single-roller shades.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified, 10 inches long.

D. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

E. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than [**10 inches**] [**3 inches**] square. Mark interior face of material if applicable.
2. Roller Shade: Full-size operating unit, not less than 16 inches wide by 36 inches long for each type of roller shade indicated.
3. Installation Accessories: Full-size unit, not less than 10 inches long.

F. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material.

C. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED, SINGLE-ROLLER SHADES

A. Products: Subject to compliance with requirements, provide one of the following:

1. Draper, Inc.; .
2. Hunter Douglas, Inc.;.
3. MechoShade Systems, LLC; Mecho/5.
4. Springs Window Fashions; SWFcontract;.

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Manufacturer's standard.

a. Loop Length: Full length of roller shade.
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Clip, jamb mount.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.

a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of interior face of shade.
2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

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D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

F. Shadebands:

1. Shadeband Material: Light-blocking fabric.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Exposed with endcaps.
b. Color and Finish: As selected by Architect from manufacturer's full range.

G. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

a. Shape: L-shaped.
b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 4 inches.

2. Endcap Covers: To cover exposed endcaps.
3. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
4. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
5. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.

1. Source: Roller shade manufacturer.
2. Type: Polyester with foamed-acrylic backing.
3. Roll Width: 48 inches.
4. Orientation on Shadeband: As indicated on Drawings.
5. Features: Washable.
6. Color: As selected by Architect from manufacturer's full range.

2.4 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

B. Roller Shade Locations: At exterior windows in common areas; coordinate with drawings.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 12 24 13

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SECTION 12 32 16 - MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad casework.
2. Hardware and accessories.

1.2 DEFINITIONS

A. Definitions in the AWI/AWMAC/WI's "Architectural Woodwork Standards" apply to the Work of this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

B. Keying Conference: Conduct conference at project site. Incorporate keying conference decisions into final keying requirements.

1.4 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

1.5 ACTION SUBMITTALS

A. Product Data:

1. Plastic-laminate-clad casework.
2. Hardware and accessories.

B. Shop Drawings: For plastic-laminate-clad casework.

1. Include plans, elevations, sections, and attachments to other work including blocking and reinforcements required for installation.
2. Indicate types and sizes of casework.
3. Indicate manufacturer's catalog numbers for casework.
4. Show fabrication details, including types and locations of hardware.
5. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and equipment.
6. Apply AWI's Quality Certification Program label to Shop Drawings.

C. Keying Schedule: Include schematic keying diagram, and index each key set to unique designations that are coordinated with the Contract Documents.

D. Samples: For casework and hardware finishes.

E. Samples for Initial Selection: For casework and hardware finishes.

F. Samples for Verification: For the following:

1. Plastic Laminates: 12 by 12 inches, for each type, color, pattern, and surface finish required.

    a. Provide one Sample applied to core material with specified edge material applied to one edge.

2. Base Cabinet: One full-size, 16-inch- wide, finished base cabinet complete with hardware, doors, and drawers but without countertop.

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3. Wall Cabinet: One full-size, 12-inch- wide, finished wall cabinet complete with hardware, doors, and adjustable shelves.
4. Full-Size Samples: Maintain at Project site during construction in an undisturbed condition as a standard for judging the completed Work. Unless otherwise indicated, approved sample units may become part of the completed Work if in undisturbed condition at time of Substantial Completion. Notify Architect of their locations.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For casework manufacturer.

B. Sample Warranty: For special warranty.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI's Quality Certification Program certificates.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during remainder of construction period. Maintain temperature and relative humidity during remainder of construction period in range recommended for Project location by the AWI/AWMAC/WI's "Architectural Woodwork Standards."

B. Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.

C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing them, and indicate measurements on Shop Drawings.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of components or other failures of glue bond.
b. Warping of components.
c. Failure of operating hardware.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR CASEWORK

A. Quality Standard: Unless otherwise indicated, comply with the AWI/AWMAC/WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.

1. Grade: Premium.

B. Product Designations:

1. Drawings indicate sizes, configurations, and finish materials of manufactured plastic-laminate-clad casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish materials, and complying with the Specifications may be considered. See Section 01 60 00 "Product Requirements."
2. Drawings indicate configurations of manufactured plastic-laminate-clad casework by referencing designations of Casework Design Series numbering system in the Appendix of the AWI/AWMAC/WI's "Architectural Woodwork Standards."

2.2 PLASTIC-LAMINATE-CLAD CASEWORK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advanced Cabinet Systems (ACS).
2. Case Systems Inc.
3. Stevens Industries, Inc.
4. TMI Systems Corporation.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Design: Face-frame cabinet construction with the following door and drawer-front style:

1. Flush overlay.

D. Grain Direction for Wood-Grain Plastic Laminate:

1. Doors: Vertical with continuous vertical matching.
2. Drawer Fronts: Vertical with continuous vertical matching.
3. Face Frame Members: Lengthwise.
4. End Panels: Vertical.
5. Bottoms and Tops of Units: Side to side.
6. Knee Space Panels: Vertical.
7. Aprons: Horizontal.

E. Exposed Materials:

1. Plastic-Laminate Grade: VGS.

a. Colors and Patterns: As selected by Architect from manufacturer's full range.

2. Edgebanding: Plastic laminate matching adjacent surfaces.

a. PVC Edgebanding Color: Casework manufacturer's standard.

3. Solid Wood: Clear hardwood lumber of species indicated, selected for compatible grain and color.

a. Wood Species: White maple.
b. Wood Finish: As selected by Architect from casework manufacturer's full range.

F. Semiexposed Materials:

1. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.

G. Concealed Materials:

1. Solid Wood: With no defects affecting strength or utility.
2. Plywood: Hardwood plywood.
3. Plastic Laminate: Grade VGS.

2.3 HARDWARE AND ACCESSORIES

A. Hardware: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.

1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Butt Hinges: Stainless steel, semiconcealed, five-knuckle hinges complying with ANSI/BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.

C. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, Type B01602, self-closing. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.

1. Degrees of Opening: 135 degrees.

D. Wire Pulls: Solid stainless steel wire pulls, fastened from back with two screws.

1. Provide two pulls for drawers more than 24 inches wide.

E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.

1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
2. Drawers: Provide one bumper on back side of drawer front at each corner.

F. Drawer Slides: ANSI/BHMA A156.9.

1. Manufacturer's standard.
2. Standard Duty (Grade 1): Undermount.
3. General-purpose drawers; provide 100 lb load capacity.

2.4 MATERIALS

A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

B. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated.

C. Softwood Plywood: DOC PS 1.

D. Plastic Laminate: High-pressure decorative laminate complying with ISO 4586-3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABET Inc.
b. Arborite, Division of Wilsonart Canada ULC.
c. Formica Corporation.
d. Laminart LLC.
e. Nevamar Company, LLC.
f. Pionite; a Panolam Industries International, Inc. brand.
g. Wilsonart LLC.

2. Source Limitations: Obtain from single source from single manufacturer.

E. PVC Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3.0 mm thick at doors and drawer fronts, 1.0 mm thick elsewhere.

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2.5 FABRICATION

A. Plastic-Laminate-Clad Cabinet Construction: As required by referenced quality standard, but not less than the following:

1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard.
2. Shelves: 3/4-inch- thick plywood or 1-inch- thick particleboard.
3. Backs of Casework: 1/2-inch- thick particleboard or MDF where exposed, 1/4-inch- thick, veneer-core hardwood plywood dadoed into sides, bottoms, and tops where not exposed.
4. Drawer Fronts: 3/4-inch particleboard.
5. Drawer Sides and Backs: 1/2-inch- thick solid-wood or veneer-core hardwood plywood, with glued dovetail or multiple-dowel joints.
6. Drawer Bottoms: 1/4-inch- thick hardwood plywood glued and dadoed into front, back, and sides of drawers. Use 1/2-inch material for drawers more than 24 inches wide.
7. Drawer Bodies: Steel drawer pans formed from 0.0359-inch- thick metal, metallic phosphate treated, and finished with manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil for topcoat and 2 mils for system.
8. Cabinet Doors:

a. 48 Inches (1220 mm) High or Less: 3/4 inch thick, with particleboard or MDF cores and solid-wood stiles and rails.

B. Filler Strips: Provide as needed to close spaces between casework and walls, ceilings, and equipment. Fabricate from same material and with same finish as casework.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Grade: Install casework to comply with same quality standard grade as item to be installed.

B. Install casework level, plumb, and true in line; shim as required using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.

D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten cabinets to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch.

E. Fasten casework to adjacent units and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI/AWMAC/WI's "Architectural Woodwork Standards."

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

G. Adjust operating hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

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3.3 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

1. Inspection entity to prepare and submit report of inspection.

3.4 CLEANING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 12 32 16

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SECTION 12 35 30 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Residential stock cabinets.

1.2 DEFINITIONS

A. Concealed Surfaces of Casework: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of casework installed directly against and completely concealed by walls or other casework, and tops of wall cabinets and utility cabinets.

B. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.

C. Semiexposed Surfaces of Casework: Surfaces behind opaque doors or drawer fronts, including interior faces of doors, interiors and sides of drawers, and bottoms of wall cabinets.

1.3 COORDINATION

A. Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.

B. Coordinate locations of utilities that will penetrate cabinets.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components, and profiles and finishes for casework.
2. Include rated capacities, operating characteristics, profiles, and finishes for hardware.

B. Shop Drawings:

1. Include plans, elevations, details, and attachments to other work.
2. Show materials, finishes, filler panels, and hardware.
3. Indicate manufacturer's catalog numbers for casework.

C. Samples: For casework and hardware finishes.

D. Samples for Initial Selection: For casework and hardware finishes.

E. Samples for Verification: For the following:

1. Base Cabinet: One full-size, 15-inch- wide, finished base cabinet complete with hardware, doors, and drawers but without countertop.
2. Wall Cabinet: One full-size, 15-inch- wide, finished wall cabinet complete with hardware, doors, and adjustable shelves.
3. Full-Size Samples: Maintain at Project site during construction in an undisturbed condition as a standard for judging the completed Work. Unless otherwise indicated, approved sample units may become part of the completed Work if in undisturbed condition at time of Substantial Completion. Notify Architect of their exact locations.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For casework.

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1.6 QUALITY ASSURANCE

A. Source Limitations for Cabinets: Obtain cabinets through one source from a single manufacturer.

B. Unless otherwise indicated, comply with KCMA A161.1.

C. All cabinetry to meet Virginia Housing Minimum Cabinet Requirements.

1. Minimum Cabinet Requirements review form must be completed by Contractor then submitted and accepted by Virginia Housing prior to ordering cabinets.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.

C. Field Measurements: Where casework is indicated to fit to other construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.

1. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 RESIDENTIAL STOCK CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but not limited to, the following:

1. Advanta Cabinets.
2. Merillat.
3. Regent Cabinets.
4. Saco Industries.
5. Smart Cabinetry.

B. Quality Standard: Provide cabinets that comply with KCMA A161.1.

1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with KCMA A161.1.

C. Door and Drawer Face Style: Reveal overlay; faces partially cover cabinet fronts.

1. Door and Drawer Fronts:

a. Solid-wood stiles and rails, 3/4 inch thick, with 1/4-inch- thick, veneer-faced plywood center panels.

D. Cabinet Style: Face frame.

1. Face Frames:

a. 3/4-by-1-5/8-inch solid wood with glued mortise and tenon or doweled joints.

E. Exposed Cabinet End Finish: Wood veneer.

F. Cabinet End Construction: 1/2 inch thick plywood.

G. Cabinet Tops and Bottoms: 1/2 inch thick plywood.

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1. Tops and Bottoms to be dadoed, glued, and stapled into sides and face frames.

H. Back, Top, and Bottom Rails: 3/4-by-2-1/2-inch solid wood, interlocking with end panels and rabbeted to receive top and bottom panels. Back rails secured under pressure with glue and with mechanical fasteners.

I. Wall-Hung-Unit Back Panels: 1/4-inch- thick plywood.

1. Back Panels to be dadoed or rabbeted, glued, and stapled into end panels.

J. Base-Unit Back Panels: 1/2 inch thick plywood .

1. Back Panels to be dadoed or rabbeted, glued, and stapled into end panels.

K. Front Frame Drawer Rails: 3/4-by-1-1/4-inch solid wood mortised and fastened into face frame.

L. Drawers: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Subfronts, Backs, and Sides: 1/2-inch- thick solid wood.

a. Sides to be dadoed, rabbeted, or dove tailed with front and back members.

2. Bottoms: 1/4-inch- thick plywood.

a. Bottoms to be dadoed and glued and/or factory stapled into drawer box.

M. Shelves: 5/8-inch thick plywood with edge banding.

N. Factory Finishing: Finish cabinets at factory.

O. Assembly: Cabinets are to be factory/manufacturer assembled.

2.2 CABINET MATERIALS

A. Hardwood Lumber: Kiln dried to 7 percent moisture content.

B. Softwood Lumber: Kiln dried to 10 percent moisture content.

C. Cabinets to be CARB2 compliant.

D. Hardwood Plywood: HPVA HP-1.

E. MDF: Medium-density fiberboard, ANSI A208.2, Grade MD.

F. Hardboard: ANSI A135.4, Class 1 tempered.

G. Exposed Materials:

1. Exposed Wood Species: Maple.

a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
b. Staining and Finish: As selected by Architect from manufacturer's full range.

2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.

a. Edge band exposed edges with a minimum of 1/8-inch- thick, solid-wood edging of same species as face veneer.

H. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces or stained to be compatible with exposed surfaces.
2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces or stained to be compatible with exposed surfaces.

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3. Thermally Fused Laminate Panels: Plywood finished with thermally fused, melamine-impregnated decorative paper.
    a. Provide material finished on both sides for shelves, dividers, drawer bodies, and other components with two semiexposed surfaces.
    b. Provide PVC or polyester edgebanding on components with semiexposed edges.
    c. Colors: As selected by Architect from cabinet manufacturer's full range.

I. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility.

2.3 CABINET HARDWARE

A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Architect from manufacturer's full range.

B. Pulls: Back-mounted decorative pulls.
1. Unit Pulls: Amerock BP 76312CS26D, Satin Nickel.
2. Common Area Pulls: Amerock BP 19003. Coordinate with Interior Design Drawings.

C. Hinges: Concealed, soft-closing hinges.

D. Drawer Guides: Epoxy-coated-metal, soft-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.

E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
2. Drawers: Provide one bumper on back side of drawer front at each corner.

F. Exposed hardware finishes: As selected by Architect from manufacturer’s full range.

G. For concealed hardware, provide manufacturer’s standard finish that complies with product class requirements in BHMA A156.9.

2.4 ACCESSORIES

A. Assembly adhesives shall meet CARB 2 requirements.

B. Installation Sealants: Meet VOC requirements.

C. Provide skirt panel and apron at accessible unit knee spaces.

D. Blocking: Solid dimensional wood blocking.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of casework.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verify placement of backing/blocking is correct for cabinet installation per drawing details and coordinated with shop drawings.

3.2 INSTALLATION OF RESIDENTIAL CASEWORK

A. Install casework with no variations in adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework.

B. Install casework without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.

C. Install casework level and plumb to a tolerance of 1/8 inch in 8 feet.

D. Fasten casework to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c.
2. Wall cabinets are to be fastened to blocking with a minimum of four washer head cabinet screws; two in each upper and lower nailing strip for each wall cabinet.

E. Holes in cabinet backs for plumbing or other utilities are to be drilled and completely covered by escutcheon plates.

3.3 ADJUSTING AND CLEANING

A. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

B. Clean casework on exposed and semiexposed surfaces. Touch up as required to restore damaged or soiled areas to match original factory finish, as approved by Architect.

C. Replace cabinet doors that are split or warped more than 1/8 inch measured diagonally from corner to corner.

D. Remove excess sealant.

END OF SECTION 12 35 30

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SECTION 12 36 40 - STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes stone countertops for unit kitchens, unit bathrooms, and common areas.

1.2 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory and manufactured product.

B. Shop Drawings:

1. Include plans, sections, details, and attachments to other work.
2. Show locations and details of joints.
3. Show direction of veining, grain, or other directional pattern.

C. Samples for Verification: For each stone type indicated, in sets of Samples not less than 12 inches square.

1. Include two or more Samples in each set and show the full range of variations in appearance characteristics expected in the completed Work.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, according to referenced ASTM standards. Base reports on testing done within previous three years.
2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer indicating that sealants will not stain or damage stone.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stone countertops to include in maintenance manuals. Include product data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate stone countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of stone countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical countertop as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturer, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and according to Section 07 92 00 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

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1.7 DELIVERY, STORAGE, AND HANDLING

A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.

1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain each variety of stone, from a single quarry, whether specified in this Section or in another Specification Section, with resources to provide materials of consistent quality in appearance and physical properties.

1. For stone types that include same list of varieties and sources, provide same variety from same source for each.

2.2 GRANITE

A. Material Standard: Comply with ASTM C615/C615M.

B. Description: Stone to be selected by Interior Designer.

C. Varieties and Sources: Subject to compliance with requirements, provide the following:

1. MSI Surfaces.

a. Unit Kitchens: Architect to select from manufacturer’s full line.
b. Common Areas: Architect to select from manufacturer’s full line.

D. Cut stone from contiguous, matched slabs in which natural markings occur.

E. Finish: Polished.

F. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

2.3 ADHESIVES, GROUT, SEALANTS, AND STONE ACCESSORIES

A. General: Use only adhesives formulated for stone and ceramic tile and that are recommended by their manufacturer for the application indicated.

B. Water-Cleanable Epoxy Adhesive: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Atlas Minerals & Chemicals, Inc.
b. Bonsal American, an Oldcastle company.
c. Bostik, Inc.
d. C-Cure.
e. Custom Building Products.
f. H.B. Fuller Construction Products Inc. / TEC.
g. Jamo Inc.
h. LATICRETE SUPERCAP, LLC.
i. MAPEI Corporation.

j. Merkrete; a Parex USA, Inc. brand.
k. Southern Grouts & Mortars, Inc.
l. Summitville Tiles, Inc.

C. Water-Cleanable Epoxy Grout: ANSI A118.3, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Atlas Minerals & Chemicals, Inc.
b. Boiardi Products Corporation; a QEP company.
c. Bonsal American, an Oldcastle company.
d. Bostik, Inc.
e. C-Cure.
f. Custom Building Products.
g. H.B. Fuller Construction Products Inc. / TEC.
h. Jamo Inc.
i. LATICRETE SUPERCAP, LLC.
j. MAPEI Corporation.
k. Merkrete; a Parex USA, Inc. brand.
l. Sauereisen.
m. Southern Grouts & Mortars, Inc.
n. Summitville Tiles, Inc.

D. Stone Adhesive: Two-part epoxy adhesive, formulated specifically for bonding stone to stone, with an initial set time of not more than two hours at 70 deg F.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Akemi North America.
b. Axson North America, Inc.
c. Bonstone Materials Corporation.

2. Color: Clear.

E. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 07 90 05 "Joint Sealants" and that will not stain the stone it is applied to.

1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
2. Joint Sealant: Single component, nonsag, neutral curing, silicone; Class 25.
3. Color: Clear.

F. Stone Joint Splines: Stainless-steel or brass washers approximately 1 inch in diameter and of thickness to fit snugly in saw-cut kerf in edge of stone units.

G. Stone Cleaner: Specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer and, if a sealer is specified, by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

H. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bostik, Inc.
b. Custom Building Products.
c. Hillyard, Inc.
d. HMK Stone Care System; ACI International.
e. Miracle Sealants Company.
f. Stone Care International Inc.

g. Summitville Tiles, Inc.

2.4 STONE FABRICATION, GENERAL

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that may impair structural integrity, function, or appearance.

1. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by Architect.

B. Grade and mark stone for final locations to produce assembled countertop units with an overall uniform appearance.

C. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated.

1. Clean sawed backs of stones to remove rust stains and iron particles.
2. Dress joints straight and at right angle to face unless otherwise indicated.
3. Cut and drill sinkages and holes in stone for anchors, supports, and attachments.
4. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
5. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units. Form corners of molded edges as indicated with outside corners slightly eased unless otherwise indicated.
6. Finish exposed faces of stone to comply with requirements indicated for finish of each stone type required and to match approved Samples and mockups. Provide matching finish on exposed edges of countertops, splashes, and cutouts.

D. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

2.5 STONE COUNTERTOPS

A. General: Comply with recommendations in MIA's "Dimension Stone - Design Manual VII."

B. Nominal Thickness: Provide thickness indicated, but not less than 1-1/2 inches. Gage backs to provide units of identical thickness.

C. Edge Detail: Straight, slightly eased at top.

D. Splashes: Provide 1 1/2-inch- thick backsplashes and end splashes unless otherwise indicated.

1. Height: 4 inches.
2. Top-Edge Detail: Straight, slightly eased at corner.

E. Joints: Fabricate countertops without joints where possible.

F. Joints: Fabricate countertops in sections for joining in field.

1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long may result, unless unavoidable.
2. Joint Type: Bonded, 1/32 inch or less in width.

G. Cutouts and Holes:

1. Undercounter Fixtures: Make cutouts for undercounter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.

2. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

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3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive stone countertops and conditions under which stone countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone countertops.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone countertops.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by stone countertop Installer for anchoring stone countertops. Furnish installers of other work with Drawings or templates showing locations of these items.

B. Before installing stone countertops, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives and rinse with clear water. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES

A. Variation from Level: Do not exceed 1/8 inch in 96 inches, 1/4 inch maximum.

B. Variation in Joint Width: Do not vary joint thickness more than one-fourth of nominal joint width.

C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch difference between planes of adjacent units.

D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION OF COUNTERTOPS

A. Install countertops by adhering to supports with water-cleanable epoxy adhesive.

B. Do not cut stone in field unless otherwise indicated. If stone countertops or splashes require additional fabrication not specified to be performed at Project site, return to fabrication shop for adjustment.

C. Set stone to comply with requirements indicated. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure stone countertops in place.

D. Bond joints with stone adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

E. Space joints with 1/16-inch gap for filling with sealant. Use temporary shims to ensure uniform spacing.

1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to

accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

G. Install backsplashes and end splashes by adhering to countertops with stone adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Leave 1/16-inch gap between splashes and wall for filling with sealant. Use temporary shims to ensure uniform spacing.

H. Install backsplashes and end splashes by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch gap between countertop and splashes for filling with sealant. Use temporary shims to ensure uniform spacing.

I. Grout joints to comply with ANSI A108.10. Remove temporary shims before grouting. Tool grout uniformly and smoothly with plastic tool.

J. Apply sealant to joints; comply with Section 07 90 05 "Joint Sealants." Remove temporary shims before applying sealant.

3.5 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.

B. Remove and replace stone countertops of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
2. Defective countertops.
3. Defective joints, including misaligned joints.
4. Interior stone countertops and joints not matching approved Samples and mockups.
5. Interior stone countertops not complying with other requirements indicated.

C. Replace in a manner that results in stone countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

D. Clean stone countertops no fewer than six days after completion of installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that may damage stone.

E. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

END OF SECTION 12 36 40

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SECTION 12 36 61.13 - CULTURED MARBLE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cultured marble countertops.
2. Integral sinks.
3. Integral backsplashes.
4. Loose end and/or side splashes.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, integral sinks, and methods of joining.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.

1.3 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis-of-Design: Virginia Marble.
2. Bathroom World Manufacturing Company.
3. Cherry Marble Group.
4. Comar Products, Inc.
5. Craig Baker Marble Co., Inc.
6. Custom Marble Products.
7. Imperial Marble Corp.
8. MarCraft, Inc.
9. Roma Marble, Inc.
10. Rynone Manufacturing Corp.
11. Tiffany Marble.

2.2 CULTURED MARBLE COUNTERTOPS

A. Cultured Marble: Gel-coated solid fabrication of filled plastic resin complying with CSA B45.5/IAPMO Z124.

1. Colors and Patterns: As selected by Architect from manufacturer's full range.

B. Configuration: One-piece units with integral sink bowls and backsplashes unless otherwise indicated, not less than 1 inch thick.

1. Front: Straight, slightly eased at top.
2. Backsplash: Straight, slightly eased at cove and top.
3. End and/or Side Splash: Matching backsplash.

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2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by cultured marble manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer.

1. Install end and/or side splashes to comply with manufacturer's written instructions.

C. Install aprons to backing and countertops with adhesive. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

D. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants." Remove temporary shims before applying sealant.

END OF SECTION 12 36 61.13

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SECTION 12 48 13 FLOOR MATS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Loose laid entrance mats.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show the following:

1. Divisions between mat sections.

C. Samples for Initial Selection: For each type of product indicated.

D. Maintenance Data: For floor mats to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain floor mats through one source from a single manufacturer.

B. Accessibility Requirements: Provide installed floor mats that comply with most stringent requirements of Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and Sections 302 and 303 in ICC A117.1.

C. ASTM C 1028-89 Static Coefficient of Friction Dry 0.70.

1.4 PROJECT CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

1.5 COORDINATION

A. Coordinate installation of mats with installation of finish floors to receive floor mats.

PART 2 - PRODUCTS

2.1 ENTRANCE MATS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis-of-Design: Waterhog Grand Premier ECO Entrance Mats by American Floor Mats; www.americanfloormats.com.
2. Roppe.
3. Musson, R. C. Rubber Co.
4. Pawling Corporation; Architectural Products Division.
5. Mats Inc.

2.2 FABRICATION

A. Fiber type: Solution dyed polypropylene, outstanding lightfastness (100% Recycled Content).

B. Weight: 36 oz/sqyd.

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C. Nub Height: 3/8”

D. Design: Diamond Pattern.

E. Backing Type: 100% SBR Rubber (20% Recycled Content)

F. Thickness: 0.110” – Border: 0.190”, Nubs; 0.050” between nubs.

G. Durometer: 60

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, and other conditions affecting installation of floor mats.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install floor mats to comply with manufacturer's written instructions. Coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

PART 4 - END OF SECTION

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SECTION 12 48 14 RECESSED FLOOR MATS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Recess mounted entrance mats.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show the following:

1. Divisions between mat sections.

C. Samples for Initial Selection: For each type of product indicated.

D. Maintenance Data: For floor mats to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain floor mats through one source from a single manufacturer.

B. Accessibility Requirements: Provide installed floor mats that comply with most stringent requirements of Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" and Sections 302 and 303 in ICC A117.1.

C. ASTM C 1028-89 Static Coefficient of Friction Dry 0.70.

1.4 PROJECT CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

1.5 COORDINATION

A. Coordinate installation of mats with installation of finish floors to receive floor mats.

PART 2 - PRODUCTS

2.1 ENTRANCE MATS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Basis-of-Design: Construction Specialties; Pedimat M1. Refer to Interior Design Drawings for schedule.
2. Roppe.
3. Musson, R. C. Rubber Co.
4. Pawling Corporation; Architectural Products Division.
5. Mats Inc.

2.2 FABRICATION

A. Fiber type: Solution dyed polypropylene, outstanding lightfastness (100% Recycled Content).

B. Weight: 36 oz/sqyd.

C. Thickness: 7/16 inch.

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D. Insert: Heavy duty carpet.

E. Rails: Aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, and other conditions affecting installation of floor mats.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install floor mats to comply with manufacturer's written instructions. Coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

B. Coordinate requirements of floor mat with recess in concrete slab to provide flush surface.

END OF SECTION

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SECTION 12 93 00 SITE FURNISHINGS

PART 1 - GENERAL:

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary

1. Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following site and street furnishings:

1. Bike Racks
2. Benches.
3. Trash receptacles.
4. Exterior dog waste stations.

B. Related Sections include the following:

1. Division 31 Section "Earthwork" for excavation for installation of concrete footings.
2. Division 3 Section "Cast-in-Place Concrete" for formed voids in concrete footings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

1. Submit location of product manufacturer.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Size: Not less than 6-inch- long linear components and 4-inch- square sheet components.

C. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

D. Maintenance Data: For site furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of site and street furnishings through one source from a single manufacturer.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Bench Replacement Slats: Not less than two full-size units for each size indicated.
2. Trash Receptacle Inner Containers: 1 full-size unit.

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PART 2 - PRODUCTS:

2.1 MANUFACTURERS

A. Basis-of-Design Products: Subject to compliance with requirements, provide the following products by or a comparable product by another manufacturer approved by Architect.

1. Bike Racks: Columbia Cascade Company; Model CycLoops 2170.
2. Bench: Victor Stanley, Inc.; Homestead Series Model 32.
3. Trash Receptacles: Victor Stanley, Inc.; Model ES-242.
4. Exterior Dog Waste Stations: Full dog waste station with roll bag system by Dog Waste Depot; www.dogwastedepot.com.

2.2 MATERIALS

A. Steel: Free from surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.
3. Tubing: Cold-formed steel tubing complying with ASTM A 500.
4. Sheet: Commercial steel sheet complying with ASTM A 569/A 569M.

B. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.

1. Recycled Polyethylene: Fabricated from not less than 96 percent recycled, purified, fractional-melt plastic resin for not less than 90 percent recycled post- consumer waste by weight content HDPE.

C. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials; commercial quality; tamperproof, vandal and theft resistant; concealed, recessed, and capped or plugged. Provide as required for site furnishings' assembly, mounting, and secure attachment.

D. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

2.3 BIKE RACKS:

A. Frame: Steel.

B. Table Height: As indicated by basis-of-design product.

C. Overall Width: Bike capacity as noted on drawings.

D. Overall Depth: As indicated by basis-of-design product.

E. Weight: As indicated by basis-of-design product.

F. HDPE Color: As selected by Architect from manufacturer's full range.

2.4 BENCHES:

A. Frame: Steel.

B. Seat and Back: Plastic; formed from evenly spaced parallel slats.

C. Arms: None.

D. Seat Height: As indicated by basis-of-design product.

E. Overall Width: 6 feet.

F. Overall Depth: As indicated by basis-of-design product.

G. Weight: As indicated by basis-of-design product.

H. Seat Surface Shape: As indicated by basis-of-design product.

I. HDPE Color: As selected by Architect from manufacturer's full range.

2.5 TRASH RECEPTACLES

A. Materials: 3/8” x 1” vertical solid steel bar; 1/4” x 2-1/2” horizontal solid steel bands; 3/8” x 3” steel support bars; 5/8” solid steel top ring; 36 gallon capacity high density plastic liner; leveling feet with a 3/8” diameter threaded steel shaft.

B. Lids and Tops: Formed lid attached to the frame with two vinyl-coated steel aircraft cables.

C. Style: As indicated by basis-of-design product.

D. Weight: As indicated by basis-of-design product.

E. Liners: High-density plastic liner.

F. Capacity: Not less than 24 gal.

G. Installation Method: Anchored to cast-in-place concrete.

2.6 EXTERIOR DOG WASTE STATIONS

A. Materials: 100 percent Commercial Grade Aluminum.

B. Finish: Powder Coated "Forest Green".

C. Each System Includes:

1. Post, sign, bag dispenser, round mesh waste can with lid, 400 waste bags, 50 can liners and all required hardware for a complete installation.

D. Number of Dog Waste Stations required: See drawings.

2.7 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full- length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Steel and Iron Components: Galvanized, galvanized and color coated, or color coated. Bare metal steel or iron components are not permitted.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; smooth all surfaces, free from burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Assemble components in the factory to the greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL AND GALVANIZED STEEL FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester-TGIC, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - - EXECUTION:

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Complete field assembly of site and street furnishings, where required.

B. Unless otherwise indicated, install site and street furnishings after landscaping and paving have been completed.

C. Install site and street furnishings level, plumb, true, and securely anchored or positioned at locations indicated on Drawings.

3.3 CLEANING

A. After completing site and street furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

PART 4 - **END OF SECTION**

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SECTION 12 93 15
MODULAR BIKE STORAGE SYSTEM

PART 1 - PART 1 GENERAL

1.1 SUMMARY

A. This Section includes modular bike storage system.

B. Related Work:

1. Division 12 Section "Site Furnishings" for individual bike racks.

1.2 SYSTEM DESCRIPTION

A. System to be specifically designed to maximize the number of bikes per square foot by hanging the bikes vertically; bike supported by the fork and wheel rim.

B. System must be modular permitting it to be relocated, resized and added to in the future.

C. System to be U-lock compatible.

D. Provide system as single-sided and double-sided floor-supported, foot-mounted units, securely anchored to the slab; do not provide wall mounted units.

1.3 SUBMITTALS

A. Product Data: Include physical characteristics such as shape, dimensions, bicycle parking capacity and finish for components.

B. System Layout: Contractor to provide layout for approval of the Architect; each building to accommodate storage of 20 bicycles per building.

C. Shop Drawings: Show installation details including attachment to adjacent construction.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store bicycle storage system components in original undamaged packages and containers until ready for installation.

B. Handle bicycle storage system components with sufficient care to prevent any scratches or damage to finish.

PART 2 - PART 2 PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: DERO Bike Rack Co., www.dero.com.

2.2 SYSTEM

A. Basis-of-Design: DERO Space Saver Rack.

B. Configuration:

1. Single-sided and double-sided in accordance to layout; foot supported.
2. Provide hangers 16 inches o.c. with staggered parking heights.

C. Materials:

1. Hangers: 1 inch OD 11 gauge with 3/8" steel rod.
2. Spacers: PVC pipe.
3. Uprights: 2" x 2" HSLA gauge square tube.

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4. Finish:

a. Body: Black TGIC powder-coat (standard).
b. Hanger Rods: Black baked on rubber coating.
c. Crossbars: Galvanized.
d. Feet: Galvanized.
e. Powder coat finishes are applied over an electrostatically applied epoxy primer.

PART 3 - PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION

A. General:

1. Provide components required for layout indicated.
2. Install bike storage system plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Securely anchor to slab/w3all per manufacturer's written instructions.

PART 4 - END OF SECTION

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SECTION 14 91 82 - TRASH CHUTES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Waste chutes. (At Building 2 only)
2. Waste doors. (At Building 2 only)

1.2 DEFINITIONS

A. Access Door: Door other than an intake or discharge door that penetrates the chase wall for service access to devices in the chase.

B. Chase: The shaft that encloses a chute.

C. Discharge Door: Door or hatch at the bottom of a chute, through which materials exit the chute.

D. Intake Door: Door or hatch that penetrates the chase wall and chute, and through which materials are fed into the chute.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chutes.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include each type and location of intake, discharge, and access door.
4. Include diagrams for power, signal and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fire-rated door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, section 5.2.3.1.
2. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Coordination Drawings: Plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Size and construction of chase enclosing each chute; locations for power, signal, and control wiring; and sprinkler-piping and water-service connections.
2. Chute-discharge locations coordinated with compactor-intake or container locations.

C. Product Certificates: For each type of chute.

D. Field quality control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For chutes to include in operation and maintenance manuals.

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1. Include manufacturer's recycling plan guidelines.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80 section 5.2.3.1, plus the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 TRASH CHUTES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chutes International.
2. Midland Chutes.
3. U.S. Chutes; U.S.C. Group.
4. Valiant Products, Inc.
5. Wilkinson Hi-Rise, LLC.

B. Source Limitations: Obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing and inspecting agency, for fire-protection ratings indicated.

1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
2. Intake Doors: Labeled, Labeled door to match adjacent construction fire ratingwith 30-minute temperature rise of 250 deg F.
3. Access Doors: Labeled door to match adjacent construction fire rating with 30-minute temperature rise of 250 deg F.

C. Discharge-Door Assemblies: Labeled door to match adjacent construction fire rating with 30-minute temperature rise of 250 deg F. according to NFPA 252 or UL 10B requirements for fire-rated door assemblies.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Standard: Provide chutes complying with NFPA 82 unless otherwise indicated.

2.3 WASTE CHUTES

A. Chute Metal: Aluminum-coated, cold-rolled, commercial steel sheet; ASTM A463/A463M, Type 1, with not less than T1-40 coating.

1. Thickness: 0.0625 inch.

B. Chute Size: 24-inch diameter Or As indicated on Drawings.

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2.4 WASTE DOORS

A. Intake-Door Assemblies: ASTM A240/A240M, Type 304, stainless steel self-closing units with positive latch and latch handle, with stainless steel trim; constructed as required for performance requirements indicated; and with frame suitable for the enclosing chase construction.

1. Door Type: Hopper.
2. Size: Manufacturer's standard size for door type, chute type, and diameter indicated.
3. Finish: Manufacturer's standard satin or ASTM A480/A480M No. 3 directional polish.
4. Lockset: Lever-handle-type cylinder lock that releases latch with key that is removable only when cylinder is locked.
    a. Lock Cylinder: Cylinders [**specified in Section 08 71 00 "Door Hardware."**] [**specified in Section 08 71 11 "Door Hardware (Descriptive Specification)."**] [**standard with manufacturer.**]
    b. Keying: For each chute, key cylinders [**alike**] [**differently for each floor**] [**to master key system**] <**Insert requirement**>.
    c. Keys: [**Two**] [**Three**] <**Insert number**> for each cylinder.
5. Latchset: Lever-handle type that unlatches door.
6. Accessible Automatic Door Operating System: Manufacturer's standard system complying with applicable provisions of the cited accessibility standard.
7. Electrical Interlocks: Interlock system that is energized by opening one intake door; remaining intake doors automatically lock when system is energized.
8. Baffles: Rubber backdraft baffles at each intake.

B. Discharge-Door Assemblies: Aluminum-coated steel; direct vertical-discharge type, inclined, and horizontally closing and latching; constructed as required for performance requirements indicated; and equipped with 165 deg F fusible links that cause doors to close in the event of fire.

C. Detector System: Heat- and smoke-detecting interlock system with temperature-rise elements that locks chute doors when temperature in chute reaches a predetermined, adjustable temperature.

1. Locate smoke detector outside discharge door with solenoid to close discharge door.

D. Access-Door Assemblies: Manufacturer's standard ASTM A240/A240M, Type 302/304, stainless steel doors with trim; constructed as required for performance requirements indicated; with frame suitable for the enclosing chase construction; in satin or ASTM A480/A480M No. 3 directional polish finish; equipped with cylinder locks that release latch with keys that are removable only when cylinder is locked.

1. Lock Cylinder: Cylinders standard with manufacturer.
2. Keying: Key access-door cylinders alike.
3. Keys: Two for each cylinder.

E. Manual Control System: Control system with manual switches that lock chute doors during shutdown hours and service operations.

2.5 ACCESSORIES

A. Chute Fire Sprinklers: NFPA 13; manufacturer's standard, recessed, automatic, NPS 1/2 sprinklers; ready for piping connections.

B. Flushing Spray Unit: NPS 3/4 spray-head unit located in chute above highest intake door, ready for hot-water piping connection, and with access door for spray-head and piping maintenance.

C. Sanitizing Unit: NPS 3/4 disinfecting and sanitizing spray-head unit located in chute above highest intake door, including 1-gal. tank and adjustable proportioning valve with bypass for manual control of sanitizing and flushing operation, ready for hot-water piping connection, and with access door for spray-head and piping maintenance.

D. Intake-Door Baffles: Rubber baffles, 1/8 inch thick.

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E. Sound Dampening: Manufacturer's standard sound-deadening coating on exterior of chute and sound and vibration isolator pads at supporting frame at each floor penetration.

F. Recycling Containers: Provide two (2) Industry standard, 2-cu. yd. containers for each recycling chute.

2.6 FABRICATION

A. Factory-assemble chutes to greatest extent practicable with nonleaking, continuously welded or lock-seamed joints without bolts, rivets, or clips projecting into chute interior. Include intake-door assemblies, metal supporting framing at each floor, and chute expansion joints between each support point.

B. Roof Vent: Fabricate vent unit as full-size extension of chute, open to the atmosphere. Extend vent to height above roofing surface as indicated on Drawings. Equip vent with full insect screening and metal explosion-release cap. Fabricate with roof-deck flange, counterflashing, and clamping ring of nonferrous metal compatible with chute metal.

C. Chute Fire Sprinklers: Install internally within chute, recessed out of the chute area through which material travels, and according to NFPA 13. Locate fire sprinklers at or above the top intake door of chutes, within the chute at alternate floor levels in buildings more than two stories tall, and at the lowest service level.

D. Equipment Access: Fabricate chutes with access for maintaining equipment located within the chute, such as flushing and sanitizing units, fire sprinklers, and plumbing and electrical connections.

PART 3 - EXECUTION

3.1 INSTALLATION OF WASTE CHUTES

A. Install and test chutes before installing enclosing chase construction.

B. Install chutes according to NFPA 82 and manufacturer's written instructions. Assemble components with tight, nonleaking joints. Anchor chutes securely to supporting structure to withstand impacts and stresses. Install chute and components to maintain fire-resistive performance of chute and the enclosing chase construction.

C. Install chutes plumb, without obstructions that might prevent materials from free falling within chutes.

D. Anchor flanges of chute vents to roof curbs before installing roofing and flashing. Install chute-vent counterflashing after roofing and roof-penetration flashing are installed.

3.2 INSTALLATION OF WASTE DOORS

A. Intake and Discharge Doors: Interface door units with throat sections of chutes for safe, snag-resistant, sanitary depositing of materials in chutes.

1. Interconnect sanitizer control with door interlock system.

B. Electrical Interlock System: Install according to applicable NECA 1 recommendations.

3.3 FIELD QUALITY CONTROL

A. Test chute components after installation.

1. Operate doors, locks, and interlock systems to demonstrate that hardware operates properly and smoothly and electrical wiring is connected correctly.
2. Complete test operations before installing chase enclosures.

B. Test heat- and smoke-sensing devices for proper operation.

C. Inspections:

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1. Fire-rated door inspections: Inspect each fire-rated door according to NFPA 80, section 5.2
2. Repair or remove and replace door installations where inspections indicate that they do not comply with specified requirements.
3. Reinspect repaired or replaced doors to determine if replaced or repaired door installations comply with specified requirements.
4. Prepare and submit separate inspection report for each fire-rated door indicating compliance with each item listed in NFPA 80 and NFPA 101.

D. Plumbing Access Doors: After construction of chase enclosure, verify that access doors have been correctly located and properly installed for their purpose.

3.4 ADJUSTING

A. Adjust doors for smooth and balanced movement.

B. Operate sanitizing unit through one complete cycle of chute use and cleanup, and replenish chemicals or cleaning fluids in unit containers.

3.5 CLEANING

A. After completing chase enclosure, clean exposed surfaces of chute system's components. Do not remove labels of testing and inspecting agencies.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain each chute and related equipment.

B. Demonstrate replenishment of sanitizing-unit chemicals or cleaning fluids.

3.7 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of chute Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper chute operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.

END OF SECTION 14 91 82

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SECTION 22 01 00 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Plumbing systems.

1.2 RELATED WORK

A. Requirements of: "General Conditions for the Contract" and architect's section. When referencing the specifications, the words 'division' and 'section' are interchangeable.

B. Requirements of other sections or divisions as relates to: products installed but not furnished; or products furnished but not installed under this division.

C. Requirements of other sections or divisions as relates to coordination of work.

1.3 CODES AND STANDARDS

A. Comply with the current edition of the following codes, in force by law, including all amendments and referenced codes and regulations: the 2021 Virginia Uniform Statewide Building Code; the National Fire Codes; local building ordinances; and the rules and regulations of the building Owner for work on site. The International Plumbing Code 2021.

B. Exceed minimum recommendations of: NSF, ASPE, ASHRAE, and SMACNA.

C. Comply with applicable requirements of the Owner for New Construction and Renovation.

D. Comply with Enterprise Green Communities, universal design, and Virginia housing and guidelines and standards as provided in the constitution documents.

E. Comply with, Energy Star, and Zero Energy Ready Home standards.

1.4 SHOP DRAWINGS AND PRODUCT DATA

A. Submit shop drawings and/or product data on all manufactured equipment and materials specified or referenced in this Division and on the associated drawings.

B. Submit shop drawings and product data electronically in PDF format in accordance with requirements in architect's division and as required herein.

C. Shop drawings and product data shall include:

1. Clear identification of manufacturer and all submitted items.
2. Manufacturer's catalog literature.
3. Manufacturer's installation instructions.
4. Specific performance characteristics.
5. Specific dimensional data.
6. Specific electrical characteristics.

D. Refer to individual specification sections for additional requirements on specific items.

1.5 OPERATING AND MAINTENANCE DATA

A. Upon substantial completion of the contract, provide the owner with a complete set of manufacturer's operating, maintenance, and preventive maintenance instructions, parts, lists and complete procurement information, including equipment numbers and descriptions for all equipment installed on the project. The required information shall include energy ratings as needed for future conservation calculations.

B. Submit in accordance with requirements in architect's division and as required herein.

C. Provide at the time of substantial completion and prior to final inspection.

D. The manual shall be in a three-ring binder, tabbed by specification section.

E. Operating and maintenance data for each section shall include:

1. Summary list of equipment and materials used on project.

a. Indicate name, model number, serial number, and name plate data for each.
b. Manufacturer's complete catalog information for each.
c. Manufacturer’s complete installation instructions for each.

2. List of mechanical equipment requiring lubrication.

a. Indicate name of equipment, location, and type and frequency of lubrication.

3. Manufacturer's maintenance instructions for each piece of equipment.

a. Include name of vendor, installation instructions, parts numbers and lists, operation instructions, and maintenance and lubrication instructions.

4. Warranty certificates for each item clearly indicate expiration date (including any specified extended warranties) on each certificate.

F. Refer to individual specification sections for additional requirements on specific items.

G. Operating staff persons shall be provided with written instructions for the proper operations of systems and equipment.

1.6 WARRANTIES

A. Refer to architect’s division for general project guaranties.

B. Guarantee mechanical systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.

C. The beginning of the specified time frame for warranties for equipment and materials specified under this Division shall coincide with the beginning of the general warranty for the project specified in the architect’s division.

D. Refer to other Sections for requirements for specific equipment.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Provide new materials and equipment unless otherwise noted.

B. Adhesives, sealants, paint, and sealant primers are to be made with low emitting VOC materials. Provide shop drawings of all such materials used on the project clearly indicating their VOC limits.

C. Furnish (including freight and unloading) and install unless otherwise noted.

D. Store materials and equipment on site and protect from the weather.

E. Access panels shall be:

1. Suitable for the wall or ceiling type installed in.
2. 14 gauge cold rolled steel, galvanized and bonderized.
3. With metal frame, butt hinges and screw operated cam type latch.
4. Finish selected by the Architect.
5. Cesco Model W or approved equal.

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2.2 SUBSTITUTIONS

A. Equipment and materials used on the project shall be those specified as basis of design.

B. Acceptable alternate manufacturers are listed.

1. Equivalent products by these manufacturers may be substituted.
2. Contractor is responsible for guaranteeing 'equivalence.'

C. Contractor must make a written request to the Architect, for approval to substitute materials or equipment by manufacturers not listed, at least five working days prior to bidding date.

PART 3 - EXECUTION

3.1 DRAWINGS

A. Plumbing drawings indicate general arrangement of pipe, equipment, etc.

1. Follow as closely as possible in actual building construction.
2. Coordinate with other trades.

B. Consider the Architectural, Structural, Mechanical, and Electrical drawings part of this work insofar as these drawings furnish information relating to design and construction of this building.

C. Due to the small scale of the drawings, all offsets, fittings and accessories required are not shown.

1. Provide offsets, fittings, and accessories not shown but required to complete installation at no additional cost to the Owner.

D. In case of conflict between Specifications and plumbing drawings, contact the Architect for directions as to which to follow before proceeding.

1. Notify Architect of any change in Contract Cost required to complete work each way.
2. Contractor is responsible for costs resulting from proceeding without direction or clarification from Architect.

3.2 COORDINATION

A. Coordinate installation of work under this Division with work installed under other Divisions.

B. Notify Architect immediately of conflicts or deficiencies.

C. Do not proceed until unsatisfactory conditions have been resolved.

D. Coordinate with Architect before disconnecting utilities to equipment to remain in use.

E. Provide access panels to allow service access to equipment and valves located above inaccessible ceilings. Install panels to allow proper service access to devices.

3.3 PROJECT CLOSEOUT

A. Equipment nameplates and applicable UL and AGA labels shall be in place when the Project is turned over to the Owner.

B. Repair damaged and defective equipment and materials.

1. Replace items that cannot be properly repaired.

C. Clean exposed and semi-exposed surfaces of equipment and materials.

1. Touch-up shop-applied finishes to restore damaged or soiled areas.

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3.4 TRAINING

A. Instruct Owner's representative in operation and maintenance of mechanical systems utilizing Operation and Maintenance Manual.

B. Minimum instruction period shall be:

1. Plumbing systems - three hours.

C. The instruction period shall occur after substantial completion of Plumbing systems and prior to completion of project.

D. Coordinate with the Architect and Owner.

END OF SECTION 22 01 00

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SECTION 22 05 00 – PIPES & PIPE FITTINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Piping materials

B. Pipe fittings

C. General piping installation procedures

PART 2 - PRODUCTS

2.1 PIPING

A. Refer to other sections of this Division for types of piping to be used for various piping systems.

B. Piping materials shall conform to the standards listed in the current International Plumbing Code, the International Mechanical Code, and comply with the requirements of the owner.

C. Do not run plastic piping in ceiling plenum spaces, which occur above the Lab areas.

2.2 FITTINGS

A. Same type and class of material as pipe, or of material having equal or superior physical and chemical properties.

B. Thread lubricant shall be teflon tape or pipe dope, low VOC type.

C. Cement for solvent weld shall be type recommended by pipe manufacturer, low VOC type.

2.3 UNIONS

A. Rated to 250 psi at 180°F, bronze.

B. Watts No. 3200

PART 3 - EXECUTION

3.1 GENERAL

A. Fabricate and install piping systems in accordance with requirements in other sections and with materials suitable for the intended fluid and operating temperatures.

3.2 PIPING SLEEVES

A. Provide sleeves for piping penetrating walls and floors as follows:

1. Use cast iron sleeves for piping passing through footings and foundation walls.
2. Use 14 ga. galvanized steel sleeves for piping passing through walls and floors above grade.
3. Extend sleeves to 2 inches above floors subject to wetting.
4. Run insulation continuously through sleeves.
5. Grout in solid around sleeves.
6. Firestop between piping and sleeve passing through fire rated walls, ceilings and floors with UL Listed firestop material or equipment - refer to diagrams on the drawings.

3.3 CUTTING AND PATCHING

A. Keep to a minimum.

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B. When required, do cutting as required by the tradesperson responsible for construction of wall or floor being cut.

C. Patching and finish repairs are to be done by trade responsible for wall or floor surface being patched.

3.4 PIPING INSTALLATION

A. Run vertical risers square and plumb.

B. Make connections of dissimilar metals with insulating couplings.

C. When metallic piping is in contact with a material or atmosphere exerting a corrosive action, piping and fittings shall be coated with a corrosion-resistant material.

D. Welding shall be done by experienced, certified welders.

E. Provide chrome plated escutcheon for exposed piping penetrating a finished surface.

F. Secure escutcheon to finished surface with silicone caulking.

3.5 Do not run plastic piping in supply or return air plenums (Call Center raised floor areas).

3.6 PROJECT CLOSEOUT

A. Remove mud, dust, dirt and flux from piping.

B. Flush and chemically clean piping systems as specified in specific section pertaining to that system.

C. Pressure test piping systems in accordance with requirements in individual sections.

1. Notify Architect 72 hours prior to conducting tests.
2. Remove pressure sensitive devices prior to conducting tests.

END OF SECTION 22 05 00

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SECTION 22 05 19 – PIPING SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Back-flow prevention devices

B. Air Vents

C. Temperature gauges

D. Pressure gauges

PART 2 - PRODUCTS

2.1 BACK-FLOW PREVENTION DEVICES

A. Domestic water: Reduced pressure type, with inlet strainer, sized to fit pipe, UL and ASSE 1013 approved, bronze with strainer. Devices to be suitable for potable water and as approved by the local code official. Provide the BFP device testing as required by the local code authorities.

B. Watts No. 909S or equal with air gap

2.2 AUTOMATIC AIR VENT

A. 240°F, non-metallic float, stamped brass body, suitable for potable water.

1. Branch lines - rated to 30 psi.
2. Hoffman, Watts

2.3 MANUAL AIR VENT

A. Rated to 50 psi., 240°F, disc-type vent, built-in check valve, 1/8" straight shank connection, suitable for potable water.

B. Hoffman

2.4 TEMPERATURE GAUGES

A. Red reading type, glass fronts, 9-inch scales, cast aluminum case, adjustable angle with socket, 40°F to 220°F range, suitable for potable water.

B. Trerice, Weksler, Dwyer

2.5 PRESSURE GAUGES

A. 4.5-inch diameter case, bronze tubes, bronze movements, white dial, black micrometer, adjustable pointers, and 0-100 psi range, suitable for potable water.

B. Provide cock and equalizing tube.

C. Trerice, Weksler, Dwyer

PART 3 - EXECUTION

3.1 BACKFLOW PREVENTERS

A. Install water line feeds to the ice makers, coffee makers, tea makers, etc., and at water service as indicated on the drawings.

B. Install to allow service access.

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C. Connect drain line from main water service backflow preventer air gap and extend to floor drain.

3.2 AUTO AIR VENTS

A. Provide at high points in domestic hot water return piping.

B. Provide 2" nipple at vent location on main piping and install vent.

C. Provide 1/8" copper or nylon tubing off vent discharge connection and extend to floor drain.

3.3 STRAINERS

A. Provide at locations indicated on the drawings.

B. Locate strainers so cleanout plug is accessible.

C. Clean strainers after 24 hours and 30 days of operation.

3.4 TEMPERATURE GAUGES

A. Provide hot water at water heater.

B. Provides immersion well for sensor probes.

3.5 PRESSURE GAUGES

A. Provide at regulating valve on supply side of water service.

B. Provide needle valve for pressure gauge.

END OF SECTION 22 05 19

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SECTION 22 05 23 – VALVES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Equipment shutoff

B. Pressure regulating

C. Check

D. Balancing and service

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Valves of the same type provided for the project shall be by a single manufacturer.

2.2 EQUIPMENT SHUTOFF

A. Gate valves

1. 150 lb. swp., block pattern, union bonnet, solid wedge
2. Bronze on potable water and iron on other
3. Nibco No.*-134

B. Ball Valves

1. 150 lb., full port, bronze, blowout proof stem, teflon seat
2. Nibco No. *-585-70

2.3 CHECK VALVES

A. Inline lift type, teflon seat, spring actuated, bronze body, 150 psi, 150°F

B. Suitable for horizontal or vertical installation

C. Nibco, Conbraco, Watts

2.4 SERVICE:

A. Hose end drain valve, 3/4" copper to hose type, with vacuum breaker. Nibco No. 72.

2.5 PRESSURE REGULATING VALVES

A. Water service

1. Union inlet connections, integral stainless-steel strainer, rated to 300 psi, reduced pressure range of 25 to 75 lbs., with built-in thermal bypass and bronze body.
2. Watts U5B or equal

B. Gas pressure regulating valve.

1. Rated for 15 psi maximum gas pressure, 2 psi operating pressure, straight thru flow, non-lockup type, high pressure cast aluminum housing, vent connection.
2. Provide vent limiting device in accordance with local gas utility recommendations, or vent regulator to exterior as per manufacturer's recommendations.
3. Maxitrol RV series.

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2.6 SAFETY RELIEF

A. ASME P&T relief valve

1. Fully automatic, bronze body, 250 MBH rating
2. Watts 40 XL

B. Vacuum relief valve

1. Watts No. 36

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide valves in piping systems as follows:

1. Equipment shut-off: gate or ball.
2. Pressure regulating at water service, set to pressure designated by Owner's representative, and at gas appliances per the riser diagram.
3. Gas shut-off: gas cock.
4. Pump discharge: check.
5. Water heaters: safety relief valve.
6. Wall hydrants and hose bibbs: vacuum breaker.

3.2 INSTALLATION

A. Install valves as follows:

1. With stems upright and with clearance for handle.
2. Dismantle if required to prevent overheating seals and packing during installation.

B. Provide valve tags with identification. Provide framed glass cover valve chart in maintenance office.

3.3 PROJECT CLOSEOUT

A. Clean bodies with liquid detergent.

END OF SECTION 22 05 23

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SECTION 22 05 29 – PIPE SUPPORTS & ANCHORS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Hangers and Clamps

PART 2 - PRODUCTS

2.1 PIPE HANGERS

A. Standard Clevis hanger, steel, plain finish. B-Line Figure B3100.

B. Hangers for uninsulated copper pipes shall be copper plated or plastic covered.

2.2 PIPE CLAMPS

A. Short pipe strap, steel, plain finish. B-Line Figure B3180.

B. Clamps for uninsulated copper pipes shall be copper plated or plastic covered.

PART 3 - EXECUTION

3.1 PREPARATION

A. Metal piping - support rod sizes for hangers and maximum spacing for hangers and clamps

1. Pipes up to 1" - 3/8" rods, 6 feet on center
2. Pipes 1.25” to 2" - 3/8" rods, 8 feet on center
3. Pipes 2.5” to 3.5" - 1/2" rods, 10 feet on center
4. Pipes 4” to 5" - 5/8" rods, 10 feet on center
5. Pipes 6"+ - 3/4" rods, 10 feet on center

B. Plastic piping

1. Support rod sizes for hangers - same as for metal piping.
2. Maximum spacing for hangers and clamps - 4 feet on center.

C. Support vertical runs of piping with clamps at maximum six-foot intervals.

D. Size hangers and clamps for insulated pipe to surround insulation.

E. Size riser clamps to pipe size.

3.2 INSTALLATION

A. Secure clamps to structure. Provide at floors on pipe risers.

B. Make adequate provisions for expansion, contraction, slope, and anchorage.

C. Do not lay or support piping on any building member.

D. Provide galvanized steel insulation shields at hangers and clamps for insulated pipe.

E. Support vertical runs with hangers at top of risers.

3.3 PROJECT CLOSEOUT

A. Make sure hangers are supporting the pipe and not loose.

END OF SECTION 22 05 29

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SECTION 22 05 53 – PLUMBING IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Piping painting and labels

B. Valve tags

C. Equipment tags

PART 2 - PRODUCTS

2.1 PIPING LABELS

A. Factory made, self-adhering markers, pressure sensitive style, vinyl.

B. Except as otherwise specified, colors shall conform with ANSI and OSHA Standards.

C. Pipe marker legends and background colors shall conform with Owner's existing standards.

D. Legend sizes for bare or insulated pipe shall be as follows:

1. for pipes smaller than 1" - 5/16" high.
2. for pipes 1" to 3" - 1" high.
3. for pipes 3" and larger - 2" high.

E. Seton Name Plate Corp.

2.2 VALVE TAGS

A. 1.5" round, 19-gauge brass tags

B. 1/4" legend text over 1/2" number, black filled

C. No. 16 brass jack chain and S-hook

D. Seton Name Plate Corp

2.3 EQUIPMENT TAGS

A. Engraved plates: black formica with white reveal on engraving

B. Minimum text height - 1/8"

C. Seton Name Plate Corp

PART 3 - EXECUTION

3.1 PIPING SYSTEMS

A. Label new piping as indicated herein.

B. Identify piping and gauges with color codes and permanent labels.

1. Provide labels at major branches, wall penetrations, in mechanical rooms, at changes in direction and at 20-foot intervals.
2. Provide direction of flow arrow at each label.

C. Color code piping systems as follows:

1. Domestic cold water - Blue stripe
2. Domestic hot water - Red stripe

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3. Domestic hot water return - Orange stripe
4. Storm - Green band

3.2 VALVE TAGS

A. Provide engraved brass or laminated valve tag with valve number and valve service for each valve.

B. Provide valve chart in frame identifying valves by number location and use.

3.3 EQUIPMENT TAGS

A. Provide tags for each piece of major equipment.

B. Install tags on equipment at a readily visible location.

C. Secure to unit with stainless, sheet metal screws.

D. Tags shall indicate equipment mark (i.e.: water heater), and warranty expiration date for each.

END OF SECTION 22 05 53

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SECTION 22 07 00 – INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe insulation

B. Lavatory supply & waste insulation

1.2 QUALITY ASSURANCE

A. The installer for the insulation systems shall have been engaged in the installation of insulation for similar type projects for at least five years.

B. Insulation shall meet or exceed minimum fire ratings and be rated for use in ceiling return air plenums as applicable.

PART 2 - PRODUCTS

2.1 PIPE INSULATION

A. Fiberglass with all-service jacket, vapor barrier and self-sealing lap.

1. Certainteed, Mansville, Knauf

B. Elastomeric: closed cellular, preslit rubber tubes.

1. Armstrong

C. Elbow covers - prefabricated fittings, plenum rated as required.

1. Certainteed, Knauf, Mansville

2.2 LAVATORY SUPPLY AND WASTE INSULATION

A. Molded closed cellular vinyl

B. Truebro Inc. Model #102W

PART 3 - EXECUTION

3.1 PIPE INSULATION

A. Type and size of insulation shall be as follows:

1. Domestic CW piping - ½" fiberglass up to 1.25" diameter. 1" thick for pipe sizes 1.5" and up.
2. Domestic HW piping - 1" thick fiberglass.
3. Interior horizontal condensate drain - ½" closed cell rubber or fiberglass.
4. Interior Storm - insulate horizontal and 10ft of vertical piping with 1" fiberglass with ASJ jacket. Insulate roof drain sumps with 1” fiber with ASJ jacket.
5. Underslab domestic water – ¾” thick closed cell.

3.2 General

1. Insulate piping, valves, tees, and fittings.
2. Secure insulation with adhesive and seal joints with sealant.
3. Do not compress insulation or use tape or plastic ties.
4. Insulation shall be continuous through walls, sleeves, hangers and supports.

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5. Provide 16 gage x 10" long galvanized steel shield at piping supports to minimize compression of insulation.
6. Install pre-fitted plastic elbows and tees or apply canvas jacket in three layers at elbows.
7. Do not puncture vapor barrier on cold piping insulation.
8. If the support penetrates vapor barrier, insulate support and seal to pipe insulation.

B. Project closeout

1. Clean dirt, dust and debris from insulation surfaces.
2. Repair defects in insulation surface or jacket.
3. Label pipe insulation as designated in Section 22 05 53.

C. Lavatory supply and waste insulation

1. Insulate waste piping and water supply lines beneath handicapped lavatories and sinks.

END OF SECTION 22 07 00

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SECTION 22 10 00 – PLUMBING PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Domestic water system

B. Sanitary waste & vent system

C. Storm system

PART 2 - PRODUCTS

2.1 DOMESTIC WATER

A. PEX SDR 9 or CPVC SDR 13.5.

B. Underslab – PEX with no joints.

2.2 SANITARY DRAINAGE

A. Schedule 40 Solid Wall PVC with solvent weld fittings. Schedule 40 PVC to be solid core type. No cellular core pipe is permitted. No substitutions for cellular core pipe to be made.

2.3 STORM

A. Schedule 40 Solid Wall PVC with solvent weld fittings. No cellular core pipe is permitted. No substitutions for cellular core pipe to be made.

2.4 SANITARY VENT

A. Schedule 40 PVC with solvent weld fittings. No cellular core pipe is permitted. No substitutions for cellular core pipe to be made.

2.5 Gas

A. Schedule 40 Black Steel.

PART 3 - EXECUTION

3.1 PREPARATION

A. Field verify suitability of inverts and exact location of piping at suggested points of connection prior to rough-in of work.

3.2 INSTALLATION

A. Install piping as high as possible and maintain the required slope. Coordinate work with other trades.

B. Do not use plastic piping in return air plenums.

C. Firestop pipe penetrations through fire rated construction per UL requirements.

D. Paint exterior gas piping with two coats yellow enamel with rust inhibitor.

E. Provide dirt leg, regulator, union and shut off valve at equipment connections.

F. Insulate and identify piping per specifications.

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3.3 TESTING & CLEANING

A. Water pipe testing – Test at pressure not less than working pressure of the system. Maintain such pressure for minimum of 1 hour.

B. Sanitary, Storm & Vent pipe testing – With 10 ft of head of water. Maintain such pressure for minimum of 1 hour.

C. Flush water piping with potable water.

D. Tests shall show no substantial loss in pressure.

E. Piping run in concealed areas shall be leak tested prior to being concealed.

F. Sterilize domestic water piping in accordance with the Virginia State Board of Health.

1. Submit water samples for testing as required.

END OF SECTION 22 10 00

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SECTION 22 40 00 – PLUMBING FIXTURES, SPECIALTIES, & EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Plumbing fixtures

B. Fixture supports

C. Plumbing appliances

D. Plumbing equipment

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES, SUPPORTS, APPLIANCES, AND EQUIPMENT

A. Shall be as specified on the drawings.

2.2 SUPPLY STOPS

A. Chrome plated brass, quarter turn

2.3 TRAPS

A. Chrome plated brass, 17-gauge, p-trap with cleanout plug

PART 3 - EXECUTION

3.1 ROUGH-IN INSTALLATION

A. Refer to Section 22 10 00 for installation requirements of piping systems.

B. Verify exact location of fixtures and drains prior to rough-in.

3.2 FIXTURE INSTALLATION

A. Install handicapped fixtures as per ADA.

B. Provide chrome plated, 1/4 turn stops for fixtures.

C. Provide chrome plated nipples from piping in wall to stops where exposed.

D. Exposed water piping below lavatories to be chrome plated.

E. Provide bolt caps for water closets and urinals.

F. Provide chrome plated tailpiece and trap with cleanout for lavatories and sinks.

1. Provide grid strainer for lavatories.
2. Provide removable basket strainer for sinks.

G. Mount plugged outlets and wall cleanouts at 18" above finished floor.

H. Mount hose bibbs and wall hydrants at 36" above finished grade.

I. Install cleanout to grade in accordance with detail on drawings.

J. Water heater installation:

1. Provide shut-off valves and unions on hot and cold piping.
2. Install the expansion tank.
3. Set tank type water heaters in overflow pan.

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3.3 PROJECT CLOSEOUT

A. Caulk joints between fixtures and finished surfaces with clear, silicone caulk.

B. Clean dirt and debris from appliances, fixtures and equipment.

C. Polish chrome finish at completion of project.

END OF SECTION 22 40 00

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SECTION 23 01 00 – COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Heating, ventilating, and air conditioning systems.

1.2 RELATED WORK

A. Requirements of: “General Conditions for the Contract” and "Architect’s division". When referencing the specifications, the words ‘division’ and ‘section’ are interchangeable.

B. Requirements of other sections or divisions as relates to: products installed but not furnished; or, products furnished but not installed under this division.

C. Requirements of other sections or divisions as relates to: coordination of work.

1.3 CODES AND STANDARDS

A. Comply with the current edition of the following codes, in force by law, including all amendments and referenced codes and regulations: the 2021 Virginia Uniform Statewide Building Code; the National Fire Codes; local building ordinances; and the rules and regulations of the building Owner for work on site.

B. Exceed minimum recommendations of: NSF, ASPE, ASHRAE, and SMACNA.

C. Comply with applicable requirements of the Owner for New Construction and Renovation.

D. Comply with Enterprise Green Communities, universal design, and Virginia housing and guidelines and standards as provided in the constitution documents.

E. Comply with, Energy Star, and Zero Energy Ready Home standards.

1.4 SHOP DRAWINGS AND PRODUCT DATA

A. Submit shop drawings and/or product data on all manufactured equipment and materials specified or referenced in this Division and on the associated drawings.

B. Submit shop drawings and product data electronically in PDF format in accordance with

C. Shop drawings and product data shall include:

1. Clear identification of manufacturer and all submitted items.
2. Manufacturer’s catalog literature.
3. Manufacturer's installation instructions.
4. Specific performance characteristics.
5. Specific dimensional data.
6. Specific electrical characteristics.

D. Refer to individual specification sections for additional requirements on specific items.

1.5 OPERATING AND MAINTENANCE DATA

A. Upon substantial completion of the contract, provide the owner with a complete set of manufacturer’s operating, maintenance, and preventive maintenance instructions, parts, lists and complete procurement information, including equipment numbers and descriptions for all equipment installed on the project. Required information shall include energy ratings as needed for future conservation calculations.

B. Submit in accordance with requirements of the architectural and as required herein.

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C. Provide at time of substantial completion and prior to final inspection.

D. Manual shall be in a three ring binder, tabbed by specification section.

E. Operating and maintenance data for each section shall include:

1. Summary list of equipment and materials used on project.

a. Indicate name, model number, serial number, and name plate data for each.
b. Manufacturer's complete catalog information for each.
c. Manufacturer’s complete installation instructions for each.

2. List of mechanical equipment requiring lubrication.

a. Indicate name of equipment, location, and type and frequency of lubrication.

3. Manufacturer's maintenance instructions for each piece of equipment.

a. Include name of vendor, installation instructions, parts numbers and lists, operation instructions, and maintenance and lubrication instructions.

4. Warranty certificates for each item clearly indicating expiration date (including any specified extended warranties) on each certificate.

F. Refer to individual specification sections for additional requirements on specific items.

G. Operating staff persons shall be provided with written instructions for the proper operations of systems and equipment.

1.6 WARRANTIES

A. Refer to architectural sections for general project guaranties.

B. Guarantee mechanical systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents. This includes offsets in the ductwork as noted on the plans.

C. The beginning of the specified time frame for warranties for equipment and materials specified under this section, shall coincide with the beginning of the general warranty for the project specified in architectural sections.

D. Refer to other Sections for requirements for specific equipment.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Provide new materials and equipment unless otherwise noted.

B. Adhesives, sealants, paint, and sealant primers are to be made with low emitting VOC materials. Provide shop drawings of all such materials used on the project clearly indicating their VOC limits.

C. Furnish (including freight and unloading) and install unless otherwise noted.

D. Store materials and equipment on site and protect from weather.

E. Access panels shall be:

1. suitable for the wall or ceiling type installed in
2. 14 gauge cold rolled steel, galvanized and bonderized
3. with metal frame, butt hinges and screw operated cam type latch
4. finish selected by the Architect
5. Cesco Model W or approved equal

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2.2 SUBSTITUTIONS

A. Equipment and materials used on project shall be those specified as basis of design.

B. Acceptable alternate manufacturer's are listed.

1. Equivalent products by these manufacturer's may be substituted.
2. Contractor is responsible for guaranteeing `equivalence'.

C. Contractor must make a written request to the Architect, for approval to substitute materials or equipment by manufacturers not listed, at least five working days prior to bidding date.

PART 3 - EXECUTION

3.1 DRAWINGS

A. Mechanical drawings indicate general arrangement of pipe, equipment, ducts, etc.

1. Follow as closely as possible in actual building construction.
2. Coordinate with other trades.
3. Modify sizes of ductwork as required due to interference with the building structure or other trades, at no additional cost to the Owner. Maintain equivalent free area dimensions.

B. Consider the Architectural, Structural, Plumbing, and Electrical drawings part of this work insofar as these drawings furnish information relating to design and construction of this building.

C. Due to the small scale of the drawings, all offsets, fittings and accessories required are not shown.

1. Provide offsets, fittings, and accessories not shown but required to complete installation at no additional cost to the Owner.

D. In case of conflict between Specifications and Mechanical drawings, contact the Architect for direction as to which to follow before proceeding.

1. Notify Architect of any change in Contract Cost required to complete work each way.
2. Contractor is responsible for costs resulting from proceeding without direction or clarification from Architect.

3.2 COORDINATION

A. Coordinate installation of work under this Division with work installed under other Divisions.

B. Notify Architect immediately of conflicts or deficiencies.

1. Do not proceed until unsatisfactory conditions have been resolved.

C. Coordinate with Architect before disconnecting utilities to equipment to remain in use.

1. Provide access panels to allow service access to equipment, dampers and valving located above inaccessible ceilings. Install panels to allow proper service access to devices.

3.3 PROJECT CLOSEOUT

A. Motor and equipment nameplates and applicable UL and AGA labels shall be in place when Project is turned over to the Owner.

B. Repair damaged and defective equipment and materials.

1. Replace items that cannot be properly repaired.

C. Clean exposed and semi-exposed surfaces of equipment and materials.

1. Touch-up shop-applied finishes to restore damaged or soiled areas.

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3.4 TRAINING

A. Instruct Owner's representative in operation and maintenance of mechanical systems utilizing Operation and Maintenance Manual.

B. Minimum instruction period shall be:

1. HVAC Equipment - four hours.
2. Controls - two hours.

C. Instruction period shall occur after substantial completion of Mechanical systems and prior to completion of project.

D. Coordinate with the Architect and Owner.

END OF SECTION 26 00 0

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SECTION 23 05 48 – NOISE & VIBRATION CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Noise Control:

1. Offsets in branch ductwork.
2. Acoustical duct lining.

B. Vibration Control:

1. Flexible duct connectors.
2. Spring type vibration isolators.

PART 2 - PRODUCTS

2.1 OFFSETS IN BRANCH DUCTWORK

A. Provide offsets in branch ductwork as shown on plans to minimize noise transfer.

B. When branch duct connections are taken off the main trunk ducts, provide offsets at the connections as shown on the plan.

2.2 DUCT LINER

A. Material - long glass fibers bound with thermosetting resin with black airstream coating.

B. Density - 2 lb.; Absolute roughness factor - 0.004.

C. Adhesive - ASC-A-7001A-1971 approved.

D. Mechanical fasteners - SMACNA MF-1-1971.

E. Design based on Certainteed Ultralite Type 200.

2.3 FLEXIBLE DUCT CONNECTORS

A. 3" wide, fiberglass reinforced, neoprene band, bound to galvanized sheet metal flange.

B. Duro-Dyne.

2.4 FLEXIBLE REFRIGERANT PIPING CONNECTORS

A. Core - Bronze, close pitch annular; Hose braid - Braided bronze; Ends - Copper sweat; Working pressure - 300 PSIG.

B. Mason Industries Type BBF

2.5 VIBRATION ISOLATORS

A. TYPE D - hanger type, spring type isolator.

1. Laterally stable with housing.
2. Spring shall be sized based on weight of equipment, min. 1/2" deflection, 30 degree rod swing angle.
3. Design based on Mason Type 30N.

B. TYPE A - ribbed neoprene pad.

1. Overall thickness 1", rated 50 psi.
2. B-Line Part No. NNP-9.

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C. TYPE B - free standing, spring type isolator.

1. Laterally stable without housing.
2. Baseplate to have 1/4" neoprene, acoustical, friction pad on underside and bolt holes for securing baseplate to the supporting structure, and bolt to secure equipment.
3. Devices installed outdoors to be weatherproof construction.
4. Design based on Mason Type SLFH.

PART 3 - EXECUTION

3.1 OFFSET IN BRANCH DUCTWORK

A. Install as shown on the drawings to minimize noise transfer thru the duct system.

3.2 DUCT LINER

A. Line heating and air conditioning return air rectangular trunk ducts within 20 feet of the ducted air handling units.

1. Thickness - 1/2".
2. Duct sizes shown on drawings are inside sheet metal dimensions, enlarge duct to maintain inside free areas.

B. Do not line exhaust, supply and outside air intake ducts.

C. Install in accordance with SMACNA duct liner application standards and as follows:

1. Cut and thoroughly coat edges with adhesive.
2. Butt joints tightly.
3. Top and bottom sections shall overlap side sections.
4. Secure to clean ductwork with adhesive at 90 percent coverage.
5. Additionally secure with mechanical fasteners installed as follows:
    a. Transversely (across duct) - 3" from corners and at intervals not exceeding 12" on center.
    b. Longitudinally (along duct) - 3" from transverse joints and at intervals not exceeding 18" on center.
    c. Ducts less than 8" in interior width do not require fasteners.
6. Keep liner clean and free from dust. Repair tears with mastic.

3.3 VIBRATION ISOLATORS

A. Install horizontal ducted fan coil units with Type D isolation.

1. Size isolators in accordance with the weight distribution of equipment and manufacturer's recommendations to produce uniform deflection.

B. Install upflow ducted fan coil units/AHU’s on Type A isolation.

C. Install outdoor heat pump units (condensing units) on roof on Type B isolation.

D. Remove shipping blocking and screws from isolation devices at time of install.

3.4 FLEXIBLE DUCT CONNECTORS

A. Provide flexible duct connections at:

1. Fans over ¼ hp.
2. Ducted fan coil units/AHU’s.
3. Roof Top units.
4. Make-up air units.

B. Maintain 2" minimum clearance between the adjacent galvanized sheet metal ducts.

C. Install to minimize air leakage.

D. Support ductwork within 12" of flexible duct connection. Flexible duct connections shall not support ductwork.

END OF SECTION 23 05 48

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SECTION 23 05 53 – MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Piping painting and labels

B. Valve tags

C. Equipment tags

PART 2 - PRODUCTS

2.1 PIPING LABELS

A. Factory made, self adhering markers, pressure sensitive style, vinyl.

B. Except as otherwise specified, colors shall conform with ANSI and OSHA Standards.

C. Pipe marker legends and background colors shall conform with Owner's existing standards.

D. Legend sizes for bare or insulated pipe shall be as follows:

1. For pipes smaller than 1" - 5/16" high
2. For pipes 1" to 3" - 1" high
3. For pipes 3" and larger - 2" high

E. Seton Name Plate Corp., Opti-Code Inc or W.H. Brady Co.

2.2 VALVE TAGS

A. 1.5" round, 19 gauge brass tags.

B. 1/4" legend text over 1/2" number, black filled.

C. No. 16 brass jack chain and S-hook.

D. Seton Name Plate Corp., Opti-Code Inc or W.H. Brady Co.

2.3 EQUIPMENT TAGS

A. Engraved plates: black formica with white reveal on engraving. Minimum text height - 1/8".

B. Seton Name Plate Corp., Opti-Code Inc or W.H. Brady Co.

2.4 DUCT LABELS

A. Factory made, self adhering markers, pressure sensitive style, vinyl.

B. Except as otherwise specified, colors shall conform with ANSI and OSHA Standards.

C. Legend sizes - 1/2".

D. Seton Name Plate Corp., Opti-Code Inc or W.H. Brady Co.

PART 3 - EXECUTION

3.1 EQUIPMENT TAGS

A. Provide tags at each piece of major equipment.

B. Install on equipment at readily visible location.

C. Secure to unit with stainless, sheet metal screws.

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D. Tag shall indicate: equipment mark (ie: RTU-1, DOAS-2 etc); and warranty expiration date for each outdoor condensing unit and RTU.

3.2 DUCT LABELS

A. Provide label at each duct access door.

B. Label shall indicate device being accessed.

END OF SECTION 23 05 53

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SECTION 23 07 00 – HVAC INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Refrigerant pipe insulation

B. Condensate piping insulation

C. Duct insulation

1.2 QUALITY ASSURANCE

A. Installer for the insulation systems shall have been engaged in the installation of insulation for similar type projects for at least five years.

B. Insulation shall meet or exceed minimum fire ratings and be rated for use in ceiling return air plenums as applicable.

PART 2 - PRODUCTS

2.1 DUCT INSULATION

A. Refrigerant Piping:

1. Closed cellular rubber to code required thickness/ EarthCraft requirements.
2. Acceptable manufacturers: Certainteed, Johns-Manville, Knauf, Owens-Corning.

B. Condensate Piping:

1. Horizontal condensate drain - ½" thick fiberglass with ASJ.
2. Acceptable manufacturers: Certainteed, Johns-Manville, Knauf, Owens-Corning.

C. Duct wrap:

1. Fiberglass, with reinforced foil faced scrim Kraft facing with density of one lb/cu.ft.for ducts in attic only.
2. 3/8" thick foil faced air cell insulation for ducts with in the building envelope.
3. Acceptable manufacturers: Certainteed, Johns-Manville, Knauf, Owens-Corning or Reflectix.

D. Exterior duct insulation:

1. Two layers of 1” thick closed cell rubber insulation sheet, with top layer overlapping the sides. Mechanical fasten insulation at 18” centers. Provide an EPDM rubber jacket sealed weathertight over the insulation. Provide blocking on top of the duct to pitch insulation on top at 5%.

PART 3 - EXECUTION

3.1 DUCT INSULATION

A. Insulate heating, ventilating, and air conditioning ducts as follows:

1. Supply outside air and return air trunk ducts when installed inside building insulation envelope with foil faced air cell insulation, minimum R=6.0 installed.
2. Supply air, exhaust air and return air trunk ducts when installed outside the building insulation envelope with 3” thick fiberglass duct wrap or with 2 layers of foil faced air cell insulation, minimum R=8.0 installed.

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3. Secure insulation to ductwork with Foster adhesive at 50 percent coverage and with 3” wide SMACNA approved FSK tape.
4. In areas of limited ceiling space use the thinner air cell foil faced insulation.

B. Do not puncture vapor barrier.

C. Do not compress insulation except in areas of structural interference.

D. For rectangular ducts over 14" wide, fiberglass duct wrap shall be additionally secured to duct with mechanical fasteners and washers on 12" centers.

E. Penetrations through the facing shall be sealed with vapor barrier mastic.

F. Duct coverings shall not extend thru walls, floors or ceilings required to be firestopped.

G. Duct coverings shall not conceal any service opening unless a permanent label is affixed to insulation locating the exact position of the opening.

END OF SECTION 23 07 00

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SECTION 23 09 00 – CONTROLS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Electronic controls.

1.2 CONTROL DIAGRAMS

A. Diagrams on the drawings indicate schematic configuration of control systems only.

B. Provide accessories and auxiliary devices required (relays, switches, contacts, transformers, electric enclosure boxes, etc.) to operate system as specified herein and on the drawings.

PART 2 - PRODUCTS

2.1 TEMPERATURE, HUMIDITY AND AIR QUALITY SENSORS

A. Refer to Equipment List on drawings.

B. Provide wall mounted temp. and wall mounted humidity sensors for the DOAS make-up air units.

2.2 DAMPER OPERATORS

A. 24 VAC Motorized dampers:

1. Refer to Equipment List on the drawings.

2.3 CONTROL WIRING

A. Low voltage wiring shall be insulated and shielded as required by the equipment manufacturer, for the length of runs and anticipated electrical load on the wiring.

B. Route and label wiring in a neat and orderly manner.

C. Wiring run exposed in mechanical rooms shall be in conduit.

1. Comply with requirements of Division 26 for conduit work.

PART 3 - EXECUTION

3.1 INSTALLATION (GENERAL)

A. Comply with manufacturer's instructions for installation of materials and equipment. Install components to allow service access.

B. Mount room thermostats and air quality sensors at 48 inches above finished floor.

1. Thermostats to have lock-out dip switches to limit adjustment in the field.
2. Do not install in area of direct sunlight or direct diffuser airflow.

C. Do not install instrumentation when areas are under construction except for required rough-ins, taps, supports and test plugs.

D. Conductor drops in finished areas shall be run concealed. - comply with requirements set forth in Section 26.

E. Install damper actuators to allow proper operation. Actuators must be in the near vertical position - consult with manufacturer.

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F. The location of components shown on the drawings are approximate and are subject to such revisions as may be necessary or desirable at the time work is being installed at no additional cost to the Owner.

3.2 SEQUENCE OF CONTROL

A. The thermostat will index the occupied or unoccupied mode of operation according to a programmable time-of-day and day-of-week schedule.

B. On call for heat by the thermostat (temp. sensor), the AHU blower and heat pump compressor will be enabled and modulated. aux. electric strip heat to be enabled as applicable for other units.

C. On a call for cooling, the AHU unit blower and cool compressor will be enabled.

D. Float switch to disable applicable air handling unit/FCU unit in case of water in the overflow pan.

E. The room mounted CO2 sensor to open the respective motorized OA damper in case of high CO2 detected in the room or duct (1000 ppm adjustable).

F. On a call for de-humidification, the de-humidifier to enable the unit blower and dehumidifier.

3.3 PROJECT CLOSEOUT

A. Prior to final completion, demonstrate operation of control system to Owner's staff and provide complete operating and maintenance documentation.

B. Provide electronic copies in .pdf format of As-Built wiring diagrams detailing high and low voltage wiring, field and factory wiring.

END OF SECTION 23 09 00

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SECTION 23 22 00 – CONDENSATE PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Condensate drain

PART 2 - PRODUCTS

2.1 CONDENSATE DRAINS

A. Type L copper

B. Schedule 40 PVC

PART 3 - EXECUTION

3.1 PREPARATION

A. Field verify suitability of inverts and exact location of piping at suggested points of connection prior to rough-in of work.

3.2 INSTALLATION

A. Provide condensate drain piping for FC's, RTU, DOAS's and AHUs' evaporator coil and extend to the exterior or hub drain. Provide condensate pumps as required.

B. Install piping as high as possible and maintain required slope.

C. Do not use plastic piping in return air plenums.

3.3 TESTING & CLEANING

A. Leak test drainage, waste & vent piping systems with 10 foot water column for 6 hours.

END OF SECTION 23 22 00

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SECTION 23 23 00 – REFRIGERANT PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Piping

B. Piping specialties

PART 2 - PRODUCTS

2.1 PIPING

A. Domestic Type ARC copper with 5% silver brazing alloy.

2.2 FITTINGS

A. Wrought copper with long radius elbows.

2.3 SUCTION LINE TRAPS

A. Manufactured one-piece.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Slope suction lines down toward compressor at one inch per 10 feet.

B. Locate traps at vertical rises against flow.

C. Any piping which exceeds 30" horizontal exterior run support piping between building and outdoor units on a continuous, weather-resistant, welded steel, pipe rack. Clamp to rack at 18 inch intervals.

D. Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.

E. Install piping for the VRF (VRV) HVAC system in strict accordance with the manufacturer’s installation requirements.

F. Provide isolation valves at the refrigerant piping leaving the distribution boxes to each air handling unit or fan coil unit. Isolation valves to be accessible.

3.2 TESTING AND CHARGING

A. Leak test piping with freon and halide leak detector.

B. Charge piping per equipment manufacturer's recommendations.

END OF SECTION 23 23 00

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SECTION 23 30 00 – HVAC DISTRIBUTION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Ductwork

B. Duct hangers and supports

1.2 QUALITY ASSURANCE

A. Fabricate components of the hvac duct system (transitions, elbows, branch take-offs, etc.) per SMACNA recommendations for pressure classifications as follows:

1. Supply air ductwork - 2" wc.
2. Return and outside air ducts - 2" wc.

1.3 CODES AND STANDARDS

A. NFPA 90A - Air Conditioning and Ventilating Systems

B. SMACNA duct construction standards

PART 2 - PRODUCTS

2.1 GENERAL

A. Maximum angle of offsets, reductions or enlargements: 30 degrees.

2.2 FLEXIBLE PREINSULATED DUCTWORK (SUPPLY DUCTS ONLY)

A. Standard manufactured product of Flexmaster as follows:

1. Maximum length: 8 feet
2. Insulation: 1 lb/cu. ft. density - refer to insulation specifications for thickness requirements.
3. Vapor barrier: Fire retardant vinyl
4. Duct: Trilaminate foil and mechanical lock steel spiral (use of adhesives to secure duct to spiral is not allowed)
5. Construction Standards: U L 181 Class 1, NFPA 90A
6. Working Pressure: 6"
7. Connection to trunk duct: combination damper/extractor/spin-in w/ locking lever. Position locking lever on bottom of duct or at location to allow ease of balance. Duro-dyne.
8. Joint sealant: UL Listed Foster Mastic
9. Support: 1" wide bands @ 48" OC max.

2.3 ROUND OR RECTANGULAR METAL DUCTWORK

A. Shop fabricated as follows:

1. Materials: Galvanized steel sheet, ASTM A 527-85
2. Construction: per SMACNA HVAC Duct Construction Standards and VUSBC M-301.4
3. Joint Sealant: UL 181 mastic, Hardcast FTA-20
4. Elbows: Radius elbows type with minimum Radius: Width (R/W) ratio of 1.5 or square elbows with single thickness turning vanes with trailing edge.
5. Provide reinforcing angles and rods for larger ducts per SMACNA guidelines to prevent buckling, breathing, vibrations and unnecessary noise.

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2.4 DUCT HANGERS

A. 1" x 18 ga. galvanized steel straps or 3/8" steel rods and angle iron.

2.5 DRYER VENTS

A. Shop fabricated as follows:

1. Rigid galvanized steel with long radius elbows and no screws protruding into vent.
2. Use rivets at joint and fitting connections.
3. Use flexible metal vent at connection to dryer.
4. Minimum thickness of vent to be 26 gauge.
5. Fire stop vent penetrations thru fire rated construction per ULC-AJ7063.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify routing of ducts and coordinate with building structure and other trades prior to fabricating ductwork.

3.2 INSTALLATION

A. Install internal ends of slip joints in direction of air flow.

B. Seal joints, seams, screws and rivets in ductwork and casings airtight.

1. Coat with UL Listed sealant or cover with UL Listed FSK duct tape.

C. Branch duct take-offs shall use a full size tap at a 45 degree angle or a direct 90 degree tap with a 45 degree angle beveled throat clinch collar.

D. Branch ducts to grilles directly below trunk duct shall be full neck size.

E. Paint interior of duct where visible with flat black paint at air outlets and inlets.

F. Cap duct openings during construction.

G. Attach flexible duct to spin-in collars/rigid duct with mastic and secure flexible duct with 1/2" wide drawband and FSK duct tape.

H. Maximum sag of flexible duct shall not exceed 1/2" per foot of support spacing.

1. Support system shall not damage duct or cause out of round shape in flexible duct.
2. Use hard round duct for branch duct runouts exceeding eight feet.
3. Cut and remove excess length of unused duct.
4. Install duct hangers as follows:
5. Close to transverse joints on trunk ducts.
6. Locate at ducts penetrating wall as though wall will not contribute to the support of the duct.
7. In pairs at exact opposite sides of duct.
8. Provide at least one set of hangers for short duct branches three feet or less in length.
9. Locate 2-24 inches from flexible connections and 2-12 inches from ends of all branch duct.
10. At changes in duct direction
11. Hanger spacing shall be as follows:

a. Up to 4 sq. ft. in area - 8' on center
b. 4.1 to 10 sq. ft. in area - 6' on center

I. Do not bear ducts on structural members or ceiling.

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J. Insulate exterior SA and RA ducts with two – 1" thick layers of closed cell rubber – seal joints weathertight. Provide blocking to pitch top at 4% slope. Top layer shall overlap sides. Provide EPDM rubber jacket over insulation with seams and joints sealed weathertight.

K. Insulate ducts per section 23 07 00.

3.3 PROJECT CLOSEOUT

A. Provide Test and Balance of the air distribution system and equipment in accordance with AABC or NEBB recommendations.

1. Submit 3 complete reports indicating initial air balance CFM, design CFM and final air flow CFM, and final face velocities at inlets and outlets for each zone. Include minimum outside air cfm's.
2. Bind each report in plastic folder.

END OF SECTION 23 30 00

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SECTION 23 33 00 – AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Dampers

B. Access doors

1.2 QUALITY ASSURANCE

A. Motorized dampers and electric duct heaters shall be UL or ETL approved.

1.3 CODES AND STANDARDS

A. SMACNA duct construction standards.

1.4 SUBMITTALS

A. Provide submittals in accordance with Division 1 on:

1. Dampers
2. Access doors

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Dampers:

1. Pottorf, Ruskin, Cesco

B. Access doors:

1. Pottorf, Ruskin, Cesco

2.2 EQUIPMENT

A. Relief and backdraft dampers:

1. Parallel blade design with frame
2. Aluminum mill finish
3. Foam gasketed blades
4. Nylon bushings
5. Full 90 degree operation
6. Adjustable counterbalance

B. Control dampers:

1. 16 ga. galvanized steel
2. Rubber blade edges
3. Bronze Oilite bearings
4. Zinc plated pivot pins
5. Opposed blade type
6. Leakage rate of one percent of rated flow
7. Size operators with a 50 percent safety factor

C. Volume dampers:

1. 16 ga. galvanized steel
2. Blade width shall not exceed 12"

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3. For duct dimensions larger than 12" use a multi-vane type damper
4. Low leakage type with locking quadrant
5. Linkage and actuators to be mounted outside of airstream

D. Splitter dampers:

1. 16 ga. galvanized steel
2. Single panel type
3. Full height of ductwork
4. Length shall be size of largest duct dimension
5. Continuous hinge
6. Pushrod with locking quadrant on exterior of duct.

E. Fire dampers:

1. Dynamic rated Type B with blade pocket outside of air stream. Dampers in ceiling to be radiation type with thermal blanket.
2. Flange for connection of ductwork
3. 212°F rated link
4. 22 ga. galvanized steel
5. UL approved
6. Horizontal units shall have negator closure spring
7. Damper rating: same rating as rated wall or ceiling in which it is located.
8. Dampers in wood construction ceiling to be UL Listed radiation type with thermal blanket.

F. Access doors:

1. Factory built with sash locks, butt hinge, gasket, 24 ga. door and 22 ga. frame.
2. Access doors in insulated duct shall be double construction, with insulation encased.
3. Access door in high velocity duct shall be rated to 10" wc.
4. Basis of design: Cesco Model HAD-10.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Dampers:

1. Push rod for volume dampers and splitter dampers shall be mounted in an accessible location on the exterior of the duct. Provide 10" long orange ribbon on damper controller to assist in locating for the balancing contractor and maintenance personnel. Do not install volume dampers in ducts above inaccessible ceilings - dampers at register and diffuser outlets will have to be used to balance the system.
2. Install motorized control dampers to all proper operation and service access. Mark the end of the shaft protruding outside of the duct to indicate damper position.
3. Secure fire damper/sleeve to structure so in case duct pulls away from damper, damper will remain intact in the firerated wall/ceiling. Provide copies of installation instructions on site for use by the building inspectors.
4. Secure smoke damper to ductwork. Provide access door. Assure proper smoke damper operation.

B. Access Doors:

1. Provide in ducts where shown and for access to automatic dampers, fire dampers, filters and all other equipment not otherwise accessible. Locate door within six inches of device served. If flexible duct or a grille can be removed to access dampers or equipment, the access door is not required.
2. Install in accessible locations.
3. Provide labels on access door indicating device served. Text size shall be minimum 3/8" tall on an engraved adhesive backed label.

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END OF SECTION 23 33 00

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SECTION 23 36 00 – AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Grilles & Registers

1.2 SUBMITTALS

A. Provide submittals in accordance with Division 1 on:

1. Grilles, Registers and Diffusers

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Grilles, Registers, Diffusers:

1. Air Guide, Titus, Tuttle and Bailey, Price, Carnes, Ruskin, Cesco, Pottorf.

2.2 EQUIPMENT

A. Grilles, Registers, Diffusers:

1. Manufacturers and model numbers as specified on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grilles, Registers and Louvers:

1. Grilles, Registers, Diffusers shall be ceiling, wall, or duct mounted as shown on the drawings. Match the frame of the grille/diffuser type with appropriate ceiling type based on field conditions.
2. Cut ceiling tiles and mount G,R&D's square and plumb.
3. Provide finishes of product as selected by the Architect where indicated on the G,R&D Schedule.
4. Openings to the exterior shall be covered with birdscreen.
5. Caulk perimeter of louvers to provide a weathertight installation.

END OF SECTION 23 36 00

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SECTION 23 72 00 – FANS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Exhaust fans

1.2 QUALITY ASSURANCE

A. Fan capacity shall be AMCA rated and UL approved.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Carnes, Cook, Twin City, Acme, Penn

2.2 EQUIPMENT

A. Design is based on manufacturer's and model numbers listed on the drawings.

2.3 STANDARD FEATURES AND OPTIONS

A. Fans:

1. Provide motorized or backdraft dampers, and safety switches for fans.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Support fans from structure with metal strapping or all thread steel rods.

B. Connect ductwork - use flexible duct connectors for fans/units over 1/4 hp. Install dampers and assure proper operation for fans.

3.2 PROJECT CLOSEOUT

A. Test performance of fans and submit written report of test results.

B. Replace/repair bent panels.

END OF SECTION 23 72 00

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SECTION 23 81 29 – SPLIT SYSTEM HEAT PUMPS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Indoor/Outdoor unit and controls for split systems heat pumps.

1.2 WARRANTY

A. Provide 5 year written non-prorated unit parts warranty.

1. Provide stamped brass tag affixed to unit in a visible location.
2. Tag shall indicate warranty expiration date.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. LG, Carrier, Daikin, Trane, Samsung, Goodman

2.2 EQUIPMENT

A. Equipment to be ETL or UL Listed and AHRI approved.

B. Refer to drawings for capacities and model numbers.

C. Equipment to use electronic expansion valves, inverter drive variable speed compressors and variable speed blowers in the fan coil units/AHU's.

2.3 STANDARD FEATURES AND OPTIONS

A. AHU:

1. Insulated housing, hinged return air filter rack (for ducted units), return air filter for ductless, integral drain pan with primary and secondary overflow connections.
2. Evaporator coil - copper tube with aluminum fins.
3. Blower shall be DWDI, statically and dynamically balanced, with - 100,000 hours bearing life, internal vibration isolation.
4. Secure the wall mount bracket to the wall for the indoor high wall ductless units and secure unit to the bracket.

B. Condensing unit:

1. Heavy gauge galvanized steel, weatherproof construction, support base, primed with baked enamel finish.
2. Condenser coil - copper tube with aluminum fins, direct drive propeller fan and condenser guard.
3. Factory terminal blocks, control transformer in a weatherproof compartment.
4. Compressor - scroll type with R-410A refrigerant, anti-short cycle timer/relay, high and low pressure switches, thermal overload relays, suction accumulator. Provide low ambient cooling controls and a phase monitor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install outdoor units on roof on 4x4 pressure treated wood - see diagram on drawings. Bottom of units to be elevated 6" above the roof.

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B. Support vertical indoor ducted fan coil units from floor. Use vibration isolators at the ducted units.

C. Provide a float switch in the secondary overflow drain pan port.

D. Maintain required clearance around perimeter and top of units. Install top of unit level.

E. Install refrigerant piping between outdoor unit and evaporative coil; connect, evacuate and charge system as per manufacturer's recommendations. Install refrigerant piping in a manner as not to infringe upon equipment proper service access.

F. Secure the wall mount bracket to the wall for the indoor high wall ductless units and secure unit to the bracket.

G. Connect ductwork, control wiring and condensate drain piping to fan coil units/AHU's as applicable. Condensate drain piping to be extended and discharge at 8" above finished grade at locations as determined by the Architect, or discharge to the sanitary or storm piping through an approved waste receptor with air gap. Condensate drain piping shall be combined and shall drop concealed in walls as necessary.

3.2 PROJECT CLOSEOUT

A. Comb bent coil fins of the outdoor unit, and spray wash with hot water and detergent.

B. Provide factory authorized start-up, and testing of refrigeration equipment.

C. Submit complete test report of equipment performance (ie: air temperature, suction and discharge pressures, air flow, electrical characteristics) under various load conditions.

D. Report shall be bound in plastic folder.

END OF SECTION 23 81 29

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SECTION 26 00 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Electrical Lighting and Power

B. Fire Alarm

C. Empty Conduit Systems

1.2 RELATED WORK

A. Requirements of the Architect.

B. Other divisions as relates to: products installed but not furnished by this Division, or products furnished but not installed by this Division.

C. Other divisions as relates to: coordination of work.

D. See general electrical specifications on sheet _E-001 for additional general requirements. In case of conflicts, the most stringent requirement shall apply without prior written approval.

E. Refer to 'Elec. Specs – Apartments' on sheet _E-300 for additional requirements specific to the apartment dwelling units.

F. Electrical contractor shall provide coordination studies for the entire electrical system. All equipment and breakers shall be provided as required to achieve selective coordination in accordance with the NEC.

1.3 CODES AND STANDARDS

A. Comply with: 2021 Virginia Uniform Statewide Building Code and the National Fire Codes.

B. Comply with the current VHDA, DOE Zero Energy Ready Home Multifamily, and Enterprise Green Communities programs and standards.

C. Meet or exceed recommendations of: IEEE, IES, NEMA and UL.

D. Owner's requirements and criteria.

1.4 SHOP DRAWINGS AND PRODUCT DATA

A. Submit in accordance with the Architect's requirements for the following. Refer to individual sections for additional requirements.

1. Wiring Devices
2. Disconnect Switches
3. Panelboards
4. Switchboards
5. Lighting Controls
6. Indoor Lighting Fixtures
7. Outdoor Lighting Fixtures
8. Emergency Lighting Fixtures and Zone Inverter
9. Fire Alarm System

1.5 WARRANTIES

A. In addition to guarantee specified in the General Conditions, refer to individual sections for additional requirements.

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1.6 PROJECT RECORD DRAWINGS

A. Provide as required by the Architect.

1.7 OPERATING MAINTENANCE AND MANUALS

A. Provide in accordance with the Architect's requirements for the following.

1. Wiring Devices
2. Disconnect Switches
3. Panelboards
4. Switchboards
5. Lighting Controls
6. Indoor Lighting Fixtures
7. Outdoor Lighting Fixtures
8. Emergency Lighting Fixtures and Zone Inverter
9. Fire Alarm System

B. Data shall include catalog sheets, assembly details, dimensional drawings, operating and maintenance instructions, manufacturer's name and name of local supplier.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Provide new materials and equipment unless otherwise noted. Furnish (including freight and unloading) and install unless otherwise noted.

2.2 SUBSTITUTIONS

A. Equipment provided for this project shall be equivalent to products specified herein and on the drawings. Equivalent equipment by alternate manufacturers listed, may be substituted for the particular model specified, however Contractor shall guarantee equivalence and is responsible for modifications required and coordination with other divisions to fit substituted product into the project.

B. Substitutions of equipment by a manufacturer not listed as an alternate, will be allowed only if written approval is obtained 10 days prior to bidding. Bidding contractors must make a written request to the Architect for approval of a substitution, at least 17 days prior to bidding date. Written request shall include pertinent data on the equipment required to evaluate its equivalence.

PART 3 - EXECUTION

3.1 EXECUTION

A. Notify Architect immediately of conflicts and deficiencies. Do not proceed until unsatisfactory conditions have been resolved.

B. Repair damaged and defective equipment and materials. Replace items that cannot be properly repaired. Clean exposed and semi-exposed surfaces of equipment and materials. Touch-up shop-applied finishes to restore damaged and soiled areas.

3.2 DRAWINGS

A. Electrical drawings show general arrangement and routing of equipment. Follow as closely as possible in actual building construction while coordinating with other trades.

B. Consider Architectural, Structural, HVAC and Plumbing drawings a part of this work as these drawings furnish information relating to design and construction of the project.

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C. In case of conflict between Specifications and Drawings, consult Architect immediately for determination of how to proceed.

3.3 TRAINING

A. Instruct Owner's representative in operation and maintenance of electrical systems utilizing Operation and Maintenance Manual.

B. Instruction period shall occur after substantial completion of electrical systems and prior to completion of the project. Coordinate with the Architect and the Owner.

3.4 TESTING

A. Engage a qualified testing agency to perform tests and inspections of conductors and cables.

END OF SECTION 26 00 0

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SECTION 26 05 13 – WIRE & CABLE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Wire

B. Cable

1.2 RELATED WORK

A. Control Wiring

B. Raceways and Fittings

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Copper, minimum size No. 12 AWG. Other wire sizes shall be as indicated on the drawings. Where 120 volt circuit homeruns to panelboard exceed 100'-0" in length, increase minimum size to No. 10 AWG or larger as required to compensate for voltage drop.

B. Conductors No. 10 and smaller shall be solid, Conductors No. 8 and larger shall be stranded.

2.2 CONDUCTOR INSULATION

A. 600 volt, type THHN THWN (90 deg C).

2.3 CABLE

A. Metal Clad Cable (MC) - 600 volt, 90 deg C with steel or aluminum interlocked armor and green insulated grounding conductor.

B. Nonmetallic Sheathed Cable (NM) may be used in areas where allowed in accordance with NEC Article 334.

C. Service-Entrance Cable (SE) may be used for apartment feeders where allowed in accordance with NEC Article 338.

1. In areas not of type III, IV, or V construction, MC feeders, or feeders in conduit shall be used to serve the apartment units.

D. All feeder wiring serving core area panels shall be in conduit.

2.4 SPLICES AND TAPS

A. Conductors No. 10 and smaller - steel spring wire connector with thermoplastic shell.

B. Conductors No.8 and larger - mechanical type, tap connectors with insulated covers or split bolts taped to conductor insulation value.

2.5 SUPPORTS

A. Provide & install supports in accordance with the NEC.

PART 3 - EXECUTION

3.1 CONDUCTOR INSTALLATION

A. Install conductors in raceway unless otherwise indicated.

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B. Pulling conductors:

1. Do not pull conductors until raceway system is complete and boxes are free of foreign materials and moisture.
2. Do not use heavy mechanical means to pull conductors. Wire pulling lubricant used shall be approved for use with conductor insulation type.

C. Conductors shall be continuous from point of origin to panel or equipment termination without running splices in intermediate boxes.

D. Conductors of different voltages shall not be pulled into same raceway.

E. Do not share neutrals on 120 volt branch circuits, pull separate neutral with each circuit.

F. Color code conductors as follows:

1. Black – Phase A
2. Red – Phase B
3. Blue – Phase C
4. White – Neutral
5. Green or Bare - Ground

3.2 CABLE INSTALLATION

A. Cable shall be supported directly from the structure with staples or one-hole snap straps and intervals required by the National Electrical Code. Bored holes shall not exceed 1" diameter and shall be a minimum of 2'-0" from structural bearing points, notching of structural members is prohibited.

B. Guard strips shall be provided on each side of cable where run across top of structure in accessible attics or ceiling spaces. Strips shall be at least as high as cable.

C. Cable in vertical raceways shall be supported in accordance with NEC 300.19.

D. MC Cable shall be routed as straight with structure and as neatly as possible, “spider web” type routing of cables to find the shortest distance possible will be reworked or replaced at the discretion of the Engineer.

END OF SECTION 26 05 13

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SECTION 26 05 33 – RACEWAY & FITTINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Conduits

B. Fittings

1.2 RELATED WORK

A. Excavation and Backfilling

B. Wire and Cable

C. Boxes

D. Conduit Systems

PART 2 - PRODUCTS

2.1 CONDUITS

A. Conduit sizes shall be as required by the National Electrical Code (unless indicated or specified otherwise) for the number and size of wire indicated. Minimum size conduit shall be ½ inch electrical trade size. Flexible metal conduit used for lighting fixture whips may be 3/8" where allowed by code.

1. Electric metallic tubing: thin wall, hot-dipped galvanized, applicable specifications WW-563/ANSI C33.98/ANSI C80.3/UL 797/CSA C22.2 No. 83.
2. Rigid nonmetallic conduit: heavy wall, schedule 40 PVC, applicable specifications WC-1094A/UL651.
3. Flexible metal conduit: steel, applicable specifications UL1/WWC-C-566/CSA 22.2 No. 56.
4. LiquidTight flexible metal conduit: steel with a thermoplastic jacket, applicable specifications UL360/CSA C22.2 No. 56.

2.2 FITTINGS

A. Electric metallic tubing:

1. Dry locations: set screw, all steel, zinc plated with nylon insulated throat.

B. Rigid nonmetallic conduit: schedule 40 solvent cement type.

C. Flexible metal conduit: steel/malleable iron, zinc plated, angled saddle or squeeze type with anti short bushings.

D. LiquidTight flexible metal conduit: compression type, steel/malleable iron, zinc plated with nylon insulated throat and taper threaded hubs.

2.3 CONDUIT INSTALLATION

A. Use electric metallic tubing except as follows:

1. Use rigid nonmetallic conduit in or under on grade concrete slabs.
2. Use flexible metal conduit for motor and equipment connections in dry locations. Length shall be as short as possible and shall not exceed six feet.
3. Branch circuit wiring above suspended ceilings, in stud partitions or in furred spaces may be metal clad cable (MC) as permitted by the National Electrical Code.

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B. Install conduits concealed in walls, ceilings or floors unless indicated or specified otherwise. Conduits may be installed exposed in unfinished areas (ie: equipment rooms).

C. Install exposed conduits in runs parallel or perpendicular to walls structural members, or intersections of vertical planes or ceilings. Exposed and concealed conduits shall pass through walls, floors or ceilings at right angles.

D. Insure that conduits are in alignment between bends, elbows and terminations; that bends are free of crimps, that joints and terminations are tight and secure; that interiors are smooth and free of burrs and foreign objects; and that interiors are full size entire length.

E. During construction, close ends of conduits with metal or plastic caps intended for the purpose.

F. Field bending of conduits and tubing shall be made with hand or powered equipment approved for the purpose. Use of torches to bend nonmetallic conduit is not approved. Radius of bends shall be as per the National Electrical Code for type of conduit and tubing used.

G. Conduits passing through a fire rated wall or floor shall not lessen the rating of the structure through which they pass.

H. Final installation of conduits penetrating waterproof construction shall be completely watertight.

I. Plumbing work takes precedent in chase walls, do not run any wiring in plumbing walls until piping is complete.

J. All conduits shall run within the floor structure or the roof/ceiling structure below flat roofs. Do not run conduit below the aforementioned structural elements.

2.4 SLEEVES

A. Sleeve conduits passing through concrete floor slabs and concrete, masonry, tile and gypsum walls as follows:

1. Locate and install sleeves as floors and walls are being built, not after erection.
2. Sleeves for concrete floor slabs - 24 gauge sheet steel with lock seam joint. Terminate flush with floor.
3. Sleeves for walls - galvanized steel pipe unless otherwise noted, protruding from surface no more than 1/4 inch.
4. Provide escutcheon for conduits passing through wall or floors in finished areas.
5. Do not provide sleeves for conduits imbedded in concrete or through concrete slabs on grade.

2.5 SUPPORTS

A. Conduit shall be supported directly from the structure at intervals required by the National Electrical Code as follows:

1. Use standard conduit hangers, one hole snap straps, thin wall conduit clamps, malleable iron pipe straps, strut channel, beam clamps, U-bolts and all-thread rods.
2. Do not use wire ties, stab-on clips or perforated strap iron.
3. Do not support from ceiling assembly or drywall.
4. Securely attach supports to the structure by means of wood screws on wood, toggle bolts on hollow masonry units, bolts and expansion shields on concrete or brick and machine screws or welded threaded studs on steel.
5. Provide vertical supports in accordance with the NEC.

END OF SECTION 26 05 33

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SECTION 26 21 00 – ELECTRIC SERVICE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Underground Electric Service

1.2 RELATED WORK

A. Raceways and Fittings

B. Wire and Cable

C. Boxes

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Refer to the appropriate Section of this Division of the Specification for the requirements for the various components of the electric service.

B. Service shall be 120/240 volt, Single phase, 3 wire.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide labor and materials not furnished by the power company.

B. Do work regarding the electrical service and its equipment in accordance with the requirements of the power company. If the Contract Documents indicate work that is to exceed these requirements, follow the Contract Documents.

C. Label equipment for the electric service in accordance with the appropriate section of this Division. Main switches or breakers are to be identified as such in addition to identifying the item fed.

3.2 SEQUENCING AND SCHEDULING

A. Notify the power company of the timing requirements for the project and arrange for metering equipment, connections and service.

END OF SECTION 26 21 00

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SECTION 26 23 00 – SWITCHBOARDS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Service entrance switchboards
B. Provisions for utility CT metering
C. Distribution sections
D. Main and feeder circuit breakers
E. Accessories required for a complete and operable installation

1.2 RELATED WORK

A. Concrete
B. Electric Service
C. Panelboards
D. Grounding
E. Raceways & Fittings

1.3 QUALITY ASSURANCE

A. Switchboards shall be listed and labeled in accordance with UL 891.
B. Equipment shall comply with NEC, NEMA, and IEEE standards.
C. Provide equipment suitable for available fault current at service entrance.

PART 2 - PRODUCTS

2.1 Switchboards

A. General:

1. Switchboards shall be the same manufacturer as the panelboards.
2. Factory assembled, dead-front, freestanding.
3. Copper bus bars.
4. Neutral bus to be 100% rating of phase busing.
5. Service entrance rated.
6. Sections as noted on drawings
7. Approved by power company
8. Circuit breakers.
9. Switchboards shall be in accordance with NEC 240.87 where applicable.
10. Switchboards shall be as scheduled on the drawings and as specified herein or the equivalent by:
    a. Square-D
    b. Eaton
    c. Siemens
11. 65,000 AIC rated.
    a. Provide a separate line-item in bid for 100,000 AIC rating.
12. Metering and CT provisions shall be provided as required by utility company.

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13. Provide barriers between service, metering, and distribution sections.

2.2 CIRCUIT BREAKERS

A. Molded case, thermal-magnetic unless indicated otherwise.

B. Main and feeder breakers shall be electronic trip LSI, LSIG where rated 1000A or higher.

C. Breakers shall be AFCI type in apartment units for circuits required to have AFCI protection per the NEC.

D. Provide series connected short circuit rating of 65,000 AIC using breakers in a combination which allows some breakers to have lower individual interrupting ratings than the available fault current. These combinations are to be UL tested and certified. Where series ratings are utilized, provide design documentation in accordance with locale requirements.

1. Where the available fault current exceeds 65,000, provide properly rated breakers as required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Neatly type circuit designations in distribution section on directory card. Notations shall indicate the nature and location of loads served.

B. Provide engraved laminate nameplate on outside of housing, nameplate shall include switchboard designation on the drawings, service voltage and phase.

C. Provide engraved laminate nameplate on outside of each distribution section, nameplate shall include load served, location of , service voltage and phase.

D. Install switchboards in accordance with manufacturer's instructions and NEC requirements.

E. Coordinate final layout with utility company.

F. Verify torque of all power and grounding connections.

G. Confirm breaker settings per coordination study.

H. Provide labeling consistent with panel schedules diagrams

END OF SECTION 26 23 00

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SECTION 26 24 16 – PANELBOARDS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Panelboards

B. Load Centers

C. Circuit Breakers

1.2 RELATED WORK

A. Raceways and Fittings

B. Disconnect Switches

C. Grounding

PART 2 - PRODUCTS

2.1 PANELBOARDS and Load Centers

A. General:

1. Panelboards provided shall be by one manufacturer.
2. Factory made and assembled.
3. Copper bus bars.
4. 20” Wide cabinets with doors.
5. Provided with directory card, frame and transparent cover.
6. Flush mounted cylinder type locks, keyed alike with 2 keys for each panelboard.
7. Panels shall be in accordance with NEC 240.87 where applicable.
8. Panelboards shall be as scheduled on the drawings and as specified herein or the equivalent by:

    a. Square-D
    b. Eaton
    c. Siemens

B. Apartment unit panels shall be load centers as shown on the plans, and the same manufacturer as the panelboards.

1. Provide with surge suppression device.

2.2 CIRCUIT BREAKERS

A. Thermal-magnetic.

B. Molded case.

C. Bolt-on type (for commercial area panels).

D. Breakers shall be AFCI type in apartment units for circuits required to have AFCI protection per the NEC.

E. Provide series connected short circuit rating of 65,000 AIC using breakers in a combination which allows some breakers to have lower individual interrupting ratings than the available fault current. These combinations are to be UL tested and certified. Where series ratings are utilized, provide design documentation in accordance with locale requirements.

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1. Where the available fault current exceeds 65,000, provide properly rated breakers as required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Flush or surface mount as indicated on the drawings

B. Neatly type circuit designations on directory card. Notations shall indicate the nature and location of loads served.

C. Provide engraved laminate nameplate for each panel located on outside of door (excluding apartment unit panels), nameplate shall include panel designation on the drawings, service voltage and phase.

END OF SECTION 26 24 16

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SECTION 26 25 00 – GROUNDING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Grounding Electrode System

B. Equipment Grounding

1.2 RELATED WORK

A. Wiring Devices

B. Panelboards

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Connections to building steel shall be made with bronze or brass bolted type fittings designed for the use.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grounding electrode system:

1. Size as indicated on the drawings.
2. As described in article 250 of the National Electrical Code.
3. Protect exposed sections from physical abuse.

B. Equipment grounding:

1. Conduits shall not be used for grounding, pull ground conductors in conduits. Size equipment grounding conductors as per table 250-95 of the National Electrical Code.

END OF SECTION 26 25 00

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SECTION 26 27 16 – BOXES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Outlet and Junction Boxes

B. Pull Boxes

C. Wireway

D. Floor Outlets

1.2 RELATED WORK

A. Raceways and Fittings

B. Wire and Cable

C. Wiring Devices

D. Conduit System

PART 2 - PRODUCTS

2.1 OUTLET AND JUNCTION BOXES

A. Galvanized sheet steel type.

B. Single device box shall be “non-gangable” type and for multiple devices “gangable” type shall be used.

C. Boxes for exposed work shall be 4" square type. Boxes for exposed work in wet locations shall be die cast type with threaded hubs.

D. Sectional boxes shall not be used in masonry or concrete.

E. Boxes for use with non-metallic sheathed cable shall be plastic of fiberglass type.

F. Boxes shall be fire-rated where used in rated construction.

G. Sized for number of conductors, fittings and devices as required by the National Electrical Code.

2.2 PULL BOXES AND WIREWAYS

A. Indoor NEMA 1 - galvanized sheet steel, screw cover type.

B. Outdoor NEMA 3R - galvanized sheet steel, screw cover type with top mounted drip shield and seamless sides.

C. Size for number and size of conduit entries and type of pull as required by the National Electrical Code.

2.3 FLOOR OUTLETS

A. In concrete floor:

1. Wiremold fully adjustable Omnibox 880, one, two or three gang as specified on the drawings. Duplex cover shall be 828R flip lid type and data/phone cover shall be 828COMTC communication plate.
2. Coverplates and trim suitable for finished floor surface.

B. In raised floor:

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1. Wiremold Evolution Series floor box, four gang with (2) duplex receptacles and (2) data outlet plates.
2. Coverplates and trim suitable for finished floor surface.

C. Alternate manufacturers:

1. Carlon
2. Hubbell
3. Steel City
4. Thomas and Betts

PART 3 - EXECUTION

3.1 INSTALLATION

A. Secure boxes to structure by means of screws, bolts, rod hangers or other approved means. Raceways entering or leaving box shall not be used for support.

B. Boxes shall be level and plumb. Boxes for flush equipment shall be placed to within 1/4" of the finished surface, provide extensions or plaster rings as required.

C. Junction and pull boxes shall be installed readily accessible, unobstructed by piping, ducts or other equipment.

D. Boxes shall be mounted at height indicated on the drawings or directly adjacent to piece of equipment served.

E. Seal spare or unused openings in boxes with approved fittings.

F. Do not place floor boxes until exact spacings and locations are identified by the Architect.

G. For boxes installed in wet locations provide clear silicone caulk between box and surrounding surface to prevent water entry.

H. Boxes shall be located to maintain code required separation in fire rated walls, or provide fire rated putty pads or equivalent as required.

END OF SECTION 26 27 16

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SECTION 26 27 26 – WIRING DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Wiring Devices

B. Coverplates

1.2 RELATED WORK

A. Boxes

B. Empty Conduit System

PART 2 - PRODUCTS

2.1 WIRING DEVICES

A. Single pole wall switch – P&S No. 20AC1

B. Three way wall switch – P&S No. 20AC3

C. Four way wall switch – P&S No. 20AC4

D. General purpose duplex receptacle – P&S No. 5362

E. Ground fault circuit interrupter – P&S No. 2097 self testing

F. All receptacles shall be tamper resistant in apartment units, and public areas.

G. Refer to drawings for specification of additional devices, devices not specified shall be of the same manufacturer and specification quality as those listed above. Device color as specified by architect.

2.2 COVERPLATES

A. Interior recessed – stainless steel or colored (verify type and color with Architect).

B. Interior surface – 4” square raised cover, galvanized

2.3 ALTERNATE MANUFACTURERS

A. Cooper

B. Hubbell

C. Mulberry

D. Leviton

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices approximately at the locations indicated on the drawings. Determine exact location by conditions of construction. Coordinate locations to avoid conflict with other equipment being installed. Install devices straight and solid to box. Coordinate placement of boxes in and around knee spaces, counter tops, built-in casework and the like to avoid conflicts with mirrors and other items, switches shall be to strike side of door. Refer to Architectural drawings.

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B. Mounting heights of wall outlets shall be as indicated on the drawings and shall be measured from the finished floor to the center of the outlet. No outlet or operable portion of a switch shall be outside of the ADA reach zone.

C. Where devices are shown grouped together, provide a single, multiple gang plate. Dimmer switches specified require additional boxes for ganging and are not suitable for ganging with switches, verify requirements prior to rough-in.

D. Where GFI outlets are used to provide feed-thru protection, do not feed-thru across partitions, provide a separate device.

E. Coordinate placement with wall panels, trim, etc.

END OF SECTION 26 27 26

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SECTION 26 28 16 – DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Non-fused Safety Switches

1.2 RELATED WORK

A. Panelboards

PART 2 - PRODUCTS

2.1 SAFETY SWITCHES

A. General:

1. Same manufacturer as the panelboards, refer to Section 16740.
2. NEMA 1 for indoor use, NEMA 3R for outdoor use.

B. Non-fused safety switches:

1. Single phase and 60 ampere or less rated:

a. Deadfront pullout type, clam shell design.

2. Three phase and single phase rated more than 60 ampere:

a. Visible blade type with external operating handle and cover interlock and pad locking provisions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount switches on wall or at associated piece of equipment. Wall mounted switches shall be 48 inches above finished floor.

B. Provide engraved plastic laminate nameplate for each disconnect switch located on front outside cover, nameplate shall indicate item served and panel/circuit number.

END OF SECTION 26 28 16

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SECTION 26 50 02 – DRIVERS & ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Drivers for lighting fixtures

B. Lighting fixture accessories

1.2 RELATED WORK

A. Section Indoor Lighting Fixtures

B. Section Outdoor Lighting Fixtures

PART 2 - PRODUCTS

2.1 LED DRIVERS

A. Rated for 60Hz at 120V/277V input, produces less than 20%THD, power factor between 90% and 100%, dimmable, and shall be thermally protected.

2.2 Accessories

A. Including but not limited to the following for a complete lighting fixture installation:

1. Plaster frames.
2. Tee bar hangers.
3. Hold down clips for suspended ceilings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unless indicated otherwise drivers shall be factory installed and wired.

B. Install accessory equipment, not factory installed, as recommended by the manufacturer and as required by the National Electrical Code.

END OF SECTION 26 50 02

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SECTION 26 51 00 – INDOOR LIGHTING FIXTURES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Indoor Lighting Fixtures

1.2 RELATED WORK

A. Lamps

B. Drivers and Accessories

C. Outdoor Lighting Fixtures

D. Emergency Lighting Fixtures

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Scheduled on the drawings.

2.2 Accessories

A. Including but not limited to the following for a complete lighting fixture installation:

1. Plaster frames.
2. Tee bar hangers.
3. Hold down clips for suspended ceilings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of fixtures shall be in a neat, workmanlike manner. Provide straps, supports, hangers and other materials required for proper installation.

B. Surface mounted fixtures shall not have gaps between the fixture and attaching surface unless mounting is designed to hold fixture off ceiling, or except where required by code regulation. Continuous rows of fixtures shall be installed so as to provide perfect alignment.

C. Support surface mounted fixtures directly from the building structure and not from the ceiling grid system. Use all-thread rods, beam clamps, pipe clamps and pipe or perforated steel channel for support. Wire ties and stab-on clips will not be accepted. The support assembly shall be capable of supporting 150 pounds in addition to the fixture weight indefinitely.

D. Recessed fixtures shall not have gaps between the fixture trim and adjacent surface. Where light leaks occur, suitable gaskets shall be installed.

E. Recessed lighting fixtures installed in modular or integrated ceilings shall be of the proper type for the type of ceiling being installed. Verifying type of ceiling construction prior to ordering of fixtures. Lighting fixtures shall be supported by the ceiling grid system. Additional ceiling ties shall be installed at each corner of the lighting fixture to reinforce the ceiling system.

END OF SECTION 26 51 00

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SECTION 26 52 00 – EMERGENCY LIGHTING FIXTURES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Emergency Lighting Fixtures

B. Exit Lighting Fixtures

1.2 RELATED WORK

A. Indoor Lighting Fixtures

PART 2 - PRODUCTS

2.1 EMERGENCY LIGHTING FIXTURES

A. As specified on drawings:

1. Emergency lighting batteries:

a. High-temperature nickel cadmium battery, 90 minute duration.
b. LED pilot light and test switch.
c. Solid state automatic battery charger.

PART 3 - EXECUTION

3.1 UNITARY EQUIPMENT AND EXIT LIGHT INSTALLATION

A. Connect to branch circuit wiring serving area where installed ahead of any local switching.

3.2 EMERGENCY BATTERY INSTALLATION

A. Unless indicated otherwise batteries shall be factory installed.

B. Connect emergency mode lead to an unswitched conductor.

END OF SECTION 26 52 00

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SECTION 26 56 00 – OUTDOOR LIGHTING FIXTURES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Outdoor Lighting Fixtures

B. Control

1.2 RELATED WORK

A. Raceways and Fittings

B. Drivers and Accessories

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. As specified on drawings.

2.2 CONTROLS

A. Photocell – Tork series 2020 or equal, swivel mount, 1800 watts.

B. Timeclock – Tork series EWZ100 series or equal, 100 hour battery backup, 7 day.

C. Contactors – Square D mechanically held, electrically operated.

PART 3 - EXECUTION

3.1 LIGHTING FIXTURE INSTALLATION

A. Use manufacturer’s recommendations.

3.2 CONTROL INSTALLATION

A. Provide photocell "ON-OFF", control for lights and signage as specified on the drawings.

B. Photocell shall be built-in to light or mounted above roof line facing north and shielded from surrounding light sources. Photocells shall be located where accessible but out of view of the public.

C. Set timeclock hours for sign as directed by the Owner.

END OF SECTION 26 56 00

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SECTION 27 20 00 – EMPTY CONDUIT

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Equipment Spaces

B. Conduit for cable systems

1.2 RELATED WORK

A. Raceways and Fittings

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Conduit and Boxes

1. Refer to appropriate Sections.

B. Pull cord

1. Polypropylene rope.

C. Equipment Space

1. 3/4”, fire rated plywood, smooth one side, full 8’-0” high, width as shown on the drawings.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION

A. Install as shown on plans.

B. Provide pull string in conduits.

C. Paint all sides and edges of equipment space with 2 coats of gray enamel paint prior to installation.

D. At project closeout, provide blank coverplates for rough-ins not utilized by the Owners cabling contractors.

END OF SECTION 27 20 00

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SECTION 28 31 00 – FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Fire Alarm System

1.2 RELATED WORK

A. Raceways and Fittings

B. Wire and Cable

C. Boxes

1.3 GENERAL SYSTEM AND DESIGN REQUIREMENTS

A. Building shall be provided with a fully addressable fire alarm system with voice notification in accordance with applicable codes, local requirements, and shall meet all high-rise building standards.

B. Contractor shall provide all design, drawings, calculations, product data, etc. as required for construction, permitting, inspections, etc.

C. Provide expander panels as required. Coordinate with electrical contractor for additional circuits required for expander panels. Wire to nearest emergency panelboard.

PART 2 - PRODUCTS

2.1 GENERAL INITIATING DEVICES

A. Manual pull stations: dual action type, semi-flush mounted.

B. Sprinkler flow switch: coordinate with sprinkler contractor.

C. Tamper switch: coordinate with sprinkler contractor.

D. Duct mounted smoke detector: photoelectric type w/ auxiliary contacts for fan shut-down or damper release, coordinate sampling tube lengths with Division 15.

E. Ceiling mounted smoke detector: photoelectric type.

F. Ceiling mount heat detector: fixed temperature and rate-of-rise.

G. Provide addressable interfaces, relay modules and transformers, etc. required for a complete operating system.

2.2 GENERAL INITIATING DEVICES

A. Horn/Strobes: ADA compliant with voice alarm.

B. Strobes: ADA compliant.

C. Strobes shall be fully synchronized.

2.3 ACCEPTABLE MANUFACTURER’S

A. Edwards

B. Simplex

C. Siemens

D. Notifier

E. Gamewell

2.4 CONTROLS

A. Remote annunciators shall be LCD display, English language in flush mount enclosure.

PART 3 - EXECUTION

3.1 SYSTEM OPERATION

A. On receipt of an alarm condition from an initiating device, the control panel shall sound evacuation signals throughout the building until the system is reset.

B. Provide separate indications at the control panel and remote annunciator to indicate which device is in alarm.

C. Provide an alarm signal to an approved central station system.

D. System is to be interfaced with the stairwell pressurization systems.

E. Coordinate with security contractor for any door/rolling gate release required.

3.2 INSTALLATION

A. Wiring for system shall be fire protective system cable or in conduit as directed by the system manufacturer.

B. Provide wiring, conduit and outlet boxes required for a complete system as recommended by the system manufacturer.

1. Electrical contractor shall coordinate with final device and equipment locations based on final fire alarm system design. Provide all conduits, boxes, wiring, etc. as required.

C. Wires shall test free of grounds and crosses between conductors.

3.3 QUALITY ASSURANCE

A. Final connections between control equipment and the wiring system shall be made under direct supervision of a representative of the manufacturer.

B. Provide complete drawings and specifications of system wiring and device locations to the local authority as required for review prior to commencement of any work. Include any required calculations, additional drawings and product data required.

END OF SECTION 28 31 00

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SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, plants and grass to remain.
2. Removing existing trees and other vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place and removing site utilities.
7. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities.
2. Division 01 Section "Execution" for verifying utility locations and for recording field measurements.
3. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
4. Division 32 Section "Turf and Grasses" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

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1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

B. Contractor shall follow recommendations provided in the Geotechnical Report provided in Division 02. Recommendations from the report shall govern if the recommendations are more restrictive than these specifications.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

C. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to Sediment and Erosion Control Drawings.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

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3.3 TREE PROTECTION

A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within fenced area.
2. Do not permit vehicles, equipment, or foot traffic within fenced area.
3. Maintain fenced area free of weeds and trash.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by Architect.

3.4 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Construction Manager will arrange to shut off indicated on-site utilities when requested by Contractor.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Construction Manger and Owner not less than five days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Construction Manager’s written permission.

C. Excavate for and remove underground utilities indicated to be removed. Refer to sections covering site utilities.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
4. Use only hand methods for grubbing within tree protection zone.
5. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

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1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Do not stockpile topsoil within tree protection zones.
2. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.8 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 10 00

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SECTION 31 20 00
EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Conditions, any Supplementary General Conditions and Division 1, General Requirements, are hereby made a part of this Section as fully as if repeated herein.

1.2 SECTION INCLUDES

A. Earthwork includes areas below building foundations, below concrete slabs on grade, below paved areas and subgrading of all unpaved area in the site.

1. Layout and staking for earthwork.
2. Excavation and rough grading.
3. Erosion and sediment control.
4. Foundation excavation for footings.
5. Establishing subgrades, leveling and proofrolling.
6. Filling, backfilling and compaction.
7. Keeping streets clean of materials tracked off site.
8. Includes trenching, excavation and backfill for utilities.
9. Maintenance and/or repair of damage to the rough grading.
10. Removal and disposal of stones, debris, excess and unsuitable materials.
11. Soil treatment for termite control.
12. Field quality control, testing, and inspection.

1.3 RELATED WORK

A. DIVISION 23 - MECHANICAL, utilities.

B. DIVISION 26 - ELECTRICAL, utilities.

C. DIVISION 31 - SITE WORK, all other sections.

D. DIVISION 32 – EXTERIOR IMPROVEMENTS, all sections

E. DIVISION 33 – UTILITIES, all sections

1.4 DEFINITIONS

A. Rock Excavation: Natural geological formations or other material which cannot be removed by adequate equipment (in good condition) as defined below, shall be considered a change in the scope of work and paid for by the Owner if encountered.

1. Open Excavation and Grading: Rock in excess of the capabilities of a Caterpillar D-8 tractor (or equivalent) with 2 cu. yd. bucket and hydraulically operated single tooth power ripper.
2. Trenches, Pits and Footings: Rock in excess of the capabilities of a Caterpillar 235 Hydraulic Backhoe (or equivalent) using a 2 ft. Bucket width (3/4 cu. yd.)
3. Minimum Effort: If rock is not removed during the process of normal digging and ripping, then extend the excavation to expose the rock surface within the limit of original excavation. Contact the A/E and he may direct the sides of rock to be exposed to a depth of 3 feet. This will be to determine to the extent of additional work.

B. Earth Excavation: Anything not classified as rock including as example: soils, gravels, stones, boulders, vegetation, debris, and unsuitable materials.

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C. Unsuitable Materials: All excavated materials; debris, man made or fabricated materials, concrete spoil, organic, soft, expansive, or unstable matter; all shall be disposed of as herein specified. Excessive moisture content shall not classify a material as unsuitable.

D. Removal and disposal of unsuitable material above the subgrade elevation and placement of approved specific fill material (from on or off the site) above the subgrade elevation as directed by the Soils Engineer shall be considered a part of the work.

E. Removal and disposal of unsuitable material approved below the subgrade elevation and placement of approved specific fill material (from on or off the site) below the subgrade elevation as directed by the Soils Engineer shall be considered a change in the scope of work.

F. Soils Engineer or Inspection Agency: An Agency and its designated representatives who monitor and approve all earthwork operations described herein.

G. Subgrade: The finished elevation of the earth immediately below all slabs, granular and porous fill, paving, footings, walls, etc., except the subgrade elevation shall not be higher than 12" below the existing earth elevation at the start of the project.

H. Subgrade for utility construction: Underside of barrel of pipe, or underside of any cradle or bedding if noted on drawings, or referenced in applicable local government specifications. For pipe drains and miscellaneous structures encased in concrete or on concrete, stone and/or gravel cradle, subgrade is lowest outside surface of encasement or cradle.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

K. Drainage Course: Course supporting the slab on grade that also minimizes upward capillary flow of pore water.

L. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

M. Utilities: On site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

N. Filter Material: Course placed around drainage pipes.

O. Unit prices: The contractor shall provide unit prices for all authorized earth excavation and backfill completed below the subgrade, and for all rock excavation completed by drilling and hoe ramming.

1.5 QUALITY ASSURANCE

A. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO).
2. American Society for Testing and Materials (ASTM).
3. City of Roanoke Right-of-Way Excavation and Restoration Standards, dated July 1, 2020 and all revisions thereof.
4. Virginia Department of Transportation (VDOT) Road and Bridge Standards, 2016 Edition, and all revisions thereof.
5. Viriginia Department of Transportation (VDOT) Road and Bridge Specifications, 2020 Edition, and all revisions thereof. Delete references to Measurement and Payment.

B. Tolerances: As indicated herein.

C. Testing: Requirements as specified herein.

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1.6 SUBMITTALS

A. Notification:

1. Notify and provide data to regulatory authorities and A/E prior to commencement of work.
2. Provide notice of: encounter with unknown utilities; subgrades before filling; areas requiring testing or inspection.

B. Product Data: For the following:

1. Geotextile.
2. Detection warning tape

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D2487 of each on site and borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D698 for each on site and borrow soil material proposed for fill and backfill.
3. Field reports; in-place soil density tests.
4. One optimum moisture – maximum density curve for each type of soil encountered.
5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
6. Test reports must be submitted daily to the Architect and Owner.

1.7 PROJECT CONDITIONS

A. Subsurface Conditions: Subsurface soils investigations have been made at the site. The report and logs of the test borings and test pits are included in the Appendix of these specifications. Such investigations have been made for the purposes of design only and neither the Engineers, the Owner, nor the Geotechnical Engineer guarantee adequacy or accuracy of the data, or that data are representative of all conditions to be encountered. Such information is made available for general information only and shall not relieve the Contractor of the responsibility for making his own investigations, tests, and analysis. Any additional test borings and other exploratory operations may be made by Contractor shall be at no cost to Owner.

1. The Geotechnical Report has been performed and final report will be issued and attached in future submissions.

B. Erosion and sediment control, in addition to erosion control specified in Division 1 & Section 31100:

1. Standards: Comply with the requirements of the "Virginia Erosion and Sediment Control Handbook.
2. General Erosion: Prevent erosion of earthwork; repair and correct any ditches, gullies or erosion immediately and upon occurrence.
3. Excavations: Prevent water from flowing into open excavations and toward building walls.
4. Slopes: Cover (with continuous plastic membrane) and stake all slopes steeper than 1.5 horizontal to 1 vertical.

C. Environmental Conditions:

1. Do not apply soil treatment when temperature is at or below freezing or when ground is frozen or frost is expected.
2. Do not apply soil treatment when surface water is present..

D. Existing Conditions: Accept the site in the condition which it exists at the time of the award of the contract and perform all work to the grades indicated.

1. Protect plant material, lawns and other features not designated for removal.

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2. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

E. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.
2. Do not interrupt existing utilities serving facilities occupied and used by others, except when permitted in writing by Construction Manager and then only after acceptable temporary utility services have been provided. Provide a minimum of 48 hour notices to utility Owners and receive written notice to proceed before interrupting any utility.

F. Rock Excavation: Rock excavation may be performed with hoe rams, jack hammers, or any method the Contractor wishes to employ except for explosives.

1.8 PROTECTION

A. Safety: Provide protective measures necessary for the safety of workmen, to the public and adjacent property. Prevent cave ins, collapse of walls, structures and slopes, both on and adjacent to the site.

B. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable O.S.H.A. requirements.

C. Repair: Includes the removal and replacement with new materials affected by settlement.

PART 2 - PRODUCTS

2.1 FILL AND BACKFILL

A. Satisfactory Soils:

1. Compacted fill and backfill shall be free of deleterious matter such as frozen materials, organics, wood, debris, or rock larger than 4 inches in diameter and be classified SP, SW, SM, SC, GP, GC, GM, or GW per ASTM D-2487. All material shall have a liquid limit and plasticity index not exceeding 40 and 15 respectively when tested in accordance with ASTM D-4318.
2. The minimum dry unit weight shall not be less than 105 PCF maximum dry density as determined by ASTM D-1557, modified proctor.
3. All fill and backfill materials shall be obtained from on site or from off site sources and shall be approved by the Geotechnical Engineer prior to placement.
4. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

C. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with a least 90 percent passing a 1 ½ inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

1. Locations: All on site fill areas

D. Drainage fill:

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1. Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel, (ASTM D 448 Coarse - aggregate grading size 57), with 100% passing of 1-1/2" sieve and not more than 5% passing a No. 8 sieve.

E. Stone Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM 2940/D 2940M; with at least 95 percent passing a 1.5 inch (37.5 mm) sieve and not more than 8 percent passing a No. 200 (0.075 mm) sieve.Locations: All vehicular traffic areas.

F. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM 2940/D 2940M; with at least 95 percent passing a 1.5 inch (37.5 mm) sieve and not more than 8 percent passing a No. 200 (0.075 mm) sieve..

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1 inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; AASHTO M-43, size No. 17.

I. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 FILL AND BACKFILL FOR UTILITIES

A. Backfill: Earth removed from the trench provided that in the opinion of Soils Engineer such excavated material is satisfactory for backfilling.

B. Should the excavated material be considered unsatisfactory for backfilling, the Contractor shall remove and dispose of such unsatisfactory material and substitute, in lieu thereof, suitable material obtained from elsewhere on or off the site.

C. Materials shall meet the requirements specified in paragraph 2.1.A above.

2.3 TOPSOIL

A. Refer to Section 32 92 00 Turf and Grasses.

2.4 FLOWABLE FILL

A. Stabilized flowable fly ash mixture with a maximum slump of 8" and a minimum unconfined compressive strength of 100 psi after 28 days used to fill construction excavations.

B. Manufacturer: American Stone Mix or approved equal.

2.5 ACCESSORIES

A. Detectable Warning Tape: Acid and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems
5. Green: Sewer systems.

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2.6 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
4. Tear Strength: 56 lbf; ASTM D 4533.
5. Puncture Strength: 56 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
4. Tear Strength: 90 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify existing ground surfaces have been stripped of topsoil, root mat and existing pavement, unsatisfactory soils, concrete spoil, obstructions and deleterious material.

B. Locate underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Contact "Miss Utility".

C. Use of explosives will not be permitted, unless approved by Owner in writing and Regulatory Agencies having jurisdiction.

D. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

F. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

G. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 EXCAVATION

A. Excavation consists of removal and disposal of material encountered when establishing required finish grade elevations. All excavation is unclassified.

B. Unauthorized Excavations:

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1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of A/E. Unauthorized excavation, as well as remedial work directed by A/E, shall be at Contractor's expense.
2. Under footings, foundations, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing to excavation bottom, without altering required top elevation. Lean concrete, flowable fill, or compacted structural fill may be used to bring elevations to proper position, when acceptable by A/E.

C. Additional Excavation: When excavation has reached required subgrade elevations, notify Soils Engineer who will make an inspection of conditions.

1. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated materials as directed by A/E
2. Removal of unsuitable material below the subgrade elevation and its replacement as directed will be paid by the Owner on basis of contract conditions relative to change in work.

D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of materials excavated.

1. Maintain sides and slopes of excavations in safe conditions until completion of backfilling.

E. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
2. Convey water removed from excavations and rain water into approved sediment control devices. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
3. Excessive groundwater conditions: Refer to the General Conditions.

G. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

1. Prevent saturation of soil above the optimum moisture content.
2. Locate and retain soil materials away from edge of excavations.
3. Dispose of excess soil material and waste materials as herein specified.

H. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

1. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

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2. If in excavating for building foundations the soil directly below the building foundations is disturbed, the disturbed soil shall be removed and shall be recompacted to 95% compaction or replaced with concrete backfill.

I. Excavation for Stone and Concrete Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown:

1. Where rock or concrete spoil is encountered, carry excavation 18" below subgrade and backfill with suitable material approved by the A/E.

J. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed with ample working room.

1. Excavate trenches to depth, lines, gradients, and elevations indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
2. Where rock is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of crushed stone or gravel prior to installation of pipe.
3. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.
    a. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
    b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
4. Backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing. Concrete is specified in Division 3.
5. Do not backfill trenches until tests and inspections have been made and backfilling authorized by A/E. Use care in backfilling to avoid damage or displacement of pipe systems.

K. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1 degree C.).

L. Ground Surface Preparation (Structural and Pavement areas):

1. The existing ground surface in the structural and pavement areas shall be stripped of topsoil, root mat, existing pavements, unsatisfactory soils, concrete spoil, obstructions and deleterious material. Base course material from the existing pavements may remain if approved by the A/E. The entire area shall be proof rolled, a minimum of four (4) passes, with a loaded dump truck with a minimum axle load of 10 tons in the presence of the soils engineer. Soft spots identified by the Soils Engineer during proofrolling will be undercut and backfilled in accordance with Section 3.4. Proofrolling and compaction equipment shall meet the requirements of Section 3.3.D. Undercutting and backfilling operations for eliminating soft spots above the subgrade elevation shall be included in the base bid.
2. In cut areas, prior to the construction of paving or concrete slab on grade, the entire subgrade shall be proofrolled in the presence of the Soils Engineer. Soft areas encountered during proofrolling shall be undercut and backfilled in accordance with section 3.4. Proofrolling and compaction equipment shall be in compliance with Section 3.3 D. The cost of undercutting and backfilling above the subgrade elevation shall be included in the base bid.

M. Earthwork Quantities:

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1. Contractor shall be responsible for determining earthwork quantities for the completion of the work.

3.3 COMPACTION

A. General: Control soil compaction during construction providing percentage of dry density specified for each area classification.

B. Percentage of Maximum Density Requirements: Compact soil to the following percentages of the maximum dry density which is determined in accordance with ASTM D-1557, or in accordance with ASTM D-2049 for soils which will not exhibit a well-defined moisture-density relationship.

1. Structural, pavement and walkway areas, steps and utility trenches – minimum compaction of 95% of the maximum dry density.
2. Lawn areas outside the designated structural fill limits – minimum compaction 85% of the maximum dry density and maximum compaction of 90% of the maximum dry density.

C. Moisture Control: Obtaining a uniformly high degree of compaction requires control over the moisture content of the material being placed in the fills and backfill. The soils used in fill and backfill shall be brought to within 3% of optimum moisture at no additional cost to the Owner.

1. Where the soil layer is too dry, the Contractor shall apply water uniformly using approved equipment to increase the moisture content to within 3% of the optimum, taking precautions to prevent free water from appearing on the surface during or subsequent to compaction operations.
2. Where the soil layer is too wet, the Contractor shall dry the soils by plowing or discing to aerate the soil and reduce the moisture content to within 3% of the optimum.

D. Compaction equipment shall be as required to complete the scope of work outlined in the geotechnical report, contract documents and specifications for this project.

3.4 BACKFILL AND FILL

A. General: Place acceptable soil material in layers not more than eight (8) inches in thickness to required subgrade elevations, for each area classification listed below. Each layer shall be compacted to the requirements of Section 3.3B.

1. Fill and backfill within building and pavement limits and in utility trenches shall be structural fill soils meeting the requirements of Section 2.1.A.
2. Under lawn areas outside the designated structural fill limits, backfill and fill soils shall be soils meeting the requirements of Section 2.1.A, or other on site materials approved by the Geotechnical Engineer.
3. Fill and backfill located below walkways and steps shall be constructed of structural fill soils meeting the requirements of Section 2.1.A.
4. Drainage fill material shall be proof rolled to a uniform stable condition prior to placement of vapor retarder.
5. Stone base course shall be compacted to 95% maximum dry density per ASTM D-1557.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, subdrainage damp proofing, waterproofing, and perimeter insulation.
2. Concrete and masonry have cured 28 days and is adequately braced.
3. Inspection, testing, approval, and recording locations of underground utilities.
4. Removal of concrete formwork.
5. Removal of trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

C. Ground surface preparation: Shall be in accordance with Section 3.2K.

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1. When existing ground surface has density less than that specified under Section 3.3B for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum dry density.

D. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth, for material compacted by heavy compaction equipment and not more than 4" in loose depth for material compacted by hand-operated tampers.

1. Before compaction, moisten or aerate each layer as may be necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density for each classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.
3. Structural fill shall extend a minimum of five (5) feet beyond building and road pavement limits and shall include the support slopes to their full width.
4. Backfilling against pipe structures, whose joints involve the use of cement mortar or other concrete, or where buttresses are constructed, shall not be done until mortar has set at least 12 hours.
5. Compaction over one foot above the pipe shall be done with approved mechanical tampers. Compaction density shall be as specified in Section 3.3.

E. Utility trench backfill

1. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
2. Coordinate backfilling with utilities testing.
3. Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
4. Fill voids with approved backfill materials while shoring, bracing, and sheeting is removed.
5. Place and compact final backfill of satisfactory soil material to final subgrade.
6. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
7. Utility trench backfill shall meet standards and specifications of the City of Roanoke, the Western Virginia Water Authority, and VDOT as applicable.

3.5 ROUGH GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surfaces with specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades. In fill areas, sloped surfaces steeper than 5 horizontal to 1 vertical shall be benched so that fill materials will be placed on a level surface. All fill subgrades shall be observed by the Geotechnical Engineer.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevations.

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2. Walks: Shape surface or areas under walks to line, grade and cross-section, with finish surface not more than .04' above or below required subgrade elevation
3. Pavements: Shape surface areas under pavement to line, grade and cross-section, with finish surface not more than .04' for bituminous surfaces and 08' for stone surfaces, above or below required subgrade elevation.

C. Grading Surface or Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of .02' when tested with a 10' straightedge.

3.6 BUILDING SLAB BASE COURSE

A. General: Slab base course consists of placement of drainage fill or stone base course material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.

B. Placing: Place slab base course on prepared subgrade in layers of uniform thickness, conforming to indicate cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

1. When a compacted drainage course is shown to be 6" thick or less, place material in a single layer. Where shown to be more than 6" thick, place material in equal layers, except no single layers more than 6" or less than 3" in thickness when compacted.

C. Any ruts or soft yielding spots which may occur or any areas having inadequate compaction or deviations from the requirements set forth herein shall be corrected by removing and adding uniformly graded crushed stone or by loosening crushed gravel, reshaping and recompacting. The subgrade shall have a uniform density throughout its entire depth and width and shall be approved by the A/E prior to pouring any concrete.

D. Following this preparation, the subgrade shall be protected from damage as described below:

1. The subgrade shall be protected from damage by heavy loads or equipment moving on tracks or cleats.
2. The contractor shall at all times keep the subgrade drained.
3. No concrete shall be deposited upon a frozen subgrade nor, until the subgrade has been approved by the A/E.
4. Immediately in advance of placing concrete, the subgrade shall be sprinklered with as much water as it can readily absorb.

3.7 FINISH GRADING & PLACING TOPSOIL

A. Refer to Specification Section 32 92 00 – “Turf and Grasses”

3.8 MAINTENANCE

A. Protection of graded areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.

B. Reconditioning compacted areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

C. Restore areas previously occupied by stockpiled materials to match finished condition of the remainder of the work.

3.9 APPLICATION OF SOIL TREATMENT

A. Refer to Section 31 31 16 Termite control

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3.10 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials including trash, debris, and unsuitable and excess excavated material, and dispose of off Owner's property.

3.11 FIELD QUALITY CONTROL – SOILS

A. Quality Control Testing During Construction: Within the lump sump prices bid, Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections. Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

1. Perform field density tests in accordance with ASTM D-1556 (sand cone method) or ASTM D-2922 and D-3017(shallow depth nuclear method), as applicable.
2. Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab area, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case less than 2 tests. Field density tests shall be made at all walkway entrances and ramps into the proposed building.
3. Foundation Wall Backfill: Take enough field density tests to ensure backfill is being properly compacted.
4. Utility Trench Backfill: Perform field density tests on a spot-check basis to determining if compaction is in accordance with the specifications.
5. Lawns, athletic fields and areas receiving topsoil: Perform field density tests on a spot-check basis to assist the Contractor in determining if compaction is in accordance with the specifications.
6. If in opinion of A/E, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.
7. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent evaluation and approval of each footing subgrade should be performed by Geotechnical Testing Agency.
8. Costs of testing and inspection shall be borne by the Contractor.

3.12 TESTING AND INSPECTION

A. INSPECTION AGENCY: Inspect and test construction of embankments, fills, backfills, trenches, and subgrades and report to the A/E conformance in all particulars to specification requirements.

B. Scheduling:

1. Assign qualified personnel to be on site at all times when operations are scheduled.
2. The Contractor should note that no earthwork operation shall be permitted in their absence.

C. Responsibilities:

1. Evaluation of subgrade preparation and suitability.
2. Moisture content and field density tests on all layers of fill and backfill material placed.
3. Evaluation of degree of compaction attained for all fill and backfill material placed.
4. Testing and evaluation of borrow material.
5. Sources of borrow and of select fill.
6. Footing subgrade suitability.
7. Inspection of installation of Subdrainage system.

D. Results of Tests:

1. Make results available to the Soils Engineer and A/E immediately upon completion of areas of layers.

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E. Final Report: The Inspection Agency shall prepare a written report that summarizes the work inspected during the course of the project. A discussion of all deviations from the contract documents and specifications, with their related impact on the final construction, shall be described in detail. The engineer of record shall review this final report, and recommend corrective measures (as deemed necessary) that must be made prior to final acceptance of the work. Prior to final payment, a written report certifying that the work meets the requirements of the contract documents, specifications, and all governing agencies shall be prepared, submitted, and approved by the A/E.

PART 4 - END OF SECTION 31 20 00

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SECTION 31 22 00 – GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading the site for site structures.

C. Finish grading.

1.2 QUALITY ASSURANCE

A. Contractor shall follow recommendations provided in the Geotechnical Report provided in Division 02. Recommendations from the report shall govern if the recommendations are more restrictive than these specifications.

1.3 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: See Section 31 23 23.

B. Other Fill Materials: See Section 31 23 23.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs, from damage by grading equipment and vehicular traffic.

G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

H. Protect plants, lawns, rock outcroppings and other features to remain as a portion of final landscaping.

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3.3 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

G. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.4 SOIL REMOVAL

A. Stockpile excavated topsoil on site.

B. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion

3.5 FINISH GRADING

A. Before Finish Grading:

1. Verify building and trench backfilling have been inspected.
2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

D. Place topsoil in areas indicated.

E. Place topsoil where required to level finish grade.

F. Place topsoil to thickness as scheduled.

G. Place topsoil during dry weather.

H. Remove roots, weeds, rocks, and foreign material while spreading.

I. Near plants, spread topsoil manually to prevent damage.

J. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

K. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

L. Lightly compact placed topsoil.

3.6 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.7 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

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B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.8 CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

3.9 FIELD QUALITY CONTROL

A. See Section 31 23 23 for compaction density testing.

END OF SECTION

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SECTION 31 23 16 - EXCAVATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

1.2 QUALITY ASSURANCE

A. Contractor shall follow recommendations provided in the Geotechnical Report provided in Division 02. Recommendations from the report shall govern if the recommendations are more restrictive than these specifications.

B. Regulatory Requirements: All utility trenching shall meet standards and specifications of the City of Roanoke, the Western Virginia Water Authority, and VDOT as applicable.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Notify utility company to remove and relocate utilities.

D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Protect plants, lawns, rock outcroppings, and other features to remain.

3.3 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut utility trenches wide enough to allow inspection of installed utilities.

F. Hand trim excavations. Remove loose matter.

G. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 23 23.

H. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

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I. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect. If the proposed excavation extends more than 1 foot into the excavation, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by the Geotechnical Engineer.

J. Remove excavated material that is unsuitable for re-use from site.

K. Remove excess excavated material from site.

3.4 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by Architect before placement of foundations.

3.5 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

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SECTION 31 23 16.13 – TRENCHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.2 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses 2017.

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2019.

D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)) 2012, with Editorial Revision (2015).

E. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method 2015, with Editorial Revision (2016).

F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)) 2012, with Editorial Revision (2015).

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.

H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2017.

I. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils 2017, with Editorial Revision (2018).

J. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017a.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.

C. Regulatory Requirements: All utility trenching shall meet standards and specifications of the City of Roanoke, the Western Virginia Water Authority, and VDOT as applicable.

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PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. General Fill: Conforming to Access Management Regulations and Standards of Virginia standard.

B. Granular Fill: Coarse aggregate, conforming to Access Management Regulations and Standards of Virginia standard.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, woven.

2.3 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Notify utility company to remove and relocate utilities.

D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Protect plants, lawns, rock outcroppings and other features to remain.

F. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

3.3 TRENCHING

A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

G. Remove excavated material that is unsuitable for re-use from site.

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H. Remove excess excavated material from site.

I. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

J. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

3.4 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.5 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

G. Correct areas that are over-excavated.

1. Thrust bearing surfaces: Fill with concrete.
2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

H. Compaction Density Unless Otherwise Specified or Indicated:

1. Under paving, slabs-on-grade and similar construction: 97 percent of maximum dry density.
2. At other locations: 95 percent of maximum dry density.

I. Reshape and re-compact fills subjected to vehicular traffic.

3.6 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

3.7 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.8 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167 or ASTM D6938.

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C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180 or ASTM D698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.9 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

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SECTION 31 23 19
DEWATERING

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes construction dewatering.

B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities and support facilities.
2. Division 31 Section "Earth Moving" for excavating, backfilling, site grading and for site utilities.
3. Division 31 Section "Excavation Support and Protection."

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.

1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Accomplish dewatering without damaging existing buildings adjacent to excavation.
4. Remove dewatering system if no longer needed.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
2. The geotechnical report is included elsewhere in the Project Manual.

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C. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PART 2 PRODUCTS (Not Used)

PART 3 - PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If

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dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 OBSERVATION WELLS

A. Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated and additional observation wells as may be required by authorities having jurisdiction.

B. Observe and record daily elevation of ground water and piezometric water levels in observation wells.

C. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. Suspend construction activities in areas where observation wells are not functioning properly until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.

1. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

PART 4 - END OF SECTION

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SECTION 31 23 23 - FILL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.2 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: 4 inches below finish grade elevations indicated on drawings, unless otherwise indicated.

1.3 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses 2017.

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.

C. ASTM C150/C150M - Standard Specification for Portland Cement 2019a.

D. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2012.

E. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)) 2012, with Editorial Revision (2015).

F. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method 2015, with Editorial Revision (2016).

G. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)) 2012, with Editorial Revision (2015).

H. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.

I. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils 2017, with Editorial Revision (2018).

J. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017a.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Samples: 10 pounds sample of each type of fill; submit in air-tight containers to testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

E. Compaction Density Test Reports.

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1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

B. Contractor shall follow recommendations provided in the Geotechnical Report provided in Division 02. Recommendations from the report shall govern if the recommendations are more restrictive than these specifications.

1.6 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.

1.7 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. General Fill: Subsoil excavated on-site.

1. Graded.
2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
3. Conforming to ASTM D2487 Group Symbol CL.

B. Structural Fill: Subsoil excavated on-site.

1. Graded.
2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
3. Conforming to ASTM D2487 Group Symbol CL.

C. Concrete for Fill: Lean concrete.

D. Granular Fill: Pit run washed stone; free of shale, clay, friable material and debris.

1. Graded in accordance with ASTM C136/C136M, within the following limits:

a. 2 inch sieve: 100 percent passing.
b. 1 inch sieve: 95 percent passing.
c. 3/4 inch sieve: 95 to 100 percent passing.
d. 5/8 inch sieve: 75 to 100 percent passing.
e. 3/8 inch sieve: 55 to 85 percent passing.
f. No. 4 sieve: 35 to 60 percent passing.
g. No. 16 sieve: 15 to 35 percent passing.
h. No. 40: 10 to 25 percent passing.
i. No. 200: 5 to 10 percent passing.

E. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.

1. Graded in accordance with ASTM C136/C136M; within the following limits:

a. No. 4 sieve: 100 percent passing.
b. No. 14 sieve: 10 to 100 percent passing.
c. No. 50 sieve: 5 to 90 percent passing.
d. No. 100 sieve: 4 to 30 percent passing.

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e. No. 200 sieve: 0 percent passing.

F. Topsoil: See Section 31 22 00.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, woven.

2.3 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. See Section 31 22 00 for additional requirements.

D. Verify structural ability of unsupported walls to support imposed loads by the fill.

E. Verify areas to be filled are not compromised with surface or ground water.

3.2 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.3 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

F. Correct areas that are over-excavated.

1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

G. Compaction Density Unless Otherwise Specified or Indicated:

H. Reshape and re-compact fills subjected to vehicular traffic.

I. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed

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unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.4 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), AASHTO T 180.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Proof roll compacted fill at surfaces that will be under slabs-on-grade.

3.6 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

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SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Chemical soil treatment.

1.2 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

C. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.

C. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.

D. Test Reports: Indicate regulatory agency approval reports when required.

E. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.

F. Certificate of compliance from authority having jurisdiction indicating approval of toxicants.

G. Manufacturer's Instructions: Indicate caution requirement.

H. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three (3) years of documented experience.

I. Maintenance Data: Indicate re-treatment schedule.

J. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing this type of work and:

1. Having minimum of three (3) years documented experience.
2. Approved by manufacturer of treatment materials.
3. Licensed in the State in which the Project is located.

1.5 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year installer's warranty against damage to building caused by termites.

1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.

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PART 2 - PRODUCTS

2.1 CHEMICAL SOIL TREATMENT

A. Toxicant Chemical: EPA Title 7, United States Code, 136 through 136y approved; synthetically color dyed to permit visual identification of treated soil.

B. Diluent: Recommended by toxicant manufacturer.

C. Manufacturers:

1. ArgEvo Environmental Health, Inc.
2. Bayer Environmental Science Corp: www.backedbybayer.com/pest-management/#sle.
3. FMC Professional Solutions: www.fmcprosolutions.com/#sle.
4. Syngenta Professional Products: www.syngentaprofessionalproducts.com/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements.

D. Mixes: Mix toxicant to manufacturer's instructions.

E. Toxicant Chemical: EPA approved; synthetically color dyed to permit visual identification of treated soil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

B. Verify final grading is complete.

3.2 APPLICATION - CHEMICAL TREATMENT

A. Comply with requirements of U.S. EPA and applicable state and local codes.

B. Spray apply toxicant in accordance with manufacturer's instructions.

C. Apply toxicant at following locations:

1. Under Slabs-on-Grade.
2. At Both Sides of Foundation Surface.
3. Soil Within 10 feet of Building Perimeter For a Depth of 5 feet.

D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.

E. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.

F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.

G. Re-treat disturbed treated soil with same toxicant as original treatment.

H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.3 PROTECTION

A. Do not permit soil grading over treated work.

END OF SECTION

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SECTION 31 50 00
EXCAVATION SUPPORT AND PROTECTION

PART 1 - PART 1 GENERAL

1.1 SUMMARY

A. This Section includes temporary and permanent excavation support and protection systems.

1.2 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.

1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.3 SUBMITTALS

A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For Installer and professional engineer.

1.4 PROJECT CONDITIONS

A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer.

1. The geotechnical report is referenced elsewhere in the Project Manual.

B. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PART 2 PRODUCTS

2.1 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 4 inches.

E. Shotcrete: Comply with Division 3 Section "Shotcrete" for shotcrete materials and mixes, reinforcing, and shotcrete application.

F. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

G. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

PART 3 - PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 SOLDIER BEAMS AND LAGGING

A. Install steel soldier beams before starting excavation. Space soldier beams at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier beams as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at centers indicated and secure to soldier beams.

3.3 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

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3.4 TIEBACKS

A. Tiebacks: Drill for, install, grout, and tension tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

1. Test loading shall be observed by a qualified professional engineer responsible for design of excavation support and protection system.
2. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by Architect.
2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
2. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

B. Leave excavation support and protection systems permanently in place.

PART 4 - END OF SECTION 31 50 00

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SECTION 31 50 10
EXCAVATION SUPPORT AND PROTECTION

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes temporary excavation support and protection systems.

B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities and support facilities.
2. Division 31 Section "Earth Moving" for excavating and backfilling and for existing utilities.
3. Division 31 Section "Dewatering" for dewatering excavations.

1.3 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.

1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 SUBMITTALS

A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For Installer and professional engineer.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems.

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
2. The geotechnical report is included elsewhere in the Project Manual.

C. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PART 2 PRODUCTS (Not Used)

PART 3 - PART 3 EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

PART 4 - **END OF SECTION**

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SECTION 32 12 16
ASPHALT PAVING

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving overlay.
4. Asphalt surface treatments.
5. Pavement-marking paint.
6. Cold milling of existing hot-mix asphalt pavement.

B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.3 DEFINITIONS

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

B. DOT: City of Roanoke.

1.4 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of the Virginia Department of Transportation (VDOT).

1. Standard Specification: Virginia Department of Transportation (VDOT).
2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

C. Job-Mix Designs: For each job mix proposed for the Work.

D. Qualification Data: For manufacturer.

E. Material Test Reports: For each paving material.

F. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

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1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.

C. Regulatory Requirements: Comply with City of Roanoke Right-of-Way Excavation and Restoration Standards and VDOT Standards and Specifications for asphalt paving work.

D. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
2. Review condition of subgrade and preparatory work.
3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp. Adhere to all specifications in the VDOT Standards and Specifications.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at minimum ambient or surface temperatures specified in the VDOT Standards and Specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials: All materials used under this section shall conform to VDOT Standards and Specifications, including, but not limited to: graded aggregate, asphalt cement, and tack coat.

B. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency. Provide granular, liquid or wettable powder form. Obtain written approval from the Maryland Department of the Environment prior to application of the herbicide.

1. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

a. Ciba-Geigy Corp.
b. Dow Chemical, USA
c. E.I. Du Pont de Nemours & Co., Inc.
d. FMC Corp

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e. Thompson-Hayward Chemical Co.
f. U.S. Borax and Chemical Corp.
g. Allied Chemical Corp.
h. Ag-Chem Products, Inc.

C. Lane Marking Paint: Paint shall comply with VDOT Standards and Specifications.

1. Color: White
2. Color: Yellow
3. Color: Blue

D. Joint Sealants: Joint Sealants shall comply with VDOT Standards and Specifications.

E. Tack Coat: VDOT Standards and Specifications.

2.2 MIXES

A. Hot-Mix Asphalt: Provide Plant Mixed, hot-laid, asphalt-aggregate mixture complying with VDOT Standards and Specifications.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with if formulated by manufacturer for that purpose.
2. Remove spillages and clean affected surfaces.

D. Proceed with paving only after unsatisfactory conditions have been corrected.

E. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at a rate of 0.05 to 0.10 gal. Per sq. yd. Of surface in accordance with State Highway Construction and Material Specifications.

F. Allow to dry until at proper condition to receive paving.

G. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.2 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of as specified on plans.
2. Mill to a uniform finished surface free of gouges, grooves, and ridges.
3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Transport milled hot-mix asphalt to asphalt recycling facility.

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7. Keep milled pavement surface free of loose material and dust.

3.3 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.10 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

E. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.5 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 225 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.

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5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Immediately correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course. Joints shall comply with VDOT Standards and Specifications.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

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H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Contractor shall provide striping on parking and roadway surfaces as indicated on the plans. The following is a list of all required striping:

1. Parking stalls.
2. Cross-hatch/gore areas.
3. Handicap Parking symbols.
4. Stop bars.
5. Directional arrows.
6. Lane lines.
7. Words/numbers.

C. Allow paving to age for 30 days before starting pavement marking.

D. Sweep and clean surface to eliminate loose material and dust.

E. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal. for all markings with the exception of parking stall lines.

3.10 WHEEL STOPS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded at one-quarter to one-third points. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: With in the lump sum prices bid, contractor engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

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C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.12 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated materials to accumulate on-site.

PART 4 - END OF SECTION

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SECTION 32 13 13
CONCRETE PAVING

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Walkways.
5. Truncated domes

B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Qualification Data: For manufacturer. Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

D. Material Test Reports: General contractor will engage a qualified testing agency for indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.

7. Bonding agent or epoxy adhesive.
8. Joint fillers.

F. Field quality-control test reports.

G. For plazas and wide walkways, submit control joint spacing plan for review.

H. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," for concrete outside of concrete parking lot.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete producer.
d. Concrete pavement subcontractor.

2. Regulatory requirements: Comply with City of Roanoke Right-of-Way Excavation and Restoration Standards and VDOT standards and specifications for concrete paving work.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1. Traffic control plan for public streets shall be submitted to and approved by the City of Roanoke.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Products: Subject to compliance with requirements, provide one of the products specified.

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3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

D. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615/A 615M, Grade 60 deformed bars.

E. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.

F. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

G. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60, plain steel bars.

H. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

J. Zinc Repair Material: ASTM A 780.

2.4 CONCRETE MATERIALS

A. Materials: All materials including but not limited to reinforcing materials, concrete materials, concrete mix, admixtures, curing materials, traffic paint and other related materials used under this section shall conform to VDOT Standards and Specifications. References to a required class of concrete shall correspond to the classes as shown in VDOT Standards and Specifications.

B. Fly ash shall meet the approval of the ASTM C-618 pozzolan Class F and may be used as a partial substitute for cement when approved by the Architect.

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C. The concrete mix used in performing this work shall be per VDOT Standards and Specifications depending on the compressive strength shown on the details and shall meet the approval of the Architect.

D. The concrete temperature shall not exceed 90°F when delivered to the job-site or at any time prior to placement in the forms.

E. Type I - Portland Cement: Shall be used from October 1 through May 1 and when the air temperature in the shade and away from artificial heat is above 70°F or less, or as directed by the Architect.

F. Type II - Portland Cement: Shall be used from May 1 through October 1 and when the air temperature in the shade and away from artificial heat is above 70°F, or as directed by the Architect.

G. When approved by the Architect, Hi-Early strength concrete may be used. Approval will be on a case by case basis.

H. Water: ASTM C 94/C 94M.

I. Air-Entraining Admixture: ASTM C 260.

J. Chemical Admixtures: Admixtures may only be use with prior approval by the Architect. Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

1. Available Products:

a. Fibrillated Fibers:

1) Axim Concrete Technologies; Fibrasol F.
2) FORTA Corporation; Forta.
3) Euclid Chemical Company (The); Fiberstrand F.
4) Grace, W. R. & Co.--Conn.; Grace Fibers.
5) SI Concrete Systems; Fibermesh.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

1. Available Products:

a. Axim Concrete Technologies; Cimfilm.

b. Burke by Edeco; BurkeFilm.
c. ChemMasters; Spray-Film.
d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
e. Dayton Superior Corporation; Sure Film.
f. Euclid Chemical Company (The); Eucobar.
g. Kaufman Products, Inc.; Vapor Aid.
h. Lambert Corporation; Lambco Skin.
i. L&M Construction Chemicals, Inc.; E-Con.
j. MBT Protection and Repair, ChemRex Inc.; Confilm.
k. Meadows, W. R., Inc.; Sealtight Evapre.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
n. Sika Corporation, Inc.; SikaFilm.
o. Symons Corporation; Finishing Aid.
p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.

E. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

1. Available Products:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.
b. Burke by Edoco; Resin Emulsion White.
c. ChemMasters; Safe-Cure 2000.
d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
f. Euclid Chemical Company (The); Kurez VOX White Pigmented.
g. Kaufman Products, Inc.; Thinfilm 450.
h. Lambert Corporation; Aqua Kure-White.
i. L&M Construction Chemicals, Inc.; L&M Cure R-2.
j. Meadows, W. R., Inc.; 1200-White.
k. Symons Corporation; Resi-Chem White.
l. Tamms Industries, Inc.; Horncure 200-W.
m. Unitex; Hydro White.
n. Vexcon Chemicals, Inc.; Certi-Vex Enviocure White 100.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or pre-molded wood fiber strips (Homex 300) or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Chemical Surface Retarder: (For exposed aggregate concrete) Water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.

1. Products:

a. Burke by Edeco; True Etch Surface Retarder.
b. ChemMasters; Exposee.
c. Conspec Marketing & Manufacturing Co., Inc.; Delay S.
d. Euclid Chemical Company (The); Surface Retarder S.
e. Kaufman Products, Inc.; Expose.

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f. Metalcrete Industries; Surftard.
g. Nox-Crete Products Group, Kinsman Corporation; Crete-Nox TA.
h. Scofield, L. M. Company; Lithotex.
i. Sika Corporation, Inc.; Rugasol-S.
j. Vexcon Chemicals, Inc.; Certi-Vex Envioset.

2.8 WHEEL STOPS

A. Wheel Stops: Solid, integrally colored, 96 percent recycled HDPE or commingled postconsumer and postindustrial recycled plastic; UV stabilized; 4 inches high by 6 inches wide by 72 inches long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Dowels: Galvanized steel, 3/4-inch diameter, 10-inch minimum length.

2.9 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): As indicated on drawings. Minimum compressive strength of 3,000 psi where not indicated
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
3. Slump Limit: 2-5, plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture, plasticizing and retarding admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals. Limits shall be as follows per MD SHA requirements:

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.

G. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

H. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

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2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116 where synthetic fibers are noted on the plans. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.11 ADA TRUNCATED DOMES

A. General: In-line replaceable designed to be installed in a “wet set” condition. Units must include anchors which allow replacement by removing colored covers and bolts while leaving anchors in place.

B. Materials: Homogenous glass and carbon reinforced composite

1. UV stable and colorfast.
2. Resistant to slat and chemical staining per ASTM B 117 & 1308.
3. Minimum Compressive and Tensile Strength of 28,900 psi and 11,600 psi respectively.
4. Must be able to handle load bearing capacity of 16,000 lbs per AASHO –H20 with no visible damage.
5. Color must be uniform throughout with no paint or coating to provide color.
6. Dome geometry must comply with ADA regulations for detectable warnings at curb ramps in diameter, height and spacing.

C. Where installation on radius is shown, provide precut and scored units for installation without gaps and piecemeal infills. Field cut rectangular units will not be acceptable.

D. Units shall be by ADA Solutions, Inc. or approved equal.

2.12 PAVEMENT MARKINGS

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N; colors complying with FS TT-P-1952.

1. Color: As indicated.

PART 3 - PART 3 EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."

C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

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3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
2. Provide tie bars at sides of pavement strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. By default, all isolation joints are scheduled to receive joint sealant. If joint sealant is specifically indicated as not required, place top of joint filler flush with finished concrete surface.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

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6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated for standard walkways. For larger walkways, width greater than 12' and plazas, submit shop drawing of joint pattern. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 3/8-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

H. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

I. Screed pavement surfaces with a straightedge and strike off.

J. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

K. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

L. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

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1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

M. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

N. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

O. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Construct test sections of each type of concrete paving, including at least one expansion joint and control joints, for review by CM, Owner and Architect for agreement of finish prior to starting concrete installation. Review will include texture of broom finish, joint striking, picture framing and geometric conformity.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
3. Incorporate “picture framing” of concrete in finish within lump sum prices bid.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

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1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.
11. Curbs – vertical ¼” in 10’

3.10 WHEEL STOPS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes drilled or cast into wheel stops at one-quarter to one-third points. Firmly bond each dowel to wheel stop and to pavement. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.

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a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.13 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

PART 4 - END OF SECTION

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SECTION 32 13 73
CONCRETE PAVING JOINT SEALANTS

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within cement concrete pavement.

B. Related Sections include the following:

1. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F .
2. When joint substrates are wet or covered with frost.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

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PART 2 - PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

2.3 COLD-APPLIED JOINT SEALANTS

A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.

1. Products:

a. Crafco Inc.; RoadSaver Silicone.
b. Dow Corning Corporation; 888.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

PART 3 - PART 3 EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.

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3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

PART 4 - END OF SECTION 32 13 73

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SECTION 32 14 00 - UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

A. Section Includes:

1. Concrete pavers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data:

1. For materials other than water and aggregates.
2. For the following:

a. Pavers.
b. Bituminous setting materials.
c. Mortar and grout materials.
d. Edge restraints.

B. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C136.

C. Samples for Initial Selection: For each type of unit paver indicated and the following:

1. Joint materials involving color selection.
2. Exposed edge restraints involving color selection.

D. Samples for Verification: For full-size units of each type of unit paver indicated. Assemble no fewer than five Samples of each type of unit on suitable backing and grout joints.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.

C. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C67.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified unit paving installer. Installer's personnel assigned to the Work shall have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with one of the following designations:

1. Residential Paver Technician Designation.
2. Commercial Paver Technician Designation.

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B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Submit to latex-additive manufacturer, for testing as indicated below, Samples of flooring materials that will contact or affect mortar and grout that contain latex additives.

1. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimal adhesion with, and will be nonstaining to, installed brick and other materials constituting brick flooring installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquids in tightly closed containers protected from freezing.

E. Store asphalt cement and other bituminous materials in tightly closed containers.

1.9 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Bituminous Setting Bed:

1. Install bituminous setting bed only when ambient temperature is above 40 deg F and when base is dry.
2. Apply asphalt adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg Ffor 12 hours immediately before application. Do not apply when setting bed is wet or contains excess moisture.

C. Weather Limitations for Mortar and Grout:

1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg Fand higher.

a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mphand ambient temperature exceeds 90 deg F, set pavers within 1 minute of spreading setting-bed mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

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2.2 CONCRETE PAVERS

A. ADA Truncated Dome Concrete Unit Pavers

1. Basis-of-Design: Hanover Architectural Products, Detectable Warning Paver
2. Color and Finish: Charcoal, Natural Finish.
3. Size: 12 inches by 12 inches by 2 inches deep.

B. Concrete Pavers, Solid Paving Units, Normal-Weight Concrete: Solid paving units made from normal-weight concrete with a compressive strength not less than 6000 psi, water absorption not more than 5 percent according to ASTM C140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C67.

1. Thickness: 3 15/16 inches.
2. Face Size and Shape:

a. 35 7/16 inches by 11 13/16 inches.

3. Color: Refer to Landscape Drawings.
4. Basis-of-Design: Techo-Bloc Industria Granitex; Industria 900 Series.
5. Refer to Landscape Drawings for more information.

2.3 CURBS AND EDGE RESTRAINTS

A. Steel Edge Restraints: Manufacturer's standard painted steel edging with loops pressed from or welded to face to receive stakes at 36 inches o.c. and steel stakes 15 inches long for each loop.

1. Basis-of-Design: Border Line Steel Landscape Edging by Border Concepts, Inc.
2. Color: Black.
3. Refer to Landscape Drawings for sizes and locations of edge restraints.

2.4 ACCESSORIES

A. Compressible Foam Filler: Preformed strips complying with ASTM D1056, Grade 2A1.

2.5 AGGREGATE SETTING-BED MATERIALS

A. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate.

B. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.

1. Provide sand of color needed to produce required joint color.

C. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.

C. Proceed with installation only after unsatisfactory conditions have been corrected and waterproofing protection is in place.

3.2 PREPARATION

A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

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B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.

C. Proof-roll prepared subgrade according to requirements in Section 31 20 00 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

3.3 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

1. For concrete pavers, a block splitter may be used.

D. Handle protective-coated brick pavers to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.

E. Joint Pattern: As indicated.

F. Tolerances:

1. Do not exceed 1/32-inchunit-to-unit offset from flush (lippage) or 1/8 inch in 10 feetfrom level, or indicated slope, for finished surface of paving.

G. Expansion and Control Joints:

1. Provide cork joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

H. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

1. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after unit paver installation.
2. For metal edge restraints with top edge exposed, drive stakes at least 1 inch below top edge.

3.4 AGGREGATE SETTING-BED APPLICATIONS

A. Compact soil subgrade uniformly to at least 95 percent of ASTM D698 laboratory density.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Place aggregate subbase and base, compact by tamping with plate vibrator, and screed to depth indicated.

D. Place aggregate subbase and base, compact to 100 percent of ASTM D1557 maximum laboratory density, and screed to depth indicated.

E. Treat leveling course with herbicide to inhibit growth of grass and weeds.

F. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size unit pavers.

1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

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G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.

H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

I. Do not allow traffic on installed pavers until sand has been vibrated into joints.

J. Repeat joint-filling process 30 days later.

3.5 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

END OF SECTION 32 14 00

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SECTION 32 31 00 - FENCES AND GATES, INFILL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior swing infill panel for steel gate

B. Products furnished but not installed under this Section include inserts and anchors for attachment.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance of Gate System: Engineer, fabricate, and install guardrail systems to comply with requirements of ASTM E 985 for structural performance.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of ornamental gate system to prevent buckling, opening up of joints, and overstressing of components, connections, and other detrimental effects. Base design calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.

C. Shop drawings showing fabrication and installation of gate system including plans, elevations, sections, details of components, and attachments to other units of Work. Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional engineer responsible for their preparation. Provide elevation of gate, including panel size, clips, gate hardware and panel installation for approval prior to fabrication.

D. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors available for those units with factory-applied color finishes.

E. Samples for verification purposes of each type of exposed finish required, prepared on components indicated below that are of the same thickness and metal indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain gate system of each type and material from a single manufacturer.

B. Engineering Responsibility: Engineer gate and infill system by qualified professional engineer legally authorized to practice in jurisdiction where Project is located.

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1.5 PROJECT CONDITIONS

A. Field Measurements: Check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of Work.

1.6 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on ornamental gate components within the specified warranty period and agreeing to repair finish or replace components that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXTERIOR STEEL GRILLE GATES

A. Representative Product: Orsogril, Sterope Pattern"; manufactured by Barnett Bates.

B. Materials: Electro-forged welded steel swing gate, with posts and hinges.

1. Gate Design: Match Orsogril Pattern: Sterope manufactured by Bennett Bates.
2. Posts: Minimum 2 by 2-inch steel tubes or manufacturer's standard.
3. Hinges: Weld female hinge half to gate frame and field bolt male hinge half to post.
4. Finish: Polyester coated galvanized steel, hot dip galvanized according to ASTM A 123.
5. Color: As selected by Architect to match other building components.
6. Pattern: BarnettBates Orsogril Sterope standard rectangular design. Nominal 2-7/16" x 5-3/16" Grid Opening. 1" x 3/32" main bar on 2-7/16" centers, 3/16" diameter round crossbar at 5-3/16" centers
7. Prepare gate for panic hardware.

2.2 METALS

A. General: Provide metal forms and types that comply with requirements of referenced standards and that are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

2.3 FASTENERS

A. Fasteners for Anchoring Gate System to Other Construction: Select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring gateto other types of construction indicated and capable of withstanding design loadings. For steel fittings use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating or ASTM B 696, Class 12 for cadmium plating.

B. Fasteners for Interconnecting Gate System Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work, except where otherwise indicated.

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C. Cast-In-Place and Postinstalled Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.

1. Cast-in-place anchors.

2.4 FABRICATION

A. General: Fabricate gate system to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, and anchorage, but not less than that required to support structural loads.

B. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard brackets, miscellaneous fittings, and anchors for connection of gate members to other construction.

C. Provide inserts and other anchorage devices for connecting gate system to wall as indicated in drawings. Fabricate anchorage devices capable of withstanding loadings imposed by gate systems. Coordinate anchorage devices with supporting structure.

D. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

E. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated.

F. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

G. Close exposed tops of gate members by use of manufacturer's standard prefabricated cap fittings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of fencing. Set gate accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of gate components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/4 inch in 12 feet.

C. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing gate posts to in-place construction.

3.3 PROTECTION

A. Protect finishes of gate system from damage during construction period by use of temporary protective coverings approved by gate manufacturer. Remove protective covering at time of Substantial Completion.

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B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION 32 31 19

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SECTION 32 31 32 - WOOD COMPOSITE FENCES AND GATES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wood composite fences.

B. Wood composite gates.

C. Excavation for posts.

1.2 REFERENCES

A. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

B. ASTM D 143 - Standard Test Methods for Small Clear Specimens of Timber.

C. ASTM D 198 - Standard Test Methods of Static Tests of Lumber in Structural Sizes.

D. ASTM D 1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.

E. ASTM D 1413 - Standard Test Method for Wood Preservatives by Laboratory Soil-Block Cultures.

F. ASTM D 1761 - Standard Test Methods for Mechanical Fasteners in Wood.

G. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics.

H. ASTM D 2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

I. ASTM D 2395 - Standard Test Methods for Specific Gravity of Wood and Wood-Based Materials.

J. ASTM D 4761 - Standard Test Methods for Mechanical Properties of Lumber and Wood-Base Structural Material.

K. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

L. ASTM F 1679 - Standard Test Method for Using a Variable Incidence Tribometer (VIT).

M. American Wood Preservers Association (AWPA) E1-06 - Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.

1.3 DESIGN / PERFORMANCE REQUIREMENTS

A. Design Requirements: Design fence system to withstand Miami/Dade County 110 MPH steady wind and 130 MPH gusting wind tests.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used indicating sizes, profiles, surface finishes, and performance characteristics, and including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Instructions on care and cleaning of composite wood products.

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C. Verification Samples: For each finish product specified, two samples, minimum size 9 inches (229 mm) square, representing actual product, color, and patterns.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for cleaning and maintenance.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products in accordance with the manufacturer's instructions.

B. Store level and flat, off ground or floor, with supports at each end and maximum 24 inches on center.

C. Do not stack wood composite over 8 feet (203 mm) high.

D. Cover wood composite with waterproof covering, vented to prevent moisture buildup.

1.6 WARRANTY

A. Provide manufacturer's 25-year residential warranty / 10 year commercial warranty providing coverage against checking, splitting, splintering, rotting, structural damage from termites, and fungal decay of wood composite.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Trex Fencing - Seclusions: www.trexfencing.com.

2.2 MATERIALS

A. Wood composite: Reclaimed wood and plastic with integral coloring; free from toxic chemicals and preservatives:

1. Characteristics:

a. Abrasion resistance: 0.01 inch wear per 1000 revolutions, tested to ASTM D 2394.
b. Hardness: 1124 pounds, tested to ASTM D 143.
c. Self ignition temperature: 743 degrees F, tested to ASTM D 1929.
d. Flash ignition temperature: 698 degrees F, tested to ASTM D 1929.
e. Flame spread rating: 80, tested to ASTM E 84.
f. Water absorption, 24 hour immersion, tested to ASTM D 1037:

1) Sanded surface: 4.3 percent.
2) Unsanded surface: 1.7 percent.

g. Thermal expansion coefficient, 36 inch long samples:

1) Width: 35.2 x 10-6 to 42.7 x 10-6.
2) Length: 16.1 x 10-6 to 19.2 x 10-6.

h. Fastener withdrawal, tested to ASTM D 1761:

1) Nail: 163 pounds per inch.
2) Screw: 558 pounds per inch.

i. Static coefficient of friction:

1) Dry: 0.53 to 0.55, tested to ASTM D 2047.
2) Dry: 0.59 to 0.70, tested to ASTM F 1679.
3) Wet: 0.70 to 0.75, tested to ASTM F 1679.

j. Fungus resistance, white and brown rot: No decay, tested to ASTM D 1413.

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k. Termite resistance: 9.6 rating, tested to AWPA E-1.
l. Specific gravity: 0.91 to 0.95, tested to ASTM D 2395.
m. Compression:
    1) Parallel: 1806 PSI ultimate, 550 PSI design, tested to ASTM D 198.
    2) Perpendicular: 1944 PSI ultimate, 625 PSI design, tested to ASTM D 143.
n. Tensile strength: 854 PSI ultimate, 250 PSI design, tested to ASTM D 198.
o. Shear strength: 561 PSI ultimate, 200 PSI design, tested to ASTM D 143.
p. Modulus of rupture: 1423 PSI ultimate, 250 PSI design, tested to ASTM D 4761.
q. Modulus of elasticity: 175,000 PSI ultimate, 100,000 PSI design, tested to ASTM D 4761.
r. Thermal conductivity: 1.57 BTU per inch per hour per square foot at 85 degrees F, tested to ASTM C 177.

2.3 COMPONENTS

A. Fence System: Seclusions Privacy Fence System.
    1. Fence height:
        a. Custom height as indicated on the Drawings.
    2. Components:
        a. Fence posts.
        b. Post caps:
            1) Pyramid.
        c. Top rail
        d. Aluminum bottom rail inserts.
        e. Bottom rail covers/Pickets.
        f. Fence brackets.
        g. Gate Basis-of-Design: Trex Super Duty Double Drive Gate.
    3. Surface texture: Smooth.
    4. Color: As selected by Architect from manufacturers full range.
    5. See drawings for layout, locations and details.

2.4 ACCESSORIES

A. Fasteners: 1-5/8 inch galvanized or corrosion-resistant coated steel. Provide finish nails where applicable.

B. Concrete: Provide as Specified in Section 03 30 00 - Cast-in-Place Concrete; minimum 2500 PSI compressive strength at 28 days, with a 3 to 5 inch slump.

C. Gate Hardware:
    1. Provide two Trex hinges per gate leaf minimum, and size to gate weight and conditions.
    2. Provide center gate stop and drop rod for double gates.
    3. Provide with latching mechanism.
    4. Provide with padlock provisions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

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3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Cut and drill wood composite using carbide tipped blades.

C. Space posts maximum 8 feet on center.

D. Drill post holes into undisturbed or compacted soil; excavate deeper in soft or loose soils and for posts with heavy lateral loads.

E. Drill posts to 12 inch diameter. Locate bottom of post 30 inches below grade or below frost line whichever is greater.

F. Place top of concrete flush with finished grade.

G. Screw fence brackets to posts with four 1-5/8 inch long exterior screws.

H. Cut top rails, pickets, bottom rail covers and aluminum bottom rails to lengths required.

I. Slide bottom rail covers over aluminum bottom rail pieces.

J. Position aluminum bottom rail on fence brackets with deeper side of rail channel facing downward.

K. Cut end pickets to height to provide clearance under brackets and screw to posts.

L. Insert pickets into bottom rail, interlocking adjacent pieces.

M. Position top rail and screw attach to top brackets with 1-5/8 inch long exterior screws.

N. Use finish nails to secure pickets to rails if the pickets are not tightly interlocked.

O. Place post caps over post tops and secure with construction adhesive or four finish nails.

3.4 CLEANING

A. Clean wood composite to remove stains:

1. Mold, mildew, and berry and leaf stains: Clean surfaces with conventional deck wash containing detergent or sodium hypochlorite.
2. Rust and ground-in dirt: Clean surfaces with cleaner containing oxalic or phosphoric acid.
3. Oil and grease: Clean surfaces with detergent containing degreasing agent.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 32 31 32

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SECTION 32 92 00 TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Seeding
2. Hydroseeding
3. Turf renovation
4. Erosion-control material(s)

B. Related Sections:

1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
2. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

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1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For existing native surface topsoil, existing in-place surface soil, and imported or manufactured topsoil.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and meadow establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's personnel assigned to the Work shall have certification in one of the following categories from the Professional Landcare Network:

a. Certified Landscape Technician - Exterior, with installation and maintenance specialty area(s), designated CLT-Exterior.
b. Certified Turfgrass Professional designated CTP.
c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.
d. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
e. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed. Lab must be familiar with and comply with the Virginia State Nutrient Management Laws.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.

a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Pre-installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of substantial completion.

1. Regular Seeding Season
2. Spring: March 1st - May 15th
3. Fall: August 15th – November 15th

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

B. Seeded Turf: Contractor to maintain seeded landscaping for a one (1) year maintenance period from the date of final acceptance of the project. Include all watering, mowing, trimming, reseeding, fertilizing, chemical and physical weed control and removal and other operations as necessary for a healthy lawn.

C. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

1. Sodded Turf: Contractor to maintain sodded landscaping for a minimum 90-day maintenance period from the date of final acceptance of the project. Include all watering,

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mowing, trimming, reseeding, fertilizing, chemical and physical weed control and removal, and other operations as necessary for a healthy lawn.

2. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species as follows:

C. General Lawns: Proportioned by weight as follows:

1. 50% Kentucky bluegrass (Poa pratensis). Minimum of three varieties such as Dynamo. Washington, and Laser. Variety to be approved by Architect.
2. 30% chewings red fescue (Festuca rubra variety).
3. 10% perennial ryegrass (Lolium perenne).
4. 10% tall fescue (Fetuca arundinacea).

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
2. Retain first option in subparagraph below if magnesium is required; retain second or third option if magnesium is already present in the soil. See Evaluations.
3. Provide lime in form of ground dolomitic limestone or calcitic limestone.

B. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

C. Aluminum Sulfate: Commercial grade, unadulterated.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

F. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

G. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

H. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. After all grading has been completed the soil shall be irrigated 12 to 24 hours prior to laying the sod. The sod shall not be laid on soil that is dry and powdery.

C. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pickets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

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1. Lay sod across angle of slopes exceeding 1:3.
2. Retain subparagraph below if required. Steel staple anchors are commonly used. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

D. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 2 inches below sod.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 or less decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight
2. Bulk Density: 800 – 1,000 lbs/yd2.
3. Nutrient Content (dry weight basis): N, 1% or above; P, 1% or above.
4. Source: Feedstock; agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
5. Sodium absorption ratio shall be less than 6.0.
6. Shall be fully mature and stable before usage.
7. Shall be screened using a sieve no finer than ¼” and no greater than ½”.

2.5 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

B. All fertilization must comply with the Virginia State Nutrient Management Laws.

2.6 PLANTING SOILS

A. General Lawn Areas: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of loose compost to surface soil by volume: 1:4
2. Weight of Lime per 1000 Sq. Ft: 2 lbs./1000 SF.
3. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: 1 lb./SF

B. General Lawn Areas: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Sandy Loam screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and

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aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

   a. Ratio of Loose Compost to Topsoil by Volume: 1:4.
   b. Weight of Lime per 1000 Sq. Ft.: 2 lbs. 1000 /sf.
   c. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: 1 lb/1000 SF.

C. The contractor shall submit soil analysis results from soils testing laboratory to the Architect. Indicate source and obtain Architect's approval before hauling planting mixes to site. An analysis test of a 5 pound bag sample is required.

D. The water infiltration rate of the disturbed soil sample shall be a minimum of .4 inches/hour.

E. The soil structure shall be loose, friable and not subject to consolidation or compaction.

2.7 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.8 SUBMERGED GRAVEL WETLAND SOIL

A. Soil shall be in accordance with most recent version of the Maryland Stormwater Design Manual for ESD practices and City of Salisbury Standards.

2.9 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.10 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd. with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

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PART 3 - PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than ½" in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Thoroughly blend planting soil off-site before spreading.
    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.
    c. Spread planting soil to a depth of 8 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
        1) Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
        2) Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

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2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.

    a. Apply fertilizer directly to surface soil before loosening.
    b. Remove stones larger than ½" in any dimension and sticks, roots, trash, and other extraneous matter.
    c. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

B. Fill cells of erosion-control mat with planting soil and compact before planting.

C. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

D. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 6 to 9 lbs/100 SF for General Lawns.

C. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

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G. Protect seeded areas from hot, dry weather or drying winds by applying mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly and roll surface smooth.

3.6 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic or fiber-mulch manufacturer's recommended tackifier.
2. Retain one of two subparagraphs below. See "Hydroseeding" Article in the Evaluations.
3. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.7 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. After all grading has been completed the soil shall be irrigated 12 to 24 hours prior to laying the sod. The sod shall not be laid on soil that is dry and powdery.

C. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Retain subparagraph below if required. Steel staple anchors are commonly used.
3. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

D. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 2 inches below sod.

3.8 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor re-grading is required.
2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

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H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.9 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. Retain first subparagraph below if mulching is required.
3. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
4. Regrade, replant and establish control with erosion blankets or crimped straw, in eroded areas to produce a uniformly smooth surface.
5. Refill, regrade and replant any tire rut areas from maintenance vehicles or mowers to produce a uniformly smooth surface.
6. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: In the absence of rainfall, during the week of seed or sod installation, watering shall be performed daily by the contractor or as often as deemed necessary. Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
3. Watering shall continue until the stand of turf is accepted.

C. Mow turf as soon as top growth is tall enough to cut. All mowing shall be the contractor’s responsibility until final acceptance. Heavy mowing, resulting in grass piles, shall be “double-mowed” or the contractor shall remove the piles. Repeat mowing to maintain 2-1/2 to 3” height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

D. Turf Post fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1lb/1000 sq. ft. to turf area.

3.10 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 6 by 6 inches. For seeded areas, bare spots which persist after three weeks of favorable growing weather,

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areas shall be re-cultivated, re-seeded, raked and rolled. Re-seeding of bare spots shall be done as many times as necessary until an acceptable stand of turf is established.

2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities. For sodded areas, bare spots shall be re-sodded until deemed acceptable.
3. If the turf stand is not acceptable by the following seeding and sod season, the contractor shall re-seed or sod and fertilize as necessary the unaccepted areas at no additional charge.
4. Flooded, washed out, rilled or otherwise damaged or defective areas of seeding, sod, mulch, grade, swales, or berms shall be reconstructed and all grades re-established in accordance with the grade plans or other specifications, or when such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications.
    a. Improper Grades:
        1) Low or high spots on flat or fairly level areas.
        2) Improper drainage such as swales. Low areas, rip-rapped outlets and paved areas.
        3) Washed out or rilled areas.
        4) Exposed debris
5. Turf Grass Conditions:
    a. Poor or thin stand; improper application of sod, dead grass or sod; use of seed mixtures or sod other than approved in specification.
    b. Improper fertilization application – uneven spreading, insufficient amounts, and failure to refertilize during extended acceptance.
    c. Persistent weeds established in turf areas

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove non-degradable erosion-control measures after grass establishment period.

PART 4 - END OF SECTION

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SECTION 32 93 00
PLANTS

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants
2. Planting soils
3. Tree stabilization
4. Landscape edgings

B. Related Sections:

1. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Division 32 Section "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required]; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

H. Finish Grade: Elevation of finished surface of planting soil.

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I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

K. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

L. Planting Area: Areas to be planted.

M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
3. Plant Photographs: Include color photographs in digital 3- by 5-inch print format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Samples for Verification: For each of the following:

1. Mulch: 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

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C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Material Test Reports: For existing native surface topsoil, existing in-place surface soil, and imported or manufactured topsoil.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Three years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Certification program in first subparagraph below is administered by the Professional Landcare Network. See Evaluations.
5. Personnel Certifications: Installer's personnel assigned to the Work shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation and maintenance specialty area(s), designated CLT-Exterior.
    b. Certified Ornamental Landscape Professional, designated COLP.

6. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; action exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil

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amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of plants purchased under allowances will be made by Architect, who will tag plants at their place of growth before they are prepared for transplanting.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

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G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Architect's written permission.

C. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: March 1st to May 31st.
2. Fall Planting: September 15th to November 15th.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

F. Water: Water shall be available at the site for use in planting work. This water shall be provided at no cost to the contractor; however, the transportation of water from the source at the site to the planting operations throughout the project shall be the responsibility of the contractor.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of [tree stabilization and edgings.

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d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Substantial Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 12 months from date of Substantial Completion.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 12 months from date of Substantial Completion.

C. Remove and immediately replace all plants, as determined by the Architect to be unsatisfactory, during the initial planting stage.

D. Initial Inspection: Inspection of plants will be made by the Architect of the completion of planting. Upon completion of all items, an inspection shall be made within one (1) week of written notification from the landscape contractor to the owner/agent. During inspection, the landscape contractor shall be present and a punch list of items shall be drawn up for completion or the job approved outright. Once the owner or owner’s agent approves the work, an official letter of acceptance shall be sent notifying all appropriate parties of such, and the date registered as the commencement of the guarantee period. During the period prior to acceptance, the contractor is responsible for the maintenance and welfare of all materials. This contract calls for an additional 30 days maintenance including all water after initial acceptance. Maintenance after this period shall be the responsibility of the Owner. Note: The contractor shall periodically inspect the site during the guarantee period and notify the owner or owner’s representative in writing if proper maintenance is not being performed. Contractor shall coordinate the frequency of his inspections in accordance with the various maintenance concerns throughout the seasons.

PART 2 - PART 2 PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and with healthy root systems developed by transplanting or root pruning. Provide well-shaped,

fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Plants that meet the requirements specified in the plant list, but that do not possess a normal balance between height and spread, will not be accepted. Where any requirement is omitted from the plant list, the plant for use where symmetry is required shall be matched as nearly as possible. Plants shall be pruned prior to delivery only upon approval of the Architect.
2. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
3. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls. Plants larger in size than specified in the Plant List may be used if approved. The use of larger plants shall not increase the contract price. If the use of larger plants is approved, the ball of earth or spread of roots shall be increased in proportion to the size of the plant. If plants required to be bare root are furnished in sizes greater than specified, they shall be balled and burlapped. Provide plants indicated by two measurements so that only a maximum of 25% of the minimum size indicated are used, and 75% of the maximum size is used.

C. Requirements for the measurements, branching, grading, balling and burlapping of plants in the Plant List shall follow the code of standards currently recommended by ANSI Z60.1.

D. The contractor shall be responsible for all certificates of inspection of plant materials that may be required by Federal, State, or other authorities to accompany shipment of plants.

E. Plants designated as B&B in the Plant List shall be adequately balled and burlapped with firm, natural balls of soil, the diameter of which shall not be less than that specified and the depth of which shall be sufficient to include the roots. No plant required to be balled and burlapped shall be planted if the ball is cracked or broken either before or during the process of planting.

F. All plants shall be handled so that the roots are adequately protected at all times. The balls of balled and burlapped plants which cannot be planted immediately on delivery shall be well protected with soil or other acceptable material. Bare rooted plants shall be planted or heeled-in immediately upon delivery. If heeled-in all bundles of plants shall be opened and the plant separated before the roots are covered, and care shall be taken to prevent air pockets among the roots. All heeled-in plants shall be watered daily.

G. Attention is called to the fact that scientific and common names used for the plants acquired under this contract are generally in conformity with the Joint Committee on Horticultural Nomenclature. The names of varieties not included herein are generally in conformity with the names accepted in the Nursery trade.

H. All plants shall conform to the varieties specified in the Plant List. No substitutes will be permitted. Plants are subject to inspection and approval at place of growth, for compliance with specification requirements for quality, size and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of work.

I. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at roof flame according to ANSI Z60.1. Root flare shall be visible before planting.

J. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant, as shown on drawings.

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K. If formal arrangements or consecutive order of plants is shown on drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
2. Provide lime in form of ground dolomitic limestone or calcitic limestone.

B. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

C. Aluminum Sulfate: Commercial grade, unadulterated.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

F. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

G. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

H. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 or less decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Bulk Density: 800 – 1000 lbs/yd1.
3. Nutrient Content (dry weight basis): N, 1% or above; P, 1% or above.
4. Source: Feedstock; Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
5. Sodium absorption ratio shall be less than 6.0.
6. Shall be fully mature and stable before usage.
7. Shall be screened using a sieve 3 no finer than ¼” and no greater than ½”.

B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

B. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 21-gram tablets.

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2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

C. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

2.5 PLANTING SOILS

A. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Surface Soil by Volume: [1:4.
2. Weight of Lime per 1000 Sq. Ft.: 2 lbs/1000 SF.
3. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: 1 lb/1000 SF.

B. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs, or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Sandy loam, screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
2. Mix imported topsoil or manufactured topsoil with the following soil amendments[and fertilizers] in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Topsoil by Volume: 1:4.
b. Weight of Lime per 1000 Sq. Ft.: 2 lbs/1000 SF.
c. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: 1 lb / 1000 SF.

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

2.7 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

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C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
3. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
4. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.

2.9 LANDSCAPE EDGINGS

A. Aluminum Edging: Standard-profile extruded-aluminum edging, ASTM B 221 (ASTM B 221M), Alloy 6063-T6, fabricated in standard lengths with interlocking sections with loops stamped from face of sections to receive stakes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Curv-Rite, Inc.
b. Permaloc Corporation.
c. Russell, J. D. Company (The).
d. Sure-Loc Edging Corporation.

2. Edging Size: 3/16 inch wide by 5-1/2 inches deep
3. Stakes: Aluminum, ASTM B 221, Alloy 6061-T6, approximately 1-1/2 inches wide by 12 inches long.
4. Finish: Mill (natural aluminum).

2.10 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

C. Burlap: Non-synthetic, biodegradable.

PART 3 - PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

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1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 6 inches. Remove stones larger than 1/2 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Thoroughly blend planting soil off-site before spreading.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime with dry soil before mixing fertilizer.
c. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top [2 inches (50 mm)] [4 inches (100 mm)] of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

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3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped] and container-grown stock.
2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected overnight, after working hours, and when unattended by installer's personnel.

B. Subsoil and topsoil removed from excavations may not be used as planting soil.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

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D. Set container-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Remove root ball from container without damaging plant. Separate roots from several areas and spread. Cut three areas of root ball and spread roots.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Set and support bare-root stock in center of planting pit or trench with root flare 1 inch above adjacent finish grade.

1. Use planting soil for backfill.
2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.
3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch from root tips; do not place tablets in bottom of the hole or touching the roots.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 MECHANIZED TREE SPADE PLANTING

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

C. Cut exposed roots cleanly during transplanting operations.

D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.

E. Where possible, orient the tree in the same direction as in its original location.

3.7 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

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D. Do not apply pruning paint to wounds.

3.8 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
2. Allow enough slack to avoid rigid restraint of tree.

3.9 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.10 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 224” radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 EDGING INSTALLATION

A. Aluminum Edging: Install aluminum edging where indicated according to manufacturer's written instructions. Anchor with aluminum stakes spaced approximately 36 inches apart, driven below top elevation of edging.

3.12 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to

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minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.13 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.14 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.15 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

PART 4 - END OF SECTION

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SECTION 33 01 10.58 - DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 14 16.

B. Testing and reporting results.

1.2 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites 2018.

B. AWWA B301 - Liquid Chlorine 2010.

C. AWWA B302 - Ammonium Sulfate 2016.

D. AWWA B303 - Sodium Chlorite 2018.

E. AWWA C651 - Disinfecting Water Mains 2014.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Test Reports: Indicate results comparative to specified requirements.

C. Certificate: From authority having jurisdiction indicating approval of water system.

D. Disinfection report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.
3. Test locations.
4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
5. Date and time of flushing start and completion.
6. Disinfectant residual after flushing in ppm for each outlet tested.

E. Bacteriological report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certification that water conforms, or fails to conform, to bacterial standards of Virginia.

1.4 QUALITY ASSURANCE

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of Virginia.

C. Submit bacteriologist's signature and authority associated with testing.

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PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate and AWWA B303 Sodium Chlorite.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.2 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.

B. Provide and attach equipment required to perform the work.

C. Introduce treatment into piping system.

D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

F. Replace permanent system devices removed for disinfection.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 40 00.

B. Test samples in accordance with AWWA C651.

END OF SECTION

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SECTION 33 05 00
COMMON WORK RESULTS FOR UTILITIES

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Grout.
2. Flowable fill.
3. Piped utility demolition.

1.3 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

PART 2 - PART 2 PRODUCTS

2.1 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi , 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.2 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, portland.
2. Density: 115- to 145-lb/cu. ft..
3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
4. Water: Comply with ASTM C 94/C 94M.
5. Strength: 100 to 200 psig at 28 days.

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PART 3 - PART 3 EXECUTION

3.1 PIPED UTILITY DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

PART 4 - END OF SECTION 33 05 00

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SECTION 33 14 16 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water pipe for site conveyance lines.

B. Pipe valves.

C. Fire hydrants.

1.2 REFERENCE STANDARDS

A. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2016.

B. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).

C. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets 2015.

D. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter 2015.

E. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals 2019.

F. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.

G. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges 2011.

H. AWWA C200 - Steel Water Pipe, 6 In. (150 mm) and Larger 2017.

I. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipe 2015.

J. AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe, 4 in. (100 mm) and Larger - Shop Applied 2012.

K. AWWA C206 - Field Welding of Steel Water Pipe 2017.

L. AWWA C207 - Steel Pipe Flanges for Waterworks Service, Size 4 In. Through 144 In. (100 mm Through 3,600 mm) 2018.

M. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings 2017.

N. AWWA C209 - Cold-Applied Tape Coatings for Steel Water Pipe, Special Sections, Connections, and Fittings 2013.

O. AWWA C210 - Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines 2015.

P. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service 2009.

Q. AWWA C502 - Dry-Barrel Fire Hydrants 2018.

R. AWWA C504 - Rubber-Seated Butterfly Valves 2015.

S. AWWA C508 - Swing-Check Valves for Waterworks Service, 2-In. Through 48-In. (50-mm Through 1,200-mm) NPS 2017.

T. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service 2015.

U. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances 2017.

V. AWWA C606 - Grooved and Shouldered Joints 2015.

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W. AWWA C800 - Underground Service Line Valves and Fittings 2014.

X. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution 2016.

Y. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service 2017.

Z. AWWA C904 - Cross-Linked Polyethylene (PEX) Pressure Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service 2016.

AA. AWWA M11 - Steel Water Pipe - A Guide For Design and Installation 2016.

BB. UL 246 - Hydrants for Fire-Protection Service Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with utility company requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 WATER PIPE

A. Steel Pipe: Welded or Seamless complying with AWWA C200.

1. Joints:

a. Rubber Gasketed Bell and Spigot: Provide pipe manufacturer's standard design, meeting the requirements of AWWA C200.
b. Welded: Provide electrodes complying with AWWA C206.

B. Ductile Iron Pipe: AWWA C151/A21.51:

C. Copper Tubing: ASTM B88, Type K, Annealed:

D. PVC Pipe: ASTM D1785 Schedule 80.

E. Polyethylene Pipe: AWWA C901:

F. Crosslinked Polyethylene Tubing: AWWA C904.

G. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters.

2.2 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves Up To 3 Inches:

1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.

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C. Ball Valves Up To 2 Inches:

1. Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA inlet end, compression outlet with electrical ground connector, with control rod, valve key, and extension box.

D. Swing Check Valves From 2 Inches to 24 Inches:

1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

E. Butterfly Valves From 2 Inches to 24 Inches:

1. AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, ten position lever handle.

2.3 HYDRANTS

A. Hydrants: Type as required by utility company.

B. Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.

C. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles, one pumper nozzle.

D. Finish: Primer and two coats of enamel in color required by utility company.

2.4 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 23 16.13.

B. Cover: As specified in Section 31 23 16.13.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.3 TRENCHING

A. See the sections on excavation and fill for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.4 INSTALLATION - PIPE

A. Install ductile iron piping and fittings to AWWA C600.

B. Install crosslinked polyethylene tubing and fittings to AWWA C904.

C. Route pipe in straight line.

D. Install pipe to allow for expansion and contraction without stressing pipe or joints.

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E. Slope water pipe and position drains at low points.

3.5 INSTALLATION - STEEL PIPE

3.6 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway in accordance with Section 21 11 00.

D. Set hydrants to grade, with nozzles at least 20 inches above ground in accordance with Section 21 11 00.

E. Locate control valve 4 inches away from hydrant.

F. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inches washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.

G. Paint hydrants in accordance with Section 09 91 13.

3.7 SERVICE CONNECTIONS

A. Provide water service to utility company requirements with reduced pressure backflow preventer and water meter with bypass valves and sand strainer.

3.8 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Perform field inspection and testing in accordance with Section 01 40 00.

END OF SECTION

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SECTION 33 31 13 - SITE SANITARY SEWERAGE GRAVITY PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.

B. Connection of building sanitary drainage system to municipal sewers.

C. Cleanout access.

1.2 REFERENCE STANDARDS

A. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings 2020.

B. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe 2018.

C. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines 2017.

D. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe 2015a.

E. ASTM C14M - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, Culvert Pipe and (Metric) 2015a.

F. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe 2019b.

G. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric) 2019b.

H. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings 2004 (Reapproved 2018).

I. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets 2012 (Reapproved 2017).

J. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric) 2011 (Reapproved 2017).

K. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings 2014.

L. ASTM C700 - Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated 2018.

M. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).

N. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications 2018.

O. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping 2001 (Reapproved 2014).

P. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2017.

Q. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2016.

R. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Material 2014.

S. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.

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1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe, pipe accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

E. Field Quality Control Submittals: Document results of field quality control testing.

F. Project Record Documents:

1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 - PRODUCTS

2.1 SEWER PIPE MATERIALS

A. Provide products that comply with applicable code(s).

B. Cast Iron Soil Pipe: ASTM A74, service type, inside nominal diameter of indicated inches, hub and spigot end.

C. Joint Seals for Cast Iron Pipe: ASTM C564 rubber gaskets.

D. Ductile Iron Pipe: ASTM A746, Pressure Class 350, with asphaltic lining, inside nominal diameter of indicated inches, bell and spigot end.

E. Joint Seals for Ductile Iron Pipe: AWWA C111/A21.11; styrene butadiene rubber (SBR) or vulcanized SBR gaskets.

F. Concrete Pipe: Nonreinforced, ASTM C14 or ASTM C14M, Class 1; inside nominal diameter of indicated inches, bell and spigot end joints.

G. Joint Seals for Concrete Pipe: ASTM C443 (ASTM C443M) rubber compression gaskets.

H. Plastic Pipe: ASTM D3350, SDR 11, High Density Polyethylene (HDPE) material; inside nominal diameter of indicated inches, with cell classification of 335434C or better, thermal butt fusion joints and fittings in accordance with manufacturer's recommendations; pipe and fittings same material utilizing transition fittings when connecting to existing piping.

I. Joint Seals: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.

J. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.2 PIPE ACCESSORIES

A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

2.3 CLEANOUT MANHOLE

A. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female dry joints, cast steel ladder rungs into shaft sections at 12 inches; nominal shaft diameter of 36 inches.

B. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00, levelled top surface to receive concrete shaft sections, sleeved to receive sanitary sewer pipe sections.

C. Lid and Frame: Cast iron construction, hinged lid.

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PART 3 - EXECUTION

3.1 GENERAL

A. Perform work in accordance with applicable code(s).

3.2 TRENCHING

A. See Section 31 23 16.13 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.3 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

1. Plastic Pipe: Also comply with ASTM D2321.
2. Clay Pipe: Also comply with ASTM D2321.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Connect to building sanitary sewer outlet and municipal sewer system , through installed sleeves.

E. Install trace wire 6 inches above top of pipe; coordinate with Section 31 23 16.13.

3.4 INSTALLATION - CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.5 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 40 00.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.6 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

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SECTION 33 41 00 STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All storm sewer piping and structures shall be installed in accordance with VDOT Standards and Specifications and manufacturer recommendations.

1.2 SUMMARY

A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:

1. Precast concrete manholes.
2. Precast concrete catch basins & inlets
3. Storm drain pipe and appurtenances

1.3 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silttight, unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Storm drain pipe.

B. Shop Drawings: For the following:

1. Manholes: Include plans, elevations, sections, details, and frames and covers.
2. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, design calculations, and concrete design-mix report.

C. Field quality-control test reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe, pipe fittings, and seals from dirt and damage.

B. Handle manholes according to manufacturer's written rigging instructions.

C. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

D. Handle downspout boots according to manufacturer’s written instructions.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Construction Manager Owner no fewer than five days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Construction Manager's written permission.

B. Site Information: Perform site survey, research public utility records, and verify existing utility locations. Verify that Storm Drainage System piping may be installed in compliance with original design and referenced standards.

1. Locate existing Storm Drainage System piping and structures that are to be abandoned and closed.

PART 2 - PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.3 PE PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings NPS 48 and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.

1. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
2. Corrugated PE Pipe and Fittings NPS 12 to NPS 48: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
3. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

B. Corrugated PE Pipe and Fittings NPS 56 and NPS 60: AASHTO MP7, Type S, with smooth waterway for coupling joints.

1. Watertight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

C. Provide perforated pipe where indicated on drawings.

1. Manufacturer supplied perforations, field perforations are not allowed.
2. AASHTO Class II pattern with AASHTO/ASTM designated open area.

2.4 STEEL PIPE AND FITTINGS

A. Aluminized Corrugated-Steel Pipe and Fittings: per AASHTO M-274 with fittings of similar form and construction as pipe. Pipe shall have mannings N equal to 0.012 or less.

1. Pipe shall have ¾”x 3/4”x7 ½” external ribs in accordance with AASHTO M-36.
2. Pipe shall be 14 gage
3. Joint Bands: shall be of similar materials and comply with City requirements. Using 10 ½” minimum width and 16 gage minimum thickness.
4. Coating: Aluminum

B. Available Manufacturers:

1. Ultraflow by Contech
2. Spiral Rib Pipe by Lane

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2.5 PVC PIPE AND FITTINGS

A. PVC Water-Service Piping:

1. Pipe: ASTM D 1785, Schedule 40 PVC, with plain ends for solvent-cemented joints.
2. Fittings: ASTM D 2466, Schedule 40 PVC, socket type.

B. Provide perforated pipe where indicated on drawings.

1. Manufacturer supplied perforations, field perforations are not allowed.
2. AASHTO Class II pattern with AASHTO/ASTM designated open area.

2.6 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 , with groove and tongue ends

1. Joining material may be either:

a. Portland cement mortar consisting of 1 part Portland cement, 2 parts sand and enough water to provide a workable mix, or
b. Bitumastic joint filler equal to Ram-Neck.

2. Class IV, Wall A.

2.7 NONPRESSURE-TYPE PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.8 MANHOLES

A. Precast Concrete Manholes: ASTM C 478, precast reinforced concrete, of depth indicated with provision for rubber gasket joints.

1. Base Section: 8-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
2. Riser Sections: 5-inch minimum thickness; 48-inch diameter, and lengths to provide depth indicated.
3. Top Section: Eccentric cone type, unless concentric cone or flat-slab-top type is indicated. Top of cone to match grade rings.
4. Grade Rings: Provide 2 or 3 reinforced concrete rings, with 12 maximum inches total thickness and match 24-inch diameter frame and cover.
5. Gaskets: ASTM C 443, rubber.
6. Steps: Cast into base, riser, and top sections sidewall at 12-to 16-inch intervals.
7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
8. Channel and Bench: Concrete or Brick.
9. Coat Exterior Surface with two (2) coats of coal-tar epoxy, 15 mil. Minimum thickness.

B. Manhole Steps: Wide enough for a man to place both feet on one step and designed to prevent lateral slippage off the step.

1. Material: Steel-reinforced plastic.

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C. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty, ductile iron, 24-inch inside diameter by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter cover, indented top design, with lettering "STORM DRAIN" cast into cover.

2.9 CATCH BASINS & INLETS

A. Standard Precast Concrete Catch Basins & inlets: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1. Catch basins & inlets shall be according to the local utility standard as noted on the structure schedule.
2. All materials for catch basins, steps, frames and grates, curb inlets and other appurtenances and incidentals shall conform to Sections 300 & 400 of Maryland Standard Specifications for Construction and Materials.

B. Standard PVC Surface Drainage Inlets and In-Line Drains as indicated on the drawings.

1. Ductile Iron Grates shall be considered an integral part of the surface drainage structure and shall be furnished by the same manufacturer.
2. Structures shall be as manufactured by Nyloplast a division of Advanced Drainage Systems, Inc..

2.10 STORMWATER DETENTION STRUCTURES

A. Manufactured Stormwater Detention Systems: to be installed in accordance with these specifications and all manufacturer recommendations. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service Include indented top design with lettering "STORM SEWER" cast into cover.

2.11 PIPE OUTLETS

A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides conforming to details with materials conforming to VDOT Standards and Specifications.

2.12 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

   a. Invert Slope: 1 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

   a. Slope: 4 percent.

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D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING APPLICATIONS

A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.

a. flexible or rigid couplings for same or minor difference OD pipes.

B. Gravity-Flow, Nonpressure Sewer Piping: Pipe materials as indicated on drawings:

1. Reinforced-concrete sewer within public right-of-way and public drainage easements.
2. Retain one or more of nine subparagraphs below. If more than one type of material and joining method is used, identify various materials on Drawings and show points of transition from one material to another.
3. Type S HDPE drainage pipe and fittings, silttight couplings, and coupled joints for privately maintained piping unless otherwise indicated on drawings.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
2. Retain subparagraph above or first subparagraph below.
3. Install piping below frost line.
4. Install corrugated steel piping according to ASTM A 798/A 798M.
5. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

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6. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
7. Install PE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."

3.4 PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
3. Join dissimilar pipe materials with nonpressure-type flexible or rigid couplings.
4. Join corrugated PE piping according to CPPA 100 and the following:

    a. Use silttight couplings for Type 1, silttight joints.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections according to ASTM C 891.

3.6 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.7 STORMWATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Install outlets that spill onto grade, anchored with concrete, where indicated.

C. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

D. Construct energy dissipaters at outlets, as indicated.

3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.9 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22.

3.10 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8-inch- thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

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B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:

1. Remove manhole or structure and close open ends of remaining piping.
2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade according to Division 31 Section "Earth Moving."

3.11 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.12 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:
    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.

3.13 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

3.14 DOWNSPOUT BOOTS

A. Install downspout boots per manufacturer’s written instructions and recommendations.

PART 4 - END OF SECTION

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SECTION 33 46 00
SUBDRAINAGE

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes subdrainage systems for the following:

1. Foundations.
2. Underslab areas.
3. Plaza decks.
4. Retaining walls.
5. Landscaped areas.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. HDPE: High-density polyethylene plastic.

C. PE: Polyethylene plastic.

D. PP: Polypropylene plastic.

E. PS: Polystyrene plastic.

F. PVC: Polyvinyl chloride plastic.

G. Subdrainage: Drainage system that collects and removes subsurface or seepage water.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Perforated-wall pipe and fittings.
2. Solid-wall pipe and fittings.
3. Drainage conduits.
4. Drainage panels.
5. Geotextile filter fabrics.

B. Approval of waterproofing manufacturer's service agent for use of drainage panels against and for waterproofing membrane protection.

PART 2 - PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

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2.2 PIPING MATERIALS

A. Refer to the "Piping Applications" Article in Part 3 for applications of pipe, tube, fitting, and joining materials.

2.3 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings:

1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. NPS 8 and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
3. Couplings: Manufacturer's standard, band type.

B. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.

C. Perforated Clay Pipe and Fittings: ASTM C 700, Standard- and Extra-Strength classes, unglazed, socket-and-spigot ends, for gasketed joints.

1. Gaskets: ASTM C 425, rubber.

D. Perforated Concrete Pipe and Fittings: ASTM C 444, Type 1, and applicable requirements in ASTM C 14 Class 2, socket-and-spigot ends for gasketed joints.

1. Gaskets: ASTM C 443, rubber.

2.4 SOLID-WALL PIPES AND FITTINGS

A. ABS Sewer Pipe and Fittings: ASTM D 2751.

1. Solvent Cement: ASTM D 2235.
2. Gaskets: ASTM F 477, elastomeric seal.

B. Cast-Iron Soil Pipe and Fittings: ASTM A 74, Service and Extra-Heavy classes, hub-and-spigot ends, gray, for gasketed joints.

1. Gaskets: ASTM C 564, rubber, of thickness matching class of pipe.

C. PE Drainage Tubing and Fittings: AASHTO M 252, Type S, corrugated, with smooth waterway, for coupled joints.

1. Couplings: AASHTO M 252, corrugated, band type, matching tubing and fittings.

D. PE Pipe and Fittings: AASHTO M 294, Type S, corrugated, with smooth waterway, for coupled joints.

1. Couplings: AASHTO M 294, corrugated, band type, matching tubing and fittings.

E. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, bell-and-spigot ends, for gasketed joints.

1. Gaskets: ASTM F 477, elastomeric seal.

2.5 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.

1. Sleeve Materials:

a. For Concrete Pipes: ASTM C 443, rubber.
b. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
c. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

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d. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant metal tension band and tightening mechanism on each end.
3. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.

2.6 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M; with round-flanged, cast-iron housing; and secured, scoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

B. Copper-Alloy Cleanouts: ASME A112.36.2M; with round-flanged, cast-iron housing with clamping device; and scoriated, Medium-Duty Loading class, copper-alloy cover. Include countersunk, brass cleanout plug.

C. PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub.

2.7 DRAINAGE CONDUITS

A. Molded-Sheet Drainage Conduits: Prefabricated geocomposite with cuspated, molded-plastic drainage core wrapped in geotextile filter fabric.

1. Available Manufacturers:

a. American Wick Drain Corporation.
b. JDR Enterprises, Inc.
c. TC Mirafi.

2. Nominal Size: 12 inches high by approximately 1 inch thick.

a. Minimum In-Plane Flow: 30 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.

3. Nominal Size: 18 inches high by approximately 1 inch thick.

a. Minimum In-Plane Flow: 45 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.

4. Filter Fabric: PP geotextile.
5. Fittings: HDPE with combination NPS 4 and NPS 6 outlet connection.

B. Multipipe Drainage Conduits: Prefabricated geocomposite with interconnected, corrugated, perforated-pipe core molded from HDPE complying with ASTM D 1248 and wrapped in geotextile filter fabric.

1. Available Manufacturers:

a. Varicore Technologies, Inc.

2. Nominal Size: 6 inches high by approximately 1-1/4 inches thick.

a. Minimum In-Plane Flow: 15 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.

3. Filter Fabric: Nonwoven, needle-punched geotextile.
4. Fittings: HDPE with combination NPS 4 and NPS 6 outlet connection.
5. Couplings: HDPE.

C. Single-Pipe Drainage Conduits: Prefabricated geocomposite with perforated corrugated core molded from HDPE complying with ASTM D 3350 and wrapped in geotextile filter fabric.

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1. Available Manufacturers:
    a. Advanced Drainage Systems.
2. Nominal Size: 12 inches high by approximately 1 inch thick.
    a. Minimum In-Plane Flow: 30 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
3. Nominal Size: 18 inches high by approximately 1 inch thick.
    a. Minimum In-Plane Flow: 45 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
4. Filter Fabric: Nonwoven, PP geotextile.
5. Fittings: HDPE with combination NPS 4 and NPS 6 outlet connection.
6. Couplings: Corrugated HDPE band.

D. Mesh Fabric Drainage Conduits: Prefabricated geocomposite with plastic-filament drainage core wrapped in geotextile filter fabric. Include fittings for bends and connection to drainage piping.
1. Available Manufacturers:
    a. Colbond Geosynthetics.
2. Nominal Size: 6 inches high by approximately 0.9 inch thick.
    a. Minimum In-Plane Flow: 2.4 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
3. Filter Fabric: Nonwoven geotextile made of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. when tested according to ASTM D 4491.

E. Ring Fabric Drainage Conduits: Drainage conduit with HDPE-rings-in-grid-pattern drainage core, for field-applied geotextile filter fabric. Include fittings for bends and connection to drainage piping.
1. Available Manufacturers:
    a. Invisible Structures, Inc.
2. Nominal Size: 0.5 m high by 1 inch thick.
    a. Minimum In-Plane Flow: 82 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
3. Nominal Size: 1 m high by 1 inch thick.
    a. Minimum In-Plane Flow: 164 gpm at hydraulic gradient of 1.0 when tested according to ASTM D 4716.
4. Filter Fabric: Specified in Part 2 "Geotextile Filter Fabrics" Article.

2.8 DRAINAGE PANELS

A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, 36 to 60 inches wide with drainage core faced with geotextile filter fabric.
1. Available Manufacturers:
    a. American Wick Drain Corporation.
    b. Cosella-Dorken.
    c. Eljen Corp.
    d. Greenstreak, Inc.
    e. JDR Enterprises, Inc.

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f. LINQ Industrial Fabrics, Inc.
g. Midwest Diversified Technologies Incorporated.
h. TC Mirafi.

2. Drainage Core: Three-dimensional, nonbiodegradable, molded PP or PS.

a. Minimum Compressive Strength: 10,000 lbf/sq. ft. when tested according to ASTM D 1621.
b. Minimum In-Plane Flow Rate: 2.8 gpm/ft. of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psig when tested according to ASTM D 4716.

3. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:

a. Survivability: Class 2.
b. Apparent Opening Size: No. 60 sieve, maximum.
c. Permittivity: 0.2 per second, minimum.

4. Filter Fabric: Woven geotextile fabric, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation less than 50 percent; complying with the following properties determined according to AASHTO M 288:

a. Survivability: Class 2.
b. Apparent Opening Size: No. 60 sieve, maximum.
c. Permittivity: 0.02 per second, minimum.

5. Film Backing: Polymeric film bonded to drainage core surface.

B. Mesh Fabric Drainage Panels: Prefabricated geocomposite with drainage core faced with geotextile filter fabric.

1. Available Manufacturers:

a. Colbond Geosynthetics.

2. Drainage Core: Open-construction, resilient, approximately 0.4-inch- thick, plastic-filament mesh.

a. Minimum In-Plane Flow Rate: 2.4 gpm/ft. of unit width at hydraulic gradient of 1.0 and normal pressure of 25 psig when tested according to ASTM D 4716.

3. Filter Fabric: Nonwoven geotextile of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. when tested according to ASTM D 4491.

C. Net Fabric Drainage Panels: Prefabricated geocomposite with drainage core faced with geotextile filter fabric.

1. Available Manufacturers:

a. GSE Lining Technology, Inc.
b. JDR Enterprises, Inc.
c. Strata Systems, Inc.

2. Drainage Core: 3-dimensional, PE nonwoven-strand geonet, approximately 0.25-inch-thick.

a. Minimum In-Plane Flow Rate: 2.4 gpm/ft. of unit width at hydraulic gradient of 1.0 and normal pressure of 25 psig when tested according to ASTM D 4716.

3. Filter Fabric: Nonwoven geotextile of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. when tested according to ASTM D 4491.

D. Ring Fabric Drainage Panels: Drainage-core panel for field application of geotextile filter fabric.

1. Available Manufacturers:

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a. Invisible Structures, Inc.

2. Drainage Core: 3-dimensional, HDPE rings in grid pattern, approximately 0.1 inch thick.

a. Minimum In-Plane Flow Rate: 50 gpm/ft. of unit width at hydraulic gradient of 1.0 and normal pressure of 25 psig when tested according to ASTM D 4716.

2.9 SOIL MATERIALS

A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 31 Section "Earth Moving."

PART 3 - PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.3 PIPING APPLICATIONS

A. Underground Subdrainage Piping:

1. Perforated PE pipe and fittings, couplings, and coupled joints.
2. Perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.

B. Underslab Subdrainage Piping:

1. Perforated PE pipe and fittings, couplings, and coupled joints.
2. Perforated PVC sewer pipe and fittings and loose, bell-and-spigot joints.
3. Perforated clay pipe and fittings, Extra-Strength class; gaskets; and gasketed joints.
4. Perforated concrete pipe and fittings, gaskets, and gasketed joints.

C. Header Piping:

1. PE drainage tubing and fittings, couplings, and coupled joints.
2. PVC sewer pipe and fittings, couplings, and coupled joints.

3.4 CLEANOUT APPLICATIONS

A. In Underground Subdrainage Piping:

1. At Grade in Earth: Cast-iron cleanouts.
2. At Grade in Paved Areas: Cast-iron cleanouts.

B. In Underslab Subdrainage Piping:

1. In Equipment Rooms and Unfinished Areas: Cast-iron cleanouts.
2. In Finished Areas: Copper-alloy cleanouts.

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3.5 FOUNDATION DRAINAGE INSTALLATION

A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.

B. Place impervious fill on subgrade adjacent to bottom of footing and compact to dimensions indicated, but not less than 6 inches deep and 12 inches wide after concrete footing forms have been removed.

C. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

D. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

E. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

F. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.

G. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

H. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

I. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

J. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

K. Install vertical drainage panels as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article. Do not install aggregate.
3. Separate 4 inches of fabric at beginning of roll and cut away 4 inches of core. Wrap fabric around end of remaining core.
4. Wrap bottom of panel around drainage pipe.
5. Attach panel to wall at horizontal mark and at beginning of pipe. Place core side of panel against wall. Use concrete nails with washers through product cylinders to attach panel to wall. Place nails from 2 to 6 inches below top of panel, approximately 48 inches apart. Construction adhesives, metal stick pins, or double-sided tape may be used instead of nails. Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
6. If additional panels are required on same row, cut away 4 inches of installed panel core, install new panel against installed panel, and overlap new panel with installed panel fabric.
7. If additional rows of panels are required, overlap lower panel with 4 inches of fabric.
8. Cut panel as necessary to keep top 12 inches below finish grade.
9. For inside corners, bend panel. For outside corners, cut core to provide 3 inches for overlap.

L. Do not use drainage panels as protection for waterproof membrane unless approved by factory-authorized service representative of waterproofing membrane manufacturer. Submit approval if so used.

M. Place initial backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

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3.6 UNDERSLAB DRAINAGE INSTALLATION

A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.

F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

H. Install horizontal drainage panels as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at inside edge of footings.
3. Place drainage panel over drainage pipe with core side up. Peel back fabric and wrap fabric around pipe. Locate top of core at bottom elevation of floor slab.
4. Butt additional panels against other installed panels. If panels have plastic flanges, overlap installed panel with flange.

3.7 PLAZA DECK DRAINAGE INSTALLATION

A. Horizontal Drainage Panel: Install between slab and floor cover. Place core on structural floor. Install panels to fit tightly around floor drains of building's storm drainage system. Provide stormwater access into floor drain.

1. Install drainage piping as indicated in Part 3 "Piping Installation" Article for plaza deck subdrainage.

B. See Division 32 Section "Unit Paving."

3.8 RETAINING-WALL DRAINAGE INSTALLATION

A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

B. Place supporting layer of drainage course over compacted subgrade to compacted depth of not less than 4 inches.

C. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.

E. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

F. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

G. Place drainage course in layers not exceeding 3 inches in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.

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H. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

I. Install vertical drainage panels as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
3. If weep holes are used instead of drainage pipe, cut 1/2-inch- diameter holes on core side at weep-hole locations. Do not cut fabric.
4. Mark horizontal calk line on wall at a point 6 inches less than panel width above footing bottom. Before marking wall, subtract footing width.
5. Separate 4 inches of fabric at beginning of roll and cut away 4 inches of core. Wrap fabric around end of remaining core.
6. Wrap bottom of panel around drainage pipe.
7. Attach panel to wall at horizontal mark and at beginning of wall corner. Place core side of panel against wall. Use concrete nails with washers through product. Place nails from 2 to 6 inches below top of panel, approximately 48 inches apart. Construction adhesives, metal stick pins, or double-sided tape may be used instead of nails. Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
8. If another panel is required on same row, cut away 4 inches of installed panel core and wrap fabric over new panel.
9. If additional rows of panel are required, overlap lower panel with 4 inches of fabric.
10. Cut panel as necessary to keep top 12 inches below finish grade.
11. For inside corners, bend panel. For outside corners, cut core to provide 3 inches for overlap.
12. Do not use drainage panels as protection for waterproof membrane unless approved by factory-authorized service representative of waterproofing membrane manufacturer. Submit approval if so used.

J. Fill to Grade: Place satisfactory soil fill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

3.9 LANDSCAPING DRAINAGE INSTALLATION

A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

D. Install drainage conduits as indicated in Part 3 "Piping Installation" Article for landscaping subdrainage with horizontal distance of at least 6 inches between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with adhesive or tape.

E. Add drainage course to top of drainage conduits.

F. After satisfactory testing, cover drainage conduit to within 12 inches of finish grade.

G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

H. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

I. Fill to Grade: Place satisfactory soil fill material over drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

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3.10 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated.
2. Underslab Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent.
3. Plaza Deck Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 1.0 percent.
4. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated. However, when water discharges through wall weep holes, pipe may be installed with a minimum slope of zero percent.
5. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches, unless otherwise indicated.
6. Lay perforated pipe with perforations down.
7. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install ABS piping according to ASTM D 2321.

D. Install PE piping according to ASTM D 2321.

E. Install PVC piping according to ASTM D 2321.

F. Install clay piping according to ASTM C 12 and NCPI's "Clay Pipe Engineering Manual."

G. Install concrete piping according to ACPA's "Concrete Pipe Handbook."

3.11 PIPE JOINT CONSTRUCTION

A. Cast-Iron Soil Pipe and Fittings: Hub and spigot, with rubber compression gaskets according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook." Use gaskets that match class of pipe and fittings.

B. Join ABS pipe and fittings according to ASTM D 2751.

C. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties."

D. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties"; or according to ASTM D 2321.

E. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.

F. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.

G. Join perforated clay pipe and fittings with gaskets according to ASTM C 425.

H. Join perforated concrete pipe and fittings with gaskets according to ASTM C 443.

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I. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.12 CLEANOUT INSTALLATION

A. Cleanouts for Foundation Retaining-Wall Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In vehicular-traffic areas, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches in depth. Set top of cleanout flush with grade. Cast-iron pipe may also be used for cleanouts in nonvehicular-traffic areas.
3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches in depth. Set top of cleanout plug 1 inch above grade.

B. Cleanouts for Underslab Subdrainage:

1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.13 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.

C. Where required, connect low elevations of foundation subdrainage to stormwater sump pumps.

3.14 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping.

1. Install PE warning tape or detectable warning tape over ferrous piping.
2. Install detectable warning tape over nonferrous piping and over edges of underground structures.

3.15 FIELD QUALITY CONTROL

A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.16 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

PART 4 - END OF SECTION