

LETTER OF TRANSMITTAL

PROJECT NAME: Ameren Lambert Community Solar Energy Center
 PROJECT NUMBER: 1704-101
 TRANSMITTAL DATE: 2/27/2018
 TRANSMITTAL DESCRIPTION: **90% DESIGN SUBMITTAL**

SUBMITTED TO:
 Ameren Missouri
 1901 Choteau Avenue
 St. Louis, MO 63166

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SUBMITTED BY:
 Azimuth Energy
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 St. Louis, MO 63110

Daniel Stroh, Director of Engineering
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This transmittal includes:

	Copies	Item	Description
<input checked="" type="checkbox"/>	1	Design Drawings	90% Design Drawings (PDF), Site Plan (AutoCAD)
<input type="checkbox"/>		Energy Production Estimate (1 st Year)	
<input type="checkbox"/>		Engineering Calculations	
<input type="checkbox"/>		Test Reports	
<input type="checkbox"/>		Information	
<input type="checkbox"/>		Operation & Maintenance Manual	
<input type="checkbox"/>		Other	

Purpose of transmittal defined below:

<input checked="" type="checkbox"/>	For review and comment
<input type="checkbox"/>	For approval
<input checked="" type="checkbox"/>	For your use
<input type="checkbox"/>	As requested

Transmittal response (where requested):

<input type="checkbox"/>	Approved as submitted
<input type="checkbox"/>	Approved as noted
<input type="checkbox"/>	Returned for corrections
<input checked="" type="checkbox"/>	Not required

NAME: _____ DATE: _____

COMMENTS: _____



SOLAR PHOTOVOLTAIC SYSTEM

AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER

11601 MISSOURI BOTTOM ROAD SAINT LOUIS, MO 63044

GENERAL NOTES

ANNOTATIVE DEFINITIONS

- : EQUIPMENT TAG. REFER TO SINGLE LINE DIAGRAM FOR DETAILS
- : FEEDER TAG (FREE AIR). REFER TO SINGLE LINE DIAGRAM FOR DETAILS
- : FEEDER TAG (IN CONDUIT). REFER TO SINGLE LINE DIAGRAM FOR DETAILS
- : FOUNDATION ASSEMBLY REFERENCE POINT TAG
- : ELEVATION CALLOUT
- : SECTION CALLOUT
- : SITE DETAIL CALLOUT
- : COLUMN LINE

ELECTRICAL DEFINITIONS

- S#:## : INVERTER - STRING#
- INV# : INVERTER #
- ACCP# : AC INVERTER COMBINER PANEL #
- MDS# : MAIN DISCONNECT SWITCH #
- LC# : LOADS CENTER #
- MNTR# : MONITORING EQUIPMENT #
- XFMR# : TRANSFORMER #
- DC-EGC : DC EQUIPMENT GROUNDING CONDUCTOR
- DC-GEC : DC GROUNDING ELECTRODE CONDUCTOR
- AC-EGC : AC EQUIPMENT GROUNDING CONDUCTOR
- AC-GEC : AC GROUNDING ELECTRODE CONDUCTOR
- OCPD : OVER CURRENT PROTECTION DEVICE
- TVSS : TRANSIENT VOLTAGE SURGE SUPPRESSION DEVICE

GENERAL

- ALL WIRING METHODS AND INSTALLATION PRACTICES SHALL BE IN COMPLIANCE WITH THE APPROPRIATE ELECTRIC CODE OF THE TERRITORY OF THE INSTALLATION, LOCAL STATE/PROVINCE CODES, AND OTHER APPLICABLE LOCAL CODES.
- CONTRACTOR SHALL BECOME FAMILIAR WITH ALL INSTALLATION INFORMATION IN THE EQUIPMENT DOCUMENTATION FROM THE MANUFACTURER PRIOR TO BEGINNING THE INSTALLATION, AND SHALL OBSERVE THE MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.
- CONTRACTOR SHALL CONFIRM THAT CONDUIT LOCATE SERVICES HAVE BEEN COMPLETED BEFORE EXISTING GRADE IS EXCAVATED OR EXISTING FLOORING IS DEMOLISHED, DRILLED, OR CUT, REGARDLESS OF THE LOCATION ON THE SITE.
- CONTRACTOR SHALL UPDATE "RED-LINE" CONSTRUCTION DOCUMENTS ON A DAILY BASIS, AND PROVIDE THE COMPLETE RED-LINE DOCUMENT PACKAGE TO THE PROJECT MANAGER UPON SUBSTANTIAL COMPLETION OF THE PROJECT.
- CONTRACTOR SHALL DAILY CLEAN UP TRASH AND WASTE RESULTING FROM THEIR WORK. CONTRACTOR SHALL DISPOSE OF ALL TRASH IN LOCATIONS AND/OR RECEPTACLES DESIGNATED BY OWNER. PACKING MATERIALS SUCH AS CARDBOARD AND RECYCLABLE PLASTICS SHALL BE RECYCLED ONSITE OR REMOVED OFFSITE BY THE CONTRACTOR FOR OFFSITE RECYCLING.

MECHANICAL & CONSTRUCTION

- SEE SITE LAYOUT PLAN, CIVIL SITE PLAN, FOUNDATION PLAN, AND OTHER RACKING SHEETS FOR SPECIFIC MECHANICAL AND CONSTRUCTION NOTES.
- RACKING SHALL BE FULLY SECURED BEFORE ANY MODULES ARE MOUNTED.
- INSTALLING CONTRACTOR SHALL REVIEW AND ADHERE TO ALL RACK MANUFACTURER'S INSTRUCTIONS FOR TORQUE SETTINGS AND MARKING OF HARDWARE FOR MODULE AND RACKING ASSEMBLIES.
- RACKING AND MODULES SHALL BE INSTALLED WITHIN SPECIFIED TOLERANCES IN MANUFACTURER'S INSTRUCTIONS.

ELECTRICAL

- SEE SINGLE LINE DIAGRAM, ELECTRICAL PLAN, AND OTHER ELECTRICAL SHEETS FOR SPECIFIC ELECTRICAL DETAILS AND ADDITIONAL NOTES.
- ELECTRICAL SYSTEM COMPONENTS SHALL BE UL-LISTED FOR THEIR INTENDED PURPOSE, INCLUDING BUT NOT LIMITED TO WIREWAYS, DISCONNECTS, JUNCTION BOXES, MODULES, COMBINERS, INVERTERS, ETC.
- ALL JUNCTION BOXES OR COMBINERS SHALL BE INSTALLED IN READILY ACCESSIBLE LOCATIONS. PENETRATIONS INTO JUNCTION BOXES IN EXPOSED LOCATIONS SHOULD BE ON THE SIDES OR BOTTOM, AND NOT ON THE TOP SURFACE. WHEN THE CONNECTION PENETRATES THE TOP OF AN ENCLOSURE, WEATHER-TIGHT MEYERS HUBS SHALL BE USED.
- CONNECTIONS TO NEMA-3/3R (OR HIGHER) CONDUIT BODIES, WIREWAYS, AND JUNCTION BOXES SHALL BE MADE WITH UL-LISTED WEATHER-TIGHT CONNECTORS TO MAINTAIN THE ENCLOSURE'S NEMA RATING.
- EXPOSED CONDUCTORS ENTERING CONDUIT BODIES, WIREWAYS, AND JUNCTION BOXES SHALL BE PROVIDED WITH DRIP LOOPS THAT DIVERT WATER AWAY FROM THE REQUIRED WIRE-GLAND/WEATHERHEAD.
- FINE-STRANDED WIRE SHALL NOT BE USED, UNLESS APPROVED IN ADVANCE. TAPS, TERMINAL BLOCKS, AND OTHER TYPES OF CONNECTORS THAT ARE NOT LISTED SHALL NOT BE USED FOR FINE-STRANDED WIRE.
- ALL CONDUIT RUNS ABOVE GROUND SHALL BE GALVANIZED RIGID CONDUIT, AND ALL CONDUIT RUNS UNDER GROUND, SHALL BE PVC SCHEDULE 40/ PVC SCHEDULE 80, AS SPECIFIED. ALL CONDUIT CONNECTIONS TO CONDUIT BODIES AND/OR ENCLOSURES SHALL INCLUDE AN EXPANSION FITTING ABOVE GROUND. CONDUIT CONNECTIONS TO EQUIPMENT SHALL USE LFNC SWEEPS ABOVE GRADE, AS SPECIFIED.
- WHEN ENTERING OR EXITING AN UNDER GROUND RUN, ALL CONDUIT TRANSITIONS SHALL HAVE A PVC SCHEDULE 80 SWEEP INSTALLED BETWEEN PVC SCHEDULE 40 CONDUIT AND PVC SCHEDULE 80.
- WIRE TERMINATION HARDWARE SHALL BE TORQUED TO MANUFACTURER'S SPECIFICATIONS, AND MARKED WITH AN INDELEBIL MARKER TO INDICATE FINAL SETTING. INSTALLING CONTRACTOR SHALL REVIEW AND ADHERE TO ALL MANUFACTURER'S INSTRUCTIONS FOR TORQUE SETTINGS OF HARDWARE FOR CONDUCTOR TERMINATIONS. CONTRACTOR SHALL USE A TORQUE WRENCH TO ENSURE THAT APPROPRIATE TORQUE SETTINGS ARE MET.
- WHEN USING ALUMINUM WIRE, TERMINATION SHALL BE STRIPPED CONDUCTOR OR PADDLE LUGS TO EQUIPMENT TERMINAL. EITHER METHOD, CONDUCTOR OR PADDLE LUG, SHALL USE NOALOX ANTI-OXIDANT COMPOUND OR APPROVED EQUAL, APPLIED PRIOR TO TERMINATION. ELECTRICIAN SHALL RE-CHECK TERMINAL TORQUE BEFORE COMPLETING THE PROJECT AND AGAIN AFTER ONE YEAR OF OPERATION.
- COLOR MARKINGS OF CONDUCTORS SHALL BE CONSISTENT THROUGHOUT ELECTRICAL SYSTEM AND WHEN CONDUCTORS PASS THRU A BOX WITHOUT TERMINATING, CONDUCTORS SHALL BE MARKED/PHASED APPROPRIATELY.
- COLOR MARKINGS AND IDENTIFICATION ON 277/480VAC UNGROUNDED CONDUCTORS SHALL BE AS FOLLOWS:
PHASE A BROWN
PHASE B ORANGE
PHASE C YELLOW
- WIRE TYPES SHALL BE AS FOLLOWS:
PV-WIRE DC SINGLE CONDUCTOR EXPOSED WITHIN THE ARRAY OR IN CONDUIT THWN-2/ ALL AC CONDUCTORS XHHW-2

GROUNDING

- SEE SINGLE LINE DIAGRAM AND ELECTRICAL SPECIFICATIONS & CALCULATIONS FOR AC AND DC SPECIFIC GROUNDING DETAILS.
- THE GROUNDING CONNECTION FROM THE MODULE TO THE RACKING SYSTEM IS MADE VIA SERRATED FLANGE HEAD BOLT AND NUTS. THE RACKING SYSTEM COMPLIES WITH UL 2703 (ISSUE 2). SEE MANUFACTURER'S CONNECTIONS AND HARDWARE SHEET FOR ADDITIONAL DETAILS.
- EGC AND/OR GEC CONTINUITY IN THE ARRAY RACKING IS PROVIDED BY BOLTED MECHANICAL CONNECTIONS WITHIN RACKING FRAMEWORK [NEC 250.64(C)]. THE GEC CONDUCTOR SHALL BE BONDED TO RACKING USING LISTED LUGS AT TWO OR MORE POINTS IN EACH SUB-ARRAY ASSEMBLY.
- DC EQUIPMENT GROUNDING CONDUCTORS, AND BONDING JUMPERS SHALL BE CONNECTED BY THREAD-FORMING MACHINE SCREWS THAT ENGAGE NOT LESS THAN TWO THREADS IN THE ENCLOSURE OR BY BONDING CLIPS APPROVED FOR THE PURPOSE.
- ALL METALLIC CONDUITS ENTERING A JUNCTION BOX OR OTHER CONDUIT BODY WHERE OPENING CONSISTS OF CONCENTRIC RINGS SHALL HAVE A BONDING BUSHING AND JUMPER FROM THE CONDUIT TO THE DC GROUNDING CONDUCTOR. EXCEPTIONS AS ALLOWED BY [NEC 250.97].
- ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR GROUNDING SYSTEM INCLUDING GROUNDING ELECTRODE(S); GEC(S). MULTIPLE GROUNDING ELECTRODES SHALL BE INSTALLED IF TOTAL RESISTANCE TO GROUND IS GREATER THAN 25 OHMS. ELECTRICAL CONTRACTOR SHALL VERIFY TOTAL RESISTANCE TO GROUND.

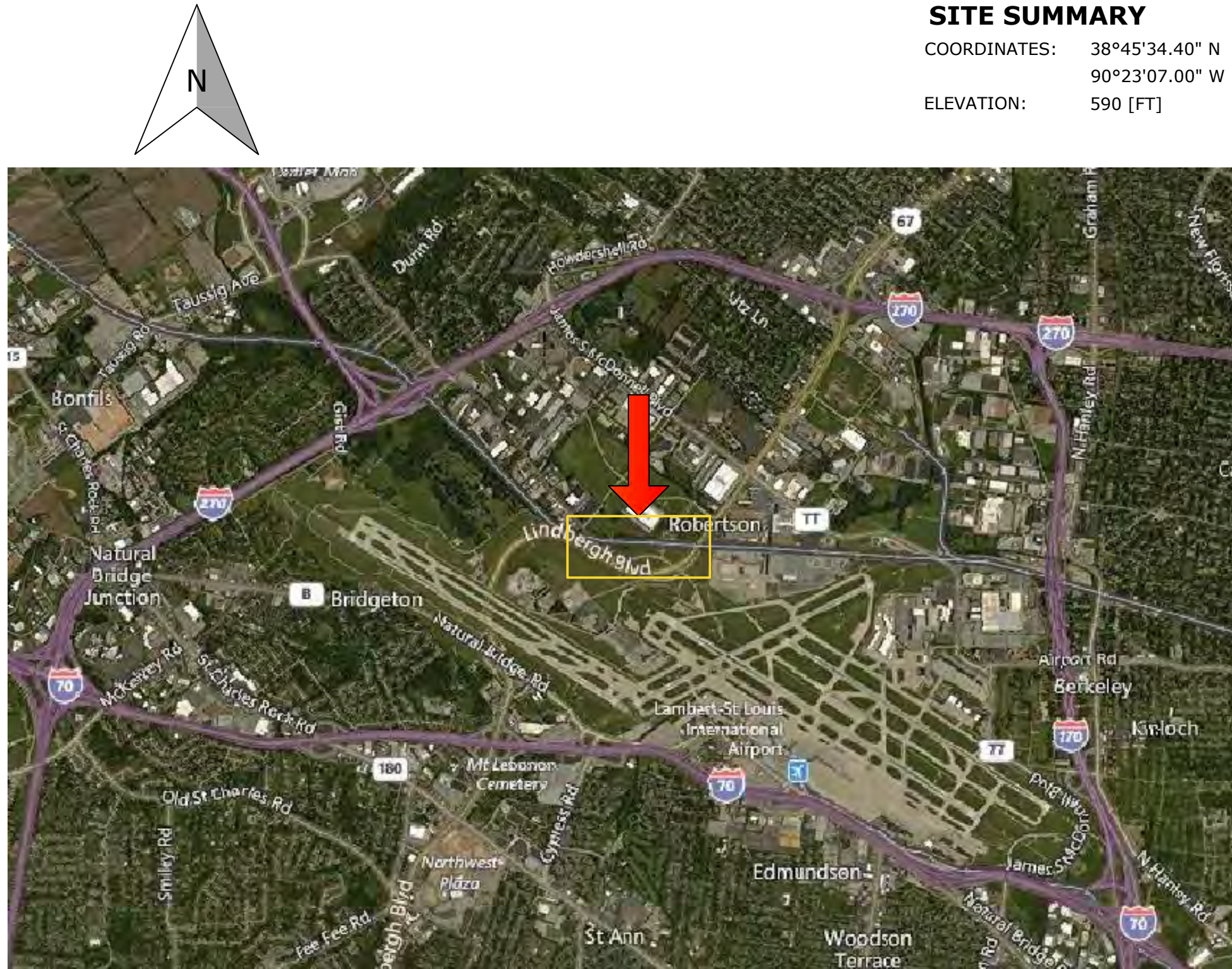
DC CIRCUITS

- SOURCE CIRCUIT CONDUCTORS IN FREE AIR SHALL BE SECURED WITHIN 12" OF ALL CONNECTORS, AND AT LEAST EVERY 48" THEREAFTER. SOURCE CIRCUIT CONDUCTORS SHALL BE ROUTED TO FOLLOW RAILS OR MODULES AS MUCH AS POSSIBLE.
- WIRE MANAGEMENT SHALL USE WIRE CLIPS APPROVED IN ADVANCE BY THE PROJECT MANAGER, SUCH AS CADDY OR EQUAL. ZIP TIES ARE ACCEPTABLE FOR WIRE SIZE AWG#8 OR SMALLER, PROVIDED ZIP TIES MEET THE FOLLOWING SPECIFICATIONS: STEEL BARB, UV RESISTANT, MINIMUM 40LB TENSILE STRENGTH, UL LISTED, TEMPERATURE RANGE -20°F TO +165°F OR BETTER.
- WIRE GLAND OR CABLE GRIP SHALL BE UL-LISTED FOR NUMBER AND SIZE OF CONDUCTORS TO PROVIDE STRAIN RELIEF FOR ALL CONDUCTORS PENETRATING A CONDUIT BODY OR ENCLOSURE FROM FREE AIR.
- APPROPRIATELY SIZED PRE-INSULATED END FERRULES SHALL BE USED TO TERMINATE DC SOURCE CIRCUIT CONDUCTORS.
- ALL DC CONDUCTORS SHALL BE LABELED AT ALL TERMINATIONS WITH STRING ID AND POLARITY WITH PRINTED SELF-LAMINATING LABELS. ALL PV WIRE/USE-2/THWN-2 USED AS A DC CONDUCTOR SHALL COMPLY WITH THESE COLOR STANDARDS. WHEN APPROVED TO MARK WITH TAPE AT THE TERMINATIONS, THE TAPE SHALL SHOW THE SAME COLORS.
GROUNDED ARRAY: RED-POSITIVE, WHITE-NEGATIVE
UNGROUNDED ARRAY: RED-POSITIVE, BLACK-NEGATIVE
- PV CONNECTORS FOR SOURCE CIRCUIT HOME RUNS AND JUMPERS SHALL MATCH EXACT MANUFACTURER AND MODEL OF PV LEAD CONNECTORS FOR INSTALLED MODULES.
- ALL JUNCTION BOXES OR COMBINERS SHALL BE INSTALLED IN READILY ACCESSIBLE LOCATIONS. WHEN RUNNING IN CONDUIT ACROSS AND BETWEEN SUB-ARRAYS, SHALL BE REFERRED TO AS AN "INTER-TABLE NIPPLE" AND CONTAINED IN SUNLIGHT RESISTANT PVC SCH40 CONDUIT. INTER-TABLE NIPPLE CONDUIT SHALL BE LESS THAN OR EQUAL TO 24" IN LENGTH. WHERE SOURCE CIRCUIT CONDUCTORS ARE #10 PV-2000V WIRE, MINIMUM CONDUIT SIZES ARE LISTED IN THE TABLE BELOW.
MAXIMUM NUMBER OF #10 PV-2000V PVC SCH40 INTER-TABLE NIPPLE SIZE SOURCE CIRCUIT CONDUCTORS (INCHES)
12 1-1/4"
20 1-1/2"
28 2"
- PV WIRE SHALL HAVE A MINIMUM BENDING RADIUS OF 3".
- DC SAFE-ASSEMBLY PROCEDURE:
A) CONTRACTOR SHALL BECOME FAMILIAR WITH ALL INSTALLATION INFORMATION IN THE EQUIPMENT DOCUMENTATION FROM THE MANUFACTURER PRIOR TO BEGINNING THE INSTALLATION, AND SHALL OBSERVE THE INSTRUCTIONS.
B) ENSURE THE REQUIRED INVERTER CLEARANCE ACCORDING TO INSTRUCTIONS. INSPECT ARRAY COMPONENTS, GROUNDING, CONNECTIONS, AND HARDWARE. FIX OR REPAIR AS NECESSARY PRIOR TO MOVING TO NEXT STEPS.
C) REMOVE ALL DC FUSES FROM THE DC COMBINER, DC RE-COMBINER, DC DISCONNECT AND/OR INVERTER.
D) OPEN AND TAG OUT ALL DC DISCONNECTS ON THE DC COMBINER, DC RE-COMBINER, DC DISCONNECT, AND/OR INVERTER.
E) CONNECT THE DC STRINGS TOGETHER AS SPECIFIED, LEAVING THE END-OF-ROW POSITIVE (+) PV CONNECTORS UNCONNECTED/OPEN. THESE POSITIVE (+) PV CONNECTORS WILL BE THE LAST CONNECTIONS TO BE MADE AFTER ALL CONDUCTORS ARE TERMINATED AND TORQUED.
F) IF LANDING ON THE DC COMBINER OR INVERTER WITH HOMERUN CABLES, MAKEUP, LABEL, AND LAND THOSE CABLES ON THE TERMINAL BLOCKS. IF LANDING WITH THE MODULE WHIPS, CUT, DRESS, AND LABEL THOSE END WHIPS AND LAND ON THE TERMINAL BLOCKS. THERE WILL BE NO CURRENT FLOW BECAUSE THE DISCONNECT SWITCHES ARE ALL OPEN AND THE LAST, TOUCH-SAFE POSITIVE (+) PV CONNECTOR IS UNCONNECTED/OPEN.
G) TORQUE THE POSITIVE (+) AND NEGATIVE (-) CONDUCTORS ON THE TERMINAL BLOCKS.
H) CONNECT THE LAST POSITIVE (+) PV CONNECTORS TO COMPLETE THE SOURCE CIRCUITS. THERE WILL BE NO CURRENT FLOW BECAUSE THE DISCONNECT SWITCHES ARE ALL OPEN.
I) AT THE DC TERMINAL BLOCK, TEST SOURCE CIRCUITS WITH METER(S) TO ENSURE INSULATION RESISTANCE, SHORT-CIRCUIT CURRENT, AND OPEN-CIRCUIT VOLTAGE ARE WITHIN ACCEPTABLE BOUNDS FOR THE CURRENT CONDITIONS; RECORD RESULTS. ALL DC FUSES SHALL REMAIN REMOVED EXCEPT THOSE FOR THE CIRCUIT BEING TESTED. AZIMUTH REPRESENTATIVE SHALL BE PRESENT FOR TESTING, UNLESS OTHERWISE INSTRUCTED.
J) SUBMIT TESTING RESULTS TO PROJECT MANAGER AND/OR CONSTRUCTION SUPERVISOR FOR REVIEW AND APPROVAL PRIOR TO SCHEDULED SYSTEM ENERGIZATION.

AC CIRCUITS

- CONDUCTORS ORIGINATING ON THE ARRAY SIDE OF THE SYSTEM SHALL BE LANDED ON "LOAD" SIDE OF ALL AC SWITCHES AND COMPONENTS, AND THE UTILITY SHALL BE ON THE "LINE" SIDE OF THAT COMPONENT.
- APPROPRIATELY SIZED PRE-INSULATED END FERRULES SHALL BE USED TO TERMINATE AC INVERTER OUTPUT CONDUCTORS.

VICINITY MAP



SITE SUMMARY

COORDINATES: 38°45'34.40" N
90°23'07.00" W
ELEVATION: 590 [FT]

SYSTEM SUMMARY

DC SYSTEM SIZE: 979,200 [kW-DC (STC)]
AC SYSTEM SIZE: 942,000 [KW-AC]
MODULES: (2,880) GCL-P6/72H 340 W MODULE
INVERTERS: (7) SOLECTRIA PVI-60TL-480
(9) SOLECTRIA PVI-50TL-480
(2) SOLECTRIA PVI-36TL-480
(80) SOLAR FLEX RACK G3L-X 4HX9 RACKING TABLES
RACKING: 25°
TILT ANGLE:
AZIMUTH: 202°, 165.5°, 175° (SOUTH=180°)
DC SYSTEM ARCHITECTURE: UNGROUNDED, 1000VDC MAX

DESIGN CRITERIA & CODES

DESIGN CRITERIA
ELECTRICAL SERVICE VOLTAGE: 277/480 [VAC]
ELECTRICAL SERVICE CONFIGURATION: GROUNDED-WYE, 3φ4W
WIND SPEED: 105 [MPH]
SNOW LOAD: 20 [PSF]
OCCUPANCY CATEGORY: 1
EXTREME LOW TEMPERATURE: -19 [°C]
AVERAGE HIGH TEMPERATURE: 35 [°C]

REFERENCE CODES
ELECTRICAL CODE: NEC 2014
BUILDING CODE: IBC 2012
ASCE 7-10

PROJECT INFORMATION

SHEET INDEX

SHEET NUMBER	SHEET ABBREVIATION	SHEET NAME	PRELIMINARY DESIGN DRAWINGS
XX-DWG-BLDG-000001	BLDG1	TITLE PAGE	X
XX-DWG-BLDG-000002	BLDG2	SITE LAYOUT PLAN	X
XX-DWG-BLDG-000003	BLDG3	CIVIL SITE PLAN	X
XX-DWG-BLDG-000004	BLDG4	FOUNDATION PLAN	X
XX-DWG-BLDG-000005	BLDG5	FOUNDATION POINTS	X
XX-DWG-ELEC-000001	ELEC1	SINGLE LINE DIAGRAM AND SPECIFICATIONS	X
XX-DWG-BLDG-000006	BLDG6	ELECTRICAL PLAN	X
XX-DWG-BLDG-000007	BLDG7	MONITORING PLAN	X
XX-DWG-BLDG-000008	BLDG8	DETAILS	X
XX-DWG-BLDG-000009	BLDG9	FENCE DETAILS	X
XX-DWG-EQPT-000001	EQPT1	DATA SHEETS	X
XX-DWG-EQPT-000002	EQPT2	MONITORING DETAILS	X
S0		SOLAR FLEXRACK: COVER SHEET	X
S1		SOLAR FLEXRACK: 4HX9 SOLAR FLEXRACK G3L	X
S2		SOLAR FLEXRACK: TILT BRACKET COMPONENTS, TILT BRACKET CONNECTIONS, & FOUNDATION DETAILS	X
S3		SOLAR FLEXRACK: CONNECTIONS	X
S4		SOLAR FLEXRACK: HARDWARE	X

PROJECT CONTACTS

OWNER'S REPRESENTATIVES
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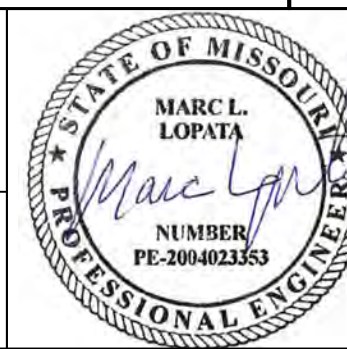
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1.618.691.9123

OPERATING DIAGRAM

NOTICE OF LIMITED RESPONSIBILITY
THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER REAL SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL.

SCALE: NOT TO SCALE
UNIT NO.: ----
DWG. SIZE: Y ARCH D (36X24)
SUB CLASS: ----

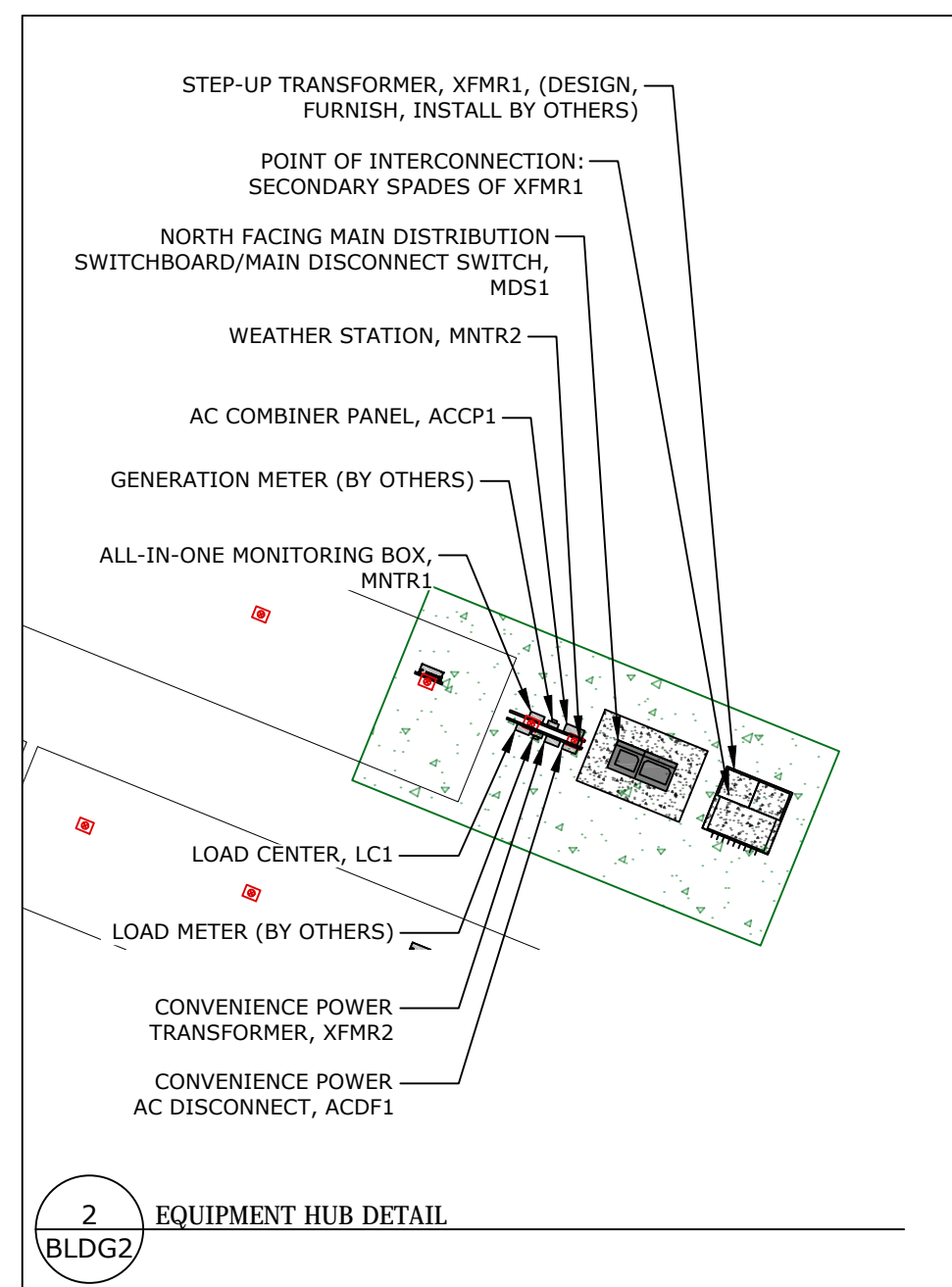
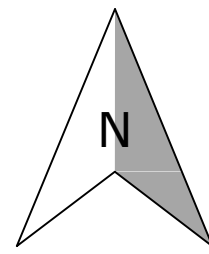
MARK UP DRAWING NO. ---
REV. ---



REV.	DATE	PROJECT NO.	DRAFTING	SUPV	ENGR	DESCRIPTION
A	02/26/18	1704-101	CJB DIR	DAS	ML	DESIGN DRAWINGS



SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER
DRAWING NO. ---
XX-DWG-BLDG-000001
REVISION NO. 0



ARRAY SUMMARY

DC SYSTEM SIZE:	979.200 [kW-DC (STC)]
AC SYSTEM SIZE:	942.000 [kW-AC]
MODULES:	(2,880) GCL-P6/72H 340 W MODULE
INVERTERS:	(7) SOLECTRIA PVI-60TL-480 (9) SOLECTRIA PVI-50TL-480 (2) SOLECTRIA PVI-36TL-480
STRINGS:	(160) STRINGS OF (18) MODULES
RACKING:	(80) SOLAR FLEX RACK G3L-X 4HX9
TILT ANGLE:	25°

SUB-ARRAY: 1

DC SYSTEM SIZE:	379.440 [kW-DC (STC)]
AC SYSTEM SIZE:	340.000 [kW-AC]
MODULES:	(1,116) GCL-P6/72H 340 W MODULE
INVERTERS:	(4) SOLECTRIA PVI-60TL-480 (2) SOLECTRIA PVI-50TL-480
STRINGS:	(62) STRINGS OF (18) MODULES
RACKING:	(31) SOLAR FLEX RACK G3L-X 4HX9
AZIMUTH:	165.5°, 202°

SUB-ARRAY: 2

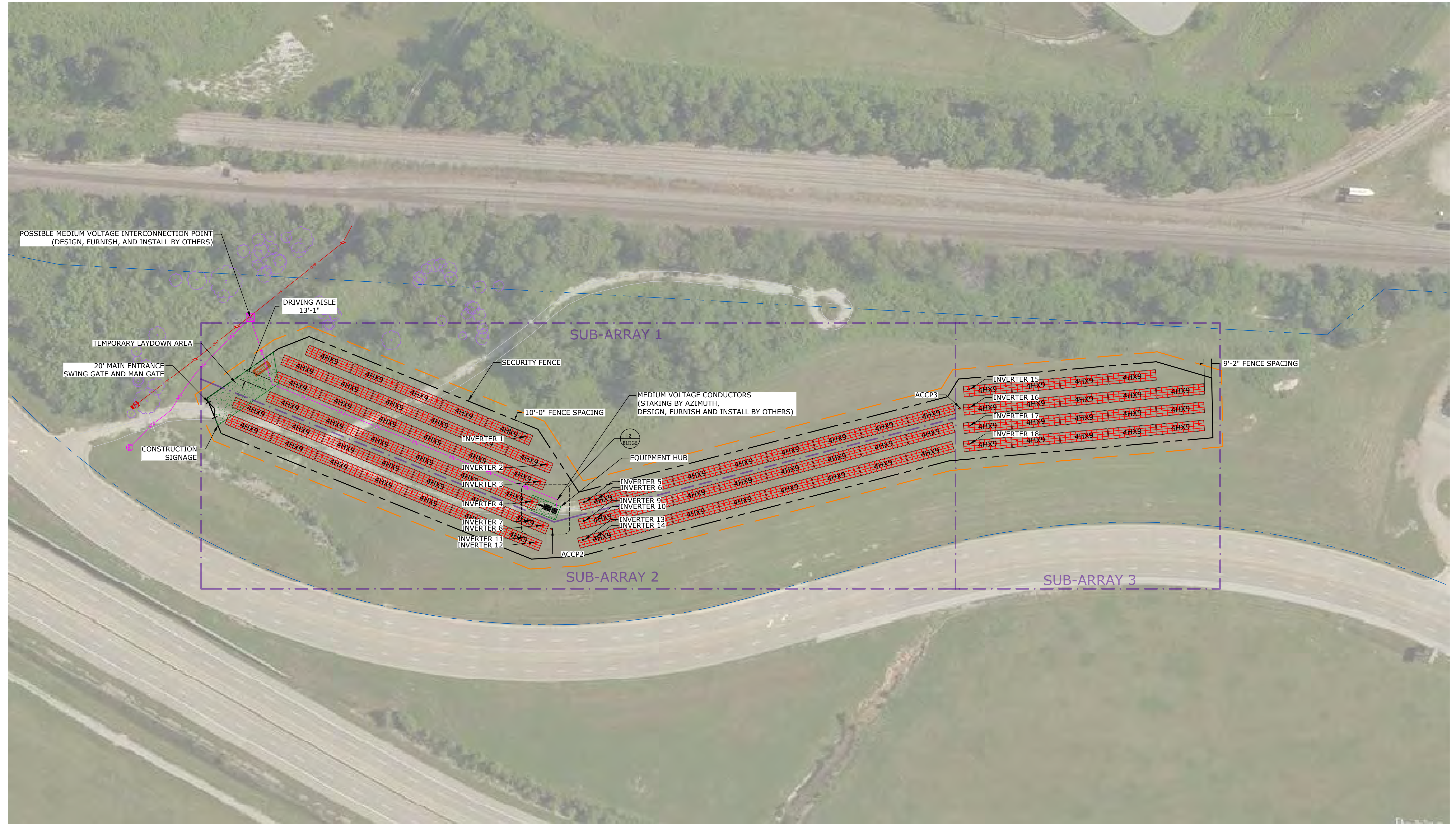
DC SYSTEM SIZE:	367.200 [kW-DC (STC)]
AC SYSTEM SIZE:	372.000 [kW-AC]
MODULES:	(1,080) GCL-P6/72H 340 W MODULE
INVERTERS:	(6) SOLECTRIA PVI-50TL-480 (2) SOLECTRIA PVI-36TL-480
STRINGS:	(60) STRINGS OF (18) MODULES
RACKING:	(30) SOLAR FLEX RACK G3L-X 4HX9
AZIMUTH:	165.5°, 202°

SUB-ARRAY: 3

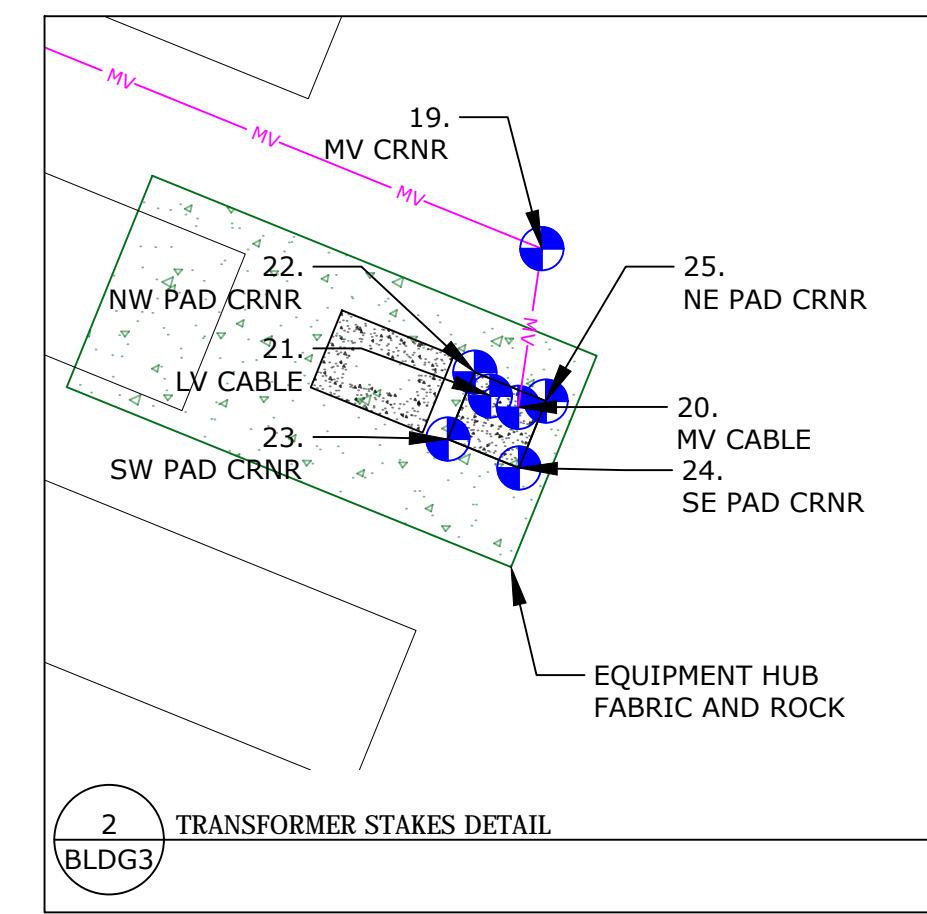
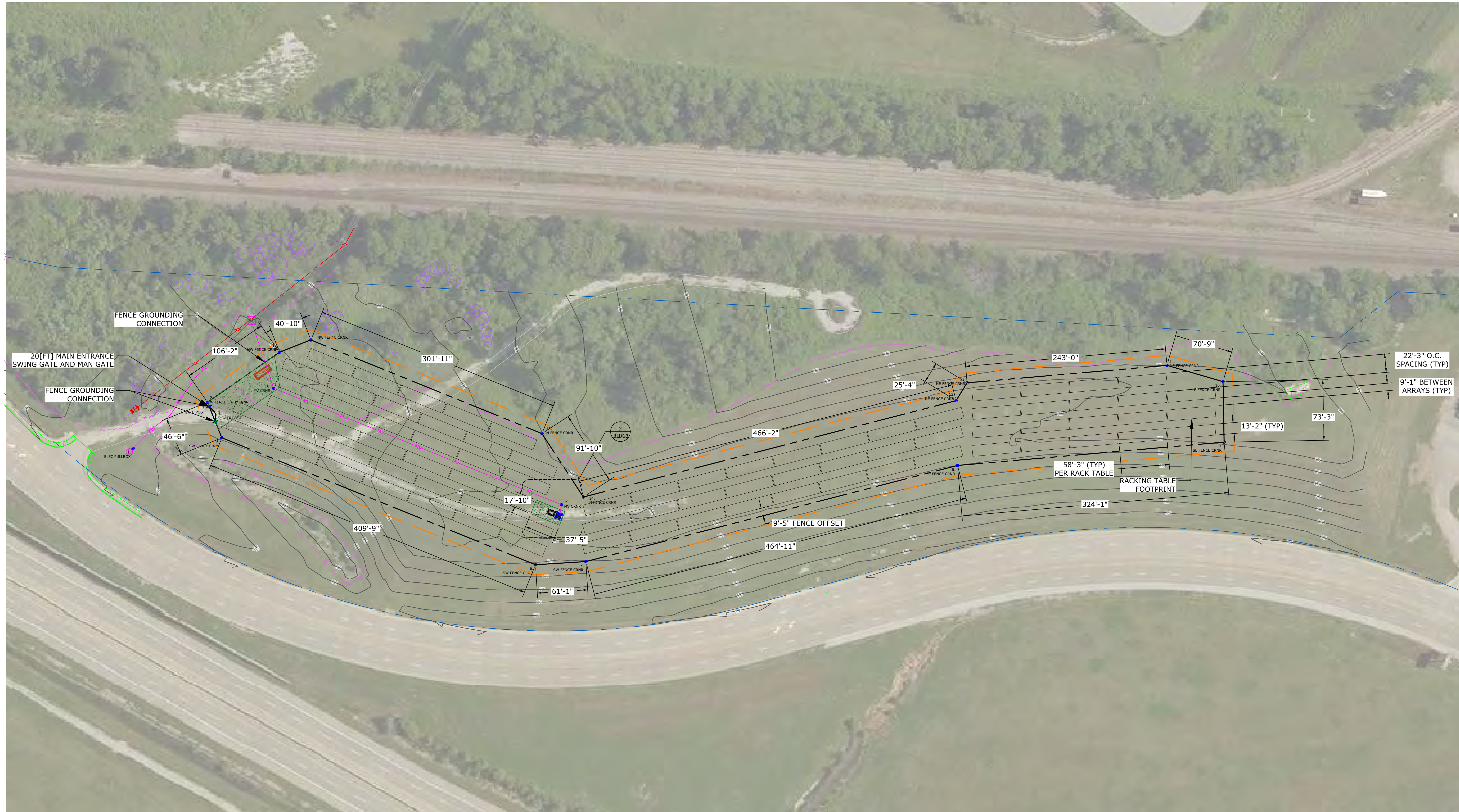
DC SYSTEM SIZE:	232.560 [kW-DC (STC)]
AC SYSTEM SIZE:	230.000 [kW-AC]
MODULES:	(684) GCL-P6/72H 340 W MODULE
INVERTERS:	(3) SOLECTRIA PVI-60TL-480 (1) SOLECTRIA PVI-50TL-480
STRINGS:	(38) STRINGS OF (18) MODULES
RACKING:	(19) SOLAR FLEX RACK G3L-X 4HX9
AZIMUTH:	175°

SHEET LEGEND

	NEW FENCE
	SUB-ARRAY
	EXISTING OVERHEAD POWER
	PROPERTY LINE
	EXISTING GRAVEL ROADWAY
	FABRIC AND ROCK
	MEDIUM VOLTAGE CONDUCTOR BY OTHERS



		CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241 DANIEL STROH, EIT CERT# 0422013-130				<p>OPERATING DIAGRAM</p> <p>NOTICE OF LIMITED RESPONSIBILITY</p> <p>THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR INITIALS.</p> <p>SCALE: 1" = 60'-0"</p> <p>UNIT NO.:</p> <p>DWG. SIZE: Y ARCH D (36X24)</p> <p>SUB CLASS:</p>		<p>MARK UP DRAWING NO.:</p> <p>REV.:</p>	
		CERTIFICANTS: MARC LOPATA, PE CERT# PVS1-120917-006937		<p>SITE LAYOUT PLAN</p> <p>-----</p> <p>-----</p> <p>-----</p>		<p>SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER</p> <p>DRAWING NO. XX-DWG-BLDG-000002</p> <p>REVISION NO. 0</p>			
<p>REV. DATE PROJECT NO. DRAFTING DRFTR/CHK'D SUPV ENGR DESCRIPTION</p> <p>A 02/26/18 1704-101 CJB DIR DAS ML DESIGN DRAWINGS</p>		<p>DRAWING RECORD</p>		<p>DRWG. SIZE: Y ARCH D (36X24)</p>		<p>-----</p>		<p>-----</p>	



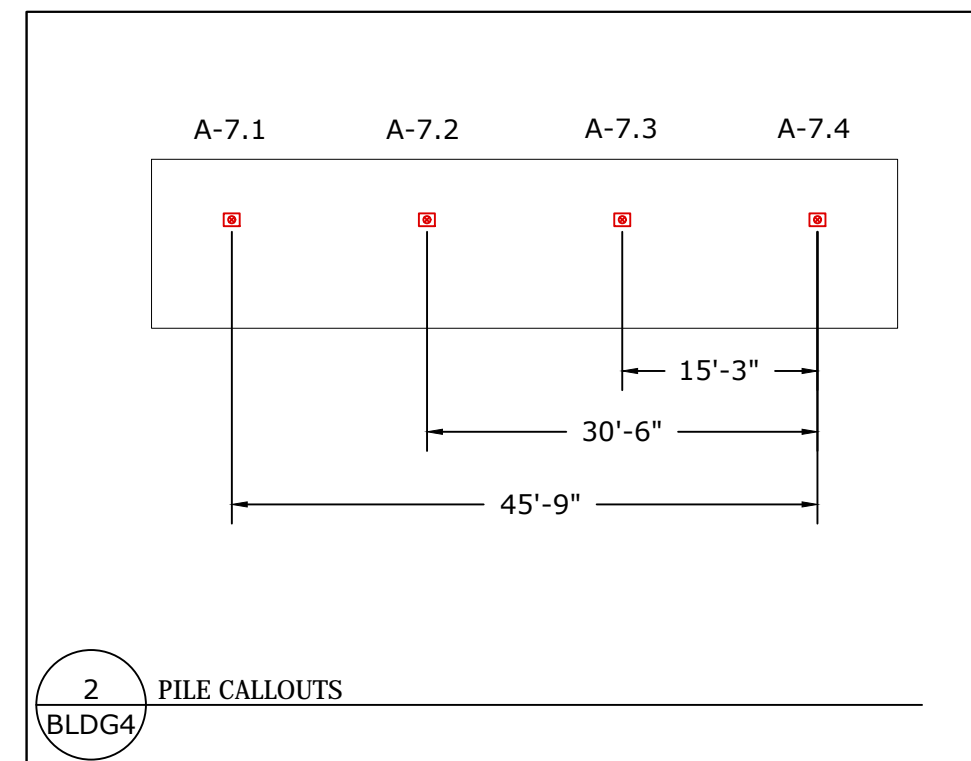
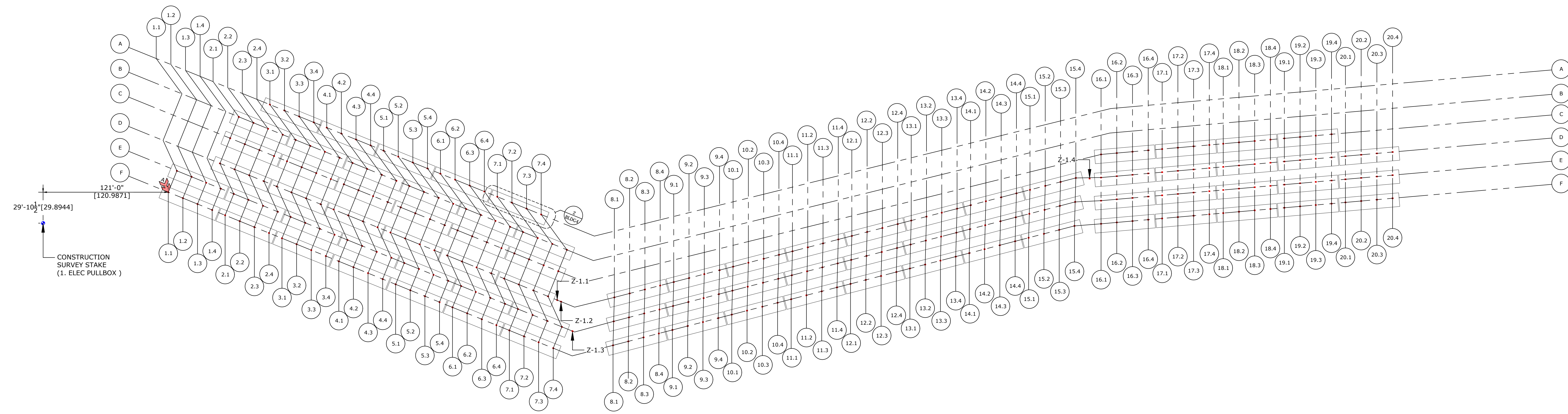
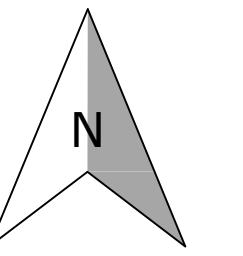
SHEET NOTES

1. TRANSFORMER PAD SURVEY STAKES LOCATE ALL FOUR PAD CORNERS, LOW VOLTAGE AND HIGH VOLTAGE INTERCONNECTION POINTS. TRANSFORMER DOORS TO OPEN NORTH.
2. VEGETATION SHALL BE REMOVED 10[FT] BEYOND THE SECURITY FENCE LINE FOR THE SITE. LARGE TREES ARE EXCLUDED.
3. FABRIC & ROCK EQUIPMENT HUB AFTER PROJECT ENERGIZATION. EQUIPMENT HUB SECTION: 3[IN] THICK OF 1.5[IN] CLEAN AGGREGATE, UNDERLAIN WITH POLYPROPYLENE GEOTEXTILE FABRIC.
4. TYPICAL ROAD AND TEMPORARY PARKING AREA SECTION: 3[IN] THICK OF 1.5[IN] MINUS CRUSHED AGGREGATE; UNDERLAIN WITH 3[IN] THICK OF 3[IN] COARSE AGGREGATE, UNDERLAIN WITH POLYPROPYLENE GEOTEXTILE FABRIC.
5. WHERE GEOTEXTILE FABRIC IS INSTALLED, CIVIL SUB-CONTRACTOR SHALL ENSURE SECTIONS OF FABRIC OVERLAP TO INHIBIT THE GROWTH OF VEGETATION.
6. CIVIL SUB-CONTRACTOR SHALL SUPPLY & INSTALL GEOTEXTILE FABRIC AS REQUIRED FOR THE COMPLETION OF THE ENTRANCE ROAD AS SPECIFIED IN THE SCOPE OF WORK, CONSTRUCTION DRAWINGS, AND ALL APPLICABLE CODES AND STANDARDS.
7. ROADS AND OTHER AGGREGATE SURFACES SHALL BE PROPERLY COMPACTED USING APPROPRIATE VIBRATING OR TAMPING EQUIPMENT.

SHEET LEGEND

	NEW FENCE
	FABRIC AND ROCK
	PROPERTY LINE
	EXISTING GRAVEL ROADWAY
	MAJOR TOPO LINE
	EXISTING OVERHEAD POWER
	MEDIUM VOLTAGE CONDUCTOR BY OTHERS
	STAKE LOCATION TO BE LOCATED BY SURVEY CREW.
	GROUNDING CONNECTION

 CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241 DANIEL STROH, EIT CERT# 0422013-130			OPERATING DIAGRAM NOTICE OF LIMITED RESPONSIBILITY THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR INITIALS.		---														
 CERTIFICANTS: MARC LOPATA, PE PVS1-120917-006937			SCALE: 1" = 60'-0" UNIT NO.: --- DWG. SIZE: Y ARCH D (36X24) SUB CLASS: ---	MARK UP DRAWING NO. --- REV. ---															
CIVIL SITE PLAN SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER			DRAWING NO. --- DRAWING NO. XX-DWG-BLDG-000003 REVISION NO. 0																
<table border="1"> <thead> <tr> <th>REV.</th> <th>DATE</th> <th>PROJECT NO.</th> <th>DRFTR/CHK'D</th> <th>SUPV</th> <th>ENGR</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>02/26/18</td> <td>1704-101</td> <td>CJB</td> <td>DIR</td> <td>DAS</td> <td>ML</td> <td>DESIGN DRAWINGS</td> </tr> </tbody> </table>					REV.	DATE	PROJECT NO.	DRFTR/CHK'D	SUPV	ENGR	DESCRIPTION	A	02/26/18	1704-101	CJB	DIR	DAS	ML	DESIGN DRAWINGS
REV.	DATE	PROJECT NO.	DRFTR/CHK'D	SUPV	ENGR	DESCRIPTION													
A	02/26/18	1704-101	CJB	DIR	DAS	ML	DESIGN DRAWINGS												



SHEET LEGEND

	NEW FENCE
	FOUNDATION ASSEMBLY REFERENCE POINT
	FOUNDATION POINT TO BE LOCATED BY SURVEYOR
	STAKE LOCATION TO BE LOCATED BY SURVEY CREW.

- SHEET NOTES**
- RACKING CONTRACTOR IS RESPONSIBLE FOR FOLLOWING ALL NOTES AND SPECIFICATIONS ON RACKING MANUFACTURER'S DRAWINGS.
 - NORTHING AND EASTING VALUES SHALL BE INTERPRETED IN RELATION TO NOTED FOUNDATION ASSEMBLY REFERENCE POINT IN HEADER OF PILE LOCATION TABLE.
 - NORTHING AND EASTING VALUES FOR PILE LOCATIONS ARE IN FEET.

FOUNDATION ASSEMBLY REFERENCE POINTS

A	ARP 'A' LOCATED 120.9871[FT] NORTH, 29.8944[FT] EAST OF SURVEY STAKE '1. ELECTRIC PULLBOX'.
---	---

		CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241 DANIEL STROH, EIT CERT# 0422013-130				OPERATING DIAGRAM NOTICE OF LIMITED RESPONSIBILITY THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS OR AMENDMENTS TO ORIGINAL DRAWINGS OR ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL.		MARK UP DRAWING NO. --- REV. ---					
		CERTIFICANTS: MARC LOPATA, PE CERT# PVSI-120917-006937		SCALE: 1" = 45'-0" UNIT NO. --- DWG. SIZE: Y ARCH D (36X24) SUB CLASS: ---		FOUNDATION PLAN SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER DRAWING NO. XX-DWG-BLDG-000004 REVISION NO. 0							
REV. A		DATE 02/26/18		PROJECT NO. 1704-101		DRAFTING DRFTR/CHK'D CJB/DIR		SUPV DAS		ENGR ML		DESCRIPTION DESIGN DRAWINGS	

SHEET NOTES

- 1. RACKING SUB-CONTRACTOR IS RESPONSIBLE FOR FOLLOWING ALL NOTES AND SPECIFICATIONS ON RACKING MANUFACTURER'S DRAWINGS INCLUDING INSTALLING RACKING PER SPECIFIED TORQUE VALUES.
2. NORTHING AND EASTING VALUES SHALL BE INTERPRETED IN RELATION TO NOTED FOUNDATION ASSEMBLY REFERENCE POINT IN HEADER OF PILE LOCATION TABLE.
3. NORTHING AND EASTING VALUES FOR PILE LOCATIONS ARE IN FEET.
4. CONTROL POSTS ARE IDENTIFIED WITHIN THE COLUMN LINE TABLES. CONTROL POST PILE NUMBER SHALL INCLUDE AN ASTERISK (*) AFTER THE PILE NUMBER. EXAMPLE: (X-1.1*). SEE SHEET S1, GENERAL NOTE #6 FOR ADDITIONAL INFORMATION.
5. SURVEYOR STAKES SHALL BE COLOR CODED TO IDENTIFY CONTROL AND NON CONTROL POSTS. YELLOW GROUND MARKINGS SHALL BE USED TO SIGNIFY NON-CONTROL POST LOCATIONS. RED GROUND MARKINGS SHALL BE USED TO SIGNIFY CONTROL POST LOCATIONS.

COLUMN LINE: A

Table with 3 columns: PILE NO., NORTH OF ARP 'A', EAST OF ARP 'A'. Rows include A-3.1* through A-7.4.

COLUMN LINE: B

Table with 3 columns: PILE NO., NORTH OF ARP 'A', EAST OF ARP 'A'. Rows include B-2.1* through B-7.4.

COLUMN LINE: C

Table with 3 columns: PILE NO., NORTH OF ARP 'A', EAST OF ARP 'A'. Rows include C-2.1* through C-19.4.

COLUMN LINE: D

Table with 3 columns: PILE NO., NORTH OF ARP 'A', EAST OF ARP 'A'. Rows include D-2.1* through D-20.4.

COLUMN LINE E:

Table with 3 columns: PILE NO., NORTH OF ARP 'A', EAST OF ARP 'A'. Rows include E-1.1* through E-20.4.

COLUMN LINE F:

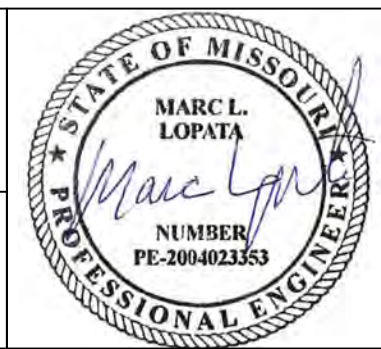
Table with 3 columns: PILE NO., NORTH OF ARP 'A', EAST OF ARP 'A'. Rows include F-1.1* through F-20.4.

EQUIPMENT MOUNTING POSTS: Z

Table with 3 columns: PILE NO., NORTH OF ARP 'A', EAST OF ARP 'A'. Rows include Z-1.1 through Z-1.4.

OPERATING DIAGRAM

NOTICE OF LIMITED RESPONSIBILITY
THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR INITIALS.



CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241 DANIEL STROH, EIT CERT# 042013-130
CERTIFICANTS: MARC LOPATA, PE CERT# PVS1-120917-006937

DRAWING RECORD table with columns: REV., DATE, PROJECT NO., DRAFTING (DRFTR/CHK'D/SUPV/ENGR), DESCRIPTION.

FOUNDATION POINTS
SCALE: NOT TO SCALE
UNIT NO.:
DWG. SIZE: Y ARCH D (36X24)
SUB CLASS:

SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER
DRAWING NO. XX-DWG-BLDG-000005
REVISION NO. 0



DC CIRCUIT EXAMPLE CALCULATIONS

MAX CIRCUIT CURRENT = [NEC 690.8(A)]
 1.25 * MAX CIRCUIT CURRENT = [NEC 690.8(B)(1)]
 MAX ADJUSTED CIRCUIT CURRENT = [NEC 690.8(B)(2)]
 PERCENT VOLTAGE DROP = (2 * ONE-WAY DISTANCE * NUMBER OF COMBINED CIRCUITS * MODULE MAXIMUM POWER CURRENT * CONDUCTOR RESISTANCE PER KFT) / (1000 * NUMBER OF SERIES MODULES * MODULE MAXIMUM POWER VOLTAGE)

AC CIRCUIT EXAMPLE CALCULATIONS

MAX CIRCUIT CURRENT = [NEC 690.8(A)]
 1.25 * MAX CIRCUIT CURRENT = [NEC 690.8(B)(1)]
 MAX ADJUSTED CIRCUIT CURRENT = [NEC 690.8(B)(2)]
 PERCENT VOLTAGE DROP (LINE-TO-NEUTRAL) = (ONE-WAY DISTANCE * NUMBER OF COMBINED CIRCUITS * INVERTER MAXIMUM OUTPUT CURRENT / RUN * CONDUCTOR IMPEDANCE PER KFT * VOLTAGE L-N TO L-L MULTIPLIER) / (1000 * CIRCUIT VOLTAGE L-L)
 IMPEDANCE PER KFT = AC RESISTANCE OF SELECTED CONDUCTOR * COSINE(COSINE(POWER FACTOR)) + AC REACTANCE OF SELECTED CONDUCTOR * SINE(COSINE(POWER FACTOR))
 NOTE: AC VOLTAGE DROP CALCULATIONS ASSUME ABSOLUTE POWER FACTOR VALUE OF 0.97.

SHEET NOTES

- CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL GENERAL NOTES, DC CIRCUIT NOTES, AND AC CIRCUIT NOTES IN DRAWING PACKAGE.
- REFER TO GENERAL NOTES FOR ELECTRICAL AND EQUIPMENT DEFINITIONS.
- BALANCED 3-PHASE, ONE PHASE SHOWN FOR CLARITY.
- REFER TO DETAILS SHEET, BLDGS, FOR LABELING INFORMATION & LOCATIONS.
- REFER TO DETAILS SHEET, BLDGS, FOR AC COMBINER PANEL AND MAIN DISTRIBUTION SWITCHBOARD EQUIPMENT SCHEDULES.

EQUIPMENT SCHEDULE

QTY	EQUIPMENT ID	EQUIPMENT TYPE	MODEL NO.	NOTES
2,880	S1.1:S18.10	PV MODULE	GCL-P6/72H 340 W MODULE	-
7	VARIES; SEE DIAGRAM	INVERTER	SOLECTRIA PVI-60TL-480	-
9	VARIES; SEE DIAGRAM	INVERTER	SOLECTRIA PVI-50TL-480	-
2	VARIES; SEE DIAGRAM	INVERTER	SOLECTRIA PVI-36TL-480	-
2	ACCP1:ACCP2	AC COMBINER PANEL	GENERAL ELECTRIC, 600A 'AE' PANELBOARD, NEMA 4	-
1	ACCP3	AC COMBINER PANEL	GENERAL ELECTRIC, 400A 'AE' PANELBOARD, NEMA 4	-
1	MDS1	MAIN DISTRIBUTION SWITCHBOARD/MAIN DISCONNECT SWITCH	GENERAL ELECTRIC, 1600A 'SPECTRA' SWITCHBOARD, NEMA3R	FAULT CURRENT RATING: 35(KAIC); PRE-INSTALLED 125KA/MODE TRANSIENT VOLTAGE SURGE SUPPRESSION DEVICE
1	XFMR1	STEP-UP TRANSFORMER	ABB 1000KVA	DESIGN, FURNISH, & INSTALL BY OTHERS
1	MNTR1	MONITORING BOX	ALSO ENERGY ALL-IN-ONE ENCLOSURE	INCLUDES EQUIPMENT PER MONITORING DETAILS SHEET
1	MNTR2	WEATHER STATION	-	INCLUDES: WIND SPEED/DIRECTION, TILTED & HORIZONTAL IRRADIANCE, AND AMBIENT & MODULE CELL TEMPERATURES
1	ACPD1	AC DISCONNECT	GENERAL ELECTRIC, SAFETY SWITCH, NEMA3R	60AMP, 20AMP FUSE
1	XFMR2	TRANSFORMER	GENERAL ELECTRIC, 10KVA SINGLE PHASE, NEMA3R	480VAC 120/240VAC
1	MNTR4	SOLAR METER	-	DESIGN, FURNISH, AND INSTALL BY OTHERS
1	MNTR3	CONVENIENCE POWER METER BASE	MILBANK, 120/240VAC, 200AMP, NEMA3R	-
1	LC1	LOAD CENTER	GENERAL ELECTRIC, 100A BUSBAR, NEMA3R	(1) 40A/2 MAIN CIRCUIT BREAKER, AND (3) 20A/1-POLE CIRCUIT BREAKERS

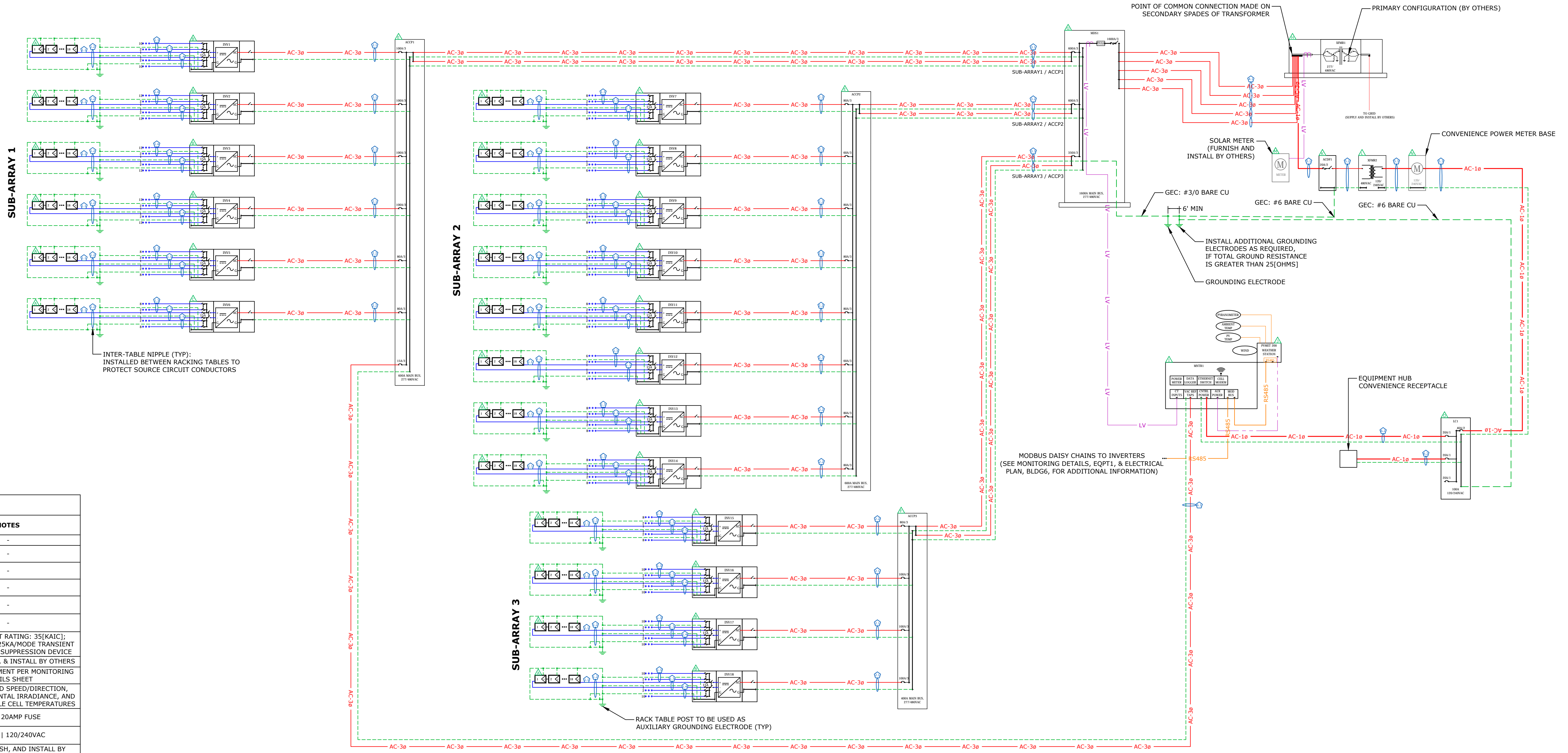
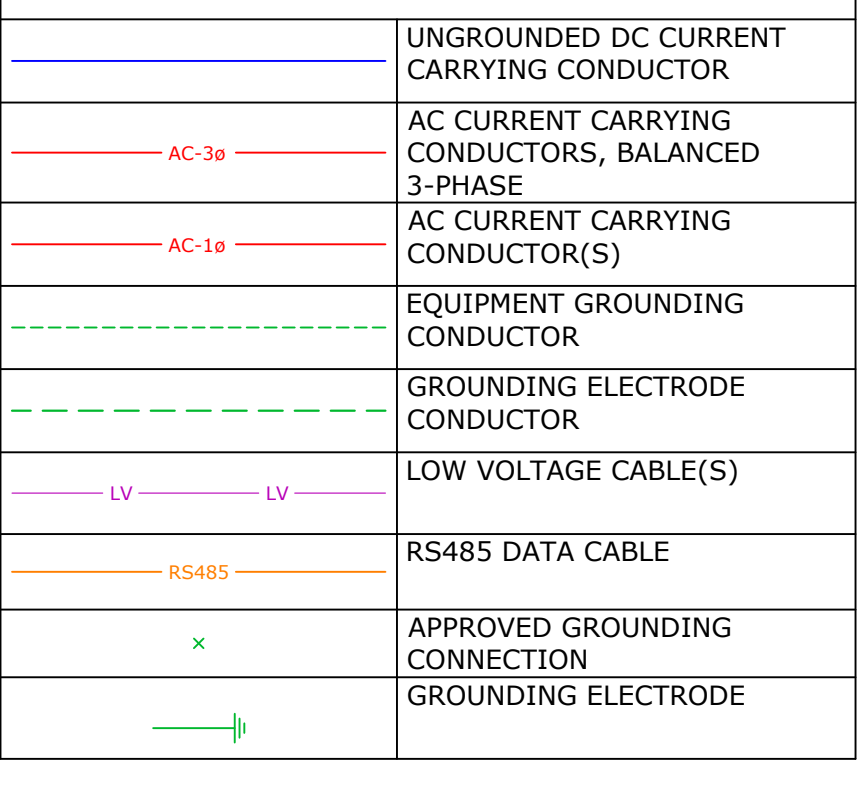
PV SOURCE CIRCUIT WIRE & CONDUIT SCHEDULE

STRING IDS	FEEDS INVERTER ID	CURRENT CARRYING CONDUCTORS	GROUNDING CONDUCTOR	CONDUIT SIZE & TYPE [INCHES]	OCPD SIZE [AMP]	NUMBER OF SERIES MODULES	NUMBER OF PARALLEL RUNS PER CIRCUIT	1.25*MAX CIRCUIT CURRENT PER RUN [AMP]	DESIGN TEMP [°C]	TEMP DERATE FACTOR	CONDUIT FILL DERATE FACTOR	MAX ADJUSTED CIRCUIT CURRENT PER RUN [AMP]	CONDUCTOR AMPACITY PER RUN [AMP@°C]	MAX ESTIMATED ONE-WAY DISTANCE [FT]	VOLTAGE DROP [%]	ACTUAL CONDUIT FILL [%]	ALLOWABLE CONDUIT FILL [%]
S1.1:S18.10	INV1:INV18	(2) #10 C PV-2000V CU	(1) #6 G BARE STR CU	FREE AIR	15	18	1	14.77	35	0.96	1.00	12.30	(1) x 40 @ 90°C	315	1.34%	0.00	40.00
S1.1:S18.10	INV1:INV18	1.2 SEE DC CIRCUIT NOTE #7 FOR CONDUCTORS & INTER-TABLE NIPPLE DETAILS			15	18	1	14.77	35	-	-	-	(1) x 40 @ 90°C	2	0.01%	VARIES	60.00
(3) STRING INVERTER INPUT CONDUIT	1.3	(6) #10 C PV-2000V CU	(1) #6 G BARE STR CU	(1) 1-1/4" PVC SCHD 40/ LFMC	15	18	1	14.77	35	0.96	0.80	15.38	(1) x 40 @ 90°C	10	0.04%	23.78	40.00
(4) STRING INVERTER INPUT CONDUIT	1.4	(8) #10 C PV-2000V CU	(1) #6 G BARE STR CU	(1) 1-1/4" PVC SCHD 40/ LFMC	15	18	1	14.77	35	0.96	0.70	17.58	(1) x 40 @ 90°C	10	0.04%	31.10	40.00
(2) STRING INVERTER INPUT CONDUIT	1.5	(4) #10 C PV-2000V CU	(1) #6 G BARE STR CU	(1) 1-1/4" PVC SCHD 40/ LFMC	15	18	1	14.77	35	0.96	0.80	15.38	(1) x 40 @ 90°C	10	0.04%	16.46	40.00

PV INVERTER OUTPUT CIRCUIT WIRE & CONDUIT SCHEDULE

EQUIP ID	FEEDS EQUIP ID	CURRENT CARRYING CONDUCTORS	GROUNDING CONDUCTOR	CONDUIT SIZE & TYPE [INCHES]	OCPD SIZE [AMP]	NUMBER OF COMBINED INVERTERS PER CIRCUIT	NUMBER OF PARALLEL RUNS PER CIRCUIT	1.25*MAX CIRCUIT CURRENT PER RUN [AMP]	DESIGN TEMP [°C]	TEMP DERATE FACTOR	CONDUIT FILL DERATE FACTOR	MAX ADJUSTED CIRCUIT CURRENT PER RUN [AMP]	CONDUCTOR AMPACITY PER RUN [AMP@°C]	MAX ESTIMATED ONE-WAY DISTANCE [FT]	VOLTAGE DROP L-L [%]	ACTUAL CONDUIT FILL [%]	ALLOWABLE CONDUIT FILL [%]
PVI-60TL CKTS TO ACCP#	2.1	(3) #2 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #8 G THWN-2 CU	(1) 1-1/2" LFMC/PVC SCHD40/ PVC SCHD 80	100	1	1	91.25	35	0.96	1.0	76.04	(1) x 130 @ 90°C	130	0.67	24.6%	40.0%
PVI-50TL CKTS TO ACCP#	2.2	(3) #4 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #8 G THWN-2 CU	(1) 1-1/2" LFMC/PVC SCHD40/ PVC SCHD 80	80	1	1	76.25	35	0.96	1.0	63.54	(1) x 95 @ 90°C	150	0.83	18.7%	40.0%
PVI-36TL CKTS TO ACCP#	2.3	(3) #6 C THWN-2 CU, (1) #10 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1" LFMC/PVC SCHD40/ PVC SCHD 80	60	1	1	54.38	35	0.96	1.0	45.31	(1) x 75 @ 90°C	125	0.38	28.2%	40.0%
ACCP1	MDS1	(3) #400 C THWN-2 AL, (1) #1/0 N THWN-2 AL	(1) #1/0 G THWN-2 CU	(1) 4" PVC SCHD40/ PVC SCHD 80	600	6	2	258.75	35	0.96	1.0	215.63	(2) x 305 @ 90°C	20	0.09	18.4%	40.0%
ACCP2	MDS1	(3) #500 C THWN-2 AL, (1) #1/0 N THWN-2 AL	(1) #1/0 G THWN-2 CU	(1) 4" PVC SCHD40/ PVC SCHD 80	600	8	2	283.13	35	0.96	1.0	235.94	(2) x 350 @ 90°C	20	0.22	21.6%	40.0%
ACCP3	MDS1	(3) #400 C THWN-2 AL, (1) #1 N THWN-2 AL	(1) #1 G THWN-2 CU	(1) 4" PVC SCHD40/ PVC SCHD 80	400	4	2	175	35	0.96	1.0	145.83	(2) x 350 @ 90°C	450	1.43	22.8%	40.0%
MDS1	XFMR1	(3) #400 C THWN-2 CU, (1) #300 N THWN-2 CU	-	(1) 4" PVC SCHD40/ PVC SCHD 80	1600	18	5	286.75	35	0.96	1.0	238.96	(5) x 380 @ 90°C	20	0.07	19.7%	40.0%
XFMR1	ACDF1	(2) #10 C THWN-2 CU, (1) #10 N THWN-2 CU	-	(1) 1" PVC SCHD40/ PVC SCHD 80	20	0	1	25.00	35	0.96	1.0	20.83	(1) x 40 @ 90°C	20	0.196%	12.2%	40.0%
ACDF1	XFMR2	(2) #8 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1" GRC	40	0	1	-	35	0.96	1.0	-	(1) x 55 @ 90°C	10	-	15.2%	40.0%
XFMR2	LC1	(2) #8 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1" GRC	40	0	1	-	35	0.96	1.0	-	(1) x 55 @ 90°C	10	-	15.2%	40.0%
ACCP1	MNTR1	(1) #12 C THWN-2 CU, (1) #12 N THWN-2 CU	(1) #12 G THWN-2 CU	(1) 1" GRC	15	0	1	-	35	0.96	1.0	-	(1) x 30 @ 90°C	10	-	6.2%	40.0%
LC1	LOAD	(1) #12 C THWN-2 CU, (1) #12 N THWN-2 CU	(1) #12 G THWN-2 CU	(1) 1" PVC SCHD40/ PVC SCHD 80	20	0	1	-	35	0.96	1.0	-	(1) x 30 @ 90°C	120	-	7.7%	40.0%

SHEET LEGEND



OPERATING DIAGRAM

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SCALE: NOT TO SCALE
 UNIT NO.:
 DWG. SIZE: Y ARCH D (36X24)
 SUB CLASS:

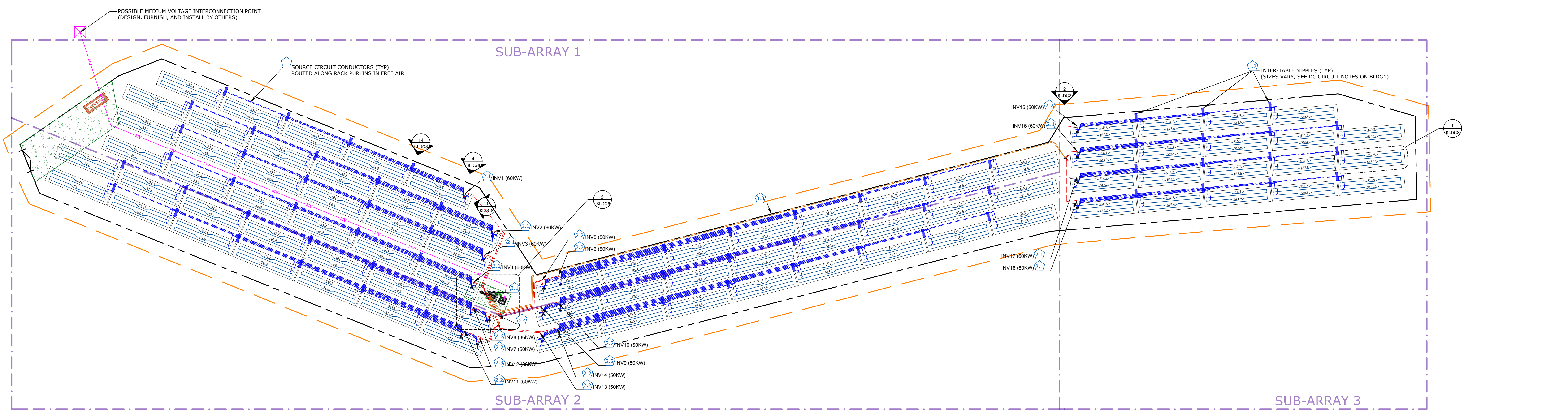
SINGLE LINE DIAGRAM AND SPECIFICATIONS

SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER
 DRAWING NO. ---
 ELEC. NO. ---
 XX-DWG-DRAWING-000001
 REVISION NO. 0

AMEREN MISSOURI

REV.	DATE	PROJECT NO.	DRAFTING	SUPV	ENGR	DESCRIPTION
A	02/26/18	1704-101	DRFR/CHK'D	CJB	DIR	DESIGN DRAWINGS

DRAWING RECORD



- SHEET NOTES**
- CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL GENERAL NOTES, DC CIRCUIT NOTES, AND AC CIRCUIT NOTES IN DRAWING PACKAGE.
 - REFER TO GENERAL NOTES FOR ELECTRICAL AND EQUIPMENT DEFINITIONS.
 - TRANSFORMER PAD AND TRANSFORMER DESIGNED, FURNISHED, AND INSTALLED BY OTHERS.
 - REFER TO DETAILS SHEET FOR SPECIFIED CALLOUTS.
 - CONTRACTOR SHALL LABEL SOURCE CIRCUIT WIRES AS SPECIFIED ON SHEET. FOR MORE INFORMATION SEE PLACARD AND WIRE LABEL NOTES ON DETAILS AND DATA SHEETS.

SHEET LEGEND

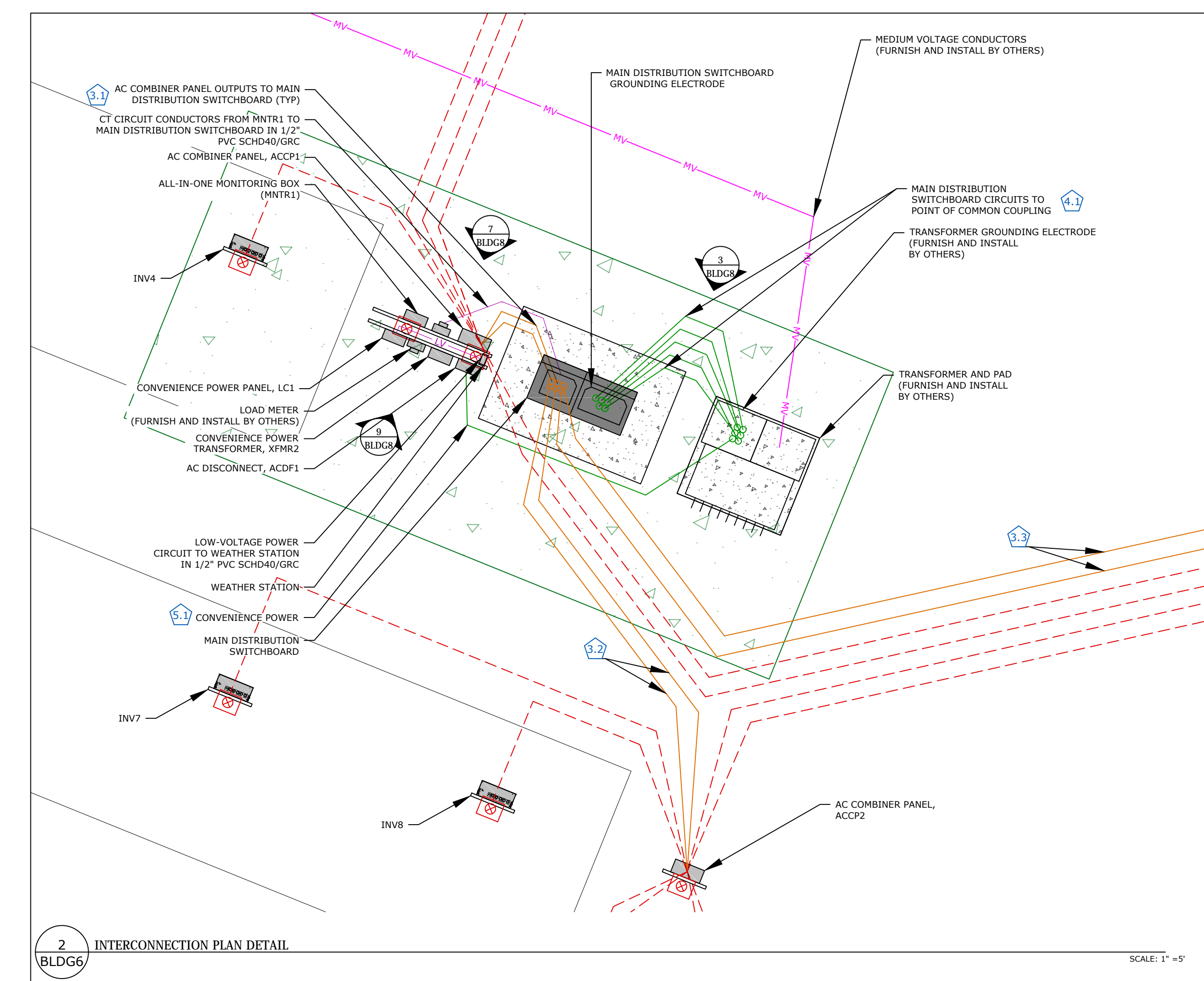
	MODULE INTERCONNECTION STRING
	SOURCE CIRCUITS FROM ARRAYS TO INVERTERS
	INVERTER OUTPUT CIRCUITS FROM INVERTERS TO AC COMBINER PANELS
	COMBINED AC OUTPUT CIRCUITS FROM AC COMBINER PANELS TO MAIN DISTRIBUTION SWITCHBOARD
	RE-COMBINED AC OUTPUT CIRCUITS FROM MAIN DISTRIBUTION SWITCHBOARD TO POINT OF COMMON CONNECTION
	AC CONVENIENCE LOAD CONDUCTORS
	LOW VOLTAGE CONDUCTORS
	MEDIUM VOLTAGE CONDUCTORS (DESIGN, FURNISH, AND INSTALL BY OTHERS)
	SUB-ARRAY

PV SOURCE CIRCUIT WIRE & CONDUIT SCHEDULE

STRING IDS	FEEDS INVERTER ID	#	CURRENT CARRYING CONDUCTORS	GROUNDING CONDUCTOR	CONDUIT SIZE & TYPE [INCHES]	OCPD SIZE [AMP]	NUMBER OF SERIES MODULES	NUMBER OF PARALLEL RUNS PER CIRCUIT
S1.1-S18.10	INV1-INV18	1.1	(2) #10 C PV-2000V CU	(1) #6 G BARE STR CU	FREE AIR	15	18	1
S1.1-S18.10	INV1-INV18	1.2	SEE DC CIRCUIT NOTE #7 FOR CONDUCTORS & INTER-TABLE NIPPLE DETAILS			15	18	1
	(3) STRING INVERTER INPUT CONDUIT	1.3	(6) #10 C PV-2000V CU	(1) #6 G BARE STR CU	(1) 1-1/4" PVC SCHD 40/ LFMC	15	18	1
	(4) STRING INVERTER INPUT CONDUIT	1.4	(8) #10 C PV-2000V CU	(1) #6 G BARE STR CU	(1) 1-1/4" PVC SCHD 40/ LFMC	15	18	1
	(2) STRING INVERTER INPUT CONDUIT	1.5	(4) #10 C PV-2000V CU	(1) #6 G BARE STR CU	(1) 1-1/4" PVC SCHD 40/ LFMC	15	18	1

PV INVERTER OUTPUT CIRCUIT WIRE & CONDUIT SCHEDULE

EQUIP ID	FEEDS EQUIP ID	#	CURRENT CARRYING CONDUCTORS	GROUNDING CONDUCTOR	CONDUIT SIZE & TYPE [INCHES]	OCPD SIZE [AMP]	NUMBER OF COMBINED INVERTERS PER CIRCUIT	NUMBER OF PARALLEL RUNS PER CIRCUIT
PVI-60TL CKTS TO ACCP#	2.1	(3) #2 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #8 G THWN-2 CU	(1) 1-1/2" LFMC/PVC SCHD40/ PVC SCHD 80	100	1	1	
PVI-50TL CKTS TO ACCPS	2.2	(3) #4 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #8 G THWN-2 CU	(1) 1-1/2" LFMC/PVC SCHD40/ PVC SCHD 80	80	1	1	
PVI-36TL CKTS TO ACCPS	2.3	(3) #6 C THWN-2 CU, (1) #10 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1" LFMC/PVC SCHD40/ PVC SCHD 80	60	1	1	
ACCP1	MDS1	3.1	(3) #400 C THWN-2 AL, (1) #1/0 N THWN-2 AL	(1) #1/0 G THWN-2 CU	(1) 4" PVC SCHD40/ PVC SCHD 80	600	6	2
ACCP2	MDS1	3.2	(3) #500 C THWN-2 AL, (1) #1/0 N THWN-2 AL	(1) #1/0 G THWN-2 CU	(1) 4" PVC SCHD40/ PVC SCHD 80	600	8	2
ACCP3	MDS1	3.3	(3) #400 C THWN-2 AL, (1) #1 N THWN-2 AL	(1) #1 G THWN-2 CU	(1) 4" PVC SCHD40/ PVC SCHD 80	400	4	2
MDS1	XFMR1	4.1	(3) #400 C THWN-2 CU, (1) #300 N THWN-2 CU	-	(1) 4" PVC SCHD40/ PVC SCHD 80	1600	18	5
XFMR1	ACDF1	5.1	(2) #10 C THWN-2 CU, (1) #10 N THWN-2 CU	-	(1) 1" PVC SCHD40/ PVC SCHD 80	20	0	1
ACDF1	XFMR2	5.2	(2) #8 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1" GRC	40	0	1
XFMR2	LC1	5.3	(2) #8 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1" GRC	40	0	1
ACCP1	MNTR1	6.1	(1) #12 C THWN-2 CU, (1) #12 N THWN-2 CU	(1) #12 G THWN-2 CU	(1) 1" GRC	15	0	1
LC1	LOAD	6.2	(1) #12 C THWN-2 CU, (1) #12 N THWN-2 CU	(1) #12 G THWN-2 CU	(1) 1" PVC SCHD40/ PVC SCHD 80	20	0	1



OPERATING DIAGRAM

NOTICE OF LIMITED RESPONSIBILITY
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SCALE: 1" = 40'-0"
 UNIT NO. ---
 DWG. SIZE Y ARCH D (36X24)
 SUB CLASS ---

ELECTRICAL PLAN

MARK UP DRAWING NO. ---
 REV. ---

SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER
 DRAWING NO. ---
XX-DWG-BLDG-000006
 REVISION NO. 0

AMEREN MISSOURI

REV.	DATE	PROJECT NO.	DRAFTING	SUPV	ENGR	DESCRIPTION
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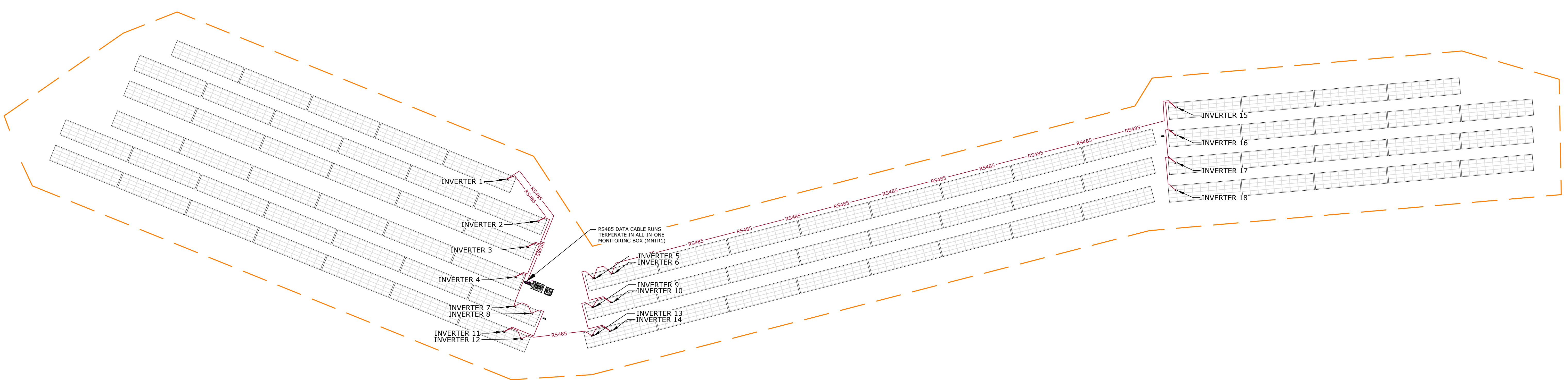
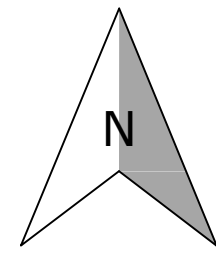
CERTIFICANTS:
 MARC LOPATA, PE
 CERT # 091110-241
 DANIEL STROH, EIT
 CERT # 042013-130

CERTIFICANTS:
 MARC LOPATA, PE
 CERT # PVSI-120917-006937

STATE OF MISSOURI
 MARC LOPATA
 PROFESSIONAL ENGINEER
 NUMBER: PE-200402333

NABCEP CERTIFIED
 PV Installation Professional

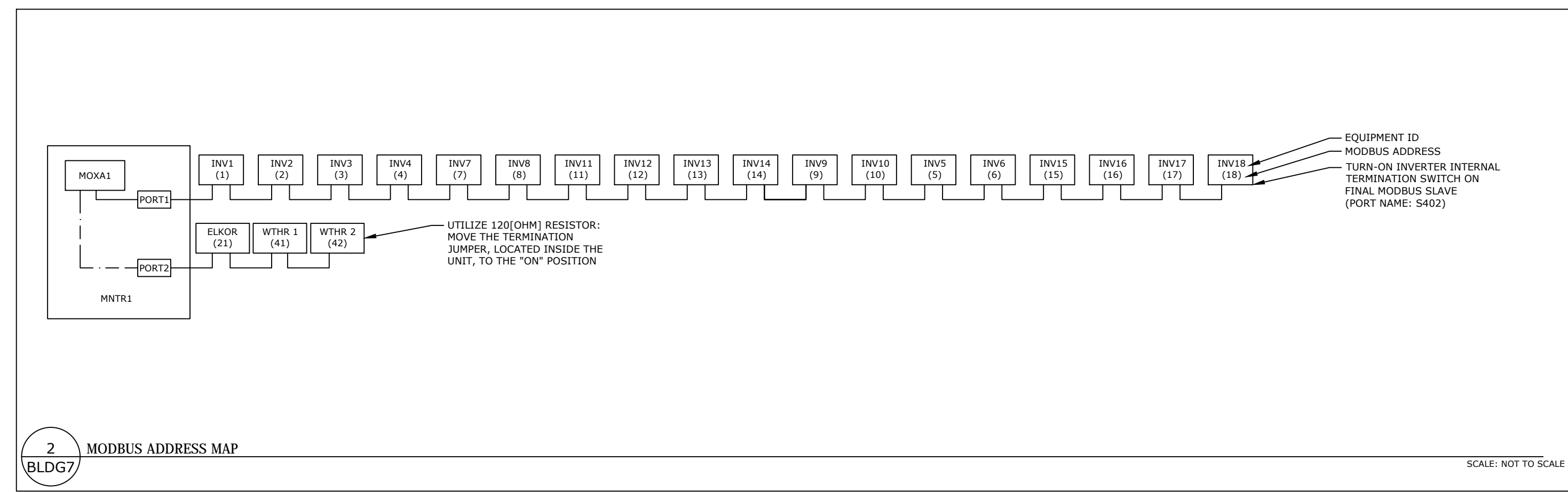
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 SOLAR DESIGNER



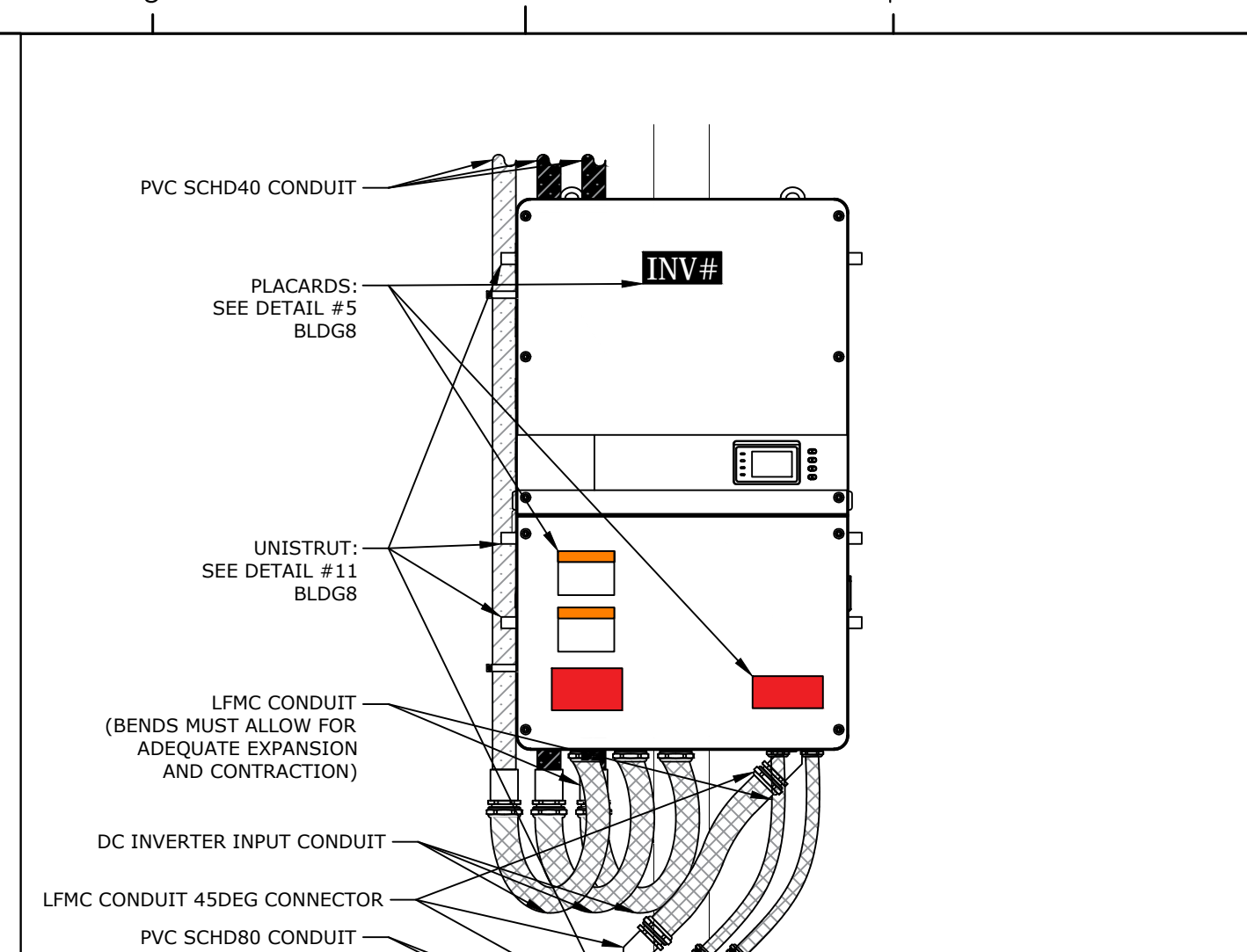
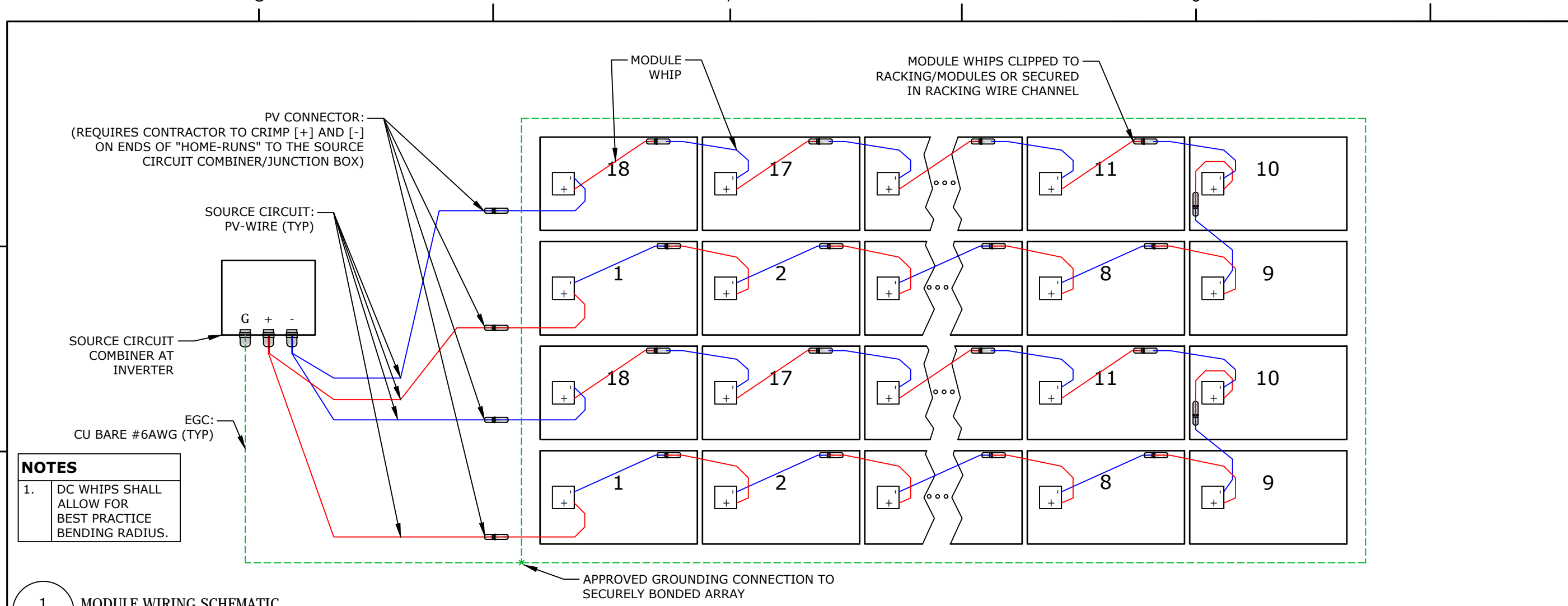
- MONITORING NOTES**
1. DAISY-CHAIN RS485 CABLE TO EQUIPMENT AS SHOWN IN MODBUS ADDRESS MAP.
 2. ALSO ENERGY DATA LOGGER CONFIGURED TO COMMUNICATE AT A BAUD RATE OF 19200. SOLECTRIA INVERTERS SET TO COMMUNICATE AT THE 19200 BAUD RATE.
 3. MODBUS PARITY TO BE SET TO "NONE".
 4. REFER TO MANUFACTURER INSTALLATION MATERIAL FOR FURTHER INSTALLATION SPECIFICATIONS.
 5. WITHIN A TRENCH, CONDUITS CONTAINING DATA CONDUCTORS AND CONDUITS CONTAINING POWER CONDUCTORS SHALL BE SEPARATED BY A MINIMUM OF 18".
 6. RS485 DATA CABLE RUNS SHALL USE 3/4" GALVANIZED RIGID CONDUIT ABOVE GRADE AT CENTRAL HUB, AND 3/4" CONDUIT AT INVERTERS AS SPECIFIED ON BLDG8.

SHEET LEGEND

	SHIELDED RS485 DATA CABLE IN CONDUIT AS SPECIFIED
--	---



 PV Installation Professional	CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241 DANIEL STROH, EIT CERT# 042013-130		OPERATING DIAGRAM		---
	NOTICE OF LIMITED RESPONSIBILITY THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS OR ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR INITIALS.		MARK UP DRAWING NO.	REV.	
 PVSI-120917-006937	CERTIFICANTS: MARC LOPATA, PE CERT# PVS1-120917-006937	SCALE: 1" = 40'-0" UNIT NO.: --- DWG. SIZE: Y ARCH D (36X24) SUB CLASS: ---	MONITORING PLAN		---
DRAWING RECORD REV. DATE PROJECT NO. DRAFTING DRFTR/CHK'D SUPV ENGR DESCRIPTION			SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER		DRAWING NO.
A 02/26/18 1704-101 CJB DIR DAS ML DESIGN DRAWINGS					XX-DWG-BLDG-000007
			REVISION NO. 0		



PLACARD & WIRE LABEL NOTES

- REQUIRED SAFETY PLACARDS, LABELS, AND SIGNS SHALL BE PERMANENTLY ATTACHED BY ADHESIVE (GORILLA GLUE OR SIMILAR) AND INSTALLED ACCORDING TO MANUFACTURER'S INSTALLATION INSTRUCTIONS. LABELS SHALL COMPLY WITH ARTICLE 690 OF THE NATIONAL ELECTRIC CODE OR OTHER APPLICABLE STATE AND LOCAL CODES.
- WHERE APPLICABLE, ALL PLACARDS, LABELS, AND SIGNS SHOULD BE INSTALLED AS SHOWN IN DETAILS.
- SOURCE CIRCUIT STRING ID WIRE LABELS SHALL BE PRINTED ON SELF-LAMINATING TYPE LABELS AND ADHERED ACCORDING TO MANUFACTURER'S INSTALLATION INSTRUCTIONS INSIDE ENCLOSURES. LABELS SHALL BE PRINTED IN THE FOLLOWING FORMAT: "[INVERTER #].[STRING #] (POLARITY)"; I.E. "S12.8 (+)". FOR EXACT LABEL DETAILS SEE STRING ID CALLOUTS ON ELECTRICAL PLAN SHEET.

ACC#1 PANELBOARD SCHEDULE

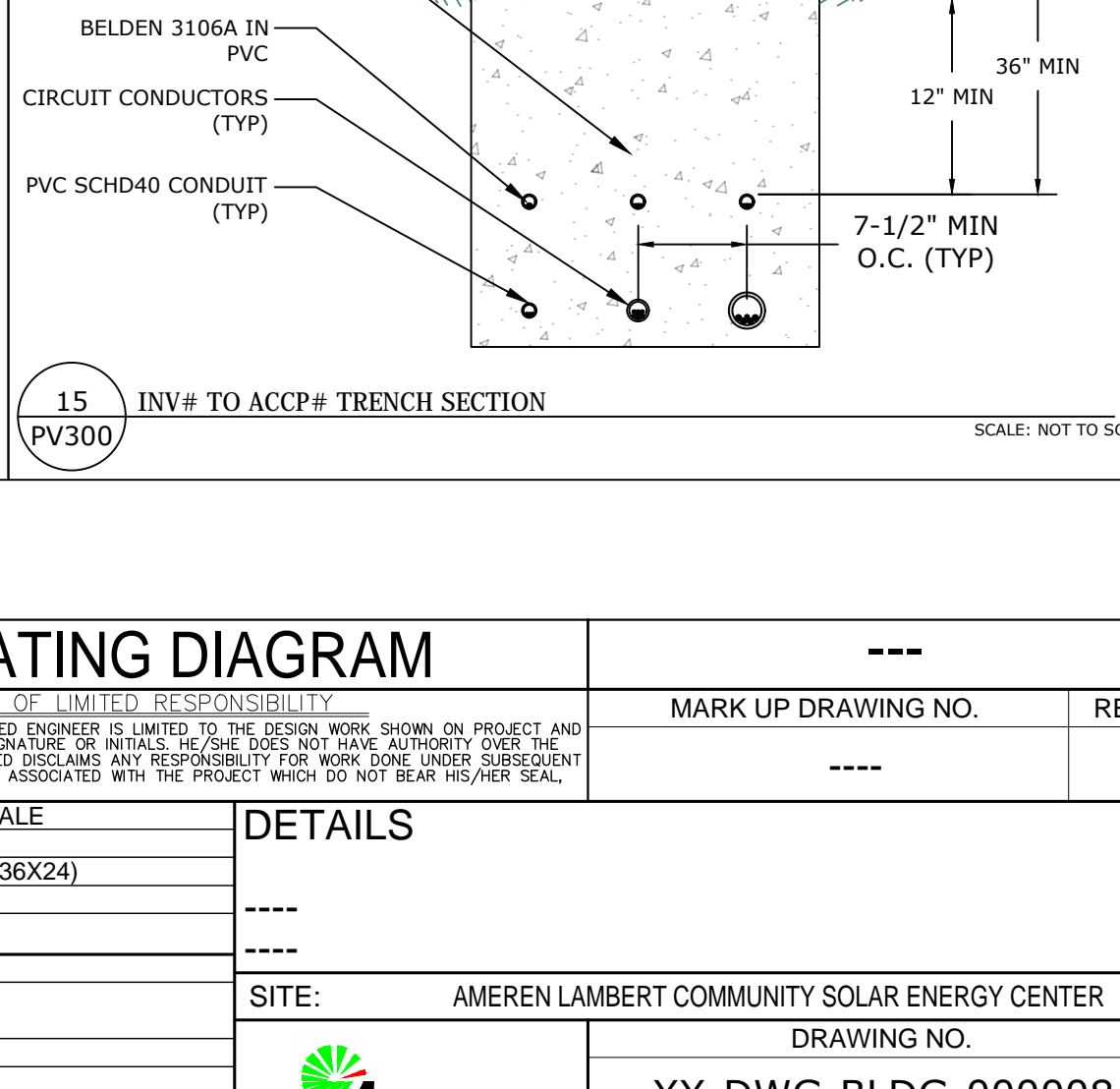
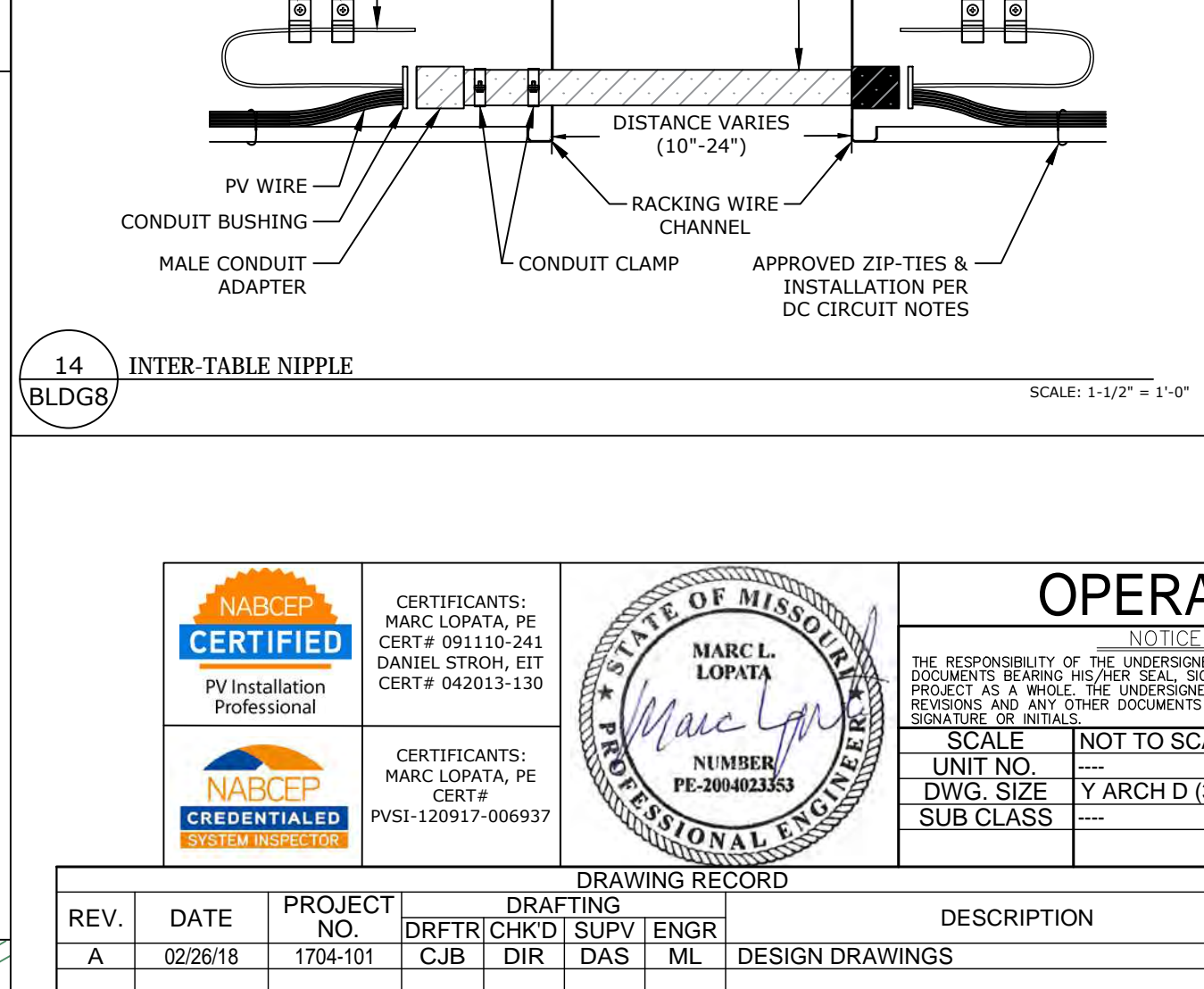
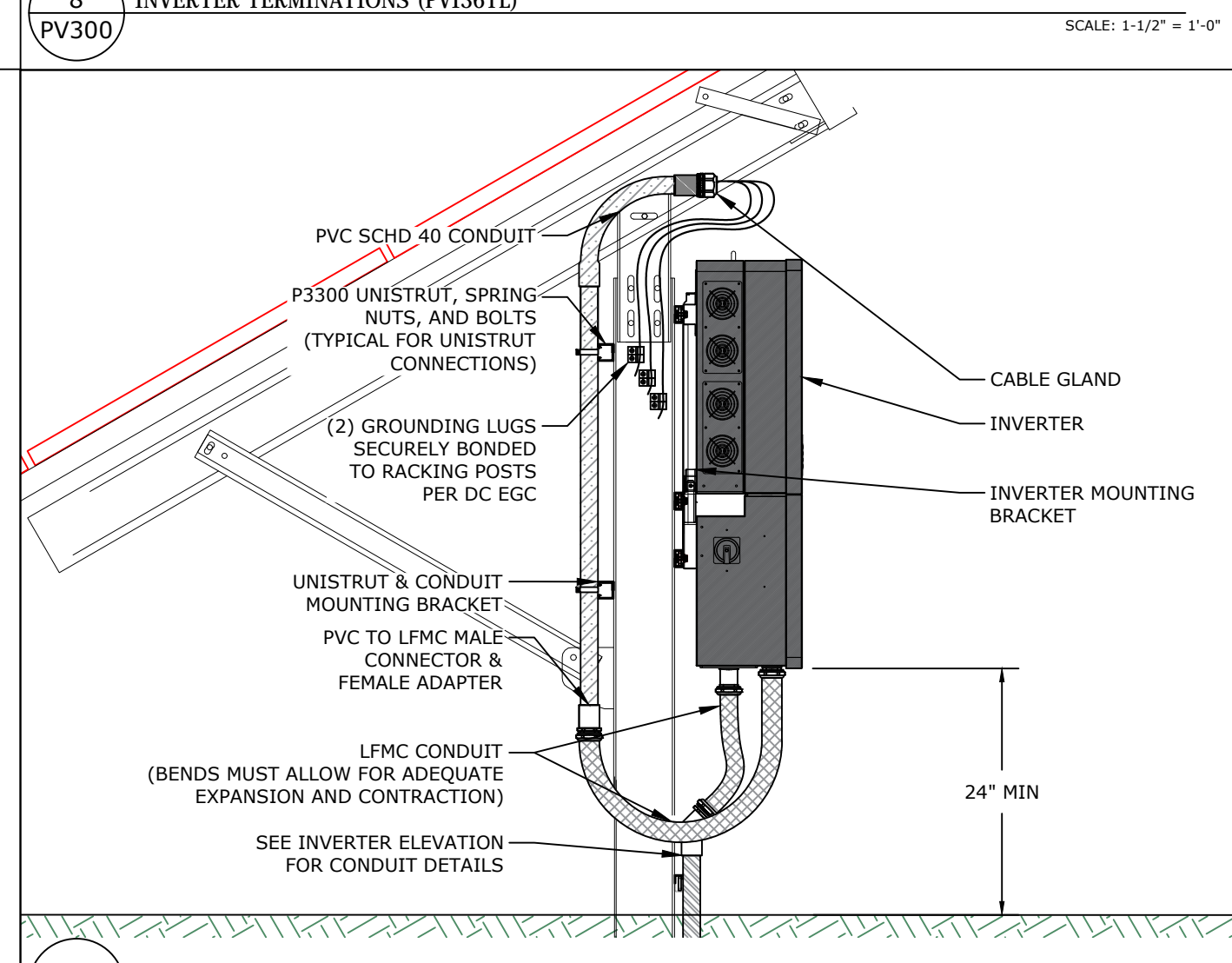
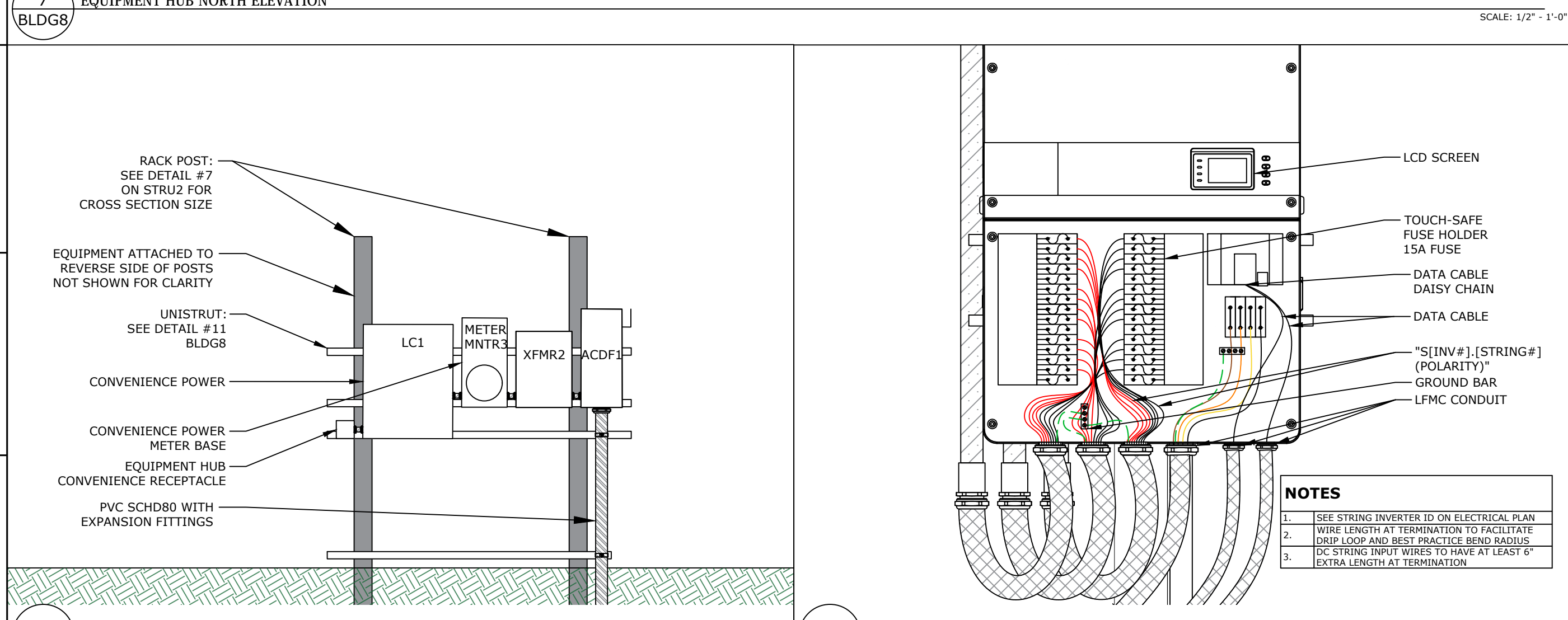
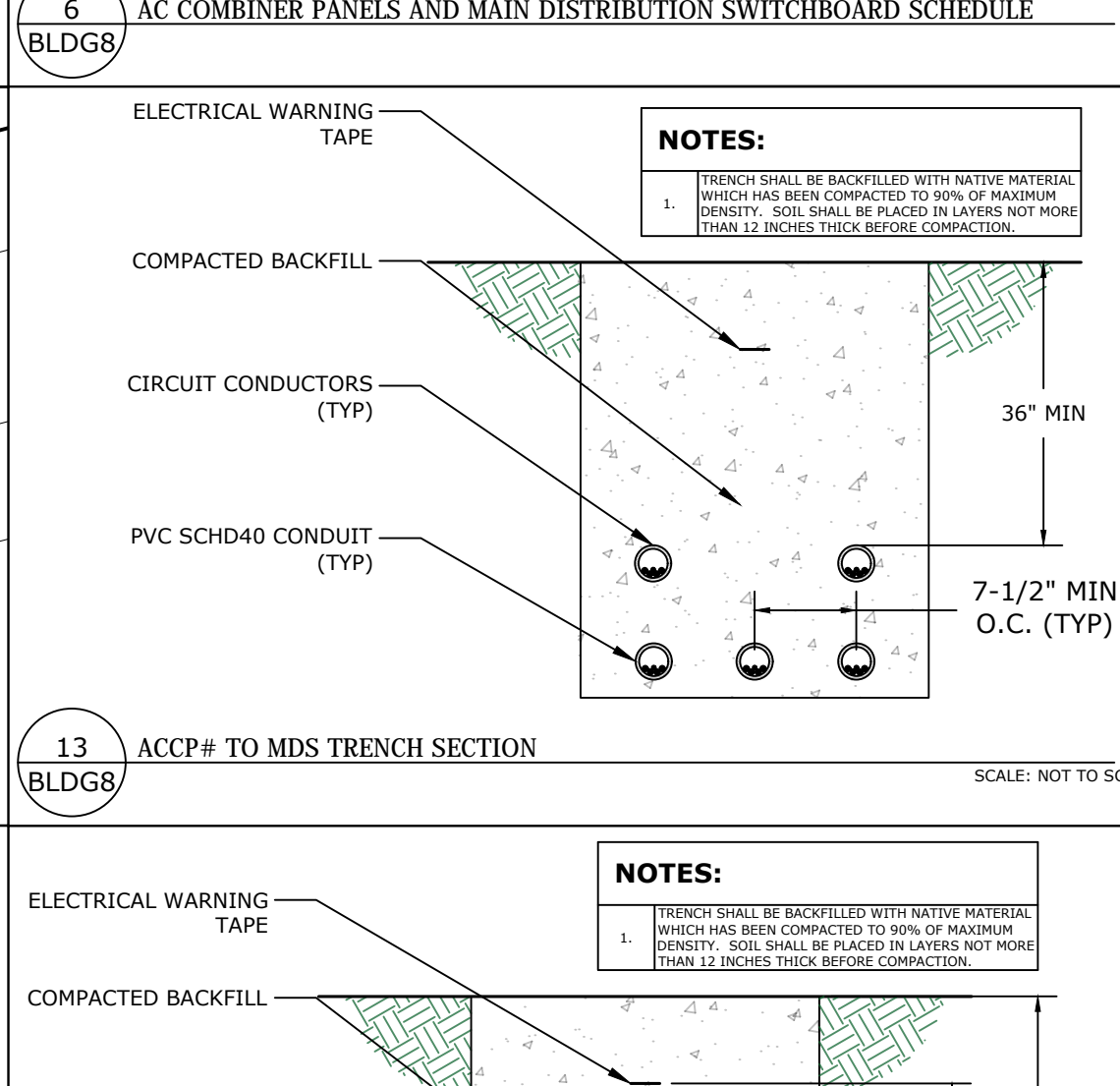
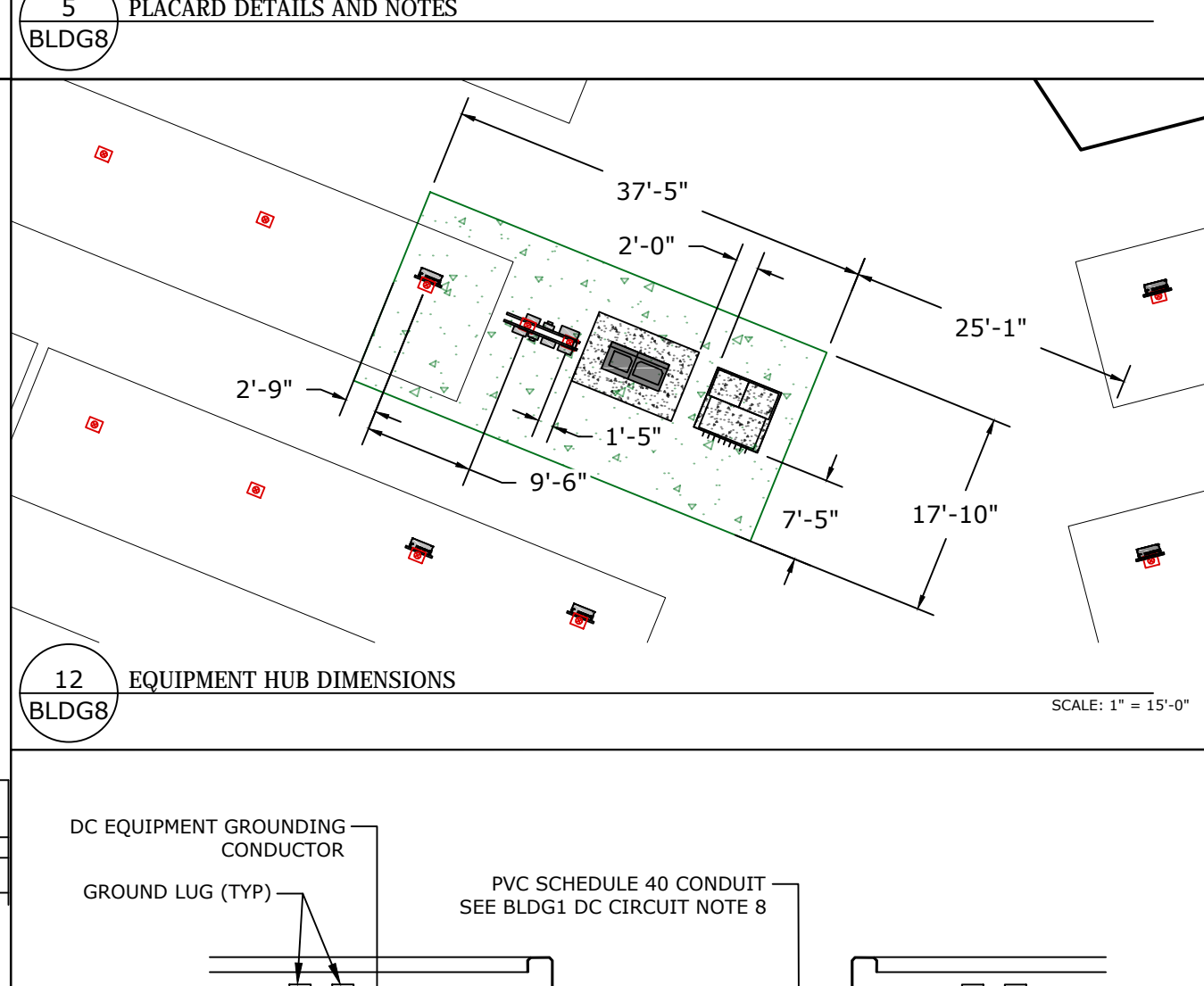
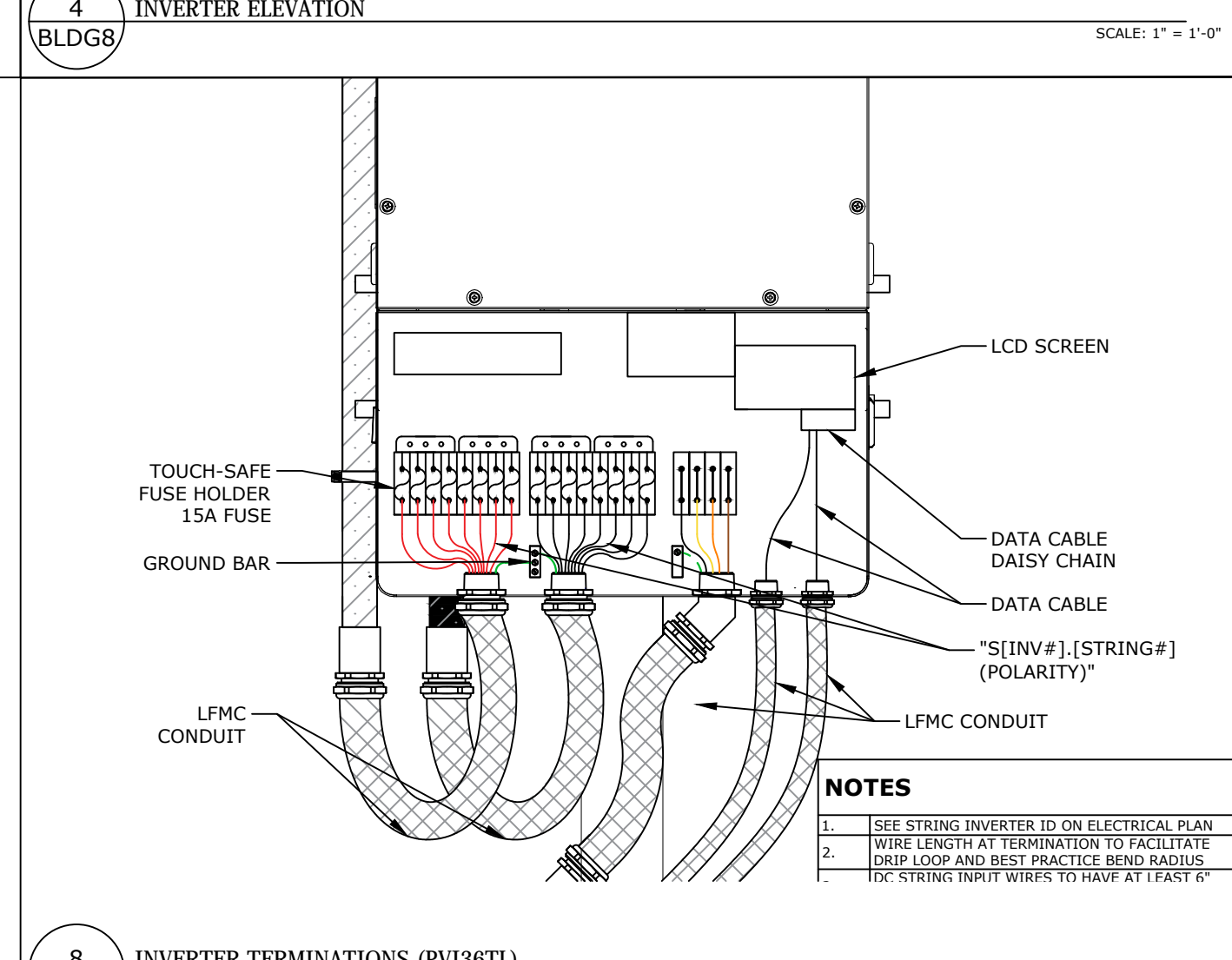
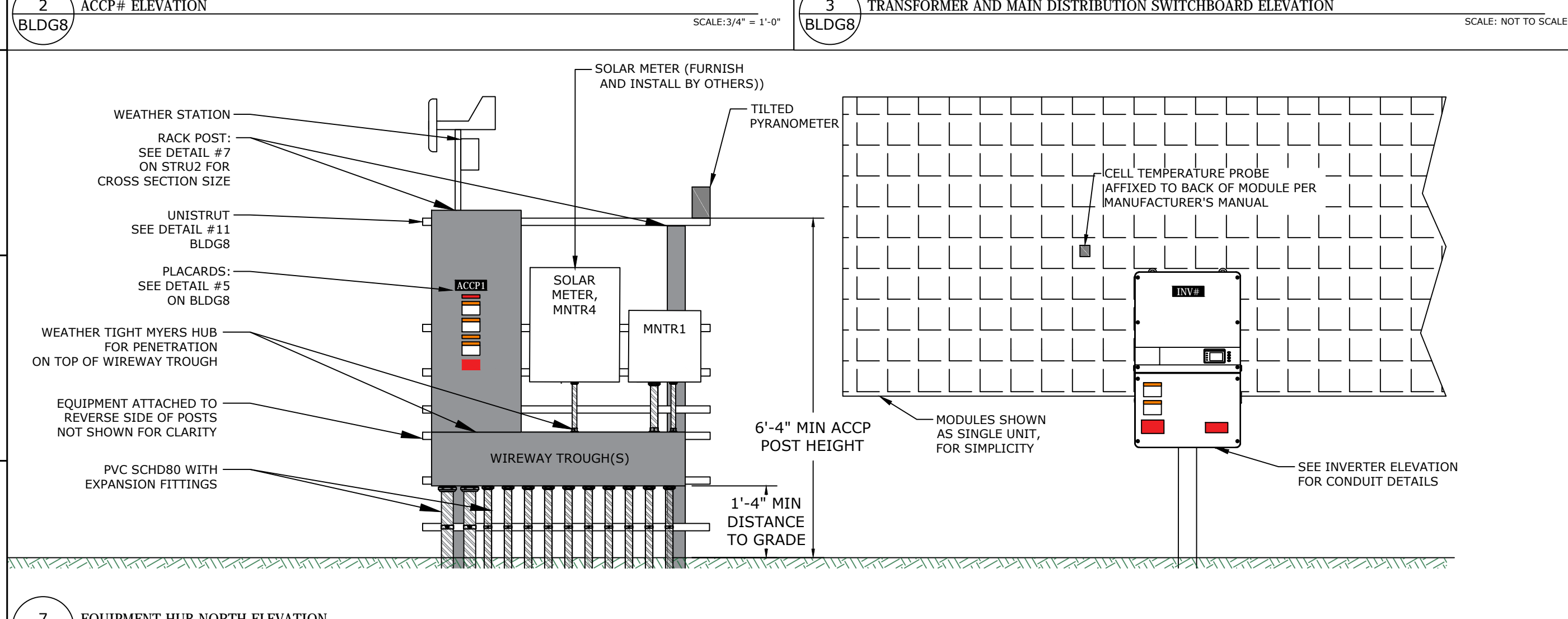
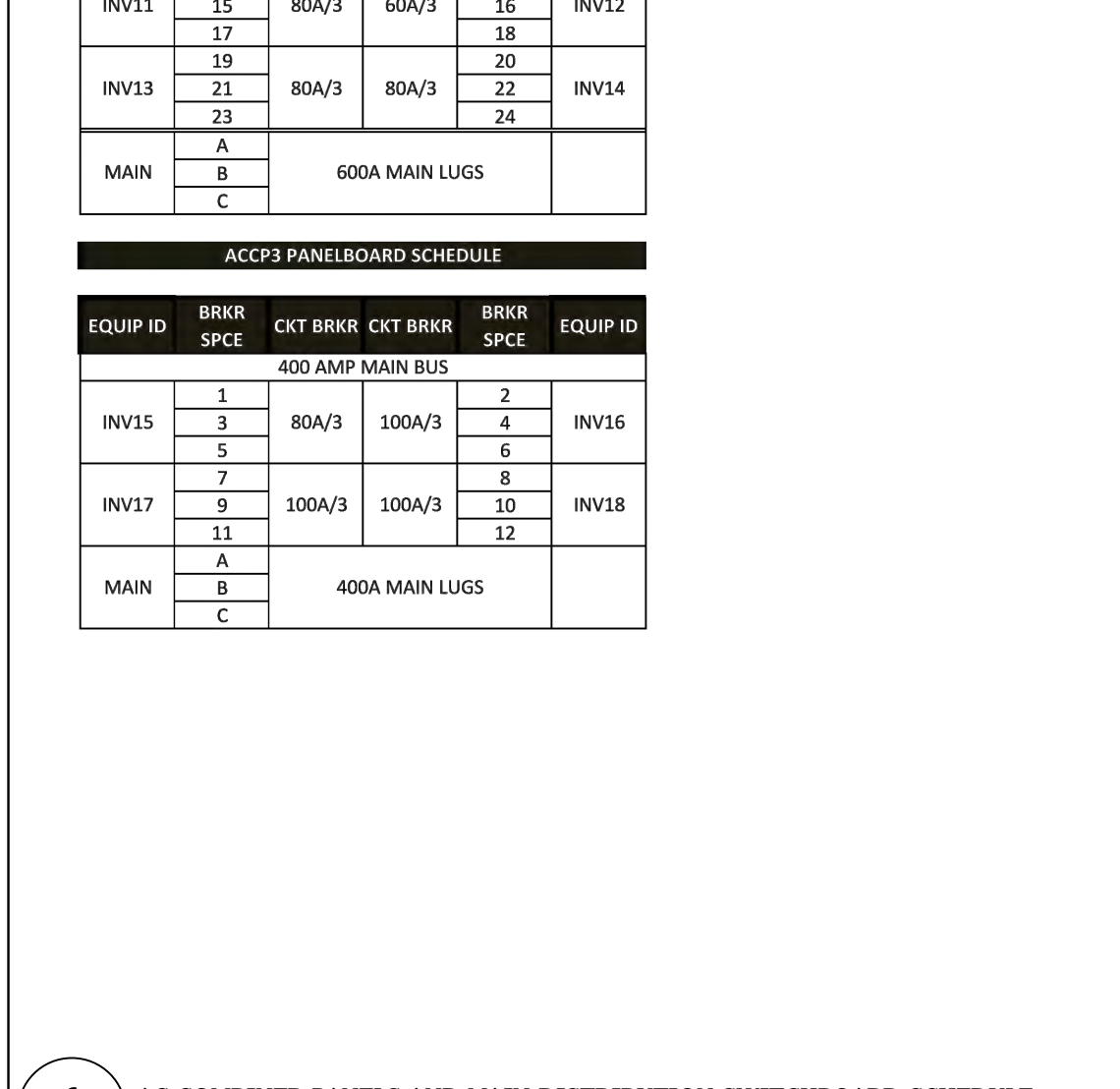
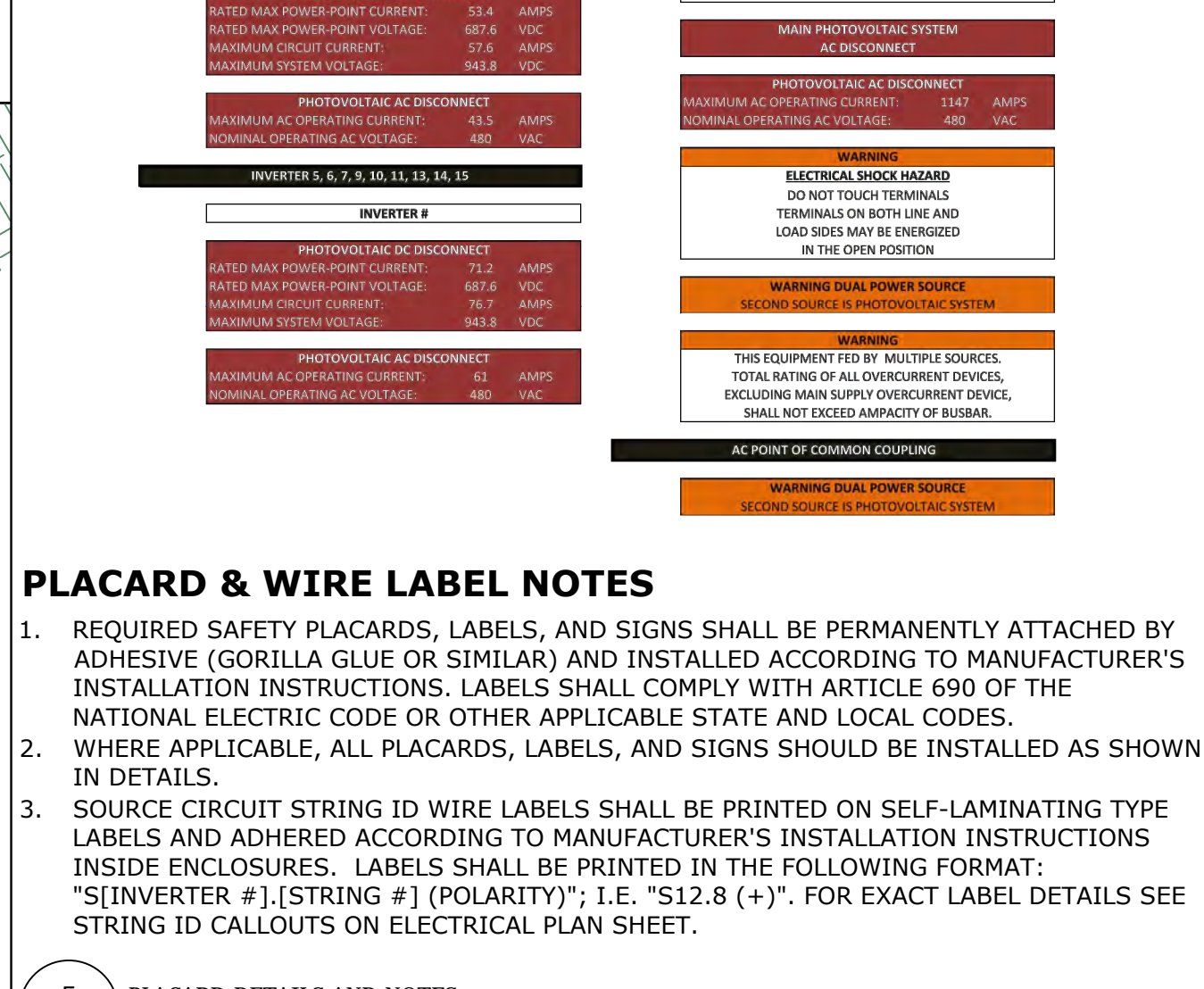
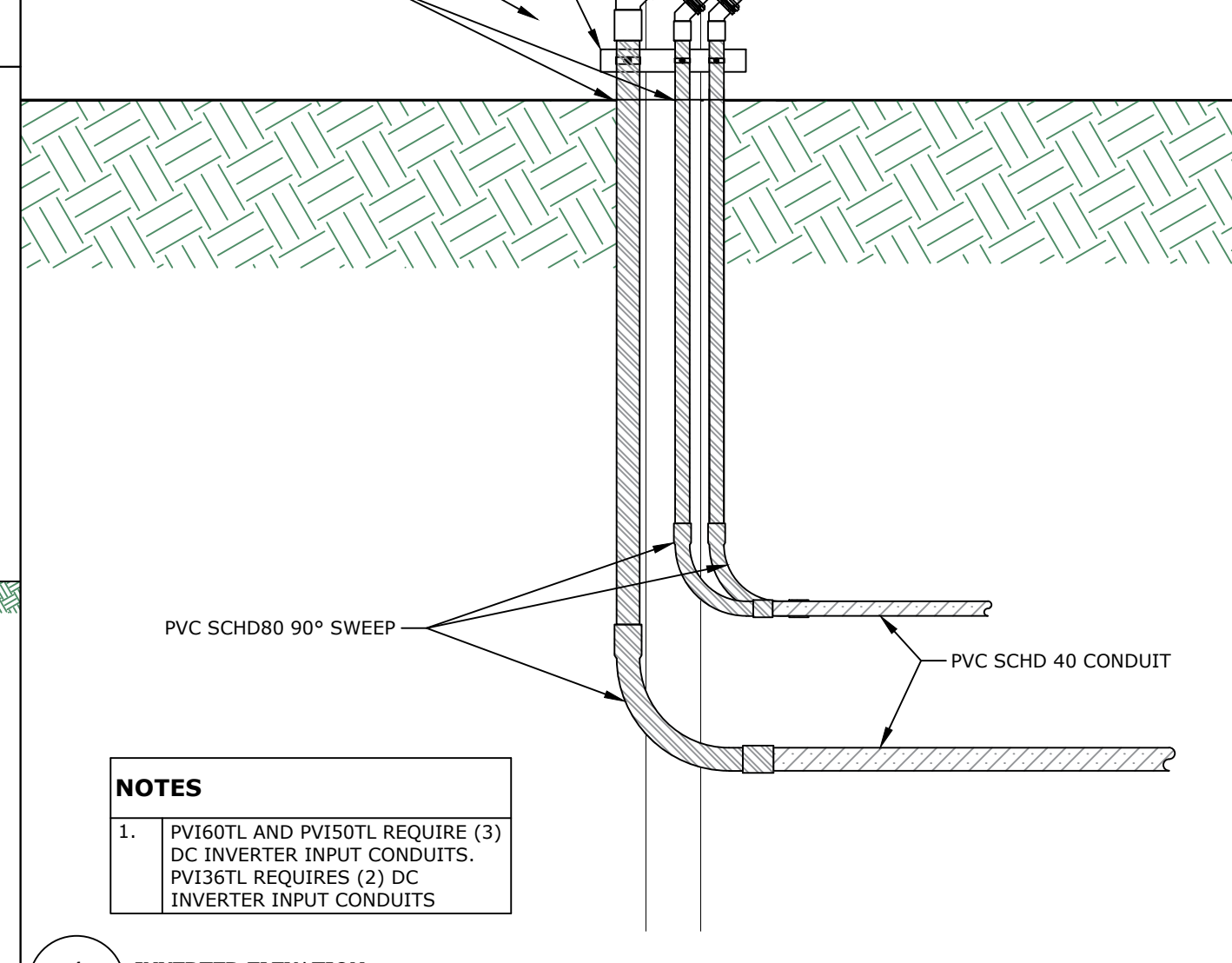
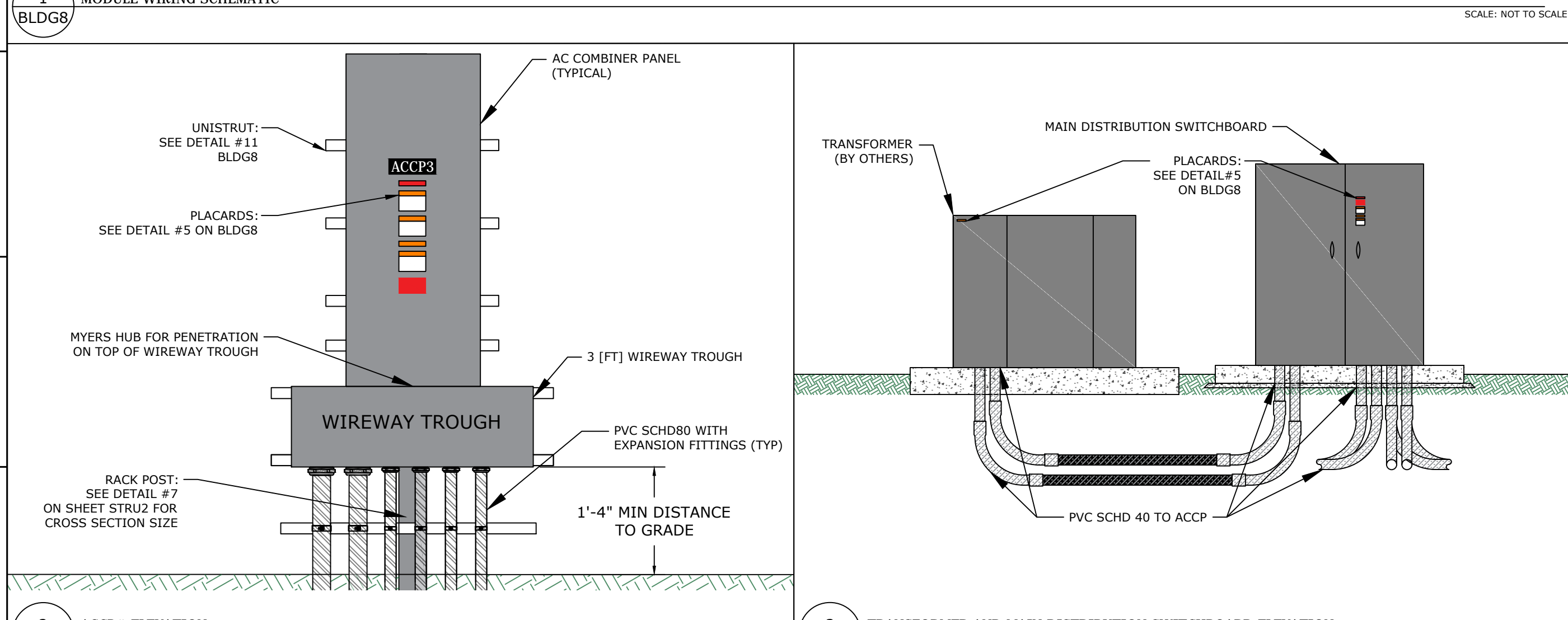
EQUIP ID	BRKR SPCE	CKT BRKR	CKT BRKR	BRKR SPCE	EQUIP ID
600 AMP MAIN BUS					
INV1	1	100A/3	100A/3	4	INV2
3	2	8	8	3	
5	3	8	8	4	
7	4	8	8	5	
9	5	100A/3	100A/3	6	INV4
11	6	10	10	7	
13	7	14	14	8	
15	8	16	16	9	INV6
17	9	80A/3	80A/3	10	
19	10	18	18	11	
21	11	20	20	12	
23	12	22	22	13	
A	13	24	24	14	
B	14			15	
C	15			16	
	16			17	
	17			18	
	18			19	
	19			20	
	20			21	
	21			22	
	22			23	
	23			24	
	24				
MAIN	A	600A MAIN LUGS			
	B				
	C				

ACC#2 PANELBOARD SCHEDULE

EQUIP ID	BRKR SPCE	CKT BRKR	CKT BRKR	BRKR SPCE	EQUIP ID
600 AMP MAIN BUS					
INV7	1	80A/3	60A/3	4	INV8
3	2	6	6	3	
5	3	6	6	4	
7	4	80A/3	80A/3	5	INV10
9	5	8	8	6	
11	6	10	10	7	
13	7	12	12	8	
15	8	14	14	9	INV12
17	9	16	16	10	
19	10	18	18	11	
21	11	20	20	12	
23	12	22	22	13	
25	13	24	24	14	
A	14			15	
B	15			16	
C	16			17	
	17			18	
	18			19	
	19			20	
	20			21	
	21			22	
	22			23	
	23			24	
	24				
MAIN	A	600A MAIN LUGS			
	B				
	C				

ACC#3 PANELBOARD SCHEDULE

EQUIP ID	BRKR SPCE	CKT BRKR	CKT BRKR	BRKR SPCE	EQUIP ID
400 AMP MAIN BUS					
INV15	1	80A/3	100A/3	2	INV16
3	2	6	6	3	
5	3	6	6	4	
7	4	80A/3	80A/3	5	INV18
9	5	8	8	6	
11	6	10	10	7	
13	7	12	12	8	
A	8			9	
B	9			10	
C	10			11	
	11			12	
	12				
MAIN	A	400A MAIN LUGS			
	B				
	C				



OPERATING DIAGRAM

NOTICE OF LIMITED LIABILITY

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SCALE: NOT TO SCALE

UNIT NO. ---

DWG. SIZE: Y ARCH D (36X24)

SUB CLASS: ---

DETAILS

--- MARK UP DRAWING NO. --- REV. ---

SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER

--- DRAWING NO. ---

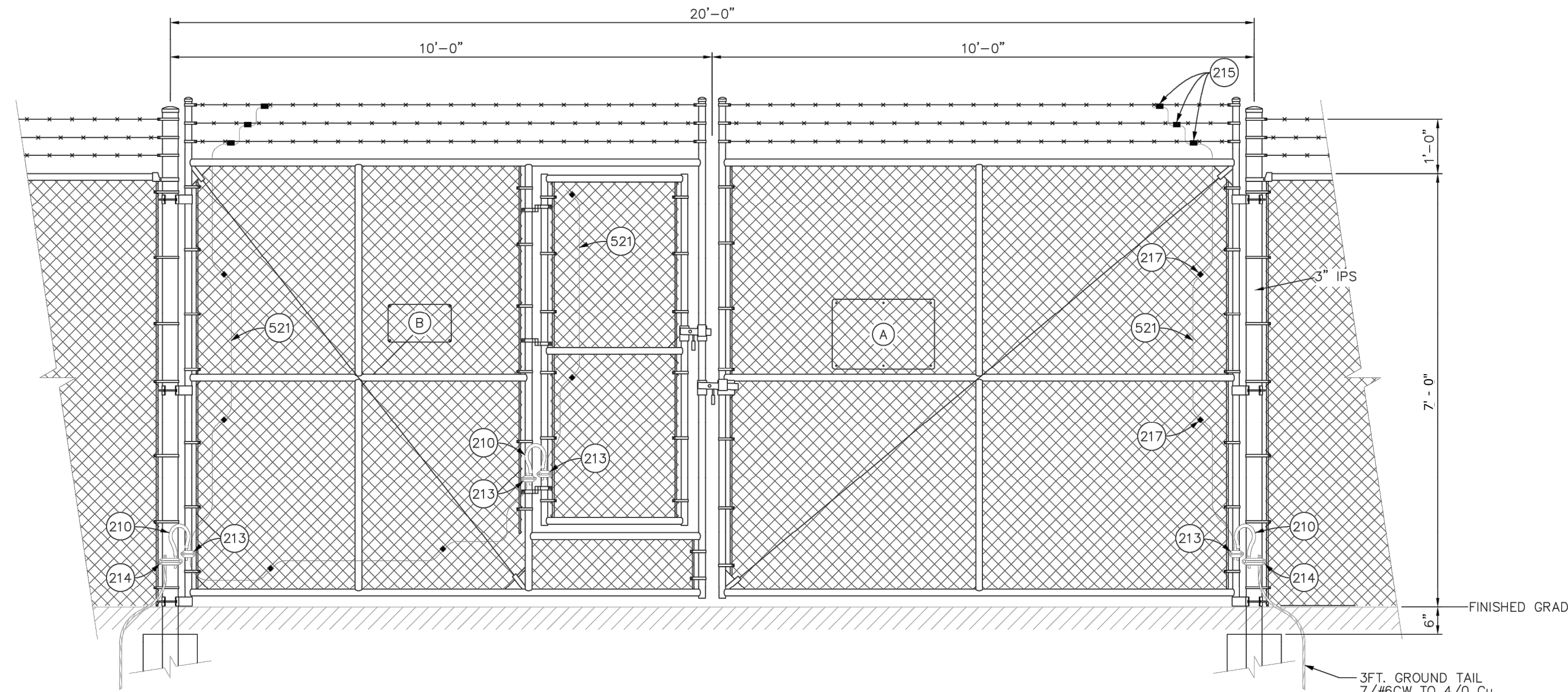
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REVISION NO. 0

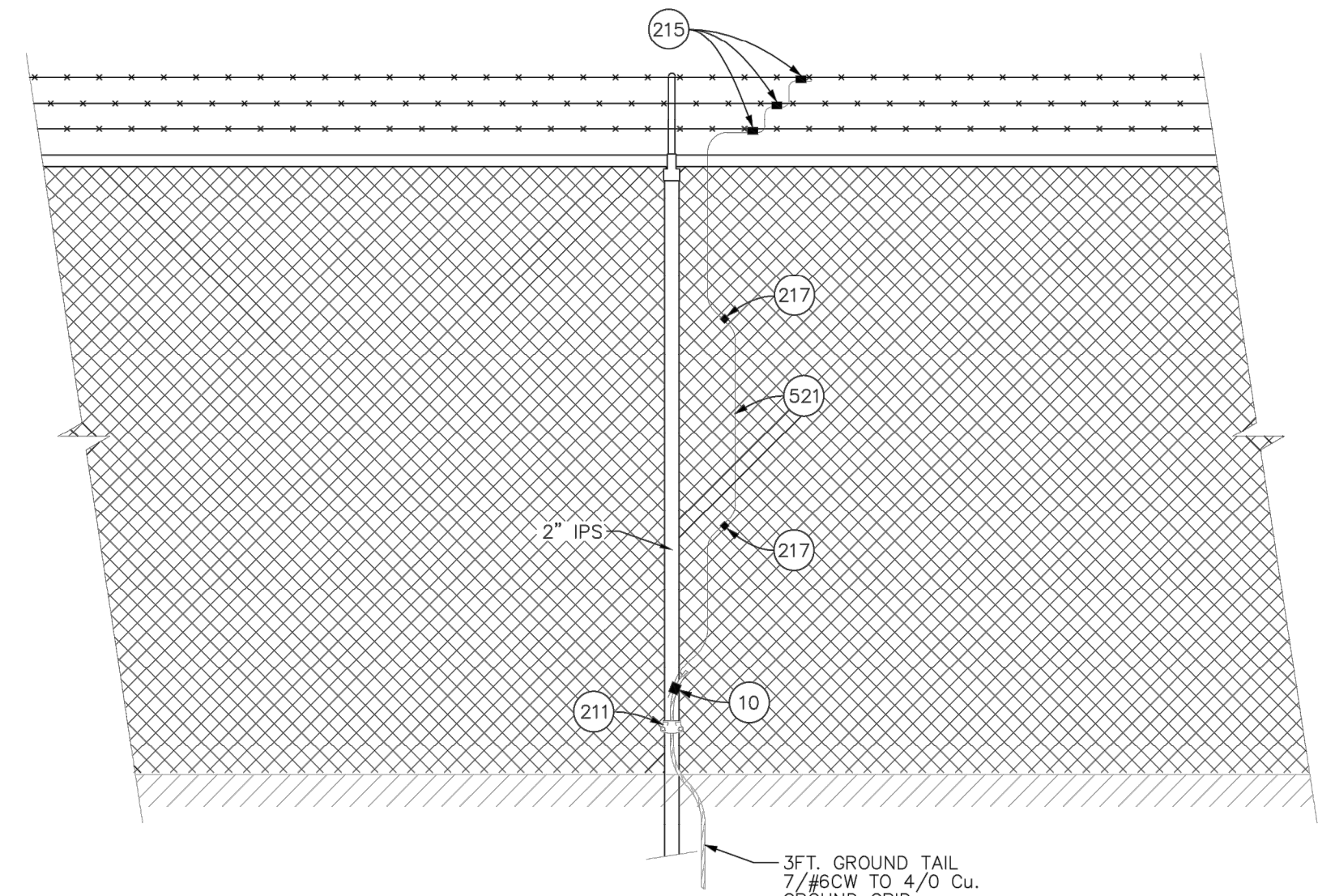
AMEREN MISSOURI

REV.	DATE	PROJECT NO.	DRFTR/CHK'D	SUPV	ENGR	DESCRIPTION
A	02/26/18	1704-101	CJB	DIR	DAS	DESIGN DRAWINGS

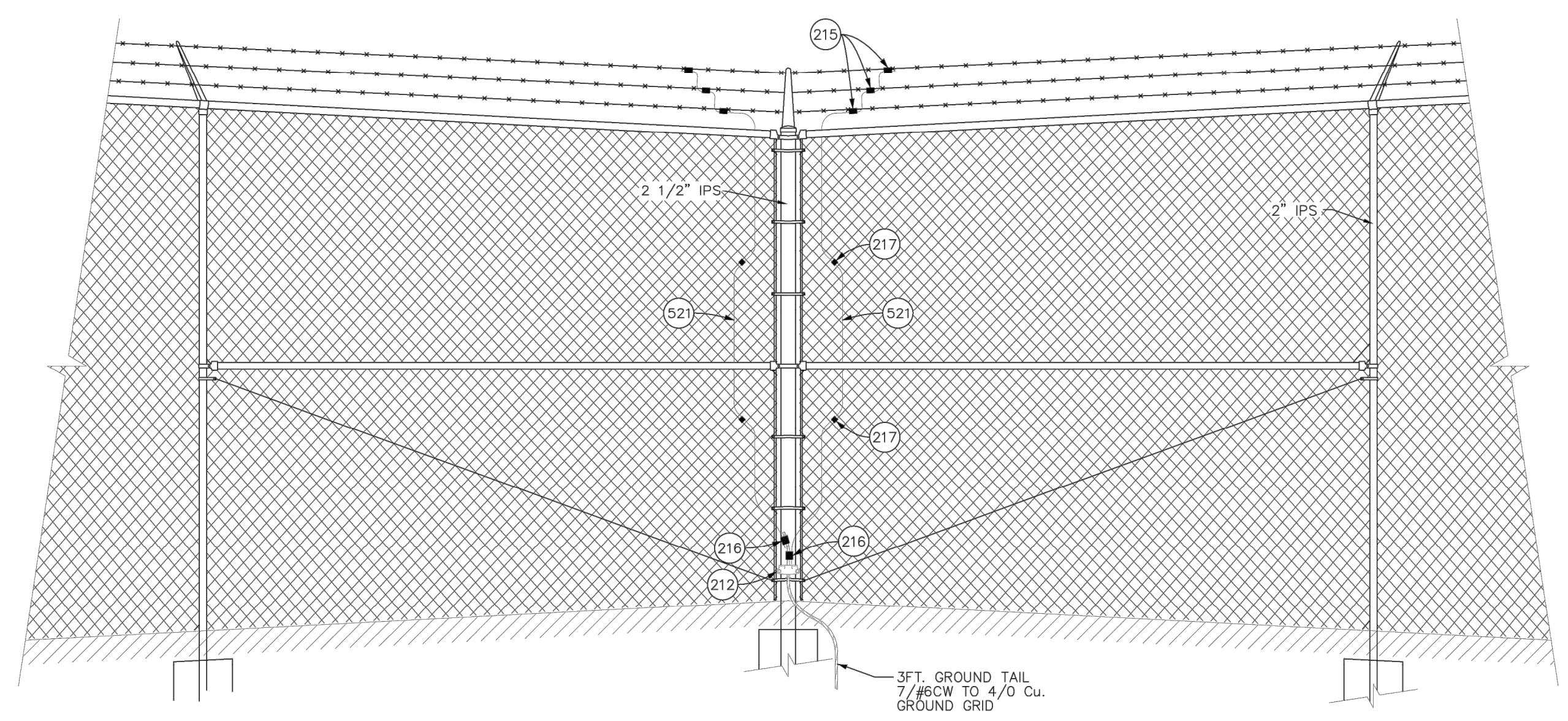
DRAWING RECORD



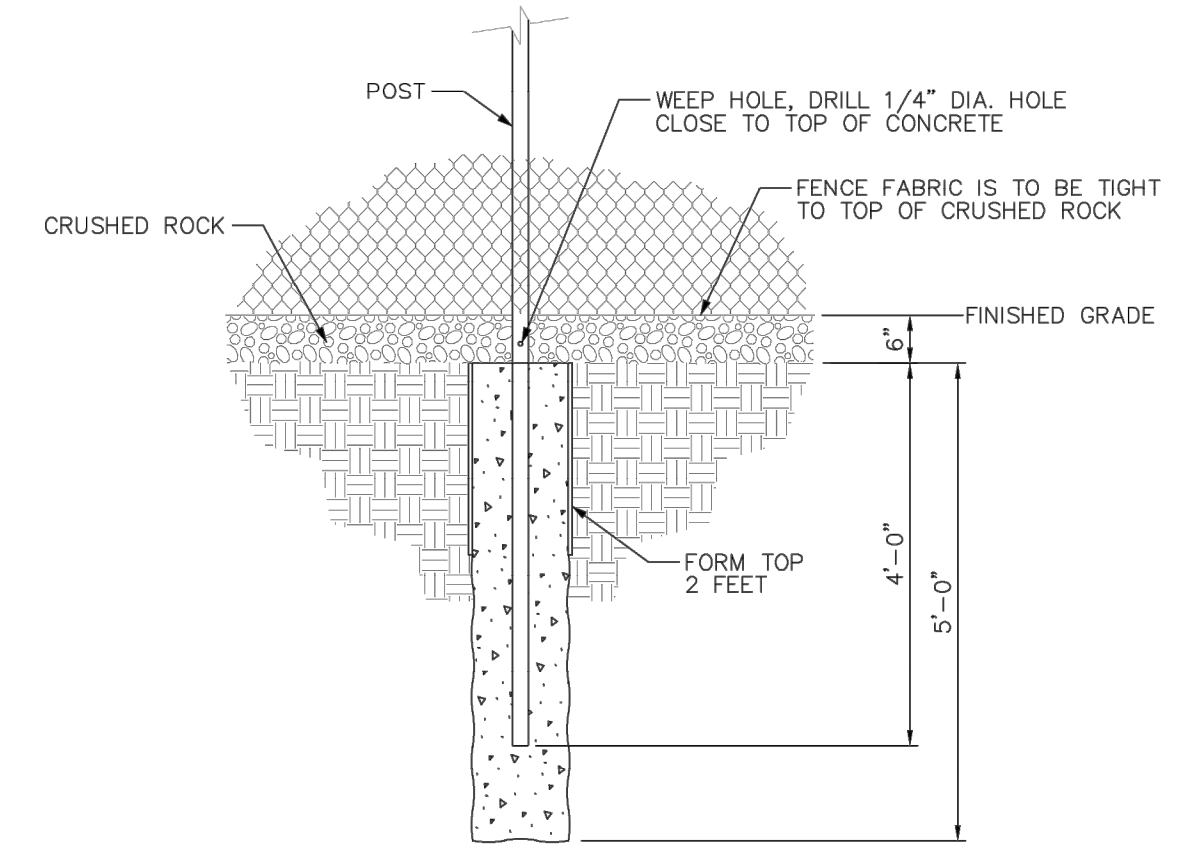
TYPICAL SWING GATE DETAIL



TYPICAL LINE POST DETAIL



TYPICAL CORNER POST DETAIL



TYPICAL FOUNDATION DETAIL

MATERIAL LIST		
ITEM NO.	DESCRIPTION	QTY.
210	CABLE, GROUNDING, 1/C, 2/0, 3276 STRAND COPPER, 21KA MAX FAULT CURRENT, BLACK COLORED JACKET; HUBBELL S3712	15FT
211	CLAMP, GROUNDING, 2" IPS, BRONZE, 1-WIRE, FOR 1/0-4/0 STR COPPER, 7/16" HOLE; HUBBELL GC-111-7C	75
212	CLAMP, GROUNDING, 2-1/2" IPS TO 2/0-250KCMIL CU, PIPE TO CABLE, BRONZE TWO PIECE CLAMP, BOTH PARTS OF CLAMP ARE ATTACHED TO THE U-BOLT; HUBBELL GC-111-8C	4
213	CONNECTOR, GROUND CABLE, #4 SOL - 2/0 STR, BRONZE, ONE, TWO OR THREE CABLES TO 2" O.D. - 1-1/2" IPS ROD OR TUBE; HUBBELL GC11061C	4
214	CONNECTOR, GROUND CABLE, 2/0 SOL - 250 MCM, BRONZE, ONE, TWO OR THREE CABLES TO 4" O.D. - 3-1/2" IPS ROD OR TUBE; HUBBELL GC110142C	2
215	CONNECTOR, COMPRESSION, H-TAP, #2-#6 ACSR, MAIN/TAP, TYPE O DIES; BLACKBURN WR159	255
216	CONNECTOR, COMPRESSION, H-TAP, 4/0 STR/6-2 STR, DIE D; BLACKBURN WR379	80
217	CONNECTOR, SPLIT BOLT, #4 SOL - 1/0 STR, CU TIN PLATED, 2-WIRE CONDUCTOR CONNECTION, " BOLT SIZE; HUBBELL SBS10	170
521	WIRE, TIE, 1/C, #4, ALUMINUM, SOLID, SOFT DRAWN, EC GRADE, UTILITY GRADE, 25LB BOX, APPROX. 651FT; DIRECT 4ASB CT 25	2 EA

- SHEET NOTES**
- GROUNDING OF THE PERIMETER FENCE SHOULD BE DONE AT LEAST ONCE, WITHIN 50' OF THE POINT WHERE THE MEDIUM VOLTAGE CONDUCTORS OR DUCT BANKS CROSS UNDER OR OVER THE PERIMETER FENCE. ADDITIONAL FENCE GROUNDING IS NOT REQUIRED. THE MEASURES FOR THIS GROUNDING ARE SHOWN IN THE FENCE DETAILS DRAWING AND VARY BY FENCE SECTION. A DRIVEN ROD LOCATED INSIDE THE FENCE LINE, AT LEAST 8' IN LENGTH, COPPER-CLAD, STAINLESS STEEL, OR STAINLESS STEEL CLAD RODS SHALL BE AT LEAST 1/2" DIAMETER. OTHER ARRANGEMENTS AS OUTLINED IN THE NESC RULE 94(B). AN UNDERGROUND GROUNDING GRID IS NOT REQUIRED.
 - BONDING OF THE GATES TO THE FENCE POST SHALL BE COMPLETED IN ACCORDANCE WITH THE FENCE DETAILS DRAWING.
 - WHERE CONCRETE FOUNDATIONS ARE REQUIRED, THEY SHALL BE IN ACCORDANCE WITH THE "TYPICAL FOUNDATION DETAIL" IN THE FENCE DETAILS DRAWING. CONCRETE FOUNDATIONS SHALL BE INSTALLED AT FENCE CORNERS IN ACCORDANCE WITH THE "TYPICAL CORNER POST DETAIL" IN THE FENCE DETAILS DRAWING. CONCRETE FOUNDATIONS SHALL BE INSTALLED AT GATES IN ACCORDANCE WITH THE "TYPICAL SWING GATE DETAIL" IN THE FENCE DETAILS DRAWING.
 - THE SECURITY FENCE SHALL BE INSTALLED AT LEAST 9" OUTSIDE THE RACKING FOOTPRINT.
 - TWO INCH MESH FENCING SHALL BE PROVIDED. FENCING SHALL BE EIGHT (8) FEET TALL WITH CONCRETE FOOTING AT GATES, FENCE CORNERS, AND AS REQUIRED ON SLOPED TERRAIN TO ENSURE SECURE AND STABLE INSTALLATION. ALL FENCING SHALL BE GALVANIZED MATERIAL.

MATERIAL LIST		
DESCRIPTION	ITEM ID	QTY.
CONCRETE - 4000 PSI AT 28 DAYS	CONTRACTOR	0.15 CU.YD.
FORM, STOVE PIPE OR WAXED CARDBOARD TUBE, 12" DIA.	CONTRACTOR	2 FT.

MATERIAL LISTED IS FOR ONE FOUNDATION

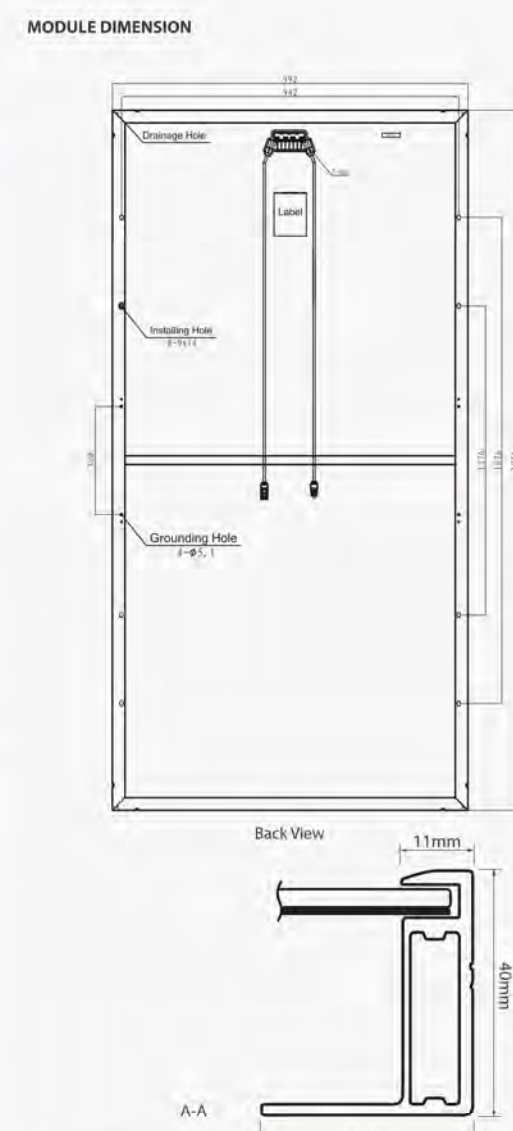


- NOTES:**
- ALL 7/#6CW GROUND TAILS TO BE 3FT. ABOVE FINISHED GRADE UNLESS OTHERWISE NOTED.
 - ALL GROUNDING WIRE AND CONNECTIONS SHALL BE INSTALLED ON THE INSIDE OF FENCE.

<p>CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241 DANIEL STROH, EIT CERT# 0422013-130</p> <p>CERTIFICANTS: MARC LOPATA, PE CERT# PVSI-120917-006937</p>		<p>OPERATING DIAGRAM</p> <p>NOTICE OF LIMITED RESPONSIBILITY</p> <p>THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR INITIALS.</p>		---															
		<p>SCALE: NOT TO SCALE</p> <p>UNIT NO. ---</p> <p>DWG. SIZE: Y ARCH D (36X24)</p> <p>SUB CLASS: ---</p>	<p>MARK UP DRAWING NO. ---</p> <p>REV. ---</p>																
<p>DRAWING RECORD</p> <table border="1"> <thead> <tr> <th>REV.</th> <th>DATE</th> <th>PROJECT NO.</th> <th>DRAFTING</th> <th>DRFTR/CHK'D</th> <th>SUPV</th> <th>ENGR</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>02/26/18</td> <td>1704-101</td> <td>CJB</td> <td>DIR</td> <td>DAS</td> <td>ML</td> <td>DESIGN DRAWINGS</td> </tr> </tbody> </table>		REV.	DATE	PROJECT NO.	DRAFTING	DRFTR/CHK'D	SUPV	ENGR	DESCRIPTION	A	02/26/18	1704-101	CJB	DIR	DAS	ML	DESIGN DRAWINGS	<p>FENCE DETAILS</p> <p>---</p> <p>---</p> <p>---</p>	
REV.	DATE	PROJECT NO.	DRAFTING	DRFTR/CHK'D	SUPV	ENGR	DESCRIPTION												
A	02/26/18	1704-101	CJB	DIR	DAS	ML	DESIGN DRAWINGS												
<p>SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER</p> <p></p>		<p>DRAWING NO. XX-DWG-BLDG-000009</p> <p>REVISION NO. 0</p>																	

GCL-P6/72H
HIGH EFFICIENCY MONOCRYSTALLINE MODULE

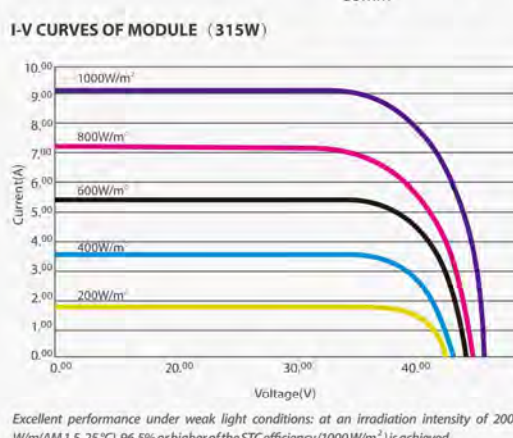
TYPE (STC)	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H
Maximum Power	320	325	330	335	340
Maximum Power Voltage	37.4	37.6	37.8	38.0	38.2
Maximum Power Current	8.56	8.64	8.73	8.82	8.90
Short Circuit Current	9.17	9.24	9.31	9.41	9.49
Open Circuit Voltage	45.8	46.0	46.2	46.4	46.6
Module Efficiency	16.5	16.7	17.0	17.3	17.5



TYPE (NOCT)	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H
Maximum Power	231.20	234.61	237.71	240.37	243.95
Maximum Power Voltage	34.10	34.30	34.50	34.70	34.90
Maximum Power Current	6.78	6.84	6.89	6.93	6.99
Short Circuit Current	7.38	7.46	7.58	7.63	7.68
Open Circuit Voltage	42.5	42.7	42.9	43.1	43.3

TYPE (MECHANICAL DATA)	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H	GCL-P6/72H
Solar Cells	7x16x156mm (6 inch)				
Cell Orientation	72 Cells (6x12)				
Module Dimensions	1956x992x40mm (77 x 39.05 x 1.57 inches)				
Weight	22.5kg/25kg				
Glass	High transparency solar glass 3.2mm (0.13 inches) or 4mm (0.16 inches)				
Backsheet	White				
Frame	Silver, anodized aluminum alloy				
J-Box	IP67 Rated				
Cables	4-core 7 (0.206 inches) x 1.200mm (47.2 inches)				
Connector	Original MC4 or Compatible				

TEMPERATURE RATINGS	MAXIMUM RATINGS
Normal Operating Cell Temperature (NOCT)	45±2°C
Temperature Coefficient of P _{max}	-0.41%/°C
Temperature Coefficient of V _{oc}	-0.32%/°C
Temperature Coefficient of I _{sc}	+0.055%/°C
Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC(IEC)
Max Series Fuse Rating	15A



WARRANTY	PACKAGING CONFIGURATION
10 years Product Workmanship Warranty	Modules per box: 26 pieces
25 years Linear Power Warranty	Modules per 40' container: 624 pieces

GCL
Bringing Green Power to Life
http://en.gclsi.com

GCL-P6/72H (2016) 010
CAUTION: READ INSTALLATION MANUAL BEFORE USING THE PRODUCT
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A BLDG9 MODULE DATA SHEET

SPECIFICATIONS	PVI 50TL	PVI 60TL
DC Input		
Absolute Maximum Open Circuit Voltage	1000 VDC	1000 VDC
Operating Voltage Range	200-950 VDC	200-950 VDC
Max Power Input Voltage Range (MPPT)	480-850 VDC	540-850 VDC
MPP Trackers	3	3
Maximum Operating Input Current	36 A per MPPT (108 A)	38 A per MPPT (114 A)
Maximum Available PV Current (I _{sc} x 1.25)	60 A per MPPT (180 A)	60 A per MPPT (180 A)
Maximum PV Power	75 kW (25 kW per MPPT)	90 kW (30 kW per MPPT)
AC Output		
Nominal Output Voltage	480 VAC, 3ø/PE/N	480 VAC, 3ø/PE/N
AC Voltage Range (Standard)	420V-500V	420V-500V
Continuous Output Power	50 kW	60 kW
Maximum Output Current	61 A	73 A
Maximum Backfeed Current	0 A	0 A
Nominal Output Frequency	60 Hz	60 Hz
Output Frequency Range	57-63 Hz	57-63 Hz
Power Factor	Unity, ±0.99 (adjustable 0.8 leading / 0.8 lagging)	Unity, ±0.99 (adjustable 0.8 leading / 0.8 lagging)
Fault Current Contribution (1 Cycle RMS)	55 A	55 A
Total Harmonic Distortion (THD) @ Rated Load	<3%	<3%
Performance		
Peak Efficiency	99.0%	99.0%
CEC Efficiency	98.5%	98.5%
Temp Loss	-22°F to +140°F (-30°C to +60°C) Derating occurs over +122°F (+50°C)	-22°F to +140°F (-30°C to +60°C) Derating occurs over +122°F (+50°C)
Ambient Temperature Range	-40°F to +158°F (-40°C to +70°C)	-40°F to +158°F (-40°C to +70°C)
Storage Temperature Range	-40°F to +158°F (-40°C to +70°C)	-40°F to +158°F (-40°C to +70°C)
Relative Humidity (non-condensing)	0-95%	0-95%
Audible Noise	+55 dBA @ 1 m at room temperature	+55 dBA @ 1 m at room temperature
Operating Altitude	13,123 Ft (4,000 m) Derating from 9,842.5 Ft (3,000 m)	13,123 Ft (4,000 m) Derating from 9,842.5 Ft (3,000 m)
Safety Listings & Certifications	UL 1741:2010, UL 1699B, CSA C22.2 #1073-D1, IEEE519, FCC PART15	UL 1741:2010, UL 1699B, CSA C22.2 #1073-D1, IEEE519, FCC PART15
Testing Agency	CSA	CSA
Mechanical		
15 Fused Positions (5 positions per MPPT)	15 A standard (20, 25, 30 A accepted*)	15 A standard (20, 25, 30 A accepted*)
AC/DC Disconnect	Standard, fully-integrated	Standard, fully-integrated
Enclosure Rating	Type 4X	Type 4X
Enclosure Finish	Polyester powder coated aluminum	Polyester powder coated aluminum
Mounting Method	0-90° from horizontal (vertical, angled, flat)	0-90° from horizontal (vertical, angled, flat)
Dimensions (H x W x D)	39.4 x 23.6 x 10.24 in. (1,000 x 600 x 260 mm)	39.4 x 23.6 x 10.24 in. (1,000 x 600 x 260 mm)
Weight	Invert: 123.5 lbs (56 kg); Wiring Box: 33 lbs (15 kg)	Invert: 123.5 lbs (56 kg); Wiring Box: 33 lbs (15 kg)
Communications		
Data Logger Hardware	Standard, Internal	Standard, Internal
SolarView Monitoring Service	Optional	Optional
Revenue Grade Meter/Monitoring	Optional, External	Optional, External
Communication Interface	RS-485 Modbus RTU	RS-485 Modbus RTU
Remote Firmware Upgrades	Standard	Standard
Remote Diagnostics	Standard	Standard
Features & Protections		
Anti-Fault Detection	Standard	Standard
Smart Grid Features	L/HVRT, L/HFRT, Soft Start, Volt-Var, Frequency-Watt and Volt-Watt	L/HVRT, L/HFRT, Soft Start, Volt-Var, Frequency-Watt and Volt-Watt
Warranty		
Standard	10 year	10 year
Optional	15, 20 year, extended service agreement	15, 20 year, extended service agreement

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B BLDG9 INVERTER DATA SHEET

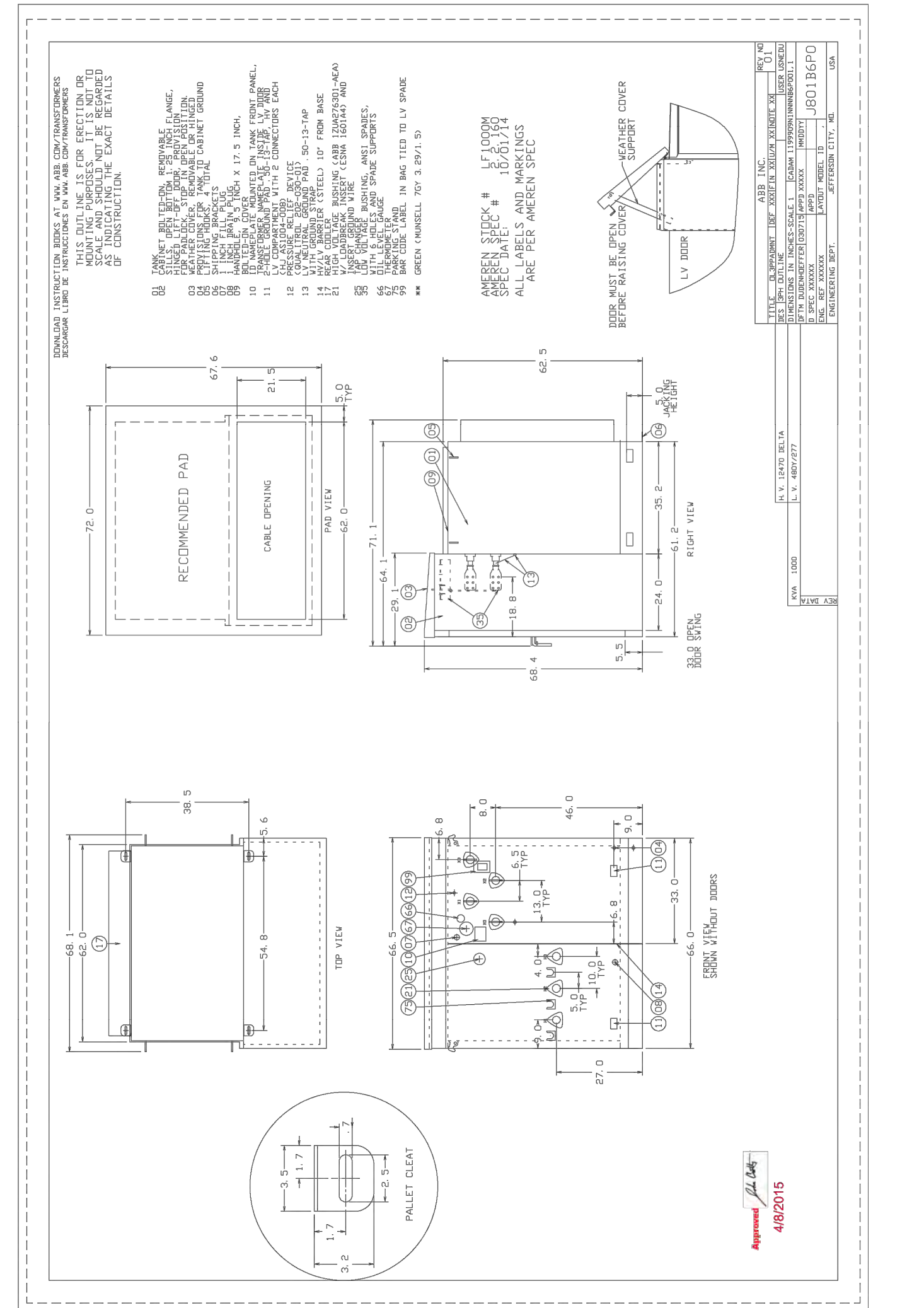
SPECIFICATIONS	PVI 14TL	PVI 20TL	PVI 23TL	PVI 28TL	PVI 36TL
DC Input					
Absolute Maximum Open Circuit Voltage	600 VDC	600 VDC	600 VDC	1000 VDC	1000 VDC
Operating Voltage Range	180-580 VDC	260-580 VDC	300-900 VDC	300-900 VDC	240-950 VDC
Max Power Input Voltage Range (MPPT)	300-540 VDC	300-550 VDC	500-800 VDC	500-800 VDC	540-800 VDC
MPP Trackers	2 with 4-fused inputs per tracker	2 with 4-fused inputs per tracker	2 with 4-fused inputs per tracker	2 with 4-fused inputs per tracker	2 with 5-fused inputs per tracker
Maximum Operating Input Current	25 A per MPPT (50 A)	35 A per MPPT (70 A)	25 A per MPPT (50 A)	29 A per MPPT (58 A)	35 A per MPPT (70 A)
Maximum Available PV Current (I _{sc} x 1.25)	45 A per MPPT (90 A)	45.5 A per MPPT (91 A)	41 A per MPPT (82 A)	48 A per MPPT (96 A)	62.5 A per MPPT (125 A)
Maximum PV Power (per MPPT)	9.5 kW	13.5 kW	15.5 kW	19 kW	27 kW
Start Voltage	300 V	300 V	300 V	330 V	330 V
AC Output					
Nominal Output Voltage	208 VAC, 3-Ph	208 VAC, 3-Ph	480 VAC, 3-Ph	480 VAC, 3-Ph	480 VAC, 3-Ph
AC Voltage Range (Standard)	14 kW	20 kW	23 kW	28 kW	36 kW
Continuous Output Power	39 A	25.5 A	27.7 A	33.7 A	43.5 A
Maximum Output Current	0 A	0 A	0 A	0 A	0 A
Maximum Backfeed Current	0 A	0 A	0 A	0 A	0 A
Nominal Output Frequency	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Output Frequency Range	57-63 Hz	57-63 Hz	57-63 Hz	57-63 Hz	57-63 Hz
Power Factor	Unity, ±0.99 (±0.8 adjustable)	Unity, ±0.99 (±0.9 adjustable)	Unity, ±0.99 (±0.8 adjustable)	Unity, ±0.99 (±0.8 adjustable)	Unity, ±0.99 (±0.8 adjustable)
Fault Current Contribution (1 Cycle RMS)	70.6 A	43.3 A	69.6 A	69.6 A	73.2 A
Total Harmonic Distortion (THD) @ Rated Load	<3%	<3%	<3%	<3%	<3%
Grid Connection Type	3ø+N/IGND (4-wire)	3ø+N/IGND (4-wire)	3ø+N/IGND (4-wire)	3ø+N/IGND (4-wire)	3ø+N/IGND (4-wire)
Efficiency					
Peak Efficiency	96.6%	97.4%	96.6%	96.6%	98.5%
CEC Efficiency	96.0%	97.0%	96.0%	96.0%	98.0%
Temp Loss	4 W	4 W	2 W	2 W	2 W
Integrated String Combiner					
Fused Positions	8 fused positions (4 positions per MPPT) 15 A (fuse by-pass available)	8 fused positions (4 positions per MPPT) 15 A (fuse by-pass available)	10 fused positions (5 positions per MPPT) 15 W (fuse by-pass available)	10 fused positions (5 positions per MPPT) 15 W (fuse by-pass available)	10 fused positions (5 positions per MPPT) 15 W (fuse by-pass available)
Temperature					
Ambient Temperature Range	-13°F to +140°F (-22°C to +60°C) Derating occurs over +50°C	-13°F to +140°F (-22°C to +60°C) Derating occurs over +50°C	-22°F to +140°F (-30°C to +60°C) Derating occurs over +45°C	-22°F to +140°F (-30°C to +60°C) Derating occurs over +45°C	-40°F to +158°F (-40°C to +70°C) Derating occurs over +45°C
Storage Temperature Range	-40°F to +158°F (-40°C to +70°C)	-40°F to +158°F (-40°C to +70°C)	-40°F to +158°F (-40°C to +70°C)	-40°F to +158°F (-40°C to +70°C)	-40°F to +158°F (-40°C to +70°C)
Relative Humidity (non-condensing)	0-95%	0-95%	0-95%	0-95%	0-95%
Operating Altitude	13,123 Ft/4,000 m (derating from 6,562 Ft/2,000 m)	13,123 Ft/4,000 m (derating from 6,562 Ft/2,000 m)	13,123 Ft/4,000 m (derating from 6,562 Ft/2,000 m)	13,123 Ft/4,000 m (derating from 6,562 Ft/2,000 m)	13,123 Ft/4,000 m (derating from 6,562 Ft/2,000 m)
Data Monitoring					
Optional SolarView Web-based Monitoring	Integrated	Integrated	Integrated	Integrated	Integrated
Optional Revenue Grade Monitoring	External	External	External	External	External
External Communication Interface	RS-485 Modbus RTU	RS-485 Modbus RTU	RS-485 Modbus RTU	RS-485 Modbus RTU	RS-485 Modbus RTU
Testing & Certifications					
Safety Listings & Certifications	UL 1741/IEEE 1547, CSA C22.2 #1073, FCC part 15 B	UL 1741/IEEE 1547, CSA C22.2 #1073, FCC part 15 B	UL 1741/IEEE 1547, CSA C22.2 #1073, FCC part 15 B	UL 1741/IEEE 1547, CSA C22.2 #1073, FCC part 15 B	UL 1741/IEEE 1547, CSA C22.2 #1073, FCC part 15 B
Testing Agency	ETL	ETL	CSA	CSA	CSA
Warranty					
Standard	10 year	10 year	10 year	10 year	10 year
Optional	15, 20 year; extended service agreement	15, 20 year; extended service agreement	15, 20 year; extended service agreement	15, 20 year; extended service agreement	15, 20 year; extended service agreement
Enclosure					
IP64 (NEMA 4) Rating	> 50 dBA @ 3 m	> 50 dBA @ 3 m	> 50 dBA @ 3 m	> 50 dBA @ 3 m	> 50 dBA @ 3 m
AC/DC Disconnect	Standard, fully-integrated	Standard, fully-integrated	Standard, fully-integrated	Standard, fully-integrated	Standard, fully-integrated
Dimensions (H x W x D)	41.6 in. x 21.4 in. x 8.5 in. (1057 mm x 544 mm x 216 mm)	39.4 in. x 23.6 in. x 9.1 in. (1001 mm x 600 mm x 232 mm)	39.4 in. x 23.6 in. x 9.1 in. (1001 mm x 600 mm x 232 mm)	39.4 in. x 23.6 in. x 9.1 in. (1001 mm x 600 mm x 232 mm)	39.4 in. x 23.6 in. x 9.1 in. (1001 mm x 600 mm x 232 mm)
Weight	141 lbs (64 kg)	132 lbs (60 kg)	104 lbs (47.2 kg)	104 lbs (47.2 kg)	121 lbs (55kg)
Enclosure Rating	Type 4	Type 4	Type 4	Type 4	Type 4X
Enclosure Finish	Polyester powder coated aluminum	Polyester powder coated aluminum	Polyester powder coated aluminum	Polyester powder coated aluminum	Polyester powder coated aluminum

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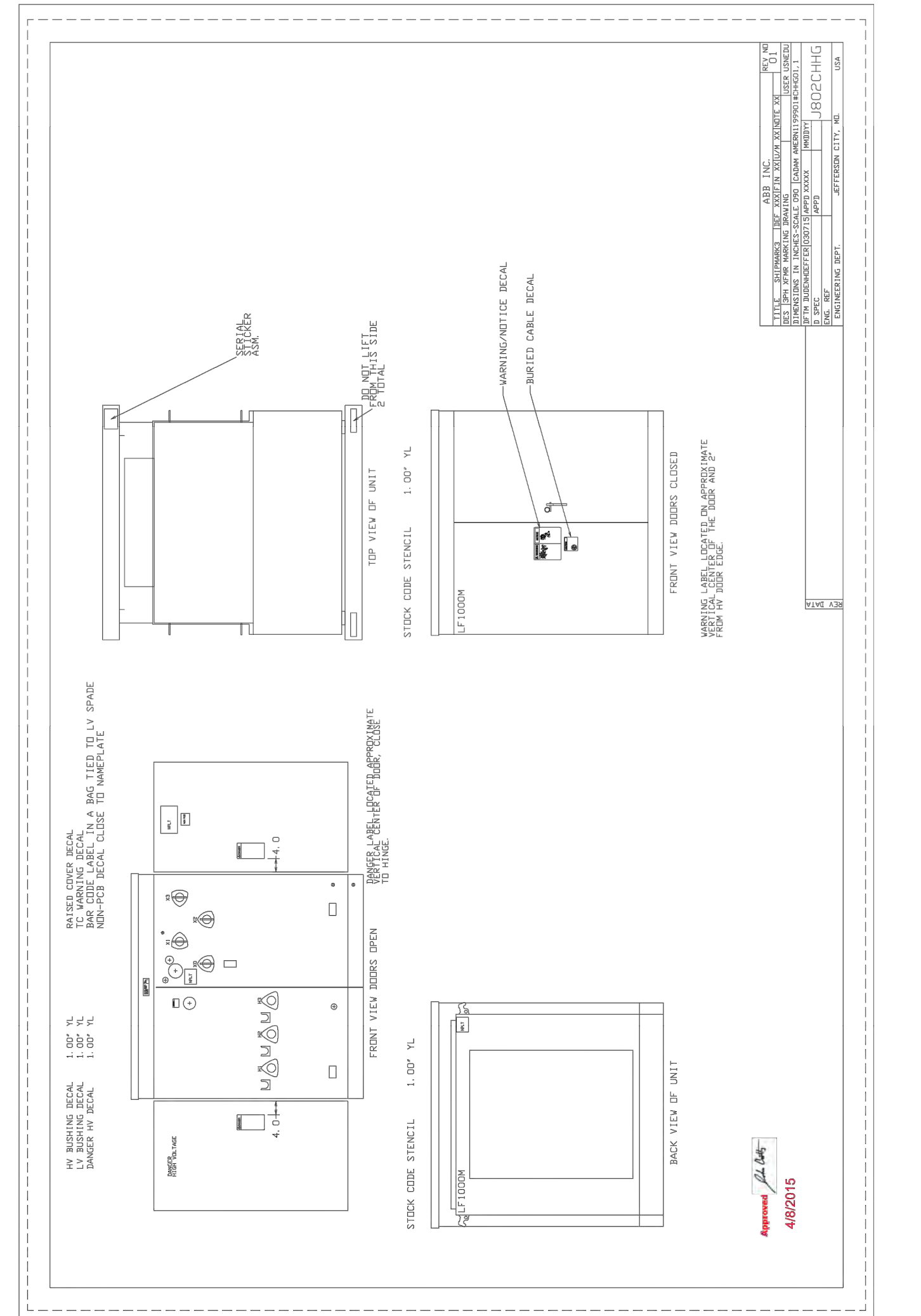
C BLDG9 INVERTER DATA SHEET

MATERIALS	
Module Hardware	Magni 560 coating standard. Stainless available upon request
Racking Hardware	Hot Dip Galvanized coating is standard
Racking Structure	G90 galvanized steel standard. Higher coatings available for high corrosion areas
Foundations	Hot Dip Galvanized
DESIGN	
Orientation	Landscape
Tilt Angle	5° - 45° (custom tilts can be accommodated)
Racking Slope Tolerance	20% E/W/N/S slope accommodations governed by post installation capabilities and do not adversely affect racking design
Wind Speed	Any
Snow Load	Any
Module Accommodation	Any 60 or 72 cell framed module along with any frameless module
Module Mounting Type	Direct bolt directly to vertical rails (bonded connection)
Foundation Accommodation	W-Section, SmartPost, Round Post, Earth Screw, Helical Pier, Ballast (pre-cast or cast in place)
Warranty	20 years
Design Life	30 year service life on all galvanized components
CERTIFICATIONS AND TESTING	
UL Certification	UL 2703 (Issue 2) compliant
Wind Tunnel Testing	CPP third party testing laboratory
Structural Connection Testing	Element Materials Technology
Code Compliance	Racks are designed using site specific loads (wind, snow, and seismic) per the governing local building codes
Finite Element Modeling	Risa 3D
Engineering	PE stamped drawings and calculations
SERVICES	
Geotechnical Engineering	Field investigation and engineering, laboratory testing, engineering analysis, push/pull tests, foundation design
Structural/Civil Engineering	Preliminary investigation, engineering
Installation	Foundation, racking, module, and module prewiring
Training	Onsite installation training at no additional cost

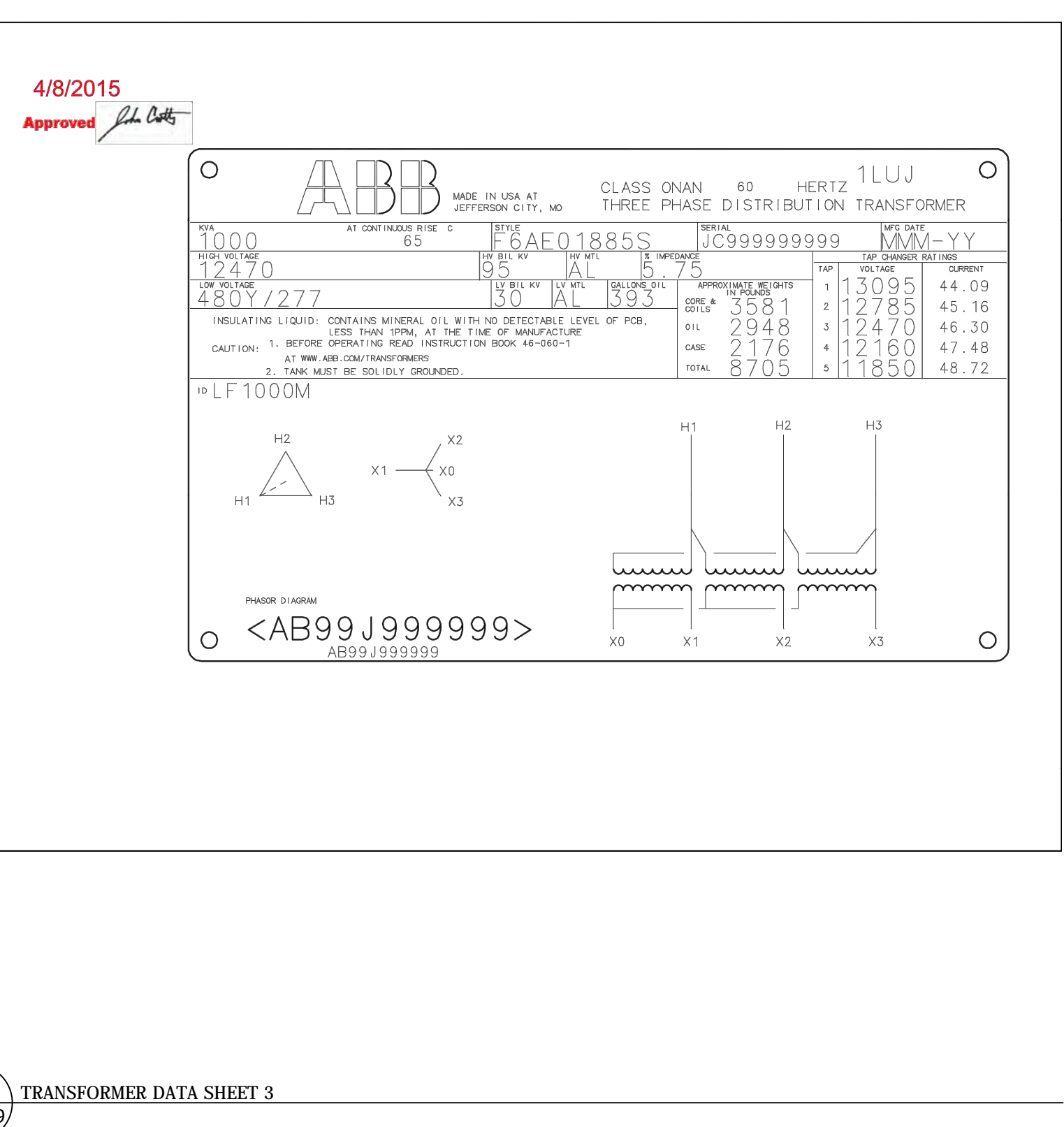
D BLDG9 RACKING DATA SHEET



E BLDG9 TRANSFORMER DATA SHEET 1



F BLDG9 TRANSFORMER DATA SHEET 2



G BLDG9 TRANSFORMER DATA SHEET 3

NABCEP CERTIFIED
PV Installation Professional

NABCEP CREDENTIALLED
SOLAR INSTALLER

CERTIFICANTS:
MARC LOPATA, PE
CERT# 091110-241
DANIEL STROH, EIT
CERT# 042013-130

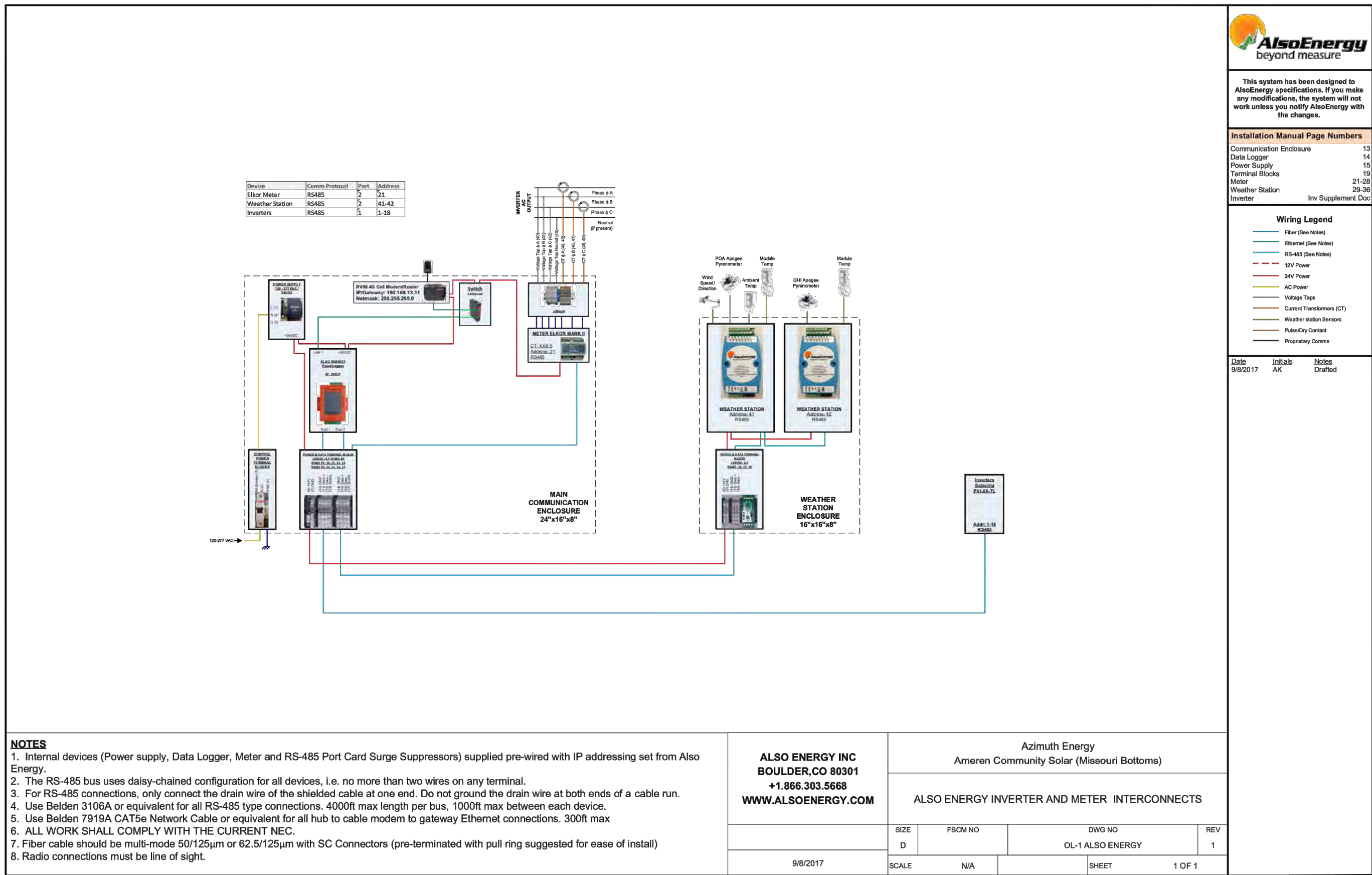
CERTIFICANTS:
MARC LOPATA, PE
CERT#
PVSI-120917-006937

STATE OF MISSOURI
MARC LOPATA
PROFESSIONAL ENGINEER
NUMBER: PE-200402353

OPERATING DIAGRAM		---	
NOTICE OF LIMITED RESPONSIBILITY THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR METALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR METALS.		MARK UP DRAWING NO.	REV.
SCALE: NOT TO SCALE		---	---
UNIT NO. ---		---	---
DWG. SIZE Y ARCH D (36X24)		---	---
SUB CLASS ---		---	---
DATA SHEETS		---	---
SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER		DRAWING NO.	
---		XX-DWG-EQPT-000001	
---		REVISION NO. 0	

REV.	DATE	PROJECT NO.	DRAFTING	SUPV	ENGR	DESCRIPTION
A	02/26/18	1704-101	DRF/CHK'D	CJB	DIR	DESIGN DRAWINGS

AMEREN MISSOURI



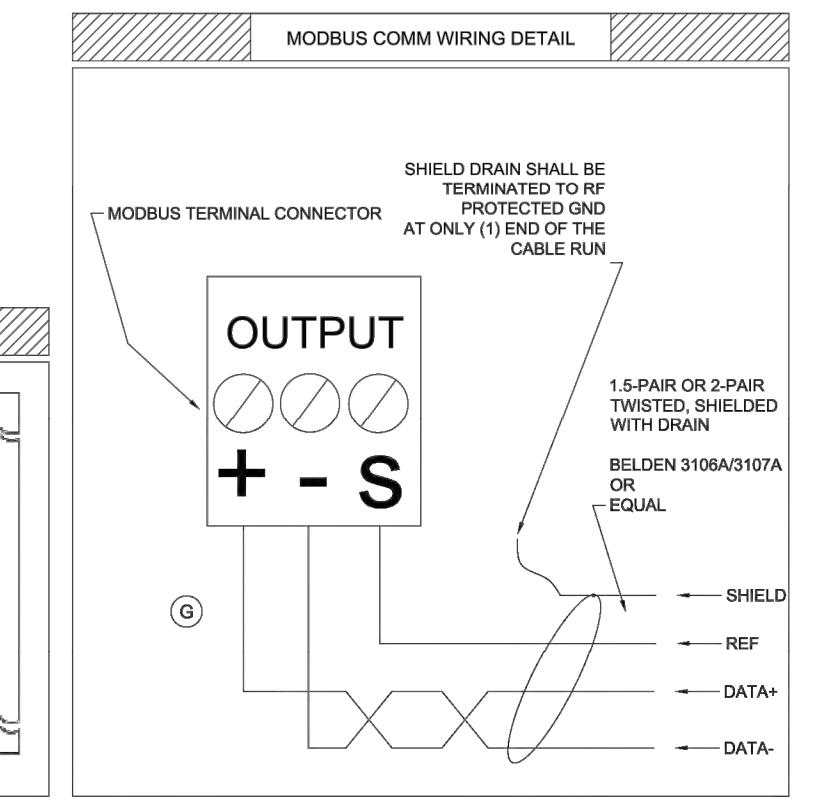
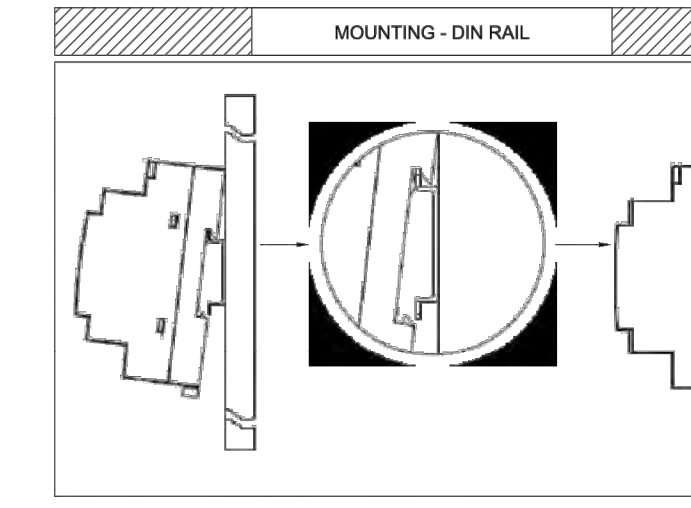
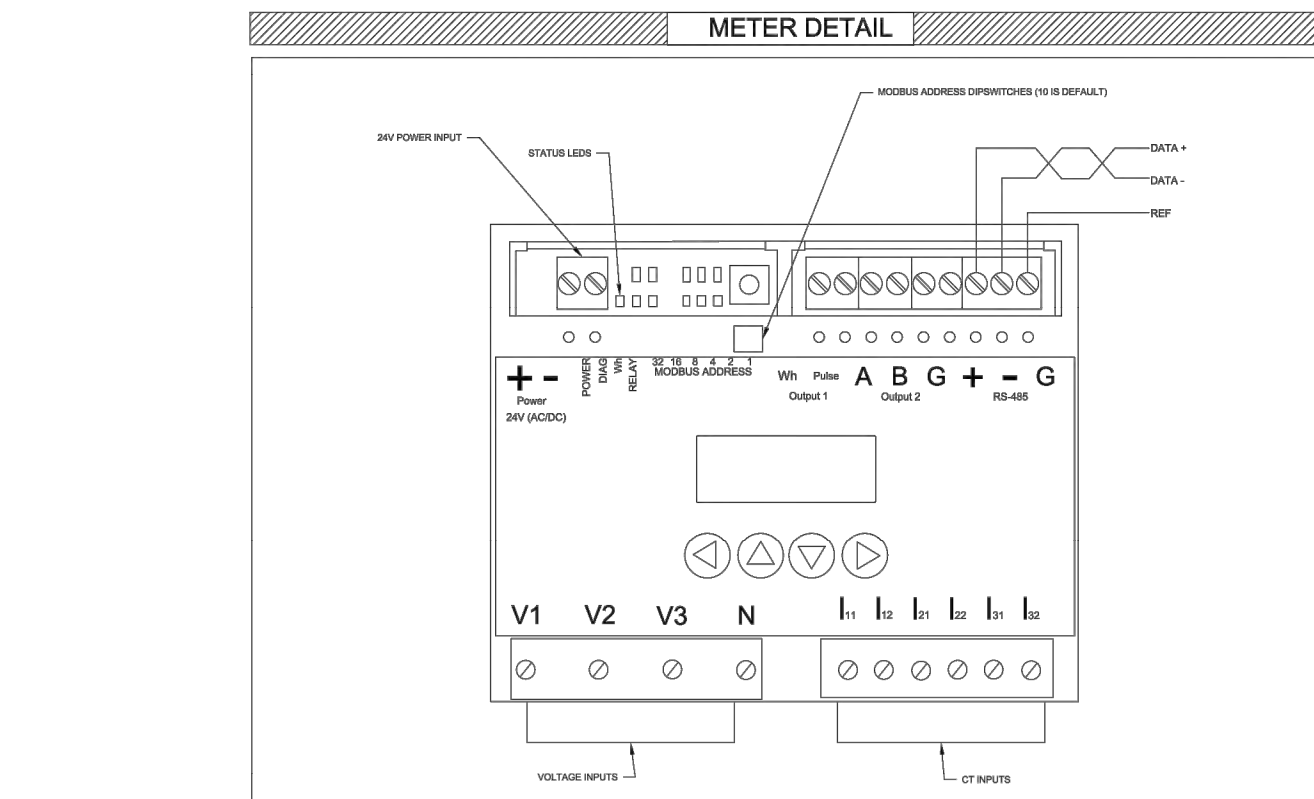
1 EQPT1 ALSO ENERGY DETAILS: SYSTEM LINE DIAGRAM



DATA ON THIS PAGE HAS BEEN TAKEN FROM:
 • www.Elkor.net/product/WattsOn-Mark_II

MATERIAL SPECIFICATIONS

ELECTRICAL	
POWER SUPPLY	12-30VDC or 24VAC, <2VA
FREQUENCY	40-70Hz nominal (30-300 Hz max)
MECHANICAL	
ENVIRONMENTAL	
AMBIENT TEMPERATURE	-40°C to +70°C
PHYSICAL	
DIMENSIONS	4.2" x 4.3" 2.4" W x L x H
WEIGHT	0.23 kg
MOUNTING	DIN RAIL 1/2" short screw wall mount



NOTICE

- ALWAYS OBSERVE BEST PRACTICES PER THE NEC & ALL AHJ.
- ELECTRICAL INSTALLATIONS SHALL BE PERFORMED ONLY BY PERSONS CONSIDERED QUALIFIED BY THE RELEVANT AUTHORITIES & SHALL POSSESS ALL REQUIRED LICENSES TO EXECUTE SUCH WORK.
- THESE DRAWINGS ARE PROVIDED IN GOOD FAITH & AS SUCH IT SHALL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO VERIFY DEVICE SPECIFIC WIRING & CONFIGURATION WITH RELEVANT DEVICE MANUFACTURERS.
- THIS SYSTEM HAS BEEN DESIGNED TO MEET THE INTENT OF THE CLIENT SYSTEM. IT SHALL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO VERIFY THAT THE SYSTEM MEETS THIS INTENT PRIOR TO COMPLETION OF SYSTEM COMMISSIONING.
- UNDER NO CIRCUMSTANCES SHALL THESE DRAWINGS BE CHANGED, REVISED OR OTHERWISE ALTERED BY ANY PERSON OR ENTITY OTHER THAN ONE AUTHORIZED BY DECK MONITORING.

EQUIPMENT DETAIL

PROJECT:

CLIENT:

DOC: 1 OF 2 REV: 1

DATE: 6/13/2016

DRAFTER: SLS

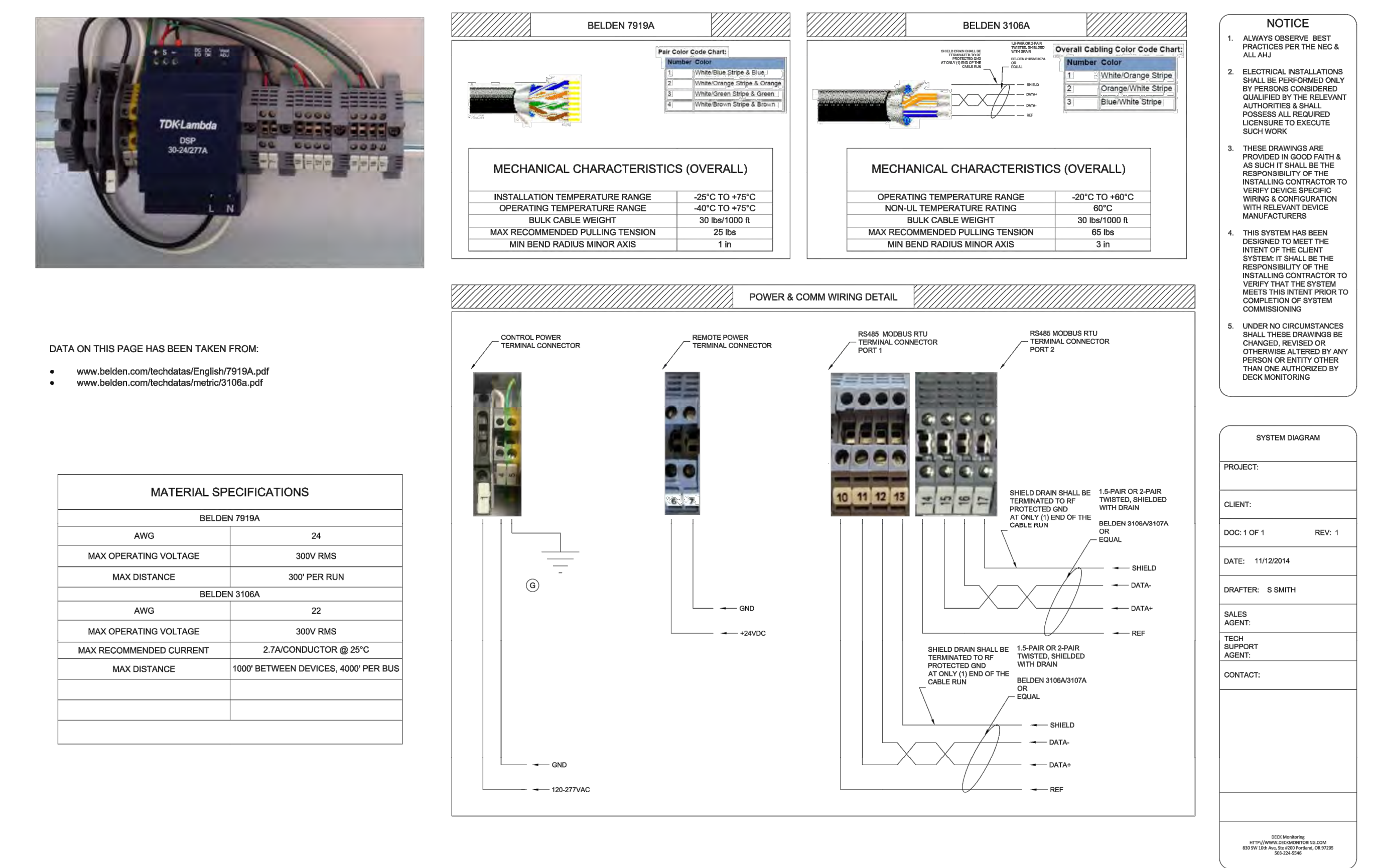
SALES AGENT:

TECH SUPPORT AGENT:

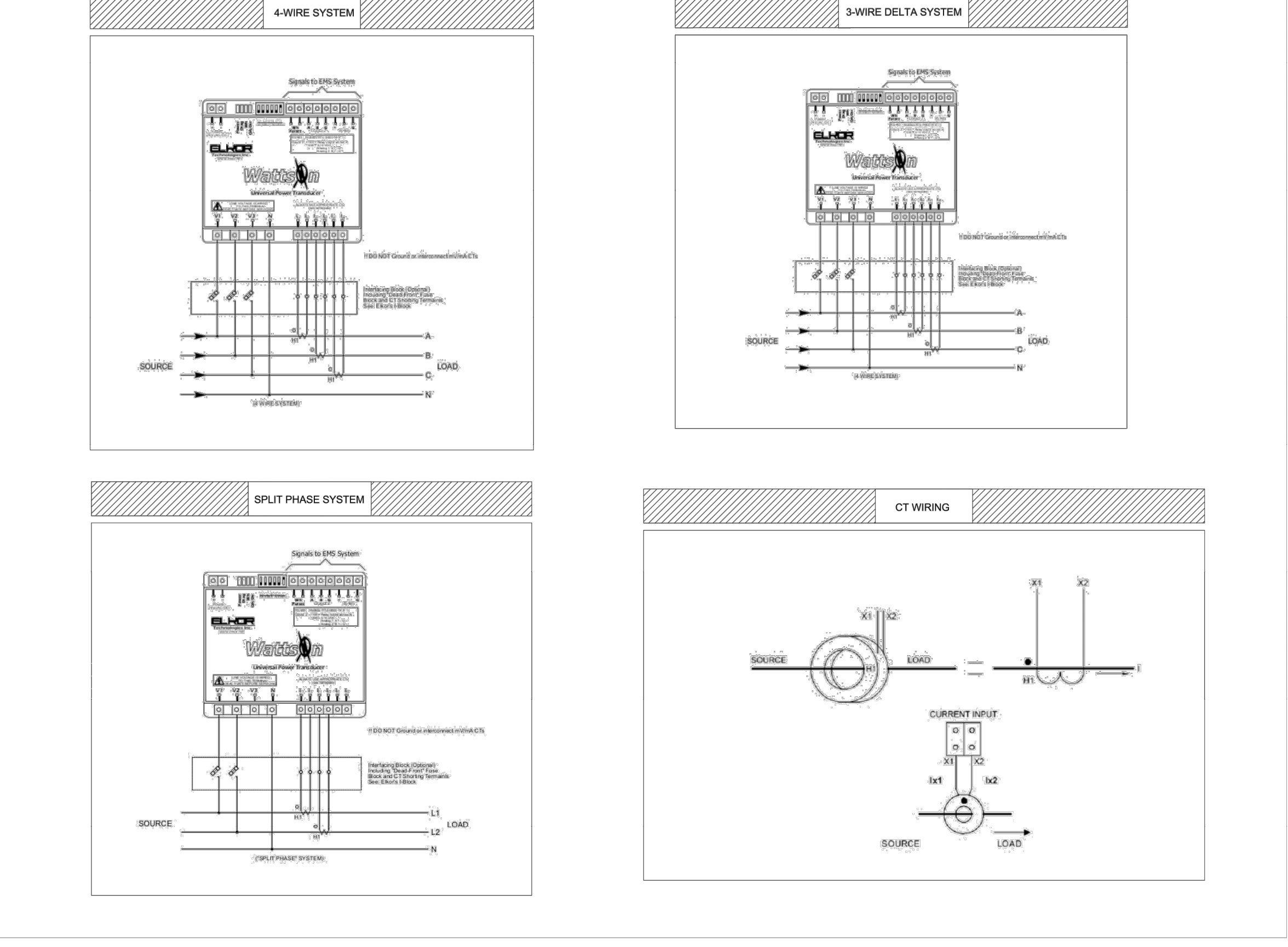
CONTACT: 866-303-5668

4870 Woodloch
 4870 Woodloch Blvd, Suite 100
 St. Louis, MO 63112

2 EQPT2 ALSO ENERGY DETAILS: ELKOR METER



3 EQPT3 ALSO ENERGY DETAILS: WIRING DETAILS



4 EQPT4 ALSO ENERGY DETAILS: CT WIRING DIAGRAM

OPERATING DIAGRAM

NOTICE OF LIMITED RESPONSIBILITY

THE RESPONSIBILITY OF THE UNDERSIGNED ENGINEER IS LIMITED TO THE DESIGN WORK SHOWN ON PROJECT AND DOCUMENTS BEARING HIS/HER SEAL, SIGNATURE OR INITIALS. HE/SHE DOES NOT HAVE AUTHORITY OVER THE PROJECT AS A WHOLE. THE UNDERSIGNED DISCLAIMS ANY RESPONSIBILITY FOR WORK DONE UNDER SUBSEQUENT REVISIONS AND ANY OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL.

SCALE: NOT TO SCALE

UNIT NO. ---

DWG. SIZE: ARCH D (36X24)

SUB CLASS: ---

MONITORING DETAILS

SITE: AMEREN LAMBERT COMMUNITY SOLAR ENERGY CENTER

DRAWING NO. ---

REV. ---

XX-DWG-EQPT-00002

REVISION NO. 0

AMEREN MISSOURI

CERTIFICATIONS:
 MARC LOPATA, PE
 CERT# 091110-241
 DANIEL STROH, EIT
 CERT# 042013-130

CERTIFICATIONS:
 MARC LOPATA, PE
 CERT# PVSI-120917-006937

STATE OF MISSOURI PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER

OPERATING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DR/FTR/CHK'D	SUPV. DAS	ENGR. ML	DESCRIPTION
A	02/26/18	1704-101	CJB	DIR	DAS	DESIGN DRAWINGS

3 EQPT3 ALSO ENERGY DETAILS: WIRING DETAILS

PROPOSED SOLAR POWER SITES:
AMEREN MISSOURI BOTTOM
SAINT LOUIS, MISSOURI 63145

PREPARED FOR:
AZIMUTH ENERGY
4240 DUNCAN AVENUE, SUITE 200
ST. LOUIS, MO 63110

PREPARED BY:
SOLAR FLEXRACK
A DIVISION OF NORTHERN STATES METALS
3207 INNOVATION PLACE
YOUNGSTOWN, OHIO 44509
PHONE: 1-888-380-8138

GENERAL NOTES:

- CODES AND STANDARDS**
IBC 2012
NEC 2014
AISC 360-10
AISI S100-10
ASCE 7-10
- WIND DESIGN PARAMETERS:**
DESIGN WIND SPEED, V - 105 MPH
RISK CATEGORY - I
WIND EXPOSURE, KZ - 0.85
TOPOGRAPHIC FACTOR, KZT - 1.00
WIND DIRECTIONALITY FACTOR, KD - 0.85
GUST FACTOR & NET PRESSURE COEFFICIENT, GCN (BASED ON WIND TUNNEL STUDY)
UPWARD - 1.2
DOWNWARD - 0.97
- SNOW DESIGN PARAMETERS:**
GROUND SNOW LOAD, Pf - 20 PSF
SNOW EXPOSURE FACTOR, Ce - 0.9
IMPORTANCE FACTOR, I - 0.8
SNOW THERMAL FACTOR, Ct - 1.2
SNOW REDUCTION FACTOR, SLIPPERY FACTOR, Cs - 0.82
- EARTHQUAKE DESIGN PARAMETERS:**
RISK CATEGORY - I
SEISMIC IMPORTANCE FACTOR, Ie - 1.0
MAPPED SPECTRAL RESPONSE ACCELERATION PARAMETERS,
SS -0.38g
S1 -0.15g
SITE CLASS - D
DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS,
SDS -0.378g
SD1 -0.223g
SEISMIC DESIGN CATEGORY - D
BASIC SEISMIC FORCE-RESISTING SYSTEM - SOLAR RACKING SYSTEM
DESIGN BASE SHEARS - 0.398 KIP
SEISMIC RESPONSE COEFFICIENT, Cs - 0.189
RESPONSE MODIFICATION COEFFICIENT, R - 2
ANALYSIS PROCEDURE - EQUIVALENT LATERAL FORCE PROCEDURE
- FOUNDATION DESIGN PARAMETERS:**
EMBEDMENT DEPTH TO BE DETERMINED BASED ON GEOTECHNICAL ENGINEERING EVALUATION
PROVIDED BY: REITZ & JENS, INC. DATED 06/28/2017
REPORT NO: 2017012415
-SEE SFR GEOTECHNICAL SUMMARY FOR RESULTS.
- POST INSTALLATION TOLERANCES AT TOP OF POST:**
VERTICAL: +/-1" (SEE NOTE BELOW)
NORTH/SOUTH: +/-1"
EAST/WEST: +/-2.5"
MAX TWIST: +/-2"
MAX OUT OF PLUMB: +/- 1"

- GROUND CLEARANCE REQUIREMENTS:**
SNOW REMOVAL AT FRONT EDGE OF RACK IS REQUIRED TO MAINTAIN PROPER CLEARANCE FOR SNOW TO SLIDE OFF.

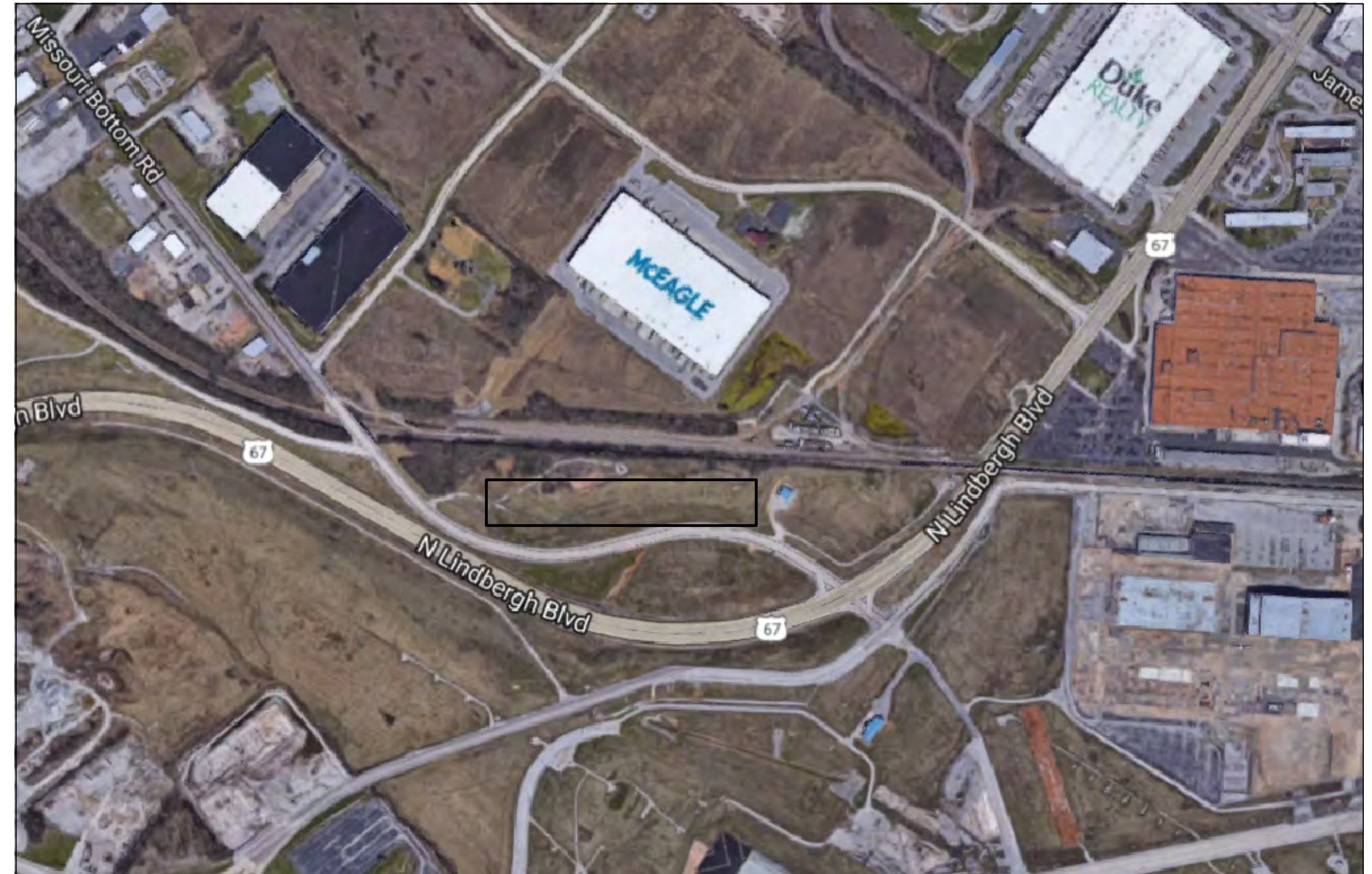
A. MINIMUM GROUND CLEARANCE TO BE HELD AT ALL "CONTROL POSTS".
B. IF GROUND CLEARANCE BETWEEN CONTROL POSTS IS GREATER THAN MINIMUM GROUND CLEARANCE, IT IS ACCEPTABLE.
C. IF GROUND CLEARANCE BETWEEN CONTROL POSTS IS LESS THAN MINIMUM GROUND CLEARANCE, THEN EXCAVATION IS REQUIRED AT LEADING EDGE OF RACK TO ACHIEVE MINIMUM GROUND CLEARANCE.
- CONNECTIONS:**
ALL CONNECTIONS TO BE SNUG TIGHT UNLESS OTHERWISE NOTED. SOME 1/2"-13 ASTM A325T BOLTS MUST BE FASTENED BY TURN OF THE NUT METHOD PER THE RESEARCH COUNCIL OF STRUCTURAL CONNECTIONS (RCSC). SEE SHEET S2-S3 FOR DETAILS.
- PV MODULE INFORMATION:**
NAME/MODEL: TO BE DETERMINED
DIMENSIONS:
WEIGHT
- MATERIALS AND COATING:**
A. PILES
I. W-SECTIONS: A992 STEEL HOT DIPPED GALVANIZED PER ASTM A123.
II. COLD FORMED BALLAST CHANNELS - A36 STEEL HOT DIPPED GALVANIZED PER ASTM A123.
III. SMART POST - A653 GRADE 50 STEEL HOT DIPPED GALVANIZED PER ASTM A123.
B. HARDWARE:
I. 1/2"Ø TO BE A325 HOT DIPPED GALVANIZED PER ASTM A153.
II. 3/8"Ø TO BE A449 MECHANICAL GALVANIZED PER MAGNI 560.
III. 5/16"Ø TO BE A449 MECHANICAL GALVANIZED PER MAGNI 560 OR STAINLESS STEEL.
IV. 1/4"Ø TO BE A449 MECHANICAL GALVANIZED PER MAGNI 560 OR STAINLESS STEEL.
C. COLD FORMED STEEL - ALL COLD FORM STEEL TO BE PRE GALVANIZED PER A653 UNLESS OTHERWISE NOTED. SEE S1 FOR THE GRADE OF STEEL FOR EACH MEMBER.

ABBREVIATIONS:

INT	INTERIOR	C-C	CENTER TO CENTER
MIN	MINIMUM	CL	CENTERLINE
MAX	MAXIMUM	CD	CRITICAL DIMENSION
PLCS	PLACES	DIA	DIAMETER
PAG	POST ABOVE GRADE	DIM	DIMENSION
REF	REFERENCE	EOP	END OF PANEL
TB	TILT BRACKET	EXT	EXTERIOR
TYP	TYPICAL	HORIZ	HORIZONTAL
VERT	VERTICAL	HDG	HOT DIPPED GALVANIZED

(POST INSTALLATION TOLERANCES ACCOUNT FOR STACKED MANUFACTURING TOLERANCES)

- RECOMMENDATIONS FOR SETTING POST ELEVATIONS:
- FIRST POST OF RACK AND FIRST POST OF NEXT RACK (CONTROL POSTS) SHALL BE PLACED SO THAT THE TOP OF POST IS EQUAL TO THE "POST ABOVE GRADE" DIMENSION. MINIMUM EMBEDMENT DEPTH REQUIRED AT ALL CONTROL POSTS.
 - THE CONTROL POST DOESN'T NECESSARILY HAVE TO BE THE 1ST POST WITHIN EACH RACK.
 - A TAUT STRING-LINE SHALL THEN BE PLACED FROM TOP CENTER OF FIRST CONTROL POST TO TOP CENTER OF NEXT CONTROL POST.
 - THE MAXIMUM SLOPE OF THE STRING-LINE SHALL BE +/- 20%
 - THE REMAINING POSTS TO BE INSTALLED WITHIN +/- 1" FROM STRING LINE.
 - EMBEDMENT DEPTH FOR POSTS BETWEEN CONTROL POSTS MUST BE INSTALLED TO WITHIN +/- 6" OF REQUIRED EMBEDMENT DEPTH.
- MINIMUM RECOMMENDED CLEARANCE BETWEEN ADJACENT RACKS TO BE NO LESS THAN 6".



NORTH
PROJECT SITE

DRAWING INDEX: G3L RACK

NO.	DESCRIPTION	ISSUED	REVISED	DATE
S1	4X9 RACK PLAN VIEW, ELEVATIONS, AND NOTES	●		
S2	TILT BRACKET COMPONENTS, CONNECTIONS & FOUNDATION DETAILS	●		
S3	RACK CONNECTIONS	●		
S4	RACK HARDWARE	●		
		SIGN-OFF SEP 15, 2017		
		ISSUANCE/REVISION		

LEGEND:
● ISSUED
○ REVISED, BUT NOT ISSUED

CUSTOMER APPROVAL

() APPROVED
() APPROVED AS NOTED RESUBMISSION NOT REQUIRED
() APPROVED AS NOTED RESUBMISSION REQUIRED
() NOT APPROVED, CORRECT AND RESUBMIT

NOTE: APPROVALS ARE SUBJECT TO COMPLY WITH CONTRACT REQUIREMENTS. CUSTOMER SHALL VERIFY ALL DIMENSIONS AND CONFIGURATION AND RETURN SIGNED PRIOR TO FINAL DRAWINGS BEING SUBMITTED.

BY: _____ DATE: _____

CUSTOMER: **AZIMUTH ENERGY**
AMEREN MISSOURI BOTTOM
SAINT LOUIS, MISSOURI 63145

DATE: 09/15/2017
JOB #: 6.375
DRAWN BY: A.A.
CHECK BY: WS
PAGE: S0 of S4

SOLAR FLEXRACK
A Division of Northern States Metals

3207 Innovation Place
Youngstown, OH 44509-4023
Phone (888) 380-8138

COVER SHEET

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REV	DESCRIPTION	DATE

CUSTOMER: AZIMUTH ENERGY
AMEREN MISSOURI BOTTOM
SAINT LOUIS, MISSOURI 63145

DATE: 09/15/2017

DESIGNER: A.A.

CHECK BY: WS

6.375

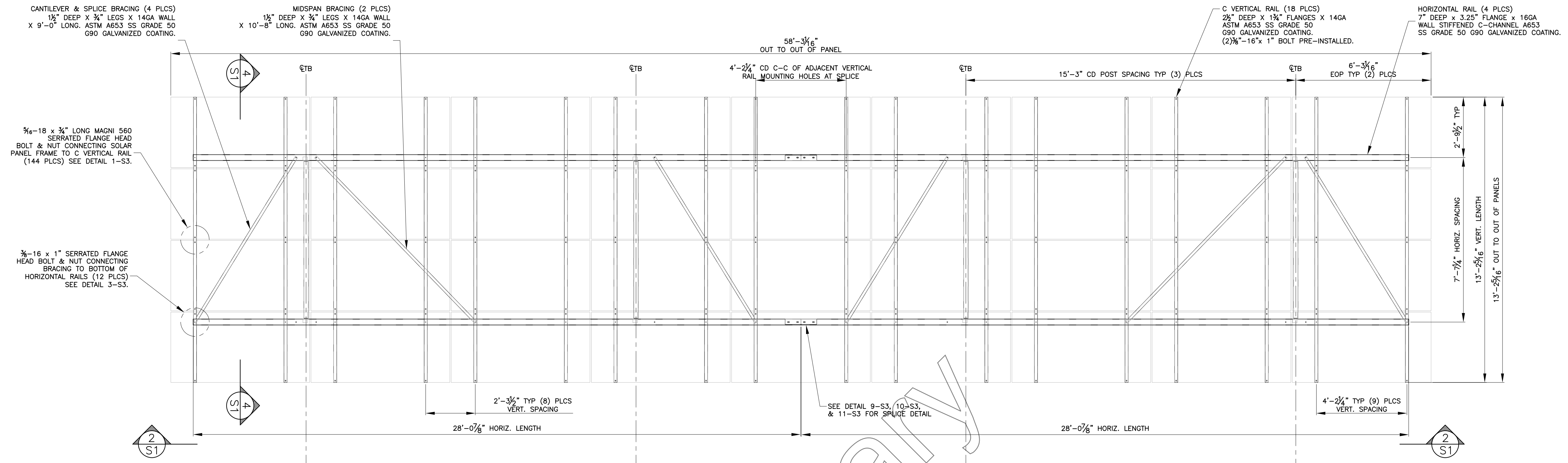
1 of 4

340W MODULE
4X9 SOLAR FLEXRACK G3L

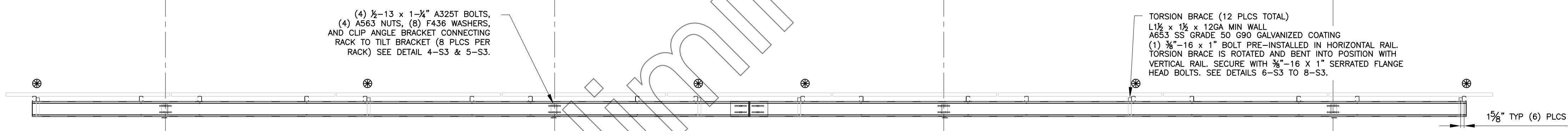


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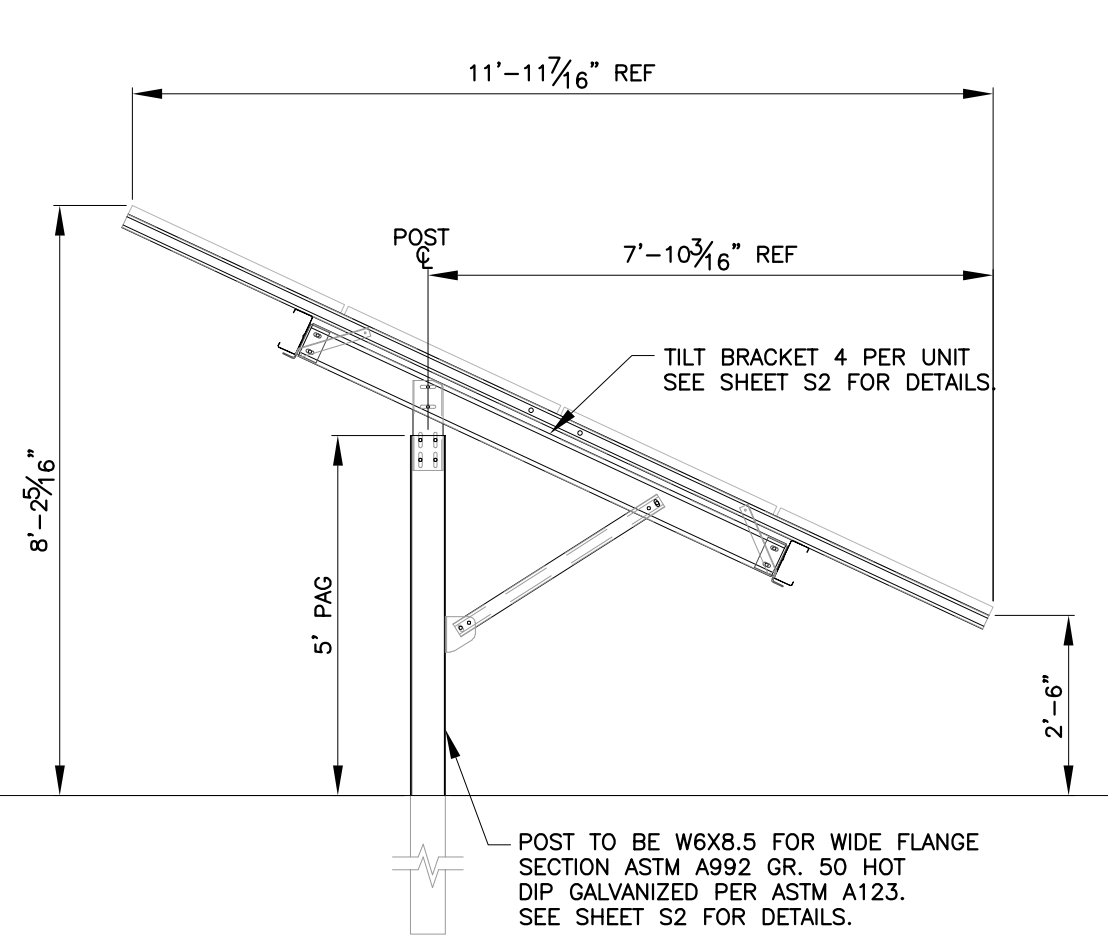


1 PROJECTED TOP PLAN VIEW
SCALE: 3/8" = 1'-0"

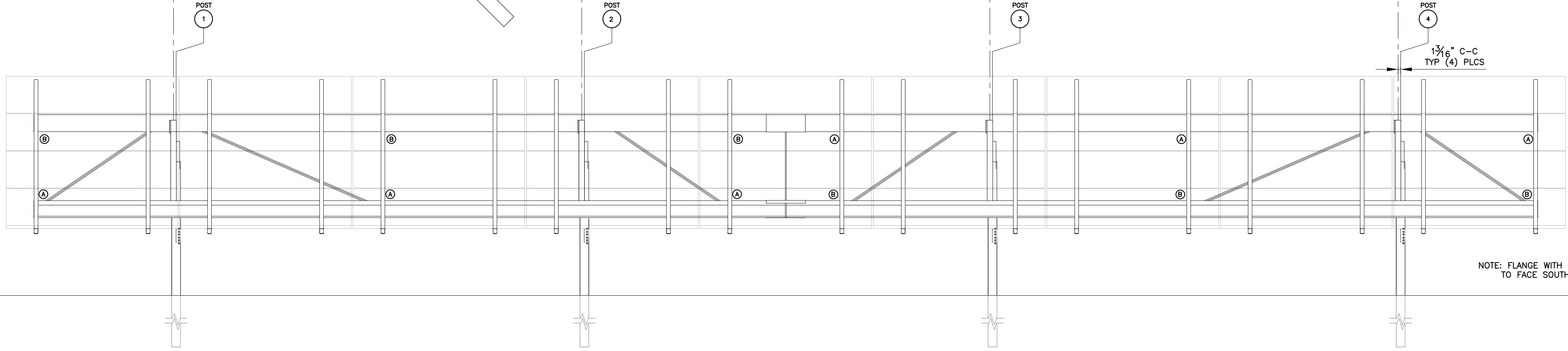


2 VIEW 2-S1
SCALE: 3/8" = 1'-0"

- ⊗ INDICATES TORSION BRACE LOCATIONS
- ⊙ = "A" TORSION BRACE S/C: 4379
- ⊙ = "B" TORSION BRACE S/C: XXXX



4 DETAIL 4-S1
SCALE: 3/8" = 1'-0"



3 FRONT ELEVATION VIEW
SCALE: 3/8" = 1'-0"

AZIMUTH ENERGY
 AMEREN MISSOURI BOTTOM
 SAINT LOUIS, MISSOURI 63145

TILT BRACKET COMPONENTS,
 CONNECTIONS & FOUNDATION DETAILS

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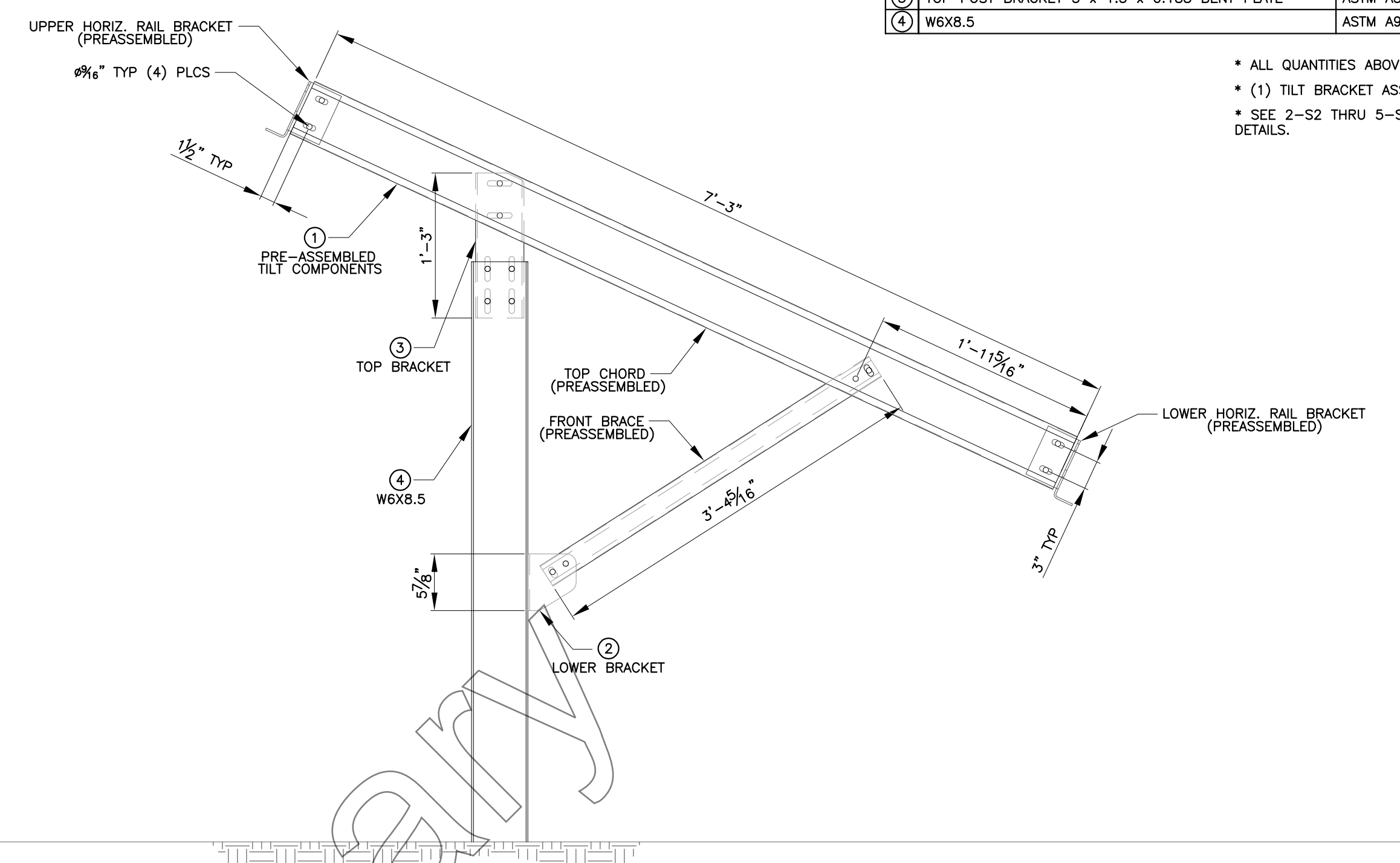
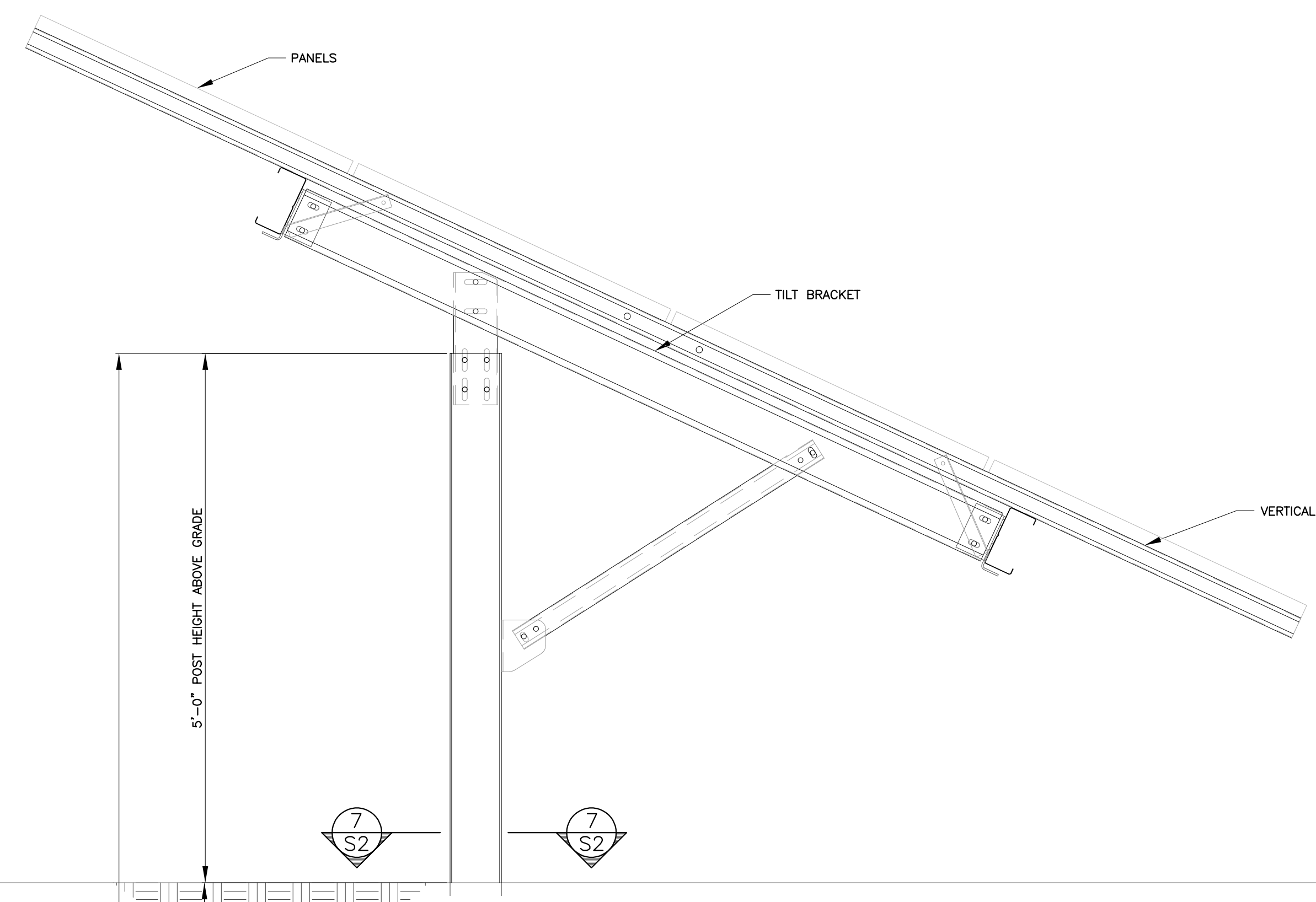
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REV	DESCRIPTION	CHK. BY	DATE

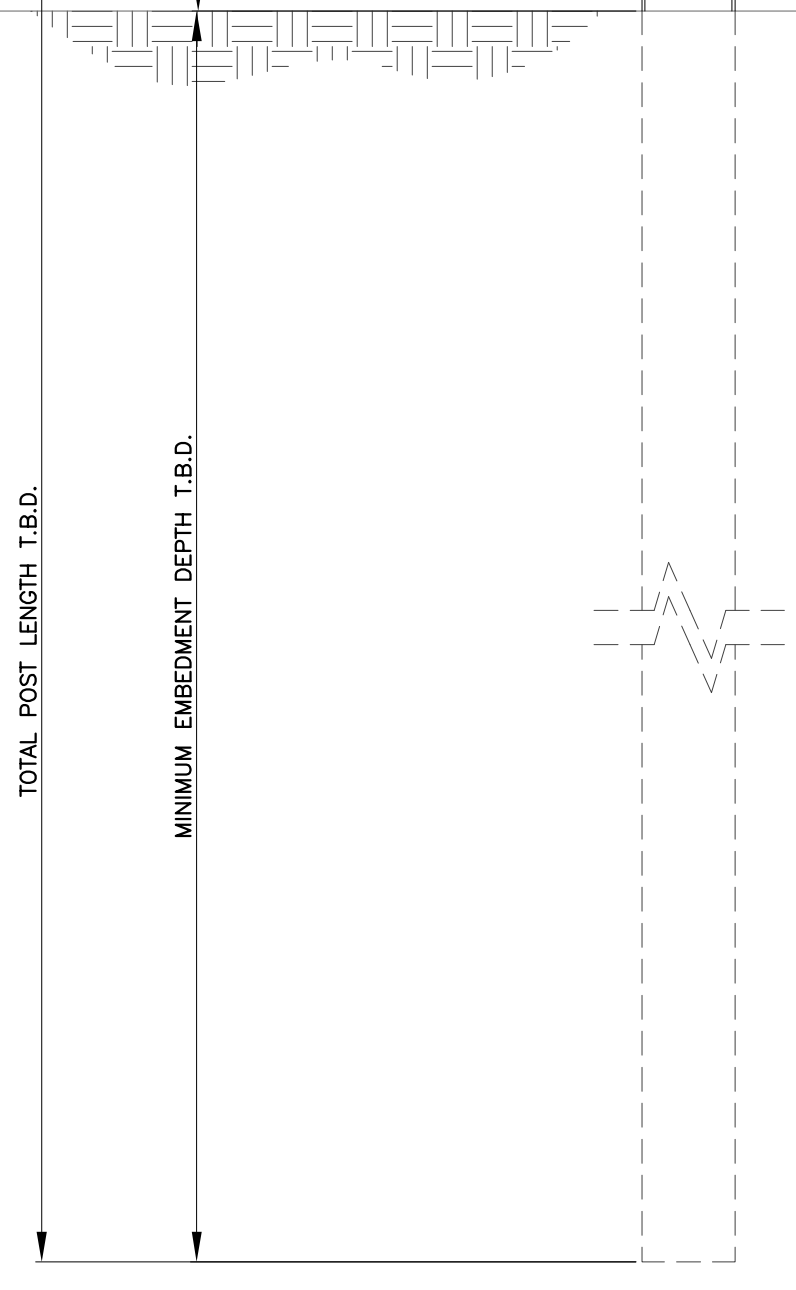
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ITEM	DESCRIPTION	MATERIAL	QTY
	TOP CHORD 6 DEEP x 2.5 LEG x 14GA THK C	ASTM A653 SS GRADE 55 G90	
1	FRONT BRACE 2.5 DEEP x 1.75 LEG x 14GA THK C	ASTM A653 SS GRADE 50 G90	1
2	LOWER HORIZ. RAIL BRACKET 6.457 x 3.68 x 0.188 THK	ASTM A36 HOT-DIP GALVANIZED	1
3	UPPER HORIZ. RAIL BRACKET 6.457 x 3.68 x 0.188 THK	ASTM A36 HOT-DIP GALVANIZED	1
4	LOWER BRACKET 5 x 2.5 x 0.18 BENT PLATE	ASTM A36 HOT-DIP GALVANIZED	1
5	TOP POST BRACKET 5 x 1.5 x 0.188 BENT PLATE	ASTM A36 HOT-DIP GALVANIZED	1
6	W6X8.5	ASTM A992 GR. 50 HOT-DIP GALVANIZED	1

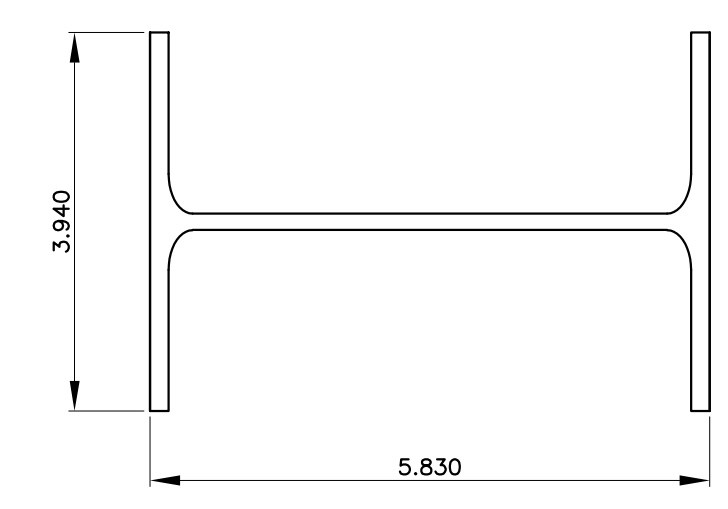
- * ALL QUANTITIES ABOVE ARE FOR ONE (1) TILT BRACKET ASSEMBLY
- * (1) TILT BRACKET ASSEMBLY PER POST
- * SEE 2-S2 THRU 5-S2 FOR ALL TILT BRACKET CONNECTION DETAILS.



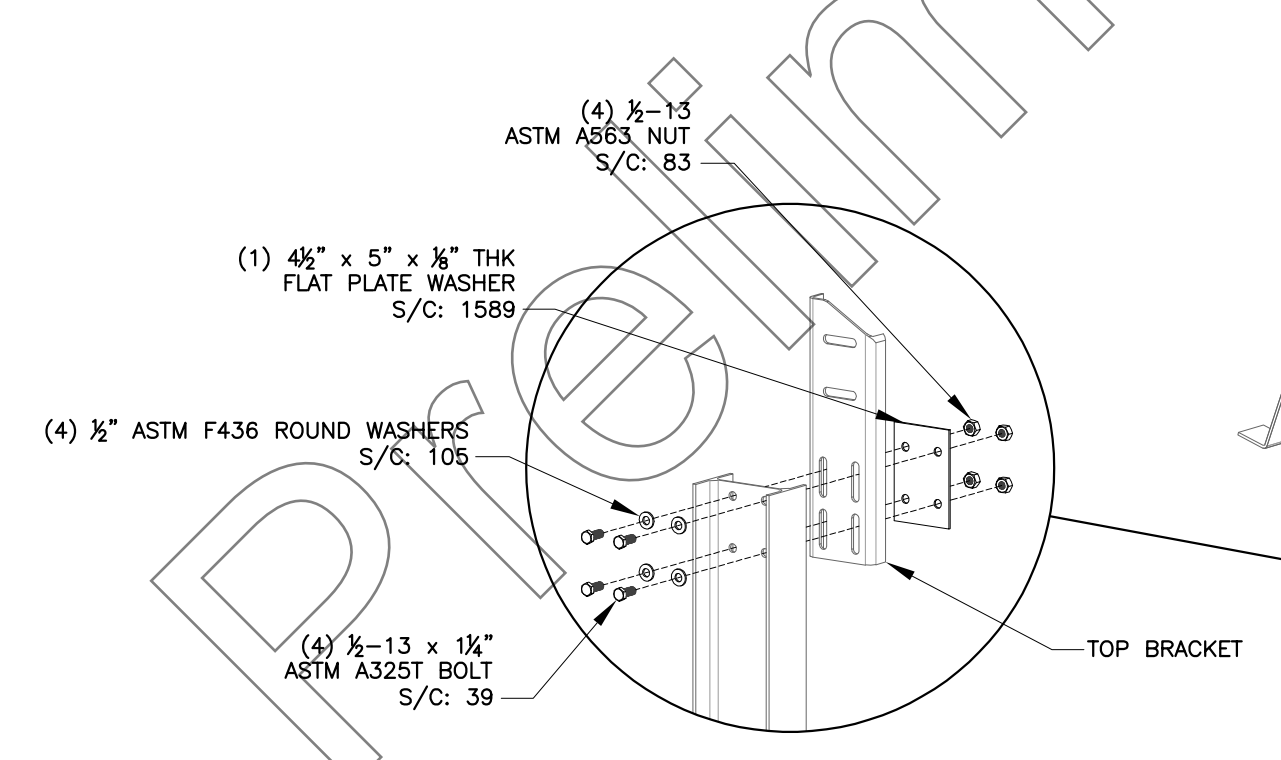
1 TILT BRACKET SIDE ELEVATION
 SCALE: 1" = 1'-0"



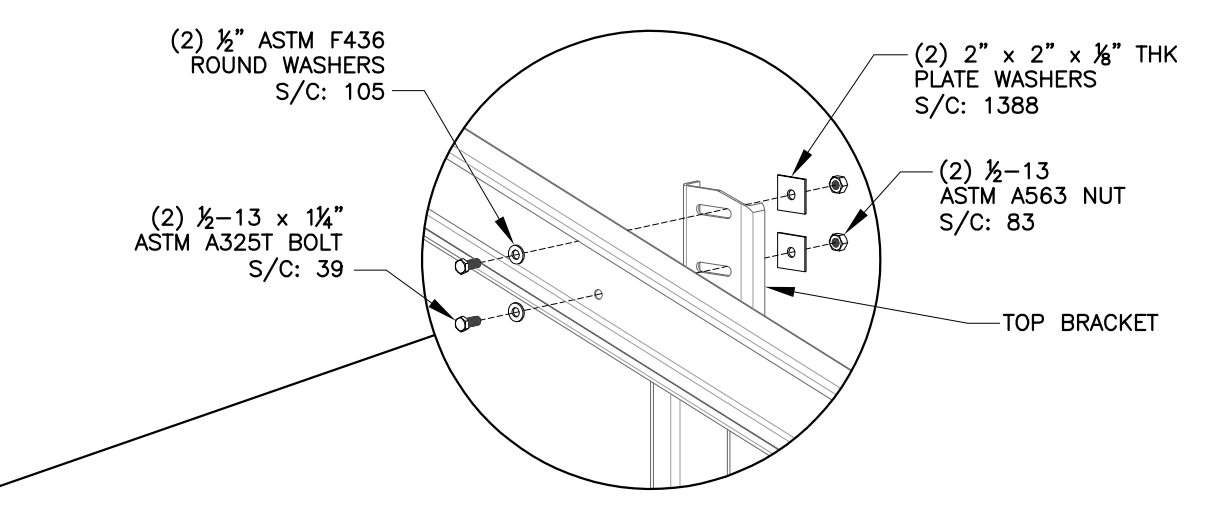
6 FOUNDATION DETAIL
 SCALE: 1" = 1'-0"



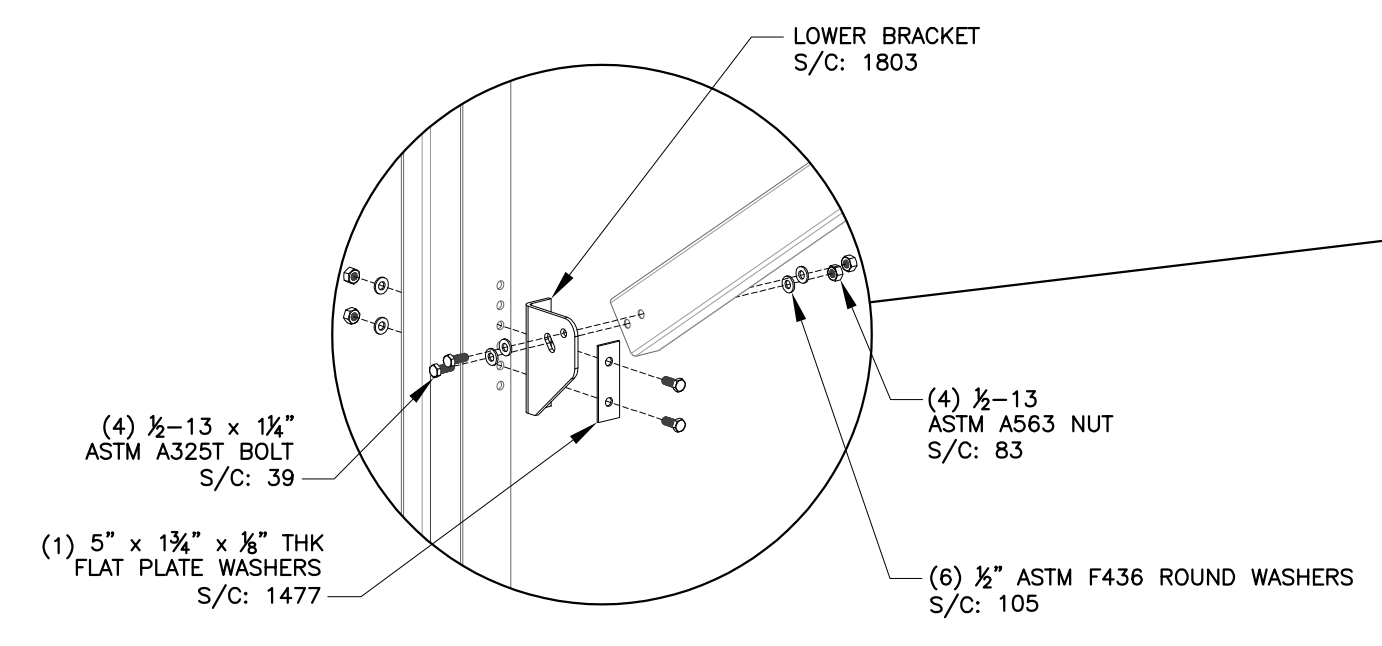
7 W6X8.5 CROSS SECTION
 SCALE: 8" = 1'-0"



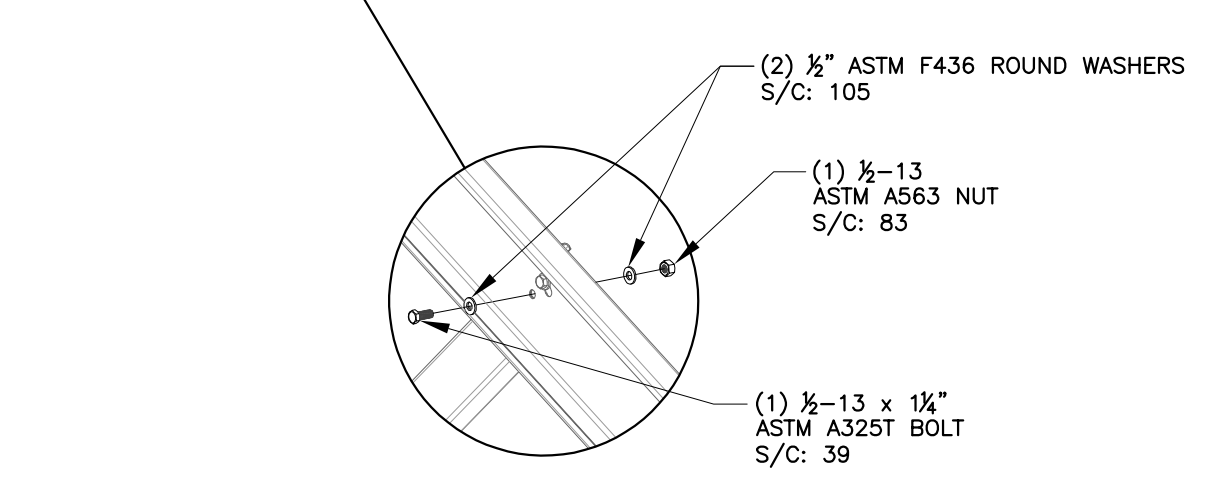
5 POST TO TOP BRACKET CONNECTION
 SCALE: NTS
 1/2"-13 ASTM A325T BOLTS CONNECTING TOP BRACKET TO POST SHALL BE FASTENED BY TURN OF THE NUT METHOD. (3/8) TURN PAST SNUG TIGHT



2 TOP CHORD TO TOP BRACKET CONNECTION
 SCALE: NTS
 1/2"-13 ASTM A325T BOLTS CONNECTING TILT BRACKET TOP CHORD TO TOP BRACKET SHALL BE FASTENED BY TURN OF THE NUT METHOD. (3/8) TURN PAST SNUG TIGHT



4 BRACE TO LOWER BRACKET CONNECTION
 SCALE: NTS
 1/2"-13 ASTM A325T BOLTS CONNECTING LOWER BRACKET TO POST SHALL BE FASTENED BY TURN OF THE NUT METHOD. (3/8) TURN PAST SNUG TIGHT



3 TOP CHORD TO BRACE CONNECTION
 SCALE: NTS

- * TOP CHORD, FRONT BRACE, AND SEAT BRACKETS WILL BE DELIVERED PREINSTALLED AND FOLDED.
- * BOLTS THAT HAVE BEEN PREINSTALLED WILL HAVE SILICONE ON THEM FOR TRANSPORTING PURPOSES, BOLTS WILL HAVE TO BE TIGHTENED.

AZIMUTH ENERGY
AMEREN MISSOURI BOTTOM
SAINT LOUIS, MISSOURI 63145

CUSTOMER:

DATE: 09/15/2017

DESIGNER: A.A.

6.3.7.5

WS

S3 of S4

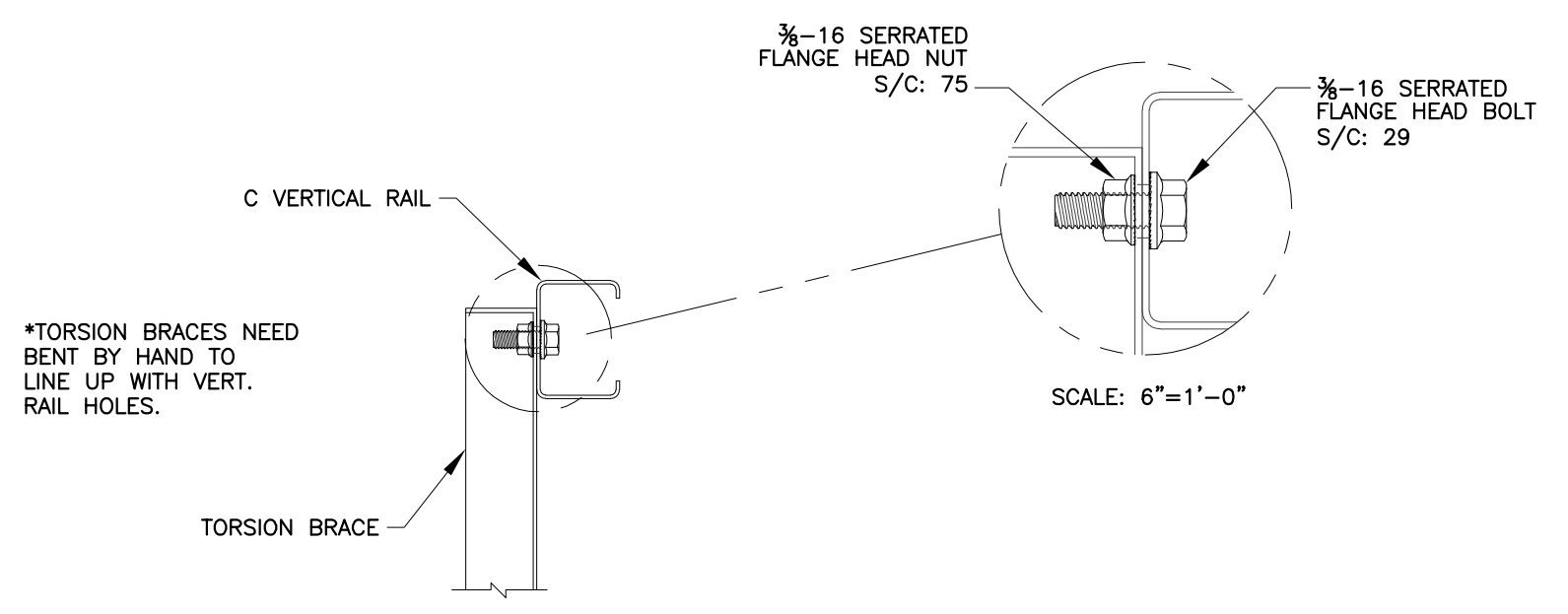
CONNECTIONS

SOLAR FLEX RACK
A Division of Northern States Metals

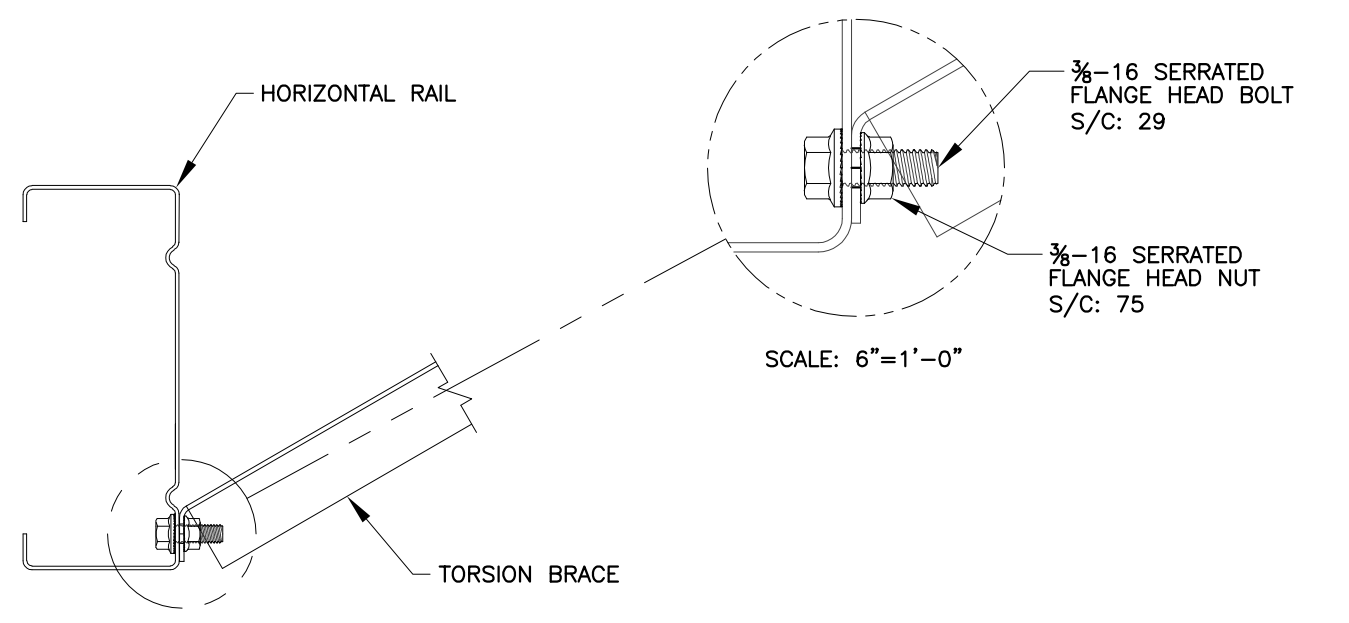
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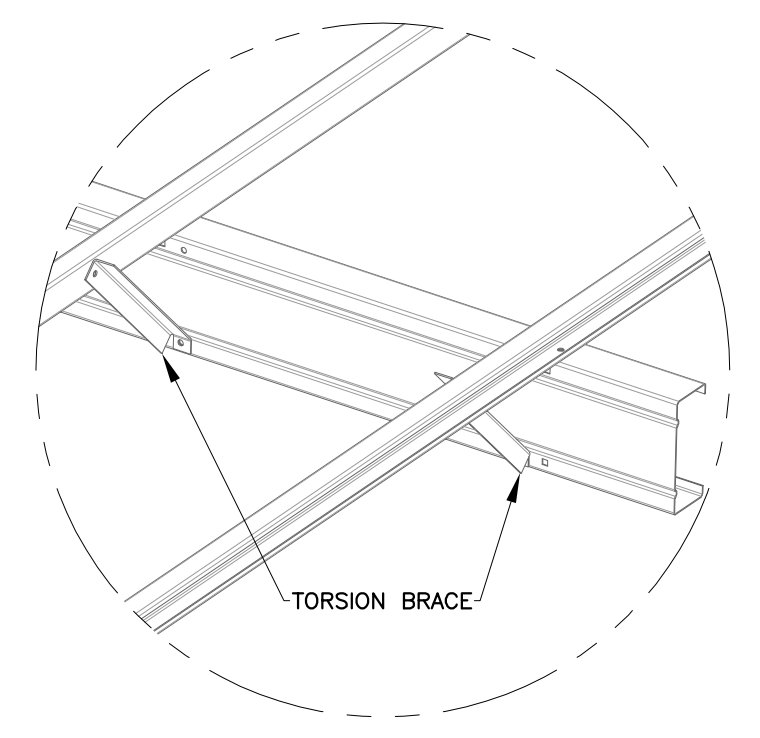
REV	DESCRIPTION	DATE



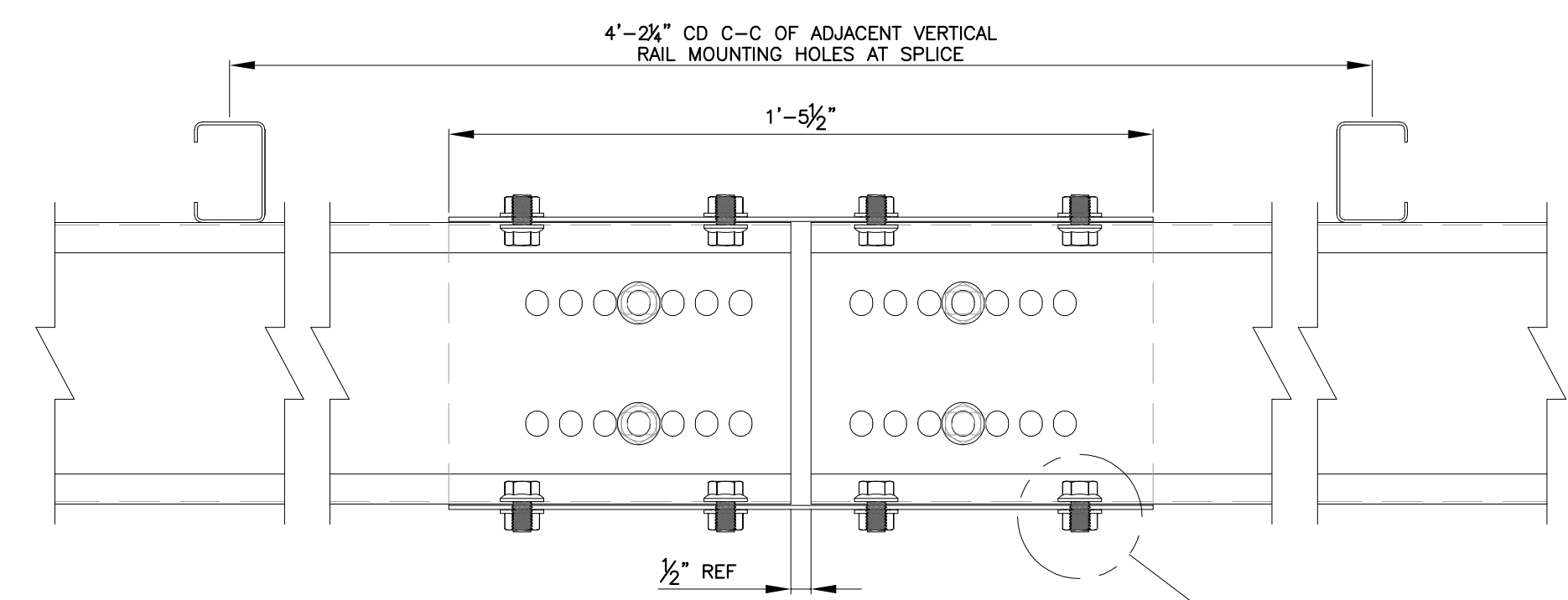
6 C VERTICAL RAIL TO TORSION BRACE
SCALE: 3" = 1'-0"



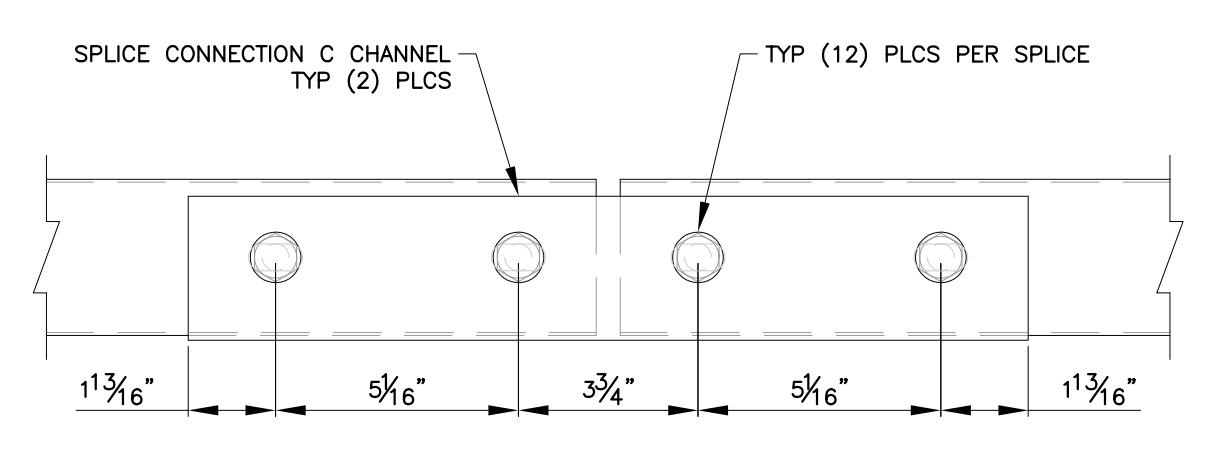
7 HORIZ. RAIL TO TORSION BRACE
SCALE: 3" = 1'-0" (PRE-ASSEMBLED)



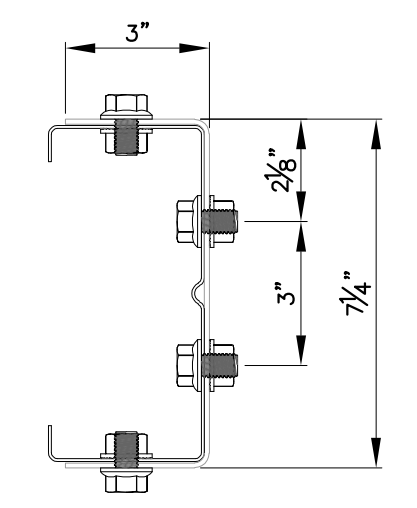
8 TORSION BRACE CONNECTIONS ISO VIEW
SCALE: NTS



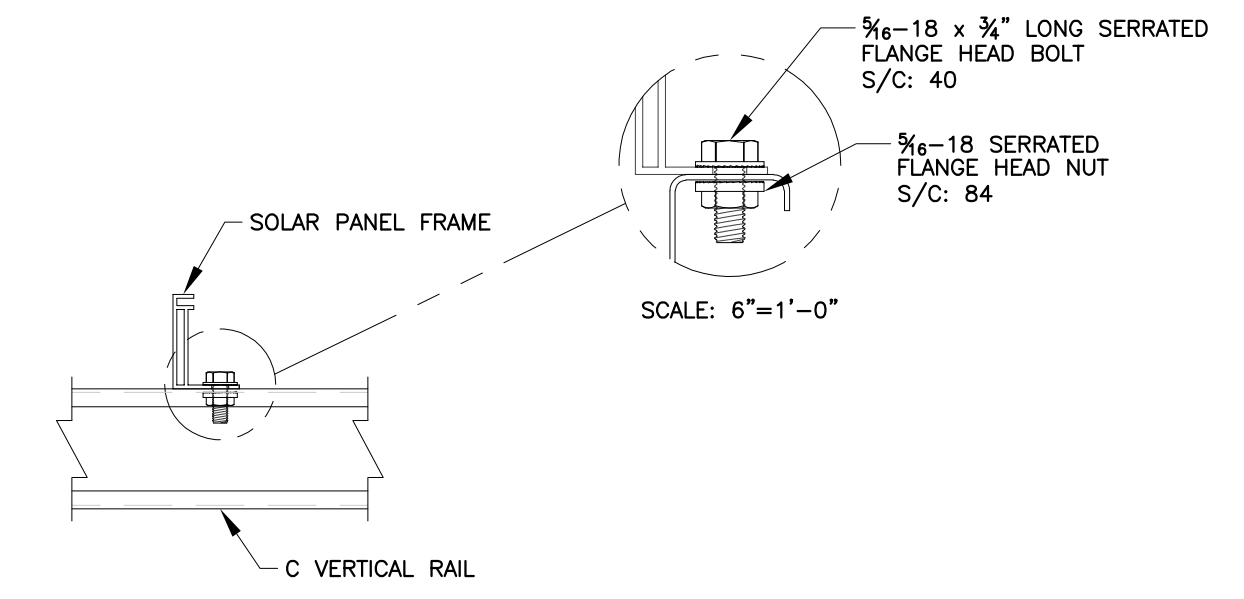
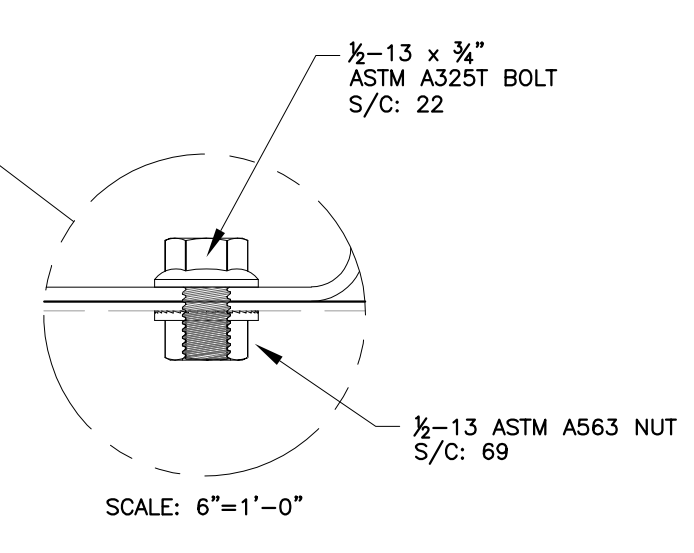
10 SPLICE CONN. ELEVATION
SCALE: 3" = 1'-0"



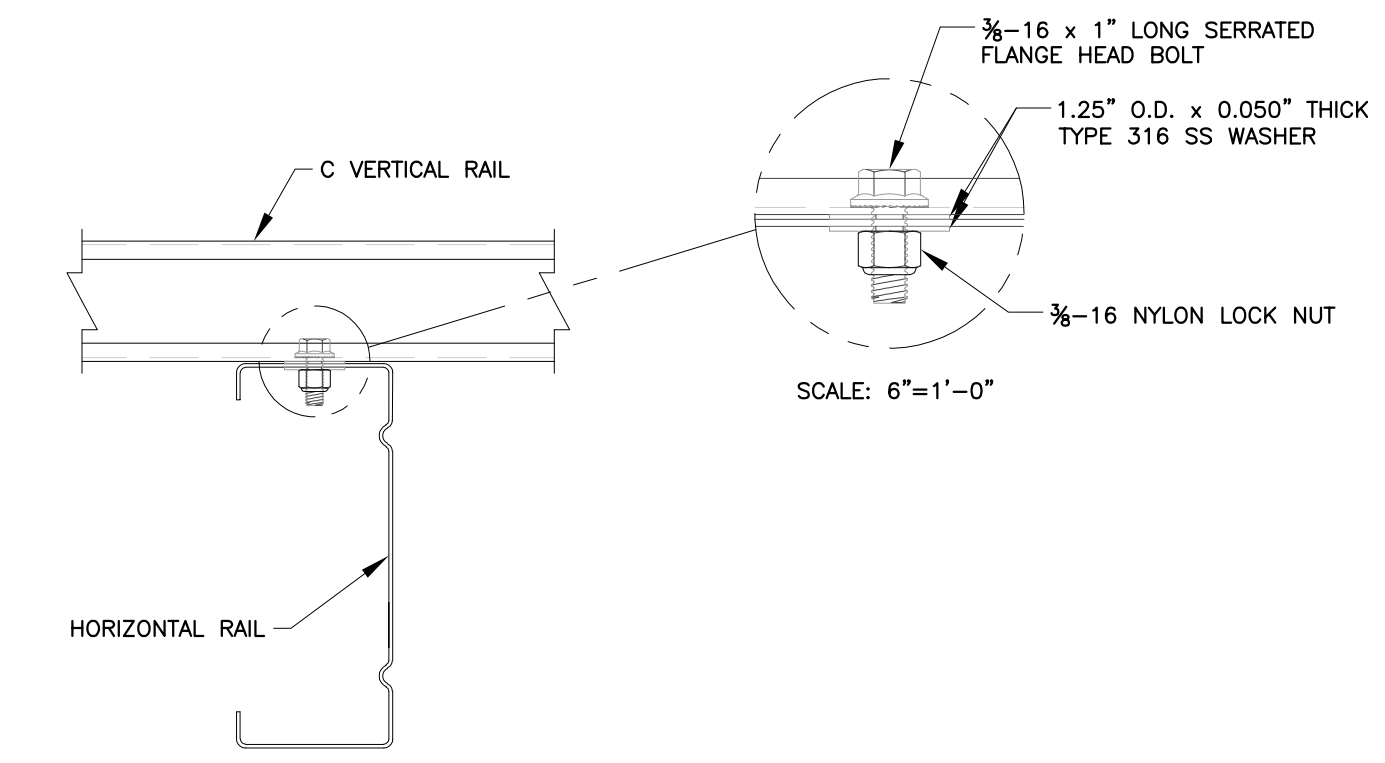
11 SPLICE CONN. FLANGE
SCALE: 3" = 1'-0"
MATERIAL: ASTM A653 SS GRADE 50
FINISH: G-90 PRE-GALVANIZED



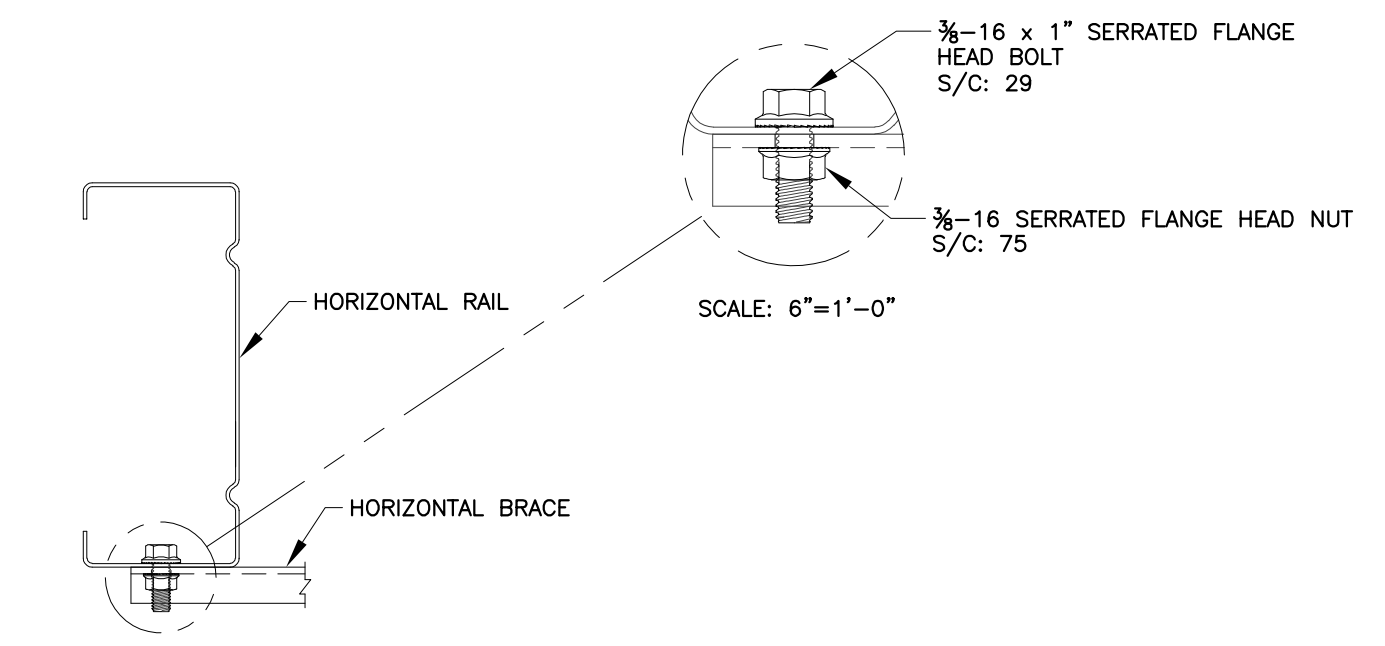
9 SPLICE PROFILE
SCALE: 3" = 1'-0"



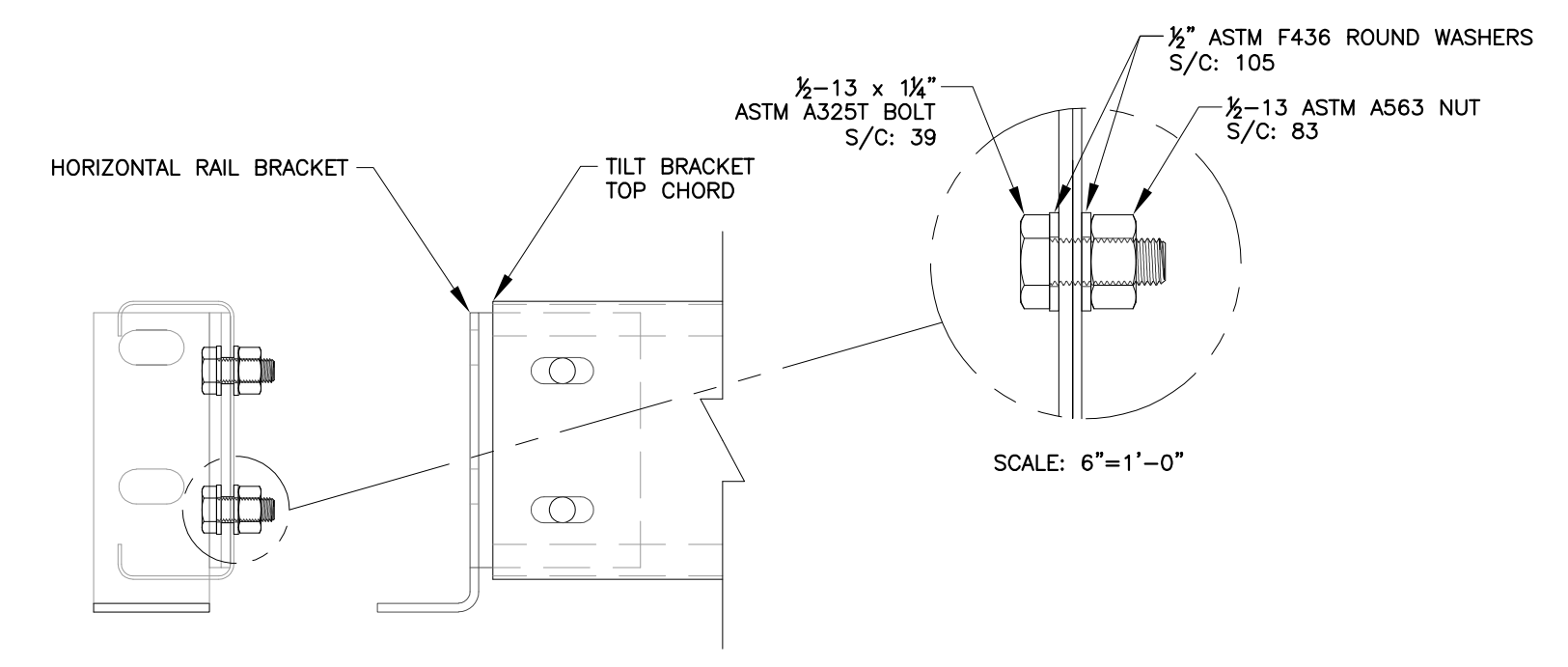
1 SOLAR PANEL TO VERT. RAIL CONN.
SCALE: 3" = 1'-0"
TORQUE: 8-14 FT-lbs



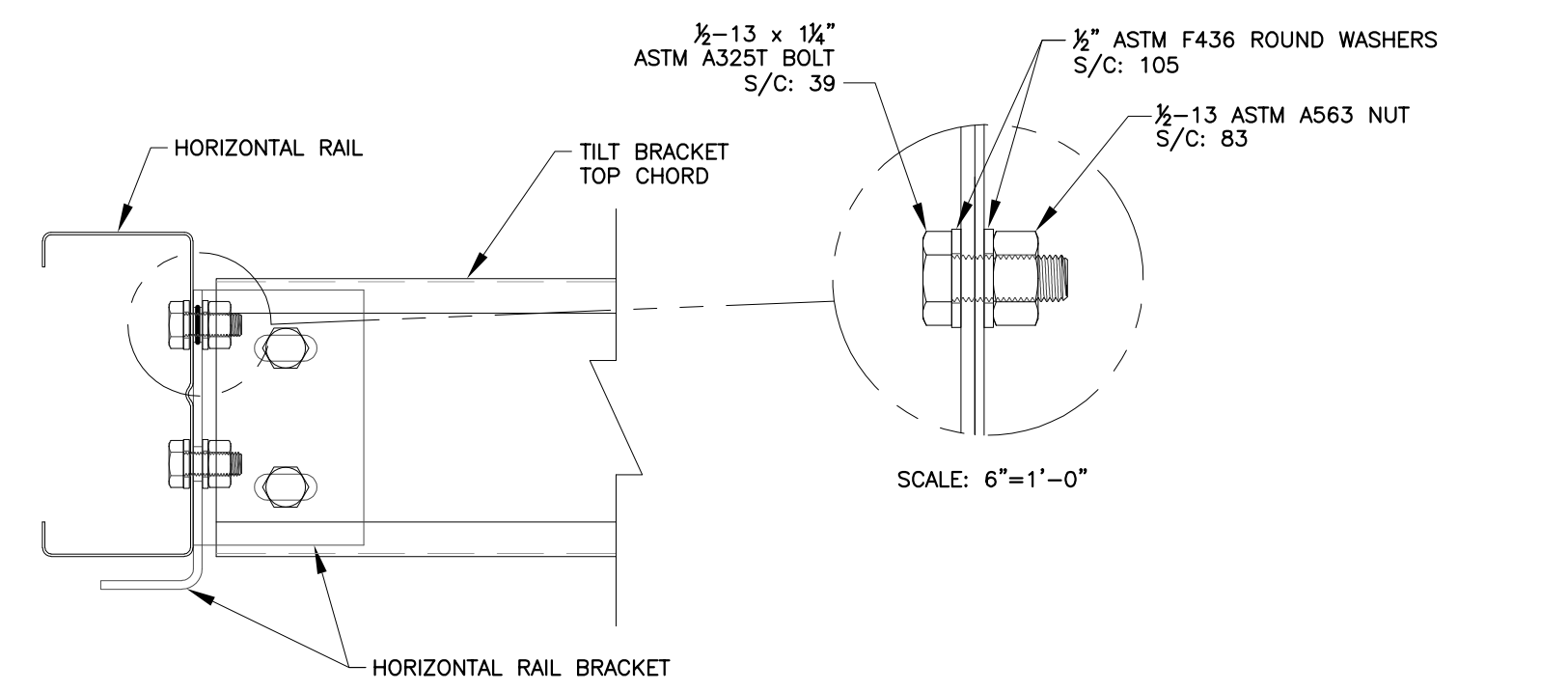
2 C VERTICAL RAIL TO HORIZ. RAIL CONN.
SCALE: 3" = 1'-0"



3 HORIZ. RAIL TO HORIZ. BRACING CONN.
SCALE: 3" = 1'-0"



4 HORIZ. RAIL BRACKET TO TILT BRACKET CONN.
SCALE: 3" = 1'-0" (PRE-ASSEMBLED NEEDS TIGHTENED)



5 TILT BRACKET TO HORIZ. CONN.
SCALE: 3" = 1'-0"

Preliminary

AZIMUTH ENERGY
AMEREN MISSOURI BOTTOM
SAINT LOUIS, MISSOURI 63145

DATE: 09/15/2017
DRAWN BY: A.A.
CHECK BY: WS
JOB # 6.375
PAGE: S4 of S4

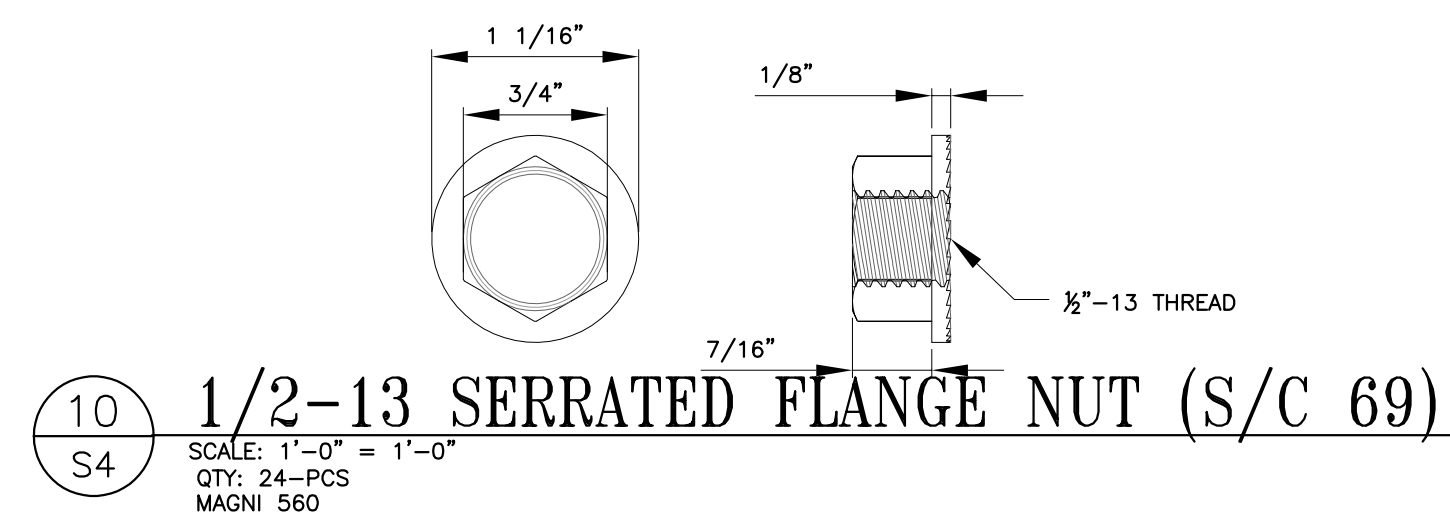
HARDWARE



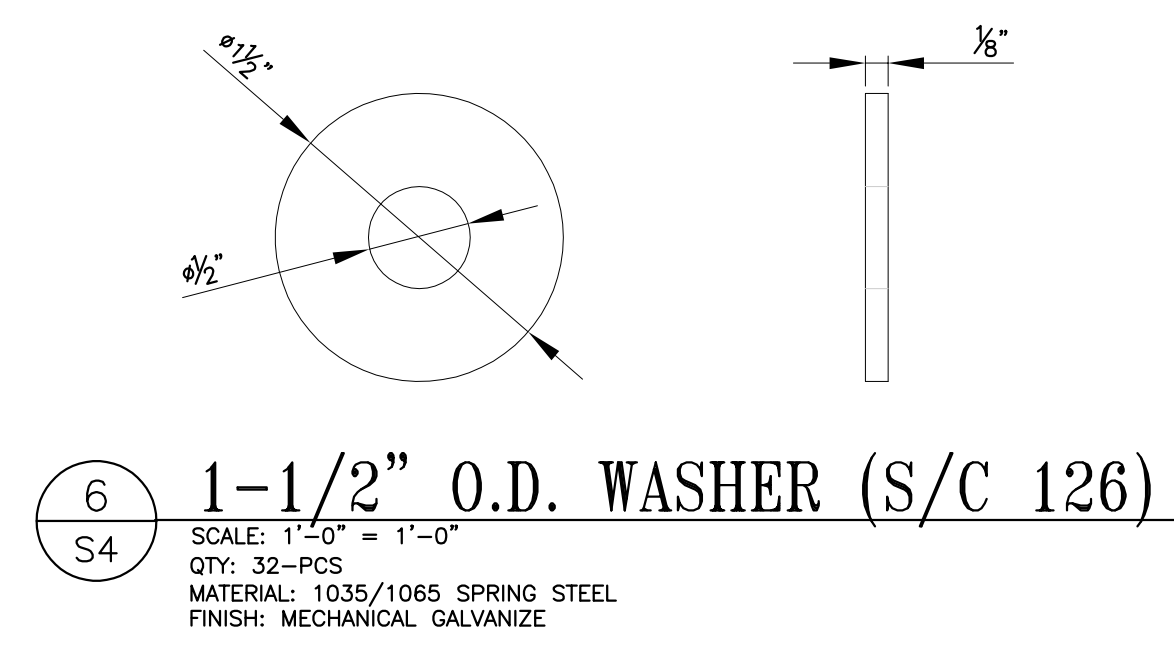
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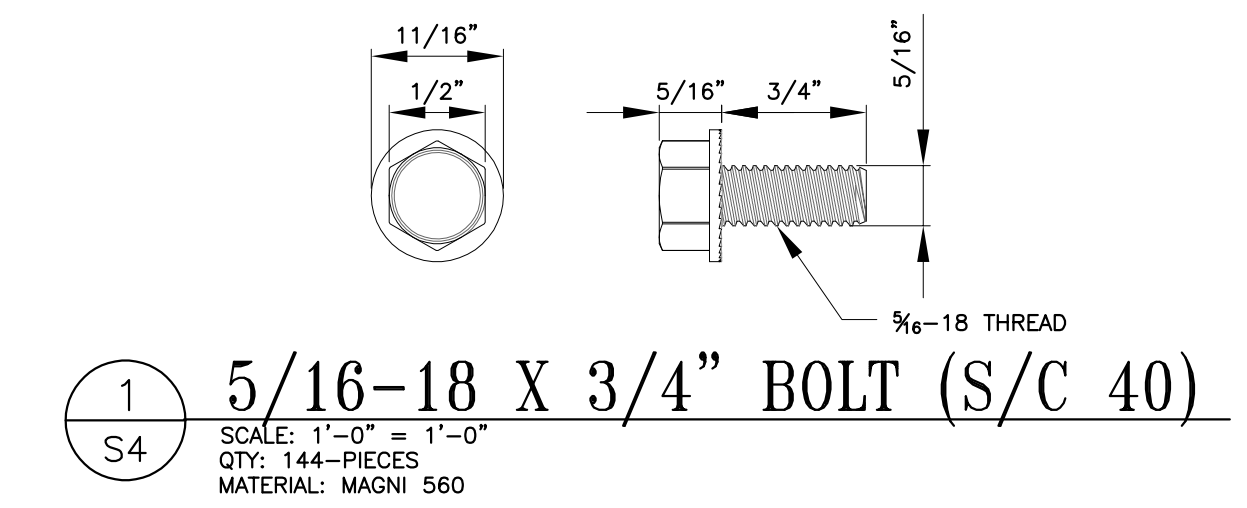
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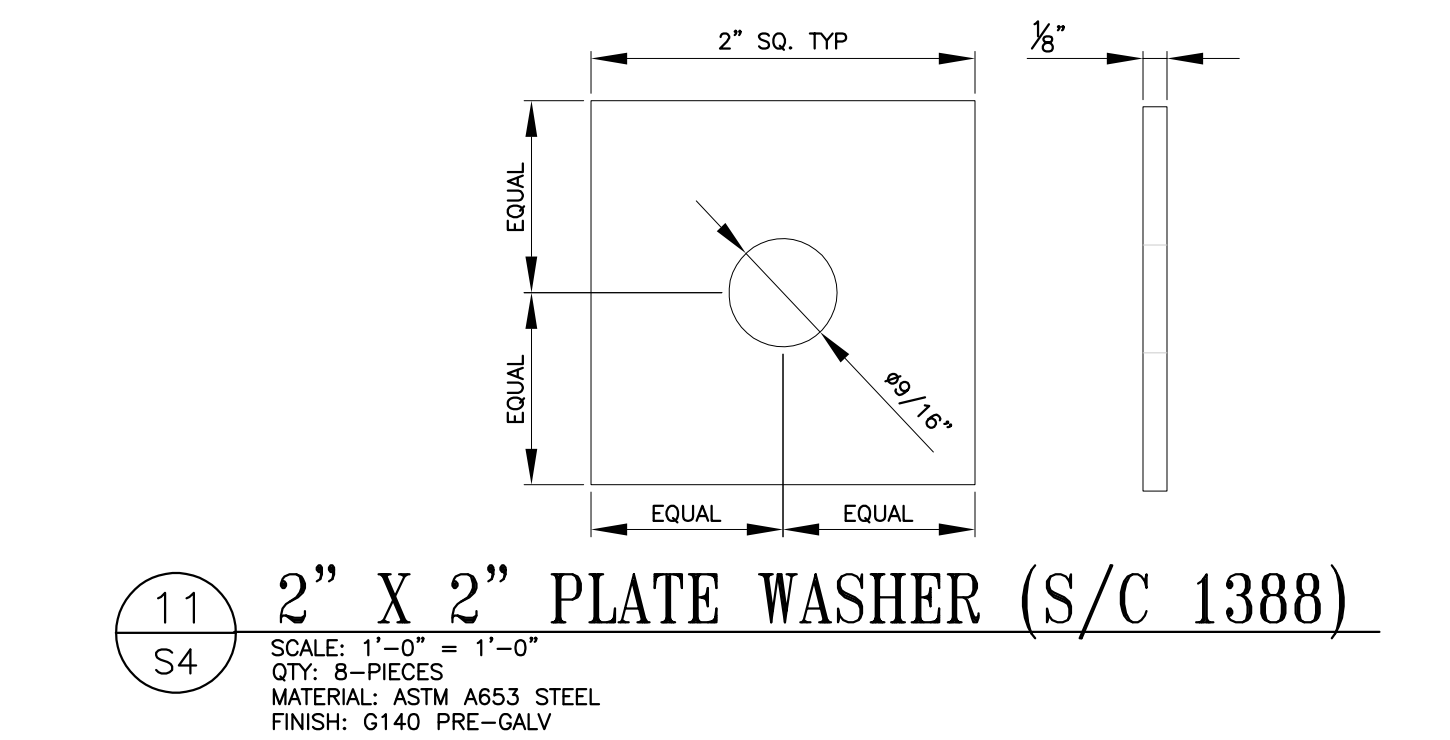
10 1/2-13 SERRATED FLANGE NUT (S/C 69)
SCALE: 1'-0" = 1'-0"
QTY: 24-PCS
MATERIAL: MAGNI 560



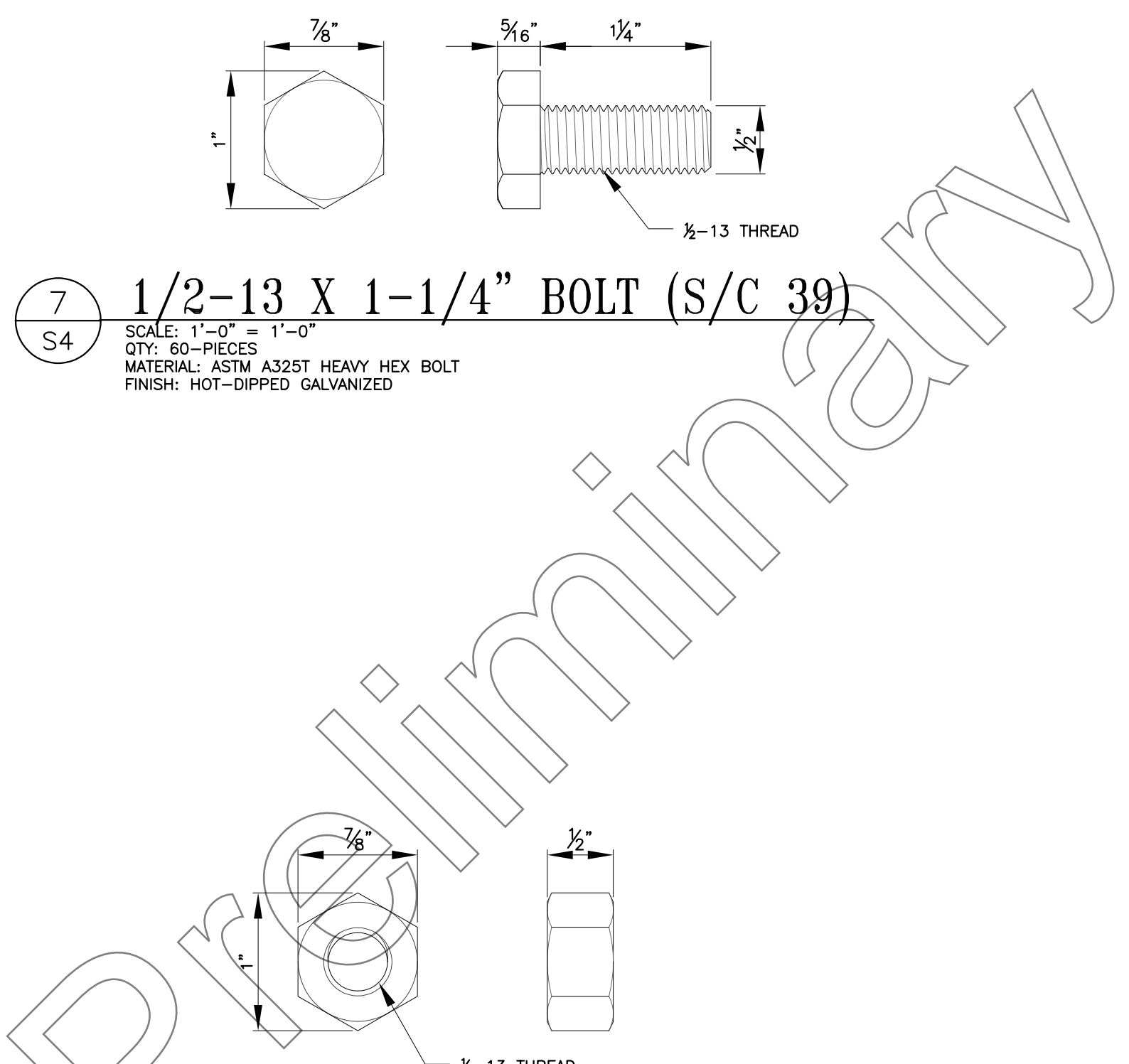
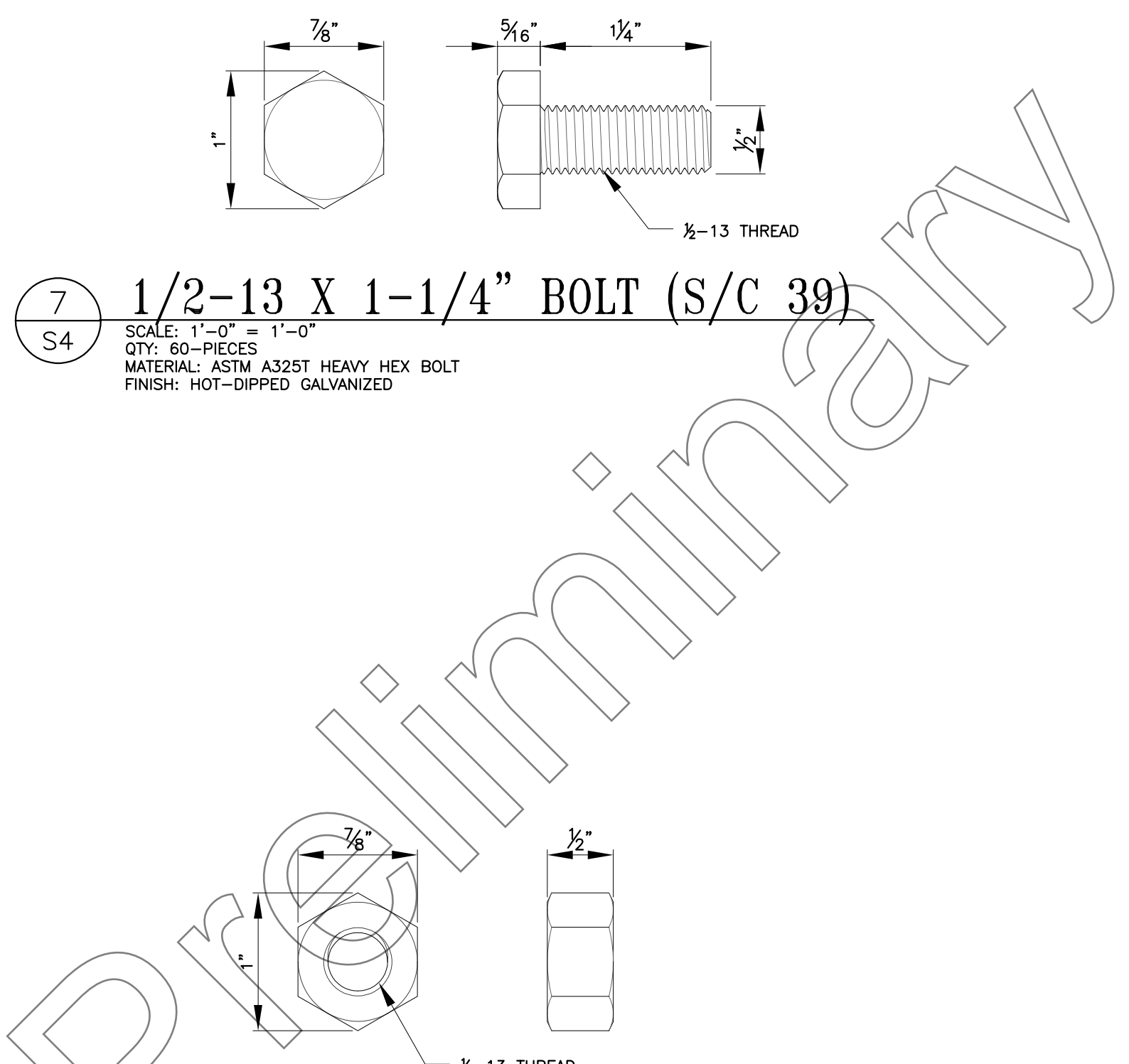
6 1-1/2" O.D. WASHER (S/C 126)
SCALE: 1'-0" = 1'-0"
QTY: 32-PCS
MATERIAL: 1035/1065 SPRING STEEL
FINISH: MECHANICAL GALVANIZE



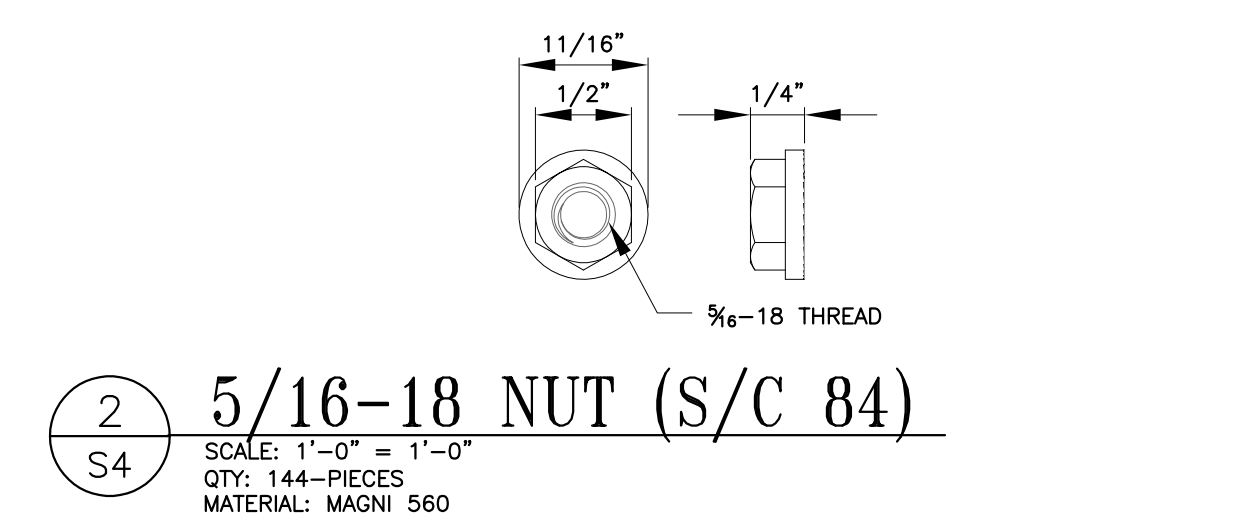
1 5/16-18 X 3/4" BOLT (S/C 40)
SCALE: 1'-0" = 1'-0"
QTY: 144-PIECES
MATERIAL: MAGNI 560



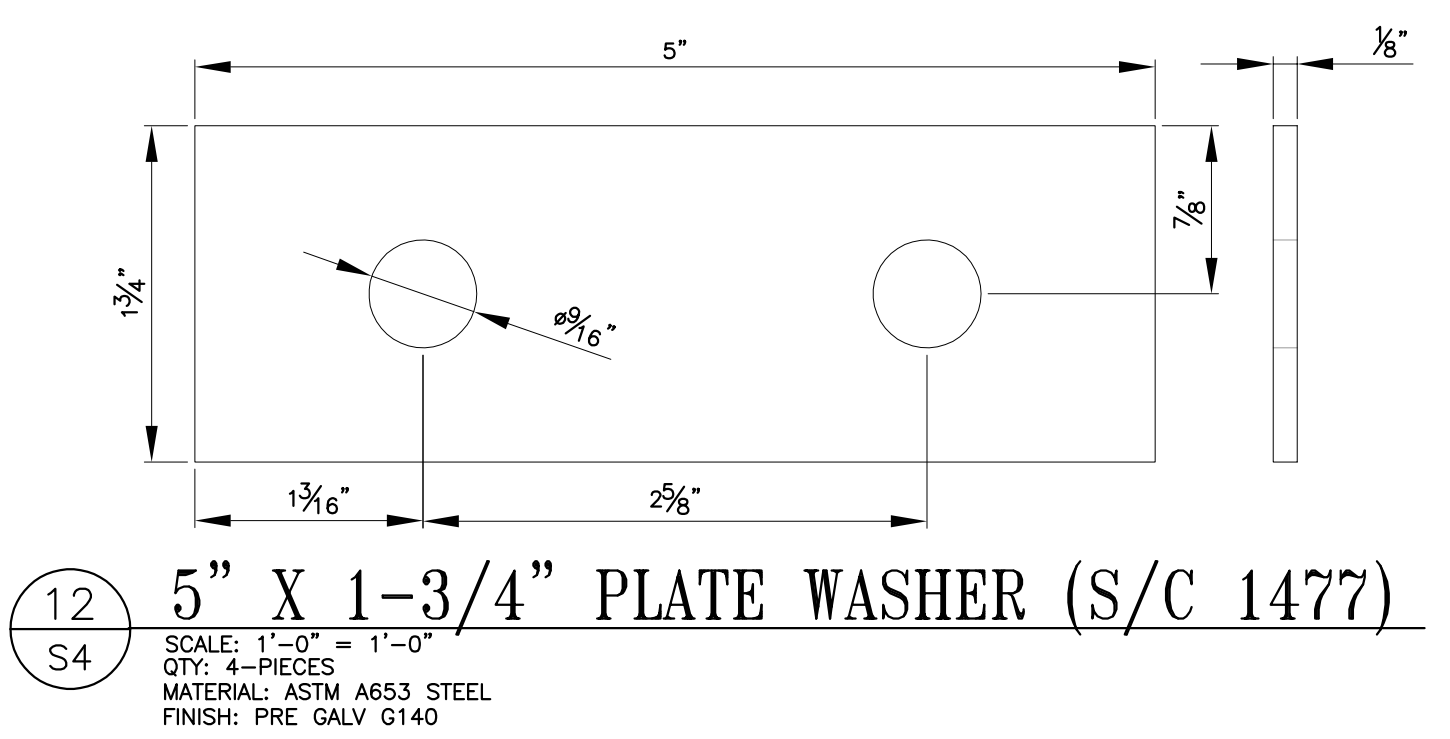
11 2" X 2" PLATE WASHER (S/C 1388)
SCALE: 1'-0" = 1'-0"
QTY: 8-PIECES
MATERIAL: ASTM A653 STEEL
FINISH: G140 PRE-GALV



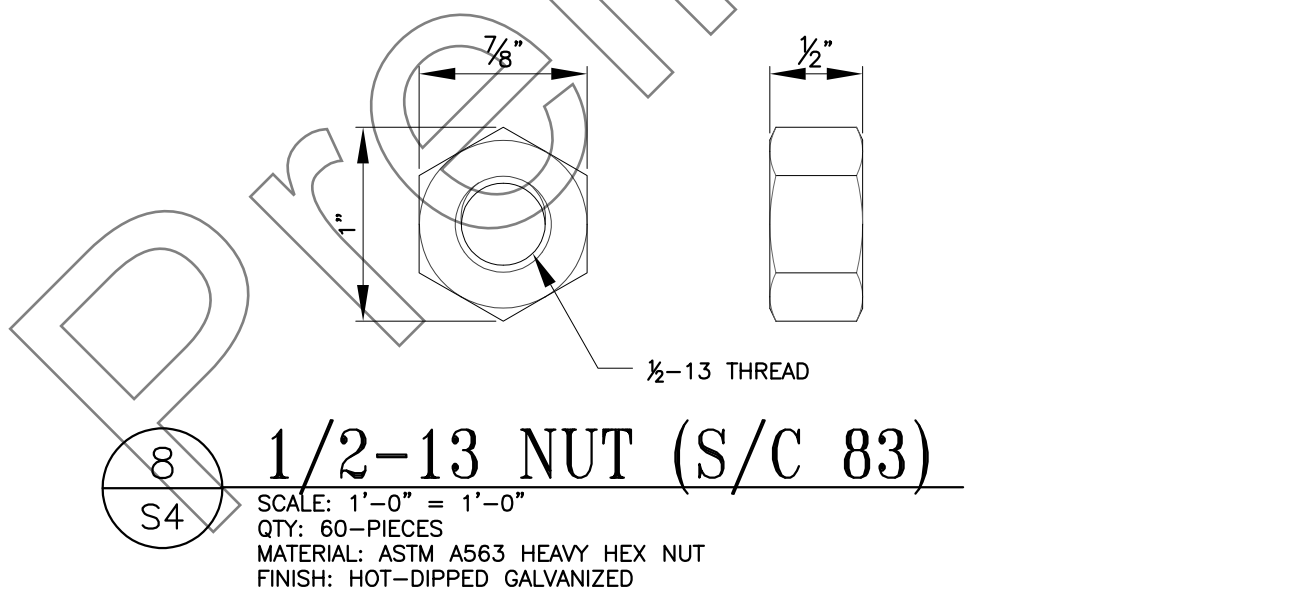
7 1/2-13 X 1-1/4" BOLT (S/C 39)
SCALE: 1'-0" = 1'-0"
QTY: 60-PIECES
MATERIAL: ASTM A325T HEAVY HEX BOLT
FINISH: HOT-DIPPED GALVANIZED



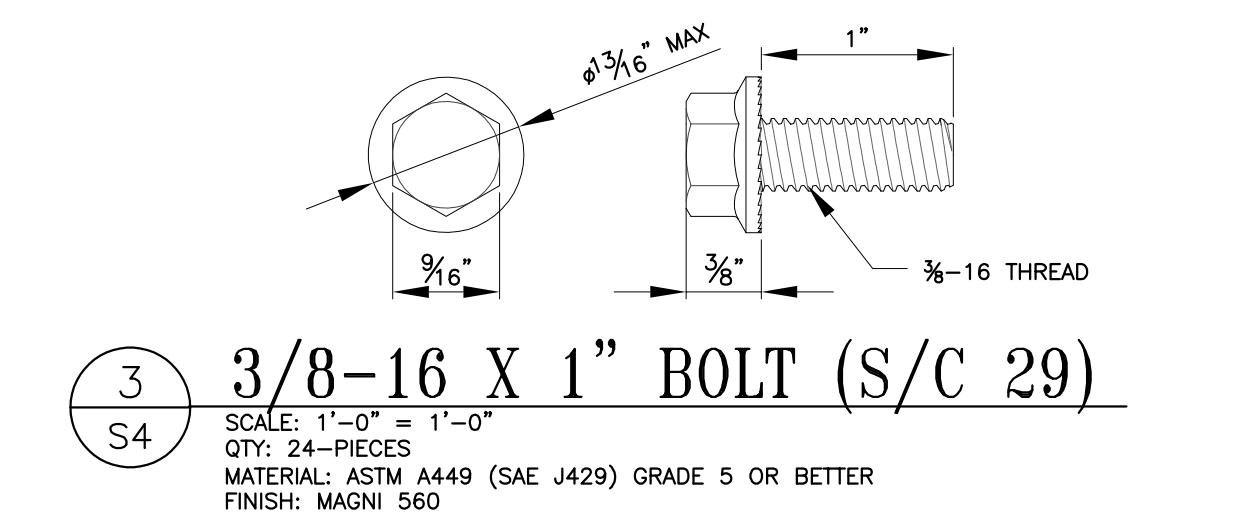
2 5/16-18 NUT (S/C 84)
SCALE: 1'-0" = 1'-0"
QTY: 144-PIECES
MATERIAL: MAGNI 560



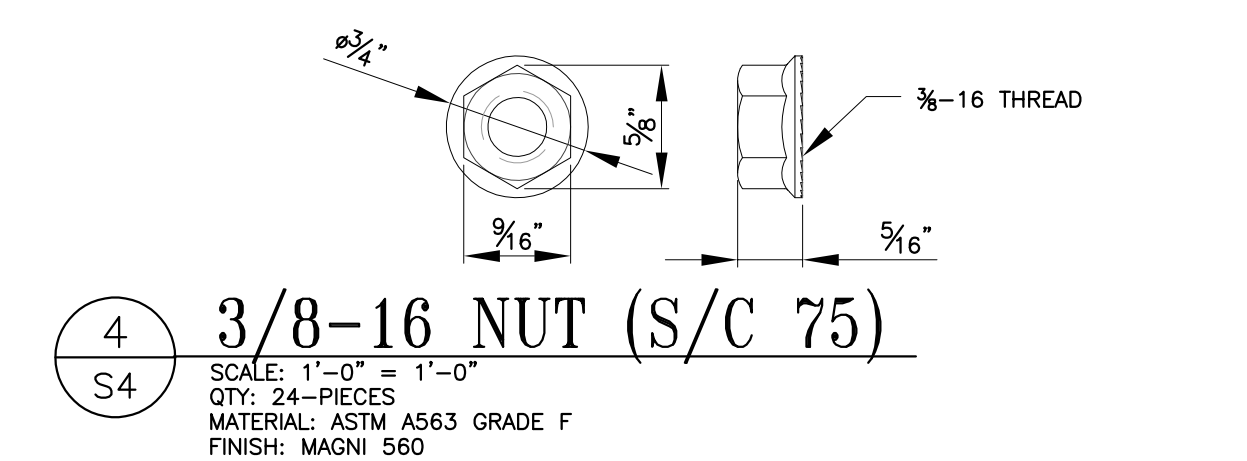
12 5" X 1-3/4" PLATE WASHER (S/C 1477)
SCALE: 1'-0" = 1'-0"
QTY: 4-PIECES
MATERIAL: ASTM A653 STEEL
FINISH: PRE GALV G140



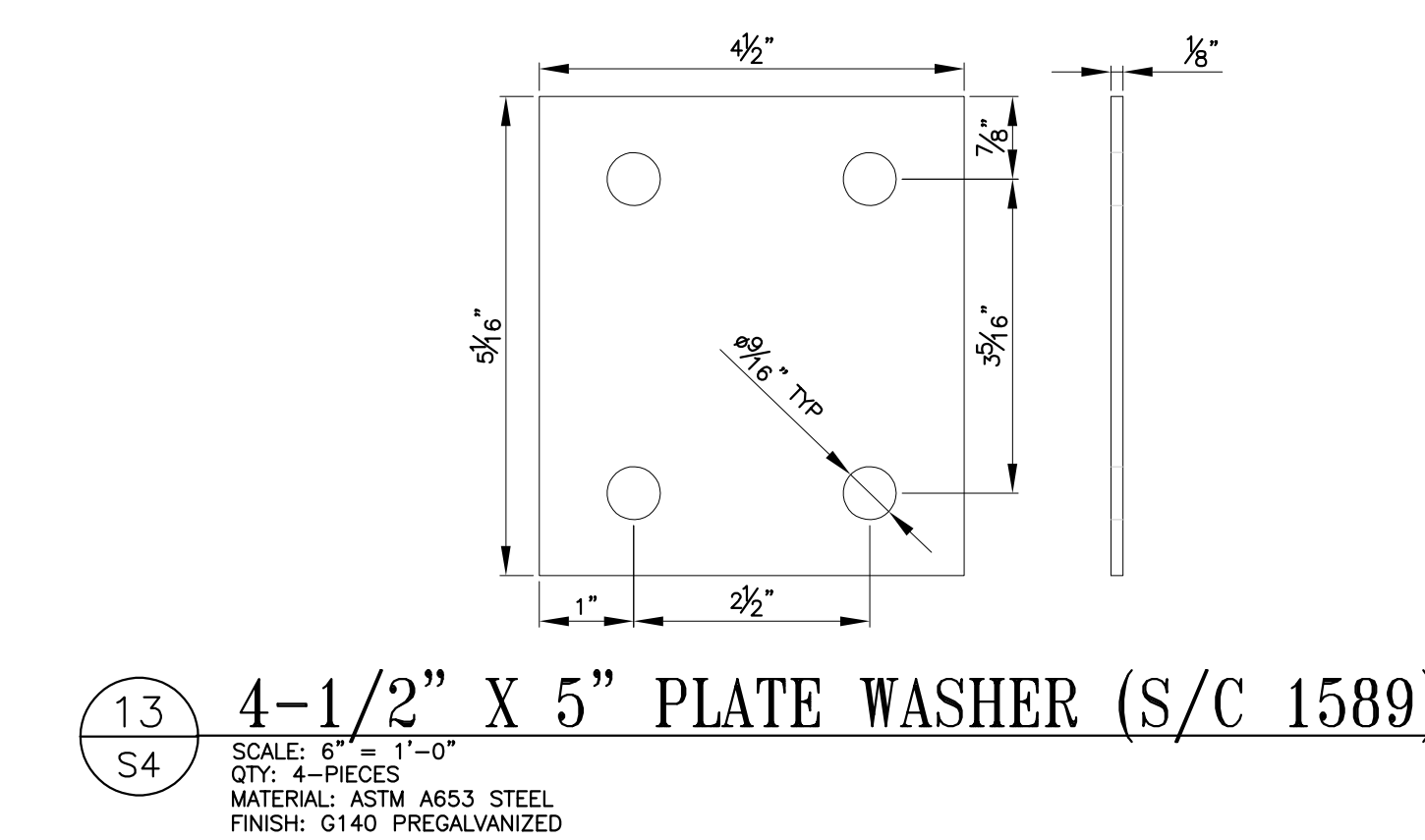
8 1/2-13 NUT (S/C 83)
SCALE: 1'-0" = 1'-0"
QTY: 60-PIECES
MATERIAL: ASTM A563 HEAVY HEX NUT
FINISH: HOT-DIPPED GALVANIZED



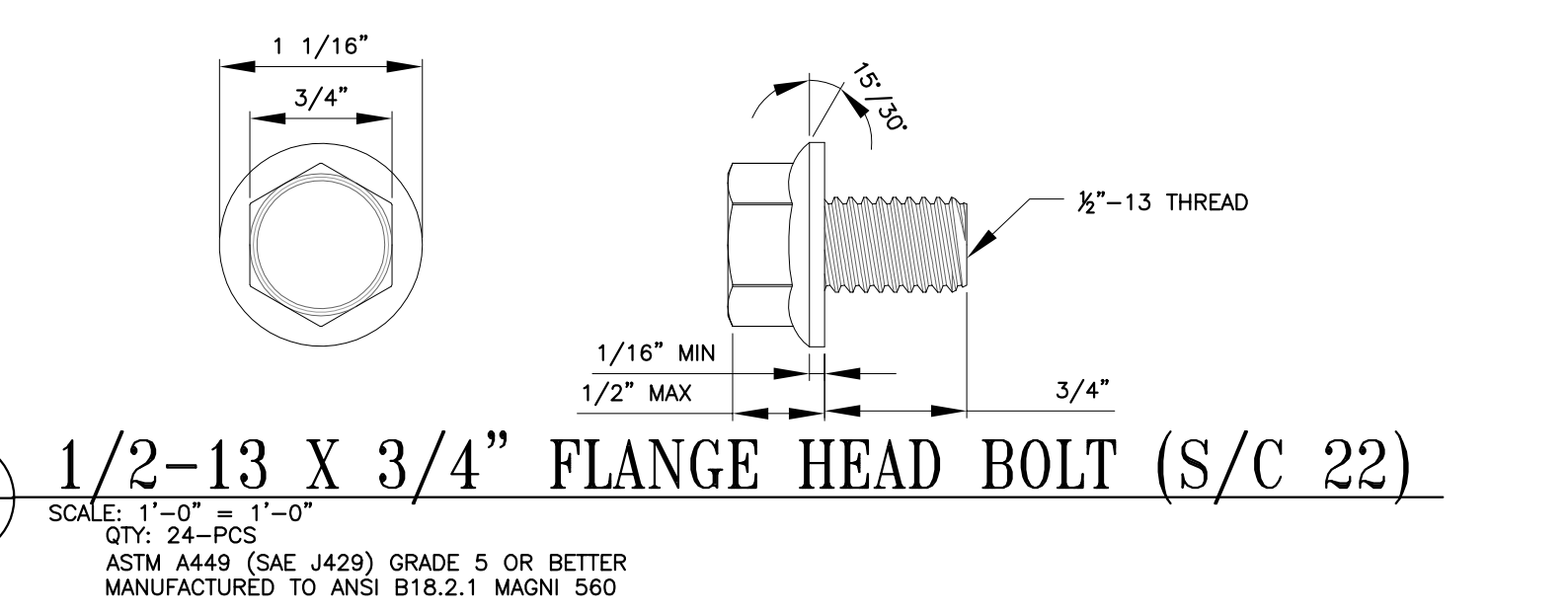
3 3/8-16 X 1" BOLT (S/C 29)
SCALE: 1'-0" = 1'-0"
QTY: 24-PIECES
MATERIAL: ASTM A449 (SAE J429) GRADE 5 OR BETTER
FINISH: MAGNI 560



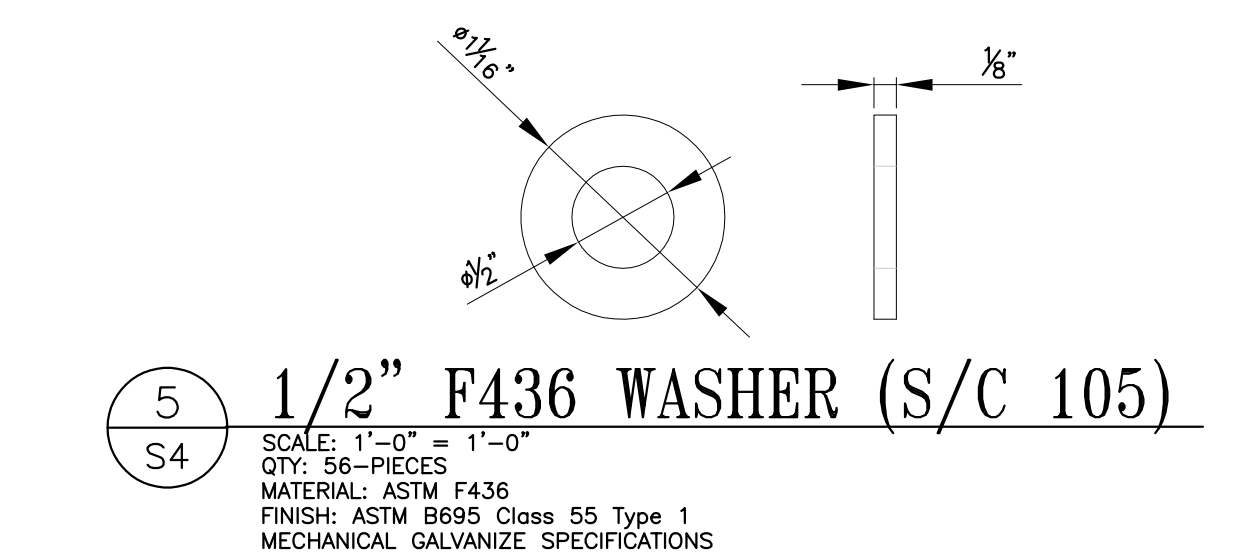
4 3/8-16 NUT (S/C 75)
SCALE: 1'-0" = 1'-0"
QTY: 24-PIECES
MATERIAL: ASTM A563 GRADE F
FINISH: MAGNI 560



13 4-1/2" X 5" PLATE WASHER (S/C 1589)
SCALE: 6" = 1'-0"
QTY: 4-PIECES
MATERIAL: ASTM A653 STEEL
FINISH: G140 PREGALVANIZED



9 1/2-13 X 3/4" FLANGE HEAD BOLT (S/C 22)
SCALE: 1'-0" = 1'-0"
QTY: 24-PCS
MATERIAL: ASTM A449 (SAE J429) GRADE 5 OR BETTER
MANUFACTURED TO ANSI B18.2.1 MAGNI 560



5 1/2" F436 WASHER (S/C 105)
SCALE: 1'-0" = 1'-0"
QTY: 56-PIECES
MATERIAL: ASTM F436
FINISH: ASTM B695 Class 55 Type 1
MECHANICAL GALVANIZE SPECIFICATIONS