ELECTRICAL LEGEND

- CONDUIT OR CABLE UP
- CONDUIT OR CABLE DOWN
- CONDUIT UNDERGROUND OR UNDERSLAB
- EXISTING TO REMAIN
- BREAK
- GROUNDING CONNECTION

WIRING DEVICES

- S_X WALL SWITCH, AT 48" AFF TO TOP OF BOX, UNO.
  SUBSCRIPTS INDICATE THE FOLLOWING:
  (NONE) SINGLE POLE
  3 THREE-WAY
  4 FOUR-WAY
  a (LOWER CASE LETTER) SWITCHING PATTERN
  F FAN SPEED
  O OCCUPANCY SENSOR
  T TIMER, ELECTRONIC
  V VACANCY SENSOR
- $\$_X$ DIGITAL LOW VOLTAGE WALL SWITCH, AT 48" AFF TO TOP OF BOX, UNO. SUBSCRIPTS INDICATE THE FOLLOWING:
  (NONE) SINGLE ZONE ON/OFF
  D SINGLE ZONE DIMMER W/ ON/OFF
  2 TWO ZONE ON/OFF
  3 THREE ZONE ON/OFF
  2D TWO ZONE DIMMER W/ ON/OFF
  4D FOUR ZONE DIMMER W/ ON/OFF
- (OS) CEILING MOUNTED OCCUPANCY SENSOR
- (PS) CEILING MOUNTED PHOTOSENSOR
- DUPLEX RECEPTACLE AT 18" AFF OR GRADE, UNO.
  SUBSCRIPTS INDICATE THE FOLLOWING:
  GF GROUND FAULT CIRCUIT INTERRUPTER
  TV CLOCK STYLE, COORD MTG HEIGHT W/ARCH
  WP WEATHERPROOF AND GFCI TYPE
- DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER/ BACKSPLASH, 2" FROM TOP OF BACKSPLASH TO BOTTOM EDGE OF FACEPLATE. 120V/20A UNO.
- QUAD RECEPTACLE AT 18" AFF, UNO
- QUAD RECEPTACLE AT 18" AFF. SPLIT WIRED FOR SWITCHING CONTROLLED BY LTG CONTROLS.
- SPECIAL RECEPTACLE, TYPE AS INDICATED VERIFY NEMA CONFIGURATION, WIRING REQUIREMENTS AND MOUNTING HEIGHT WITH RESPECTIVE EQUIPMENT MANUFACTURER, UNO.
- DOOR OPERATOR CONTROLS, MH AS INDICATED.
  SUBSCRIPTS INDICATE THE FOLLOWING:
  ADA ADA PUSHPLATE
- 120V, 20A DUPLEX RECEPTACLE IN FLUSH FLOOR BOX WITH COVER.
- CEILING MTD DUPLEX RECEPTACLE
- CEILING MTD QUAD RECEPTACLE
- (J) JUNCTION BOX
- (J) JUNCTION BOX, WALL MOUNTED
- (E) EQUIPMENT CONNECTION.
  SUBSCRIPTS INDICATE THE FOLLOWING:
  HT HEAT TRACE
  MD MOTORIZED DOOR
  OHD OVERHEAD DOOR
- (CR) OVERHEAD CORD REEL RECEPTACLE

COMMUNICATION SYSTEMS

- LV BOX MOUNTED 16" AFF TO BOTTOM OF BOX, UNO. BOX SIZE 4X4 INCH X 2.1/8" DEEP WITH DOUBLE GANG EXTENSION RING. PROVIDE CONDUIT AS INDICATED WITH PULL CORD AND BUSHED ENDS TO ABOVE ACT CEILING IN OFFICE 105. FACEPLATE, PORTS AND CABLING BY OTHERS.
- (WA) CEILING MOUNTED WIRELESS ACCESS POINT - DOUBLE GANG BACKBOX PROVIDE 1" EMPTY CONDUIT TO ABOVE ACT CEILING IN OFFICE 105
- (WA) WALL MOUNTED WIRELESS ACCESS POINT - DOUBLE GANG BACKBOX AND 1" EMPTY CONDUIT TO ABOVE ACT CEILING IN OFFICE 105

- EPO WALL MOUNTED EMERGENCY POWER OFF PUSHBUTTON

POWER DISTRIBUTION

- PANELBOARD, SURFACE MOUNTED, 120/208V
- PANELBOARD, FLUSH MOUNTED, 120/208V
- PANELBOARD, SURFACE MOUNTED, 277/480V
- PANELBOARD, FLUSH MOUNTED, 277/480V
- DASHED LINES REPRESENT ELECTRICAL EQPT REQUIRED CLEARANCES (PER NEC)
- DISCONNECT SWITCH. SIZE AND TYPE AS INDICATED.
- (VFD) VARIABLE FREQUENCY DRIVE

LIGHT FIXTURES

NOTE: "EM" INDICATES FIXTURE WITH EMERGENCY BATTERY/INVERTER

- 2' X 4' LIGHT FIXTURE
- LINEAR LIGHT FIXTURE
- EXIT SIGN WITH EMERGENCY BATTERY, CEILING MTD. DARKENED QUADRANT INDICATES STENCILED FACE(S). ARROW INDICATES DIRECTIONAL EXIT. TYPE X1, UNO
- EXIT SIGN WITH EMERGENCY BATTERY, WALL MOUNTED. DARKENED QUADRANT INDICATES STENCILED FACE(S). ARROW INDICATES DIRECTIONAL EXIT. TYPE X1, UNO.

EXTERIOR LIGHT FIXTURES

NOTE: "EM" INDICATES FIXTURE WITH EMERGENCY BATTERY/INVERTER

- WALL MOUNTED EXTERIOR LIGHT
- (PC) EXTERIOR PHOTOCELL

LIGHTNING PROTECTION

- $(\otimes_A)$ AIR TERMINAL.
  LETTER INDICATES DETAIL REFERENCE.
- LIGHTNING CONDUCTOR
- GROUND ELECTRODE

FIRE ALARM SYSTEMS

- (F) FIRE ALARM MANUAL PULL STATION AT 48" AFF
- $(SD)_X$ SMOKE DETECTOR, SUBSCRIPTS INDICATE THE FOLLOWING:
  (NONE) CEILING MOUNTED
  D DUCT DETECTOR (PROVIDED/INSTALLED AND WIRED TO FACP BY ELECTRICAL CONTRACTOR; INTERFACED WITH HVAC CONTROLS BY MECH. CONTRACTOR)
- $^{X}L^{C}$ FIRE ALARM AUDIBLE/VISUAL INDICATOR MOUNTED SUCH THAT LENS IS BETWEEN 80" & 96" AFF. ALL WALL MOUNTED TO BE AT SAME HEIGHT. X=CANDELA LEVEL. C=CEILING MTD
- $^{X}L_{C}$ FIRE ALARM VISUAL INDICATOR MOUNTED SUCH THAT LENS IS BETWEEN 80" & 96" AFF. ALL WALL MOUNTED TO BE AT SAME HEIGHT. X=CANDELA LEVEL. C=CEILING MTD
- (FACP) FIRE ALARM CONTROL PANEL
- (FAAP) FIRE ALARM ANNUNCIATOR PANEL
- (FATC) FIRE ALARM TERMINAL CABINET
- (NAC) NOTIFICATION APPLIANCE CIRCUIT PANEL

SECURITY SYSTEMS

- (CR) CARD READER. PROVIDE DOUBLE GANG BACKBOX WITH SINGLE GANG TRIM RING. PROVIDE 1"C FROM BOX TO ABOVE ACT CEILING IN OFFICE 105. PROVIDE 1" FROM DOOR STRIKE TO ABOVE ACT CEILING IN OFFICE 105.

ABBREVIATIONS

A	AMPERE
AFF	ABOVE FINISHED FLOOR
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
A/E	ARCHITECT/ENGINEER
BAS	BUILDING AUTOMATION SYSTEM
BLDG	BUILDING
BRKR	BREAKER
CIRC	CIRCULATION
CKT	CIRCUIT
CLG	CEILING
CNTR	CONTACTOR
COMM	COMMUNICATION
CONC	CONCRETE
C,COND	CONDUIT
CT	CURRENT TRANSFORMER
CTR	CENTER
CTRL	CONTROL
CU	COPPER
DIA	DIAMETER
DISC	DISCONNECT
DIV	DIVISION
DN	DOWN
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
EF	EXHAUST FAN
E,EM,EMERG	EMERGENCY
ELEC	ELECTRIC
EMT	ELECTRIC METALLIC TUBING
EQPT	EQUIPMENT
EWC	ELECTRIC WATER COOLER
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT CANDLES
FDISC	FUSED DISCONNECT SWITCH
FLR	FLOOR
FT	FOOT,FEET
GEC	GROUNDING ELECTRODE CONDUCTOR
GF	GROUND FAULT
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
G,GND	GROUND
HP	HORSEPOWER
HTR	HEATER
HVAC	HEATING, VENTILATION, AIR CONDITIONING
HW	HOT WATER UNIT HEATER
HZ	HERTZ
JB	JUNCTION BOX
KAIC	1,000 AMPERE INTERRUPTING CURRENT
KCMIL	THOUSAND CIRCULAR MILS
KW	KILOWATT
KVA	KILOVOLT AMPERE
LTG	LIGHTING
LTS	LIGHTS
LV	LOW VOLTAGE
MAX	MAXIMUM
MB	MAIN BREAKER
MFR	MANUFACTURER
MH	MOUNTING HEIGHT (AFF UNO)
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MTD	MOUNTED
N	NEUTRAL
NEMA	NATIONAL ELECTRICAL MFRS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NTS	NOT TO SCALE
OC	ON CENTER
OCPD	OVER CURRENT PROTECTIVE DEVICE
P	POLE
PB	PULL BOX
PH	PHASE
PNL	PANEL
PWR	POWER
REC	RECEPTACLE
REFR	REFRIGERATOR
REQD	REQUIRED
RM	ROOM
SE	SERVICE ENTRANCE
SECT	SECTION
SF	SQUARE FEET
SFMO	STATE FIRE MARSHAL'S OFFICE
SPD	SURGE PROTECTION DEVICE
SPKR	SPEAKER
ST	SHUNT TRIP
STRTR	STARTER
SURF	SURFACE
SW	SWITCH
SWBD	SWITCHBOARD
THRU	THROUGH
TYP	TYPICAL
UL	UNDERWRITER LABORATORIES
UNO	UNLESS NOTED OTHERWISE
V	VOLTS
VFD	VARIABLE FREQUENCY DRIVE
VBC	VIRGINIA BUILDING CODE
W	WATTS
WG	WIRE GUARD
WP	WEATHERPROOF
WTR	WATER
XFMR	TRANSFORMER

GENERAL NOTES (NEW WORK)

1. THESE NOTES APPLY TO ALL ELECTRICAL DRAWINGS.
2. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH VIRGINIA TECH DESIGN CONSTRUCTION STANDARDS MANUAL, AND LOCAL CODES AS REQUIRED BY AUTHORITY HAVING JURISDICTION (AHJ) AND AS INDICATED IN TABLE BELOW.
3. COORDINATE ALL WORK WITH THE CONSTRUCTION COMPLETION SCHEDULE SPECIFIED FOR THE PROJECT AND WITH ALL OTHER TRADES TO ENSURE THAT PROJECT IS COMPLETED ON SCHEDULE.
4. THE CONTRACTOR SHALL INCLUDE IN THEIR PRICE AFTER HOURS LABOR AND / OR WEEKEND LABOR FOR ALL WORK REQUIRED TO MEET MILESTONE DEADLINES AND CONSTRUCTION COMPLETION SCHEDULE.
5. PAY FOR AND OBTAIN ALL PERMITS UPON COMPLETION OF WORK. PRESENT THE OWNER WITH A CERTIFICATE FOR FINAL INSPECTION FROM THE LOCAL AUTHORITY.
6. IN THE PANELBOARD SCHEDULES, THE ROOM NUMBER INDICATES THE LOCATION ON THE DRAWING OF THE FIRST ITEM TO BE ENERGIZED BY THE CIRCUIT. FINAL PANEL DIRECTORIES SHALL REFLECT ALL FINAL ROOM NUMBERS FOR LOADS SERVED.
7. MOUNTING HEIGHTS, UNLESS OTHERWISE NOTED, ARE TO CENTER LINE OF EQUIPMENT, EXCEPT MOUNTING HEIGHTS OF LIGHTING FIXTURES WHICH IS TO BOTTOM OF FIXTURE. UNLESS NOTED OTHERWISE. IN ALL CASES, COMPLY WITH ADA REQUIREMENTS FOR MAXIMUM OR MINIMUM ALLOWABLE HEIGHT WHETHER INDICATED ON DRAWINGS OR NOT.
8. ALL CONDUIT AND WIRING SHALL BE RUN CONCEALED ABOVE FINISHED CEILINGS, WITHIN WALLS, OR BELOW FLOORS IN FINISHED SPACES, UNO.
9. PLACE JUNCTION BOXES IN ACCESSIBLE LOCATIONS ABOVE CEILINGS. ENSURE THAT ACCESS TO PULL OR J BOXES IS NOT BLOCKED. DO NOT LOCATE PULL OR J BOXES DIRECTLY ABOVE OTHER EQUIPMENT LOCATED IN THE CEILING SPACE. DO NOT LOCATE PULL OR J BOXES ABOVE INACCESSIBLE CEILINGS (I.E. TOILET ROOMS, RESTROOMS, ETC. OR AS INDICATED ON THE ARCHITECTURAL RCP).
10. WHERE LIGHT SWITCHES ARE INDICATED TO BE MOUNTED ON HINGED SIDE OF THE DOOR, THEY SHALL BE MOUNTED A MINIMUM OF 6" BEYOND DOOR IN THE OPEN POSITION.
11. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR CEILING TYPES AND EXACT LOCATIONS OF LIGHTING FIXTURES. REFER TO ARCHITECTURAL INTERIOR ELEVATIONS FOR SPECIFIC LOCATIONS OF WALL-MOUNTED DEVICES. COORDINATE WITH WALL FRAMING TO ACHIEVE LOCATIONS INDICATED ON CEILINGS AND WALLS.
12. LIGHT FIXTURES IN MECHANICAL ROOMS ARE SHOWN IN APPROXIMATE LOCATIONS. COORDINATE LOCATIONS AND MOUNTING HEIGHTS OF LIGHTING FIXTURES IN MECHANICAL ROOMS WITH FINAL LOCATIONS OF PIPE, DUCTS, AND OTHER EQUIPMENT FOR BEST ARRANGEMENT. FIXTURES SHALL BE EASILY ACCESSIBLE FOR RELAMPING.
13. MECHANICAL AND PLUMBING EQUIPMENT IS SHOWN IN APPROXIMATE LOCATIONS. FOR EXACT LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND PIPING, SEE MECHANICAL AND PLUMBING DRAWINGS.
14. PROVIDE FUSES IN ALL FUSED SWITCHES. FUSE RATINGS SHALL BE IN ACCORDANCE WITH EQPT MFR'S RECOMMENDATIONS.
15. DIVISION 26 CONTRACTOR SHALL INCLUDE IN THE BID PRICE, COORDINATION AND CONNECTION OF ALL HVAC, PLUMBING, AND OTHER CONTRACTOR OR OWNER FURNISHED EQUIPMENT. CHECK EQUIPMENT SHOP DRAWINGS AND COORDINATE WITH HVAC, PLUMBING AND ALL OTHER EQUIPMENT CONTRACTORS FOR DISCONNECT SWITCH, CONDUIT, WIRING REQUIREMENTS, FUSE AND BREAKER SIZES AND VOLTAGE REQUIREMENTS.
16. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL EXTERNAL STARTERS FOR MECHANICAL EQUIPMENT, UNLESS OTHERWISE NOTED ON MECHANICAL DRAWINGS.
17. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL AND PLUMBING CONTRACTORS AND SHALL PROVIDE NEUTRAL CONDUCTORS WHERE REQUIRED.
18. OCCUPANCY/VACANCY SENSORS SHALL BE SET FOR 20 MINUTES, UNO.
19. THE ELECTRICAL CONTRACTOR(S) SHALL COORDINATE THEIR WORK WITH ALL TRADES PRIOR TO FABRICATION OF SYSTEMS AND COMMENCEMENT OF INSTALLATION, AND PRIOR TO ANY PROCUREMENT OF MATERIALS. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO REVIEW THE WORK OF OTHER TRADES (INCLUDING, BUT NOT LIMITED TO STRUCTURAL, ARCHITECTURAL, CIVIL, FIRE ALARM, MECHANICAL, PLUMBING, TELE/DATA AND SECURITY) AS IT AFFECTS THE ELECTRICAL WORK, AND AS THE ELECTRICAL WORK AFFECTS OTHER TRADES TO ENSURE THE CONSTRUCTION DOCUMENTS ARE CLOSELY FOLLOWED. WHERE DISCREPANCIES ARISE, THEY SHALL BE REFERRED TO THE A/E FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
20. ALL SLEEVES AND CONDUITS SHOWN FOR LOW VOLTAGE TELE/DATA DROPS SHALL NOT BE USED FOR ANY OTHER SYSTEM OR PURPOSE.
21. IN ADDITION TO ANY OTHER ROOFING WARRANTY REQUIREMENTS IN DIVISION 7 OF THE PROJECT SPECIFICATIONS, THE CONTRACTOR SHALL PROVIDE ALL ROOF PENETRATION WORK UTILIZING METHODS AND MATERIALS NECESSARY TO MAINTAIN THE INTEGRITY OF THE ROOF SYSTEM PERFORMANCE AND INSTALLER WARRANTIES. THE CONTRACTOR SHALL PRESENT TO THE OWNER A WRITTEN WARRANTY ON THE WEATHERPROOF INTEGRITY OF ANY AND ALL ROOF PENETRATIONS INSTALLED AS A PART OF THIS CONTRACT.IN ADDITION TO ANY OTHER ROOFING WARRANTY REQUIREMENTS IN DIVISION 7 OF THE PROJECT SPECIFICATIONS, THE CONTRACTOR SHALL PROVIDE ALL ROOF PENETRATION WORK UTILIZING METHODS AND MATERIALS NECESSARY TO MAINTAIN THE INTEGRITY OF THE ROOF SYSTEM PERFORMANCE AND INSTALLER WARRANTIES. THE CONTRACTOR SHALL PRESENT TO THE OWNER A WRITTEN WARRANTY ON THE WEATHERPROOF INTEGRITY OF ANY AND ALL ROOF PENETRATIONS INSTALLED AS A PART OF THIS CONTRACT.
22. COORDINATE ELECTRIC SERVICE WITH VTES. IT SHALL BE THE ELECTRICAL CONTRACTOR(S) RESPONSIBILITY TO COORDINATE ALL REQUIREMENTS WITH VTES PRIOR TO SUBMISSION OF BID.
23. COORDINATE TELEPHONE AND CABLE TV SERVICE WITH N&S. IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO COORDINATE ALL REQUIREMENTS WITH N&S PRIOR TO SUBMISSION OF BID.
24. THE DESIGN IS BASED ON MFRS AND MODELS INDICATED AND IS INTENDED TO SHOW THE GENERAL SIZE, CONFIGURATION, LOCATION, CONNECTIONS, AND/OR SUPPORT FOR EQUIPMENT OR SYSTEMS WITH RELATION TO THE OTHER BUILDING/SYSTEMS. SEE SPECIFICATION SECTIONS FOR TECHNICAL REQUIREMENTS.
25. ALL LV CABLING OVER IN-ACCESSIBLE CEILINGS IS TO BE IN CONDUITS.
26. PROVIDE PULL STRINGS IN ALL EMPTY CONDUITS LONGER THAN 10' OR WHICH CONTAIN A 90 DEGREE ELBOW. PROVIDE BUSHINGS ON ALL UN-TERMINATED CONDUITS.
27. UNLESS INDICATED OTHERWISE, ALL UNDERGROUND CONDUIT SHALL HAVE 24" COVER MINIMUM OR AS REQUIRED BY NEC, WHICHEVER IS DEEPER.
28. FIRE ALARM SYSTEM IS A DELEGATED DESIGN SYSTEM. PLANS ARE TO BE PROVIDED TO THE UBO'S OFFICE FOR APPROVAL AND ISSUANCE OF A PERMIT PRIOR TO START OF WORK. THE REGIONAL SFMO SHALL OBSERVE THE INSTALLED FIRE ALARM SYSTEM AND WITNESS THE SYSTEM PERFORMANCE TESTS.
29. A 2" WIDE YELLOW LINE SHALL BE PAINTED ON ALL CONCRETE FLOORS WITHIN THE ELECTRICAL ROOMS AND CLOSETS INDICATING THE ELECTRICAL WORKING SPACE AS DEFINED BY THE NEC.

PANEL TYPE, VOLTAGE, OR LOCATOR	IDENTIFIER CODE
MAINS	
MAIN DISTRIBUTION PANEL	MDP
MAIN SWITCHBOARD	MSB
MAIN SWITCHGEAR	MSG
OTHER DISTRIBUTION AND BRANCH PANELS	
EMERGENCY	E (IF APPLICABLE)
DISTRIBUTION PANEL	DP (IF APPLICABLE)
VOLTAGE	LV OR HV
FLOOR	B, 1, 2, ETC.
PANEL IDENTIFIER	A-Z
SUB-PANEL IDENTIFIER	1, 2, 3, ETC.

DESIGN CODES/STANDARDS

CODE/STANDARD	YEAR/VERSION
VIRGINIA BUILDING CODE (VBC)	2021
VIRGINIA MECHANICAL CODE (VMC)	2021
VIRGINIA PLUMBING CODE (VPC)	2021
VIRGINIA ENERGY CONSERVATION CODE (VECC)	2021
VIRGINIA FUEL GAS CODE (VFGC)	2021
NATIONAL ELECTRICAL CODE (NEC)	2020

SHEET LIST - ELECTRICAL

SHEET NO	SHEET NAME
E000	LEGENDS, ABBREVIATIONS & GENERAL NOTES
E001	SITE PLAN - ELECTRICAL
E101	FLOOR PLAN - LIGHTING
E102	FLOOR PLAN - POWER
E103	FLOOR PLAN - SPECIAL SYSTEMS
E501	DETAILS
E502	DETAILS
E503	LIGHTNING PROTECTION PLAN
E601	FA RISER AND MATRIX
E701	SCHEDULES & RISERS

VIRGINIA TECH NON-CAPITAL CONSTRUCTION

FORESTRY RESEARCH OPERATIONS CENTER

140 INVENTIVE LANE
BLACKSBURG, VA 24061

VT PROJECT CODE WO# 26-819490

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COMMONWEALTH OF VIRGINIA
BRANDON M. WILSON
Lic. No. 053738
10.28.2026
PROFESSIONAL ENGINEER

UBO CONFORMANCE

SUBMITTAL

10/23/2026

ISSUED FOR CONSTRUCTION

REVISIONS

KEY PLAN

SHEET

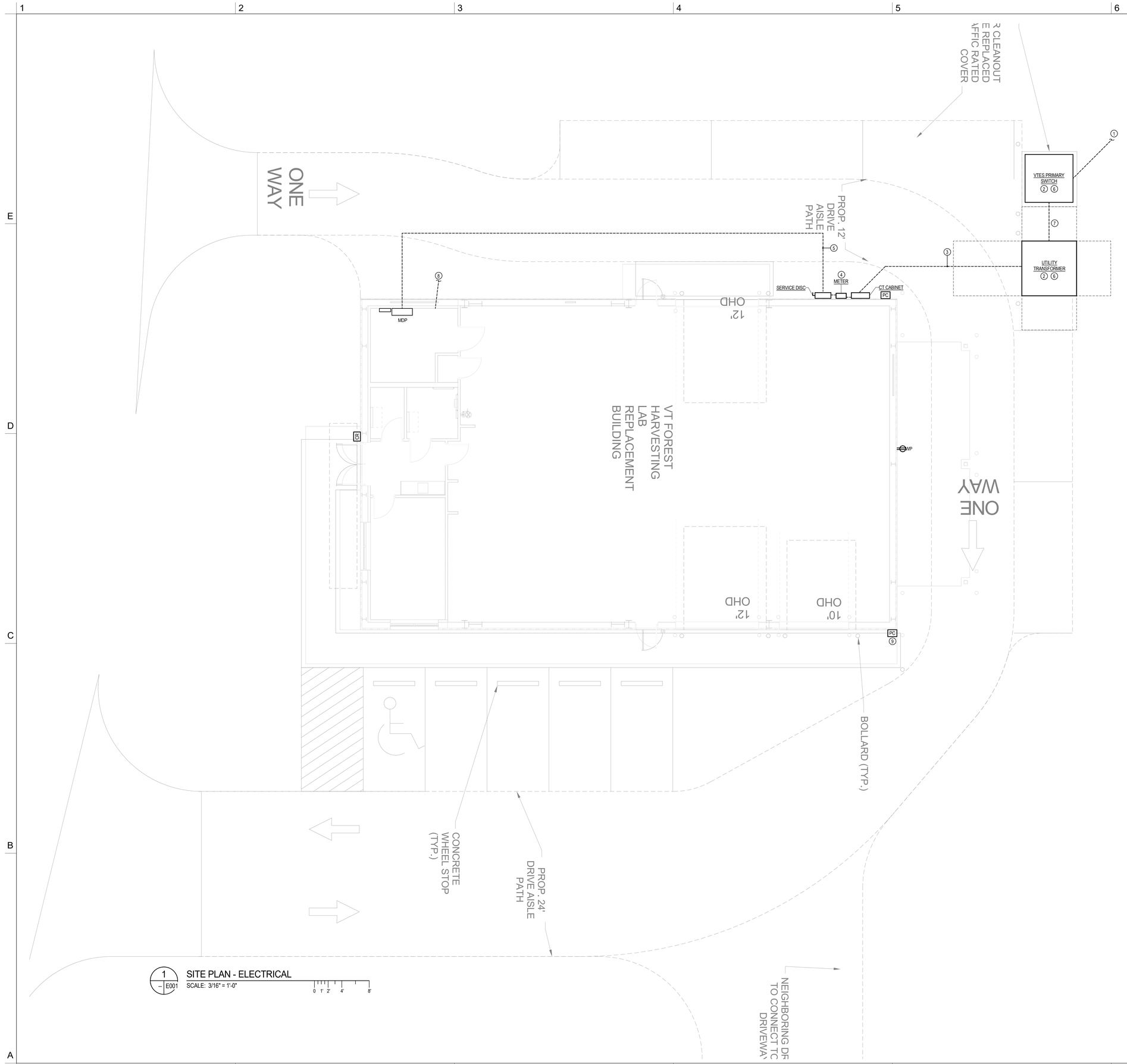
LEGENDS, ABBREVIATIONS & GENERAL NOTES

E000

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

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GENERAL NOTES (NEW WORK)

1. FIELD COORDINATE ALL IN-GROUND PULL BOX LOCATIONS AND UNDERGROUND CONDUIT RUNS WITH OTHER UTILITIES.
2. DO NOT INSTALL IN-GROUND PULL BOXES IN ASPHALT, PAVING OR OTHER AREAS SUBJECT TO HEAVY VEHICULAR TRAFFIC. IF NO OTHER LOCATION IS AVAILABLE, SUCH BOXES AND COVERS SHALL BE RATED FOR HEAVY TRAFFIC LOCATIONS.
3. SEE E101 SHEETS FOR BUILDING MOUNTED EXTERIOR LIGHTING.
4. REFER TO CIVIL DRAWINGS FOR PRIMARY DUCT BANK ROUTING.
5. REFER TO CIVIL DRAWINGS FOR COMMUNICATION DUCT BANK ROUTING.

KEY NOTES (NEW WORK)

1. COORDINATE PRIMARY FEED FROM VTES UTILITY LINE TO NEW VTES PRIMARY SWITCH. REFER TO CIVIL PLANS FOR LOCATION. COORDINATE ALL REQUIREMENTS WITH VTES GUIDELINES. CONTRACTOR SHALL MEET WITH VTES TO ENSURE PROPER INSTALLATION DURING CONSTRUCTION.
2. COORDINATE LOCATION OF PRIMARY SWITCH AND TRANSFORMER WITH CIVIL DRAWINGS. COORDINATE FINAL PLACEMENT OF EQUIPMENT WITH VTES.
3. PROVIDE CONDUIT AND WIRING FROM TRANSFORMER TO CT CABINET, METER AND SERVICE DISCONNECT. REFER TO SINGLE LINE FOR SIZING. FINAL ROUTING SHALL BE COORDINATED WITH CIVIL PLANS. SEE SHEET E502 FOR DUCT BANK DETAIL.
4. PROVIDE CONNECTION TO METER. REFER TO VTES GUIDELINES.
5. PROVIDE CONDUIT AND WIRING FROM CT CABINET TO MDP. CONDUIT TO BE ROUTED THROUGH GRAVEL DRIVE ON SITE. COORDINATE WITH CIVIL PLANS. REFER TO SINGLE LINE FOR CONDUIT AND WIRING REQUIREMENTS.
6. PROVIDE CONCRETE PAD FOR VTES EQUIPMENT. REFER TO VTES STANDARDS FOR REQUIREMENTS.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR CONDUIT BETWEEN PRIMARY SWITCH AND TRANSFORMER. VTES SHALL BE RESPONSIBLE FOR WIRING BETWEEN PRIMARY SWITCH AND TRANSFORMER. COORDINATE WITH VTES.
8. COORDINATE COMMUNICATIONS FEED FROM VT NI&S LINES TO BUILDING. REFER TO CIVIL PLANS. COORDINATE ALL REQUIREMENTS WITH VT NI&S GUIDELINES.
9. PHOTOCELL FOR CONTROL OF EXTERIOR BUILDING MOUNTED LIGHTS. FIELD COORDINATE EXACT LOCATION. AIM NORTH.

VIRGINIA TECH NON-CAPITAL CONSTRUCTION

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140 INVENTIVE LANE
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UBO CONFORMANCE

SUBMITTAL
10/23/2026
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REVISIONS

KEY PLAN

SHEET
SITE PLAN - ELECTRICAL

E001

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

CN 11053

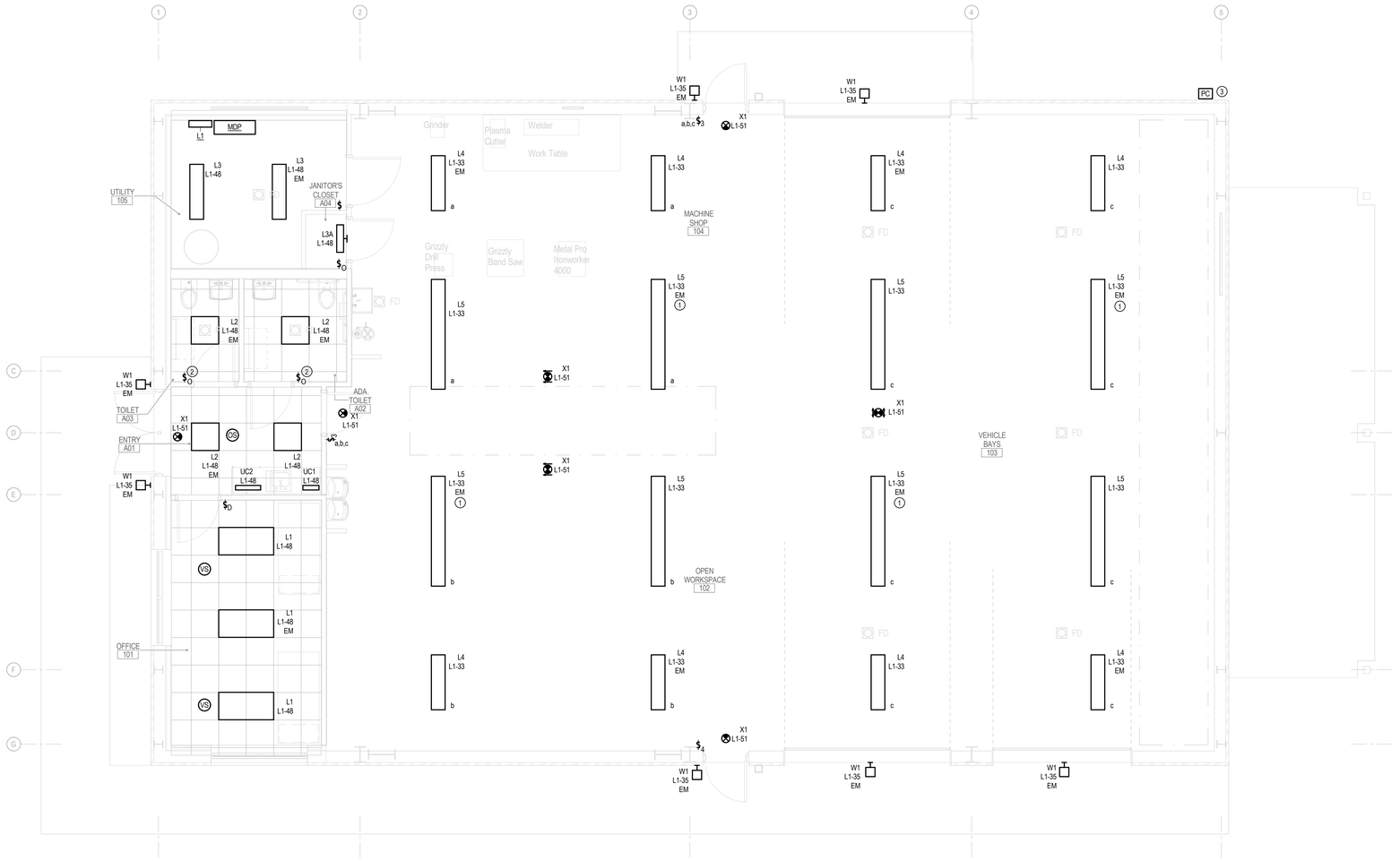
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GENERAL NOTES (NEW WORK)

1. CONTRACTOR TO PROVIDE ALL NECESSARY FRAMING FOR LIGHT FIXTURES TO BE MOUNTED WITH BOTTOM OF FIXTURE AT 15' AFF.
2. EMERGENCY POWER FOR ALL EMERGENCY LIGHTS IS PROVIDED VIA BATTERY. BATTERIES TO BE WIRED FOR SWITCHED OPERATION.
3. ALL BUILDING-MOUNTED EXTERIOR FIXTURES TO BE CONTROLLED VIA PHOTOCELL.

(E) KEY NOTES (NEW WORK)

1. ENTIRE 8' FIXTURE SHALL BE EMERGENCY.
2. WALL OCCUPANCY SENSOR TO ALSO CONTROL ROOM EXHAUST FAN. PROVIDE APPROPRIATE POWER PACK(S) AND RELAYS.
3. PROVIDE BUILDING MOUNTED PHOTOCELL. MOUNT ON ROOF. PHOTOCELL SHALL PROVIDE CONTROL OF ALL BUILDING MOUNTED EXTERIOR LIGHT FIXTURES.



1 – E101 FIRST FLOOR PLAN - LIGHTING

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

VIRGINIA TECH NON-CAPITAL CONSTRUCTION

FORESTRY RESEARCH OPERATIONS CENTER

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UBO CONFORMANCE

SUBMITTAL

10/23/2026

ISSUED FOR CONSTRUCTION

REVISIONS

KEY PLAN

SHEET

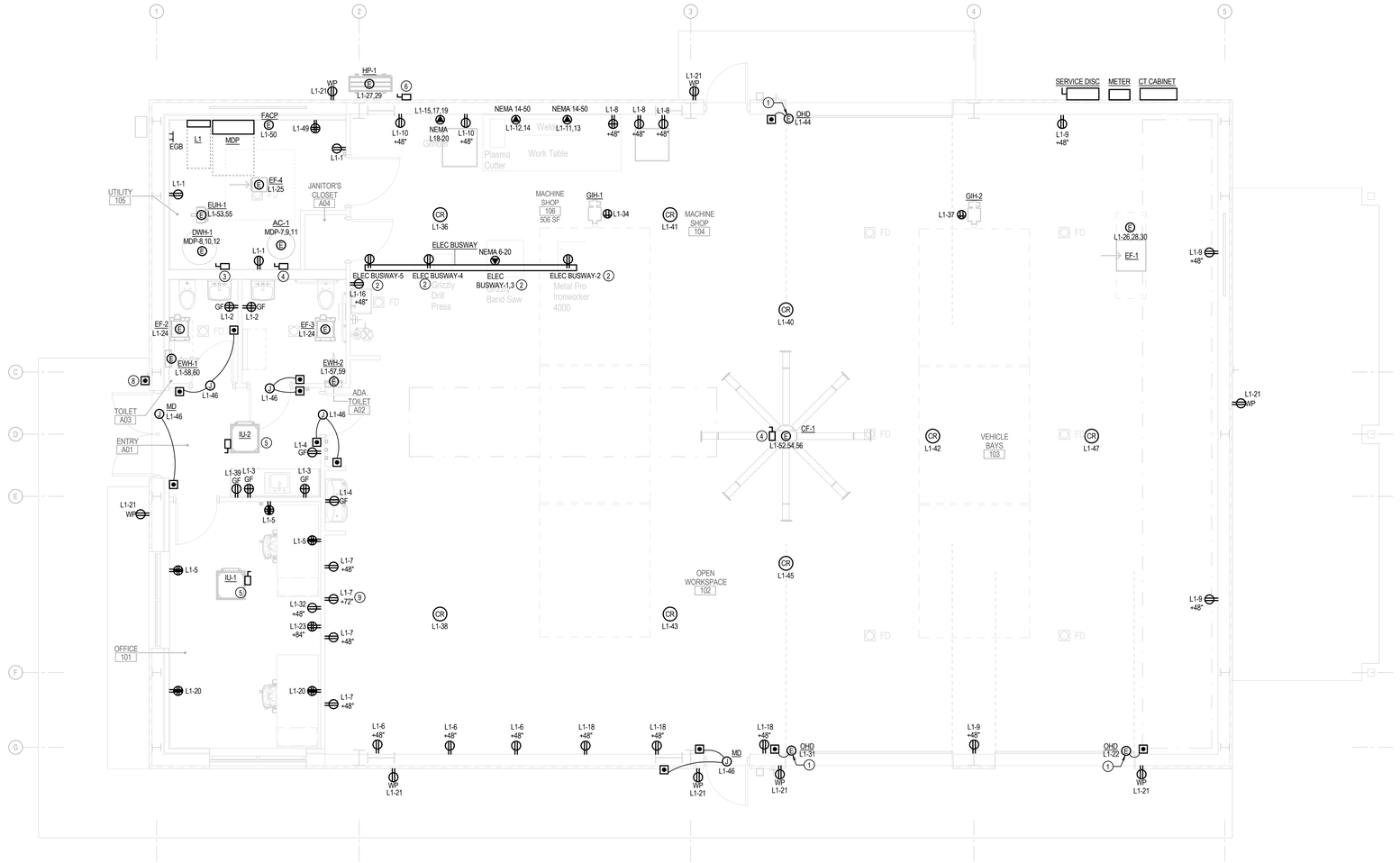
FLOOR PLAN - LIGHTING

E101

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

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1 – E102 FIRST FLOOR PLAN - POWER

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

KEY NOTES (NEW WORK)

1. CONNECTION FOR OVERHEAD DOOR. COORDINATE WITH DOOR SUPPLIED AND PROVIDE LOCKABLE DISCONNECTING MEANS AS REQUIRED. DOOR CONTROL FURNISHED WITH DOOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.
2. PROVIDE 100A-RATED STARLINE TRACK BUSWAY. REFER TO SPECIFICATIONS.
3. 30A, 120V, 1PH NON-FUSED DISCONNECT SWITCH.
4. 30A, 208V, 3PH NON-FUSED DISCONNECT SWITCH.
5. 30A, 208V, NEMA 3R, 1PH NON-FUSED DISCONNECT SWITCH. INDOOR UNIT IS FED BY OUTDOOR HEAT PUMP.
6. 60A, 208V, 1PH NON-FUSED DISCONNECT SWITCH.
7. RECEPTACLE FOR ACCESS CONTROL EQUIPMENT. FIELD COORDINATE LOCATION.
8. COORDINATE LOCATION AND MOUNTING OF ACTUATOR WITH ARCHITECTURAL PLANS.
9. COORDINATE FINAL LOCATION FOR WALL MOUNTED MONITOR WITH OWNER PRIOR TO ROUGH-IN.

VIRGINIA TECH NON-CAPITAL CONSTRUCTION

FORESTRY RESEARCH OPERATIONS CENTER

140 INVENTIVE LANE
BLACKSBURG, VA 24061

VT PROJECT CODE WO# 26-819490

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REVISIONS

KEY PLAN

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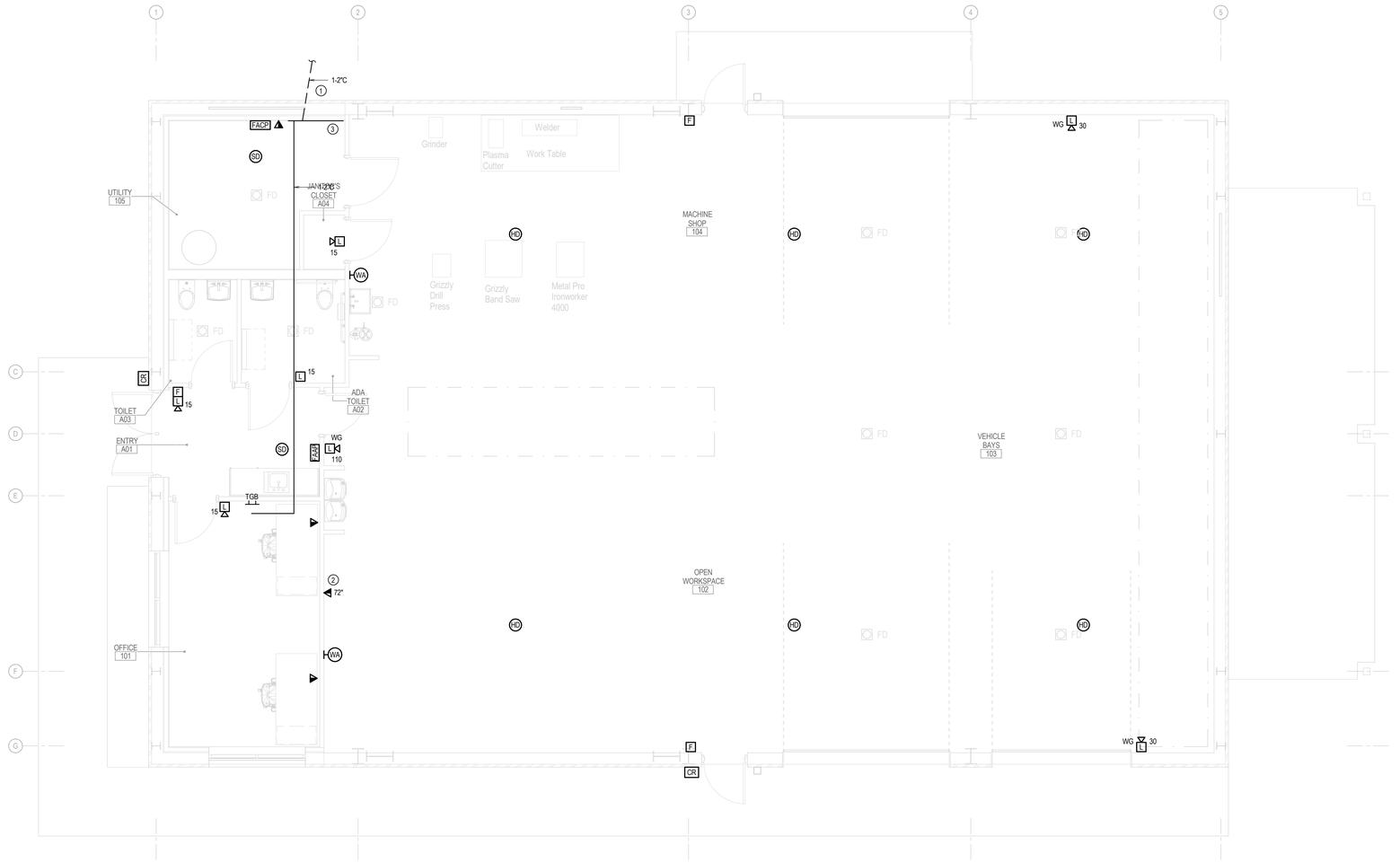
FLOOR PLAN - POWER

E102

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

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1 – E103 FIRST FLOOR PLAN - FIRE ALARM AND SPECIAL SYSTEMS

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

(E) KEY NOTES (NEW WORK)

1. INCOMING TELECOMMUNICATION SERVICE LINE. SEE CIVIL FOR CONTINUATION.
2. PROVIDE DATA OUTLET FOR WALL MOUNTED MONITOR.
3. PROVIDE 3/4" THICK FIRE TREATED PLYWOOD 4' X 8'. COORDINATE DEMARCATION POINT FOR TELECOMMUNICATIONS WITH NI&S.

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FLOOR PLAN - SPECIAL SYSTEMS

E103

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

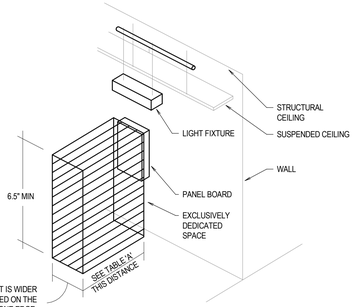
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TABLE "A" - WORKING CLEARANCES			
VOLTAGE TO GROUND, NOMINAL	CONDITION: 1	2	3
	MIN. CLEAR DISTANCE (FT)		
0-150	3	3	3
151-600	3	3.5	4

WHERE THE CONDITIONS ARE AS FOLLOWS:

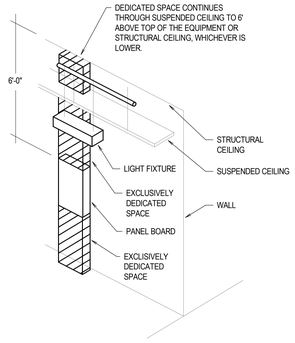
1. EXPOSED LIVE PARTS ON ONE SIDE AND NO LIVE OR GROUNDED PARTS ON THE OTHER SIDE OF THE WORKING SPACE, OR EXPOSED LIVE PARTS ON BOTH SIDES EFFECTIVELY GUARDED BY SUITABLE WOOD OR OTHER INSULATING MATERIALS. INSULATED WIRE OR INSULATED BUSBARS OPERATING AT NOT OVER 300 VOLTS SHALL NOT BE CONSIDERED LIVE PARTS.
2. EXPOSED LIVE PARTS ON ONE SIDE AND GROUNDED PARTS ON THE OTHER SIDE.
3. EXPOSED LIVE PARTS ON BOTH SIDES OF THE WORK SPACE (NOT GUARDED AS PROVIDED IN CONDITION 1) WITH THE OPERATOR BETWEEN.



30" OR WIDTH OF EQUIPMENT IF EQUIPMENT IS WIDER THAN 30" DOES NOT HAVE TO BE CENTERED ON THE EQUIPMENT BUT AT LEAST EVEN WITH ONE EDGE. EQUIPMENT DOOR SHALL BE ABLE TO OPEN AT LEAST 90 DEG.

NOTE: THIS INCLUDES BUT IS NOT LIMITED TO PANELBOARDS, SAFETY SWITCHES, MOTOR STARTERS, JUNCTION BOXES AND OTHER ELECTRIC EQUIPMENT.

NOTE:
THIS FIGURE ILLUSTRATES THE WORKING SPACE IN FRONT OF ELECTRIC EQUIPMENT REQUIRED BY SECTION 110-26 (a) OF THE NATIONAL ELECTRIC CODE.



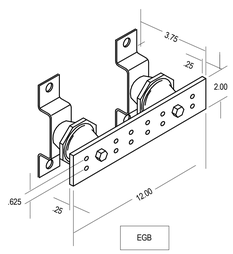
NOTE:
THIS FIGURE ILLUSTRATES THE ADDITIONAL EXCLUSIVELY DEDICATED SPACE REQUIRED OVER AND UNDER PANELBOARDS FOR CABLES, RACEWAYS, ETC. TO AND FROM PANELBOARDS REQUIRED BY SECTION 110-26 (f) OF THE NATIONAL ELECTRICAL CODE.

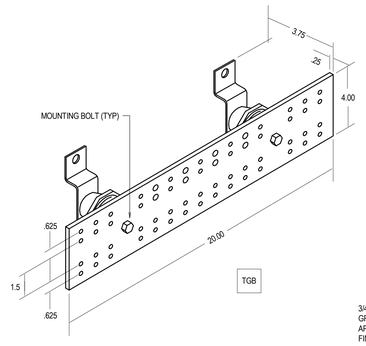
ALL ELECTRICAL EQUIPMENT

PANEL BOARDS

1 -- E501 DEDICATED WORKING SPACE FOR EQUIPMENT

SCALE: NONE

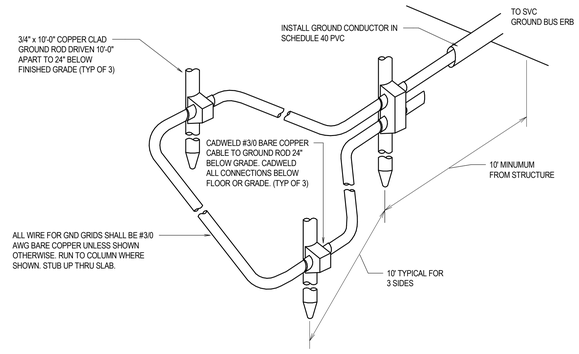




2 -- E501 GROUND BUS DETAIL

SCALE: NONE

NOTES:
A. TYPICAL BUSBARS, INSULATORS AND BACKBOARD MOUNT BRACKETS SHOWN HERE REFLECT TIA STANDARDS-COMPLIANT DIMENSIONS
B. MOUNT BUSBARS @ 12" AFF UNLESS DIRECTED OTHERWISE BY OWNER.
C. ERB HEIGHT AND THICKNESS PER SECTION 260526. LENGTH AS NEEDED TO ACCOMMODATE ALL CONNECTIONS.
D. PROVIDE SUPPORTS AS REQUIRED.
E. USE CAST SILICON BRONZE SOLDERLESS COMPRESSION TYPE TERMINALS AND LONG-BARREL, TWO-BOLT CONNECTIONS TO GROUND BUS BARS.



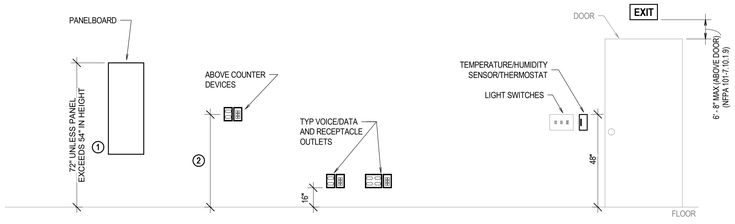
3 -- E501 GROUNDING COUNTERPOISE DETAIL

SCALE: NONE

ARC FLASH INFORMATION	
USE THIS INFORMATION IN ACCORDANCE WITH APPLICABLE OSHA STANDARDS NFPA 70E AND OTHER REQUIRED SAFE ELECTRICAL WORK PRACTICES.	
1.71 cal/cm 2 1 ft 10 in.	INCIDENT ENERGY AT A WORKING DISTANCE OF 1 FT 6 IN. ARC FLASH BOUNDARY
208V 3 ft 6 in. 1 ft 0 in.	SHOCK HAZARD WHEN COVER IS OPEN LIMITED APPROACH RESTRICTED APPROACH
EQPT NAME: L1A	JOB: 25140 DATE: xx/xx/xx

4 -- E501 SAMPLE ARC FLASH LABEL

SCALE: NONE

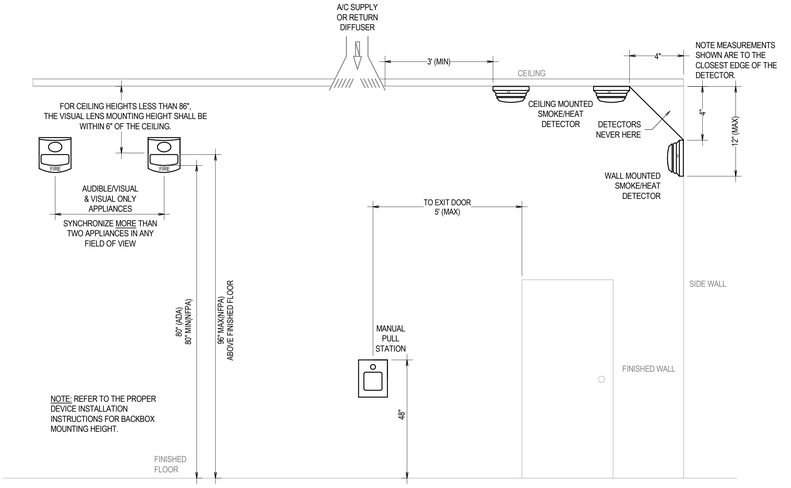


5 -- E501 TYPICAL DEVICE MOUNTING HEIGHTS

SCALE: NONE

GENERAL NOTE:
1. ALL MOUNTING HEIGHTS SHALL BE IN ACCORDANCE WITH ADA REQUIREMENTS. NOTIFY ENGINEER OF ANY DISCREPENCIES BETWEEN THE HEIGHTS INDICATED, OTHER SUBCONSULTANT DRAWINGS, OR ADA CLEARANCES.
2. COORDINATE DEVICE MOUNTING HEIGHT WITH ARCHITECTURAL ELEVATIONS AND CASEWORK DETAILS.

(#) KEYNOTES:
1. MAX HEIGHT FOR CIRCUIT BREAKER OPERATING HANDLES IS 6'-7"
2. 48" TO THE TOP IF NO COUNTER TOP OR 4" ABOVE COUNTER/BACKSPLASH IF PRESENT.



6 -- E501 TYPICAL DEVICE MOUNTING HEIGHTS II

SCALE: NONE

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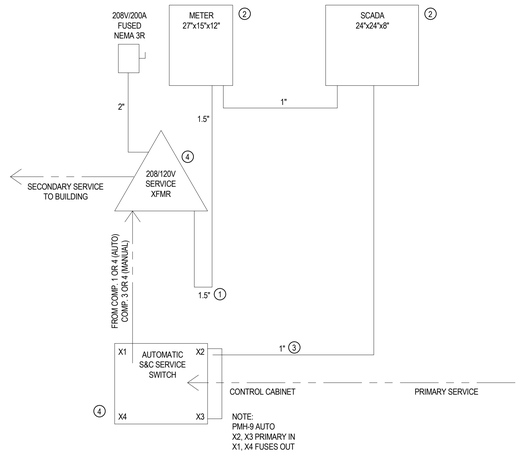
DETAILS

E501

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

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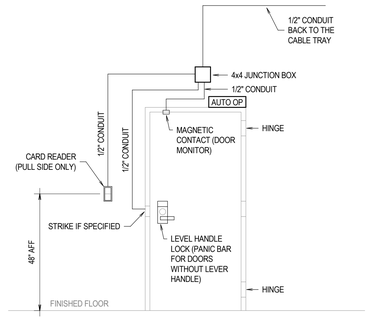
1 -- E502

RISER SERVICE YARD CONNECTION

SCALE: NONE

NOTES:

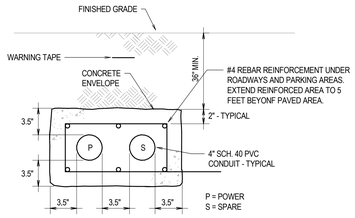
1. 1.5 INCH CONDUIT FROM SERVICE TRANSFORMER TO PT/CT CABINET SHALL BE LESS THAN 30 FEET TOTAL CONDUIT LENGTH.
2. SCADA AND METER CABINETS ARE 80 INCHES TOP OF CABINET TO FINISHED FLOOR.
3. CONDUIT ROUTING SHOWN FOR AUTOMATIC SWITCH. IF A MANUAL S&C SERVICE SWITCH IS USED IT REQUIRES AN ALTERNATE 1" CONDUIT ROUTING TO COMPARTMENT 3 OR 4 (WELL AREA), NEMA 3R JUNCTION BOX ON TOP OF SLAB THEN TO THE SCADA. SEE MANUAL S&C CONDUIT ROUTING DRAWING FOR MORE DETAIL.
4. ALL EQUIPMENT AND CABINETS SHALL BE GROUNDED. A GROUND ROD SHALL BE INSTALLED FOR EACH OF THE FOLLOWING PIECES OF EQUIPMENT: FLIP TOP CABINET, SERVICE TRANSFORMER, (2) AT SERVICE SWITCH.



4 -- E502

SINGLE DOOR ACCESS WIRING DETAIL

SCALE: NONE

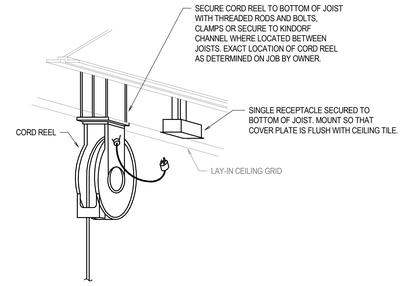


3 -- E502

DUCT BANK DETAIL

SCALE: N.T.S.

0 2' 4' 8' 16'



2 -- E502

CORD REEL DETAIL

SCALE: 12" = 1'-0"

0 2' 4' 8' 16'

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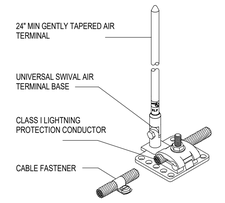
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E502

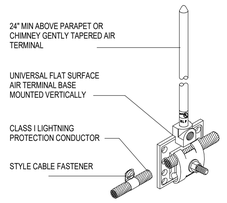
DESIGN: Designer
DRAWN: Author
REVIEW: Checker

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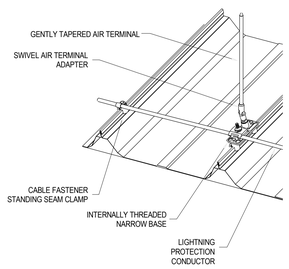
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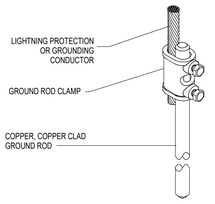
DETAIL A: AIR TERMINAL BASE



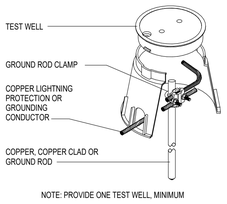
DETAIL B: AIR TERMINAL BASE



STANDING SEAM ROOF AIR TERMINAL DETAIL

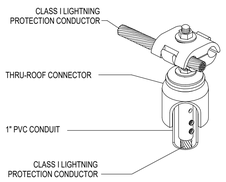


DETAIL E: GROUND ROD DETAIL

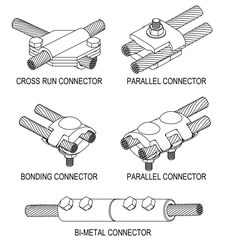


NOTE: PROVIDE ONE TEST WELL, MINIMUM

DETAIL F: GROUND ROD DETAIL



DETAIL D: THRU-ROOF CONNECTOR



TYPICAL CABLE CONNECTOR DETAILS

2 / E503 LIGHTNING PROTECTION DETAILS (ADDITIVE BID ITEM 02)
SCALE: NONE

LIGHTNING PROTECTION SYSTEM PLAN (ADDITIVE BID ITEM 02)

LIGHTNING PROTECTION SYSTEM NOTES (ADDITIVE BID ITEM 02)

LIGHTNING PROTECTION ASSESSMENT PER NFPA 780, APPENDIX L - 2014 ED.

Rectangular Structure
Annual Threat of Ocurrance (Nd)
(potential events/yr)
Nd = 0.06749

Complex Structure
Annual Threat of Ocurrance (Nd)
(potential events/yr)
Nd = 0.018

Tolerable Lightning Freq to Structure (Nc)
Nc = 0.0015

Tolerable Lightning Freq to Structure (Nc)
Nc = 0.0015

If Nd is less than or equal to Nc, a lighting protection system could be optional
If Nd is greater than Nc, a lightning protection system is recommended

Lightning Flash Density (Ng) From VAISALA map	
Ng - Richmond	3

Equivalent Area (Ae) - Rectangular Structure	
Length - L	78.5
Width - W	48.5
Height - H	27
Ae	44,993.24

Equivalent Area (Ae) - Complex Structure	
Ae (calculated graphically)	12,000.00

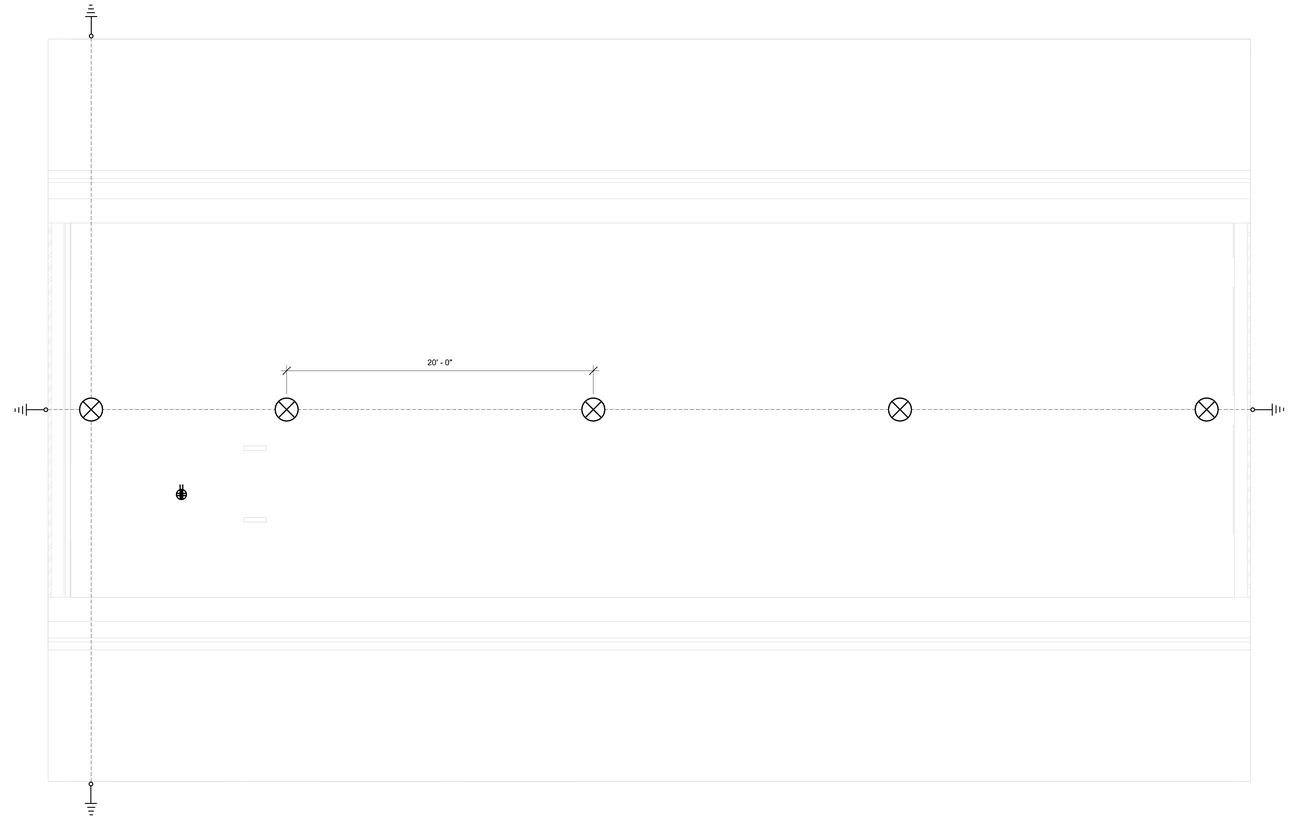
Environmental Coefficient (C1)	
Structure surrounded by taller strutures or trees within a distance of 3H	0.25
Structure surrounded by structures of equal or lesser height wirthin a distance of 3H	0.5
Isolated structure, with no other structures located within a distance of 3H	1
Isolated structure on hilltop	2
C1	0.50

Construction Coefficient (C2)			
Structure	Metal Roof	Non-Metallic Roof	Combustible Roof
Metal	0.5	1.0	2.0
Nonmetllic	1.0	1.0	2.5
Combustible	2.0	2.5	3.0
C2			0.50

Structure Contents (C3)	
Low value and noncombustible	0.5
Standard value and noncombustible	1.0
High value, moderate combustibility	2.0
Exceptional Value, flammable liquids, computer or electronics	3.0
Exceptional Value, irreplaceable cultural items	4.0
C3	2.00

Structure Occupancy (C4)	
Unoccupied	0.5
Normally occupied	1.0
Difficult to evacuate or risk of panic	3.0
C4	1.00

Lightning Consequence (C5)	
Continuity of facility services not required, no environmental impact	1.0
Continuity of facility services required, no no environmental impact	5.0
Consequence to the environment	10.0
C5	1.00



1 / E503 LIGHTNING PROTECTION PLAN (ADDITIVE BID ITEM 02)
SCALE: 1/4" = 1'-0"
0 2' 4' 8' 16'

LIGHTNING PROTECTION NOTES (ADDITIVE BID ITEM 02)

1. THE LIGHTNING PROTECTION CONTRACTOR SHALL PROVIDE A UL MASTER LABEL LIGHTNING PROTECTION SYSTEM COMPLETE WITH ALL AIR TERMINALS, CABLING, GROUND RODS AND ACCESSORIES REQUIRED FOR A COMPLETE INSTALLATION. THE LIGHTNING PROTECTION CONTRACTOR SHALL REVIEW THE ARCHITECTURAL, ELECTRICAL AND MECHANICAL DRAWINGS IN ORDER TO OBTAIN A COMPLETE UNDERSTANDING OF THE PROJECT SCOPE. BUILDING SIZE AND ROOF, AND SHALL PROVIDE SHOP DRAWINGS AND MATERIAL CUTS PRIOR TO INSTALLATION. THE LIGHTNING PROTECTION CONTRACTOR SHALL PROVIDE CONDUIT SLEEVES REQUIRED TO CONCEAL GROUNDING CONDUCTORS AND SHALL COORDINATE WITH THE GENERAL CONTRACTOR TO ASSURE THEIR PROPER AND TIMELY INSTALLATION.
2. METAL BODIES OF INDUCTANCE SITUATED WITH 6'-0" OF A LIGHTNING PROTECTION CONDUCTOR OR BONDED METAL BODY SHALL BE INTERCONNECTED TO THE LIGHTNING PROTECTION SYSTEM.
3. NO BEND OF CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90 DEGREES NOR SHALL HAVE A RADIUS OF BEND LESS THAN 8".
4. CONDUCTORS SHALL INTERCONNECT ALL AIR TERMINALS AND FORM A TWO WAY PATH TO GROUND HORIZONTALLY OR DONWARD TO CONNECTIONS TO GROUNDING RODS.
5. ALL LIGHTNING PROTECTION CONDUCTORS SHALL BE FASTENED TO THE STRUCTURE UPON WHICH THEY ARE PLACED AT MAXIMUM INTERVALS OF 3 FEET.
6. CONNECTIONS TO GROUND RODS SHALL BE MADE AT A POINT NOT LESS THAN 30" BELOW GRADE AND 24" AWAY FROM ANY FOUNDATION WALL.
7. ACTUAL JOBSITE CONDITIONS MAY NECESSITATE SLIGHT ALTERATIONS OF AIR TERMINAL AND GROUND LOCATIONS. AIR TERMINAL LOCATIONS, DOWN CONDUCTOR LOCATIONS AND CABLE ROUTINGS SHOWN ARE TYPICAL. FINE SYSTEM DESIGN AND INSTALLATION IS TO MEET ALL REQUIREMENTS FOR NFPA 780 CLASS II SYSTEM AND TO ACHIEVE A UL MASTER LABEL.
8. ALL ADHESIVE TYPE FITTINGS SHALL BE SET IN PLACE WITH AN APPLICATION OF COMPATIBLE ROOF CEMENT. COORDINATE WITH ROOFING CONTRACTOR
9. BOND ALL METALLIC PIPES ENTERING THE STRUCTURE TO THE NEAREST DOWNLEAD, GROUND ROD OR GROUND LOOP CABLE.
10. BOND TO ALL ROOF DRAINS AND PLUMBING VENTS.
11. DISTANCES BETWEEN GROUND CONDUCTORS NOT TO EXCEED 100'.
12. ROOF PADS, PAVERS, FLASHINGS OR ANY OTHER SPECIAL ROOF MATERIALS REQUIRED FOR THE INSTALLATION OF THE LIGHTNING PROTECTION SYSTEM SHALL BE FURNISHED AND INSTALLED BY THE ROOF CONTRACTOR.
13. DOWN CONDUCTORS SHALL BE RUN IN PVC CONDUIT IN EXTERIOR WALL CAVITY.
14. PROVIDE MINIMUM OF ONE GROUND TEST WELL, LOCATED NEAR TO THE STRUCTURE UPON WHICH THEY ARE PLACED AT MAXIMUM INTERVALS OF 3 FEET.
15. LIGHTNING PROTECTION SYSTEM SHALL BE BONDED TO BUILDING GROUND ELECTRODE SYSTEM.

CLASS I - MINIMUM MATERIAL REQUIREMENTS

TYPE OF CONDUCTOR	PARAMETER	SIZE (COPPER)	SIZE (ALUMINUM)
AIR TERMINAL (SOLID)	DIAMETER	3/8 INCH	1/2 INCH
MAIN CONDUCTOR, CABLE	SIZE (EACH STRAND)	17 AWG	14 AWG
	WEIGHT PER LENGTH	187 LB/1000 FT	95 LB/1000 FT
	CROSS-SECTION AREA	57,400 CIRCULAR MILS	98,600 CIRCULAR MILS
BONDING CONDUCTOR, CABLE (SOLID OR STRANDED)	SIZE (EACH STRAND)	17 AWG	14 AWG
	CROSS-SECTION AREA	26,240 CIRCULAR MILS	41,100 CIRCULAR MILS
BONDING CONDUCTOR, SOLID STRIP	THICKNESS	0.051 INCH	0.064 INCH
	WIDTH	1/2"	1/2"
MAIN CONDUCTOR, SOLID STRIP	THICKNESS	0.051 INCH	0.064 INCH
	CROSS-SECTION AREA	57,400 CIRCULAR MILS	98,600 CIRCULAR MILS

NFPA 780 - TYP BLDG LIGHTNING PROTECTION RISK ASESSMENT SUMMARY	
Nd	0.000000
Nc	Roof
10 x Nd IS GREATER THAN Nc. LIGHTNING PROTECTION IS REQUIRED	

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PROFESSIONAL SEAL
COMMONWEALTH OF VIRGINIA
BRANDON M. WILSON
Lic. No. 053738
10.28.2026
PROFESSIONAL ENGINEER

UBO CONFORMANCE

SUBMITTAL
10/23/2026
ISSUED FOR CONSTRUCTION

REVISIONS

KEY PLAN

SHEET
LIGHTNING PROTECTION PLAN

E503

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

CN 11053

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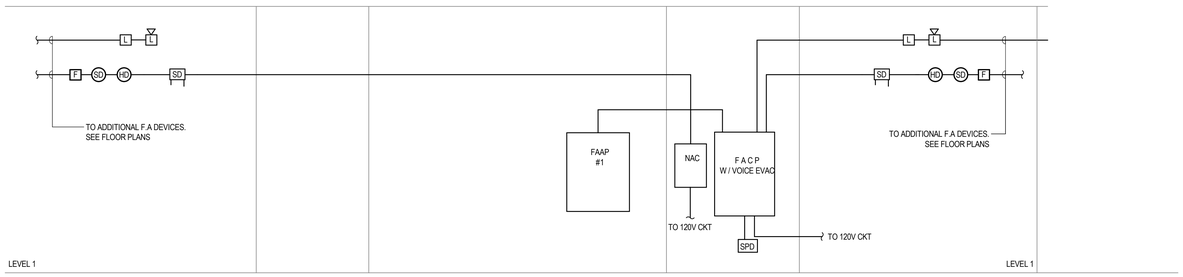
	FIRE ALARM SYSTEM INPUT/OUTPUT MATRIX	OUTPUT/ACTIVATION															
		FACP - ALARM	FACP - SUPERVISORY	FACP - TROUBLE	FAAP - ALARM	FAAP - SUPERVISORY	FAAP - TROUBLE	CENTRAL MONITORING STATION - ALARM	CENTRAL MONITORING STATION - SUPERVISORY	CENTRAL MONITORING STATION - TROUBLE	STROBE/HORN/SPEAKERS	SHUTDOWN ASSOCIATED MECH EQUIP	UNLOCK SECURE (MAG) DOORS IN EGRESS PATH	UNLOCK DELAYED EGRESS DOORS	ENERGIZE ATRIUM SMOKE EVAC FAN RELAY(S)	ENERGIZE STAIRWELL PRESSURIZATION FAN RELAY(S)
INPUT	MANUAL PULL STATION	X			X			X			X		X	X	X	X
	SMOKE DETECTOR - GENERAL	X			X			X			X		X	X	X	X
	HEAT DETECTOR - GENERAL	X			X			X			X		X	X	X	X
	DUCT SMOKE DETECTOR - MECH SHUTDOWN		X			X			X			X				
	FACP POWER LOSS			X			X			X						
	FACP LOW BATTERY VOLTAGE			X			X			X						
	DAS - LOSS OF NORMAL AC POWER			X			X			X						
	DAS - SYSTEM BATTERY CHARGER FAILURE			X			X			X						
	DAS - MALFUNCTION OF DONOR ANTENNA			X			X			X						
	DAS - FAILURE OF ACTIVE RF EMITTING DEVICE(S)			X			X			X						
	DAS - LOW BATT, AT 70%			X			X			X						
	DAS - FAILURE OF CRITICAL COMPONENTS			X			X			X						

NOTES:

1. MONITORING THE INTEGRITY OF CONDUCTORS SHALL COMPLY WITH REQUIREMENTS OF NFPA 72 4.4.7.1.
2. REMOVAL OF ANY DEVICE, WIRING DISARRANGEMENT OR SYSTEM COMPONENT FAILURE SHALL DISPLAY ON THE OPERATOR TERMINAL, THE CHANGE OF STATUS, TIME, DATE, POINT DESCRIPTION ON A POINT BY POINT BASIS, AND THE MESSAGE ASSOCIATED WITH THE POINT AND TRANSMIT, AND TRANSMIT A TROUBLE SIGNAL TO THE UL LISTED CENTRAL STATION.
3. UPON CHANGE IN STATUS OF ANY DEVICE IN SYSTEM THE FIRE ALARM CONTROL PANEL SHALL ACTIVATE AUDIBLE AND VISIBLE CHANGE INDICATORS AND DISPLAY SYSTEM POINT NUMBER, POINT DESCRIPTION AND MESSAGE ASSOCIATED WITH THE POINT. THE FIRE ALARM SYSTEM, SHALL SHUT DOWN ALL MAIN AND AUXILIARY SOUND SYSTEMS.

TESTING AND OPERATION NOTES

1. COMPLY WITH ALL REQUIREMENTS OF DIVISION 28 SPECIFICATIONS AND NFPA 72.
2. FOR EACH INSTALLATION AND SYSTEM TO BE TESTED IN ACCORDANCE WITH NFPA 72, CHAPTER 10 PRIOR TO SCHEDULING FIRE MARSHAL ENSURE NO WORKER TOUCHES OR INTERFERES WITH ANY PART OF THE FIRE ALARM SYSTEM, DEVICE, OR WIRING DURING ANY TEST OF "RING-OUT"; OR DURING ANY TESTING IN PRESENCE OF FIRE MARSHAL.
3. SEE DIVISIONS 26 AND 28 SPECIFICATIONS REGARDING COORDINATION OF FIRE ALARM SUBMITTALS WITH OTHER TRADES.
4. ALL PUBLICLY ACCESSIBLE/OCCUPIABLE AREAS SHALL BE VOID OF EXPOSED CABLES, OPEN BOXES, INCOMPLETE FIRE ALARM WORK, OR OTHERWISE INCOMPLETE INSTALLATIONS. FIRE ALARM SYSTEM(S) IN PUBLIC OCCUPIABLE AREAS SHALL BE FULLY FINISHED, TEST, AND OPERATIONALLY MAINTAINED.



1 / E601 FIRE ALARM RISER DIAGRAM

SCALE: NONE

VIRGINIA TECH NON-CAPITAL CONSTRUCTION

FORESTRY RESEARCH OPERATIONS CENTER

140 INVENTIVE LANE
BLACKSBURG, VA 24061

VT PROJECT CODE WO# 26-819490

DESIGNER

CLARKNEXSEN
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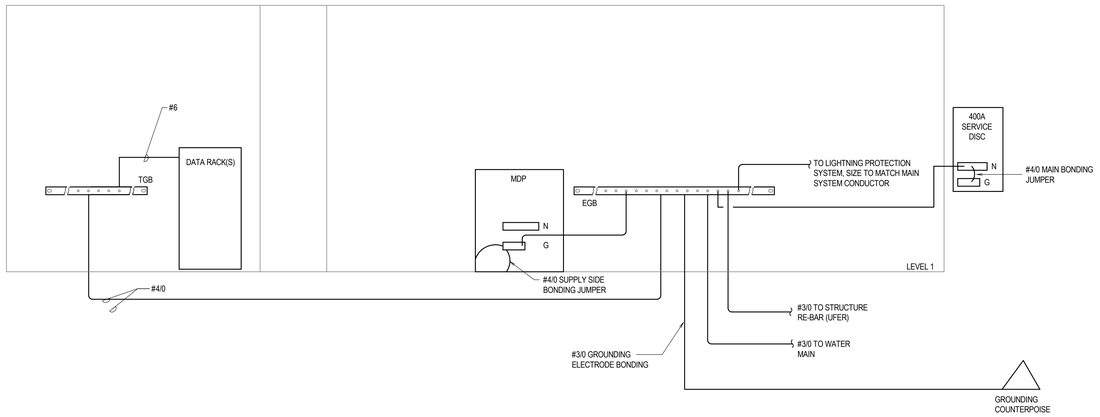
FA RISER AND MATRIX

E601

DESIGN: Designer
DRAWN: Author
REVIEW: Checker

CN 11053

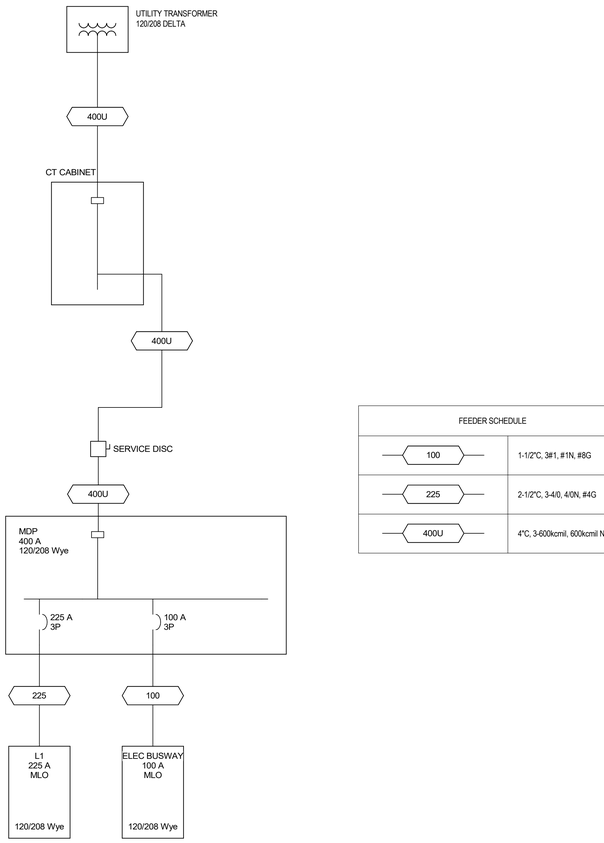
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1 / E701 GROUND RISER DIAGRAM

SCALE: 1/4" = 1'-0"

0 2' 4' 8' 16'



2 / E701 ONE-LINE DIAGRAM

SCALE: NONE

FEEDER SCHEDULE	
100	1-1/2"C, 3#1, #1N, #8G
225	2-1/2"C, 3-4/0, 4/0N, #4G
400U	4"C, 3-600kcmil, 600kcmil N

LIGHTING FIXTURE SCHEDULE

MARK	DESCRIPTION	MANUFACTURER/ MODEL	MTG	SOURCE	INITIAL COLOR TEMPERATURE	LIGHTING FIXTURE DEPTH	WATTS	REMARKS
L1	2X4 RECESSED LED TROFFER. 5500LM	LITECONTROL L55L-XX-D-22-ASO-XX-35K-D40-D01-UNV-XX	R/C	LED	3500K	2.15"	31 W	
L2	2X2 RECESSED LED TROFFER. 5500LM	LITECONTROL 55L-XX-D-24-ASO-XX-35K-D50-D01-UNV-XX	R/C	LED	3500K	2.15"	37 W	
L3	4' LED INDUSTRIAL STRIP. 6000LM	LITHONIA LIGHTING CSVT L48 6000LM LPPFL MD 40K 80CRI	SUSP	LED	3500K	N/A	53 W	
L3A	WALL MOUNTED 2' LED INDUSTRICAL STRIP 2000LM	LITHONIA LIGHTING CSS L24 AL015 MVOLT SWW3 80CRI	S/W	LED	3500K	N/A	19 W	
L4	4' LED INDUSTRIAL STRIP.12000LM	LITHONIA LIGHTING CSVT L48 12000LM LPPFL MD 40K 80CRI	SUSP	LED	3500K	N/A	94 W	
L5	8' LED INDUSTRIAL STRIP.16000LM	LITHONIA LIGHTING CSVT L96 16000LM LPPFL MD 40K 80CRI	SUSP	LED	3500K	N/A	131 W	
UC1	14" UNDER CABINET LINEAR. 622LM	KELVIX UC14 3040 010V 120277 WH	U/C	LED	3500K	N/A	8 W	
UC2	22" UNDER CABINET LINEAR. 1018LM	KELVIX UC22 3040 010V 120277 WH	U/C	LED	3500K	N/A	12 W	
W1	WALL MOUNTED LED SCONCE. 2000LM	LITHONIA LIGHTING WDGE1 LED P2 40K 80CRI VF MVOLT SRM E4WH PE DBLXD	S/W	LED	4000K	N/A	32 W	
X1	RED/GREEN EXIT SIGN WITH INTEGRAL BACKUP BATTERY	LITHONIA LIGHTING EXRG EL M6	S/C	LED	N/A	N/A	1 W	

BASIS OF DESIGN STATEMENT:
THE DESIGN SHOWN IS BASED ON THE MANUFACTURERS AND MODELS INDICATED AND IS INTENDED ONLY TO SHOW GENERAL SIZE, CONFIGURATION, LOCATION, CONNECTIONS AND/OR SUPPORT FOR THE EQUIPMENT OR SYSTEMS SPECIFIED WITH RELATION TO THE OTHER BUILDING SYSTEMS. SEE DIV 26 SPECIFICATION SECTIONS FOR ADDITIONAL TECHNICAL REQUIREMENTS.

MTG KEY:
R/C RECESSED / CEILING
S/C SURFACE / CEILING
S/W SURFACE / WALL
SUSP SUSPENDED
U/C UNDER CABINET

NOTES:
1. REFER TO LIGHTING PLANS FOR CHEVRONS AND FACES FOR EXIT SIGNS.
2. FIXTURES ON SCHEDULE ARE TYPICALLY INDICATED FOR GRID TYPE INSTALLATION. IN INSTANCES WHERE CEILING TYPE DIFFERS, PROVIDE FIXTURES AS INDICATED AND DESIGNED FOR THAT APPLICATION. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS.
3. PROVIDE ALL FIXTURES WITH ALL ACCESSORIES NECESSARY FOR A COMPLETE INSTALLATION.
4. LED FIXTURES SHALL HAVE RATED LIFE BASED ON IESNA TM-21 (BASED ON LM-80 DATA) AND PHOTOMETRIC PERFORMANCE TESTED IN ACCORDANCE WITH IESNA 79.
5. ALL LIGHT SOURCES SHALL HAVE MINIMUM CRI OF 80, UNO.
6. ALL FIXTURES SHALL BE RATED 120/277 MULTI-VOLT, UNO.
7. PROVIDE EMERGENCY BATTERY BACKUP FOR FIXTURES WHERE INDICATED WITH "EM" ON PLANS. MINIMUM 1300 LUMEN OUTPUT.
8. INPUT POWER AND LUMEN OUTPUT TOLERANCE OF SUBSTITUTED FIXTURES (IF PERMITTED) IS +/-10% (+/-5% FOR FIXTURES ≤2000 LUMENS).

PANEL NO: **MDP** | BUS AMPS: **400** | FED FROM: **SERVICE DISC** | INTEGRAL SPD: **PER SPECS**
PHASES: **3** | MAIN CB AMPS: **MLO** | MOUNTING: **SURFACE** | LOCATION: **AIR COMPRESSOR 101**
VOLTS: **120/208 Wye** | MIN. AIC RATING: **10,101** | TYPE: **DISTRIBUTION**

CIRCUIT WIRE SIZE	DESCRIPTION	NOTES	BREAKER POLE/AMP	CKT. #	A KVA		B KVA		C KVA		CKT. #	BREAKER AMP/POLE	NOTES	DESCRIPTION	CIRCUIT WIRE SIZE
				1	24.84	3.36					2				
2-1/2"C, 3-4/0, 4/0N, #4G	L1		3	225	3		21.03	1.14			4	100	3	ELEC BUSWAY	1-1/2"C, 3#1, #1N, #8G
					5				26.56	0.18	6				
3/4"C, 3#10, #10N, #10G	AC-1		3	30	7	2.00	2.00	8.00			8				
					9				2.00	8.00	10	90	3	DWH-1	1-1/4"C, 3#2, #2N, #8G
					11						12				
--	SPARE		3	100	13	0.00	0.00				14				
					15			0.00	0.00		16	100	3	SPARE	--
					17					0.00	18				
--	SPARE		3	100	19	0.00	0.00				20				
					21			0.00	0.00		22	100	3	SPARE	--
					23					0.00	24				

PANEL NOTES:

38 kVA 32 kVA 37 kVA

	CONN. LOAD	DEM. LOAD
TOTAL KVA	107 kVA	97 kVA
TOTAL AMPS	297 A	270 A

PANEL NO: **L1** | BUS AMPS: **225** | FED FROM: **MDP** | INTEGRAL SPD: **NONE**
PHASES: **3** | MAIN CB AMPS: **MLO** | MOUNTING: **SURFACE** | LOCATION: **AIR COMPRESSOR 101**
VOLTS: **120/208 Wye** | MIN. AIC RATING: **9,567** | TYPE: **LIGHTING & APPLIANCE**

CIRCUIT WIRE SIZE	DESCRIPTION	NOTES	BREAKER POLE/AMP	CKT. #	A		B		C		CKT. #	BREAKER AMP/POLE	NOTES	DESCRIPTION	CIRCUIT WIRE SIZE
3/4"C, 1#12, #12N, #12G	AIR COMPRESSOR REC		1	1	0.54	0.00					2	20	1	BATHROOM REC	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	ENTRY REC		1	3			0.00	0.36			4	20	1	ENTRY-FOUNTAIN REC	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	OFFICE REC		1	5					0.54	0.54	6	20	1	S- OPEN WORKSPACE REC	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	WORKSPACE REC		1	7	0.72	0.36					8	20	1	MACHINE SHOP REC	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	E-WORKSPACE REC		1	9			0.72	0.36			10	20	1	MACHINE SHOP REC2	3/4"C, 1#12, #12N, #12G
				11					4.78	5.82	12				
3/4"C, 2#6, #6N, #10G	WELDER		2	50							14	50	2	PLASMA CUTTER	1"C, 2#4, #4N, #8G
				13	4.78	5.82									
				15			1.01	1.44			16	20	1	1 GRIZZLY BAND SAW	3/4"C, 1#12, #12N, #12G
3/4"C, 3#12, #12N, #12G	BENCH GRINDER		3	20	17				1.01	0.54	18	20	1	S- OPEN WORKSPACE REC2	3/4"C, 1#12, #12N, #12G
					19	1.01	0.36				20	20	1	OFFICE REC	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	REC EXTERIOR		1	20	21			1.44	1.18		22	20	1	OVERHEAD DOOR 108	3/4"C, 1#10, #10N, #10G
3/4"C, 1#12, #12N, #12G	IT REC		1	20	23					1.00	24	20	1	EF-2,3	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	EF-4		1	20	25	0.53	2.00				26				
					27			3.02	2.00		28	30	3	EF-1	3/4"C, 3#10, #10N, #10G
3/4"C, 2#6, #6N, #10G	HP-1		2	45	29				3.02	2.00	30				
3/4"C, 1#10, #10N, #10G	OVERHEAD DOOR 108		1	20	31	1.18	1.00				32	20	1	ACCESS CONTROL	3/4"C, 1#12, #12N, #12G
3/4"C, 1#10, #10N, #10G	LTG		1	20	33			1.80	0.36		34	20	1	GIH-1	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	LTG EXTERIOR		1	20	35					0.22	0.50	36	20	1	CORD REEL 106	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	GIH-2		1	20	37	0.36	0.50				38	20	1	CORD REEL 107	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	ENTRY REC		1	20	39			0.80	0.50		40	20	1	CORD REEL 108	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	CORD REEL 106		1	20	41					0.50	0.50	42	20	1	CORD REEL 108	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	CORD REEL 107		1	20	43	0.50	1.18				44	20	1	OVERHEAD DOOR 108	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	CORD REEL 108		1	20	45			0.50	2.50		46	30	1	MOTORIZED DOOR OPERATORS	3/4"C, 1#10, #10N, #10G
3/4"C, 1#12, #12N, #12G	CORD REEL 108		1	20	47					0.50	0.36	48	20	1	LTG	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	IT DEMARC REC		1	20	49	0.36	1.20				50	20	1	2 FACP	3/4"C, 1#12, #12N, #12G
3/4"C, 1#12, #12N, #12G	LTG EXIT SIGNS		1	20	51			0.01	0.79		52				
					53					1.65	0.79	54	20	3	CF-1	
3/4"C, 2#10, #10N, #10G	EUH-1		2	25	55	1.65	0.79				56				3/4"C, 3#12, #12N, #12G
					57			1.12	1.12		58				
3/4"C, 2#12, #12N, #12G	EWH-2		2	20	59					1.12	1.12	60	20	2	EWH-1	3/4"C, 2#12, #12N, #12G
--	SPARE		1	20	61	0.00						62			
--	SPARE		1	20	63			0.00				64			
--	SPARE		1	20	65					0.00		66			
--	SPARE		1	20	67	0.00	0.00					68	20	1	SPARE	--
--	SPARE		1	20	69			0.00	0.00			70	20	1	SPARE	--
--	SPARE		1	20	71					0.00	0.00	72	20	1	SPARE	--
--	SPARE		1	20	73	0.00	0.00					74	20	1	SPARE	--
--	SPARE		1	20	75			0.00	0.00			76	20	1	SPARE	--
--	SPARE		1	20	77					0.00	0.00	78	20	1	SPARE	--
--	SPARE		1	20	79	0.00	0.00					80	20	1	SPARE	--
--	SPARE		1	20	81			0.00	0.00			82	20	1	SPARE	--
--	SPARE		1	20	83					0.00	0.00	84	20	1	SPARE	--

PANEL NOTES:

25 kVA 21 kVA 27 kVA

1. PROVIDE GFCI BREAKER.
2. PROVIDE LOCKING TAB FOR BREAKER

	CONN. LOAD	DEM. LOAD
TOTAL KVA	72 kVA	65 kVA
TOTAL AMPS	201 A	180 A

PANEL NO: **ELEC BUSWAY** | BUS AMPS: **100** | FED FROM: **MDP** | INTEGRAL SPD: **NONE**
PHASES: **3** | MAIN CB AMPS: **MLO** | MOUNTING: **CLG/SUSPENDED** | LOCATION: **MACHINE SHOP 106**
VOLTS: **120/208 Wye** | MIN. AIC RATING: **9,567** | TYPE: **BUSWAY**

CIRCUIT WIRE SIZE	DESCRIPTION	NOTES	BREAKER POLE/AMP	CKT. #	A KVA		B KVA		C KVA		CKT. #	BREAKER AMP/POLE	NOTES	DESCRIPTION	CIRCUIT WIRE SIZE
				1	0.96	2.40					2	30	1	METAL PRO IRON WORKER MACHINE...	N/A
N/A	GRIZZLY BAND SAW MACHINE SHOP 106		2	20	3		0.96	0.18			4	20	1	REC	N/A
N/A	REC		1	20	5				0.18	--	6	--	1	N/A	--
--	N/A		1	--	7	--	--				8	--	1	N/A	--
--	N/A		1	--	9			--	--		10	--	1	N/A	--
--	N/A		1	--	11					--	--	12	--	1	N/A	--
--	N/A		1	--	13	--	--				14	--	1	N/A	--
--	N/A		1	--	15			--	--		16	--	1	N/A	--
--	N/A		1	--	17					--	--	18	--	1	N/A	--

PANEL NOTES:

3 kVA 1 kVA 0 kVA

1. THIS SCHEDULE IS FOR REFERENCE ONLY.
2. THIS SCHEDULE IS USED TO INDICATE LOADING OF THE BUSWAY.
3. PROVIDE BUSWAY PLUG-INS TO MATCH REQUIREMENTS SHOWN.
4. REFER TO SPECIFICATIONS.

	CONN. LOAD	DEM. LOAD
TOTAL KVA	5 kVA	5 kVA
TOTAL AMPS	13 A	13 A

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