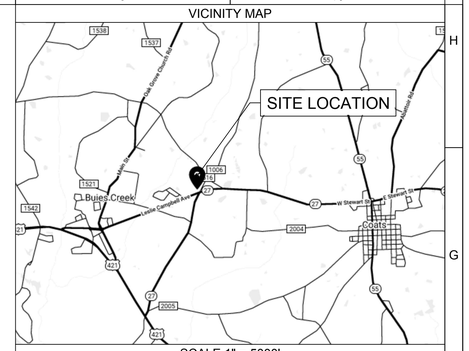
ESA BUIES CREEK, LLC.
SOLAR POWER GENERATION FACILITY

1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546



PROJECT SPECIFICATIONS DESIGN SUMMARY TABLE	
SYSTEM SIZE (AC)	2.750
SYSTEM SIZE (DC)	3.94632 MW
DC/AC RATIO	1.435
MV TRANSFORMER	(1) 2500KVA @ 22.86 kV
INVERTER(S)	SMA AMERICA SC2750-EV-US
INVERTER QTY	1
MODULE MAKE	FIRST SOLAR FS-6435
MODULE QUANTITY	9,072
MODULE STC RATING	435W
STRING SIZE AND VOLTAGE	6 MODS PER STRING, 1500VDC
STRING COUNT	1,512
RACKING SYSTEM	SOLAR FLEXRACK
RACK CONFIGURATION	2 HIGH IN PORTRAIT
TILT	20°
AZIMUTH	180°
SLA	29°
CLEAR ROW SPACING	VARIES, 8 FT. MIN.
LATITUDE	35.4147795
LONGITUDE	-78.7144972
UTILITY	DEP
CODE CYCLE	NEC 2017

Pure Power
Contractors Inc.
2812 GRAY FOX RD, MONROE NC 28110

DRAWING SCHEDULE		
DWG.NO.	DRAWING TITLE	REV
E-001	COVER SHEET	0
E-002	GENERAL NOTES 1 OF 2	0
E-003	GENERAL NOTES 2 OF 2	0
E-101	GENERAL SITE OVERVIEW	0
E-111	SHADING AND TREE REMOVAL	0
E-201	AC ONE LINE DIAGRAM	0
E-211	DC ONE LINE DIAGRAM	0
E-221	CONDUCTOR SCHEDULE AND CALCS	0
E-301	MONITORING AND LV AC WIRING DIAGRAM	0
E-311	COMMUNICATIONS DIAGRAM	0
E-312	METER WIRING DIAGRAM	0
E-321	EQUIPMENT MOUNTING DETAILS	0
E-401	DC TRENCH AND CIRCUIT LAYOUT	0
E-501	EQUIPMENT PAD PLAN VIEWS	0
E-511	EQUIPMENT PAD DETAILS	0
E-521	CONDUIT AND WIRE MANAGEMENT 1 OF 2	0
E-531	CONDUIT AND WIRE MANAGEMENT 2 OF 2	0
E-541	TRENCH DETAILS	0
E-601	GENERAL GROUNDING	0
E-602	STRUCTURE GROUNDING	0
E-603	MV EQUIPMENT GROUNDING	0
E-604	FENCE GROUNDING	0
E-701	MV SITE PLAN	0
E-801	LABELS AND SIGNAGE	0
E-811	GENERAL SIGNAGE	0
E-901	CUT SHEETS	0

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SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039078 KEVIN LESLIE
5/18/2020
PERMIT DRAWING - NOT RELEASED FOR CONSTRUCTION

AVOCA ENGINEERS, PLLC
NC FIRM LICENSE: P-1577
242 OLD NEW BRUNSWICK ROAD PISCATAWAY NJ 08854
PHONE (732) 465-1002 FAX (732) 465-1005

REVISIONS

NO.	DATE	DESCRIPTION
0	03/18/20	ISSUED FOR PERMIT - REV. MODULES AND LAYOUT

PLT STAMP
PLOT DATE: 5/18/2020 7:21 PM
E-001 COVER SHEET.DWG

PROJECT: 20-PP-044

ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
DRAWN BY:	EG
CHECKED BY:	KL

COVER SHEET

E-001

DEFINITIONS

1.1. DC STRING: A DESIGNATED QUANTITY OF SOLAR MODULES WIRED IN SERIES (POSITIVE TO NEGATIVE)
1.2. PV SOURCE CIRCUIT: A SINGLE DC STRING CIRCUIT UP TO A COMMON CONNECTION POINT
1.3. PV OUTPUT CIRCUIT: A CIRCUIT BETWEEN TWO OR MORE ELECTRICALLY PARALLELED PV SOURCE CIRCUITS AND THE PV INVERTER
1.4. COMBINER BOX: AN ELECTRICAL BOX WHERE PV SOURCE OR OUTPUT CIRCUITS ARE FUSED AND ELECTRICALLY PARALLELED. TYPICALLY CONTAINS A DC DISCONNECT.
1.5. SOLAR/PV INVERTER: AN ELECTRICAL CONVERTER WHICH CONVERTS DC OUTPUT OF PV MODULES INTO AC.

1. CODE COMPLIANCE

1.1. ALL INSTALLATION PRACTICES SHALL CONFORM TO THE NEC, NFPA, NFPA70E, NESC, AND OTHER APPLICABLE LOCAL CODES AND STANDARDS. ANY WORK THAT DOES NOT COMPLY SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
1.2. WHEN CODE AND PURE POWER SPECIFICATIONS CONFLICT, CONTRACTOR SHALL CONTACT OWNER'S ENGINEER FOR DIRECTION.
1.3. ALL TESTING PRACTICES MUST COMPLY WITH IEEE &/OR NETA-ATS UNLESS OTHERWISE SPECIFIED IN THE CONTRACT

2. GENERAL PROVISIONS

2.1. THIS SOLAR ELECTRIC SYSTEM IS INTENDED TO OPERATE IN PARALLEL WITH POWER RECEIVED FROM THE UTILITY. THIS SYSTEM IS INTENDED TO CONNECT TO THE EXISTING UTILITY POWER SYSTEM AT A SINGLE POCC.
2.2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ANY EXISTING UTILITIES AND EQUIPMENT ENCOUNTERED IN THE WORK AREAS.
2.3. ALL COMMUNICATION AND/OR APPROVALS WITH PURE POWER ENGINEERS AND ENGINEER OF RECORD SHALL BE THROUGH THE RFI PROCESS.
2.4. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON THE DRAWINGS, AND LAYOUT ALL AREAS OF THE ARRAY AND EQUIPMENT PRIOR TO ANY INSTALLATION WORK IN ORDER TO VERIFY THAT NO DISCREPANCIES, EXISTING CONDITIONS, OR OBSTRUCTIONS EXIST. IF ISSUES ARE DISCOVERED, CONTRACTOR SHALL SUBMIT A RFI TO THE ENGINEER AND INSTALLATION WORK SHALL NOT COMMENCE UNTIL FORMAL DIRECTION IS RECEIVED.
2.5. CHANGES FROM DRAWINGS ARE NOT PERMITTED UNLESS APPROVED BY ENGINEER OF RECORD IN WRITING.
2.6. ALL CONTRACTORS SHALL PROVIDE TO ENGINEER OF RECORD CONCISE MARK-UPS OF CHANGES TO DRAWINGS FOR USE IN RECORD DRAWINGS.
2.7. ALL CONTRACTORS SHALL REPORT ANY NON-CONFORMING WORK THAT IS BEING PERFORMED OR NON-CONFORMING MATERIAL THAT IS BEING USED TO THE PURE POWER PROJECT MANAGER, ENGINEER AND ENGINEER OF RECORD.

3. WORK QUALITY

3.1. ALL PV MODULES SHALL BE PHYSICALLY INSPECTED PRIOR TO INSTALLATION ON RACKING. MODULES WITH UNDERSIDE SCRATCHES THAT PENETRATE THE PROTECTIVE LAMINATE LAYER SHALL NOT BE INSTALLED. ALL DAMAGED MODULES SHALL BE REPORTED TO SITE PROJECT MANAGER IMMEDIATELY.
3.2. INTERNAL PARTS OF ELECTRICAL EQUIPMENT, INCLUDING BUSBARS, WIRING TERMINALS, INSULATORS, AND OTHER SURFACES, SHALL NOT BE DAMAGED OR CONTAMINATED BY FOREIGN MATERIALS SUCH AS DIRT, MUD, PAINT, PLASTER, CLEANERS, ABRASIVES, OR CORROSIVE RESIDUES. MANUFACTURER RECOMMENDED CLEANERS AND CLEANING PROCESSES SHALL BE FOLLOWED AS DESCRIBED IN THE INSTALLATION MANUAL. THERE SHALL BE NO DAMAGED PARTS THAT MAY VOID LISTING OR ADVERSELY AFFECT SAFE OPERATION OR MECHANICAL STRENGTH OF THE EQUIPMENT SUCH AS PARTS THAT ARE BROKEN, BENT, CUT, OR DETERIORATING BY CORROSION, CHEMICAL ACTION, OR OVERHEATING.
3.3. ALL HOT-DIPPED GALVANIZED FERROUS MATERIAL THAT WILL BE SUBJECT TO ANY DRILLING, ARE PILE DRIVEN, AND/OR COMPROMISE THE INTEGRITY OF THE GALVANIZED PROTECTION, SHALL BE TREATED WITH GALVANIZED ZINC COMPOUND TO PREVENT CORROSION.
3.4. IMPACT DRIVERS SHALL NOT BE USED FOR TIGHTENING ANY HARDWARE. CALIBRATED TORQUE DRIVERS ARE PERMISSIBLE ON RACKING COMPONENT CONSTRUCTION PENDING PURE POWER QC REVIEW OF CALIBRATION CERTIFICATE
3.5. ALL PACKAGING SHALL BE REMOVED FROM ALL EQUIPMENT PRIOR TO COMMISSIONING.
3.6. RACKING CONTRACTOR SHALL INSTALL MODULES SQUARE AND PLUMB WITH ADJACENT MODULES, IN AN AESTHETIC WAY, WITHIN THE ADJUSTABILITY OF THE RACKING. RACKING SUBJECT TO INSPECTION AND FIELD REVIEW BY PURE POWER.
3.7. ALL WIRE MANAGEMENT SHALL BE DONE NEATLY AND IN AN ORDERLY AND PROFESSIONAL MANNER.
3.8. ALL MODULE, DC STRING, AND PV OUTPUT CIRCUIT CONNECTORS SHALL BE CLEAN AND KEPT DRY UNTIL CONNECTED.
3.9. COPPER CONDUCTORS SHALL NOT COME IN CONTACT WITH ALUMINUM CONDUCTORS. IF REQUIRED, USE A LISTED DEVICE OR FITTING DESIGNED FOR THE PURPOSE WITH ANTI-OXIDATION COMPOUND.
3.10. ALL UNTERMINATED ENDS OF MEDIUM VOLTAGE CABLE SHALL BE SEALED WITH HEAT SHRINKABLE END CAPS TO PREVENT MOISTURE INGRESS.
3.11. ALL UNTERMINATED ENDS OF PV OUTPUT CABLE OUTSIDE OF EQUIPMENT ENCLOSURES SHALL BE PROTECTED BY CAPPING OR TAPING AND STORED TO MINIMIZE MOISTURE INGRESS

4. MATERIALS AND METHODS

4.1. GENERAL

4.1.1. ALL MATERIALS SHALL BE NEW, IN PROPER WORKING CONDITION, AND MARKED AND LISTED BY A NATIONAL RECOGNIZED TESTING LABORATORY. THE MATERIALS SHALL BE USED FOR THEIR INTENDED PURPOSES.
4.1.2. ALL EQUIPMENT SHALL BE ASSEMBLED, INSTALLED, AND TESTED PER MANUFACTURER'S SPECIFICATIONS AND MANUALS. IF INSTALLATION MANUALS ARE NOT PROVIDED THEY MUST BE REQUESTED, RECEIVED AND REVIEWED PRIOR TO INSTALLATION.
4.1.3. ALL CONTRACTOR FURNISHED MATERIALS SHALL BE SUTMITTED TO PURE POWER AND RECEIVE APPROVAL PRIOR TO CONSTRUCTION OF THIS PROJECT.
4.1.4. ALL EQUIPMENT SHALL BE SECURED FROM UNAUTHORIZED AND UNQUALIFIED PERSONNEL BY PADLOCKS PROVIDED BY THE CONTRACTOR.

4.2. RACEWAYS, CONDUIT BODIES, AND BOXES

4.2.1. NEW CONDUIT ROUTING SHOWN IS DIAGRAMMATIC. CONTRACTOR SHALL LAY OUT RUNS TO SUIT FIELD CONDITIONS AND THE COORDINATION REQUIREMENTS OF OTHER TRADES. ALL CHANGES MUST BE PRE-APPROVED WITH OWNER'S ENGINEER AND DOCUMENTED IN RECORD DRAWINGS.
4.2.2. COMPLETELY INSTALL ALL CONDUIT RUNS AND BACKFILL DUCTBANKS BEFORE PULLING CABLE. PULL A FLEXIBLE MANDREL AND BRUSH THROUGH EACH CONDUIT AFTER INSTALLATION. IF CONDUIT IS WET, SWAB CONDUIT INTERIOR BEFORE PULLING CABLES. LUBRICATE CONDUCTORS AS NEEDED.
4.2.3. CONTRACTOR MAY INCREASE RACEWAY SIZE AS NEEDED WITH APPROVAL FROM OWNER'S ENGINEER.
4.2.4. ALL CUT RACEWAY THREADS SHALL BE PROTECTED FROM CORROSION WITH COLD GALVANIZING ZINC COMPOUND APPLIED TO THE CUT SURFACE.
4.2.5. A WEATHER HEAD SHALL BE USED WHEN CONDUCTORS ENTER CONDUITS WITHOUT AN ENCLOSURE, WHEN NOT ON ROOF.
4.2.6. EMT, FMC, LFNC, AND LFMC CONDUIT SHALL NOT BE USED.
4.2.7. ALL METALLIC CONDUIT SHALL BE GROUNDED.
4.2.8. ALL RACEWAY FITTINGS IN OUTDOOR LOCATIONS SHALL BE WATERPROOF, UON.
4.2.9. FLEXIBLE CONDUIT OF ANY KIND WHICH IS NOT SUPPLIED BY EQUIPMENT MANUFACTURER SHALL NOT BE INSTALLED UNLESS APPROVED BY PURE POWER ENGINEERING.
4.2.10. ALL RMC CONDUIT IN CONTACT WITH EARTH SHALL BE PAINTED WITH RUST-OLEUM C9578 EPOXY OR APPROVED EQUAL TO 6" ABOVE FINISHED GRADE.
4.2.11. SCHEDULE 40 PVC SHALL BE USED FOR BURIED CONDUITS (NOT UNDER ROADS), FOR CONDUITS ENCASED IN CONCRETE, OR CONDUITS ENTERING THE INTERIOR OF PAD MOUNTED EQUIPMENT FROM BELOW GRADE SUCH THAT THE CONDUIT IS NOT EXPOSED, UON ON THE DRAWINGS.
4.2.12. RACEWAYS IN EXPOSED EXTERIOR LOCATIONS OR UNDER ROADS SHALL BE RMC OR SCHEDULE 80 PVC.
4.2.13. PVC INSTALLED IN EXPOSED EXTERIOR LOCATIONS SHALL BE LISTED AND MARKED AS UV RESISTANT.
4.2.14. LONG STRAIGHT EXPOSED CONDUIT RUNS, 100 FEET OR MORE, SHALL HAVE EXPANSION FITTINGS INSTALLED PER NEC 300.7(B). EXPANSION FITTINGS SHALL ALSO BE USED WHEN CONDUIT SPANS AN EXPANSION JOINT.
4.2.15. ALL CONDUITS TRANSITIONING FROM UNDER TO ABOVEGROUND AND TERMINATING ON A COMBINER BOX OR OTHER RAISED EQUIPMENT, SHALL HAVE AN EXPANSION/DEFLECTION FITTING INSTALLED PER NEC 300.5(J).
4.2.16. WHEN TRANSITIONING FROM FREE AIR TO CONDUIT, A FITTING SHALL BE USED TO PREVENT THE ENTRY OF MOISTURE.
4.2.17. "L" AND "T" CONDUIT BODIES SHALL NOT BE USED. MOGUL-TYPE CONDUIT BODIES SHALL BE CONSIDERED BY OWNER'S ENGINEER UPON REQUEST.
4.2.18. HDPE COUPLINGS WITH OTHER TYPES OF CONDUIT SHALL BE LISTED FOR BOTH CONDUIT TYPES.
4.2.19. USE UL-514B (OR APPROVED EQUAL) HUB LISTED TO PROVIDE MOISTURE PROTECTION FOR CONDUIT ENTRANCES IN ALL APPLICABLE LOCATIONS AS REQUIRED BY NEC 314.15. CONDUITS SHALL NOT ENTER THROUGH THE TOP OF ANY OUTDOOR EQUIPMENT.
4.2.20. ALL VERTICAL MV CONDUIT SWEEPS SHALL HAVE MINIMUM 36 INCH RADIUS. HORIZONTAL MV CONDUIT SWEEPS SHALL HAVE MINIMUM 60 INCH RADIUS.
4.2.21. MAINTAIN MINIMUM 12 INCHES OF EDGE TO EDGE SPACING HORIZONTALLY AND VERTICALLY AT CROSSINGS BETWEEN MV CONDUITS OR DUCTBANKS AND LOW-VOLTAGE OR COMMUNICATIONS CONDUITS.
4.2.22. MAINTAIN ALL CONDUIT ENTRIES TO EQUIPMENT WITHIN MANUFACTURER'S DESIGNATED CONDUIT ENTRY SPACE. ARRANGE CONDUITS TO PERMIT THE MOST DIRECT ROUTING OF CABLES TO TERMINALS AND TO ALLOW ADEQUATE SLACK FOR DISCONNECTION AND PARKING OF MV ELBOW CONNECTORS.
4.2.23. ALL CONDUITS STUBBED OR ENTERING EQUIPMENT TO BE EQUIPPED WITH BUSHINGS OR APPROVED EQUAL TO PREVENT ABRASION PRIOR TO PULLING CABLE.
4.2.24. ALL CONDUIT PASSING THROUGH FIRE-RATED ASSEMBLIES SHALL BE SEALED WITH A FIRE-RATED, LISTED FIRE STOPPING PRODUCT.
4.2.25. ALL CONDUIT PASSING THROUGH WATERTIGHT ASSEMBLIES SHALL BE SEALED WITH A LISTED WATERPROOFING PRODUCT. WATERTIGHT CONDUIT WASHERS OR NUTS SHALL BE USED ON BOTH SIDES OF CONDUIT ENTRY.
4.2.26. ALL SPARE OR EMPTY CONDUITS SHALL BE PROVIDED WITH A NYLON DRAG LINE, SHALL BE CAPPED ON BOTH ENDS, AND LABELED AS SPARE.
4.2.27. SEAL ALL CONDUIT OPENINGS, WITH THE EXCEPTION OF WEATHERHEADS, WITH APPROVED POLYWATER FST KIT FOAM OR APPROVED EQUAL TO PREVENT TRANSMISSION OF HUMID AIR BETWEEN INTERIOR AND EXTERIOR OF EQUIPMENT AND PREVENT PEST INGRESS. DUCT SEAL COMPOUND WILL NOT BE AN APPROVED EQUAL
4.2.28. CIC HDPE CONDUIT SHALL NOT BE INSTALLED IN EXPOSED LOCATIONS.
4.2.29. CONDUITS STUBBED UP FROM BELOW GROUND SHALL BE IN THE APPROPRIATE LOCATIONS AND PLUMB.
4.2.30. CONDUITS STUBBED UP SHALL IMMEDIATELY BE CAPPED TO PREVENT WATER ENTRY DURING CONSTRUCTION.
4.2.31. CABLES OR CONDUIT BURIED BELOW STREAMS OR DRAINAGE TRENCHES SHALL MAINTAIN THEIR NEC REQUIRED DEPTH BELOW THE BOTTOM OF THE STREAM OR TRENCH.
4.2.32. ANY CONDUIT RUN THAT EXCEEDS 360° IN BENDS WILL REQUIRE A PULL BOX TO BE INSTALLED. PULL BOX NEEDS TO BE INSTALLED PER NEC 342 - 362.26

4.3. CONDUCTORS

4.3.1. CONDUCTOR INSULATION COLOR SPECIFICATION:

LV AC CONDUCTORS		
	480/277V	208/120V
PHASE A	BROWN	BLACK
PHASE B	ORANGE	RED
PHASE C	YELLOW	BLUE
GROUNDED CONDUCTOR	GRAY OR WHITE	WHITE
EGC	GREEN OR BARE	GREEN OR BARE
GEC	GREEN W/ ORANGE OR BARE	GREEN W/ ORANGE OR BARE
MV AC CONDUCTORS		
PHASE A	BLACK WITH RED MARKED ENDS	
PHASE B	BLACK WITH YELLOW MARKED ENDS	
PHASE C	BLACK WITH BLUE MARKED ENDS	
PV DC CONDUCTORS - NEC 2014 OR EARLIER		
	NEGATIVE GROUNDED	UNGROUNDED
POSITIVE (+)	BLUE	BLUE
NEGATIVE (-)	BLACK WITH WHITE MARKED ENDS	BLACK
DC GEC/EGC	GREEN OR BARE	GREEN OR BARE
PV DC CONDUCTORS - NEC 2017		
	NEGATIVE GROUNDED OR UNGROUNDED	
POSITIVE (+)	BLUE	
NEGATIVE (-)	BLACK	
DC GEC/EGC	GREEN OR BARE	

NOTE: MV PHASE LETTERING TO MATCH ABOVE UNLESS OTHERWISE SPECIFIED BY UTILITY

4.3.2. ALL CONDUCTORS SHALL BE OF THE EXACT SIZE, TYPE, AND MATERIAL SPECIFIED ON THESE DRAWINGS. ANY DEVIATION REQUIRES APPROVAL FROM ENGINEER OF RECORD.
4.3.3. ALL PV SOURCE AND OUTPUT CIRCUIT WIRING WILL BE PV-WIRE TYPE, 90 DEGREE C, WET RATED AND UV RESISTANT.
4.3.4. ALL LV AC WIRING SHALL BE XLPE INSULATION RATED AT 90 DEGREES C, UON. THIS NOTE WILL BE SUPERSEDED BY ANY EQUIPMENT SPECIFICATIONS REQUIRING LV AC WIRE TO MEET HIGHER VOLTAGE OR INSULATION STANDARDS.
4.3.5. ALL COMMUNICATION CABLES SHALL BE SUBMITTED FOR APPROVAL. CABLES SHALL BE PROVIDED WITH APPROPRIATE SHIELDS, DRAIN WIRES, AND COMMON WIRES PER COMMUNICATION EQUIPMENT MANUFACTURER RECOMMENDATIONS. RS-485 CABLES SHALL BE BELDEN 9842 OR APPROVED EQUAL WITH MINIMUM 2 PAIRS AND SHIELD AND DRAIN WIRES.
4.3.6. NO CONDUCTOR SHALL BE INSTALLED IN CONTACT WITH SHARP EDGES OF RACKING OR RACEWAYS THAT COULD COMPROMISE CONDUCTOR INSULATION.
4.3.7. ALL DC MATERIALS SHALL BE NRTL LISTED FOR THE SYSTEM MAX SYSTEM VOLTAGE SHOWN IN THE DC DESIGN.
4.3.8. CONDUCTORS SHALL BE SUPPORTED IN VERTICAL CONDUITS IN ACCORDANCE WITH THE REQUIREMENTS OF NEC 300.19.
4.3.9. LV CABLE SPLICES SHALL NOT BE USED UNLESS APPROVED BY PURE POWER ENGINEER ON A CASE-BY-CASE BASIS. IN SUCH CASES, ALL SPLICES ARE TO BE MADE IN ACCESSIBLE LOCATIONS WITH LISTED WATERPROOF SPLICE LUG KITS.
4.3.10. MV CABLE SPLICES ARE PROHIBITED. ENGINEER SHALL BE NOTIFIED IF AN UNDERGROUND BREAK IN A MV FEEDER IS REQUIRED BY FIELD CONDITIONS. IN THIS CASE, CABLES SHALL BE BROUGHT ABOVEGROUND AND TERMINATED IN A SECTIONALIZING CABINET WITH LOAD/DEAD-BREAK ELBOWS AND MARKED ON RECORD DRAWINGS.
4.3.11. MV CONDUCTORS SHALL BE PULLED USING DIRECT CONNECTION OF PULLING EYES TO THE CONDUCTORS OF EACH CABLE IN THE CIRCUIT OR BY INDIVIDUAL KELLEMS GRIPS APPLIED TO EACH CABLE OF THE CIRCUIT OVER THE INSULATION WITH THE TAPE SHIELDING REMOVED. USE OF KELLEMS GRIPS OVER THE OUTER JACKET OF THE CONDUCTOR OR OVER THE SHIELDING TAPE IS NOT PERMITTED.
4.3.12. MV CABLES SHALL BE OF THE UL TYPE SPECIFIED AND BE RATED FOR VOLTAGE INDICATED IN THE DESIGN. THESE CABLES SHALL HAVE BEEN DESIGNED, MANUFACTURED, AND/OR TESTED ACCORDING TO THE FOLLOWING STANDARDS: UL 1072, ICEA S-94-649 (NEMA WC 74).
4.3.13. CABLE PULLING TENSION SHALL NOT EXCEED CABLE MANUFACTURER RECOMMENDATIONS. INSTALL HANDHOLES OR PULL BOXES TO REDUCE PULLING TENSION AS NEEDED.
4.3.14. WIRE NUTS SHALL NOT BE USED.
4.3.15. MAINTAIN MINIMUNM CONDUCTOR BEND RADIUSES AS CALLED OUT IN NEC 300.34.

4.4. ALUMINUM CONDUCTORS

4.4.1. MINIMUM WIRE SIZE FOR CURRENT CARRYING CONDUCTORS WHEN IMPLEMENTING ALUMINUM AS A CONDUCTOR SHALL BE 1/0 AWG STRANDED, COMPACT ELECTRICAL GRADE AA-8000 SERIES ALLOY.
4.4.2. ALL TERMINATIONS SHALL BE SPECIFICALLY LISTED FOR USE WITH ALUMINUM CONDUCTORS.
4.4.3. OXIDE INHIBITOR MUST BE APPLIED TO EXPOSED CONDUCTOR IMMEDIATELY AFTER STRIPPING AND BRUSHING AND IMMEDIATELY PRIOR TO INSTALLATION OF THE LUG. IN ADDITION, COMPRESSION LUGS MUST BE PRE-FILLED WITH OXIDE INHIBITOR.

4.5. MEDIUM VOLTAGE REQUIREMENTS

4.5.1. ELBOWS, BUSHINGS, AND TEST CAPS MUST BE CLEAN AND PROPERLY LUBRICATED PER MANUFACTURER'S INSTRUCTIONS BEFORE FINAL CONNECTION.
4.5.2. POWER CABLE, ELBOW, AND MV TERMINATION DRAINS SHALL BE INSTALLED IN A MANNER THAT WILL ALLOW FOR THE REMOVAL, STANDING OFF, AND/OR LANDING OF ELBOWS WITH MINIMUM BENDING RADIUS PER NEC 300.34.
4.5.3. TAPE SHIELD ADAPTER KITS ARE TO BE USED WITH POWER CABLE THAT HAS TAPE SHIELDING.
4.5.4. WHEN REQUIRED, MOUNT MV FAULT INDICATORS SUCH THAT INDICATOR WINDOW IS READILY VISIBLE WITHOUT THE NEED TO ENTER THE CABLE COMPARTMENT OR MOVE CONDUCTORS OR OTHER COMPONENTS. LABEL FAULT INDICATORS WITH CIRCUIT ID CONSISTENT WITH SECTION
4.5.5. ALL MV WORK SHALL COMPLY WITH THE LATEST EDITION OF ANSI C2 - NATIONAL ELECTRICAL SAFETY CODE (NESC).
4.5.6. SHOP DRAWINGS SHALL BE SUBMITTED TO PURE POWER ENGINEER FOR REVIEW AND APPROVAL FOR ALL CONTRACTOR-FURNISHED MV MATERIALS INCLUDING BUT NOT LIMITED TO: MV CABLES AND TERMINATIONS, SWITCHGEAR, SECTIONALIZING CABINETS.
4.5.7. ARRANGE PHASES IN ALL MV EQUIPMENT AS A-B-C FROM LEFT TO RIGHT OR TOP TO BOTTOM AS VIEWED FROM THE FRONT.
4.5.8. MV PAD MOUNTED TERMINATIONS SHALL BE WITH CONNECTORS THAT ARE INSULATED, SHIELDED, AND IEEE 386 COMPLIANT.
4.5.9. LOADBREAK ELBOWS SHALL BE CONFIGURED WITH CAPACITIVE TEST POINTS.
4.5.10. POLE MOUNTED TERMINATIONS SHALL BE COLD OR HEAT SHRINK KITS INTENDED FOR OUTDOOR USE AND SHALL COMPLY WITH IEEE 48 AS A CLASS I TERMINATION.
4.5.11. SILICON BRONZE HARDWARE SHALL BE USED ON ALL MEDIUM VOLTAGE BOLTED TERMINATIONS.

4.6. TERMINATIONS

4.6.1. ALL EQUIPMENT SHALL HAVE A TERMINAL TEMPERATURE RATING EQUAL TO OR GREATER THAN THAT OF THE ASSOCIATED CONDUCTORS.
4.6.2. STRIPPED CONDUCTORS SHOULD BE CLEAN AND FREE FROM DAMAGE AT ALL TERMINATIONS.
4.6.3. NEMA RATED, TIN COATED, LONG BARREL COMPRESSION LUGS SHALL BE USED ON ALL TERMINATIONS. MECHANICAL LUGS SHALL NOT BE INSTALLED.
4.6.4. ALL ELECTRICAL CONNECTIONS SHALL USE CONICAL OR BELLEVILLE LOCK WASHERS UON BY MANUFACTURER SPECIFICATIONS.
4.6.5. ALL COPPER TERMINATIONS SHALL HAVE KOPR-SHIELD OR EQUIVALENT APPLIED.
4.6.6. OXIDE INHIBITOR SHALL BE REQUIRED BETWEEN COMPRESSION LUGS AND BUS BARS WHEN ONE OR BOTH ARE UNCOATED AND ALUMINUM.
4.6.7. ALL MECHANICAL CONNECTIONS OTHER THAN ELBOW CONNECTORS SHALL BE MADE USING UL-LISTED CIRCUMFERENTIAL COMPRESSION LUGS. LUGS TO MATCH CONDUCTOR SIZE AND TYPE.
4.6.8. MODULE LEAD CONNECTORS SHALL BE INSTALLED SUCH THAT THEY ARE EASILY ACCESSIBLE AND PROTECTED FROM EXPOSURE TO DIRECT SUNLIGHT OR RAIN. THEY SHALL NOT BE INSTALLED WITHIN TUBING, CONDUIT OR MODULE GAPS.
4.6.9. PV SOURCE CIRCUIT CONNECTORS MUST BE IDENTICAL TO MAKE AND MODEL AS THE MODULE CONNECTORS. THE CONNECTION TO SOURCE CIRCUITS MUST BE PER THE MODULE AND CONNECTOR MANUFACTURER INSTRUCTIONS. CONNECTORS LISTED AS "COMPATIBLE" BUT NOT IDENTICAL SHALL NOT BE ACCEPTED. CONTRACTOR TO VERIFY THAT THE SOURCE CIRCUIT CONDUCTOR DIAMETER IS COMPATIBLE WITH THE CONNECTOR USED.
4.6.10. ALL LUG HOLE AND SPACING SIZE SHALL MATCH EQUIPMENT STUD SIZE AND/OR BUSBAR HOLE SIZE AND SPACING.
4.6.11. VERIFY UTILITY PHASE SEQUENCE AND COORDINATE INSTALLATION OF FEEDER CONDUCTORS TO PROVIDE CORRECT PHASE SEQUENCE AT ALL AC OVERHEAD TERMINATIONS. REFER TO GENERAL NOTE 5.5.7 FOR TRANSFORMER TERMINATION
4.6.12. STRANDED COMMUNICATION CABLE TERMINATIONS SHALL BE CRIMPED WITH FERRULES OR SPADES LISTED FOR THE WIRE SIZE BEING USED.
4.6.13. TERMINATE ALL CONTROL WIRING BETWEEN PIECES OF EQUIPMENT ON FIELD WIRING TERMINAL BOARDS. LABEL ALL CONTROL WIRES WITH TERMINAL BOARD AND TERMINAL NUMBER IDENTIFICATION AT BOTH ENDS. COLOR CODING TAPE SHALL BE PREMIUM GRADE PRESSURE SENSITIVE VINYL; HEAT, COLD, MOISTURE, UV, AND FADE RESISTANT. USE COMPRESSION TOOL LISTED FOR USE WITH SELECTED COMPRESSION CONNECTOR PER MANUFACTURER.
4.6.14. ALL CONNECTORS AND CORRESPONDING CRIMPING TOOLS SHALL BE LISTED FOR THEIR SPECIFIC APPLICATION.
4.6.15. USE OF A "ONE-SHOT" CRIMPER OR "DIE-LESS CRIMPERS" SHALL NOT BE USED.
4.6.16. COMPRESSION STYLE LUGS AND TERMINATIONS SHALL BE RATED FOR THE MAXIMUM DC AND AC VOLTAGE OF THE SYSTEM.

4.7. GROUNDING & BONDING

4.7.1. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.
4.7.2. GROUNDING LUGS AND CONNECTIONS USED OUTDOORS AND EXPOSED TO THE ENVIRONMENT SHALL BE LISTED FOR DIRECT BURIAL (DB). THIS INFORMATION WILL BE CLEARLY NOTED ON PRODUCT SUBMITTALS TO BE APPROVED BY PURE POWER.
4.7.3. ALL GROUNDING ELECTRODE CONDUCTOR SPLICES ABOVE GRADE MUST BE DONE WITH IRREVERSIBLE CRIMP, UON.
4.7.4. ALL EGC'S SHALL BE BARE COPPER, UON.
4.7.5. AFTER INSTALLATION, ALL BARE CU WIRES SHALL NOT BE IN CONTACT WITH GALVANICALLY REACTIVE METALS, SUCH AS ALUMINUM MODULE FRAMES AND RACKING.
4.7.6. GEC'S SHALL HAVE AS SHORT A DISTANCE TO THE GROUNDING ELECTRODE AS POSSIBLE AND A MINIMUM NUMBER OF TURNS.
4.7.7. ALL BELOW GRADE GEC SPLICES AND CONNECTIONS SHALL BE IRREVERSIBLY CRIMPED OR EXOTHERMICALLY WELDED, UON.
4.7.8. ALL NON-CURRENT CARRYING METAL PARTS THAT COME IN CONTACT WITH CURRENT-CARRYING CONDUCTORS SHALL BE GROUNDED. IF THE EQUIPMENT GROUNDING POINT OF CONTACT IS PAINTED, THE PAINT/FINISH AT THAT LOCATION SHALL BE PROPERLY REMOVED.
4.7.9. RACKING COMPONENTS AND STRUCTURAL SUPPORTS MUST BE ELECTRICALLY BONDED TOGETHER BY A LISTED MEANS.
4.7.10. INTER-RACK BONDING JUMPERS SHALL BE FLEXIBLE TIN COATED COPPER BRAIDING (IE: WILEY WEEBS) OR SOLID COPPER WIRE OF SIZE, TYPE, AND TERMINATION METHOD SPECIFIED.
4.7.11. MODULES SHALL BE GROUNDED TO RACKING SUPPORTS WITH A METHOD APPROVED AND LISTED BY THE RACKING MANUFACTURER. GROUNDING CLIPS OR WASHERS SHALL BE ARRANGED PER THE MANUFACTURER INSTRUCTIONS SO THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT THE RACKING GROUNDING CONNECTION OF ANY OTHER MODULE
4.7.12. ALL EQUIPMENT RACKS, COMBINER BOX RACKS, AND CHASE RACKS SHALL BE GROUNDED.

4.8. EQUIPMENT

4.8.1. ALL ELECTRICAL EQUIPMENT LOCATED OUTDOORS (JUNCTION BOXES, COMBINER BOXES, OTHER ENCLOSURES, ETC.) SHALL BE ENVIRONMENTALLY RATED TO AT LEAST NEMA 4 IF MOUNTED VERTICALLY, AND NEMA 4X IF MOUNTED WITH ACCESS DOOR/PANEL MOUNTED OUT OF VERTICAL. PROVIDE NEMA 3R ENCLOSURES WHERE NEMA 4 IS NOT AVAILABLE.
4.8.2. ANY METAL SHAVINGS RESULTING FROM SITE WORK SHALL BE CLEANED FROM ENCLOSURE INTERIORS, TOP SURFACES OF ENCLOSURE, ROOF SURFACE, AND ANY ADDITIONAL AREAS WHERE OXIDATION OR CONDUCTIVE METAL SHAVINGS MAY CAUSE RUST, ELECTRICAL SHORT CIRCUIT OR OTHER DAMAGE.
4.8.3. ALL NEMA-3R OUTDOOR ENCLOSURES SHALL BE INSTALLED WITH A MANUFACTURER APPROVED MEANS OF DRAINAGE AND VENTILATION.
4.8.4. ALL CIRCUIT BREAKERS THAT ARE SUBJECT TO REVERSE POWER FLOW SHALL BE LISTED AS BACKFEED COMPATIBLE.

Pure Power Contractors Inc.
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SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039678 KEVIN LEARY 03/18/2020
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PROJECT: 20-PP-044

ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

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1 OF 2

E-002

4.8.5. UNDERGROUND PULL BOXES OR HANDHOLES SHALL BE OPEN BOTTOM TYPE WITH 12 INCHES MINIMUM OF CLASS 5 STONE AT THE BASE TO ALLOW FOR DRAINAGE, UON PER THE DRAWINGS. PULL BOXES SHALL BE RATED FOR THE MECHANICAL LOAD APPROPRIATE FOR THE INSTALLED LOCATION.
4.8.6. DOORS OR REMOVABLE PANELS PROVIDING ACCESS TO PARTS NORMALLY ENERGIZED SHALL BE PADLOCKABLE CLOSED OR SHALL REQUIRE TOOLS FOR REMOVAL.
4.8.7. MV EQUIPMENT INSTALLED OUTSIDE OF FENCES WHERE ACCESSIBLE TO THE PUBLIC SHALL COMPLY WITH NESC REQUIREMENTS FOR TAMPER-PROOF CONSTRUCTION.
4.8.8. ALL OPENINGS INTO EQUIPMENT SHALL BE SEALED WITH GALVANIZED STEEL PLATE OR SCREEN TO PREVENT ENTRY OF INSECTS AND RODENTS.
4.8.9. EQUIPMENT MOUNTED ON CONCRETE PADS SHALL NOT BE CAULKED ALONG THE BOTTOM PERIMETER UNLESS REQUIRED BY MANUFACTURER OR THE GAP EXCEEDS 3/8" WIDE. USE ONLY EXTERIOR 100% ACRYLIC SILICONE ELASTOMERIC CAULK. NOT USED.
4.8.10. EQUIPMENT SHALL BE INSTALLED SO AS NOT TO SHADE THE PV ARRAY. ANY POTENTIAL SHADING ISSUES SHALL BE REVIEWED BY OWNER'S ENGINEER PRIOR TO INSTALLATION.
4.8.11. FUSES SHALL NOT BE INSTALLED UNTIL JUST PRIOR TO COMMISSIONING.
4.8.12. UNUSED MOUNTING HOLES SHALL BE PLUGGED TO PREVENT THE INGRESS OF MOISTURE AND INSECTS.
4.8.13. PAD MOUNTED EQUIPMENT LOCATED OUTSIDE OF FENCE SHALL BE PROTECTED BY BOLLARDS IF SUBJECT TO VEHICULAR ACTIVITY.

4.9. TRANSFORMERS

4.9.1. ALL CONDUCTORS SHALL BE ROUTED TO MAINTAIN ACCESS TO INDICATORS, VALVES, SAMPLE PORTS, SWITCHES, TAP CHANGES, FUSE WELLS, AND OTHER COMPONENTS AND ACCESSORIES REQUIRING OPERATOR ACCESS.
4.9.2. VERIFY THE FOLLOWING:
4.9.2.1. FACTORY WIRING DIAGRAM IS ACCURATE
4.9.2.2. TRANSFORMER IS LEVEL
4.9.2.3. MEDIUM & LOW VOLTAGE CONDUITS ARE SEPARATED AND IN THEIR OWN COMPARTMENT
4.9.2.4. CONICAL WASHERS SHALL BE USED FOR ALL TERMINATIONS UNLESS SUPPLIED WITH FACTORY HARDWARE OR INSTALLATION MANUAL SPECIFY DIFFERENTLY.
4.9.2.5. HARDWARE IS THE PROPER LENGTH AND EXTEND AT LEAST TWO (2) THREADS PAST NUT.

4.10. HARDWARE

4.10.1. ALL HARDWARE IN EXPOSED LOCATIONS SHALL BE STAINLESS STEEL OR HOT-DIPPED GALVANIZED STEEL. ZINC-COATED FASTENERS ARE PREFERRED INSIDE NEMA 3R OR HIGHER ENCLOSURES, UON.
4.10.2. ALL HARDWARE USED FOR GROUNDING & BONDING ABOVE GRADE SHALL BE STAINLESS STEEL.
4.10.3. ANTI-SEIZE LUBRICANT MUST BE USED ON STAINLESS HARDWARE.
4.10.4. ALL ELECTRICAL AND MECHANICAL HARDWARE TO BE TORQUED PER DEVICE LISTING, OR MANUFACTURERS RECOMMENDATIONS USING A CALIBRATED TORQUE WRENCH. CONNECTORS ARE TO BE MARKED WITH PERMANENT MARKING PAINT, AFTER TORQUING.

4.11. WIRE MANAGEMENT

4.11.1. ALL WIRE MANAGEMENT METHODS AND MATERIALS SHALL BE APPROVED BY OWNER PRIOR TO INSTALLATION.
4.11.2. ALL EXPOSED CABLES, SUCH AS MODULE LEADS AND PV CIRCUIT WIRING SHALL BE SECURED WITH MECHANICAL OR OTHER APPROVED SUNLIGHT RESISTANT MEANS. THE USE OF PLASTIC CABLE TIES IS NOT AN APPROVED METHOD TO SUPPORT OR ATTACH WIRE TO A STRUCTURE.
4.11.3. PV SOURCE AND OUTPUT CONDUCTOR CABLE CLIPS SHALL BE STAINLESS STEEL (E.G. ACC CLIPS BY WILEY OR EQUIVALENT.)
4.11.4. PLASTIC CABLE TIES MAY ONLY BE USED TO BUNDLE PV SOURCE CIRCUIT WIRING AND SHALL BE MADE OF WEATHER-RESISTANT NYLON-12. FOR WIRE SUPPORT, ONLY STAINLESS STEEL CLIPS OR PVC-COATED STAINLESS STEEL CABLE TIES MAY BE USED (HEYCO OR APPROVED EQUAL).
4.11.5. PV SOURCE OUTPUT CIRCUIT WIRING SHALL BE SUPPORTED ADEQUATELY IN LENGTHS NOT TO EXCEED NEC REQUIREMENTS. MODULE TO MODULE INTERCONNECTIONS SHALL BE SUPPORTED AT A MAXIMUM OF 12" FROM THE J-BOX AND THE MODULE TO MODULE CONNECTION POINT.
4.11.6. PROTECT WIRE FROM SHARP EDGES WITH UV RATED SPIRAL WRAP, EDGE-GUARD, OR SPLIT LOOM SUPPORTED BY CABLE TIES.

4.12. CONCRETE PADS AND UNDERGROUND

4.12.1. CONCRETE SPECIFICATIONS, UON:
4.12.1.1. 2000 PSF SOIL BEARING CAPACITY
4.12.1.2. 4000 PSI 28-DAY COMPRESSIVE STRENGTH
4.12.1.3. 145 PCF UNIT WEIGHT
4.12.1.4. REINFORCING INCLUDING TIES AND STIRRUPS CONFORMS TO ASTM A615 AND GR60
4.12.1.5. CONFORMS TO ACI301, ACI315, ACI318, ACI305, AND ACI306
4.12.1.6. REINFORCING BAR PLACEMENT CONFORMS TO CRSI
4.12.1.7. AIR ENTRAINED FOR SEVERE EXPOSURE
4.12.2. THE TOP OF ALL CONCRETE SHALL BE SLOPED AWAY FROM CENTER FOR POSITIVE DRAINAGE WITH AT LEAST A 1% SLOPE.
4.12.3. TOPS OF CONDUIT SHALL BE A MINIMUM OF 4 INCHES ABOVE THE CONCRETE PAD OR GRAVEL BEDDING TO PREVENT INGRESS OF WATER.
4.12.4. CONDUITS IN CONCRETE PADS SHALL BE PROPERLY SECURED TO AVOID CONDUIT DISPLACEMENT DURING POUR.
4.12.5. DIRECT BURIAL CONDUCTORS SHALL ENTER CONCRETE PADS THROUGH UNDERGROUND CONDUIT SLEEVE EXTENDING AT LEAST 36" OUT FROM EQUIPMENT PAD.
4.12.6. EQUIPMENT GROUND JUMPER AND GEC SHALL BE INSTALLED WITHIN CONCRETE PAD BE IN CONDUIT AND SHALL EXTEND AT LEAST 6" OUT FROM EQUIPMENT PAD.
4.12.7. EXCAVATION & TRENCHING INSPECTIONS SHALL BE DOCUMENTED AND INSPECTED DAILY AND RIGHT AFTER A RAIN EVENT.
4.12.8. IN ANY EXCAVATION/TRENCH GREATER THAN 4' IN DEPTH, OSHA-COMPLIANT ACCESS/EGRESS LADDERS SHALL BE PLACED NO MORE THAN EVERY 50'.
4.12.9. CONDUITS WITH NEGATIVE SLOPE TOWARD ELECTRICAL EQUIPMENT SHALL HAVE A PULL BOX OR VAULT ADJACENT TO THE ENTRY POINT INTO THE ELECTRICAL EQUIPMENT WITH CRUSHED STONE IN THE BOTTOM FOR DRAINAGE.
4.12.10. PROVIDE 12 INCHES OF CLASS 5 GRAVEL DRAINAGE BEDDING IN THE BOTTOM OF ALL BOTTOM CONDUIT ENTRIES TO OPEN CABLE COMPARTMENTS.
4.12.11. EQUIPMENT SHALL BE SECURELY ANCHORED TO CONCRETE PADS OR FOUNDATIONS PER MANUFACTURER'S INSTRUCTIONS USING 1/2" STAINLESS STEEL THREADED RODS EMBEDDED IN PAD 5" MINIMUM AND SECURED WITH ADHESIVE ANCHOR HILTI HIT-HY-200-A OR APPROVED EQUAL. ANCHOR BOLTS MAY BE USED ONLY AFTER OWNER'S ENGINEER REVIEW AND APPROVAL.
4.12.12. CONCRETE PAD TO BE CURED FOR MINIMUM OF 2 DAYS PRIOR TO SETTING EQUIPMENT ON PAD.
4.12.13. TRENCHES SHALL BE FREE OF STANDING OR FLOWING WATER PRIOR TO BACKFILLING.

4.13. RACKING AND MODULES

4.13.1. RACKING IS TO BE INSTALLED PER THE STAMPED AND SIGNED STRUCTURAL SHEETS AND STRUCTURAL CALCULATIONS.
4.13.2. ALL RACKING COMPONENTS ARE TO BE INSPECTED AND ACCEPTED AT TIME OF DELIVERY. ANY DEFECTS SHOULD BE BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER PRIOR TO INSTALLATION.
4.13.3. MODULES SHALL NOT BE STACKED DURING INSTALLATION WITHOUT APPROPRIATE DIVIDERS. EXTRA CARE MUST BE TAKEN TO NOT SCRATCH THE MODULE GLASS OR BACKSHEETS. ANY SCRATCHED MODULES SHALL BE REPLACED SOLELY AT THE CONTRACTOR'S EXPENSE.
4.13.4. NO PERSONNEL SHALL STEP OR STAND ON MODULES AT ANY TIME, NOR SHALL INSTALLERS LEAN ON MODULE GLASS. RACK STRUCTURE AND MODULES ARE NOT DESIGNED FOR LIVE LOADS AND MAY VOID WARRANTY.

4.14. SAFETY SIGNS AND LABELING

4.14.1. CONTRACTOR SHALL PROVIDE ALL SIGNS AND LABELS PER THESE DRAWINGS, LOCAL UTILITY REQUIREMENTS, OSHA AND THE NEC INCLUDING BUT NOT LIMITED TO SECTIONS 110, 690, AND 705.
4.14.2. ALL SIGNS SHALL BE HDPE PLASTIC, TWO-COLOR ENGRAVED, AND UV STABILIZED.
4.14.3. ALL EQUIPMENT SHALL BE LABELED ON THE FRONT EXTERIOR TO CORRESPOND TO THE IDENTIFICATION SHOWN ON THE DRAWINGS.
4.14.4. SIGNS SHALL BE FIXED TO EQUIPMENT WITH OUTDOOR RATED TWO-PART EPOXY. DOUBLE-SIDED TAPE SHALL NOT BE USED UNDER ANY CONDITIONS.
4.14.5. ALL CABLES SHALL BE LABELED AT EACH TERMINATION AND AT SPLICE LOCATIONS, AT AN ACCESSIBLE POINT INSIDE EQUIPMENT ENCLOSURE, IF POSSIBLE, WITH CIRCUIT AND PHASE IDENTIFICATION CORRESPONDING TO THE DRAWINGS.
4.14.6. CABLE AND CONDUCTOR LABELS SHALL BE HEAT SHRINK AND APPROVED FOR THEIR ENVIRONMENT. LABELS SHALL NOT COVER COMPRESSION LUGS.
4.14.7. MV CABLE LABELS SHALL BE ENGRAVED, TWO-COLOR ENGRAVED PLASTIC, SECURED WITH UV-RESISTANT WIRE TIES. THESE LABELS SHALL BE VISIBLE FROM OUTSIDE THE ENCLOSURE WITHOUT REACHING INSIDE OR MOVING CABLES.
4.14.8. PROVIDE ARC FLASH HAZARD WARNING LABELS COMPLYING WITH ANSI Z535.4 AND NFPA 70E ON ALL EQUIPMENT PER DRAWINGS. LABELS SHALL BE APPLIED ON ACCESSIBLE DOORS OR BARRIERS OF OUTDOOR EQUIPMENT.
4.14.9. ALL ELECTRICAL PANELS SHALL BE PROVIDED WITH A CLEARLY LEGIBLE AND ACCURATE PANEL SCHEDULE OR CIRCUIT DIRECTORY.
4.14.10. PHASE TAPING OF LVAC, DC, COMMUNICATION, AND SENSOR WIRES IS NOT APPROVED.

4.15. INSTRUMENTATION AND CONTROLS

4.15.1. COMMUNICATION WIRES OR CABLES SHALL NOT BE SPLICED.
4.15.2. ANALOG SENSOR CABLES SHALL NOT BE SHORTENED. SENSORS COMMUNICATING VIA RS485 DIGITAL SIGNAL MAY BE SHORTENED.
4.15.3. WITHIN THE METER AND RECLOSER, GREEN WIRE SHALL ONLY BE USED FOR GROUNDING.
4.15.4. WITHIN THE METER AND RECLOSER, WHITE WIRE SHALL ONLY BE USED FOR NEUTRAL WIRES.
4.15.5. ALL GROUND CONDUCTORS IN METER AND RECLOSER SHALL LAND ON AN INSTALLED GROUND BAR. THE CABINETS SHALL NOT BE USED AS A GROUNDING CONDUCTOR.
4.15.6. RJ45 ETHERNET CABLE TERMINATIONS SHALL BE CRIMPED DOWN ON CABLE JACKETING AND NOT INDIVIDUAL WIRES.
4.15.7. ALL FIELD TERMINATED COMMS CABLES INCLUDING, BUT NOT LIMITED TO FIBER OPTIC, ETHERNET, AND RS485 SHALL BE TESTED PRIOR TO LANDING.
4.15.8. ALL EQUIPMENT BATTERIES SHALL BE INSTALLED AND TERMINATED BY THE EC.
4.15.9. ALL METEOROLOGICAL STATIONS, MASTS, INSTRUMENTS, ELECTRICAL POWER CONNECTIONS, INSTRUMENT CONNECTIONS, SCADA SYSTEM CONNECTIONS, AND GROUNDING SYSTEMS SHALL BE INSTALLED SUCH THAT:
4.15.9.1. NO SHADING OF ANY PYRANOMETERS
4.15.9.2. MINIMIZE SHADING OF PHOTOVOLTAIC MODULES
4.15.9.3. PROPER FUNCTION OF INSTRUMENTATION IS NOT IMPAIRED
4.15.9.4. IN FULL CONFORMANCE WITH THE MANUFACTURERS' SPECIFICATIONS AND ANY APPLICABLE AHJ
4.15.10. ALL SENSOR CALIBRATION CERTIFICATES SHALL BE PROVIDED TO PURE POWER
4.15.11. PYRANOMETERS SHALL BE MOUNTED TO AVOID SHADING, REFLECTIONS FROM LIGHT-COLORED SURFACES, AND EXCESS HEAT.
4.15.12. VERIFY TILT AND LEVEL OF ALL PYRANOMETERS USING AN INCLINOMETER. INCLINOMETERS MUST BE MAGNETICALLY SHIELDED AND ACCURATE TO ±0.2° OR BETTER, SMART DEVICE-BASED INCLINOMETERS ARE NOT ACCEPTABLE.
4.15.13. GHI PYRANOMETERS SHALL BE INSTALLED LEVEL IN ALL DIRECTIONS. VERIFY LEVEL USING SENSOR'S BUILT-IN BUBBLE LEVEL IF EQUIPPED OR WITH A MAGNETICALLY SHIELDED INCLINOMETER.
4.15.14. FIXED-TILT POA PYRANOMETERS SHALL BE INSTALLED CO-PLANER WITH RESPECT TO THE PLANE OF THE PHOTOVOLTAIC MODULES AND TILT AND AZIMUTH SHOULD MATCH THE ARRAY.
4.15.15. TRACKING POA PYRANOMETERS SHALL BE LEVELED BY MANUALLY PLACING TRACKER ROW IN STOW/LEVEL MODE (0° ROTATION, VERIFY WITH SHIELDED INCLINOMETER OR LEVEL PLACED ON MODULES) AND CONFIRM SENSOR IS LEVEL IN ALL DIRECTIONS. PYRANOMETER SHALL BE MOUNTED CENTRAL TO THE AXIS OF ROTATION.
4.15.16. BACK OF MODULE TEMPERATURE SENSORS SHALL BE ADHERED TO THE BACK SIDE OF AN OPERATIONAL PV MODULE THAT IS LOCATED REASONABLY PROXIMATE TO THE CENTER OF A ROW OF PV MODULES USING A THERMALLY CONDUCTIVE COMPOUND CONSISTENT WITH THE PV MODULE MANUFACTURER'S AND THE BACK OF MODULES MANUFACTURER'S RECOMMENDATIONS.

ACRONYMS AND ABBREVIATIONS

AAC	ALL ALUMINUM CONDUCTOR
AAAC	ALL ALUMINUM ALLOY CONDUCTOR
AC	ALTERNATING CURRENT
ACSR	ALUMINUM CONDUCTOR STEEL REINFORCED
AHJ	AUTHORITY HAVING JURISDICTION
AL	ALUMINUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWG	AMERICAN WIRE GAUGE
AZ	AZIMUTH
BOM	BACK OF MODULE
C	CELSIUS
CCR	CYPRESS CREEK RENEWABLES
CB	COMBINER BOX
C/L	CENTER LINE
CIC	CABLE IN CONDUIT
COMM	COMMUNICATIONS
CONT'D	CONTINUED
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
DAS	DATA ACQUISITION SYSTEM
DC	DIRECT CURRENT
DG	DISTRIBUTED GENERATION
DISC	DISCONNECT
(E)	EXISTING
EC	ELECTRICAL CONTRACTOR
EGC	EQUIPMENT GROUNDING CONDUCTOR
EMT	ELECTRICAL METALLIC TUBING
F	FAHRENHEIT
GCR	GROUND COVERAGE RATIO
GEC	GROUNDING ELECTRODE CONDUCTOR
GET	GROUNDING ELECTRODE TERMINAL
GHI	GLOBAL HORIZONTAL IRRADIANCE
GND	GROUND
GOAB	GANG OPERATED AIR BREAK
GR	GROUND RING
HDPE	HIGH DENSITY POLYETHYLENE
ID	INSIDE DIAMETER
IMC	INTERMEDIATE METAL CONDUIT
JB	JUNCTION BOX
kV	KILOVOLT
kW	KILOWATT
LEA	LOW-ENERGY ANALOG
LFNC	LIQUID TIGHT FLEXIBLE NON-METALLIC CONDUIT
LV	LOW VOLTAGE, <2000V
MET	METEOROLOGICAL
MIN	MINIMUM
MISC	MISCELLANEOUS
MOV	METAL OXIDE VARISTOR
MCOV	MAXIMUM CONTINUOUS OPERATING VOLTAGE
MV	MEDIUM VOLTAGE
MVA	MEGA VOLT-AMPS
MW	MEGAWATT
(N)	NEW
NEC	NATIONAL ELECTRICAL CODE
NEG	NEGATIVE
NESC	NATIONAL ELECTRIC SAFETY CODE
NRTL	NATIONALLY RECOGNIZED TESTING LAB
OC	ON CENTER
OCPD	OVER CURRENT PROTECTION DEVICE
OD	OUTSIDE DIAMETER
OH	OVERHEAD
PDI	POLYMER DEADEND INSULATOR
PH/Ø	PHASE
PNL	PANEL
POA	PLANE OF ARRAY
POCC	POINT OF COMMON COUPLING
POI	POINT OF INTERCONNECTION
POS	POSITIVE
PT	POTENTIAL TRANSFORMER
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE
RFI	REQUEST FOR INFORMATION
RMC	RIGID METAL CONDUIT
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SCH	SCHEDULE
SW	SWITCH
TBD	TO BE DETERMINED
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES
UON	UNLESS OTHERWISE NOTED
UV	ULTRAVIOLET
V	VOLT
VA	VOLT AMPS
VAC	VOLTS ALTERNATING CURRENT
VDC	VOLTS DIRECT CURRENT
VT	VOLTAGE TRANSFORMER
WS	WEATHER STATION
XFMR	TRANSFORMER

SWITCH
SWITCH WITH FUSED CUTOUT
SWITCH WITH EXTERNALOPERATOR
GANG OPERATED AIR-BREAK SWITCH
HOOK STICK SWITCH
FUSED CUT-OUT
CONTACTOR
POLE
TRANSFORMER
LEA
FUSE
TERMINATION
FAULT CIRCUIT INDICATOR
LIGHTNING ARRESTER
GROUND
GROUNDED WYE
WYE
DELTA
INVERTER

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ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

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GENERAL NOTES
2 OF 2

E-003

PROJECT SPECIFICATIONS DESIGN SUMMARY TABLE

SYSTEM SIZE (AC)	2.750
SYSTEM SIZE (DC)	3.94632 MW
DC/AC RATIO	1.435
MV TRANSFORMER	(1) 2500KVA @ 22.86 kV
INVERTER(S)	SMA AMERICA SC2750-EV-US
INVERTER QTY	1
MODULE MAKE	FIRST SOLAR FS-6435
MODULE QUANTITY	9,072
MODULE STC RATING	435W
STRING SIZE AND VOLTAGE	6 MODS PER STRING, 1500VDC
STRING COUNT	1,512
RACKING SYSTEM	SOLAR FLEXRACK
RACK CONFIGURATION	2 HIGH IN PORTRAIT
TILT	20°
AZIMUTH	180°
SLA	29°
CLEAR ROW SPACING	VARIES, 8 FT. MIN.
LATITUDE	35.4147795
LONGITUDE	-78.7144972
UTILITY	DEP
CODE CYCLE	NEC 2017

LEGEND

EXISTING CONDITIONS	PROPOSED CONDITIONS
BUILDING SETBACK	BASIN AREA
EDGE OF PAVEMENT	GRAVEL ACCESS ROAD
EXISTING EASEMENT	LIMITS OF DISTURBANCE — LoD
EXISTING FENCE — X	DIVERSION DITCH — DD
EXISTING ELECTRICAL — OHE	PROPOSED OVERHEAD ELECTRICAL — OHE
EXISTING TREELINE LEFT	PROPOSED UNDERGROUND ELECTRICAL — AC
WETLAND BUFFER - 30'	SECURITY FENCE
JURISDICTIONAL WETLAND	SILT FENCE — SF
MAJOR CONTOURS	VEGETATIVE BUFFER
MINOR CONTOURS	
PROPERTY BOUNDARY	
PROPERTY (ADJOINER)	
SEWER LINE — SS	
RIGHT-OF-WAY — R/W	
STREET CENTERLINE	
STRUCTURES	

1 / E-101 **GENERAL SITE OVERVIEW**

SCALE: 1" = 50'

NORTH

GRAPHIC SCALE

0 50' 100'

SCALE: 1" = 50'

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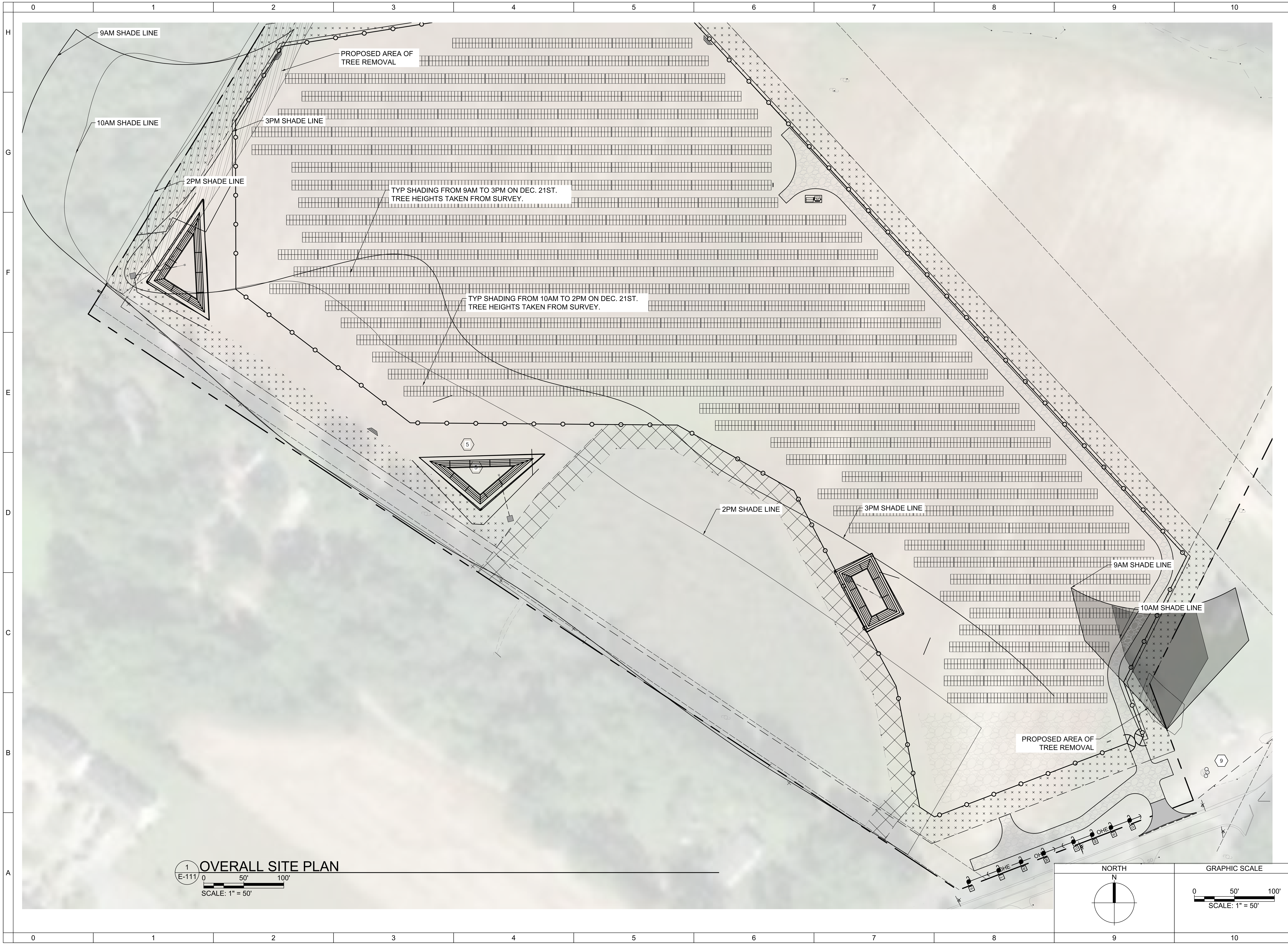
GENERAL SITE OVERVIEW

E-101



1 E-111 OVERALL SITE PLAN

0 50' 100'

SCALE: 1" = 50'

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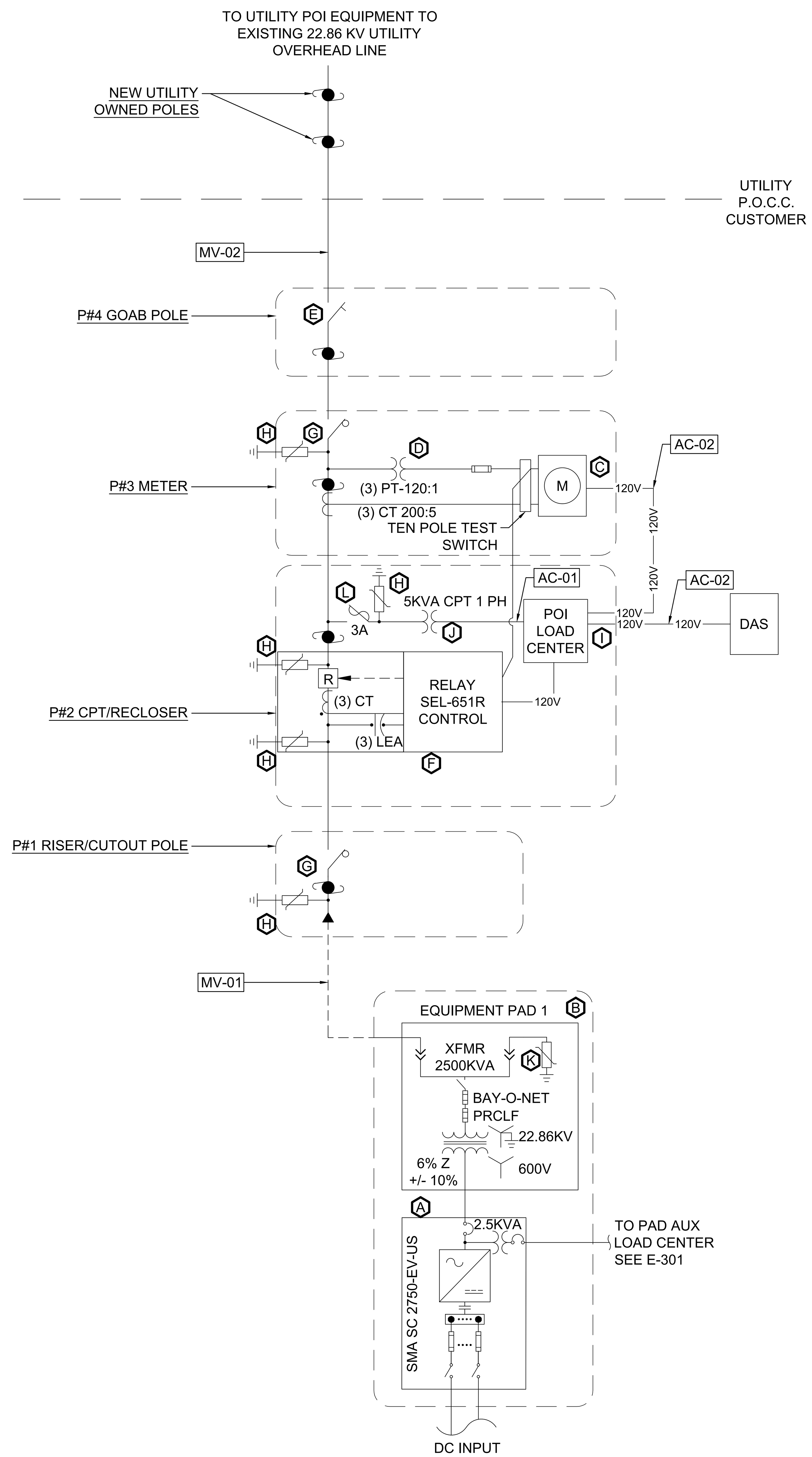
SHADING AND TREE REMOVAL

E-111



GENERAL NOTES:
1. REFER TO E-221 FOR WIRE SPECIFICATIONS
2. ALL RELAY SETTINGS REQUIRE UTILITY APPROVAL AND ARE SUBJECT TO CHANGE PENDING COORDINATION STUDY.

1
E-201
AC ONE LINE DIAGRAM
SCALE: NTS

	PROJECT INFORMATION	
	UTILITY	DUKE ENERGY PROGRESS
	AC SYSTEM SIZE (MW)	2.750
	DC SYSTEM SIZE (MW)	3.8556
	DC/AC RATIO	1.40
	PV MODULES	(9,072) FIRST SOLAR FS-6425
	DAS MANUFACTURER	TBD
A	INVERTER	
	INVERTER	(1) SMA AMERICA SC2750-EV-US
	MAX AC KW	2750
	MAX AC KVA	2750
	OUTPUT VOLTAGE	600
	MAX OUTPUT CURRENT	2646.0
	POWER FACTOR RANGE	+/- 0.95
	POWER FACTOR SETTING	TBD
	UL1741 AND IEEE1547	YES
B	TRANSFORMER	
	MANUFACTURER	TBD
	QUANTITY	1
	KVA (TEMP RISE)	2500 (@ 50 degC)
	HV KV BIL	125 MIN.
	LV KV BIL	30 MIN.
	NOMINAL HIGH VOLTAGE	22.86 kV
	NOMINAL LOW VOLTAGE	600V
	IMPEDANCE	6.0%, +/-7.5% @85°C
	PRIMARY WINDING	GRDY
	SECONDARY WINDING	Y
C	PRIMARY METER	
	MANUFACTURER	SEL
	MODEL NUMBER	735VB10910EXXXXXX16102XX
	QUANTITY	1
D	METER INSTRUMENTATION ASSEMBLY	
	MANUFACTURER	ARTECHE
	INSTRUMENTATION CLUSTER MODEL	ME-025/CCR25-20
	INSTRUMENTATION CLUSTER P/N	771029999-H
	QUANTITY	1
	PT MODEL NUMBER	URN-24
	PT PART NUMBER	757446290-H
	PT QUANTITY	3
	PT RATIO	120:1
	CT MODEL NUMBER	CRE-24
	CT PART NUMBER	756246040-H
	CT QUANTITY	3
	CT RATIO	200:5
E	GANG OPERATED LOCKABLE AIR SWITCH	
	MANUFACTURER	COOPER
	MODEL NUMBER	M2HA2SR2CHTV2
	QUANTITY	1
F	PRIMARY RECLOSER	
	MANUFACTURER	TAVRIDA
	MODEL NUMBER	OSM25_AI_2(630_150_2)
	KV BIL	150kV
	CT RATIO	600:1
	PT RATIO	234.5:1
	RELAY	SEL-651R
	RELAY MODEL NUMBER	0651R2ACXBA8AE1112DEXX
	QUANTITY	1
G	BLADED DISCONNECT	
	MANUFACTURER	HUBBELL
	MODEL NUMBER	CP710232-PB
	QUANTITY	6
	RATING	27 kV 200 A
H	LIGHTNING ARRESTER	
	MANUFACTURER	OHIO BRASS
	MODEL NUMBER	2216157425
	QUANTITY	13
	MCOV	15.3 kV
	DUTY CYCLE	18 kV
I	LOAD CENTER	
	MANUFACTURER	EATON
	RATING	125 A NEMA 3R
J	CPT	
	MANUFACTURER	HOWARD
	RATING	5 kVA
K	ELBOW ARRESTERS	
	MANUFACTURER	HUBBELL
	RATING	15.3 kV
	DUTY CYCLE	18 kV
L	FAULT TAMER	
	MANUFACTURER	S&C
	MODEL NUMBER	C 98052-P-C & 526003
	QUANTITY	1
	RATING	29 kV 3 A

RELAY SETTINGS

DEVICE	PRIMARY PICKUP (SECONDARY PICKUP)	TIME DELAY
27-1	90%	0.167
50	550 A	NONE
51	91 A	1.0 (U4 CURVE)
51G	21 A	1.25 (U4 CURVE)
59-1	110%	0.167
81U-1	57.0 Hz	0.167
81O-1	60.5 Hz	0.167

INVERTER FAULT SETTINGS

DEVICE	PICKUP	CLEARING TIME (SEC)
27-1	90%	0.167
27-2	90%	0.167
59-1	110%	0.167
59-2	110%	0.167
81U-1	57.0 Hz	0.167
81O-1	60.5 Hz	0.167

Pure Power Contractors Inc.
2812 GRAY FOX RD, MONROE NC 28110

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039078 KEVIN LEARY 03/18/2020
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AVOCA ENGINEERS, PLLC
NC FIRM LICENSE: P-1577
242 OLD NEW BRUNSWICK ROAD PISCATAWAY NJ 08854
PHONE (732) 465-1002 FAX (732) 465-1005

REVISIONS

NO.	DATE	DESCRIPTION
0	03/18/20	ISSUED FOR PERMIT - REV. MODULES AND LAYOUT

PLT STAMP
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E-201 AC ONELINE.DWG

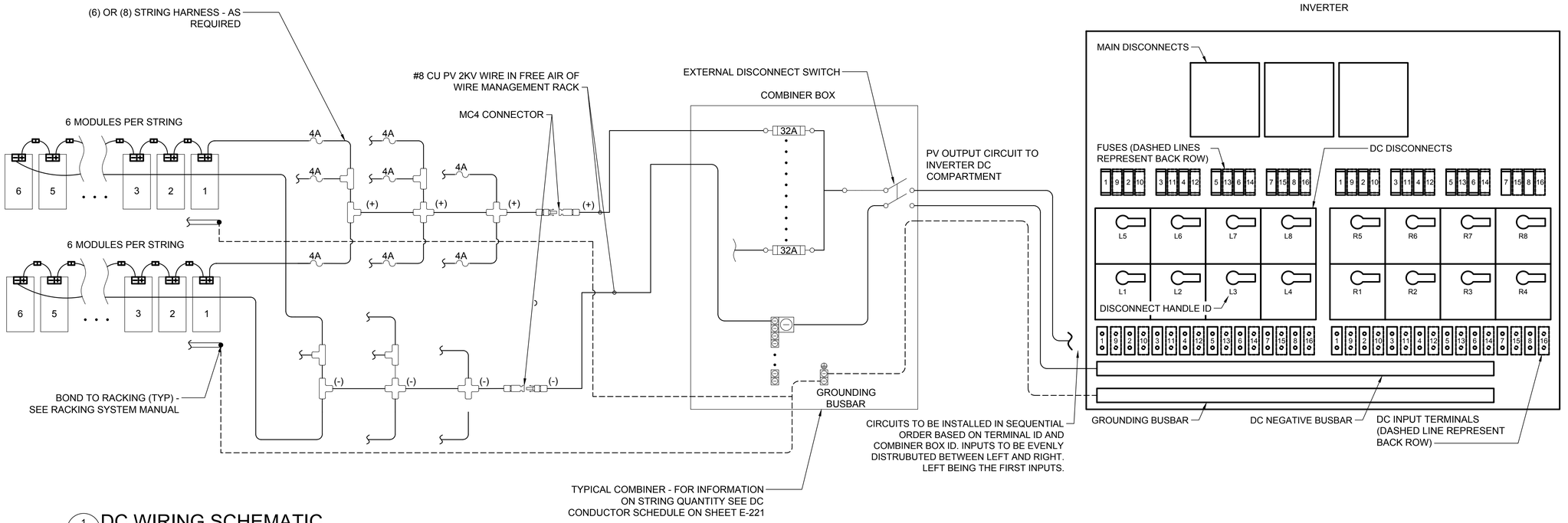
PROJECT: 20-PP-044

ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
DRAWN BY:	MD
CHECKED BY:	KL

AC ONE LINE DIAGRAM

E-201



1 DC WIRING SCHEMATIC
E-211 SCALE: NTS

INVERTER ID:	INVERTER MODEL:	INVERTER QUANTIT	MODULES:	RATED KVA:	RATED KW:	RATED AC OUTPUT CURRENT:	AC VOLTAGE OUTPUT:	MAX DC INPUT VOLTAGE	NUMBER OF MODULES	NUMBER OF STRINGS:	NUMBER OF MODULES PER	MAX. POWER POINT CURRENT	MAX POWER POINT VOLTAGE	MAX SYSTEM VOLTAGE	MAX SHORT CIRCUIT CURRENT	DC WATTS:	DC / AC RATIO
INV 1	SMA AMERICA SC2750-EV-US	1	FIRST SOLAR FS-6435	2,750.0	2,750.0	2,646.0	600	1500	9,072	1512	6	3583.4	1101.6	1441.2	4819.5	3,946,320	1.435

2 INVERTER DATA
E-211 SCALE: NTS

MODULE DATA	
FIRST SOLAR FS-6435	
QUANTITY:	
STC WATTS:	435
MAX. POWER POINT VOLTAGE (VMP):	183.6
MAX. POWER POINT CURRENT (IMP):	2.37
OPEN CIRCUIT VOLTAGE (VOC):	219.6
SHORT CIRCUIT CURRENT (ISC):	2.55
VOLTAGE COEF. (%/C):	-0.28
DESIGN CONDITIONS	
HIGHEST 2% DRY BULB DESIGN TEMP (°C):	36.1
MIN. MEAN EXTREME ANNUAL DB (°C):	-8.5

3 MODULE DATA
E-211 SCALE: NTS

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E-211.2D DC ONELINE AND COND SCHED.DWG

PROJECT: 20-PP-044

ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
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CHECKED BY:	KL

DC ONE LINE DIAGRAM

E-211

AC																			
																WIRE, FUSE, AND CONDUIT SIZE			
CIRCUIT ID	CIRCUIT LENGTH (FT)	AC VOLTAGE	MAX CURRENT	MAX NO. OF CURRENT CARRYING CONDUCTORS IN RACEWAY	NO OF PARALLEL SETS	PHASES	WIRING CONFIG	TERMINAL RATING (°C):	WIRE RATING (°C):	CONT. CURRENT (A)	CONDUIT FILL DERATE FACTOR	TEMP. CORRECTION FACTOR	MAX. CURRENT / CONDITIONS OF USE (A)	VOLTAGE DROP (%)	% FILL	OCPD (A)	WIRE SIZE AND QTY (PER PARALLEL SET/CONDUIT)	MIN. BARE CU EGC SIZE (PER CONDUIT)	CONDUIT MIN SIZE AND QTY*
AC-01	50	24	21	3	1	3	3W	75	90	26	1.00	0.96	22	6.12%	29.6%	30	(3) #6 AL XHHW-2	(1) #6	(1) 1"
AC-02	20	120	16	2	5	1	2W	75	90	20	1.00	0.96	17	0.35%	3.6%	20	(2) #12 AL XHHW-2	(1) #12	(5) 1"

NOTE: WIRE FROM POLE MOUNTED CPT TO LOAD CENTER TO BE UV RATED.

1 E-221 AC CABLE CALCULATIONS

SCALE: NTS

		CONDUIT MIN SIZE
DC-A	(2) CU #8 PV-WIRE (1) CU #6 BARE	1 IN.
DC-B	(6) CU #8 PV-WIRE (1) CU #6 BARE	1-1/2"
DC-C	(8) CU #8 PV-WIRE (1) CU #6 BARE	2"
DC-D	(10) CU #8 PV-WIRE (1) CU #6 BARE	2"
DC-E	(14) CU #8 PV-WIRE (1) CU #6 BARE	2-1/2"
DC-F	(16) CU #8 PV-WIRE (1) CU #6 BARE	2-1/2"
DC-G	(18) CU #8 PV-WIRE (1) CU #6 BARE	2-1/2"

3 E-221 DC STRING CONDUIT SIZES

SCALE: NTS

DC CONDUCTOR AND CONDUIT SCHEDULE

INVERTER	CIRCUIT ID	MODULE	CIRCUIT LENGTH (FT)	NUMBER OF STRINGS	MODULES PER STRING	NUMBER OF MODULES	MAX POWER POINT VOLTAGE	MAX SYSTEM VOLTAGE	MAX POWER POINT CURRENT	MAX SHORT CIRCUIT CURRENT	MAX NO. OF CURRENT CARRYING CONDUCTORS IN RACEWAY	TERMINAL RATING (°C):	WIRE RATING (°C):	NO OF PARALLEL SETS (POS/NEG)	MAX. CURRENT (ISC X 1.25) (A)	CONT. CURRENT (ISC X 1.25 X 1.25) (A)	CONDUIT FILL DERATE FACTOR	TEMP. CORRECTION FACTOR	MAX. CURRENT / CONDITIONS OF USE (A)	VOLTAGE DROP (%)	% FILL	WIRE, FUSE, AND CONDUIT SIZE: OCPD (A)	WIRE SIZE AND QTY (PER PARALLEL SET/CONDUIT)	MIN. BARE CU EGC SIZE (PER CONDUIT)	CONDUIT MIN SIZE AND QTY*
INV-1	CBX-01-01	FIRST SOLAR FS-6435	765	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	1.02%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-02	FIRST SOLAR FS-6435	655	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.88%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-03	FIRST SOLAR FS-6435	565	92	6	552	1101.6	1441.2	218.0	235	2	90	90	1	293.3	367	1.00	0.91	322	0.79%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-04	FIRST SOLAR FS-6435	445	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.60%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-05	FIRST SOLAR FS-6435	385	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.52%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-06	FIRST SOLAR FS-6435	355	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.47%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-07	FIRST SOLAR FS-6435	295	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.39%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-08	FIRST SOLAR FS-6435	265	92	6	552	1101.6	1441.2	218.0	235	2	90	90	1	293.3	367	1.00	0.91	322	0.37%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-09	FIRST SOLAR FS-6435	200	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.27%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-10	FIRST SOLAR FS-6435	170	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.23%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-11	FIRST SOLAR FS-6435	110	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.15%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-12	FIRST SOLAR FS-6435	80	92	6	552	1101.6	1441.2	218.0	235	2	90	90	1	293.3	367	1.00	0.91	322	0.11%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-13	FIRST SOLAR FS-6435	60	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.08%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-14	FIRST SOLAR FS-6435	100	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.13%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-15	FIRST SOLAR FS-6435	125	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.17%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-16	FIRST SOLAR FS-6435	190	88	6	528	1101.6	1441.2	208.6	224	2	90	90	1	280.5	351	1.00	0.91	308	0.25%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
	CBX-01-17	FIRST SOLAR FS-6435	315	92	6	552	1101.6	1441.2	218.0	235	2	90	90	1	293.3	367	1.00	0.91	322	0.44%	33.8%	400	(2) 600 KCMIL AL PV WIRE	(1) #3	(1) 3"
			5,080	1,512		9,072										AVERAGE CBX DC VOLTAGE DROP				0.40%					

DC SOURCE CIRCUIT SCHEDULE

CIRCUIT ID	MODULE	CIRCUIT LENGTH (FT)	NUMBER OF STRINGS	MODULES PER STRING	NUMBER OF MODULES	MAX POWER POINT VOLTAGE	MAX SYSTEM VOLTAGE	MAX POWER POINT CURRENT	MAX SHORT CIRCUIT CURRENT	MAX NO. OF CURRENT CARRYING CONDUCTORS IN RACEWAY	TERMINAL RATING (°C):	WIRE RATING (°C):	NO OF PARALLEL SETS (POS/NEG)	MAX. CURRENT (ISC X 1.25) (A)	CONT. CURRENT (ISC X 1.25 X 1.25) (A)	CONDUIT FILL DERATE FACTOR	TEMP. CORRECTION FACTOR	MAX. CURRENT / CONDITIONS OF USE (A)	VOLTAGE DROP (%)	% FILL	WIRE, FUSE, AND CONDUIT SIZE: OCPD (A)	WIRE SIZE AND QTY (PER PARALLEL SET/CONDUIT)	MIN. BARE CU EGC SIZE (PER CONDUIT)	CONDUIT MIN SIZE AND QTY*
SINGLE STRING	FIRST SOLAR FS-6435	300	1	6	6	1101.6	1441.2	2.4	2.6	8	90	90	1	3.2	4.0	0.70	0.91	5.0	0.16%	N/A	4	N/A	N/A	N/A
6-STRING HARNESS (TYP.)	FIRST SOLAR FS-6435	300	6	6	36	1101.6	1441.2	14.2	15.3	8	90	90	1	19.1	24.0	0.70	0.91	30.0	0.61%	25.3%	25	(2) #8 CU PV WIRE	(1) #6	(1) 2"
8-STRING HARNESS (TYP.)	FIRST SOLAR FS-6435	300	8	6	48	1101.6	1441.2	19.0	20.4	8	90	90	1	25.5	32.0	0.70	0.91	40.0	0.81%	25.3%	35	(2) #8 CU PV WIRE	(1) #6	(1) 2"

NOTE: 25.3% CONDUIT FILL FROM (8) #8 + (1) #6 EGC IN 2" CONDUIT

*SEE DETAIL 3 ON THIS SHEET. HOWEVER, PLEASE PLACE NO MORE THAN (8) #8 CU PER CONDUIT.

2 E-221 DC CABLE CALCULATIONS

SCALE: NTS

																WIRE, FUSE, AND CONDUIT SIZE			
CIRCUIT ID	FROM	TO	CIRCUIT LENGTH (FT)	VNOM (VAC)	NO OF PARALLEL SETS	PHASES	WIRING CONFIG	MAX. CURRENT (A)	NEC TABLE	CONT. CURRENT (MAX I X 1.25) (A)	CONDUIT FILL DERATE FACTOR	TEMP CORRECTION FACTOR	MAX. CURRENT / CONDITIONS OF USE (A)	VOLTAGE DROP (%)	WIRE SIZE AND QTY (PER PARALLEL SET/CONDUIT)	CONCENTRIC NEUTRAL	MIN. SIZE EGC (PER GROUP/CONDUIT)	CONDUIT MIN SIZE AND QTY*	
MV-01	XFMR-1	RISER POLE	1080	22,860	1	3	3W	63.1	310.60(C)78, 1 CKT	87	1.00	1.05	66	0.10%	(3) #1/0 25kV MV 90, XLPE OR EPR, AL	1/3	N/A	(1) 5"	
MV-02	RISER POLE	POI	350	22,860	1	3	3W	63.1	N/A	87	1.00	1.00	70		(4) MERLIN 336.4 KCMIL ACSR	N/A	N/A	OVERHEAD	

4 E-221 MV CABLE CALCULATIONS

SCALE: NTS

NOTE: WIRE LENGTHS PROVIDED ARE NOT TO BE USED FOR WIRE TAKEOFFS AND ARE ONLY USED FOR CALCULATION OF VOLTAGE DROP.

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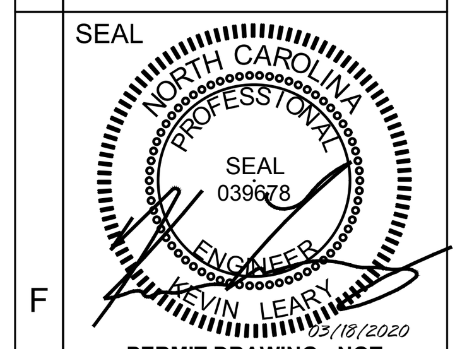
2812 GRAY FOX RD. MONROE NC 28110

SEAL



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E-211-221 DC ONELINE AND COND SCHED.DWG

PROJECT: 20-PP-044

ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
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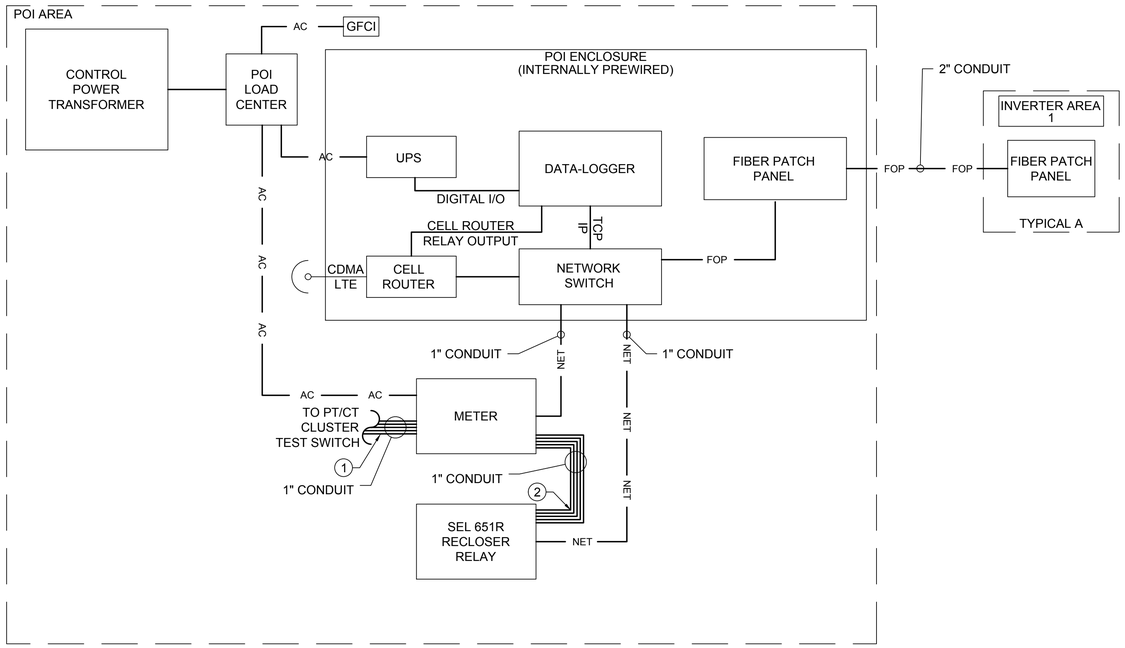
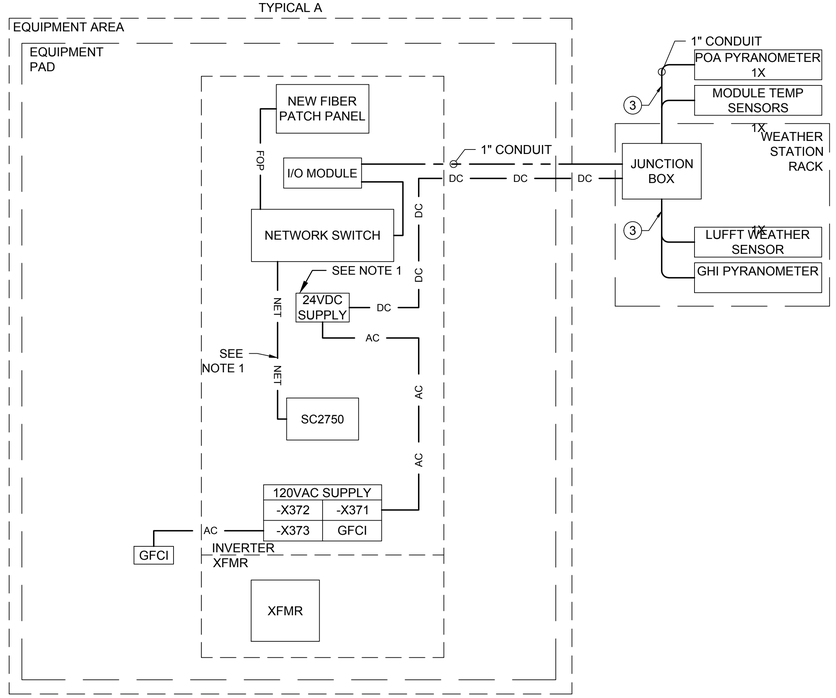
CHECKED BY:	KL

CONDUCTOR SCHEDULE AND CALCS

E-221



1 E-301 POI AREA BLOCK DIAGRAM
SCALE: NTS



2 E-301 INVERTER AREA BLOCK DIAGRAM TYPICALS
SCALE: NTS

LEGEND

AC	AC CABLE
NET	ETHERNET CABLE
COM	PLC
DC	DC CABLE
FOP	FIBER CABLE
	RS-485 CABLE
	TRANSFORMER I/O

NOTES:
1. USE SHIELDED CONNECTORS FOR ETHERNET.
2. NEW EQUIPMENT MOUNTED ON DIN RAIL ON CUSTOMER PLATE INSIDE INVERTER.
3. SEE SHEETS E-221 FOR AC AND DC WIRING.

(1) PT/CT WIRES - 12AWG, COPPER, STRANDED, XHHW-2, 600V
(2) PT/CT WIRES - 12AWG, COPPER, STRANDED, XHHW-2, 600V
(3) SENSOR WIRES - SUPPLIED BY VENDOR

POI LOAD CENTER - 125A BUS		
MAIN CIRCUIT BREAKER - 30A 2P		
BRANCH CIRCUIT ID	TO	CB SIZE
1	GFCI	20A 1P
2	METER	20A 1P
3	POI DAS	20A 1P
4	SPARE	20A 1P
5	SPACE	-
6	SPACE	-
7	SPACE	-
EQUIPMENT PAD TYP A LOAD CENTER - 125A BUS		
MAIN CIRCUIT BREAKER - 30A 2P		
BRANCH CIRCUIT ID	TO	CB SIZE
1	GFCI	20A 1P
2	DAS	20A 1P
3	SPARE	20A 1P
5	SPARE	20A 1P
6	SPACE	-
7	SPACE	-
8	SPACE	-

3 E-301 LOAD CENTER SCHEDULE
SCALE: NTS

Pure Power Contractors Inc.
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E-301 MONITORING AND LV AC.DWG

PROJECT: 20-PP-044

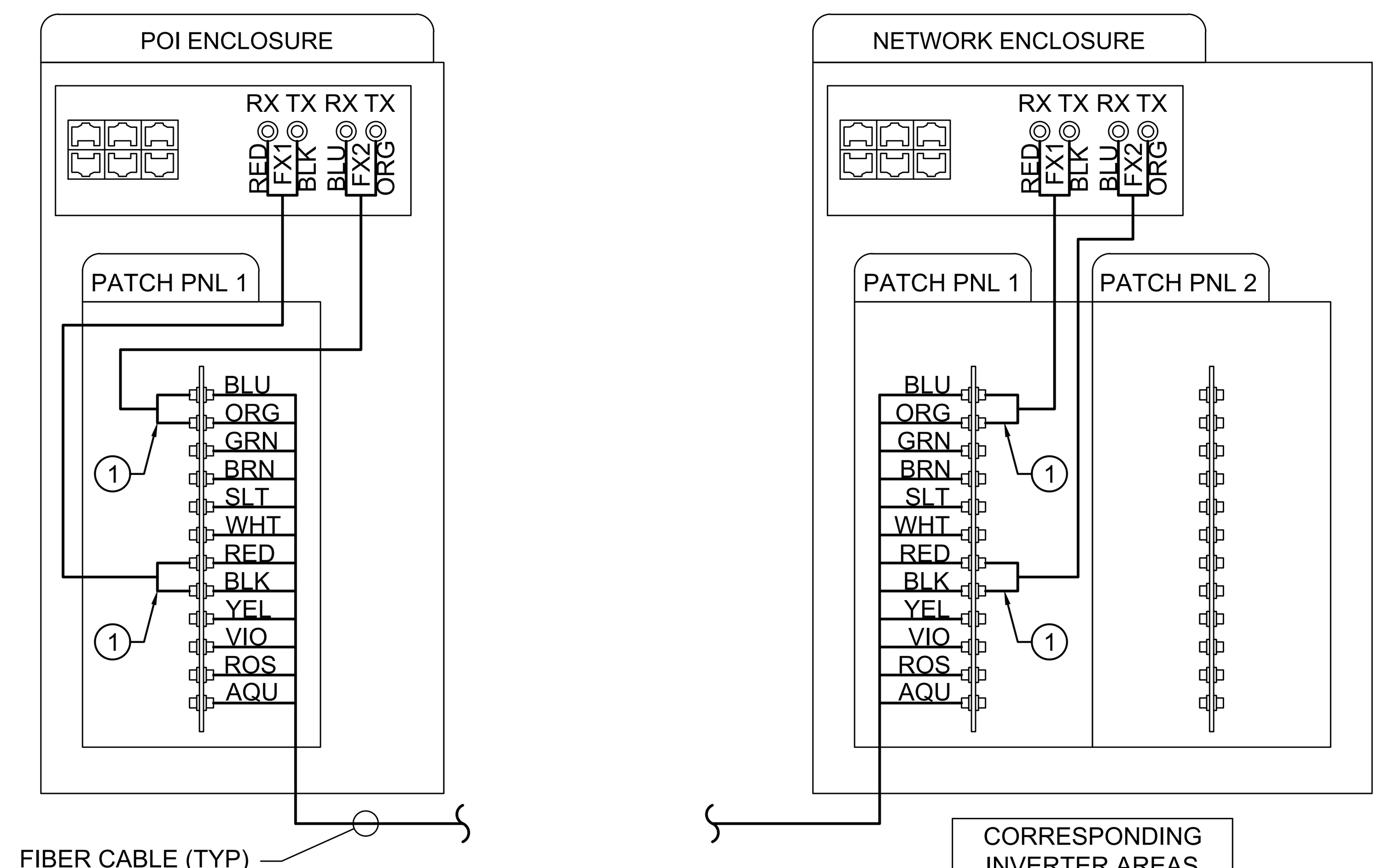
ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
DRAWN BY:	LK
CHECKED BY:	KL

MONITORING AND LV AC WIRING DIAGRAM

E-301

(1) FIBER OPTIC CABLE - CORNING 012ZU4-T4F22D20
FIBER OPTIC TERMINATIONS SHALL BE MADE VIA FUSION SPLICE



CORRESPONDING INVERTER AREAS	
INV-01	

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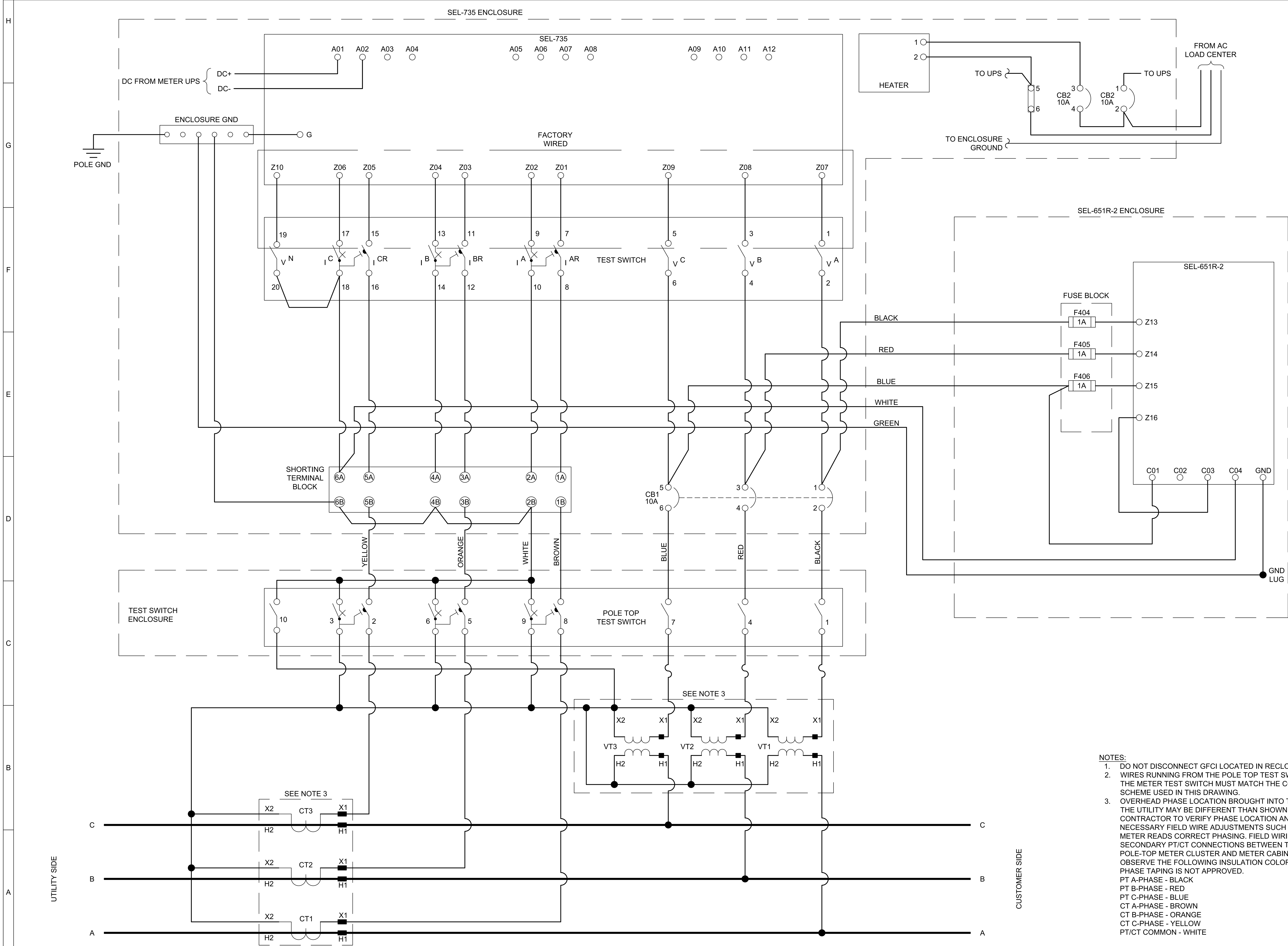
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
DRAWN BY:	LK
CHECKED BY:	KL

COMMUNICATIONS DIAGRAM

E-311



NOTES:

1. DO NOT DISCONNECT GFCI LOCATED IN RECLOSER RELAY
2. WIRES RUNNING FROM THE POLE TOP TEST SWITCH TO THE METER TEST SWITCH MUST MATCH THE COLOR SCHEME USED IN THIS DRAWING.
3. OVERHEAD PHASE LOCATION BROUGHT INTO THE SITE BY THE UTILITY MAY BE DIFFERENT THAN SHOWN. CONTRACTOR TO VERIFY PHASE LOCATION AND MAKE NECESSARY FIELD WIRE ADJUSTMENTS SUCH THAT THE METER READS CORRECT PHASING. FIELD WIRING OF THE SECONDARY PT/CT CONNECTIONS BETWEEN THE POLE-TOP METER CLUSTER AND METER CABINET SHALL OBSERVE THE FOLLOWING INSULATION COLOR CODES. PHASE TAPING IS NOT APPROVED.
   PT A-PHASE - BLACK
   PT B-PHASE - RED
   PT C-PHASE - BLUE
   CT A-PHASE - BROWN
   CT B-PHASE - ORANGE
   CT C-PHASE - YELLOW
   PT/CT COMMON - WHITE

Pure Power Contractors Inc.
2812 GRAY FOX RD, MONROE NC 28110

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PLT STAMP: EGHALY 3/18/2020 7:32 PM E-301 MONITORING AND LV AC.DWG

PROJECT: 20-PP-044

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LILLINGTON, NC 27546

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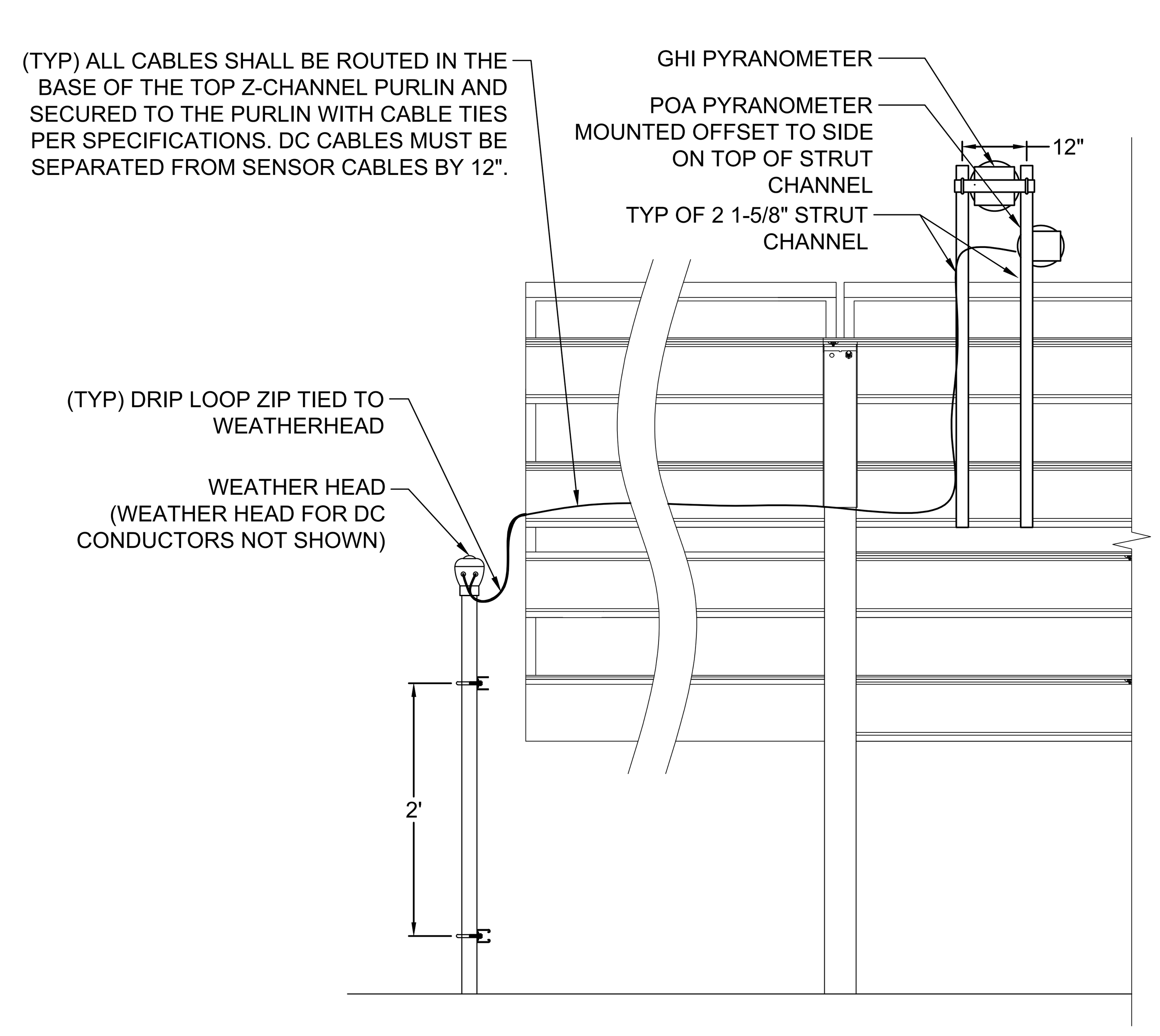
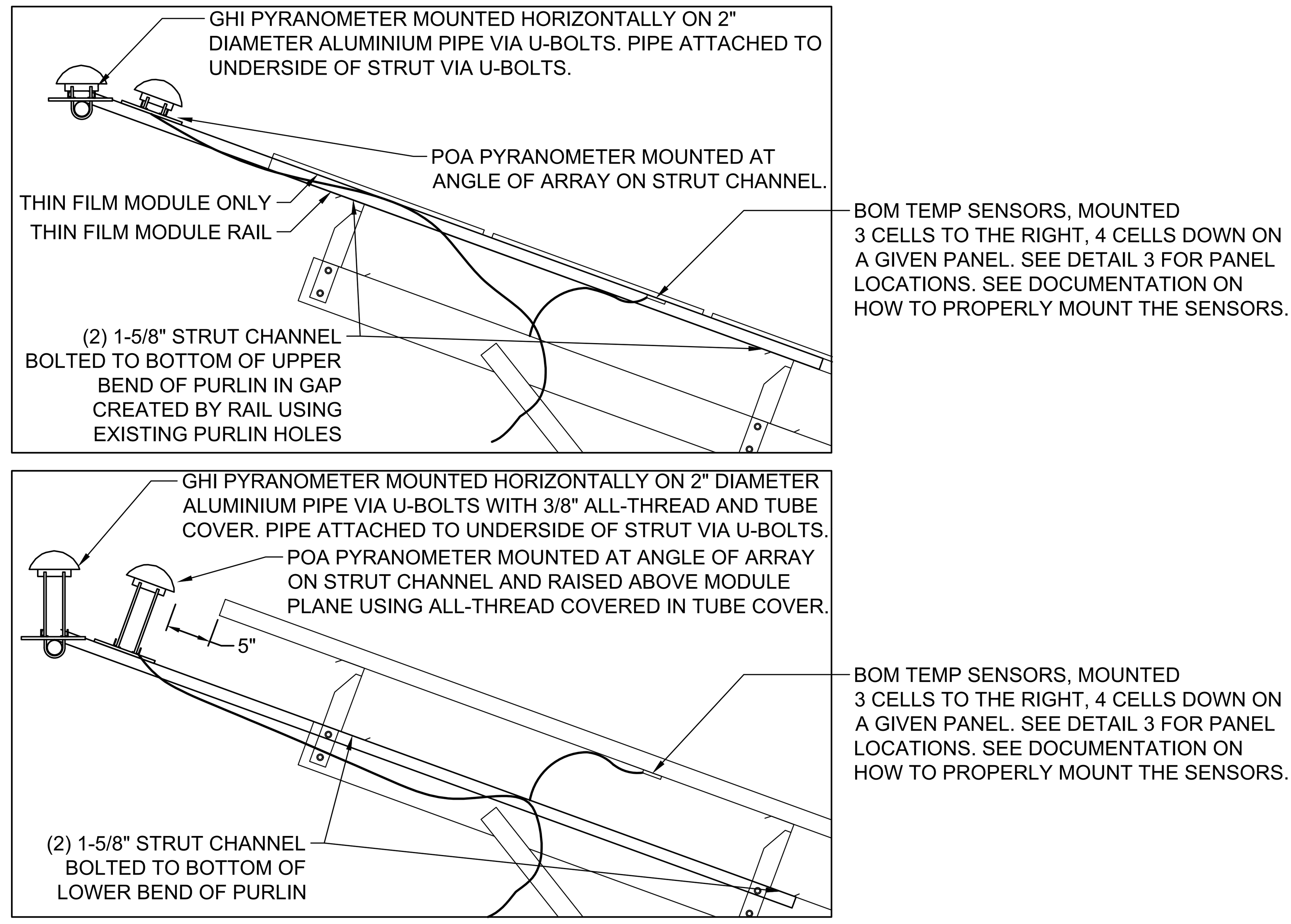
METER WIRING DIAGRAM

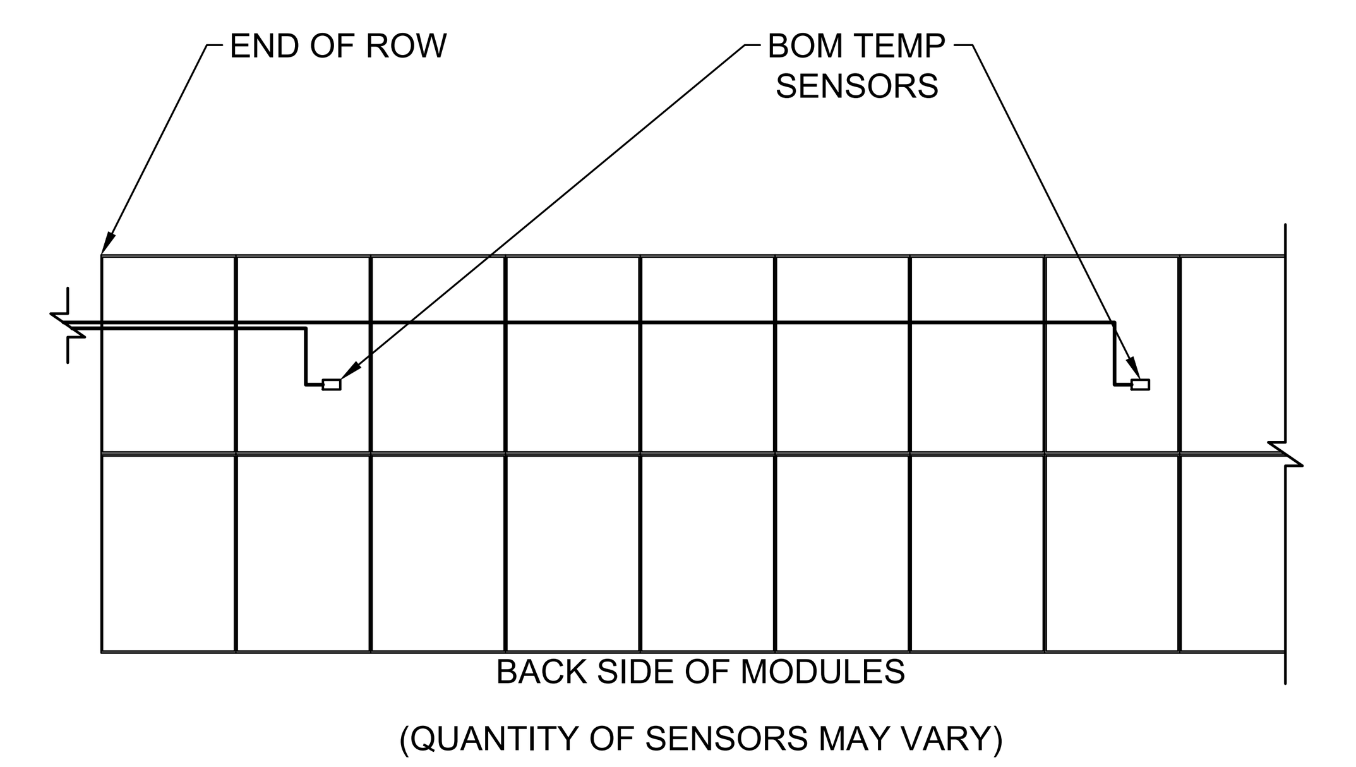
E-312



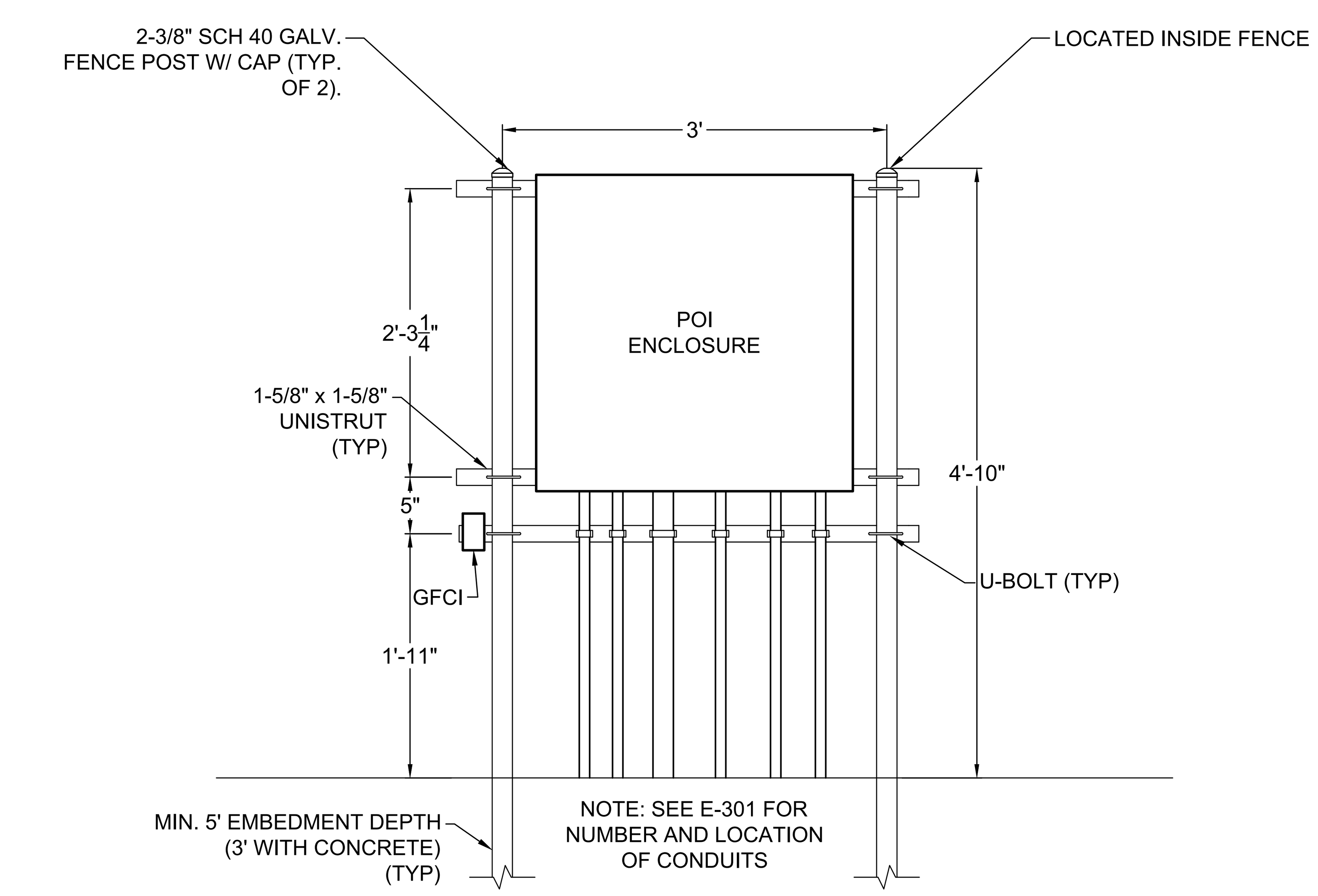
1
E-321
SENSOR MOUNTING - BACK ELEVATION VIEW
SCALE: NTS



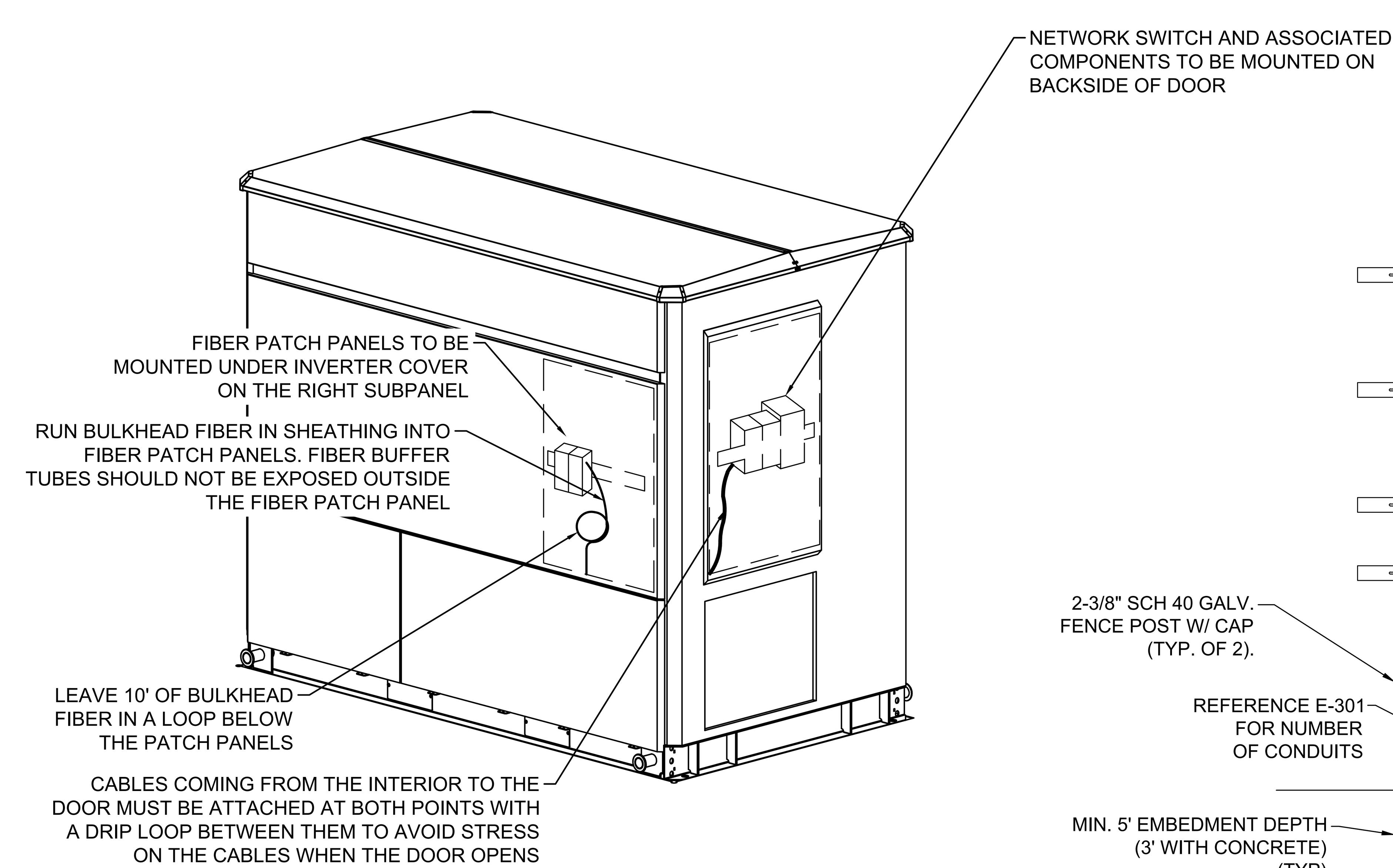
2
E-321
SENSOR MOUNTING OPTIONS - SIDE ELEVATION VIEW
SCALE: NTS



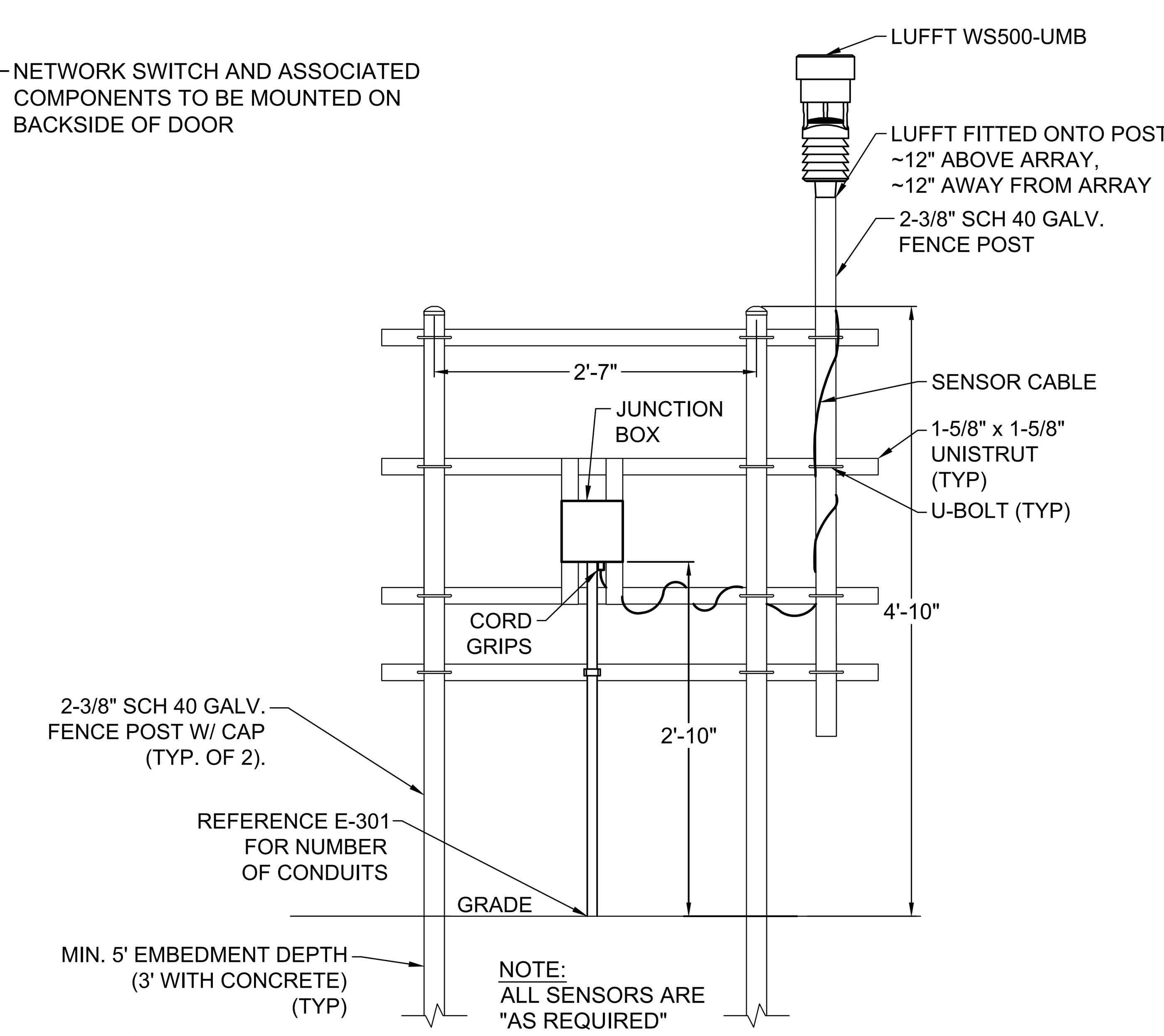
3
E-321
BOM TEMP SENSOR DETAIL
SCALE: NTS



4
E-321
POI METER STATION DETAIL
0 1' 2'
SCALE: 1" = 1'



5
E-321
EQUIPMENT INSIDE INVERTER
SCALE: NTS



6
E-321
WEATHER STATION DETAIL
0 1' 2'
SCALE: 1" = 1'

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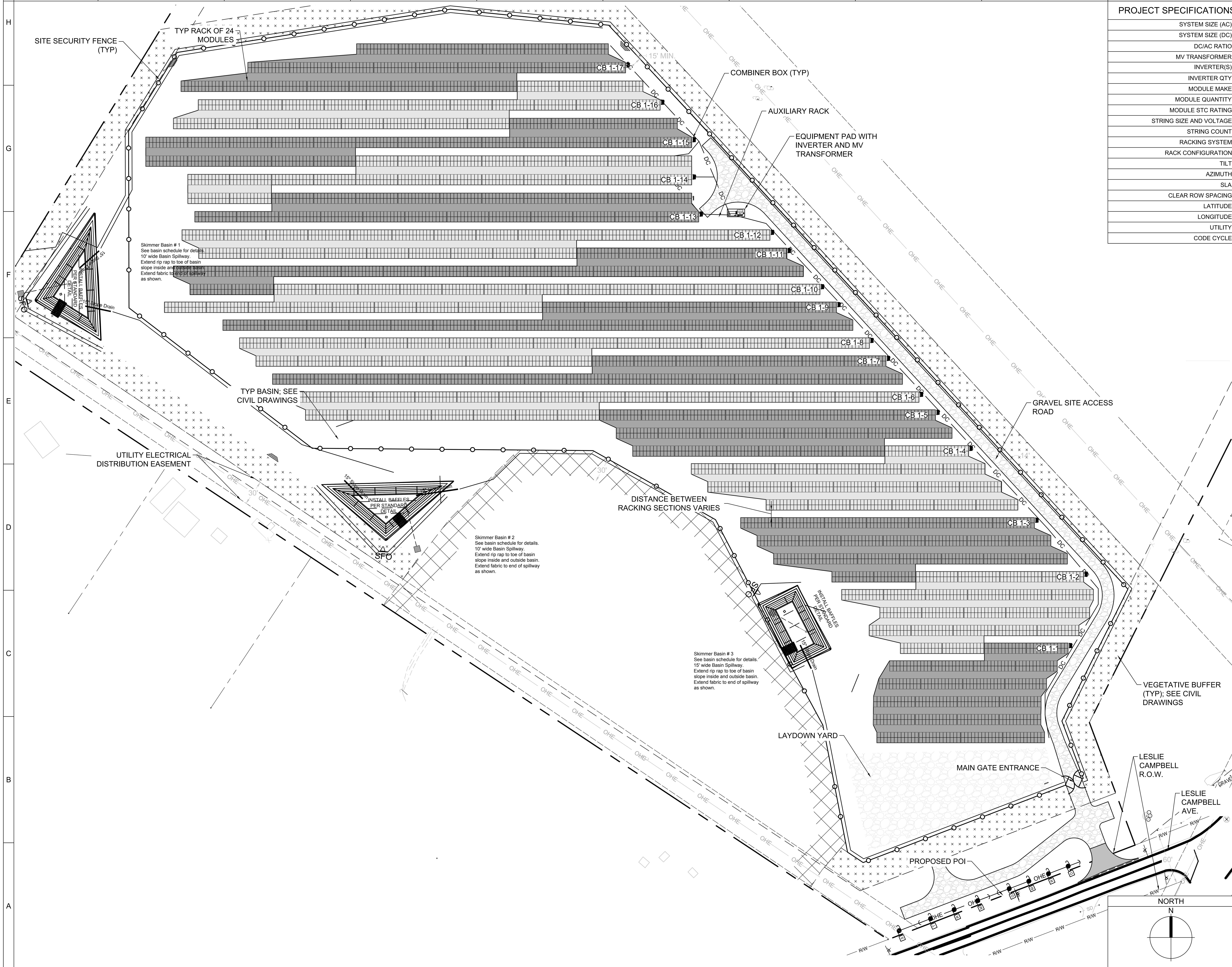
EQUIP. MOUNTING DETAILS

E-321



PROJECT SPECIFICATIONS DESIGN SUMMARY TABLE

SYSTEM SIZE (AC)	2.750
SYSTEM SIZE (DC)	3.94632 MW
DC/AC RATIO	1.435
MV TRANSFORMER	(1) 2500KVA @ 22.86 kV
INVERTER(S)	SMA AMERICA SC2750-EV-US
INVERTER QTY	1
MODULE MAKE	FIRST SOLAR FS-6435
MODULE QUANTITY	9,072
MODULE STC RATING	435W
STRING SIZE AND VOLTAGE	6 MODS PER STRING, 1500VDC
STRING COUNT	1,512
RACKING SYSTEM	SOLAR FLEXRACK
RACK CONFIGURATION	2 HIGH IN PORTRAIT
TILT	20°
AZIMUTH	180°
SLA	29°
CLEAR ROW SPACING	VARIES, 8 FT. MIN.
LATITUDE	35.4147795
LONGITUDE	-78.7144972
UTILITY	DEP
CODE CYCLE	NEC 2017

NORTH

N

GRAPHIC SCALE

0 50' 100'

SCALE: 1" = 50'

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E-401 DC TRENCH AND CIRCUIT LAYOUT.DWG

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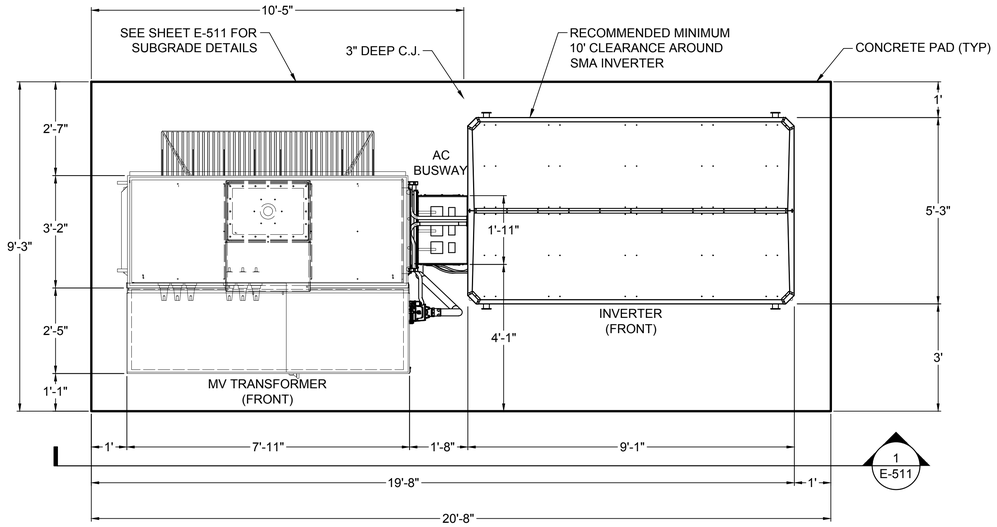
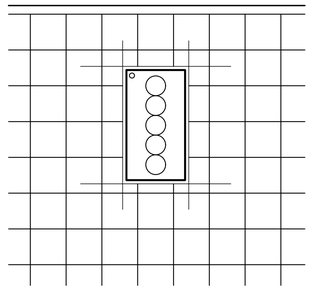
DC TRENCH AND CIRCUIT LAYOUT

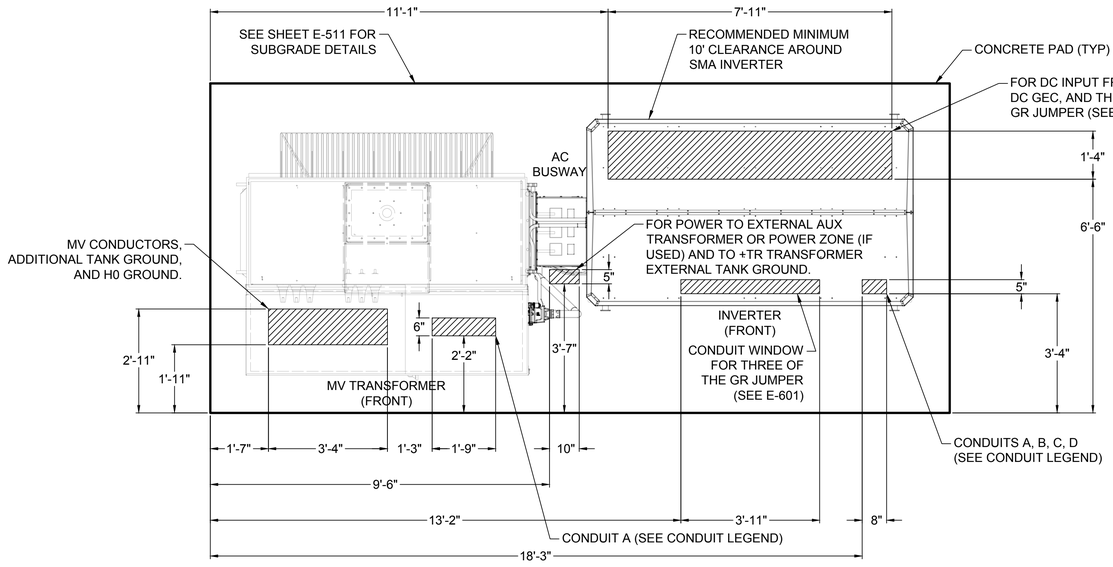
E-401



1 E-501 EQUIPMENT PAD LAYOUT
SCALE: NTS



3 E-501 EQUIPMENT PAD CONDUIT WINDOW BOX-OUT DETAIL
SCALE: NTS



2 E-501 EQUIPMENT PAD CONDUIT WINDOW LAYOUT
SCALE: NTS

CONDUIT LEGEND
A - 1.5" SPARE BETWEEN XFMR LV & INVERTER
B - 2" CONDUIT FOR FIBER FROM PAD 1 TO FPP INSIDE INVERTER
C - 1.25" CONDUIT FOR (3) #14 AWG CU XHHW-2 + RS-485 (BELDEN 3106A) BETWEEN INVERTER & MET STATION
D - 2" SPARE OUT TO PERIMETER OF PAD

NOTE:
1. FIELD VERIFY ALL EQUIPMENT CONDUIT ENTRY AREAS.
2. EQUIPMENT DIMENSIONS AND CONDUIT WINDOWS ARE ESTIMATED. SEE MANUFACTURER DRAWINGS AND/OR MANUALS PRIOR TO CONSTRUCTION.
3. ALL EQUIPMENT MOUNTED TO EQUIPMENT PAD PER MANUFACTURERS INSTRUCTION.
4. ALL CONDUIT TO BE INSTALLED BENEATH PAD UNLESS OTHERWISE NOTED.
5. "C.J" ON PLAN INDICATES CONTROL JOINT LOCATIONS.
6. WORKING CLEARANCES SHALL BE IN ACCORDANCE WITH NEC ARTICLE 110-III AND MANUFACTURER'S REQUIREMENTS.
7. INVERTER GLAND PLATES ON SIDES AND BOTTOMS TO BE REINSTALLED AS REQUIRED BY INVERTER MANUFACTURER.
8. CONDUIT BOX-OUTS SHALL BE FILLED WITH POLYWATER INSTAGROUT SEALANT (OAE) TO BLOCK MOISTURE WHILE ALLOWING THE CONDUIT TO REMAIN INDEPENDENT OF THE SLAB.
9. UNLESS OTHERWISE SPECIFIED, CONDUIT SIZE AND TYPE ARE DEFINED IN THE E-220 SERIES CONDUCTOR SCHEDULES.
10. SWEEPS AND STUB-UPS ENTERING INTO PAD-MOUNTED EQUIPMENT SHALL BE PVC SCHEDULE 40 MINIMUM.
11. PROVIDE AND INSTALL ANCHOR BOLTS: HILTI KWIK BOLT KB3 $\frac{3}{4}$" X 7" SS304 #286026 (OR APPROVED EQUAL). MINIMUM 4-3/4" EMBEDMENT, 5-1/2" HOLE REQUIRED.

KEY:
CONDUIT STUB-UP AREAS

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E-501-511 EQUIPMENT PAD.DWG

PROJECT: 20-PP-044

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1887 LESLIE CAMPBELL AVE.
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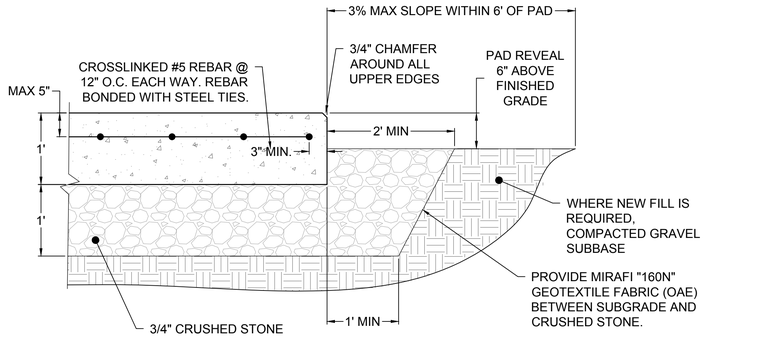
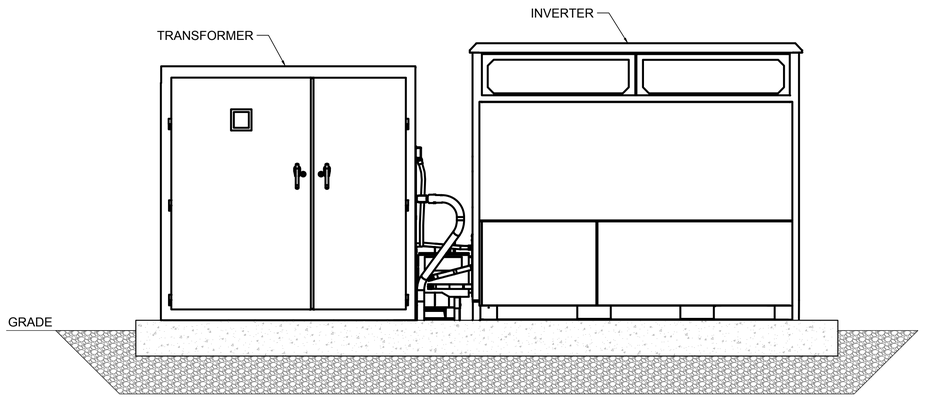
EQUIPMENT PAD PLAN VIEWS

E-501



1 E-511 **SLAB DETAIL**
SCALE: NTS

GENERAL NOTES:
1. 28-DAY COMPRESSIVE STRENGTH SHALL BE MINIMUM 4000 PSI.
2. SEE SPECIFICATION SHEETS E-002 AND E-003 FOR ADDITIONAL REQUIREMENTS.
3. DO NOT LOAD PAD BEFORE CONCRETE REACHES DESIGN STRENGTH.



2 E-511 **EQUIPMENT PAD ELEVATION VIEW**
SCALE: NTS

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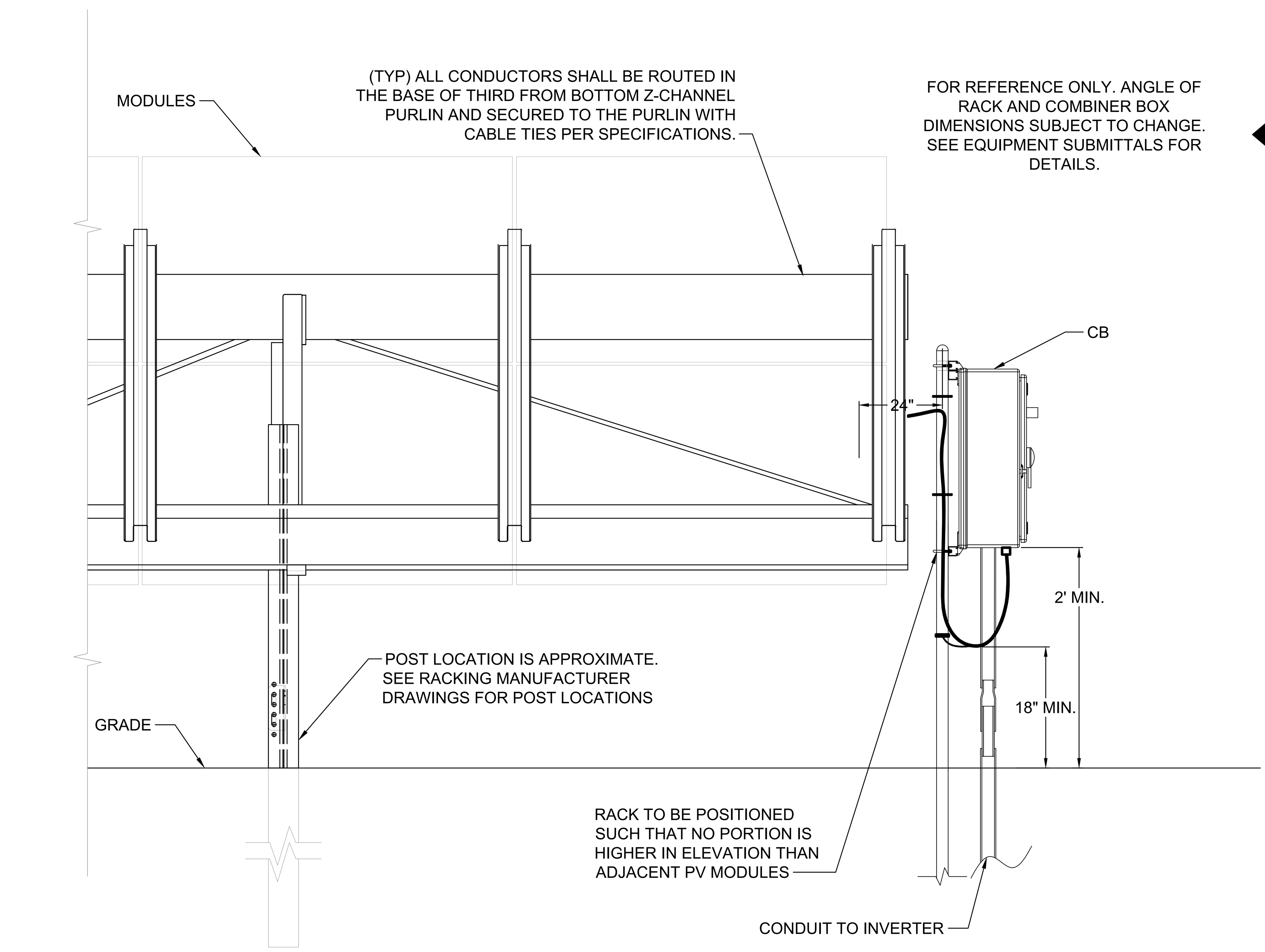
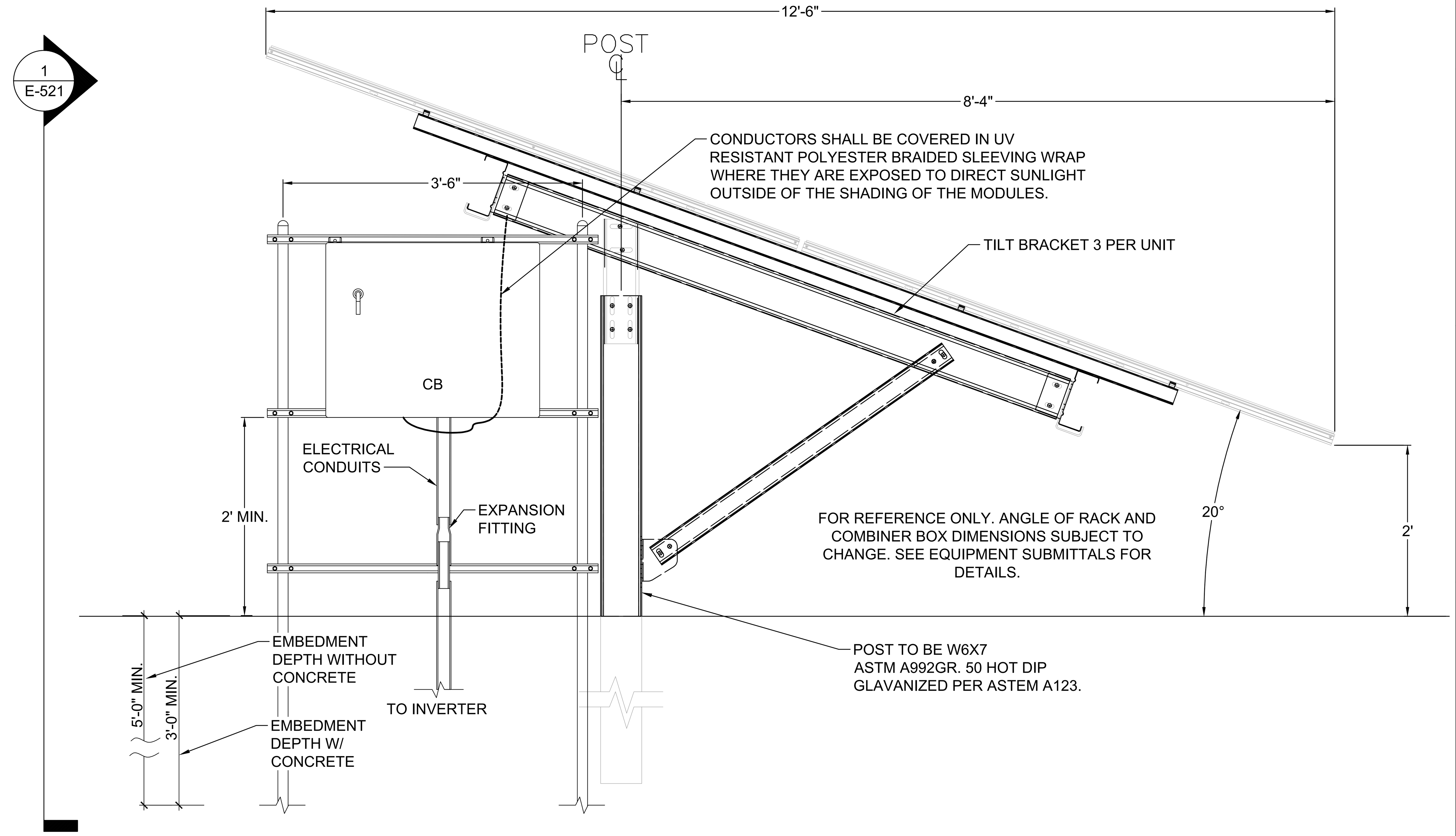
EQUIPMENT PAD DETAILS

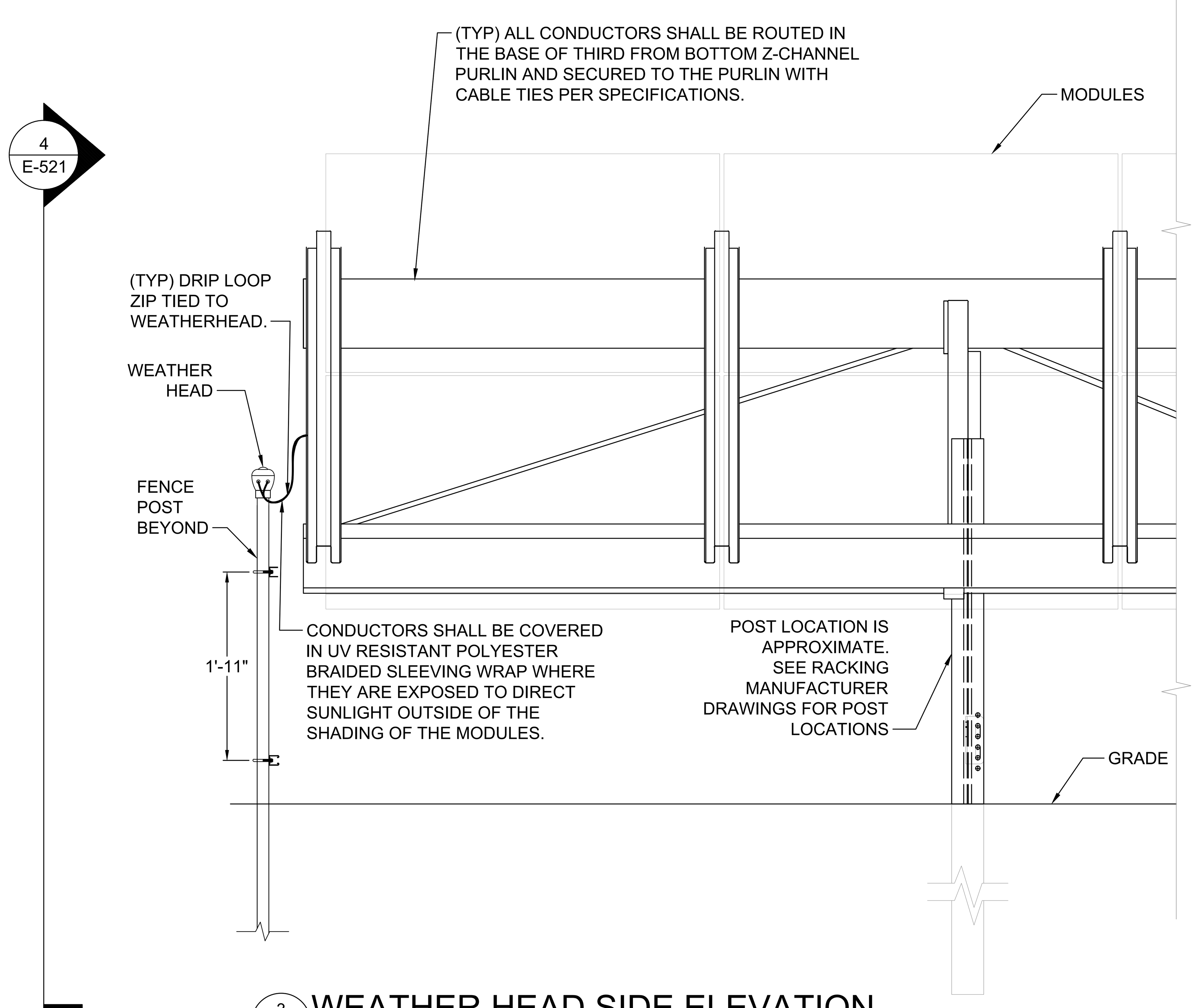
E-511



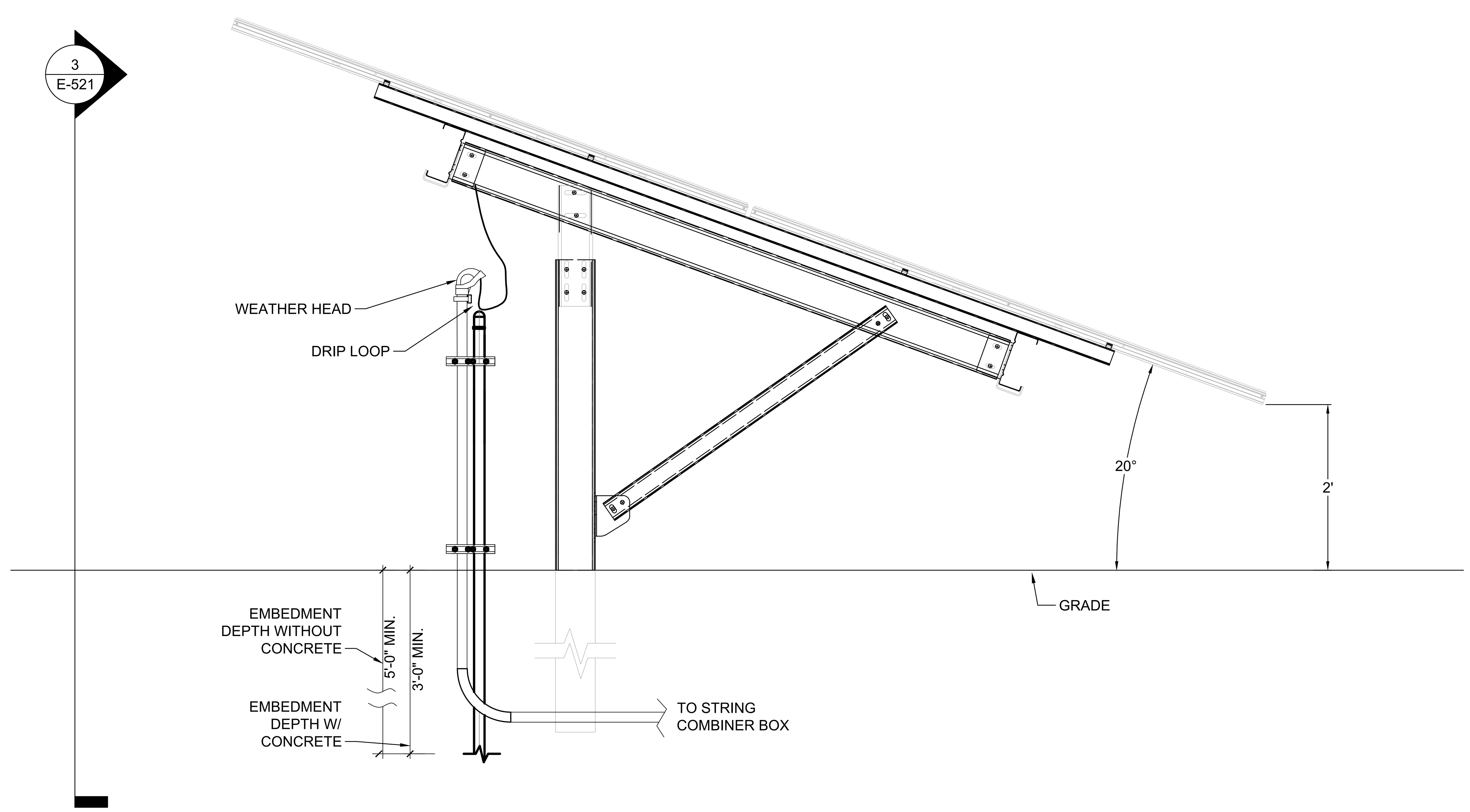
1 E-521 COMBINER BOX SIDE ELEVATION
SCALE: NTS



2 E-521 COMBINER BOX FRONT ELEVATION
SCALE: NTS



3 E-521 WEATHER HEAD SIDE ELEVATION
SCALE: NTS



4 E-521 WEATHER HEAD - FRONT ELEVATION
SCALE: NTS

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E-521-531 CONDUIT AND WIRE MGT.DWG

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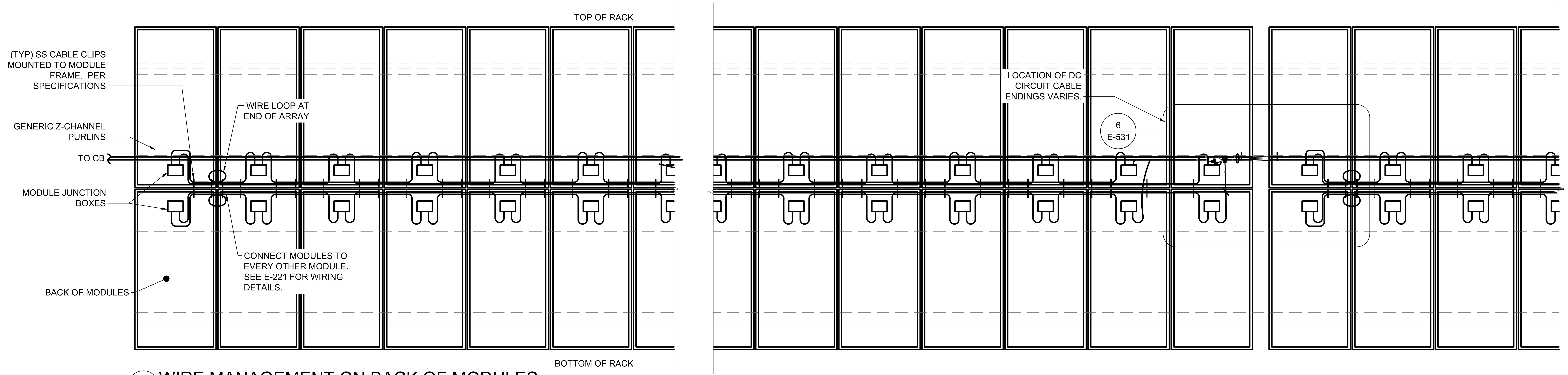
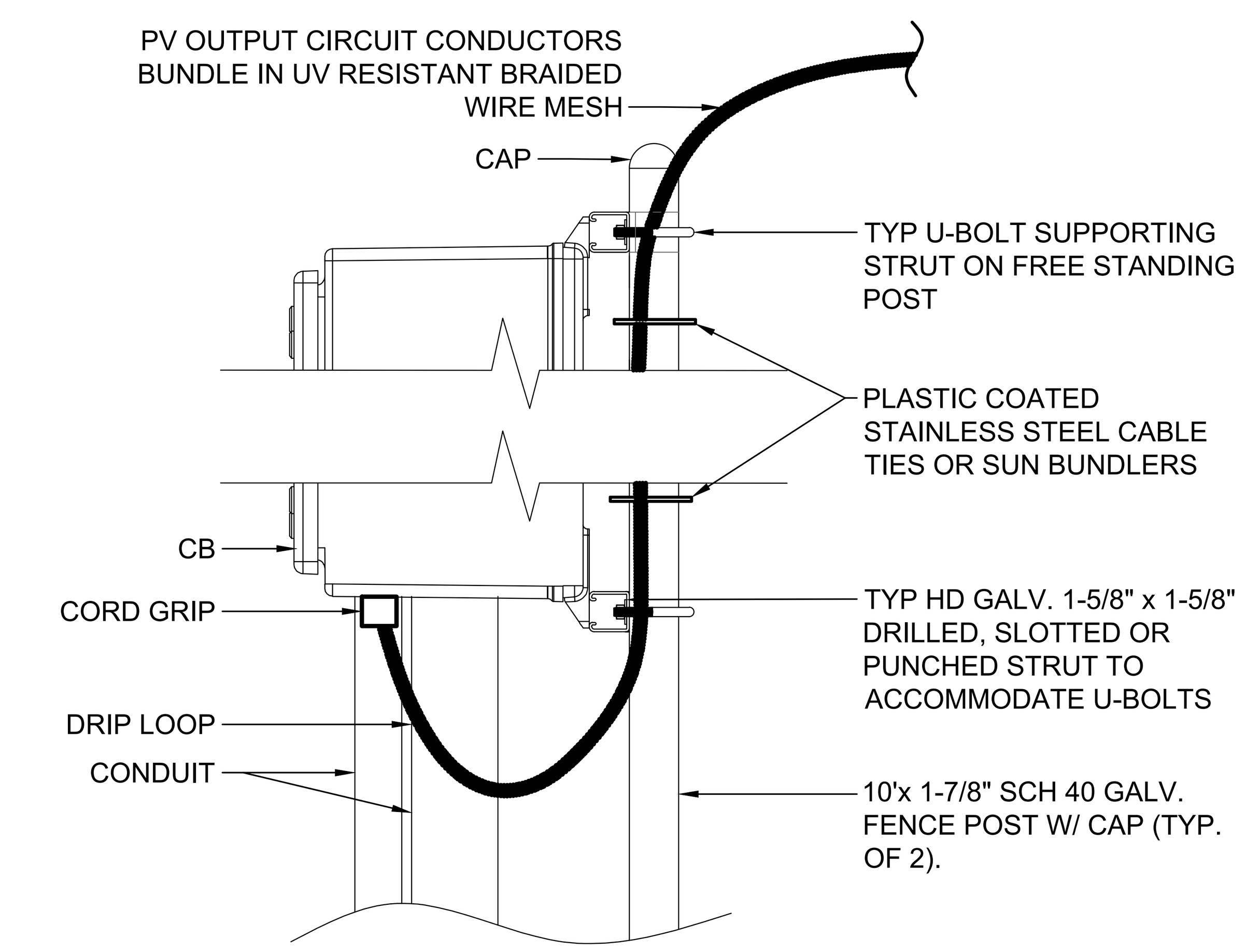
CONDUIT AND WIRE MANAGEMENT 1 OF 2

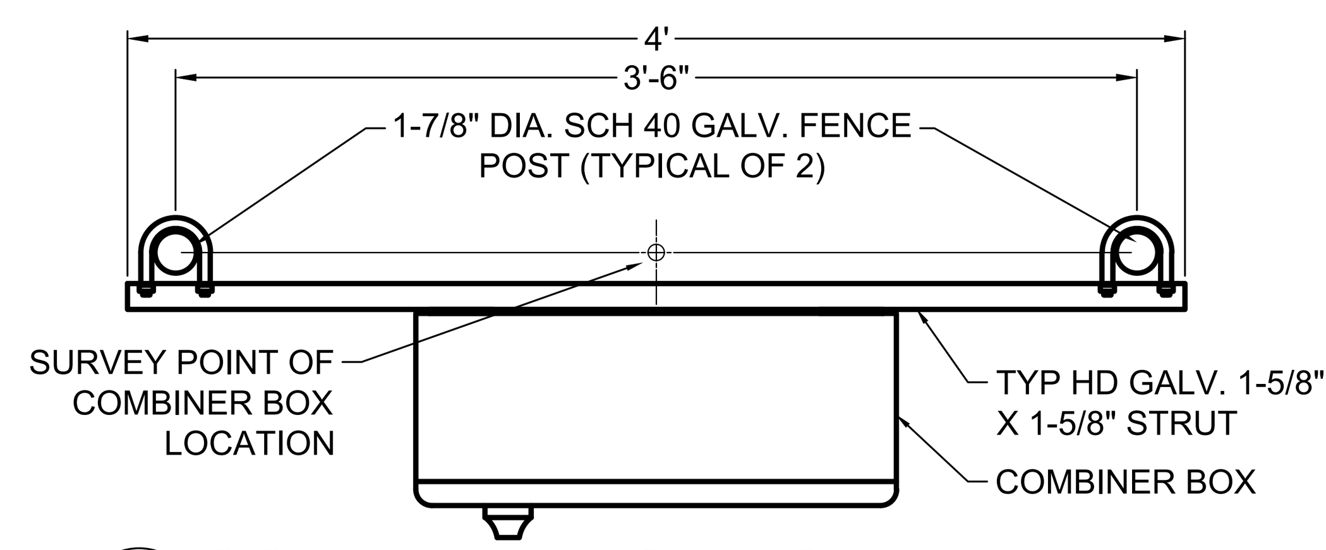
E-521



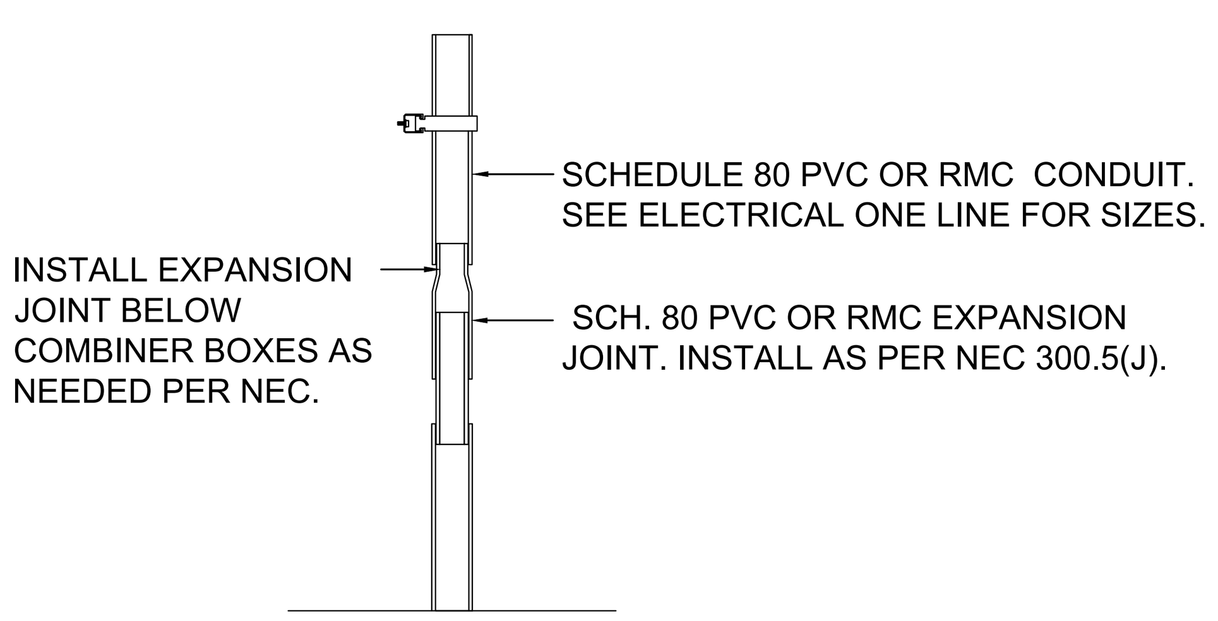
5 E-531 WIRE MANAGEMENT ON BACK OF MODULES
SCALE: NTS



1 E-531 CB ATTACHMENT DETAIL - ELEVATION
SCALE: NTS

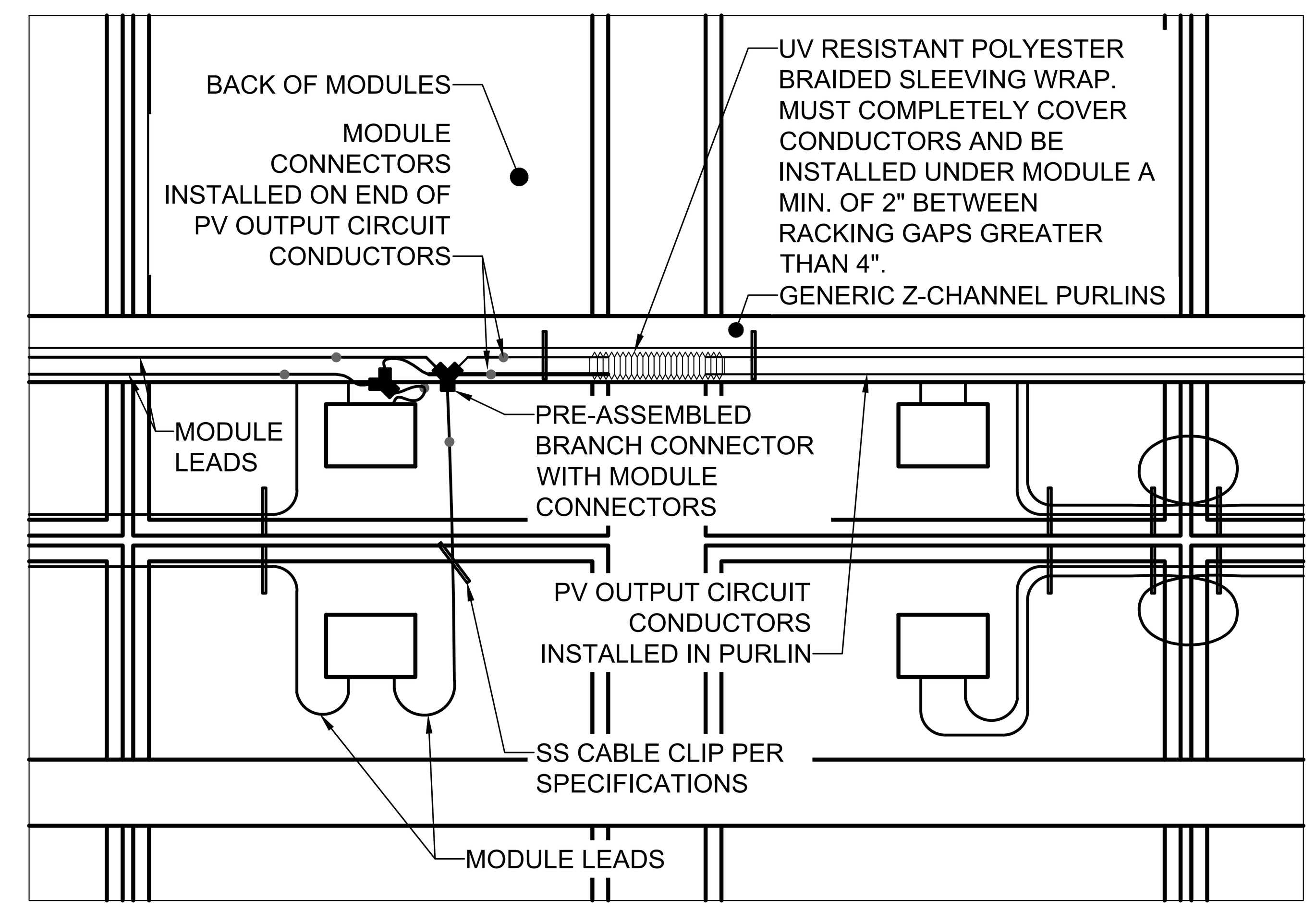


3 E-531 COMBINER BOX TOP VIEW
SCALE: NTS



2 E-531 CONDUIT EXPANSION
SCALE: NTS

4 E-531 NOT USED
SCALE: NTS



6 E-531 WIRE MANAGEMENT BETWEEN RACKS
SCALE: NTS

GENERAL NOTES

1. ALL DC STRING AND PV OUTPUT CIRCUIT CONDUCTORS SHALL BE SECURED TO THE BACK SIDE OF THE MODULE FRAME, OR RACKING COMPONENTS AND SHALL NOT COME IN CONTACT WITH THE MODULE BACK SHEET.
2. ALL PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE WIRED IN SUCH A WAY AS TO LIMIT STRAIN ON MODULE JUNCTION BOX, HAVE BENDS NO LESS THAN 8X THE RADIUS OF THE INSULATION OF THE CONDUCTOR, AND BE OUT OF DIRECT SUNLIGHT.
3. ALL CONNECTORS AND INLINE FUSES SHALL BE LOCATED UNDER THE MODULE SUCH THAT THEY ARE NEVER EXPOSED TO DIRECT SUNLIGHT OR WATER RUNOFF.
4. A MINIMUM OF (2) CABLE CLIPS SHALL BE INSTALLED ON THE FRAME OF EACH MODULE TO PROPERLY SECURE DC STRING AND SOURCE CIRCUIT CONDUCTORS.
5. NO SPLICES SHALL BE MADE ON PV SOURCE CIRCUIT, DC STRING, OR PV OUTPUT CIRCUIT CONDUCTORS. IN CASES WHERE DAMAGE HAS OCCURRED, SPLICES SHALL BE MADE WITH IDENTICAL TERMINATION CONNECTORS (MULTI-CONTACT MC4, AMPHENOL H4, ETC.). CCR REPRESENTATIVE SHALL REVIEW AND APPROVE ALL SPLICE LOCATIONS.
6. IF A DIRECT CONDUIT CONNECTION IS NOT INSTALLED, DC CONDUCTORS SHALL ENTER INTO THE BOTTOM OF NEMA RATED ENCLOSURES WITH A LIQUID TIGHT STRAIN RELIEF. HEYCO-TITE, COOPER LIQUID TIGHT OR APPROVED EQUAL.

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PROJECT: 20-PP-044

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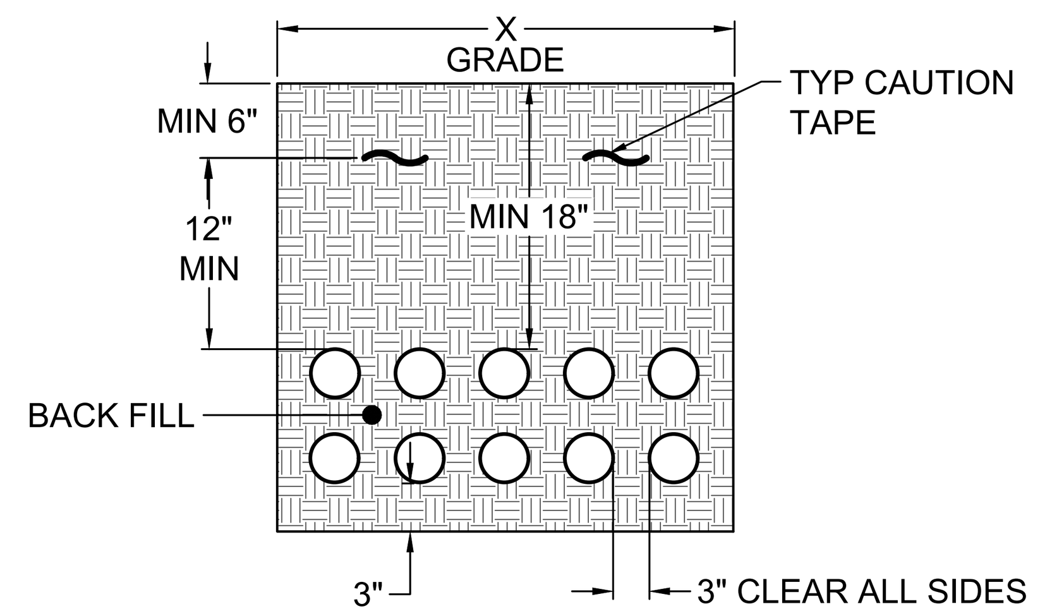
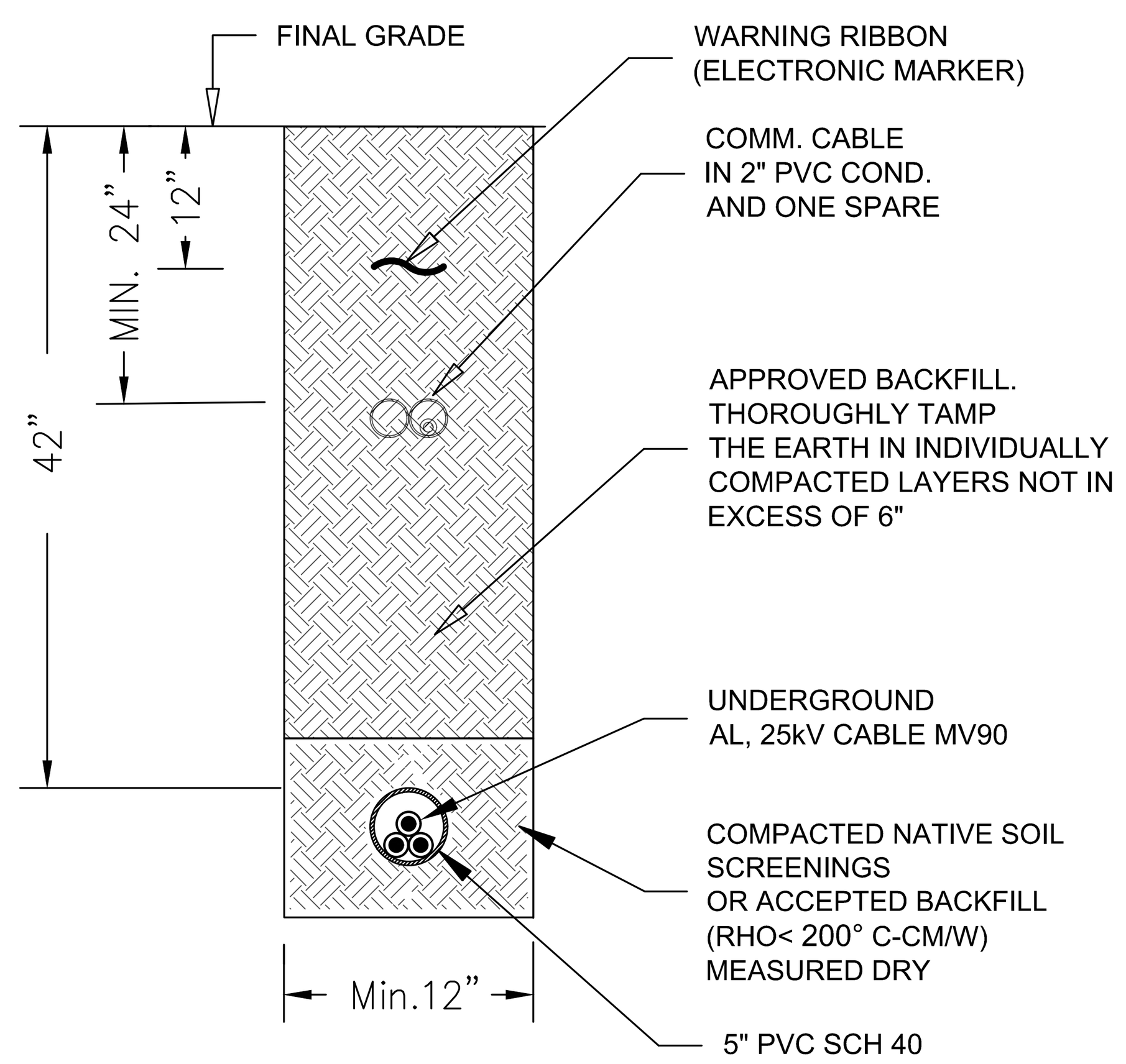
CONDUIT AND WIRE MANAGEMENT 2 OF 2

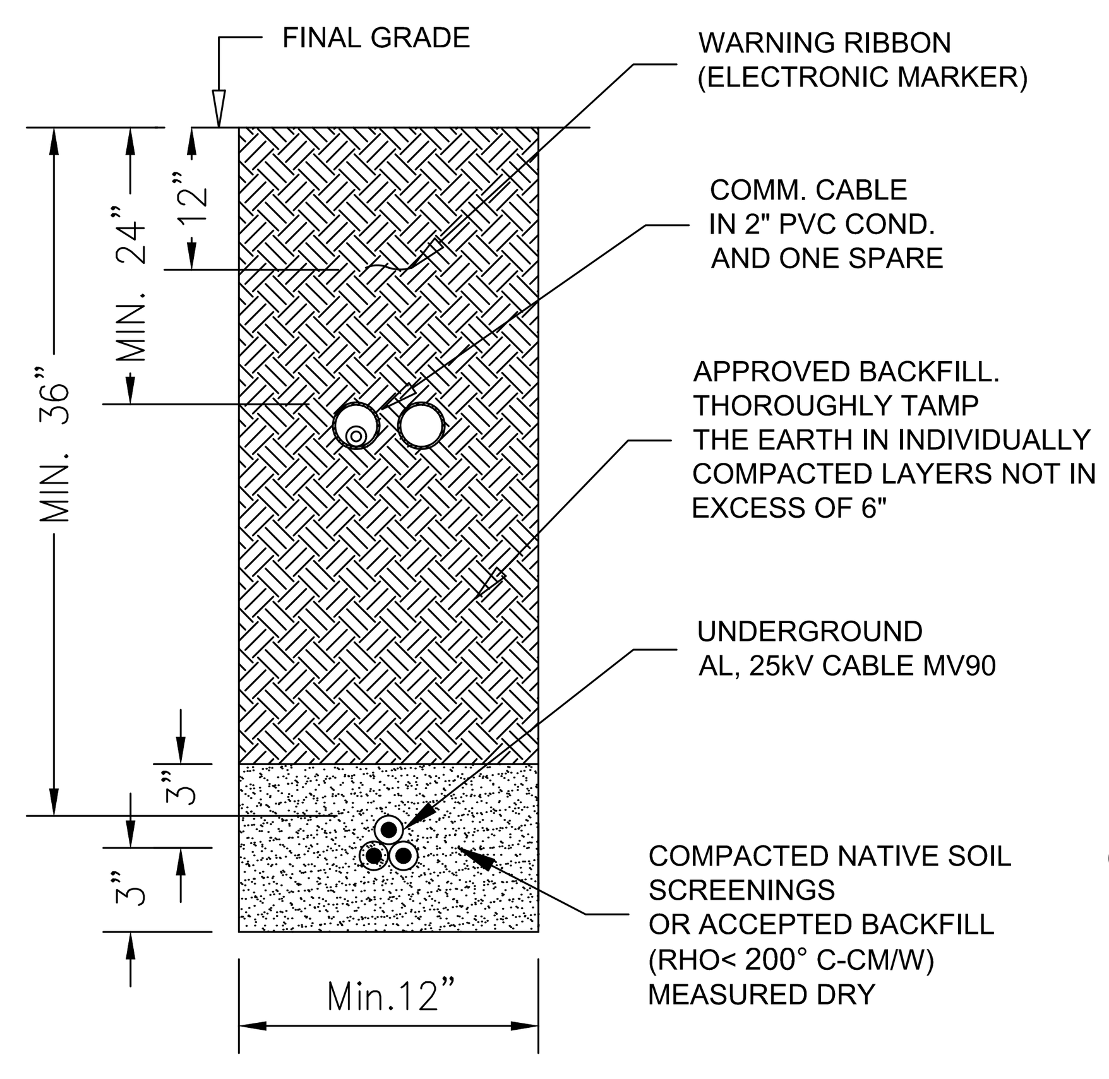
E-531



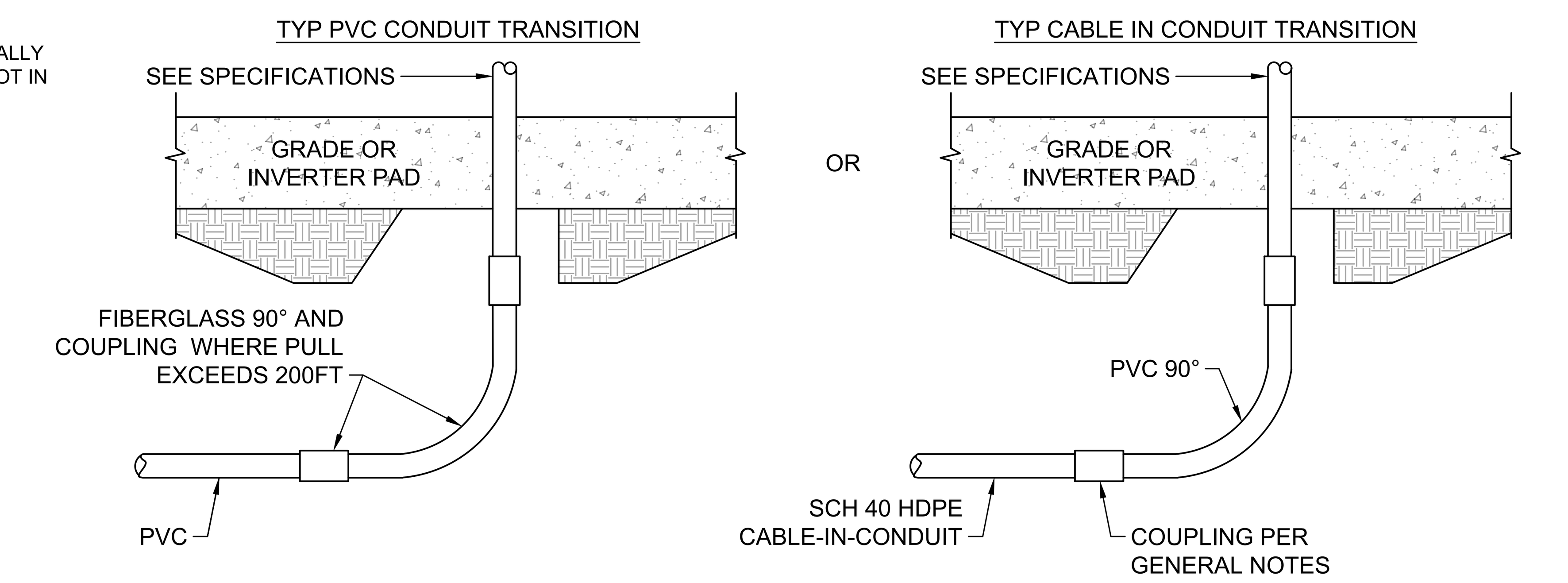
1 E-541 DC CABLE TRENCH DETAILS
SCALE: NTS



6 E-541 SECTION A - IN CONDUIT (UNDER ROAD)
SCALE: NTS



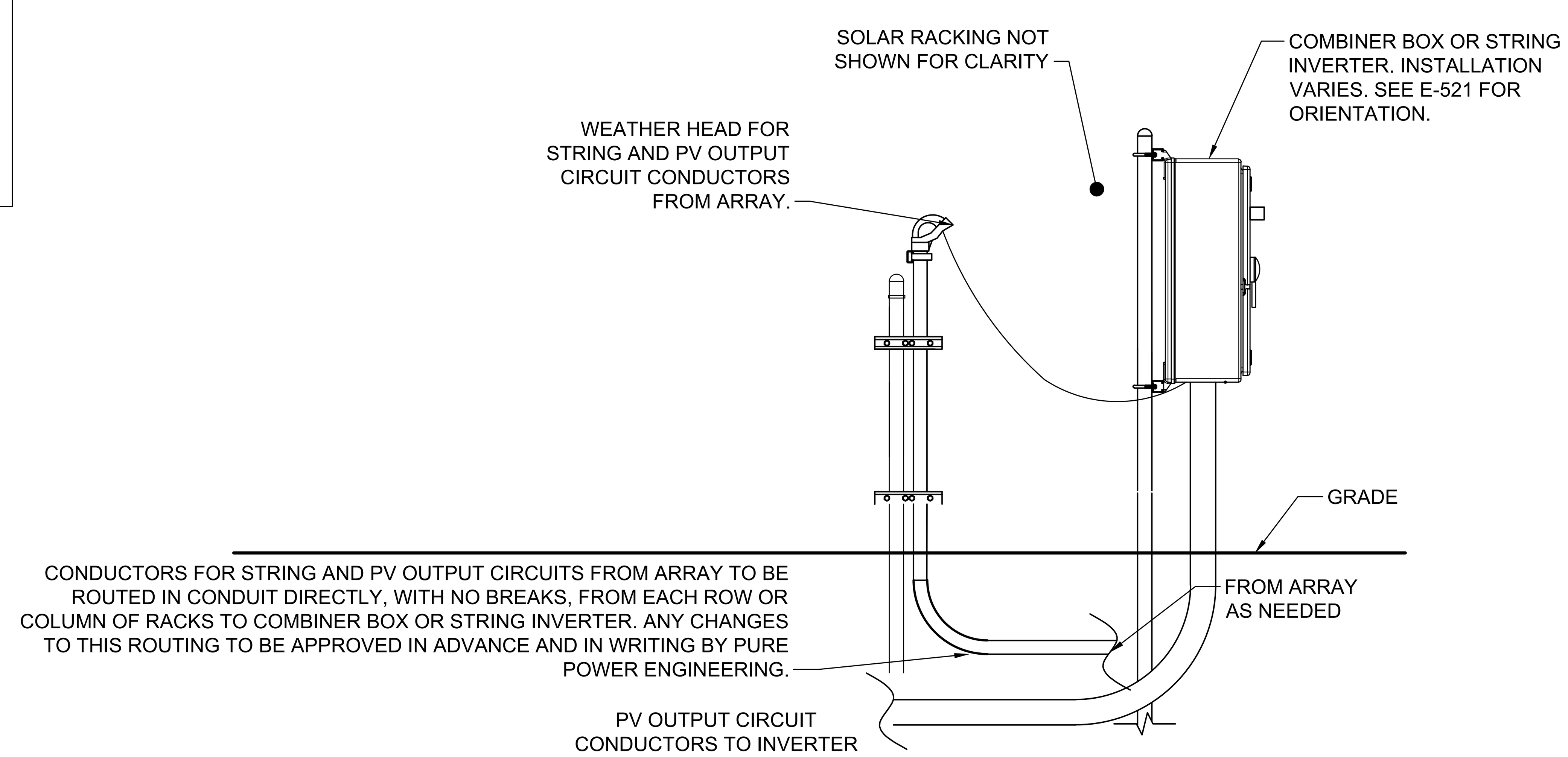
7 E-541 SECTION B - DIRECT BURIED
SCALE: NTS



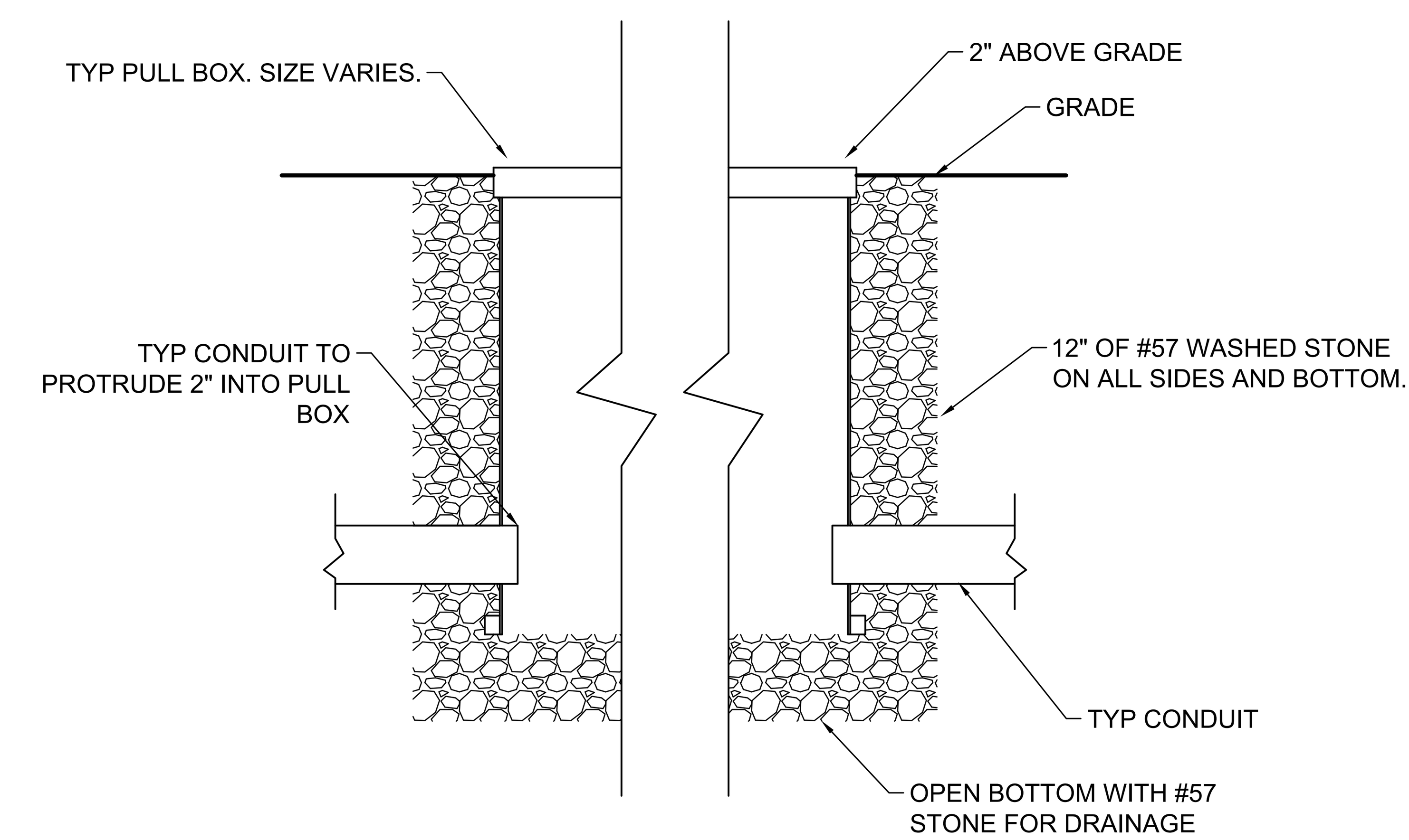
NOTES:
1. SEE GENERAL NOTES SHEETS FOR CONDUIT MATERIAL
2. INITIALLY INSTALL COUPLING AND CAP TO PREVENT DAMAGE TO STUB-UP UNTIL EQUIPMENT IS SET.
3. INSTALL CONDUIT BUSHING BEFORE PULLING CONDUCTORS TO AVOID DAMAGE TO CONDUCTORS AND CABLES.

3 E-541 UNDERGROUND CONDUIT TRANSITION DETAIL
SCALE: NTS

NOTES
1. ALL TRENCHES SHALL BE ROUTED AS DEPICTED AND SHALL NOT PASS UNDERNEATH THE SOLAR ARRAY, EXCEPT BETWEEN ROWS.
2. TRENCH BACKFILL MATERIAL SHOULD BE FREE OF ORGANIC MATERIAL AND PARTICLES LARGER THAN 1/2". BACKFILL SHOULD HAVE THERMAL CHARACTERISTIC RHO <= 250 degC-CM/W (OR LESS) AT 0% MOISTURE. BACKFILL SHALL BE COMPACTED IN 9" LOOSE LIFTS AND COMPACTED TO ACHIEVE A DENSITY OF AT LEAST 90% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST (ASTM D698). SEE GEOTECHNICAL REPORT FOR MORE INFORMATION.
3. "SELECT BACKFILL" MEET THE REQUIREMENTS ABOVE AND PASS THROUGH A 3/8" SIEVE AND CONTAIN NO SHARP OR FOREIGN OBJECTS.
4. METALLIC ELBOWS MUST BE GROUNDED IF INSTALLED LESS THAN 18" BELOW GRADE.
5. CAUTION TAPE SHALL BE DETECTABLE POLYETHYLENE PLASTIC WITH METAL CORE AND THE WORDS "CAUTION, BURIED ELECTRIC LINE BELOW". SETON OR APPROVED EQUAL.
6. ALL CONDUIT BELOW ROADWAY SHALL BE MINIMUM 24" PER NEC. CONTRACTOR TO WORK WITH LOCAL D.O.T. TO DETERMINE LOCAL AHJ MINIMUM DEPTH.
7. ALL MEDIUM VOLTAGE BEND RADII TO BE 36" MINIMUM.
8. MV TRENCHES MAY CONTAIN ADDITIONAL MONITORING CABLES/CONDUITS.
9. CONTRACTOR SHALL PERFORM AN INSULATION RESISTANCE TESTING AFTER CABLES ARE TERMINATED ON SITE. VOLTAGE APPLIED AND DURATION OF THE TEST SHALL BE IN ACCORDANCE WITH THE CABLE MANUFACTURER'S FIELD TEST RECOMMENDATIONS. TEST RESULTS FOR EACH CABLE SHALL BE SUBMITTED TO PURE POWER ENGINEERING FOR APPROVAL.

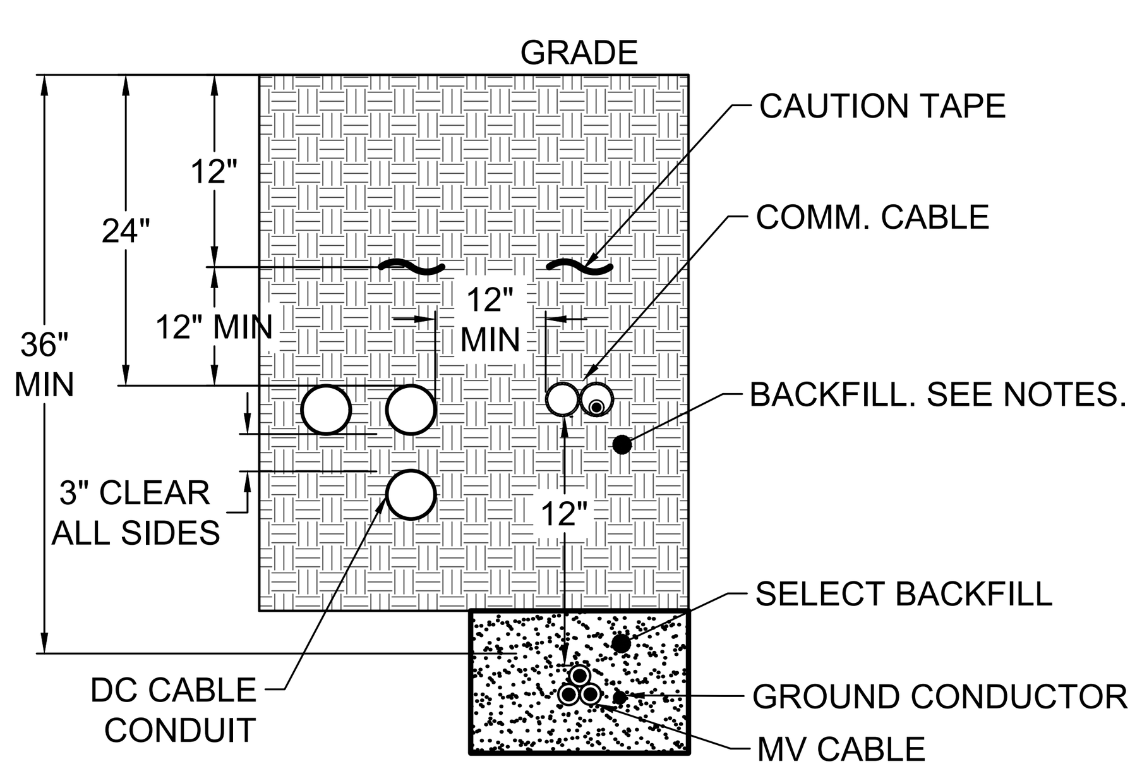


4 E-541 RACKING CONDUIT LOCATION
SCALE: NTS



NOTES
1. PULL BOXES TO BE NO SMALLER THAN MINIMUM SIZES REQUIRED BY NEC ARTICLE 314.
2. PULL BOXES TO BE SUBMITTED TO CCR ENGINEERING FOR APPROVAL PRIOR TO INSTALLATION.

5 E-541 TYPICAL PULL BOX DETAIL
SCALE: NTS



2 E-541 SHARED MV & DC
SCALE: NTS

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PROJECT: 20-PP-044

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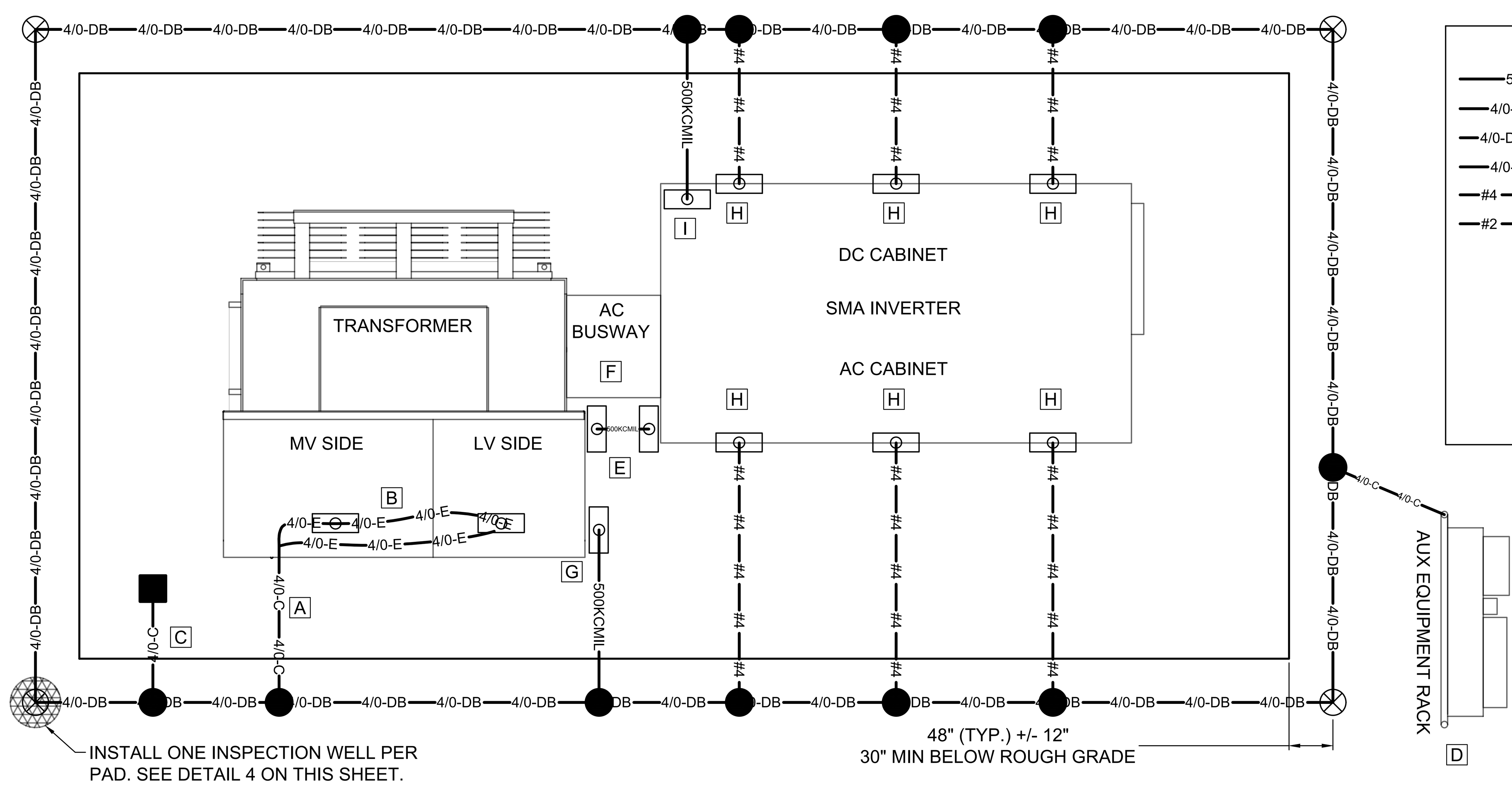
TRENCH DETAILS

E-541



LEGEND

- 500KCMIL — 500 KCMIL CU BARE, SOFT DRAWN, 1-1/2" CONDUIT
- 4/0-C — 4/0 CU BARE, SOFT DRAWN, 1" CONDUIT
- 4/0-DB — 4/0 CU BARE, SOFT DRAWN, DIRECT BURY
- 4/0-E — 4/0 CU BARE, SOFT DRAWN, EXPOSED
- #4 — #4 AWG CU BARE, 1" CONDUIT
- #2 — #2 AWG CU BARE
- COMPRESSION LUG
- SPLIT BOLT
- GROUND ROD
- ERICO 150 WELDING MATERIAL, P/N TAC2Q2Q
- CAD WELD TO REBAR
- X KEYED NOTE

INVERTER PAD GROUNDING GENERAL NOTES:

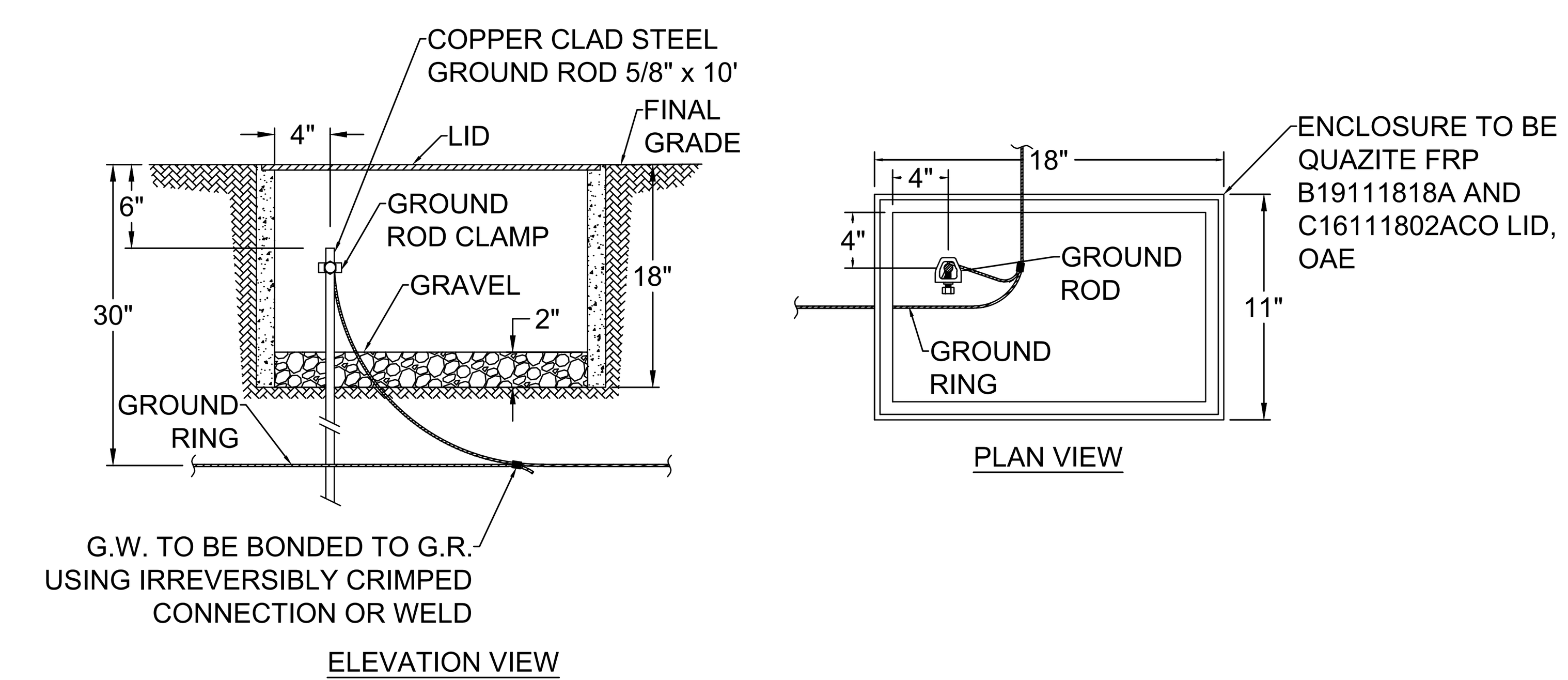
1. ALL DIRECT CONNECTIONS TO GR SHALL BE EXOTHERMICALLY WELDED TO REBAR BEFORE CONCRETE IS POURED WITH ERICO P/N RTC522Q OR APPROVED EQUAL.
2. GR TO BE BONDED TO GROUND ROD USING EXOTHERMICALLY WELDED CONNECTION. ERICO P/N GTC182Q OR APPROVED.
3. PAD LAYOUT SHOWN IS REPRESENTATIVE; REFER TO E-501 FOR ACTUAL EQUIPMENT ORIENTATION AND DIMENSIONS.
4. H0 JUMPER, CONCENTRIC NEUTRALS AND LIGHTNING ARRESTERS TO BE INDIVIDUALLY BONDED TO GROUND LOOP VIA IRREVERSIBLE CRIMP.
5. LEAVE MINIMUM 10' OF SLACK ABOVE GRADE ON ALL GR BONDING JUMPERS PRIOR TO PLACING EQUIPMENT. ONCE EQUIPMENT IS INSTALLED, THEY MAY BE CUT TO LENGTH
6. REFER TO SMA INSTALLATION MANUAL FOR ADDITIONAL INFORMATION ON GROUNDING METHODS, REQUIREMENTS, AND GROUNDING FOR REDUCTION OF RADIANT INTERFERENCE EMISSION.

INVERTER PAD GROUNDING KEYED NOTES:

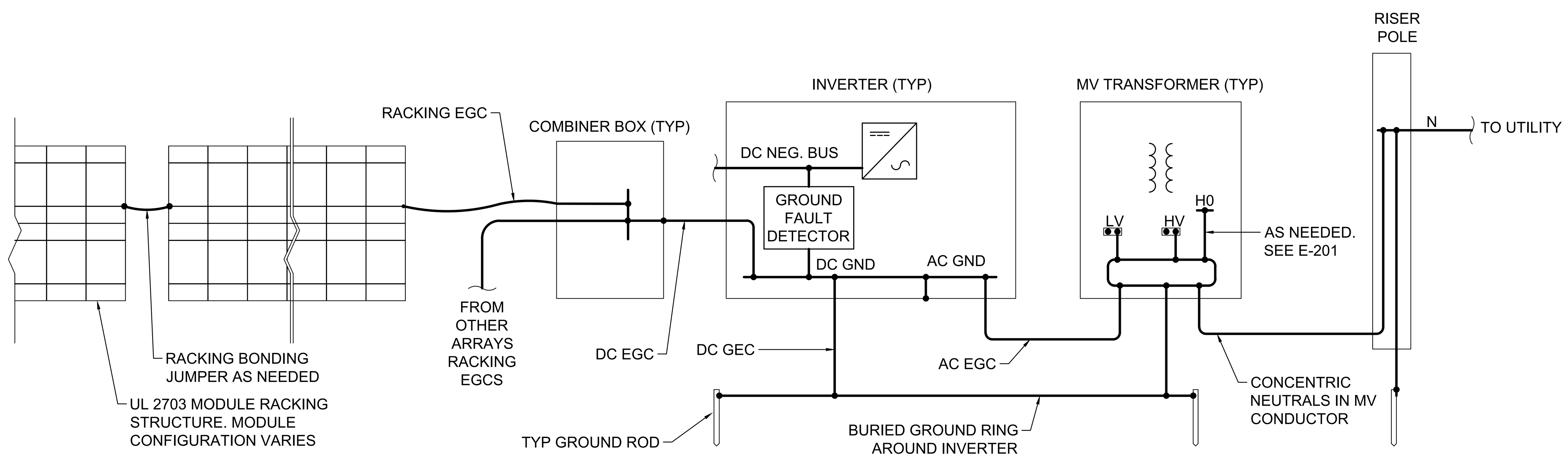
A. TRANSFORMER GROUNDING JUMPER TO GROUND LOOP. AS NEEDED PER E-201. H0 AND TANK GROUND TERMINATION ON TRANSFORMER MAY VARY. SEE TRANSFORMER DATASHEET FOR DETAILS.
B. GR JUMPER SHALL ENTER MV CABINET AND FORM LOOP THROUGH TANK GROUND IN LV AND MV CABINET. LOOP AROUND MV CONDUCTORS. LOOP SHALL BE 8' MIN LENGTH AND BE IRREVERSIBLY CRIMPED BACK ONTO SELF. SURGE ARRESTERS AND CONDUCTOR NEUTRALS TO LAND ON FRONT SECTION OF LOOP.
C. REBAR GR JUMPER TO GR.
D. GR JUMPER FROM FENCE POST GROUNDING CONNECTOR ON AUXILIARY EQUIPMENT RACK POST TO GR. SEE AUXILIARY EQUIPMENT RACK GROUNDING DETAIL.
E. EXTERNAL +TR TERMINAL ON TRANSFORMER GROUND TO INVERTER +X100 TERMINAL. CONDUCTOR RUN ABOVE CONCRETE ALONG AC BUSWAY.
F. INSTALL (2) SMA SUPPLIED BRAIDED GROUNDING CABLES ON AC BUSWAY PER INSTALL MANUAL.
G. EXTERNAL +TR TERMINAL ON TRANSFORMER GR JUMPER TO GR.
H. INVERTER GR JUMPER TO GR FOR REDUCTION OF RADIANT INTERFERENCE EMISSION. SEE MANUAL FOR EXACT LOCATIONS AND INSTALLATION METHODS. JUMPER TO BE INSTALLED THROUGH BOTTOM OF INVERTER AND WEAVED THROUGH FORKLIFT HOLES AND CONNECTED TO OUTSIDE OF INVERTER FRAME PER MANUAL. FORKLIFT GLAND PLATES TO BE REINSTALLED AND SEALED AROUND JUMPER TO PREVENT RODENT INGRESS.
I. INVERTER GR JUMPER FROM -X103 IN DC SIDE OF CABINET TO GR.

1 E-601 INVERTER PAD GROUNDING
SCALE: NTS

2 E-601 NOT USED
SCALE: NTS

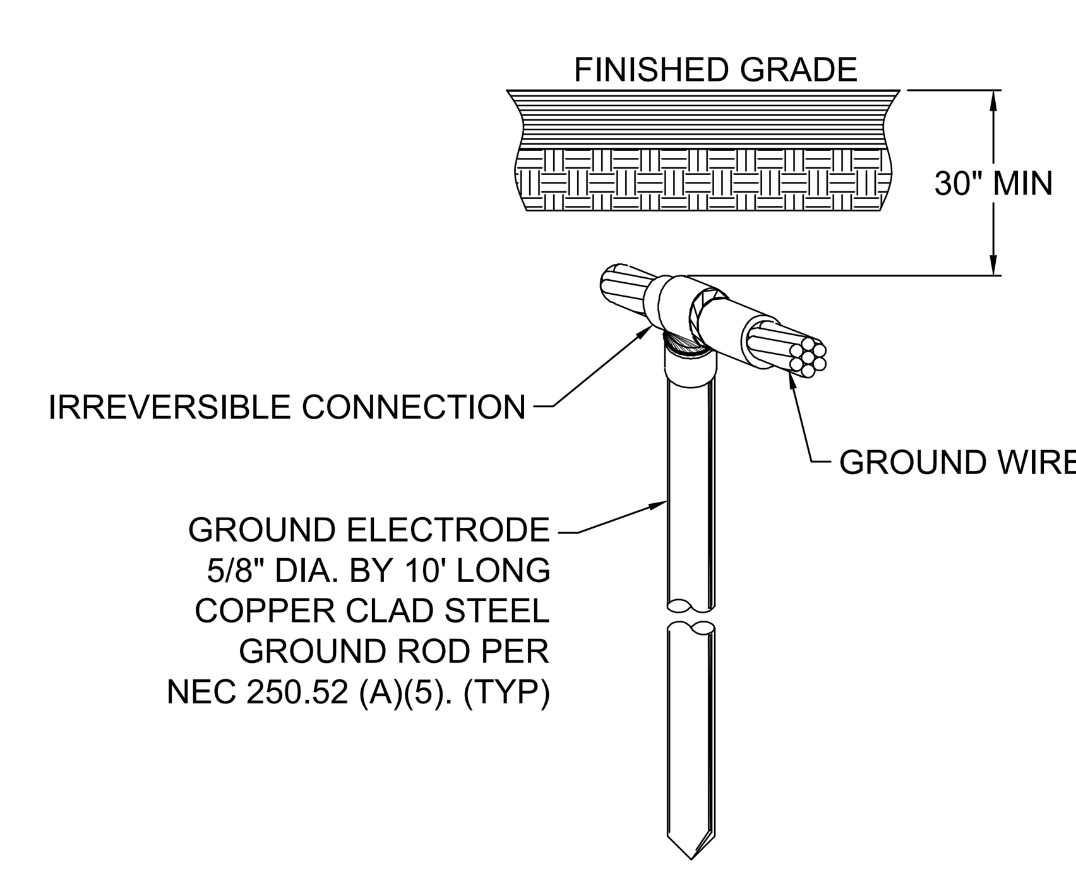


4 E-601 INSPECTION WELL
SCALE: NTS



NOTE:
1. CURRENT CARRYING CONDUCTORS NOT SHOWN FOR CLARITY.
2. SEE E-221 FOR GEC/EGC WIRE SIZES

3 E-601 OVERALL CENTRAL INVERTER GROUNDING LAYOUT
SCALE: NTS



5 E-601 TYP GROUND ROD
SCALE: NTS

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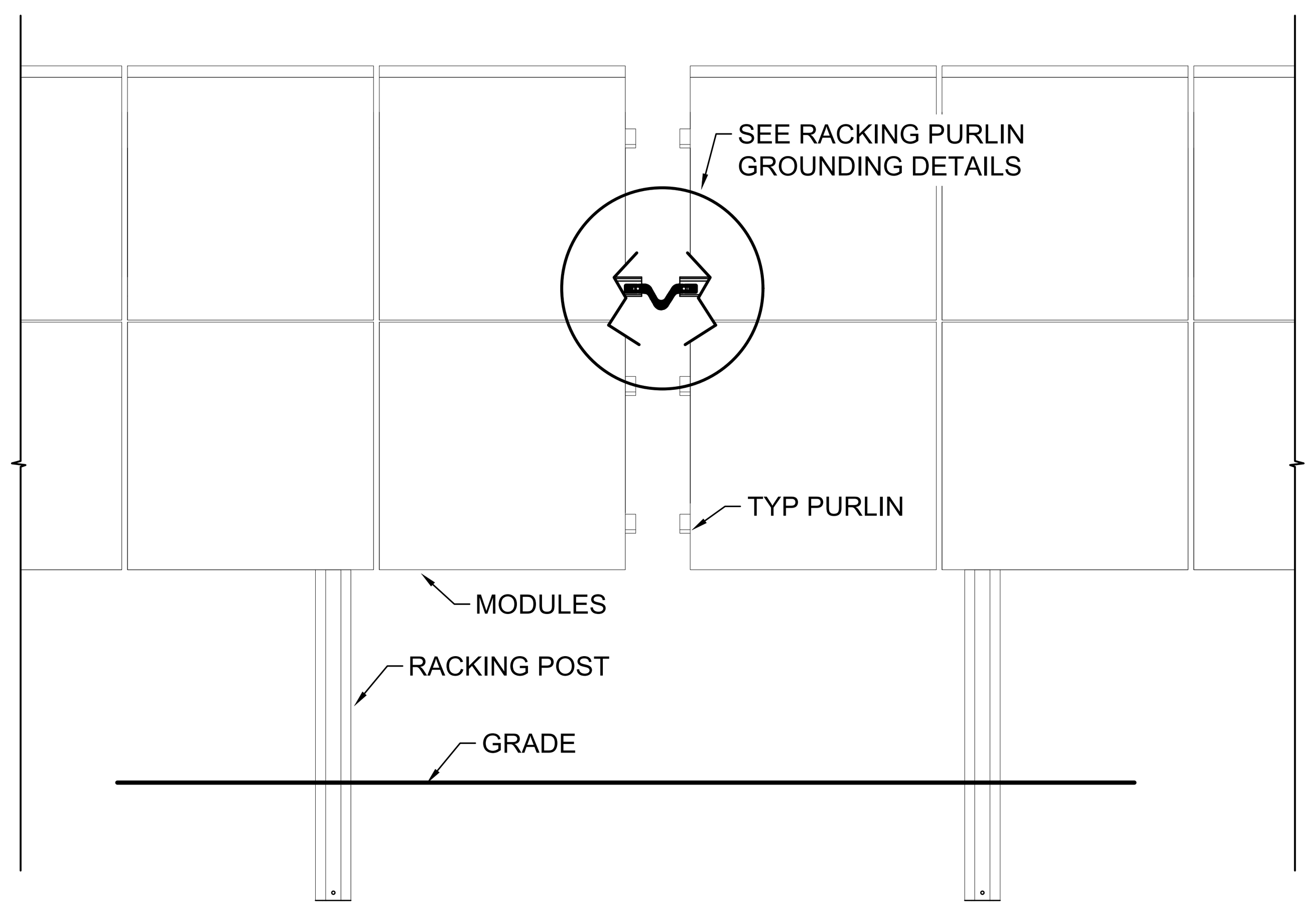
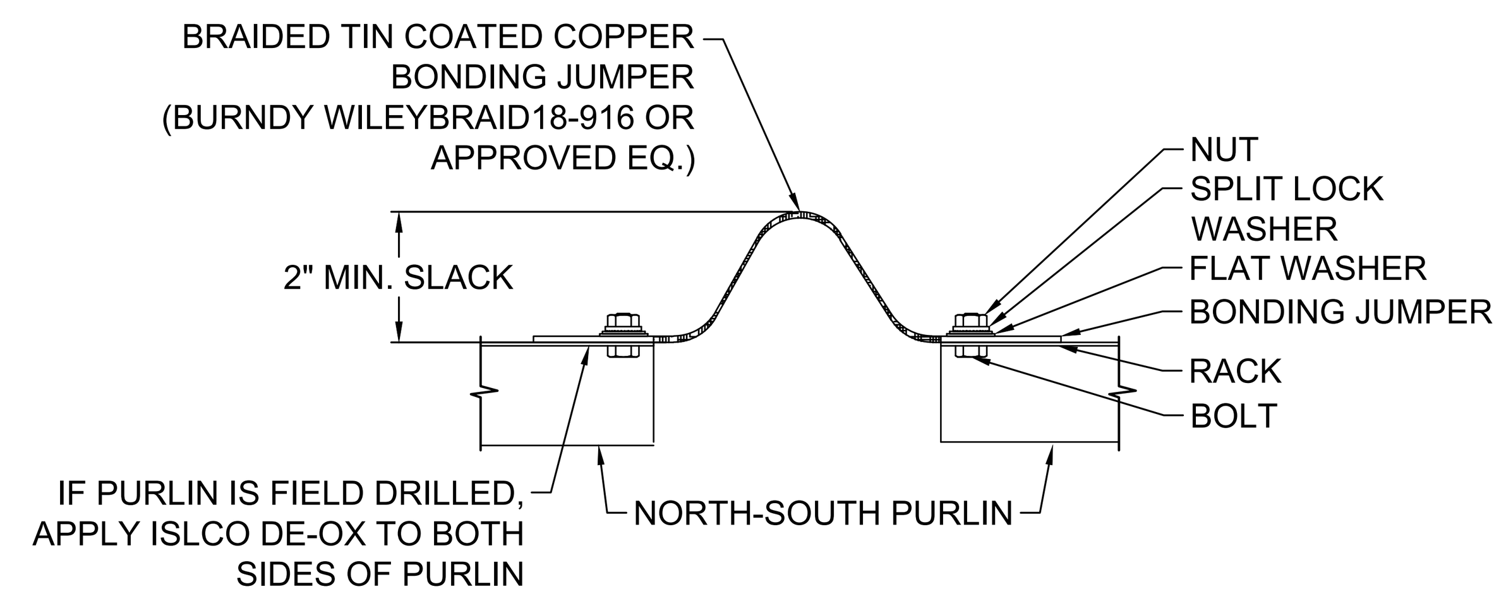
GENERAL GROUNDING

E-601



NOTE:
BONDING JUMPER TO BE INSTALLED BETWEEN EVERY RACKING SECTION ON BOTTOM PURLIN IF RACK IS NOT CONTINUOUS. SEE RACKING MANUAL FOR ADDITIONAL DETAILS.

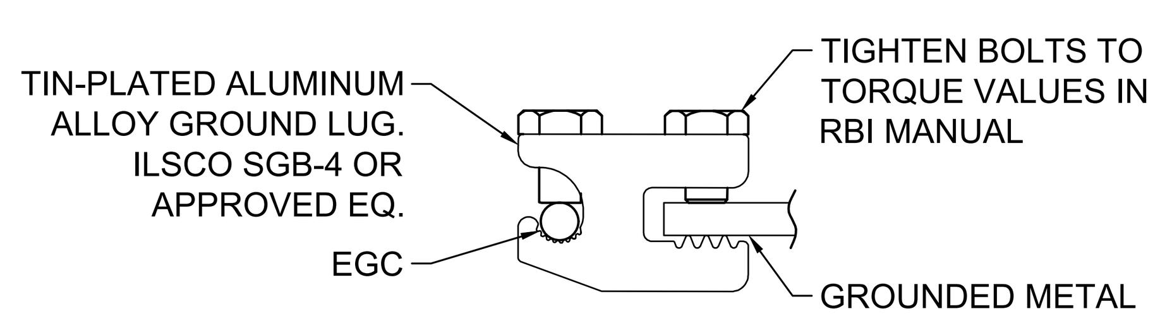
1 E-602 RACK GROUNDING
SCALE: NTS



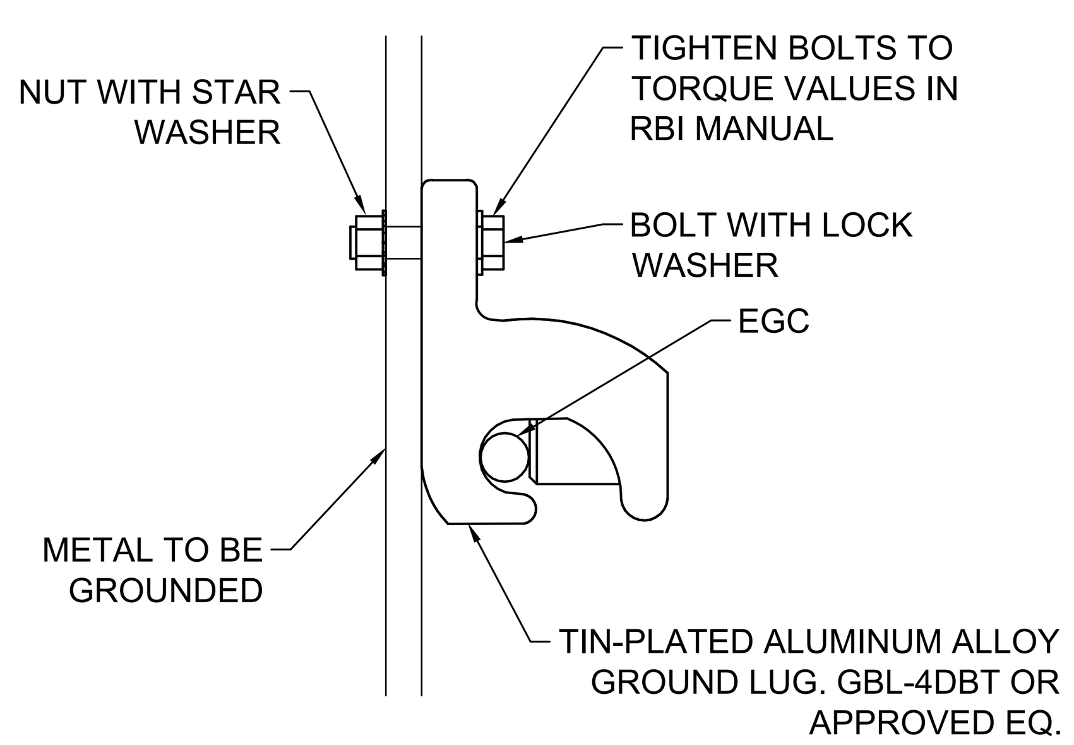
2 E-602 RACKING PURLIN GROUNDING OPTION
SCALE: NTS

NOTES
1. ALL HARDWARE SHALL BE STAINLESS STEEL.
2. ALL GROUNDING LUGS AND BRAIDS MUST BE LISTED TO UL2703. SEE RACKING MANUAL FOR ADDITIONAL DETAILS.
3. EGC SHALL BE #6 BARE SOLID CU, UON.
4. SHALL BE USED FOR EXTERIOR BONDING TO RACKING.
5. ILSCO DE-OX (OR APPROVED EQ) APPLIED TO BOTH SIDES PRIOR TO LUG AND HARDWARE INSTALLATION.

GENERAL GROUNDING NOTES
1. GROUNDING BUSHINGS SHALL BE USED ON CONDUIT TERMINATIONS IN CABINET, BOX, OR AUXILIARY GUTTER AND SHALL BE SUITABLE FOR BONDING TO GROUND IN ACCORDANCE WITH NEC 250.92.
2. METALLIC CONDUITS, ENCLOSURES, AND CONNECTORS SHALL BE INSTALLED SO THAT THE CONDUIT BONDING PATH INTEGRITY IS MAINTAINED.
3. RACKING GROUNDING AND BONDING SHALL BE INSTALLED BY E.C.

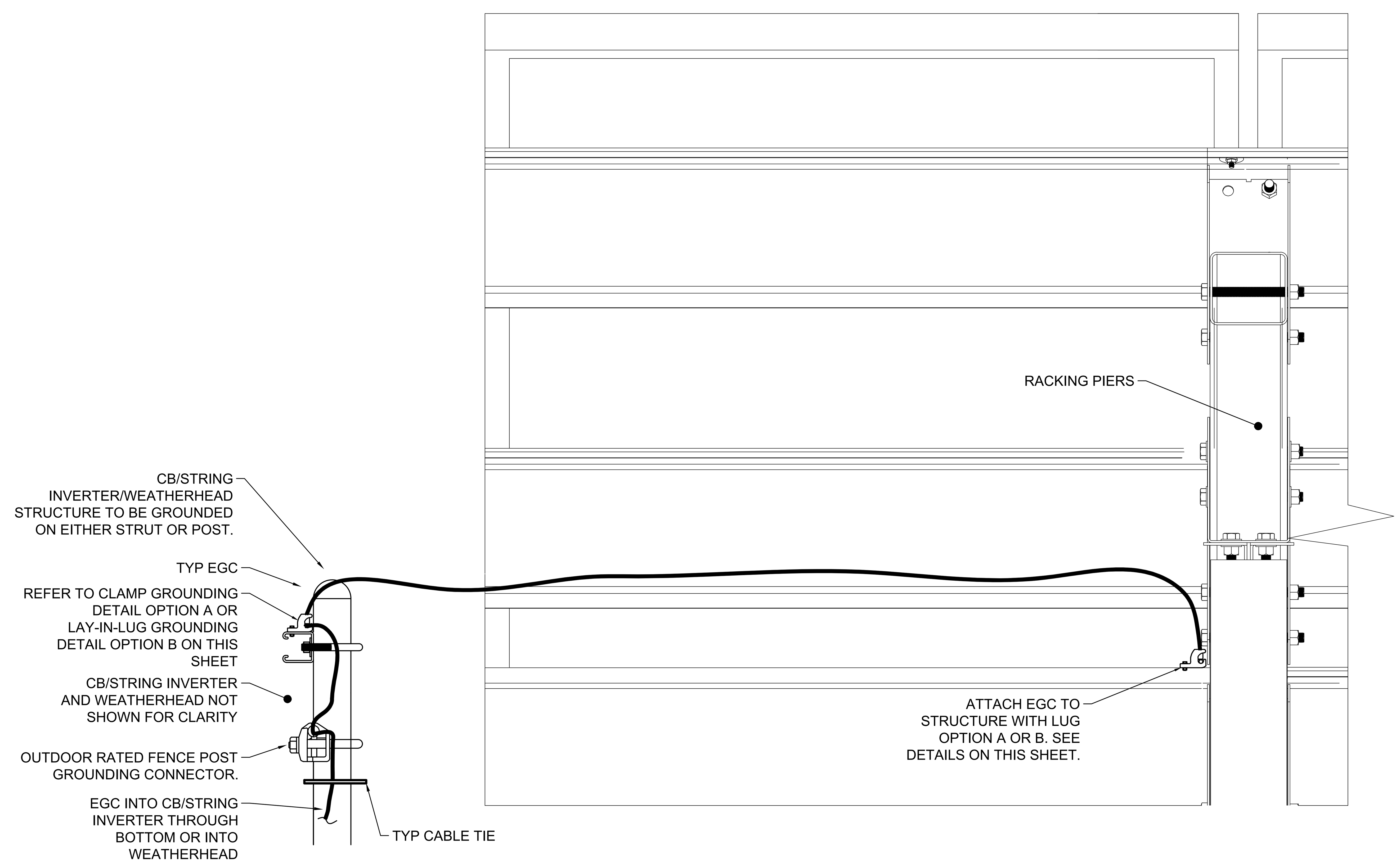


3A E-602 CLAMP GROUNDING DETAIL OPTION A
SCALE: NTS



3B E-602 LAY-IN-LUG GROUNDING DETAIL OPTION B
SCALE: NTS

NOTES
1. ALL HARDWARE SHALL BE STAINLESS STEEL.
2. EGC SHALL BE #6 BARE SOLID CU, UON.
3. SHALL BE USED FOR EXTERIOR BONDING TO RACKING.
4. ILSCO DE-OX (OR APPROVED EQ) APPLIED TO BOTH SIDES PRIOR TO LUG AND HARDWARE INSTALLATION.



4 E-602 CB/STRING INVERTER/WEATHERHEAD STRUCTURE GROUNDING
SCALE: NTS

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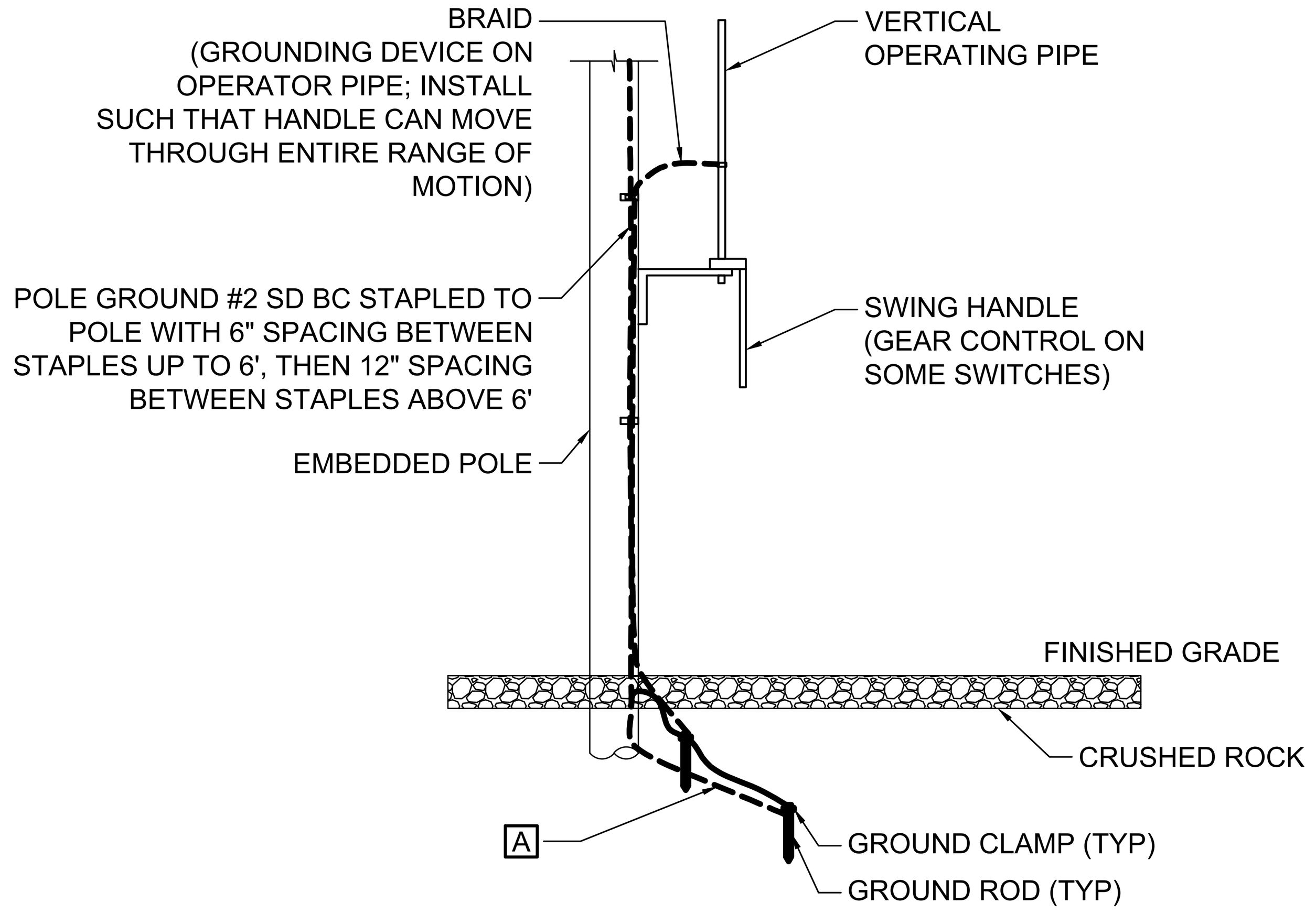
STRUCTURE GROUNDING

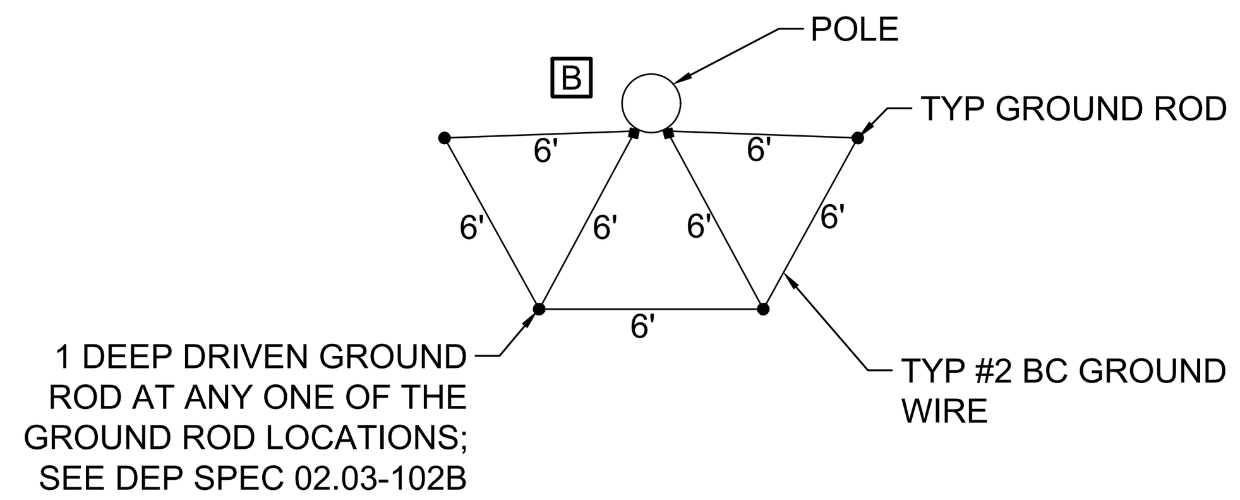
E-602



AC DISCONNECT POLE GROUNDING DETAIL KEYED NOTES

A. SEE DEP SPEC 02.03-102B DRAWING FOR INSTALLATION DETAILS.
B. SEE DEP SPEC 08.10-37 FMO DRAWING FRONT VIEW.

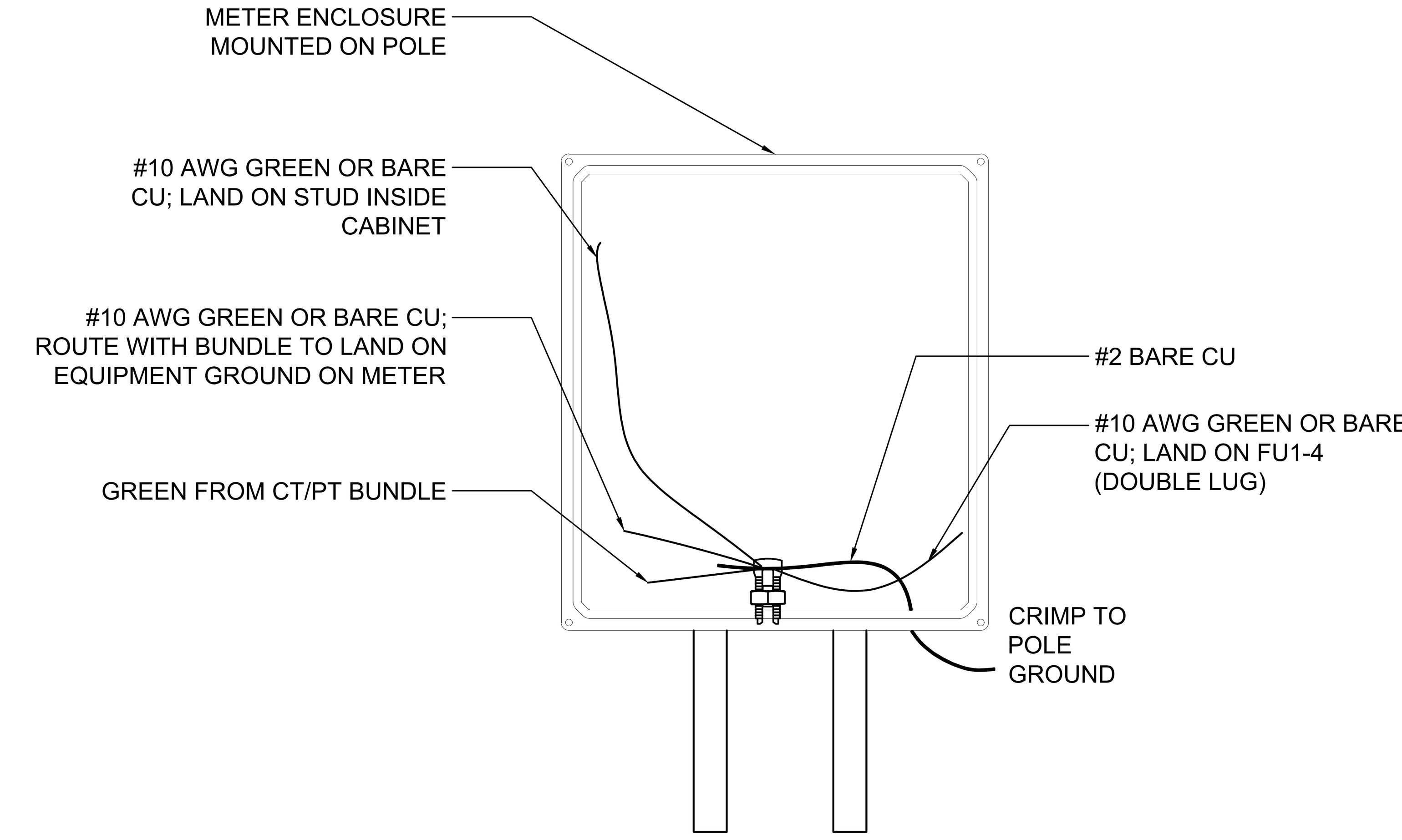
1 E-603 GOAB POLE GROUNDING DETAIL
SCALE: NTS



FENCE AND POI GROUND NOTES:

1. SEE POLE PLANS FOR ADDITIONAL POI GROUNDING DETAILS
2. ALL POLE GROUNDS TO BE #2 SC BC UON.
3. ALL MATERIALS SHALL BE COPPER OR BIMETALLIC TO RESIST GALVANIC CORROSION.

2 E-603 GROUND GRID PLAN VIEW
SCALE: NTS



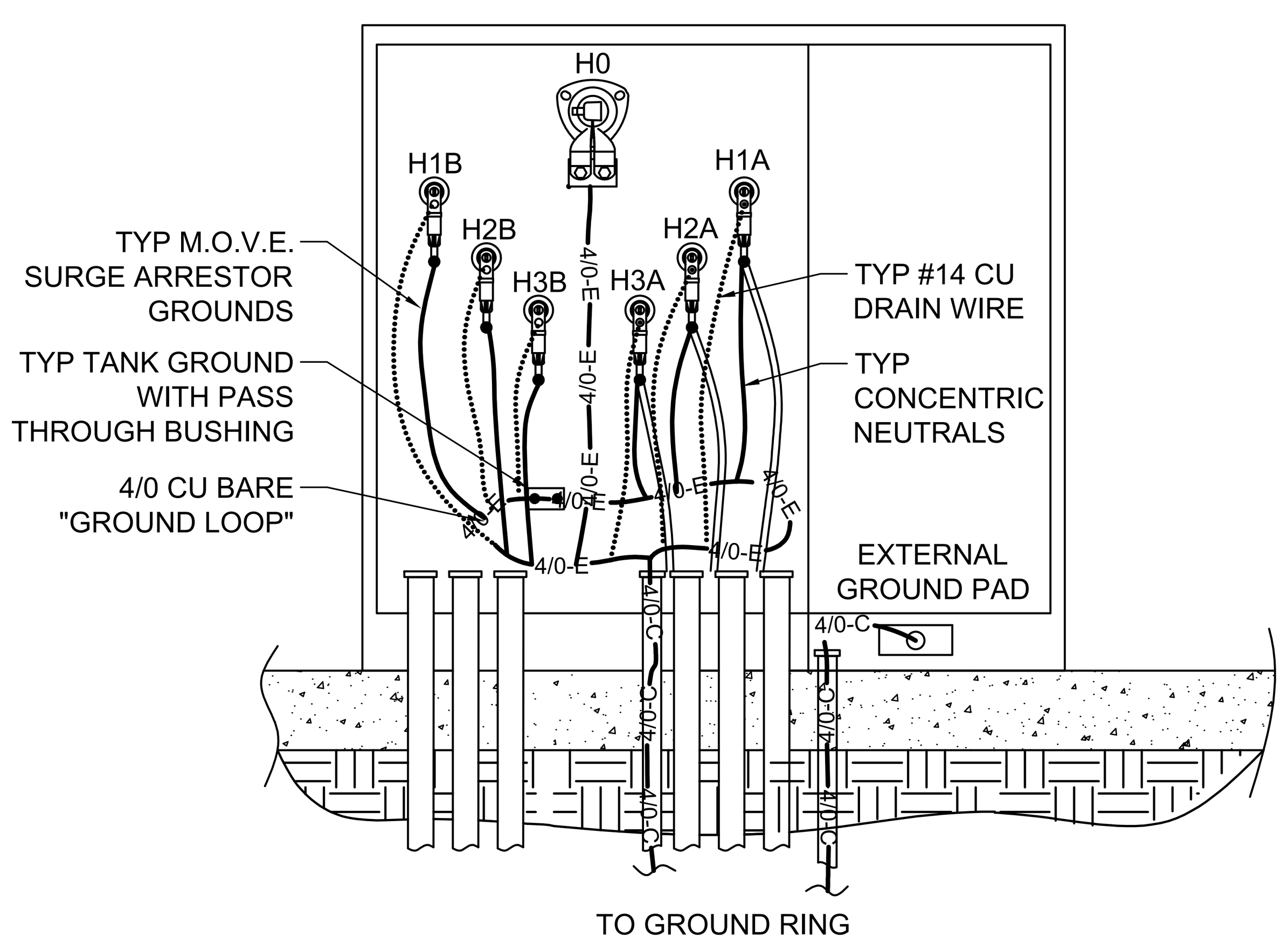
POI METER BOX GROUND NOTES:

1. CONTRACTOR TO PROVIDE KNOCK-OUT AND PROVISIONS FOR PROPERLY SEALING WHERE #2 BARE CU JUMPER TO POLE GROUND ENTERS ENCLOSURE.
2. CONTRACTOR TO PROVIDE SPLIT-BOLT AND #10 AWG BONDING JUMPERS INSIDE ENCLOSURE.
3. CONTRACTOR TO OPEN VT & CT J-BOXES TO VERIFY WIRE COLOR CODES.
4. IF ONE COMMON RETURN IS BROUGHT DOWN TO METER ENCLOSURE FROM CT'S, ADDITIONAL TERMINAL BLOCK WITH JUMPERS IS REQUIRED.

3 E-603 POI METER GROUNDING
SCALE: NTS

POI GROUND NOTES:

1. SEE E-711 FOR ADDITIONAL POI GROUNDING DETAILS
2. ALL MATERIALS SHALL BE COPPER OR BIMETALLIC TO RESIST GALVANIC CORROSION.



4 E-603 MV TRANSFORMER GROUNDING
SCALE: NTS

NOTE: SEE E-601 FOR WIRE LEGEND

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E-601-602-603-604 GROUNDING.DWG

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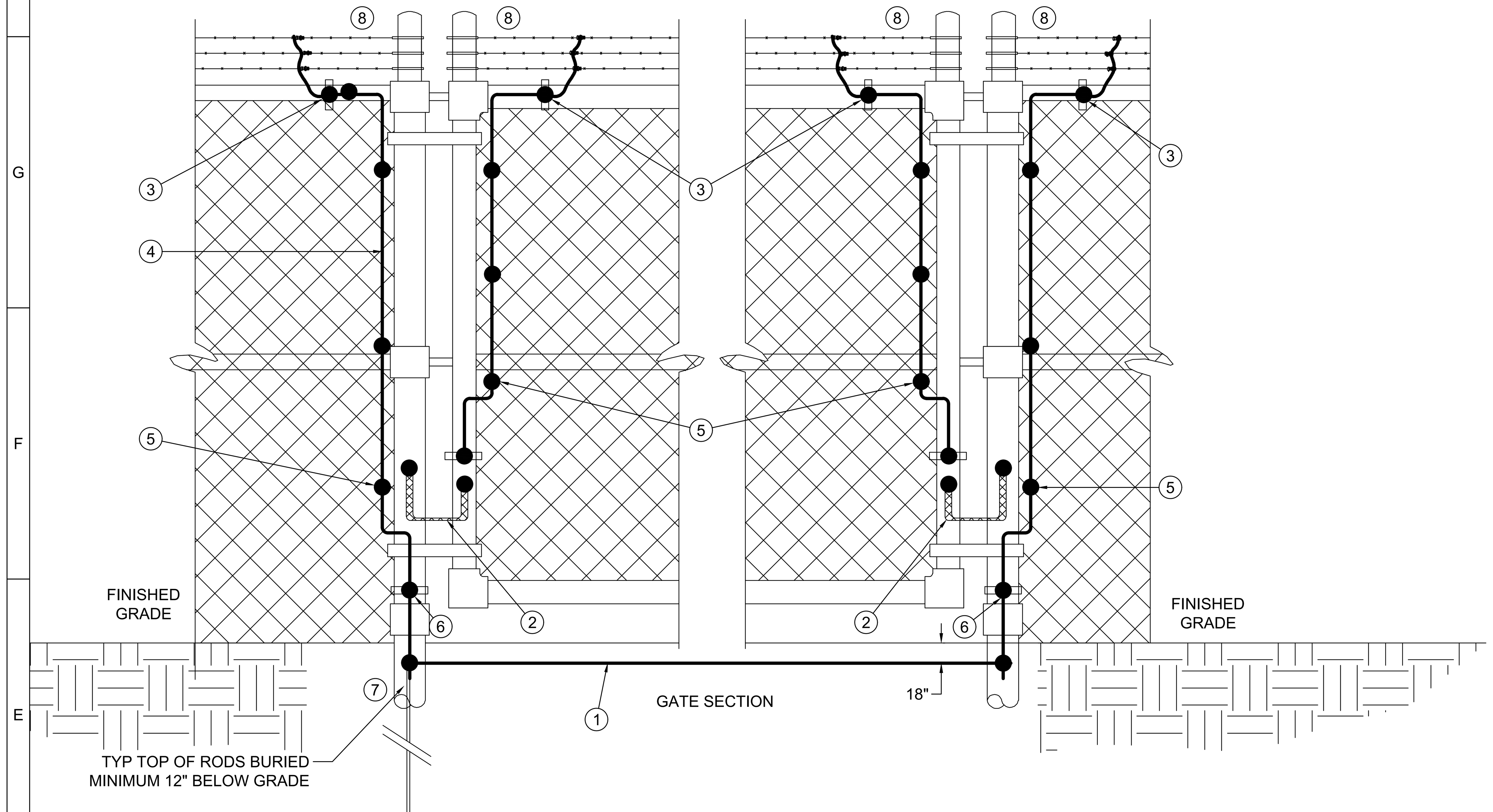
MV EQUIPMENT GROUNDING

E-603



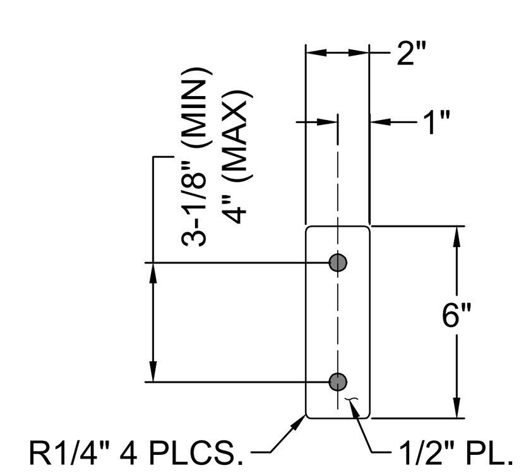
1 E-604 GATE GROUNDING
SCALE: NTS

GENERAL NOTES

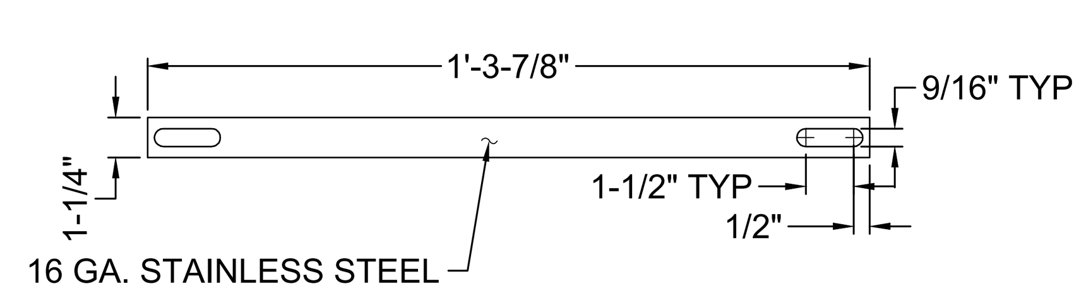
1. IF BARBED WIRE STRANDS ARE USED ABOVE THE FENCE FABRIC, THE BARBED WIRE STRANDS SHALL BE BONDED TO THE GROUNDING CONDUCTOR, JUMPER OR FENCE.
2. EXPOSED FENCE GEC'S AND CLAMPS SHALL BE INSTALLED WITHIN FENCE PERIMETER.
3. FENCES SHALL BE GROUNDED AT EACH SIDE OF A GATE OR OPENING. GROUND ALL GATE POSTS.
4. RODS AND GEC SHALL BE BURIED 24" OUTSIDE FENCE PERIMETER.

KEYED NOTES

1. GATE POSTS AND GROUND RODS SHALL BE BONDED TOGETHER WITH #2 BARE COPPER. FOR SECTIONS UNDER TRANSMISSION LINES, #2 SOLID TIN-PLATED COPPER SHALL BE USED. UNDERGROUND COPPER SHALL BE INSTALLED APPROXIMATELY 18" OUTSIDE OF FENCE.
2. FLEXIBLE GROUND WITH COMPRESSION LUGS TO PIPE CLAMPS, FENCE GATE ASSEMBLY AS MANUFACTURED BY HARGER, OR EQUAL. BRAID WITH COMPATIBLE PIPE CLAMPS BY BURNDY ALSO ACCEPTABLE.
3. PROVIDE POST CLAMP TO TOP RAIL.
4. ABOVE-GROUND MESH AND BARBED WIRE SHALL BE BONDED WITH #6 BARE SOLID COPPER MINIMUM. FOR SECTIONS UNDER TRANSMISSION LINES, #2 SOLID TIN-PLATED COPPER SHALL BE USED.
5. PROVIDE FENCE FABRIC GROUNDING CLAMPS SUCH AS MODEL "FGC" AS MANUFACTURED BY HARGER, OR EQUAL.
6. PROVIDE FENCE POST CLAMP BY ERICO, HARGER FGC6 OR FGC2 DEPENDING ON WIRE SIZE, OR EQUAL.
7. GROUND ROD BONDED TO BARE COPPER WITH EXOTHERMIC WELD OR IRREVERSIBLE CRIMP STYLE.
8. PROVIDE BRONZE SPLIT BOLT CONNECTIONS TO BARBED WIRE.



2 E-604 SPLICE PL. DETAIL
SCALE: NTS



3 E-604 STRAP PL. DETAIL
SCALE: NTS

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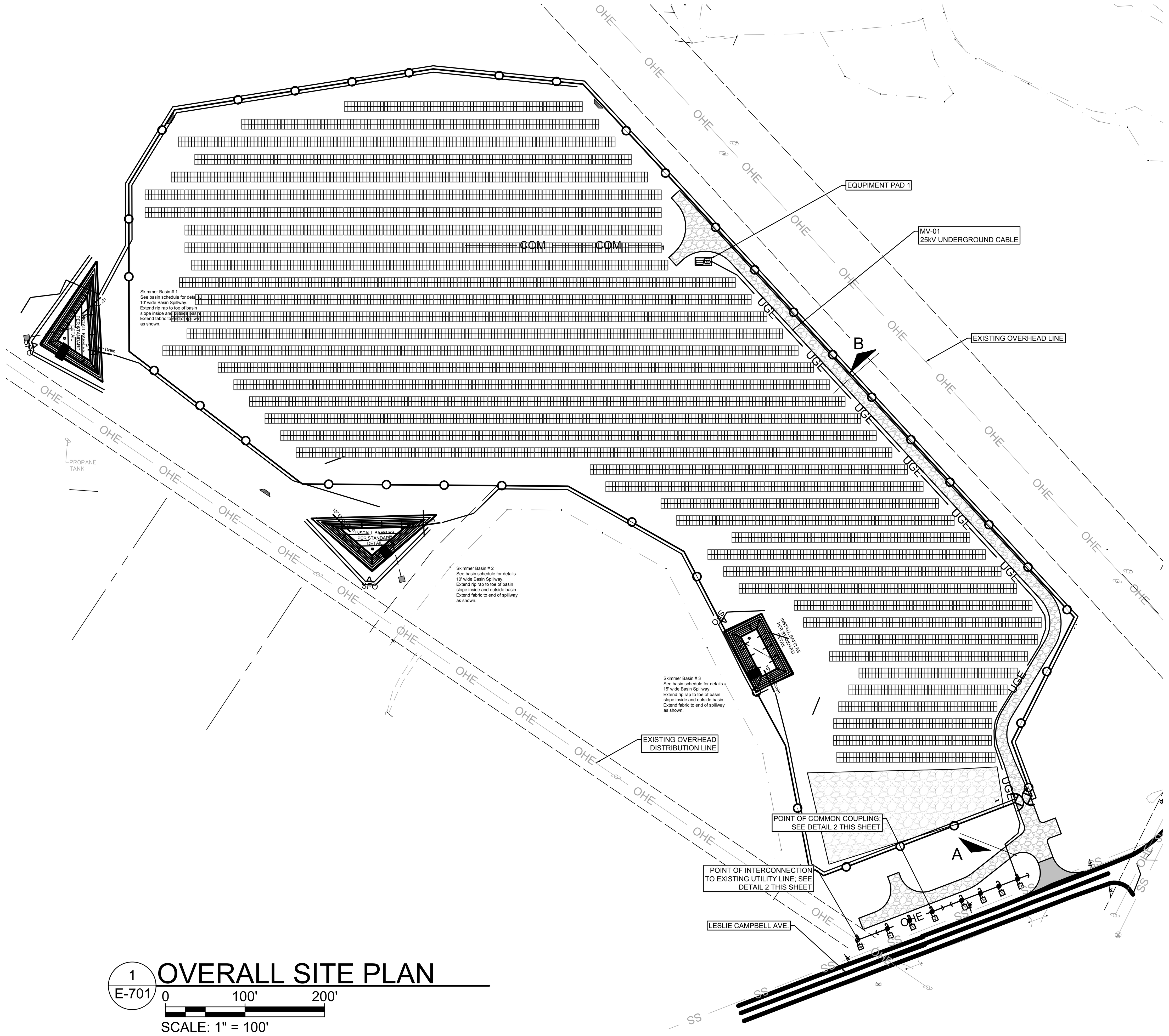
FENCE GROUNDING

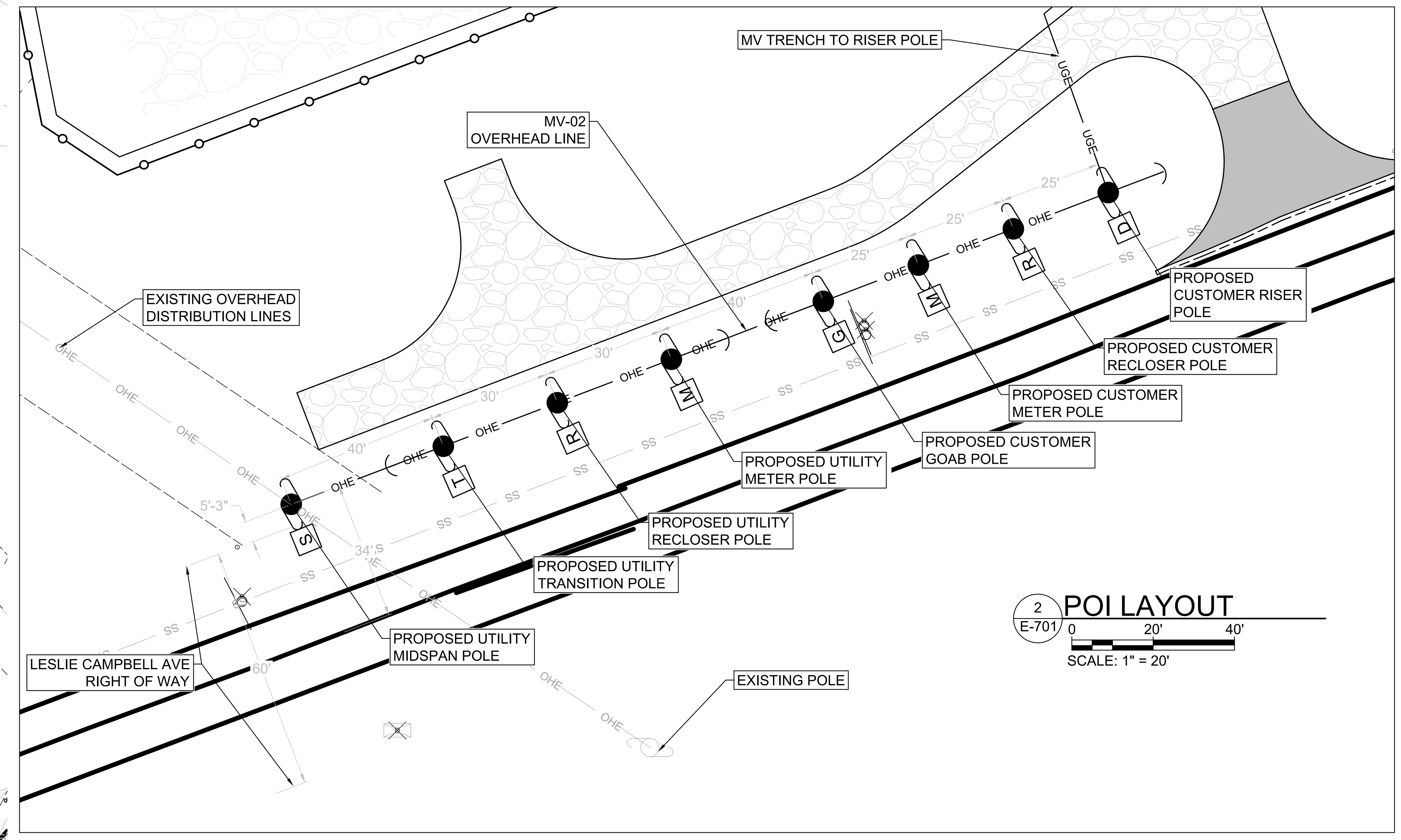
E-604



1 E-701 OVERALL SITE PLAN

0 100' 200'

SCALE: 1" = 100'



2 E-701 POI LAYOUT

0 20' 40'

SCALE: 1" = 20'

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E-701 MV SITE PLAN.DWG

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CHECKED BY:	KL

MV SITE PLAN

E-701

COMBINER BOX LABELING (1 / E-801)
SCALE: NTS

DC COMBINER BOX X-X (6" × $1\frac{1}{2}$", $\frac{3}{8}$" TYP)

NOTES:
1. BLACK BACKGROUND WITH WHITE TEXT.
2. REPLACE "X" WITH APPROPRIATE NUMBERS.
3. APPLY TO COMBINER BOXES.

⚠ WARNING (4" × $3\frac{1}{4}$", $\frac{3}{8}$" TYP, $\frac{1}{8}$" TYP)

ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT
WHEN SOLAR MODULES ARE
EXPOSED TO SUNLIGHT

PHOTOVOLTAIC DC DISCONNECT (5" × $1\frac{1}{2}$", $\frac{3}{16}$" TYP, $\frac{1}{8}$" TYP)

MAXIMUM CIRCUIT CURRENT: XXX.XX A
MAXIMUM SYSTEM VOLTAGE: XXX.XX V

NOTES:
1. RED BACKGROUND WITH WHITE TEXT.
2. REPLACE "X" WITH APPROPRIATE NUMBERS FROM DC CONDUCTOR SCHEDULE ON SHEET E-221.
3. APPLY ADJACENT TO DC DISCONNECTING MEANS.

INVERTER LABELING (2 / E-801)
SCALE: NTS

PHOTOVOLTAIC DC DISCONNECT (5" × $1\frac{1}{2}$", $\frac{3}{16}$" TYP, $\frac{1}{8}$" TYP)

MAXIMUM CIRCUIT CURRENT: XXX.XX A
MAXIMUM SYSTEM VOLTAGE: XXX.XX V

NOTES:
1. RED BACKGROUND WITH WHITE TEXT.
2. REPLACE "X" WITH APPROPRIATE NUMBERS FROM DC CONDUCTOR SCHEDULE ON SHEET E-221.
3. APPLY ADJACENT TO DC DISCONNECTING MEANS.

PHOTOVOLTAIC AC DISCONNECT (5" × $1\frac{1}{2}$", $\frac{3}{16}$" TYP, $\frac{1}{8}$" TYP)

MAXIMUM AC OPERATING CURRENT: XXX.XX A
NOMINAL OPERATING AC VOLTAGE: XXXXX V

NOTES:
1. RED BACKGROUND WITH WHITE TEXT.
2. REPLACE "X" WITH APPROPRIATE NUMBERS FROM INVERTER DATA TABLE ON SHEET E-211.
3. APPLY ADJACENT TO AC DISCONNECTING MEANS.

⚠ WARNING (4" × $2\frac{1}{4}$", $\frac{3}{8}$" TYP, $\frac{1}{8}$" TYP)

ELECTRICAL SHOCK HAZARD
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

NOTES:
1. ORANGE & WHITE BACKGROUND WITH BLACK TEXT.
2. APPLY ADJACENT TO INVERTER AC DISCONNECTING MEANS.

⚠ WARNING (4" × $3\frac{3}{16}$", $\frac{3}{8}$" TYP, $\frac{1}{8}$" TYP)

ELECTRICAL SHOCK HAZARD
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT
WHEN SOLAR MODULES ARE
EXPOSED TO SUNLIGHT

NOTES:
1. ORANGE & WHITE BACKGROUND WITH BLACK TEXT.
2. APPLY TO ALL PV DC DISCONNECTING MEANS.

⚠ WARNING (4" × $2\frac{1}{4}$", $\frac{3}{8}$" TYP, $\frac{3}{16}$" TYP)

TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

NOTES:
1. ORANGE & WHITE BACKGROUND WITH BLACK TEXT.
2. APPLY TO INVERTER.

TRANSFORMER LABELS (3 / E-801)
SCALE: NTS

TRANSFORMER X-X-X (6" × $1\frac{1}{2}$", $\frac{3}{8}$" TYP)

NOTES:
1. BLACK BACKGROUND WITH WHITE TEXT.
2. REPLACE "X" WITH APPROPRIATE NUMBERS.
3. APPLY TO TRANSFORMER DOORS.

METERING AND MONITORING LABELS (4 / E-801)
SCALE: NTS

PHOTOVOLTAIC SYSTEM GENERATION CUSTOMER METER (6" × $1\frac{1}{2}$", $\frac{1}{4}$" TYP)

NOTES:
1. BLACK BACKGROUND WITH WHITE TEXT.
2. APPLY TO METER CABINET AT POI.

MONITORING SYSTEM (6" × $1\frac{1}{2}$", $\frac{3}{8}$" TYP)

NOTES:
1. BLACK BACKGROUND WITH WHITE TEXT.
2. APPLY TO EACH MONITORING CABINET.

GOAB SWITCH POLE LABELS (5 / E-801)
SCALE: NTS

PHOTOVOLTAIC AC DISCONNECT (5" × $1\frac{1}{2}$", $\frac{3}{16}$" TYP, $\frac{1}{8}$" TYP)

MAXIMUM AC OPERATING CURRENT: XXX.XX A
NOMINAL OPERATING AC VOLTAGE: XXXXX V

NOTES:
1. RED BACKGROUND WITH WHITE TEXT.
2. APPLY ADJACENT TO AC DISCONNECTING MEANS.

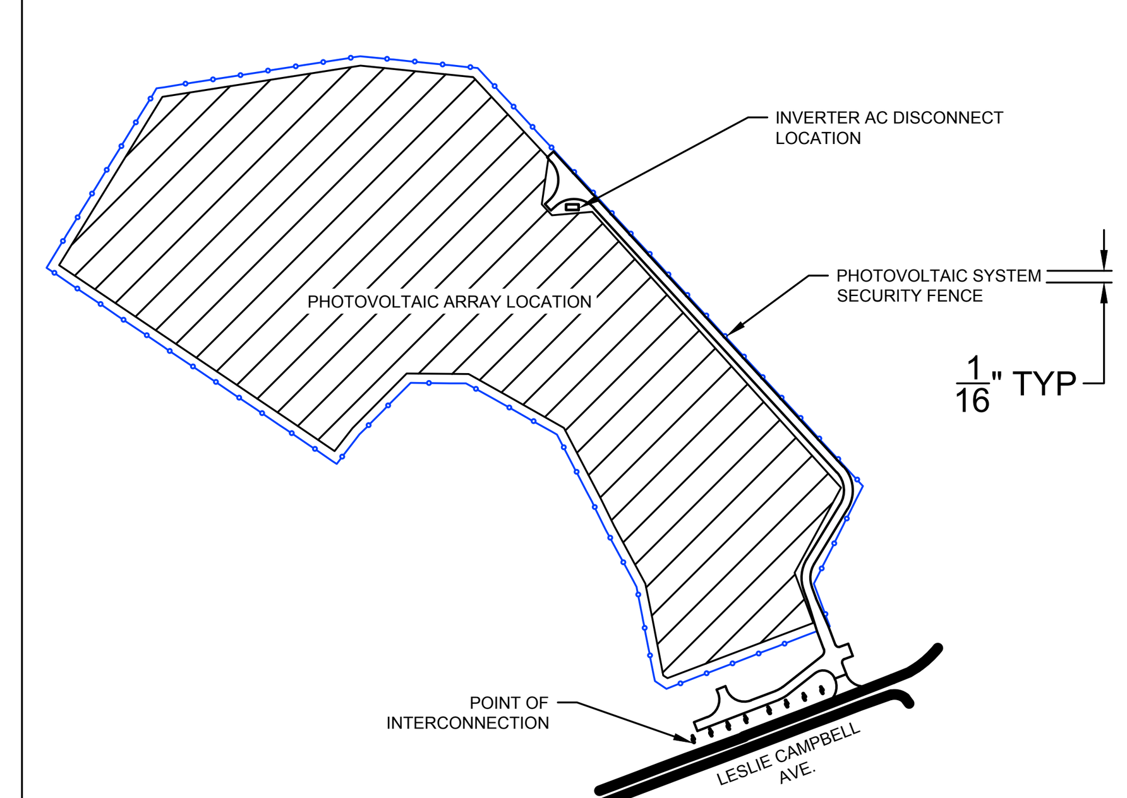
MAIN PHOTOVOLTAIC SYSTEM AC DISCONNECT ($7\frac{1}{2}$" × $1\frac{1}{2}$", $\frac{3}{8}$" TYP)

NOTES:
1. RED BACKGROUND WITH WHITE TEXT.
2. MUST BE REFLECTIVE AND MADE OF DURABLE, UNALTERABLE MATERIAL FOR PERMANENT ATTACHMENT.

DIRECTORY MAP (6 / E-801)
SCALE: NTS

⚠ CAUTION ⚠ (6" × 6", $\frac{3}{8}$", $\frac{1}{8}$" TYP)

LOCATIONS OF SERVICE AND
PHOTOVOLTAIC & BATTERY SYSTEM
DISCONNECTING MEANS



NOTES:
1. ORANGE & WHITE BACKGROUND WITH BLACK TEXT.
2. MUST BE MADE OF DURABLE, UNALTERABLE MATERIAL.
3. PERMANENTLY ATTACH TO BASE OF PV SYSTEM GOAB SWITCH POLE AND PROJECT FENCE GATE(S).

Pure Power Contractors Inc.
2812 GRAY FOX RD, MONROE NC 28110

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039678 KEVIN LEARY 03/18/2020
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AVOCA ENGINEERS, PLLC
NC FIRM LICENSE: P-1577
242 OLD NEW BRUNSWICK ROAD PISCATAWAY NJ 08854
PHONE (732) 465-1002 FAX (732) 465-1005

REVISIONS

NO.	DATE	DESCRIPTION
0	03/18/20	ISSUED FOR PERMIT - REV. MODULES AND LAYOUT

PROJECT: 20-PP-044

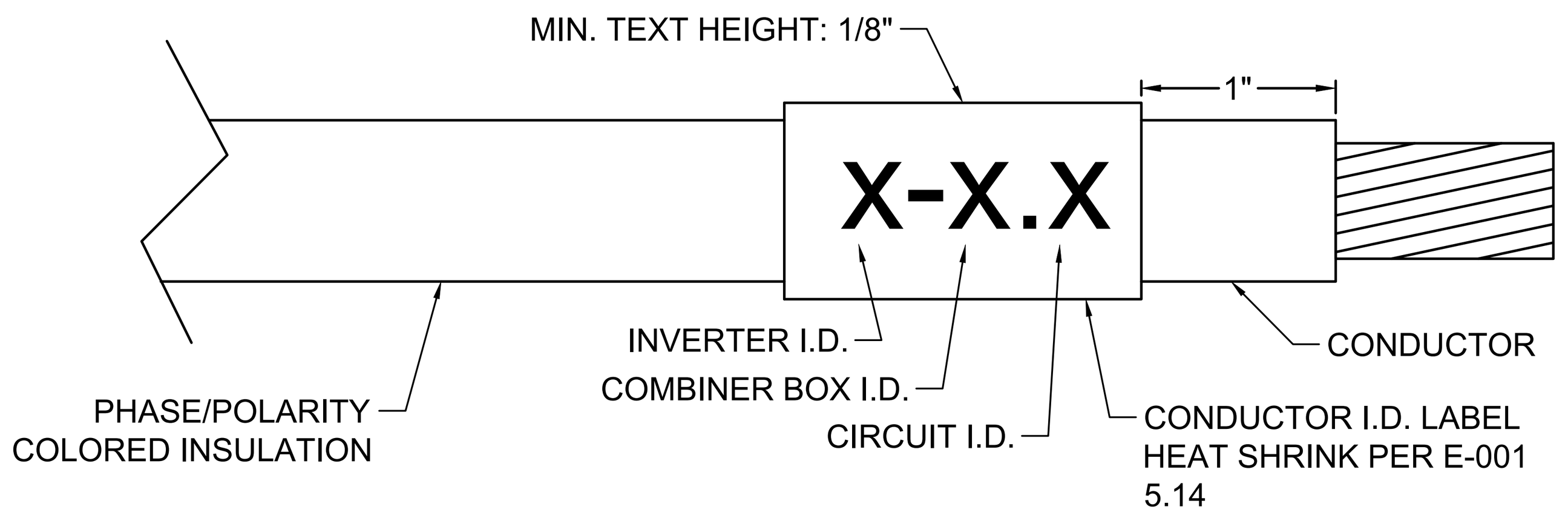
ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
DRAWN BY:	EG
CHECKED BY:	KL

LABELS AND SIGNAGE

E-801

0	1	2	3	4	5	6	7	8	9	10



TO BE PROVIDED BY E.C.

DC INPUT CIRCUITS AT THE STRING COMBINER BOXES
TYP RANGE: 1-3.1-9.1-12 (INV.CB.CIRC)
EXAMPLE: 2.4.10

DC FEEDERS FROM COMBINER BOXES
TYP RANGE: 1-3.1-9 (INV.CB)
EXAMPLE: 2.6

AC FEEDERS BETWEEN INVERTER AND TRANSFORMER
TYP RANGE: 1-3 (INV)
EXAMPLE: 2

1 / E-811 TYP WIRING LABELING
SCALE: NTS

6" × 4½"

WARNING

ARC FLASH AND SHOCK HAZARD PRESENT
APPROPRIATE PPE REQUIRED

ARC FLASH BOUNDARY	XX FT
INCIDENT ENERGY IN CAL/CM^2	XX
WORKING DISTANCE	XX IN
SHOCK HAZARD EXPOSURE	XXX VAC
INSULATING GLOVES CLASS	XX
SHOCK HAZARD **WHEN COVERS REMOVED**	
LIMITED APPROACH BOUNDARDY	XX FT XX IN
RESTRICTED APPROACH BOUNDARY	XX FT XX IN
EQUIPMENT LOCATION	TBD
DATE OF STUDY	XX-XX-XXXX
NOTES: TBD	

NOTES:
1. ORANGE & WHITE BACKGROUND WITH BLACK TEXT.
2. APPLY ADJACENT TO ALL DOOR OPENING HANDLES AND DISCONNECTING MEANS.
3. SEE FAULT STUDY FOR ALL VALUES AND EQUIPMENT LOCATION.

6" × 4½"

DANGER

ARC FLASH AND SHOCK HAZARD PRESENT
APPROPRIATE PPE REQUIRED

ARC FLASH BOUNDARY	XX FT
INCIDENT ENERGY IN CAL/CM^2	XX
WORKING DISTANCE	XX IN
SHOCK HAZARD EXPOSURE	XXX VAC
INSULATING GLOVES CLASS	XX
SHOCK HAZARD **WHEN COVERS REMOVED**	
LIMITED APPROACH BOUNDARDY	XX FT XX IN
RESTRICTED APPROACH BOUNDARY	XX FT XX IN
EQUIPMENT LOCATION	TBD
DATE OF STUDY	XX-XX-XXXX
NOTES: TBD	

NOTES:
1. RED & WHITE BACKGROUND WITH BLACK TEXT.
2. APPLY ADJACENT TO ALL DOOR OPENING HANDLES AND DISCONNECTING MEANS.
3. SEE FAULT STUDY FOR ALL VALUES AND EQUIPMENT LOCATION.

2 / E-811 TYP ARC FLASH LABELS
SCALE: NTS

Pure Power Contractors Inc.
2812 GRAY FOX RD, MONROE NC 28110

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039078
03/18/2020
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PHONE (732) 465-1002 FAX (732) 465-1005

REVISIONS

NO.	DATE	DESCRIPTION
0	03/18/20	ISSUED FOR PERMIT - REV. MODULES AND LAYOUT

PLT STAMP: NCALVACHI 3/18/2020 7:34 PM E-801-811 SIGNAGE.DWG

PROJECT: 20-PP-044

ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
DRAWN BY:	EG
CHECKED BY:	KL

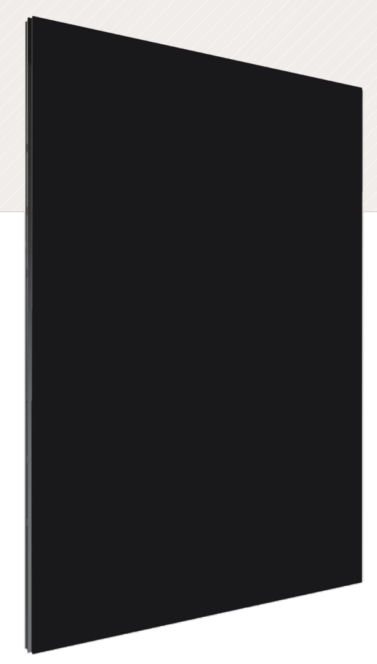
GENERAL SIGNAGE

E-811

First Solar Series 6™

NEXT GENERATION THIN FILM SOLAR TECHNOLOGY

MODULE DATASHEET



420-450 Watts
17%+ Efficiency

HIGH-POWER PV MODULES

First Solar Series 6™ photovoltaic (PV) module sets a new industry benchmark for reliable energy production, optimized design and environmental performance. Series 6 modules are optimized for every stage of your application, significantly reducing balance of system, shipping, and operating costs.

MORE ENERGY PER MODULE

- More watts per connection and per lift (420+ watts) than 72-cell silicon modules
- With superior temperature coefficient, spectral response and shading behavior, Series 6 modules generate up to 8% more energy per watt than conventional crystalline silicon solar modules
- Anti-reflective coated glass enhances energy production

INNOVATIVE MODULE DESIGN

- Under-mount frame allows for simple and fast installation
- SpeedSlots™ combine the robustness of bottom mounting with the speed of top clamping while utilizing fewer fasteners
- Dual junction box optimizes module-to-module connections
- Under-mount frame provides the cleaning and snow-shedding benefits of a frameless module, protects edges against breakage and enables horizontal stacking

PROVEN LONG-TERM RELIABILITY

- Manufactured using methods and process adapted from Series 4 modules – the most tested solar modules in the industry
- Independently tested and certified for reliable performance that exceeds IEC standards in high temperature, high humidity, extreme desert and coastal applications

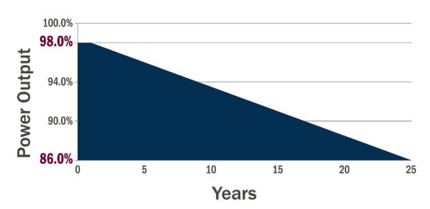
BEST ENVIRONMENTAL PROFILE

- Fastest energy payback time and smallest carbon and water footprint in the industry
- Global PV collection and recycling services available through First Solar or customer-selected third-party

INDUSTRY-LEADING MODULE WARRANTY[1]

98% WARRANTY START POINT

0.5% WARRANTED ANNUAL DEGRADATION RATE



- 25-Year Linear Performance Warranty
- 10-Year Limited Product Warranty

FIRST SOLAR SERIES 6™

MODEL TYPES AND RATINGS AT STANDARD TEST CONDITIONS (1000W/m², AM 1.5, 25°C)[2]								
NOMINAL VALUES		FS-6420 FS-6420A	FS-6425 FS-6425A	FS-6430 FS-6430A	FS-6435 FS-6435A	FS-6440 FS-6440A	FS-6445 FS-6445A	FS-6450 FS-6450A
Nominal Power[3] (-0/+5%)	P_{MAX} (W)	420.0	425.0	430.0	435.0	440.0	445.0	450.0
Efficiency (%)	%	17.0	17.2	17.4	17.6	17.8	18.0	18.2
Voltage at P_{MAX}	V_{MAX} (V)	180.4	181.5	182.6	183.6	184.7	185.7	186.8
Current at P_{MAX}	I_{MAX} (A)	2.33	2.34	2.36	2.37	2.38	2.40	2.41
Open Circuit Voltage	V_{OC} (V)	218.5	218.9	219.2	219.6	220.0	220.4	221.1
Short Circuit Current	I_{SC} (A)	2.54	2.54	2.54	2.55	2.55	2.56	2.57
Maximum System Voltage	V_{SYS} (V)	1500[5]						
Limiting Reverse Current	I_R (A)	5.0						
Maximum Series Fuse	I_{CF} (A)	5.0						
RATINGS AT NOMINAL OPERATING CELL TEMPERATURE OF 45°C (800W/m², 20°C air temperature, AM 1.5, 1m/s wind speed)[2]								
Nominal Power	P_{MAX} (W)	317.2	320.9	324.7	328.5	332.4	336.0	339.9
Voltage at P_{MAX}	V_{MAX} (V)	168.7	169.8	170.9	172.0	173.1	174.1	175.2
Current at P_{MAX}	I_{MAX} (A)	1.88	1.89	1.90	1.91	1.92	1.93	1.94
Open Circuit Voltage	V_{OC} (V)	206.3	206.6	207.0	207.3	207.7	208.0	208.8
Short Circuit Current	I_{SC} (A)	2.04	2.05	2.05	2.06	2.06	2.06	2.07

TEMPERATURE CHARACTERISTICS		
Module Operating Temperature Range	(°C)	-40 to +85
Temperature Coefficient of P_{MAX}	T_K (P_{MAX})	-0.32%/°C [Temperature Range: 25°C to 75°C]
Temperature Coefficient of V_{OC}	T_K (V_{OC})	-0.28%/°C
Temperature Coefficient of I_{SC}	T_K (I_{SC})	+0.04%/°C

MECHANICAL DESCRIPTION	
Length	2009mm
Width	1232mm
Thickness	49mm
Area	2.47m²
Module Weight	36kg
Leadwire[6]	2.5mm², 720mm (+) & Bulkhead (-)
Connectors	MC4-EVO 2 or alternate
Bypass Diode	N/A
Cell Type	Thin film CdTe semiconductor, up to 264 cells
Frame Material	Anodized Aluminum
Front Glass	2.8mm heat strengthened Series 6A™ includes anti-reflective coating
Back Glass	2.2mm heat strengthened
Encapsulation	Laminate material with edge seal
Frame to Glass Adhesive	Silicone
Load Rating[7]	2400Pa

PACKAGING INFORMATION			
Modules Per Pallet	27	Pallet Dimensions (L x W x H)	2200 x 1300 x 1164mm (86 x 51 x 45.8in)
Pallet Weight	1072kg	Pallets per 40' Container	18

CERTIFICATIONS AND TESTS

IEC
61215:2016 & 61730-1:2016[5], CE
61701 Salt Mist Corrosion
60068-2-68 Dust and Sand Resistance

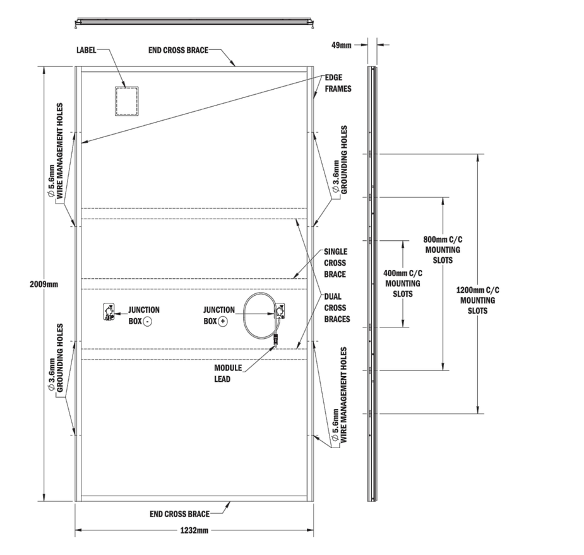
UL
UL 1703 Listed[5]

REGIONAL CERTIFICATIONS
MCS, SII, InMetro[4], FSEC, BIS[4], MyHijau

EXTENDED DURABILITY TESTS
ANSI/CAN/CSA-C450-18
Long-Term Sequential
Thresher Test
PID Resistant

QUALITY & EHS
ISO 9001:2015
ISO 14001:2015
ISO 45001:2018

MECHANICAL DRAWING



Install in portrait only

1. Limited power output and product warranties subject to warranty terms and conditions
2. All ratings ±10%, unless specified otherwise. Specifications are subject to change
3. Measurement uncertainty applies
4. Testing Certifications/Listings pending
5. IEC 61730-1: 2016 Class II | ULC 1703 1000V listed
6. Leadwire length from junction box exit to connector mating surface
7. Higher load ratings can be met with additional support, subject to testing

Disclaimer
The information included in this Module Datasheet is subject to change without notice and is provided for informational purposes only. No contractual rights are established or should be inferred because of user's reliance on the information contained in this Module Datasheet. Please refer to the appropriate Module User Guide and Module Product Specification document for more detailed technical information regarding module performance, installation and use.

1 E-901 **MODULE EQUIPMENT DATASHEET**
SCALE: NTS

shoals technologies group

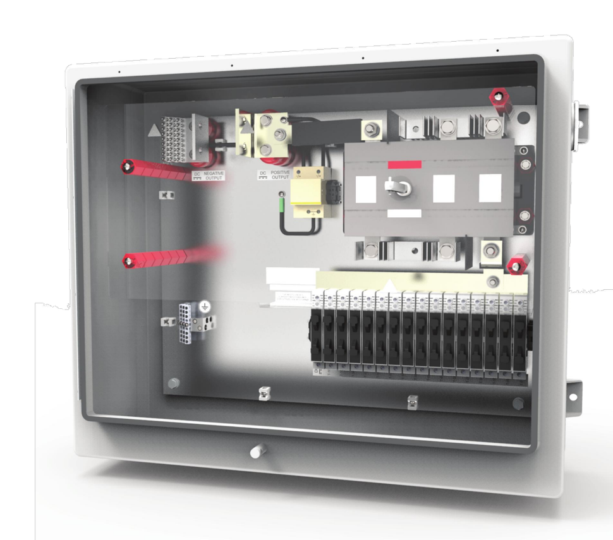
combiner box

STG.CBC.16.CLAHNC21E0

Introducing the 1500V SlimLine® series from Shoals. Reduce your installation cost and increase efficiency by taking advantage of our 1500V series which allows more panels per string & fewer boxes per site. It's lightweight. It's compact. It's simple. It's Shoals.

FEATURES
- Finger-Safe Fuse Holders
- 3-Pole 400A, 1500V Disconnect
- Surge Suppression
- Breather vent
- NEMA 4X enclosure
- Reinforced, Plated Bus Bars
- Output Bus Bars have 1.75" Std NEMA Hole Spacing
- DC Feeders run straight out of enclosure. (No bending of DC cables needed.)
- 5- year warranty standard on all models

OPTIONS
- Pre-landed pigtails or harnesses



*patent pending

TECHNICAL INFORMATION	STG.CBC.16.CLAHNC21E0
Voltage Rating	1500 V_{DC}
Rated Output Current	400A
Rated Input Current	24A
Max. Overcurrent Protection	30A
Max. Fused Output Wire Size	750 MCM Parallel
Max. Unfused Output Wire Size	750 MCM Parallel
Max. Fused Input Wire Size	4 AWG
Max. Unfused Input Wire Size	4 AWG
Number of Input Circuits	16
Enclosure Rating	NEMA 4X
Max. Operating Temperature	50 °C
Max. Enclosure Size	24" x 30" x 10"

* Product design and specification subject to change or modification without notice.

made in USA · 5 year warranty

just another way we are inventing simple®

PROPRIETARY AND CONFIDENTIAL / 1500V Combiner Box

3 E-901 **COMBINER BOX EQUIPMENT DATASHEET (SHOALS OR EQUIVALENT)**
SCALE: NTS

SUNNY CENTRAL
2000-EV-US / 2500-EV-US / 2750-EV-US

SMA

Unmatched Power Density
- Small footprint simplifies site preparation and logistics
- Industry leading over-dimensioning capabilities
- Integrated voltage supply for internal consumption and external loads

Robust Performance
- Precision air-cooling enables greater reliability and simpler service compared to liquid cooled inverters
- Best-in-class performance in any environment
- DC/AC Ratio up to 250%

Grid Management
- Conforms to all known grid requirements worldwide
- Provides Q on demand

Superior Integration
- Improved DC connection area
- Easily accessible bay for connecting site specific equipment
- Available as a stand-alone inverter or solution with medium-voltage block and tracker auxiliary rack

SUNNY CENTRAL 2000-EV-US / 2500-EV-US / 2750-EV-US

Maximum power density and simple integration for 1,500 V PV projects

The Sunny Central family features an output of up to 2,750 kVA with 1,500 V DC systems. Fewer system components are needed due to the integrated DC fuse servicing switches and convenience power. The inverter also includes integrated control power and a network switch. OptiCool™ precision air cooling keeps this central inverter running smoothly, even in extreme ambient temperatures. It also protects against sand and dust intrusion. The Sunny Central inverter is the central component of the SMA Utility Power System and offers industry leading DC:AC ratios. In conjunction with the medium-voltage block 2.0, DC technology, power plant controlling system and SMA Service, it offers maximum ROI for utility-scale PV projects.

SUNNY CENTRAL 2000-EV-US

Technical Data	SC 2000-EV-US
Input (DC)	
MPP voltage range V_{DC} (at 25°C / at 35°C / at 50°C)	1425 V / 1200 V / 1200 V
Min. input voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	778 V / 928 V
Max. input voltage $V_{DC, max}$	1500 V
Max. input current $I_{DC, max}$ (up to 50°C)	2610 A
Max. short-circuit current rating	6400 A
Number of DC inputs (20 / 24)	● / ○
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm²
Integrated zone monitoring (±0.5% shunt resistors)	○
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A
Output (AC)	
Nominal AC power (up to 50°C)	2200 kVA / 2000 kW
Nominal AC power at cos φ = 0.8 (at 35°C / at 50°C)	1760 kW
Max. output current $I_{AC, max}$	2310 A
Nominal AC current $I_{AC, nom}$	2100 A
Max. total harmonic distortion	< 3% at nominal power
Nominal AC voltage / nominal AC voltage range[1)8)]	550 V / 440 V to 660 V
AC power frequency	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz
Power factor at rated power / displacement power factor adjustable[8)]	1 / 0.8 overexcited to 0.8 underexcited
Efficiency	
CEC efficiency*[3)]	98.0%
Protective Devices	
Input-side disconnection point	DC load-break switch
Output-side disconnection point	AC circuit breaker
DC overvoltage protection	Surge arrester, type I
AC overvoltage protection (optional)	Surge arrester, class I
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III
Overcurrent protection device (according to NEC, ANSI/NFPA 70)	3600 A
Ground-fault monitoring / remote ground-fault monitoring / insulation monitoring	○ / ○ / ○
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP65 / IP34 / IP34
Degree of protection (as per UL 50)	Type 3R
General Data	
Dimensions (W / H / D)	2780 / 2318 / 1588 mm (109.4 / 91.3 / 62.5 inch)
Weight	< 3400 kg / < 7496 lb
Self-consumption: max.[4)] / partial load[5)] / average[6)]	< 8100 W / < 1800 W / < 2000 W
Self-consumption (standby)	< 370 W
Internal auxiliary power supply	○ Integrated 8.4 kVA transformer
Operating temperature range	−25 to 60°C / −13 to 140°F
Temperature range (standby)	−40 to 60°C / −40 to 140°F
Temperature range (storage)	−40 to 70°C / −40 to 158°F
Noise emission[7)]	66,3 dB(A)
Max. permissible value for relative humidity: condensing / non-condensing	95% to 100% (2 month/year) / 0 to 95%
Maximum operating altitude above MSL[8)] 1000 m / 2000 m	● / ○ (earlier temperature-dependent derating)
Fresh air consumption	6500 m³/h
Features	
DC connection	Terminal lug on each input (without fuse)
AC connection	With busbar system (three busbars, one per line conductor)
Communication	Ethernet, Ethernet/IP, Modbus TCP/IP
Enclosure / roof color	RAL 9016 / RAL 7004
Supply transformer for external loads	○ (2.5 kVA)
Standards and directives complied with	UL 62109-1, UL 1741 (Chapter 31, CDR 6I), UL 1741-SA, NEC 2011/2014, UL 1998, IEEE 1547, IEEE 693, MIL-STD-810G, BDEW, CE, CAN/CSA C22.2 107.1-1
EMC standards (pending)	CISPR 22:2008 modified class A, FCC Part 15 Class A
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001
● Standard features ○ Optional *preliminary	
Type designation	SC-2000-EV-US-10

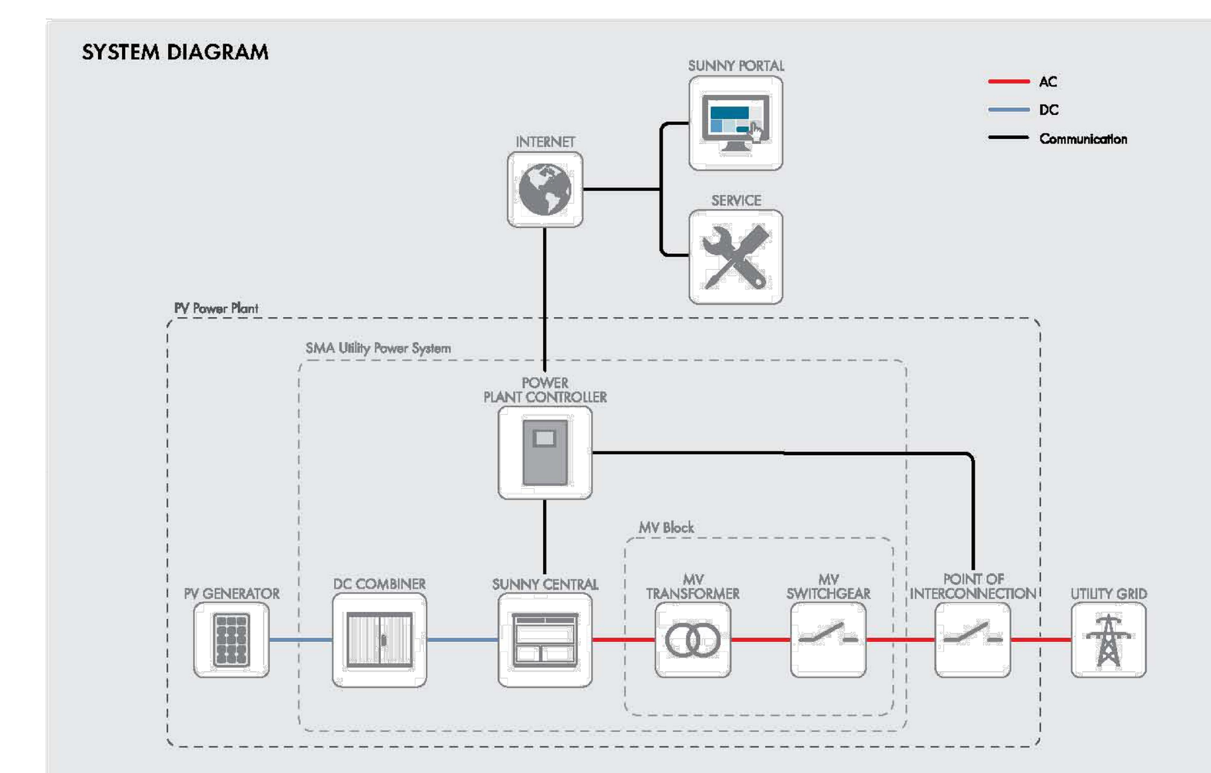
1) At nominal AC voltage < 550V, nominal AC power decreases in the same proportion
2) Preliminary values
3) Efficiency measured with internal power supply
4) Self-consumption at rated operation
5) Self-consumption at < 75% Pn at 25°C
6) Self-consumption averaged out to 5% to 100% Pn at 25°C
7) Sound pressure level at a distance of 32.8 ft (10 m)
8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.

SUNNY CENTRAL 2500-EV-US / 2750-EV-US

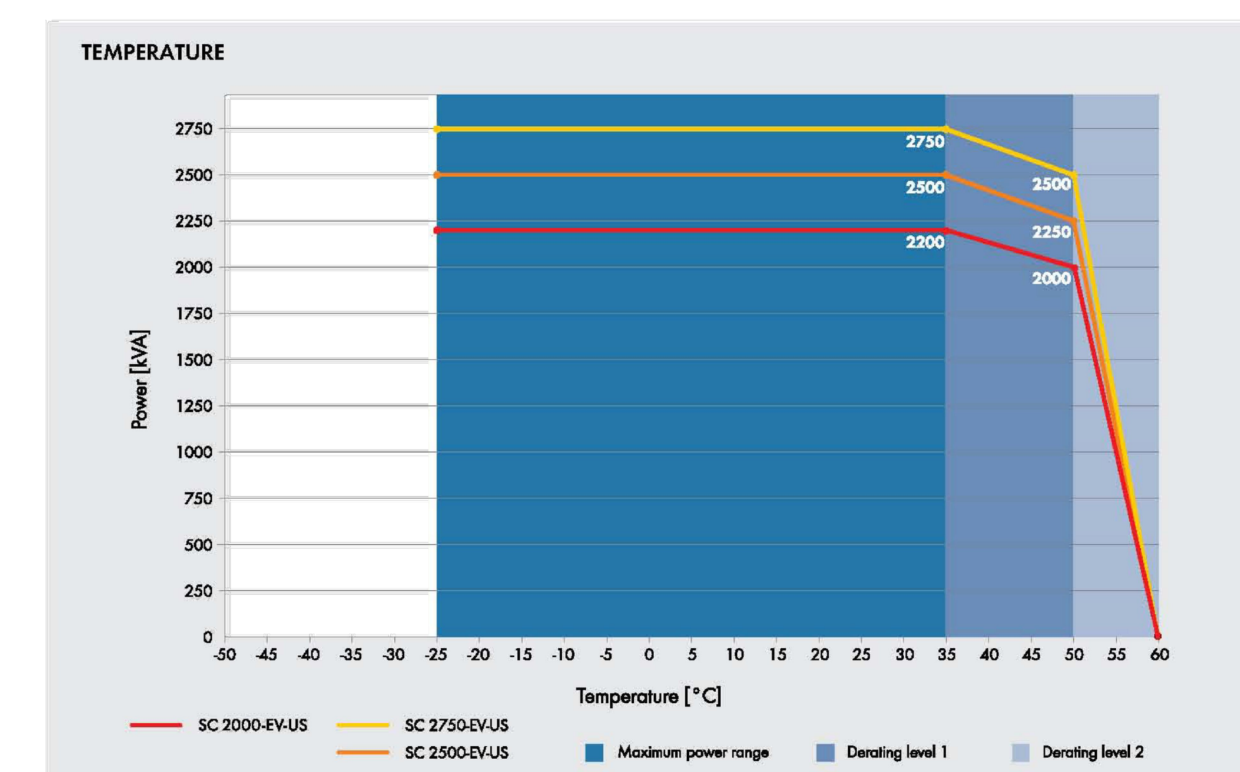
Technical Data	Sunny Central 2500-EV-US	Sunny Central 2750-EV-US
Input (DC)		
MPP voltage range V_{DC} (at 25 °C / at 35 °C / at 50 °C)	850 V to 1425 V / 1200 V / 1200 V	875 V to 1425 V / 1200 V / 1200 V
Min. input voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	778 V / 928 V	849 V / 999 V
Max. input voltage $V_{DC, max}$	1500 V	1500 V
Max. input current $I_{DC, max}$ (at 25°C / at 50°C)	3200 A / 2956 A	3200 A / 2956 A
Max. short-circuit current rating	6400 A	6400 A
Number of DC inputs (20/24)	● / ○	● / ○
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm²	2 x 800 kcmil, 2 x 400 mm²
Integrated zone monitoring	○	○
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Output (AC)		
Nominal AC power at cos φ =1 (at 35 °C / at 50 °C)	2500 kVA / 2250 kVA	2750 kVA / 2500 kVA
Nominal AC power at cos φ =0.9 (at 35 °C / at 50 °C)	2250 kW / 2025 kW	2475 kW / 2250 kW
Nominal AC current $I_{AC, nom}$ = Max. output current $I_{AC, max}$	2624 A	2646 A
Nominal AC current $I_{AC, nom}$	2624 A	2646 A
Max. total harmonic distortion	< 3% at nominal power	< 3% at nominal power
Nominal AC voltage / nominal AC voltage range[1)]	550 V / 440 V to 660 V	600 V / 480 V to 690 V
AC power frequency	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz
Min. short-circuit ratio at the AC terminals	> 2	> 2[8)]
Power factor at rated power / displacement power factor adjustable[9)]	● 1 / 0.8 overexcited to 0.8 underexcited ○ 1 / 0.0 overexcited to 0.0 underexcited	
Efficiency		
Max. efficiency[2)] / European efficiency[2)] / CEC efficiency[3)]	98.6% / 98.3% / 98.0%	98.7% / 98.5% / 98.5%
Protective Devices		
Input-side disconnection point	DC load-break switch	DC load-break switch
Output-side disconnection point	AC circuit breaker	AC circuit breaker
DC overvoltage protection	Surge arrester, type I	Surge arrester, type I
AC overvoltage protection (optional)	Surge arrester, class I	Surge arrester, class I
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III	Lightning Protection Level III
Overcurrent protection device (according to NEC, ANSI/NFPA 70)	3600 A	3600 A
Ground-fault monitoring / remote ground-fault monitoring / insulation monitoring	○ / ○ / ○	
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP65 / IP34 / IP34	IP65 / IP34 / IP34
Degree of protection (as per UL 50)	Type 3R	Type 3R
General Data		
Dimensions (W / H / D)	2780 / 2318 / 1588 mm (109.4 / 91.3 / 62.5 inch)	
Weight	< 3400 kg / < 7496 lb	
Self-consumption (max.[4)] / partial load[5)] / average[6)])	< 8100 W / < 1800 W / < 2000 W	
Self-consumption (standby)	< 370 W	
Internal auxiliary power supply	Integrated 8.4 kVA transformer	
Operating temperature range	−25 to 60°C / −13 to 140°F	
Temperature range (standby)	−40 to 60°C / −40 to 140°F	
Temperature range (storage)	−40 to 70°C / −40 to 158°F	
Noise emission[7)]	66.3 dB(A)	64.3 dB(A)
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month / year) / 0 % to 95%	
Maximum operating altitude above MSL 2000 m	●	
Fresh air consumption	6500 m³/h	
Features		
DC connection	Terminal lug on each input	
AC connection	With busbar system (three busbars, one per line conductor)	
Communication	Ethernet, Ethernet/IP, Modbus TCP/IP	
Enclosure / roof color	RAL 9016 / RAL 7004	
Display	HMI touchscreen (10.1")	
Supply transformer for external loads	○ (2.5 kVA)	
Standards and directives complied with	UL 62109-1, UL 1741 (Chapter 31, CDR 6I), UL 1741-SA, NEC 2011/2014, UL 1998, IEEE 1547, IEEE 693, MIL-STD-810G, BDEW, CE, CAN/CSA C22.2 107.1-1	
EMC standards (pending)	CISPR 22:2008 modified class A, FCC Part 15 Class A	
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001	
● Standard features ○ Optionalw		
Type designation	SC-2500-EV-US-10	SC-2750-EV-US-10

1) At nominal AC voltage, nominal AC power decreases in the same proportion
2) Efficiency measured without internal power supply
3) Efficiency measured with internal power supply
4) Self-consumption at rated operation
5) Self-consumption at < 75% Pn at 25°C
6) Self-consumption averaged out from 5% to 100% Pn at 35°C
7) Sound pressure level at a distance of 10 m
8) A short-circuit ratio of < 2 requires a special approval from SMA
9) Depending on the DC voltage

SYSTEM DIAGRAM



TEMPERATURE



Toll Free +1 888 4 SMA USA
www.SMA-America.com

SMA America, LLC

2 E-901 **INVERTER EQUIPMENT DATASHEET**
SCALE: NTS

Pure Power Contractors Inc.
2812 GRAY FOX RD, MONROE NC 28110

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039678 KEVIN LEARY 03/18/2020
PERMIT DRAWING - NOT RELEASED FOR CONSTRUCTION

AVOCA ENGINEERS, PLLC
NC FIRM LICENSE: P-1577
242 OLD NEW BRUNSWICK ROAD PISCATAWAY NJ 08854
PHONE (732) 465-1002 FAX (732) 465-1005

REVISIONS

NO.	DATE	DESCRIPTION
0	03/18/20	ISSUED FOR PERMIT - REV. MODULES AND LAYOUT

PLT STAMP
NCALVACHI 3/18/2020 7:34 PM
E-901 CUT SHEETS.DWG

PROJECT: 20-PP-044

ESA BUIES CREEK, LLC.
1887 LESLIE CAMPBELL AVE.
LILLINGTON, NC 27546

DATE:	03/18/2020
DRAWN BY:	EG
CHECKED BY:	KL

CUTSHEETS

E-901