ATTACHMENT B

SOLAR PHOTOVOLTAIC SYSTEM

AMEREN MISSOURI LAMBERT COMMUNITY SOLAR 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

1. 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.
2. 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.
3. 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.
4. 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.
5. 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

1. SEE SITE LAYOUT PLAN, CIVIL SITE PLAN, FOUNDATION PLAN, AND OTHER RACKING SHEETS FOR SPECIFIC MECHANICAL AND CONSTRUCTION NOTES.
2. RACKING SHALL BE FULLY SECURED BEFORE ANY MODULES ARE MOUNTED.
3. INSTALLING CONTRACTOR SHALL REVIEW AND ADHERE TO ALL RACK MANUFACTURER'S INSTRUCTIONS FOR TORQUE SETTINGS AND MARKING OF HARDWARE FOR MODULE AND RACKING ASSEMBLIES.
4. RACKING AND MODULES SHALL BE INSTALLED WITHIN SPECIFIED TOLERANCES IN MANUFACTURER'S INSTRUCTIONS.
5. ALL NEWLY INSTALLED MODULES SHALL BE FULLY SECURED WITH TORQUED HARDWARE PRIOR TO LEAVING THE PROJECT SITE DAILY.

ELECTRICAL

1. SEE SINGLE LINE DIAGRAM, ELECTRICAL PLAN, AND OTHER ELECTRICAL SHEETS FOR SPECIFIC ELECTRICAL DETAILS AND ADDITIONAL NOTES.
2. ELECTRICAL SYSTEM COMPONENTS SHALL BE UL-LISTED FOR THEIR INTENDED PURPOSE, INCLUDING BUT NOT LIMITED TO WIREWAYS, DISCONNECTS, JUNCTION BOXES, MODULES, COMBINERS, INVERTERS, ETC.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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 LFMC SWEEPS ABOVE GRADE, AS SPECIFIED.
8. 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.
9. WIRE TERMINATION HARDWARE SHALL BE TORQUED TO MANUFACTURER'S SPECIFICATIONS, AND MARKED WITH AN INDELIBLE 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.
10. 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.
11. COLOR MARKINGS AND IDENTIFICATION ON 277/480VAC AC UNGROUNDED CONDUCTORS SHALL BE AS FOLLOWS:
    PHASE A BROWN
    PHASE B ORANGE
    PHASE C YELLOW
12. COLOR MARKINGS AND IDENTIFICATION ON 120/240VAC AC UNGROUNDED CONDUCTORS SHALL BE AS FOLLOWS:
    PHASE A BLACK
    PHASE B RED
13. WIRE TYPES SHALL BE AS FOLLOWS:
    PV-WIRE DC SINGLE CONDUCTOR EXPOSED WITHIN THE ARRAY OR IN CONDUIT
    THWN-2/ XHHW-2 ALL AC CONDUCTORS

GROUNDING

1. SEE SINGLE LINE DIAGRAM AND ELECTRICAL SPECIFICATIONS & CALCULATIONS FOR AC AND DC SPECIFIC GROUNDING DETAILS.
2. 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.
3. 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.
4. 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.
5. 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].
6. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR GROUNDING SYSTEM INCLUDING GROUNDING ELECTRODE(S); GE(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

1. 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.
2. 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.
3. 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.
4. APPROPRIATELY SIZED UN-INSULATED END FERRULES SHALL BE USED TO TERMINATE DC SOURCE CIRCUIT CONDUCTORS.
5. 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.
   UNGROUNDED ARRAY: RED-POSITIVE, BLACK-NEGATIVE
6. PV CONNECTORS FOR SOURCE CIRCUIT HOME RUNS AND JUMPERS SHALL MATCH EXACT MANUFACTURER AND MODEL OF PV LEAD CONNECTORS FOR INSTALLED MODULES.
7. ALL JUNCTION BOXES OR COMBINERS SHALL BE INSTALLED IN READILY ACCESSIBLE LOCATIONS. WHERE APPLICABLE, POSITION THE ROOF PENETRATION JUNCTION BOX OVER THE PENETRATION SUCH THAT IT DIVERTS RAINWATER AWAY FROM FALLING ON THE TOP OF THE PENETRATION. CONDUIT PENETRATIONS INTO ALL JUNCTION BOXES SHALL BE ON THE SIDES OR BOTTOM, AND NOT ON THE TOP SURFACE.
8. SOURCE CIRCUIT CONDUCTORS WHEN RUNNING IN CONDUIT ACROSS AND BETWEEN SUB-ARRAYS, SHALL BE REFERRED TO AS AN 'INTER-TABLE NIPPLE' AND CONTAINED IN GRC 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.

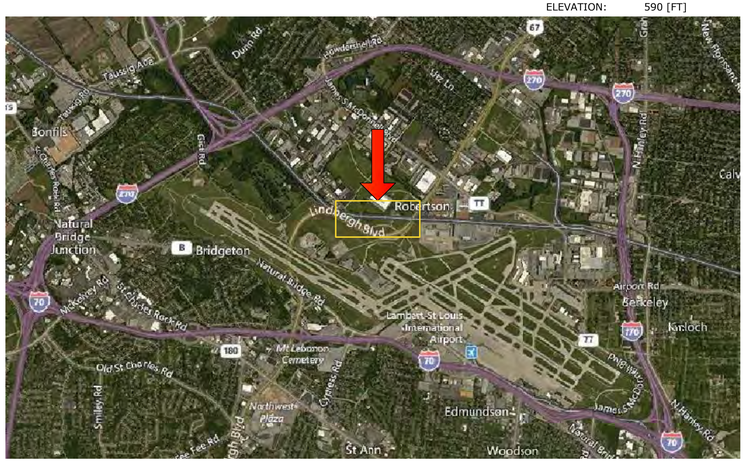
MAXIMUM NUMBER OF #10 PV-2000V SOURCE CIRCUIT CONDUCTORS	GRC INTER-TABLE NIPPLE SIZE [INCHES]
16	1-1/4"
20	1-1/2"
28	2"

9. PV WIRE SHALL HAVE A MINIMUM BENDING RADIUS OF 3".
10. 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

1. 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.
2. 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:	1,065.600 [kW-DC (STC)]
AC SYSTEM SIZE:	942.000 [KW-AC]
MODULES:	(2,880) GCL-M6/72H 370W MODULE
INVERTERS:	(7) SOLECTRIA PVI-60TL-480
	(9) SOLECTRIA PVI-50TL-480
	(2) SOLECTRIA PVI-36TL-480
RACKING:	(80) SOLAR FLEX RACK G3L-X 4HX9 RACKING TABLES
TILT ANGLE:	25°
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:	I
EXTREME LOW TEMPERATURE:	-19 [°C]
AVERAGE HIGH TEMPERATURE:	35 [°C]

REFERENCE CODES

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

RESPONSIBILITY SCHEDULE

ITEM DESCRIPTION	N/A	AZIMUTH FURN	AZIMUTH INST	AMEREN FURN	AMEREN INST
LOCATE SUBSURFACE UTILITIES/ STRUCTURES		X		X	
SECURITY FENCE		X	X		
GATE LOCKING MECHANISMS				X	X
PERMANENT SECURITY CAMERAS	X				
CONSTRUCTION CAMERA		X	X		
SECURITY LIGHTS		X	X		
SOLAR ARRAY		X	X		
SOLAR MONITORING		X	X		
AMEREN PRIVATE NETWORK (RTAC)	X				
AMEREN METER BASE		X	X		
AMEREN METER				X	X
TRANSFORMER				X	X
TRANSFORMER PAD			X	X	
LV TERMINATIONS IN TRANSFORMER SECONDARY		X	X		
MV CONDUIT		X	X		
MV HANDHOLE			X	X	
MV DESIGN, CABLE, TERMINATIONS, INTERCONNECTION				X	X
ADDITIONAL SEED & STRAW OUTSIDE FENCE	X				
ENTRANCE ROAD TO TRANSFORMER & UTILITY POLE	X				

PROJECT INFORMATION

SHEET INDEX

SHEET NUMBER	SHEET ABBREVATION	SHEET NAME	CONSTRUCTION DRAWINGS	REV B	MONITORING UPDATES	SECURITY ENCLOSURE	
LC-DWG-PROP-000001	PROP1	TITLE PAGE	X				
LC-DWG-PROP-000002	PROP2	SITE LAYOUT PLAN	X			X	
LC-DWG-PROP-000003	PROP3	CIVIL SITE PLAN	X			X	
LC-DWG-STRU-000001	STRU1	FOUNDATION PLAN	X				
LC-DWG-STRU-000002	STRU2	FOUNDATION POINTS	X				
LC-DWG-ELEC-000001	ELEC1	SINGLE LINE DIAGRAM AND SPECIFICATIONS	X		X	X	
LC-DWG-ELEC-000002	ELEC2	WIRE & CONDUIT SCHEDULE				X	
LC-DWG-ELEC-000003	ELEC3	ELECTRICAL PLAN	X			X	
LC-DWG-ELEC-000004	ELEC4	MONITORING PLAN	X				
LC-DWG-ELEC-000005	ELEC5	DETAILS	X			X	
LC-DWG-ELEC-000006	ELEC6	PANELBOARD SCHEDULE				X	
LC-DWG-PROP-000004	PROP4	FENCE DETAILS	X	X			
LC-DWG-FPD-000001	FPD1	DATA SHEETS	X			X	
LC-DWG-FPD-000002	FPD2	MONITORING DETAILS	X		X		
LC-DWG-FPD-000003	FPD3	MONITORING DETAILS 2			X		
LC-DWG-FPD-000004	SO	SOLAR FLEXRACK: COVER SHEET	X				
LC-DWG-FPD-000005	S1	SOLAR FLEXRACK: 4HX9 SOLAR FLEXRACK G3L	X				
LC-DWG-FPD-000006	S2	SOLAR FLEXRACK: TILT BRACKET COMPONENTS, TILT BRACKET CONNECTIONS, & FOUNDATION DETAILS	X				
LC-DWG-FPD-000007	S3	SOLAR FLEXRACK: CONNECTIONS	X				
LC-DWG-FPD-000008	S4	SOLAR FLEXRACK: HARDWARE	X				

PROJECT CONTACTS

OWNER'S REPRESENTATIVES

AMEREN MISSOURI
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PROJECT TEAM

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CORY BRENNAN, EIT, PROJECT ENGINEER
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1.618.691.9123

NABCEP CERTIFIED PV Installation Professional
CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241, DANIEL STROH, EIT CERT# 042013-130

NABCEP CREDENTIALED SOLAR INSTALLATION COMPANY
CERTIFICANTS: MARC LOPATA, PE CERT# PVSI-120917-006937

STATE OF MISSOURI — MARC L. LOPATA — MAR 15 2019 — NUMBER PE-2010023353 — PROFESSIONAL ENGINEER

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.

MARK UP DRAWING NO. ---- REV.

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

TITLE PAGE

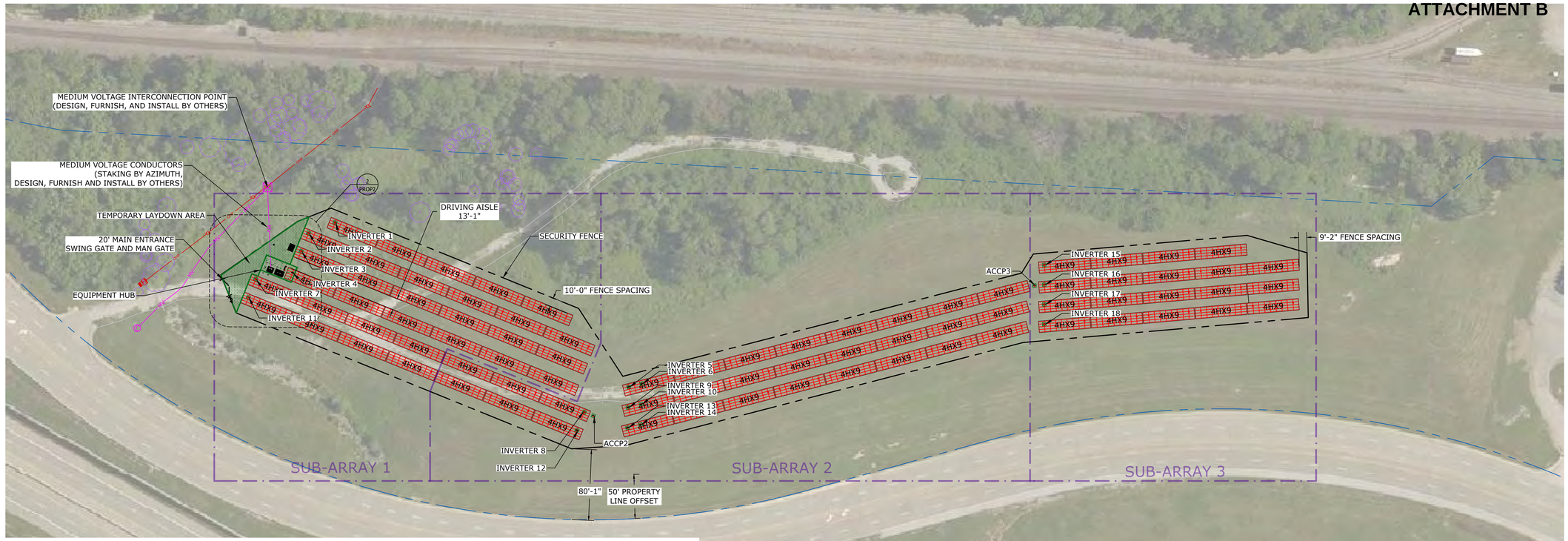
SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

DRAWING NO. LC-DWG-PROP-000001
REVISION NO. 0

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

ATTACHMENT B



N

1" = 60' - 0"
0 60' 120'

ARRAY SUMMARY

DC SYSTEM SIZE:	1,065.600 [kW-DC (STC)]
AC SYSTEM SIZE:	942.000 [KW-AC]
MODULES:	(2,880) GCL-M6/72H 370W 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: WEST

DC SYSTEM SIZE:	412.920 [kW-DC (STC)]
AC SYSTEM SIZE:	340.000 [KW-AC]
MODULES:	(1,116) GCL-M6/72H 370W 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:	202°

SUB-ARRAY 2: CENTRAL

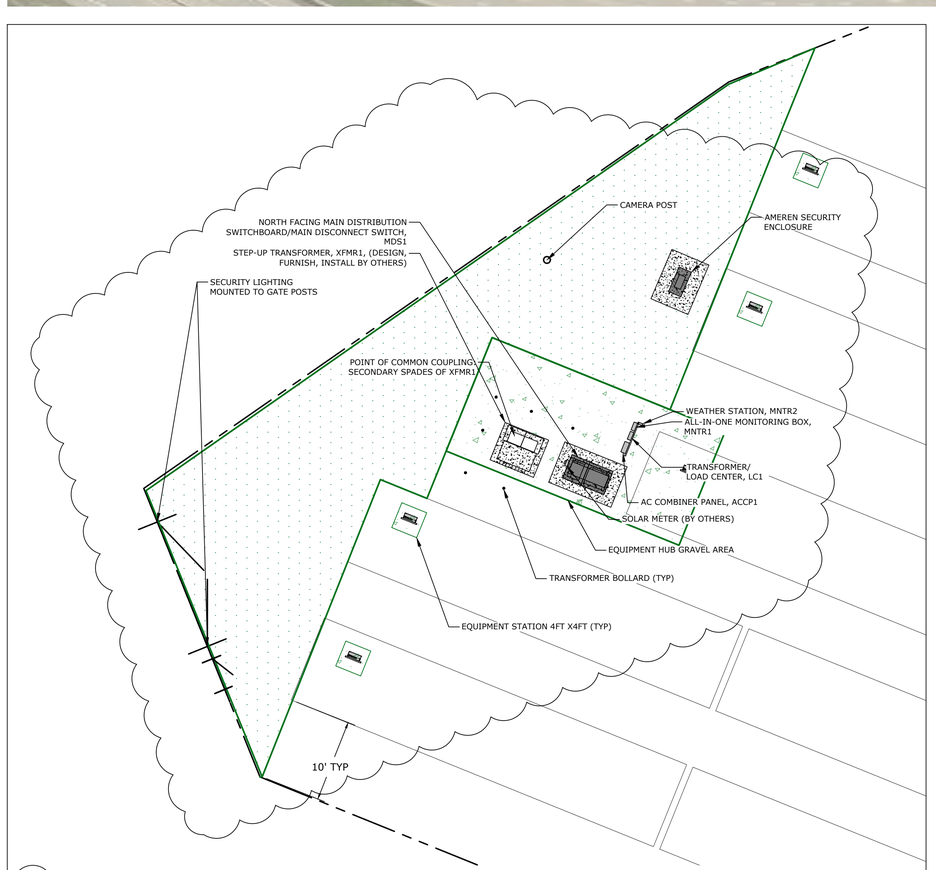
DC SYSTEM SIZE:	399.600 [kW-DC (STC)]
AC SYSTEM SIZE:	372.000 [KW-AC]
MODULES:	(1,080) GCL-M6/72H 370W MODULE
INVERTERS:	(6) SOLECTRIA PVI-50TL-480
	(2) SOLECTRIA PVI-36TL-480
STRINGS:	(60) STRINGS OF (18) MODULES
RACKING:	(30) SOLAR FLEX RACK G3L-X 4HX9
AZIMUTH:	165.5°, 202°

SUB-ARRAY 3: EAST

DC SYSTEM SIZE:	253.080 [kW-DC (STC)]
AC SYSTEM SIZE:	230.000 [KW-AC]
MODULES:	(684) GCL-M6/72H 370W 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
OHP OHP	EXISTING OVERHEAD POWER
	PROPERTY LINE
	PROPERTY LINE SETBACK
	EXISTING GRAVEL ROADWAY
	FABRIC AND ROCK
	LAYDOWN AREA
MV MV	MEDIUM VOLTAGE CONDUCTOR BY OTHERS



2 PROP2 EQUIPMENT HUB DETAIL

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED

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

STATE OF MISSOURI MARC L. LOPATA NUMBER PE-2004023353 PROFESSIONAL ENGINEER MAR 15 2019

OPERATING DIAGRAM

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MARK UP DRAWING NO. ---- REV.

SCALE	1" = 60'-0"
UNIT NO.	---
DWG. SIZE	Y ARCH D (36X24)
SUB CLASS	---

SITE LAYOUT PLAN

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

DRAWING NO. LC-DWG-PROP-000002

REVISION NO. 0

DRAWING RECORD

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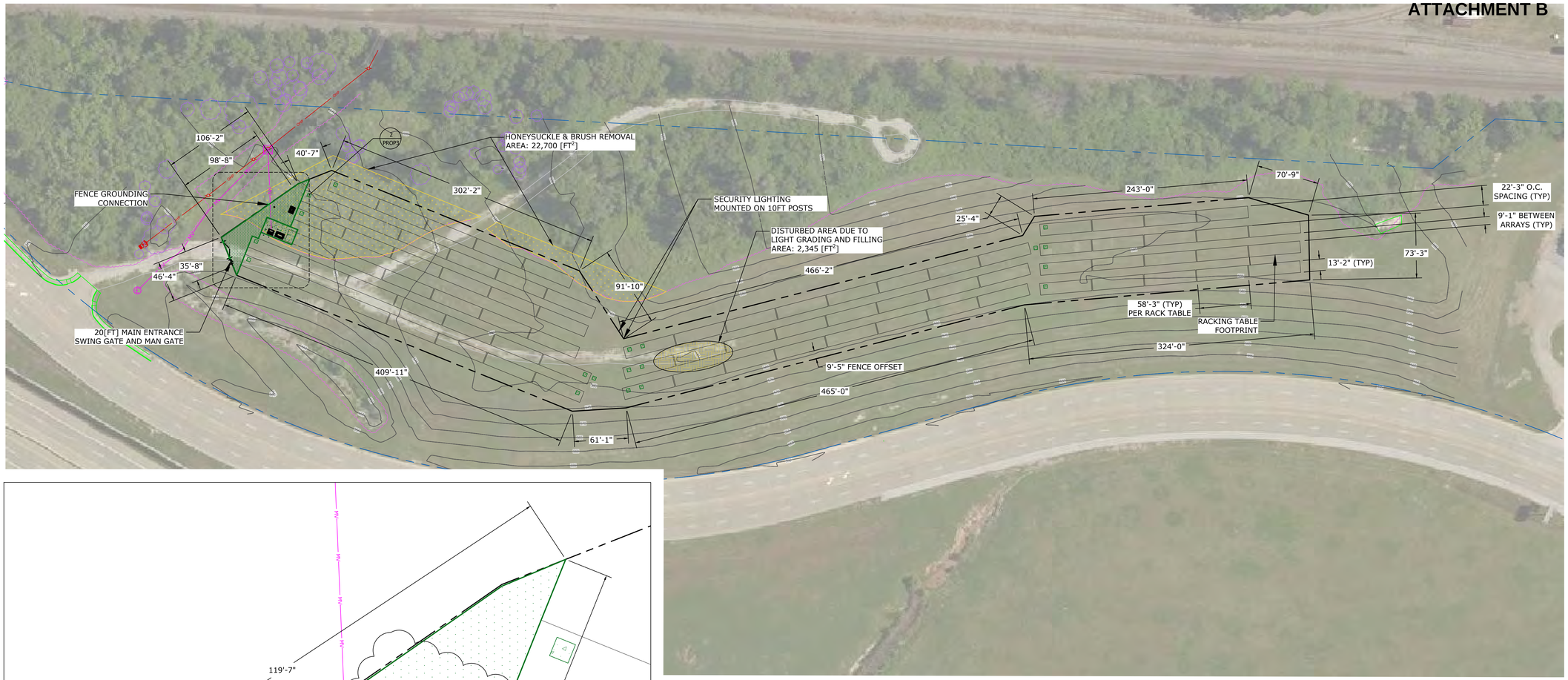
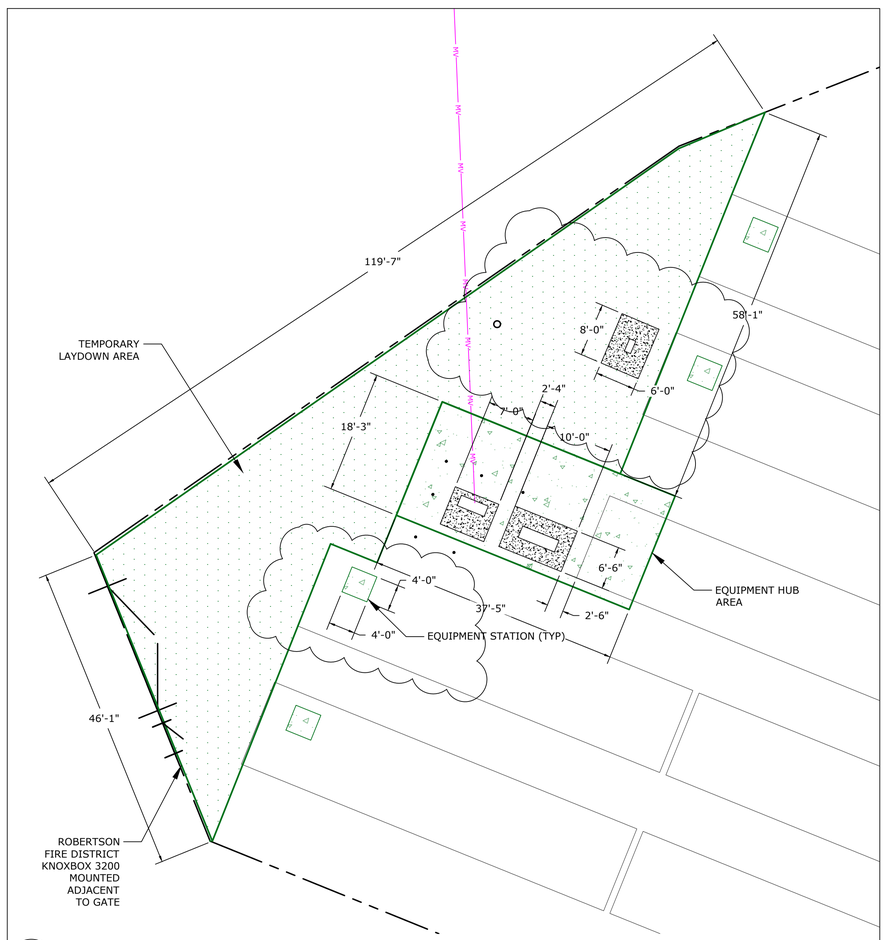
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

ATTACHMENT B





2 PROP3 EQUIPMENT HUB DETAIL

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 EQUIMENT HUB AND EQUIPMENT STATIONS AFTER PROJECT ENERGIZATION: 3[IN] THICK OF 1.5[IN] CLEAN AGGREGATE, UNDERLAIN WITH POLYPROPYLENE GEOTEXTILE FABRIC.
4. LAYDOWN AREA SECTION: 3[IN] THICK OF 1.5[IN] MINUS CRUSHED AGGREGATE; UNDERLAIN WITH 3[IN] THICK OF 3[IN] COARSE AGGREGATE.
5. WHERE GEOTEXTILE FABRIC IS INSTALLED, CIVIL SUB-CONTRACTOR SHALL ENSURE SECTIONS OF FABRIC OVERLAP TO INHIBIT THE GROWTH OF VEGETATION.
6. ROADS AND OTHER AGGREGATE SURFACES SHALL BE PROPERLY COMPACTED USING APPROPRIATE VIBRATING OR TAMPING EQUIPMENT.
7. TRANSFORMER BOLLARDS SHALL BE INSTALLED 36" FROM THE FRONT, 32" FROM THE SIDES, AND 38" FROM THE BACK OF THE TRANSFORMER PAD. THE FRONT OF THE TRANSFORMER IS THE WIRE CABINET SIDE.

SHEET LEGEND

	NEW FENCE
	EQUIPMENT HUB
	LAYDOWN AREA
	PROPERTY LINE
	EXISTING GRAVEL ROADWAY
100	MAJOR TOPO LINE
OHP OHP	EXISTING OVERHEAD POWER
MV MV	MEDIUM VOLTAGE CONDUCTOR BY OTHERS
×	GROUNDING CONNECTION

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED SOLAR INSTALLATION

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

STATE OF MISSOURI MARC L. LOPATA NUMBER PE-2004023353 PROFESSIONAL ENGINEER MAR 15 2019

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.

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

SCALE	1" = 60'-0"
UNIT NO.	---
DWG. SIZE	Y ARCH D (36X24)
SUB CLASS	---

CIVIL SITE PLAN

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

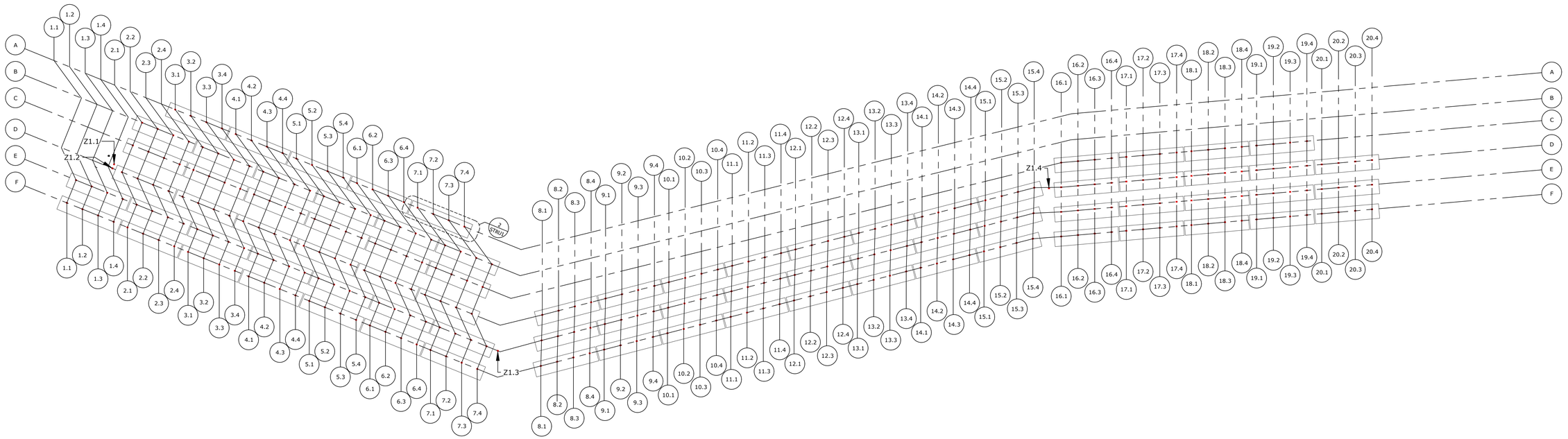
SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

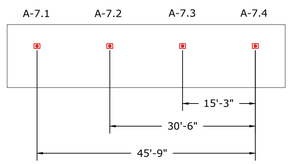
Ameren MISSOURI

DRAWING NO. LC-DWG-PROP-000003

REVISION NO. 0

ATTACHMENT B





2 STRU1 PILE CALLOUTS

SHEET LEGEND

——— – – ———	NEW FENCE
⊗	FOUNDATION POINT TO BE LOCATED BY SURVEYOR

SHEET NOTES

1. RACKING CONTRACTOR IS RESPONSIBLE FOR FOLLOWING ALL NOTES AND SPECIFICATIONS ON RACKING MANUFACTURER'S DRAWINGS.

NABCEP CERTIFIED PV Installation Professional

NABCEP CREDENTIALED SYSTEM DESIGNER

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 L. LOPATA — NUMBER PE-2004023353 — MAR 15 2019 — PROFESSIONAL ENGINEER

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.

SCALE	1" = 45'-0"
UNIT NO.	---
DWG. SIZE	Y ARCH D (36X24)
SUB CLASS	---

MARK UP DRAWING NO. ---- REV.

FOUNDATION PLAN

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

DRAWING NO. LC-DWG-STRU-000001

REVISION NO. 0

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

ATTACHMENT B

SHEET NOTES

1.	CONTRACTOR IS RESPONSIBLE FOR FOLLOWING ALL NOTES AND SPECIFICATIONS ON RACKING MANUFACTURER'S DRAWINGS INCLUDING INSTALLING RACKING PER SPECIFIED TORQUE VALUES.
2.	LATITUDE AND LONGITUDE VALUES SHALL BE INTERPRETED IN RELATION TO MO83-EF: NAD83 MISSOURI STATE PLANES, EAST ZONE, US FOOT, COORDINATE SYSTEM. ADDITIONAL DIMENSIONS ARE SHOWN FOR FIELD VERIFICATION.
3.	NORTHING AND EASTING VALUES FOR PILE LOCATIONS ARE IN DECIMAL DEGREES.

COLUMN LINE: A

PILE NO.	LAT	LONG
A-3.1*	38.759151	-90.383396
A-3.2	38.759135	-90.383347
A-3.3	38.759119	-90.383297
A-3.4	38.759104	-90.383248
A-4.1*	38.759090	-90.383204
A-4.2	38.759074	-90.383154
A-4.3	38.759058	-90.383105
A-4.4	38.759043	-90.383055
A-5.1*	38.759029	-90.383011
A-5.2	38.759013	-90.382962
A-5.3	38.758997	-90.382912
A-5.4	38.758982	-90.382862
A-6.1*	38.758968	-90.382819
A-6.2	38.758952	-90.382769
A-6.3	38.758936	-90.382719
A-6.4	38.758920	-90.382670
A-7.1*	38.758907	-90.382626
A-7.2	38.758891	-90.382576
A-7.3	38.758875	-90.382527
A-7.4	38.758859	-90.382477

COLUMN LINE: B

PILE NO.	NORTH OF ARP 'A'	EAST OF ARP 'A'
B-2.1*	38.759118	-90.383502
B-2.2	38.759103	-90.383452
B-2.3	38.759087	-90.383403
B-2.4	38.759071	-90.383353
B-3.1*	38.759057	-90.383309
B-3.2	38.759042	-90.383260
B-3.3	38.759026	-90.383210
B-3.4	38.759010	-90.383160
B-4.1*	38.758996	-90.383117
B-4.2	38.758981	-90.383067
B-4.3	38.758965	-90.383017
B-4.4	38.758949	-90.382968
B-5.1*	38.758935	-90.382924
B-5.2	38.758919	-90.382874
B-5.3	38.758904	-90.382825
B-5.4	38.758888	-90.382775
B-6.1*	38.758874	-90.382731
B-6.2	38.758858	-90.382682
B-6.3	38.758843	-90.382632
B-6.4	38.758827	-90.382583
B-7.1*	38.758813	-90.382539
B-7.2	38.758797	-90.382489
B-7.3	38.758782	-90.382439
B-7.4	38.758766	-90.382390

COLUMN LINE: C

PILE NO.	LAT	LONG
C-2.1*	38.759062	-90.383531
C-2.2	38.759046	-90.383482
C-2.3	38.759030	-90.383432
C-2.4	38.759015	-90.383382
C-3.1*	38.759001	-90.383338
C-3.2	38.758985	-90.383289
C-3.3	38.758969	-90.383239
C-3.4	38.758954	-90.383190
C-4.1*	38.758940	-90.383146
C-4.2	38.758924	-90.383096
C-4.3	38.758908	-90.383047
C-4.4	38.758892	-90.382997
C-5.1*	38.758879	-90.382953
C-5.2	38.758863	-90.382904
C-5.3	38.758847	-90.382854
C-5.4	38.758831	-90.382805
C-6.1*	38.758817	-90.382761
C-6.2	38.758802	-90.382711
C-6.3	38.758786	-90.382661
C-6.4	38.758770	-90.382612
C-7.1*	38.758756	-90.382568
C-7.2	38.758741	-90.382518
C-7.3	38.758725	-90.382469
C-7.4	38.758709	-90.382419
C-16.1*	38.759019	-90.380580
C-16.2	38.759022	-90.380527
C-16.3	38.759026	-90.380474
C-16.4	38.759030	-90.380420
C-17.1*	38.759033	-90.380373
C-17.2	38.759037	-90.380320
C-17.3	38.759040	-90.380267
C-17.4	38.759044	-90.380213
C-18.1*	38.759047	-90.380166
C-18.2	38.759051	-90.380113
C-18.3	38.759054	-90.380060
C-18.4	38.759058	-90.380006
C-19.1*	38.759061	-90.379959
C-19.2	38.759065	-90.379906
C-19.3	38.759069	-90.379852
C-19.4	38.759072	-90.379799

COLUMN LINE: D

PILE NO.	LAT	LONG
D-2.1*	38.758995	-90.383566
D-2.2	38.758979	-90.383516
D-2.3	38.758963	-90.383467
D-2.4	38.758948	-90.383417
D-3.1*	38.758934	-90.383373
D-3.2	38.758918	-90.383324
D-3.3	38.758902	-90.383274
D-3.4	38.758887	-90.383224
D-4.1*	38.758873	-90.383180
D-4.2	38.758857	-90.383131
D-4.3	38.758841	-90.383081
D-4.4	38.758826	-90.383032
D-5.1*	38.758812	-90.382988
D-5.2	38.758796	-90.382938
D-5.3	38.758780	-90.382889
D-5.4	38.758764	-90.382839
D-6.1*	38.758751	-90.382795
D-6.2	38.758735	-90.382746
D-6.3	38.758719	-90.382696
D-6.4	38.758703	-90.382646
D-7.1*	38.758689	-90.382603
D-7.2	38.758674	-90.382553
D-7.3	38.758658	-90.382503
D-7.4	38.758642	-90.382454
D-8.1*	38.758640	-90.382230
D-8.2	38.758650	-90.382178
D-8.3	38.758661	-90.382126
D-8.4	38.758671	-90.382074
D-9.1*	38.758680	-90.382029
D-9.2	38.758691	-90.381977
D-9.3	38.758701	-90.381925
D-9.4	38.758712	-90.381873
D-10.1*	38.758721	-90.381827
D-10.2	38.758732	-90.381776
D-10.3	38.758742	-90.381724
D-10.4	38.758753	-90.381672
D-11.1*	38.758762	-90.381626
D-11.2	38.758772	-90.381574
D-11.3	38.758783	-90.381523
D-11.4	38.758793	-90.381471
D-12.1*	38.758803	-90.381425
D-12.2	38.758813	-90.381373
D-12.3	38.758824	-90.381321
D-12.4	38.758834	-90.381270
D-13.1*	38.758843	-90.381224
D-13.2	38.758854	-90.381172
D-13.3	38.758864	-90.381120
D-13.4	38.758875	-90.381068
D-14.1*	38.758884	-90.381022
D-14.2	38.758895	-90.380971
D-14.3	38.758905	-90.380919
D-14.4	38.758916	-90.380867
D-15.1*	38.758925	-90.380821
D-15.2	38.758935	-90.380769
D-15.3	38.758946	-90.380718
D-15.4	38.758956	-90.380666
D-16.1*	38.758957	-90.380580
D-16.2	38.758961	-90.380527
D-16.3	38.758965	-90.380474
D-16.4	38.758968	-90.380420
D-17.1*	38.758972	-90.380373
D-17.2	38.758975	-90.380320
D-17.3	38.758979	-90.380267
D-17.4	38.758983	-90.380213
D-18.1*	38.758986	-90.380166
D-18.2	38.758989	-90.380113
D-18.3	38.758993	-90.380060
D-18.4	38.758997	-90.380006
D-19.1*	38.759000	-90.379959
D-19.2	38.759004	-90.379906
D-19.3	38.759007	-90.379852
D-19.4	38.759011	-90.379799
D-20.1*	38.759014	-90.379752
D-20.2	38.759018	-90.379699
D-20.3	38.759021	-90.379645
D-20.4	38.759025	-90.379592

COLUMN LINE E:

PILE NO.	LAT	LONG
E-1.1*	38.758975	-90.383712
E-1.2	38.758960	-90.383662
E-1.3	38.758944	-90.383612
E-1.4	38.758928	-90.383563
E-2.1*	38.758914	-90.383519
E-2.2	38.758898	-90.383469
E-2.3	38.758883	-90.383420
E-2.4	38.758867	-90.383370
E-3.1*	38.758853	-90.383326
E-3.2	38.758837	-90.383277
E-3.3	38.758822	-90.383227
E-3.4	38.758806	-90.383178
E-4.1*	38.758792	-90.383134
E-4.2	38.758776	-90.383084
E-4.3	38.758761	-90.383035
E-4.4	38.758745	-90.382985
E-5.1*	38.758731	-90.382941
E-5.2	38.758715	-90.382891
E-5.3	38.758699	-90.382842
E-5.4	38.758684	-90.382792
E-6.1*	38.758670	-90.382748
E-6.2	38.758654	-90.382699
E-6.3	38.758638	-90.382649
E-6.4	38.758623	-90.382600
E-7.1*	38.758609	-90.382556
E-7.2	38.758593	-90.382506
E-7.3	38.758577	-90.382457
E-7.4	38.758562	-90.382407
E-8.1*	38.758576	-90.382232
E-8.2	38.758587	-90.382180
E-8.3	38.758597	-90.382128
E-8.4	38.758608	-90.382077
E-9.1*	38.758617	-90.382031
E-9.2	38.758627	-90.381979
E-9.3	38.758638	-90.381927
E-9.4	38.758648	-90.381875
E-10.1*	38.758658	-90.381830
E-10.2	38.758668	-90.381778
E-10.3	38.758679	-90.381726
E-10.4	38.758689	-90.381674
E-11.1*	38.758698	-90.381628
E-11.2	38.758709	-90.381577
E-11.3	38.758719	-90.381525
E-11.4	38.758730	-90.381473
E-12.1*	38.758739	-90.381427
E-12.2	38.758750	-90.381375
E-12.3	38.758760	-90.381324
E-12.4	38.758771	-90.381272
E-13.1*	38.758780	-90.381226
E-13.2	38.758790	-90.381174
E-13.3	38.758801	-90.381122
E-13.4	38.758811	-90.381071
E-14.1*	38.758821	-90.381025
E-14.2	38.758831	-90.380973
E-14.3	38.758842	-90.380921
E-14.4	38.758852	-90.380869
E-15.1*	38.758861	-90.380823
E-15.2	38.758872	-90.380772
E-15.3	38.758882	-90.380720
E-15.4	38.758893	-90.380668
E-16.1*	38.758896	-90.380580
E-16.2	38.758900	-90.380527
E-16.3	38.758903	-90.380474
E-16.4	38.758907	-90.380420
E-17.1*	38.758910	-90.380373
E-17.2	38.758914	-90.380320
E-17.3	38.758918	-90.380267
E-17.4	38.758921	-90.380213
E-18.1*	38.758924	-90.380166
E-18.2	38.758928	-90.380113
E-18.3	38.758932	-90.380060
E-18.4	38.758935	-90.380006
E-19.1*	38.758939	-90.379959
E-19.2	38.758942	-90.379906
E-19.3	38.758946	-90.379852
E-19.4	38.758950	-90.379799
E-20.1*	38.758953	-90.379752
E-20.2	38.758956	-90.379699
E-20.3	38.758960	-90.379645
E-20.4	38.758964	-90.379592

COLUMN LINE F:

PILE NO.	LAT	LONG
F-1.1*	38.758919	-90.383741
F-1.2	38.758903	-90.383691
F-1.3	38.758887	-90.383642
F-1.4	38.758871	-90.383592
F-2.1*	38.758857	-90.383548
F-2.2	38.758842	-90.383498
F-2.3	38.758826	-90.383449
F-2.4	38.758810	-90.383399
F-3.1*	38.758796	-90.383356
F-3.2	38.758781	-90.383306
F-3.3	38.758765	-90.383257
F-3.4	38.758749	-90.383207
F-4.1*	38.758735	-90.383163
F-4.2	38.758720	-90.383113
F-4.3	38.758704	-90.383064
F-4.4	38.758688	-90.383014
F-5.1*	38.758674	-90.382970
F-5.2	38.758659	-90.382921
F-5.3	38.758643	-90.382871
F-5.4	38.758627	-90.382822
F-6.1*	38.758613	-90.382778
F-6.2	38.758597	-90.382728
F-6.3	38.758582	-90.382679
F-6.4	38.758566	-90.382629
F-7.1*	38.758552	-90.382585
F-7.2	38.758536	-90.382536
F-7.3	38.758521	-90.382486
F-7.4	38.758505	-90.382436
F-8.1*	38.758513	-90.382234
F-8.2	38.758523	-90.382182
F-8.3	38.758534	-90.382131
F-8.4	38.758544	-90.382079
F-9.1*	38.758553	-90.382033
F-9.2	38.758564	-90.381981
F-9.3	38.758574	-90.381929
F-9.4	38.758585	-90.381878
F-10.1*	38.758594	-90.381832
F-10.2	38.758605	-90.381780
F-10.3	38.758615	-90.381728
F-10.4	38.758625	-90.381676
F-11.1*	38.758635	-90.381631
F-11.2	38.758645	-90.381579
F-11.3	38.758656	-90.381527
F-11.4	38.758666	-90.381475
F-12.1*	38.758676	-90.381429
F-12.2	38.758686	-90.381378
F-12.3	38.758696	-90.381326
F-12.4	38.758707	-90.381274
F-13.1*	38.758716	-90.381228
F-13.2	38.758727	-90.381176
F-13.3	38.758737	-90.381125
F-13.4	38.758748	-90.381073
F-14.1*	38.758757	-90.381027
F-14.2	38.758768	-90.380975
F-14.3	38.758778	-90.380923
F-14.4	38.758788	-90.380872
F-15.1*	38.758798	-90.380826
F-15.2	38.758808	-90.380774
F-15.3	38.758819	-90.380722
F-15.4	38.758829	-90.380670
F-16.1*	38.758835	-90.380580
F-16.2	38.758838	-90.380527
F-16.3	38.758842	-90.380474
F-16.4	38.758846	-90.380420
F-17.1*	38.758849	-90.380373
F-17.2	38.758853	-90.380320
F-17.3	38.758856	-90.380267
F-17.4	38.758860	-90.380213
F-18.1*	38.758863	-90.380166
F-18.2	38.758867	-90.380113
F-18.3	38.758870	-90.380060
F-18.4	38.758874	-90.380006
F-19.1*	38.758877	-90.379959
F-19.2	38.758881	-90.379906
F-19.3	38.758885	-90.379852
F-19.4	38.758888	-90.379799
F-20.1*	38.758891	-90.379752
F-20.2	38.758895	-90.379699
F-20.3	38.758899	-90.379645
F-20.4	38.758902	-90.379592

EQUIPMENT MOUNTING POSTS: Z

PILE NO.	LAT	LONG
Z-1.1	38.759015	-90.383591
Z-1.2	38.759005	-90.383596
Z-1.3	38.758550	-90.382371
Z-1.4	38.758955	-90.380619

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED SYSTEM INSPECTION

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

STATE OF MISSOURI MARC L. LOPATA NUMBER PE-2010023353 MAR 15 2019 PROFESSIONAL ENGINEER

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.

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

MARK UP DRAWING NO.	REV.

FOUNDATION POINTS

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHKD	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

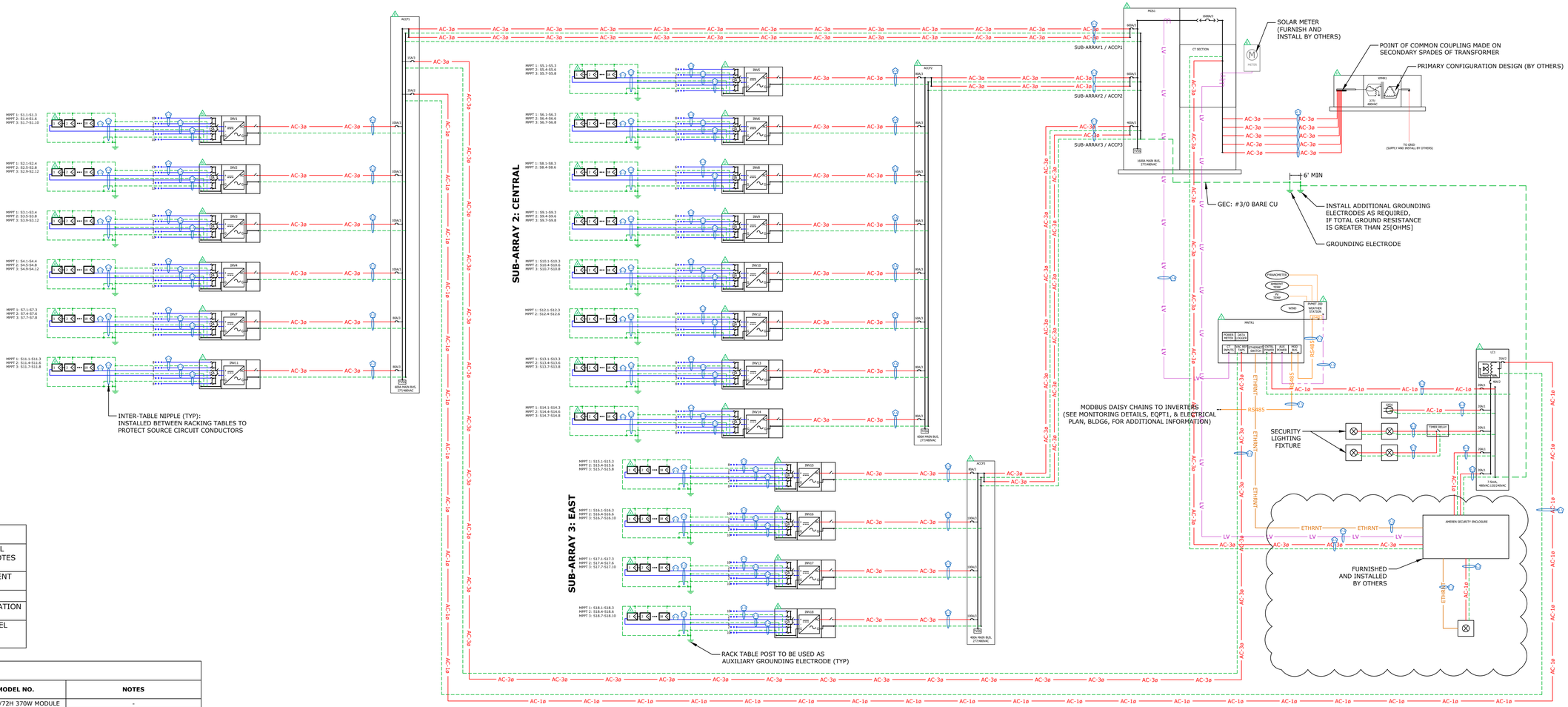
Ameren MISSOURI

DRAWING NO.

LC-DWG-STRU-000002

REVISION NO. 0

ATTACHMENT B



SHEET NOTES

1.	CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL GENERAL NOTES, DC CIRCUIT NOTES, AND AC CIRCUIT NOTES IN DRAWING PACKAGE.
2.	REFER TO GENERAL NOTES FOR ELECTRICAL AND EQUIPMENT DEFINITIONS.
3.	BALANCED 3-PHASE, ONE PHASE SHOWN FOR CLARITY.
4.	REFER TO DETAILS SHEET, ELEC5, FOR LABELING INFORMATION & LOCATIONS.
5.	REFER TO DETAILS SHEET, ELEC6, FOR AC COMBINER PANEL AND MAIN DISTRIBUTION SWITCHBOARD EQUIPMENT SCHEDULES.

EQUIPMENT SCHEDULE

#	QTY	EQUIPMENT ID	EQUIPMENT TYPE	MODEL NO.	NOTES
A	2,880	S1.1:S18.10	PV MODULE	GCL-M6/72H 370W MODULE	-
B	7	INV1-INV4: INV16-INV18	INVERTER	SOLECTRIA PVI-60TL-480	-
C	9	INV5-7, 9-11, 16-18	INVERTER	SOLECTRIA PVI-50TL-480	-
D	2	INV8, INV12	INVERTER	SOLECTRIA PVI-36TL-480	-
E	2	ACCP1:ACCP2	AC COMBINER PANEL	GENERAL ELECTRIC, 600A 'AS' PANELBOARD, NEMA 4	TVSS 50KA/MODE
F	1	ACCP3	AC COMBINER PANEL	GENERAL ELECTRIC, 400A 'AS' PANELBOARD, NEMA 4	TVSS 50KA/MODE
G	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; DRAWOUT STYLE MAIN BREAKER
H	1	XFMR1	STEP-UP TRANSFORMER	ABB 1000KVA	DESIGN, FURNISH, & INSTALL BY OTHERS
I	1	MNTR1	MONITORING BOX	ALSO ENERGY ALL-IN-ONE ENCLOSURE	INCLUDES EQUIPMENT PER MONITORING DETAILS SHEET REMOTE DYNAMIC CONTROL OF SYSTEM/INVERTERS, OPEN PLATFORM, COMMUNICATIONS, RTAC, AND PORT FORWARDING NOT INCLUDED.
J	1	MNTR2	WEATHER STATION	-	INCLUDES: WIND SPEED/DIRECTION, TILTED & HORIZONTAL IRRADIANCE, AND AMBIENT & MODULE CELL TEMPERATURES
K	1	MTR1	SOLAR METER	-	DESIGN, FURNISH, AND INSTALL BY OTHERS
L	1	LC1	TRANSFORMER/ LOAD CENTER	GENERAL ELECTRIC, 7.5KVA, NEMA3R	480V || 120/240V (1) 35A/2 MAIN CIRCUIT BREAKER, AND (3) 20A/1-POLE CIRCUIT BREAKERS

SHEET LEGEND

	UNGROUNDED DC CURRENT CARRYING CONDUCTOR
AC-3ø	AC CURRENT CARRYING CONDUCTORS, BALANCED 3-PHASE
AC-1ø	AC CURRENT CARRYING CONDUCTOR(S)
	EQUIPMENT GROUNDING CONDUCTOR
	GROUNDING ELECTRODE CONDUCTOR
LV LV	LOW VOLTAGE CABLE(S)
RS485	RS485 DATA CABLE
×	APPROVED GROUNDING CONNECTION
	GROUNDING ELECTRODE

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 L. LOPATA
MAR 15 2019
NUMBER PE-2010023353
PROFESSIONAL ENGINEER

OPERATING DIAGRAM

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

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

SINGLE LINE DIAGRAM AND SPECIFICATIONS

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRFTR	CHKD	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

Ameren MISSOURI

DRAWING NO.
LC-DWG-ELEC-000001

REVISION NO. 0

ATTACHMENT B

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 [AMP@°C]	MAX ESTIMATED ONE-WAY DISTANCE [FT]	VOLTAGE DROP [%]	ACTUAL CONDUIT FILL [%]	ALLOWABLE CONDUIT FILL [%]
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	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 #8 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" GRC/ 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" GRC/ 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" GRC/ 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 ACCP1		2.1	(3) #3 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #8 G THWN-2 CU	(1) 1-1/2" LFNC/ PVC SCHD 40/ PVC SCHD 80	100	1	1	99.25	35	0.96	1.0	82.71	(1) x 115 @ 90°C	120	0.873%	21.3%	40.0%
PVI-50TL CKTS TO ACCP1		2.2	(3) #4 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #8 G THWN-2 CU	(1) 1-1/2" LFNC/ PVC SCHD 40/ PVC SCHD 80	80	1	1	82.75	35	0.96	1.0	68.96	(1) x 95 @ 90°C	105	0.783%	18.7%	40.0%
PVI-36TL CKTS TO ACCP2		2.3	(3) #6 C THWN-2 CU, (1) #10 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1-1/4" LFNC/ PVC SCHD 40/ PVC SCHD 80	60	1	1	54.38	35	0.96	1.0	45.31	(1) x 75 @ 90°C	91	0.697%	15.7%	40.0%
PVI-50TL CKTS TO ACCP2		2.4	(3) #3 C THWN-2 CU, (1) #8 N THWN-2 CU	(1) #8 G THWN-2 CU	(1) 1-1/2" LFNC/ PVC SCHD 40/ PVC SCHD 80	80	1	1	82.75	35	0.96	1.0	68.96	(1) x 115 @ 90°C	98	0.594%	21.3%	40.0%
PVI-60TL CKTS TO ACCP3		2.5	(3) #2/0 C THWN-2 CU, (1) #4 N THWN-2 CU	(1) #4 G THWN-2 CU	(1) 2-1/2" LFNC/ PVC SCHD 40/ PVC SCHD 80	100	1	1	99.25	35	0.96	1.0	82.71	(1) x 195 @ 90°C	59	0.182%	20.2%	40.0%
PVI-50TL CKTS TO ACCP3		2.6	(3) #1/0 C THWN-2 CU, (1) #2 N THWN-2 CU	(1) #2 G THWN-2 CU	(1) 2-1/2" LFNC/ PVC SCHD 40/ PVC SCHD 80	80	1	1	82.75	35	0.96	1.0	68.96	(1) x 170 @ 90°C	52	0.158%	19.1%	40.0%
ACCP1	MDS1	3.1	(3) #350 C THWN-2 CU, (1) #350 N THWN-2 CU	(1) #1 G THWN-2 CU	(1) 3-1/2" PVC SCHD 40/ PVC SCHD 80	600	7	2	294.25	35	0.96	1.0	306.51	(2) X 350 @ 90°C	18	0.07%	25.90%	40.0%
ACCP2	MDS1	3.2	(3) #500 C THWN-2 CU, (1) #3/0 N THWN-2 CU	(1) #3/0 G THWN-2 CU	(1) 4" PVC SCHD 40/ PVC SCHD 80	600	7	2	289.63	35	0.96	1.0	241.35	(2) x 430 @ 90°C	417	1.311%	23.6%	40.0%
ACCP3	MDS1	3.3	(3) #400 C THWN-2 CU, (1) #3/0 N THWN-2 CU	(1) #3/0 G THWN-2 CU	(1) 4" PVC SCHD 40/ PVC SCHD 80	400	4	2	190.25	35	0.96	1.0	158.54	(2) x 380 @ 90°C	928	2.226%	20.4%	40.0%
MDS1	XFMR1	4.1	(3) #400 C THWN-2 CU, (1) #250 N THWN-2 CU	-	(1) 4" PVC SCHD 40/ PVC SCHD 80	1600	18	5	309.65	35	0.96	1.0	258.04	(5) x 380 @ 90°C	24	0.094%	19.1%	40.0%
ACCP1	LC1	5.1	(2) #6 C THWN-2 CU, (1) #6 N THWN-2 CU	(1) #10 G THWN-2 CU	(1) 1" GRC	50	0	1	-	35	0.96	1.0	-	(1) X 75 @ 90°C	10	-	25.10%	40.0%
ACCP1	MNTR1	6.1	(3) #10 C THWN-2 CU, (1) #10 N THWN-2	(1) #10 G THWN-2 CU	(1) 1" GRC	15	0	1	-	35	0.96	1.0	-	(1) X 40 @ 90°C	10	-	12.00%	40.0%
LC1	LOAD	6.2	(2) #10 C THWN-2 CU, (1) #10 N THWN-2	(1) #10 G THWN-2 CU	(1) 1" PVC SCHD40/ PVC SCHD 80/GRC	20	0	1	-	35	0.96	1.0	-	(1) X 40 @ 90°C	VARIES	-	12.20%	40.0%
LC1	LOAD	6.3	(2) #10 C THWN-2 CU, (1) #10 N THWN-2	(1) #10 G THWN-2 CU	(1) 1-1/2" PVC SCHD40/ PVC SCHD 80/GRC	20	0	1	-	35	0.96	1.0	-	(1) X 40 @ 90°C	VARIES	-	4.90%	40.0%

COMMUNICATIONS WIRE & CONDUIT SCHEDULE

EQUIP ID	FEEDS EQUIP ID	#.##	CURRENT CARRYING CONDUCTORS	GROUNDING CONDUCTOR	CONDUIT SIZE & TYPE [INCHES]
INV1:INV18	MNTR1	7.1	RS485- BELDEN 3106A		(1) 3/4" PVC SCHD40/ PVC SCHD 80/GRC
MNTR1	MNTR1	7.2	ETHERNET- BELDEN 7919A		(1) 1" PVC SCHD40/ PVC SCHD 80/GRC
MNTR1	MNTR2	7.3	(2) #12 THWN-2		(1) 3/4" GRC
MNTR1	MDS1	7.4	CT CONDUCTORS		(1) 3/4" PVC SHD40/ PVC SCHD80/ GRC

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED SYSTEM INSPECTOR

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

STATE OF MISSOURI MARC L. LOPATA MAR 15 2019 NUMBER PE-2010023353 PROFESSIONAL ENGINEER

OPERATING DIAGRAM

NOTICE OF LIMITED RESPONSIBILITY

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MARK UP DRAWING NO.	REV.

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

WIRE AND CONDUIT SCHEDULE

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

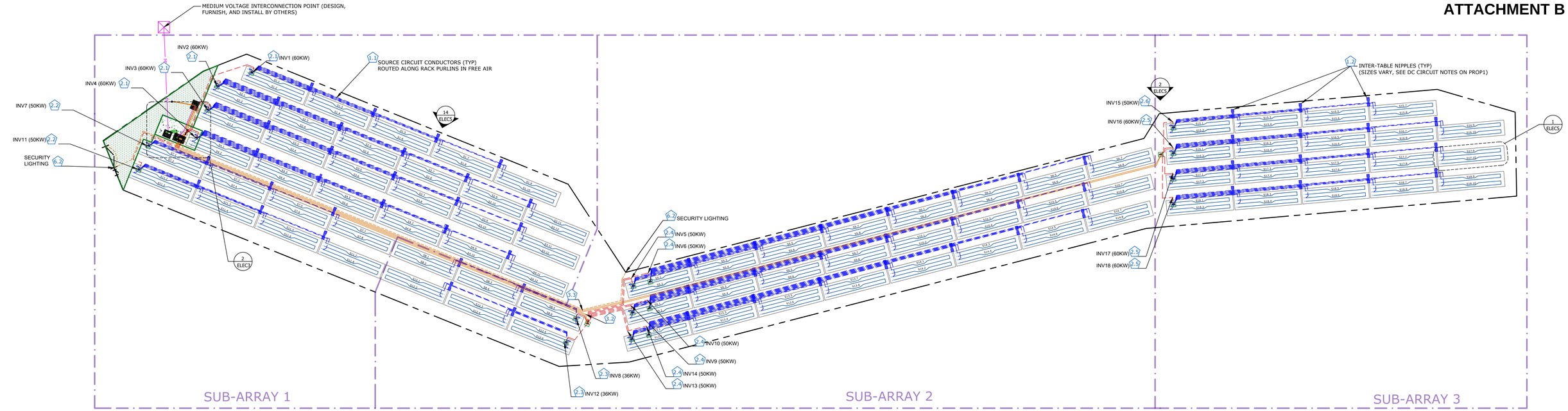
Ameren MISSOURI

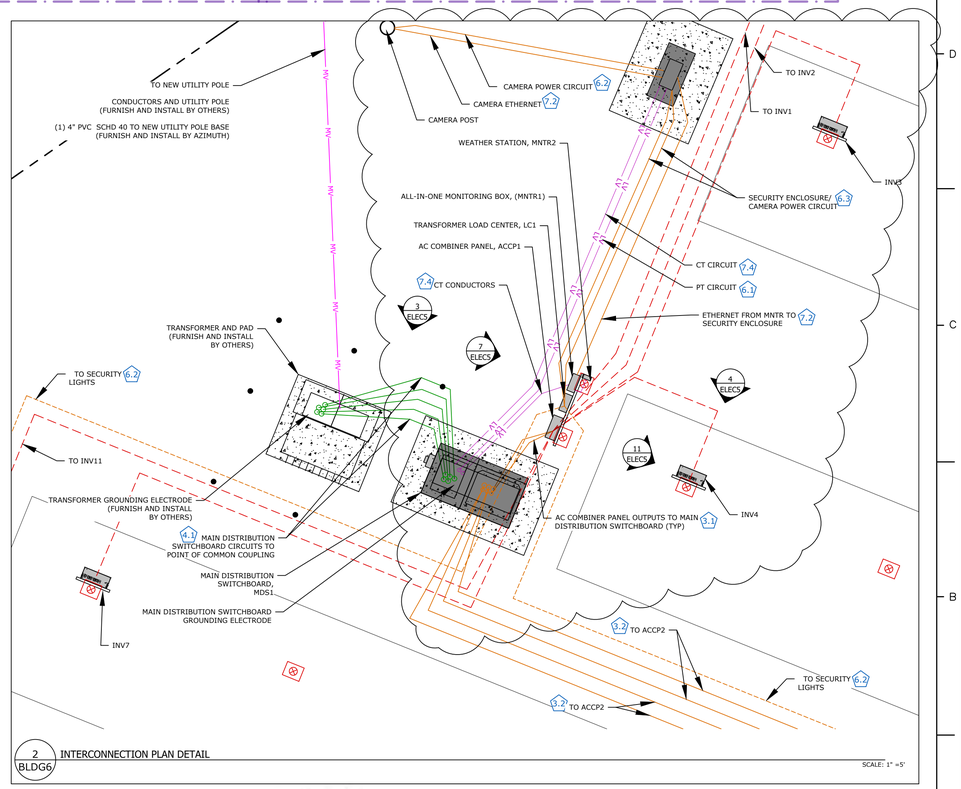
DRAWING NO.

LC-DWG-ELEC-000002

REVISION NO. 0

ATTACHMENT B





SHEET NOTES

1.	CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL GENERAL NOTES, DC CIRCUIT NOTES, AND AC CIRCUIT NOTES IN DRAWING PACKAGE.
2.	REFER TO GENERAL NOTES FOR ELECTRICAL AND EQUIPMENT DEFINITIONS.
3.	TRANSFORMER PAD AND TRANSFORMER DESIGNED, FURNISHED, AND INSTALLED BY OTHERS.
4.	REFER TO DETAILS SHEET FOR SPECIFIED CALLOUTS.
5.	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
LV LV	LOW VOLTAGE CONDUCTORS
MV MV	MEDIUM VOLTAGE CONDUCTORS (DESIGN, FURNISH, AND INSTALL BY OTHERS)
	SUB-ARRAY

NABCEP CERTIFIED PV Installation Professional

NABCEP CREDENTIALED SOLAR INSTALLATION

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 L. LOPATA NUMBER PE-2004023353 PROFESSIONAL ENGINEER
MAR 15 2019

OPERATING DIAGRAM

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

MARK UP DRAWING NO.	REV.

ELECTRICAL PLAN

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

DRAWING RECORD

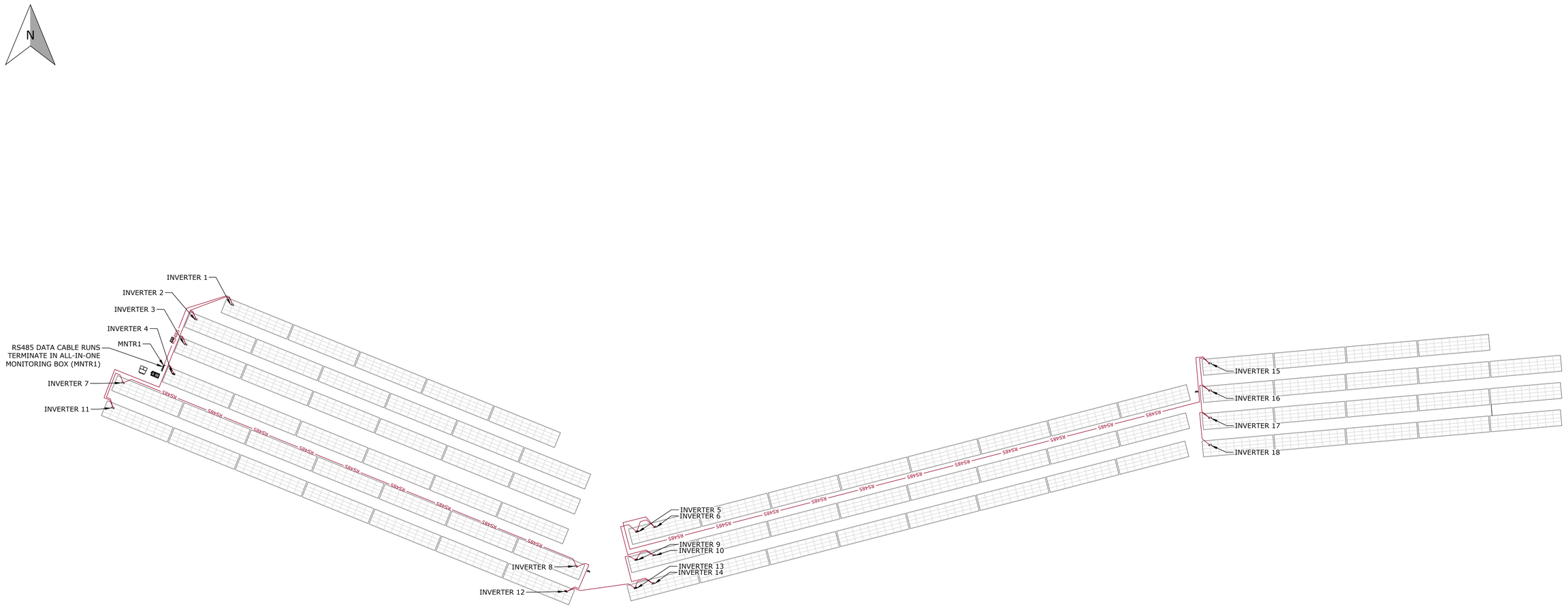
REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

Ameren MISSOURI

DRAWING NO. LC-DWG-ELEC-000003

REVISION NO. 0

ATTACHMENT B

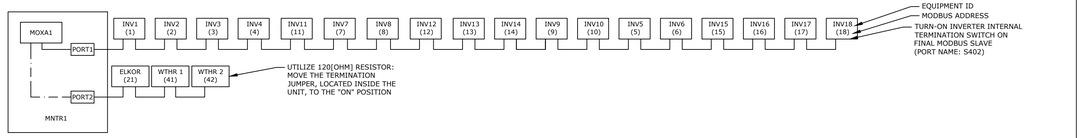


MONITORING NOTES

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 9600. SOLECTRIA INVERTERS SET TO COMMUNICATE AT THE 9600 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 ELEC5.

SHEET LEGEND

RS485	SHIELDED RS485 DATA CABLE IN CONDUIT AS SPECIFIED



2 ELEC4 MODBUS ADDRESS MAP

SCALE: NOT TO SCALE

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED SYSTEM INSPECTOR

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

STATE OF MISSOURI MARC L. LOPATA MAR 15 2019 NUMBER PE-2004023353 PROFESSIONAL ENGINEER

OPERATING DIAGRAM

NOTICE OF LIMITED RESPONSIBILITY

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MARK UP DRAWING NO.	REV.

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

MONITORING PLAN

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

DRAWING RECORD

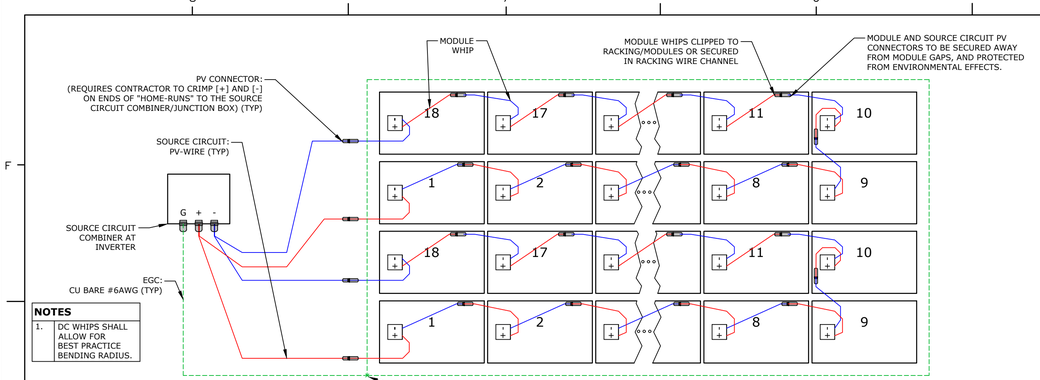
REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHKD	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

Ameren MISSOURI

DRAWING NO.

LC-DWG-ELEC-000004

REVISION NO. 0

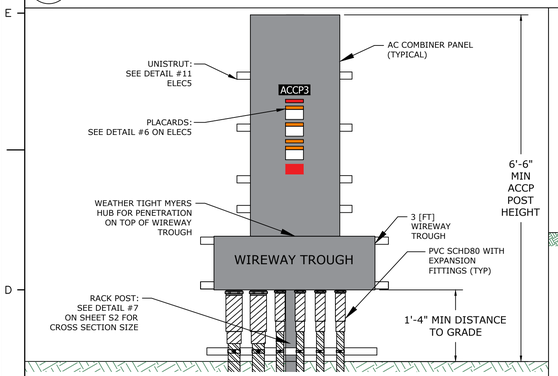


NOTES

1. DC WHIPS SHALL ALLOW FOR BEST PRACTICE BENDING RADIUS.

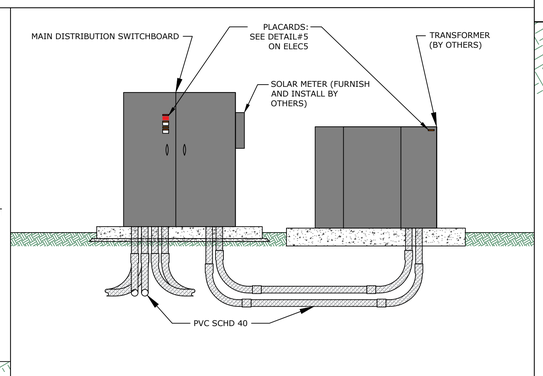
1 ELEC5 MODULE WIRING SCHEMATIC

SCALE: NOT TO SCALE



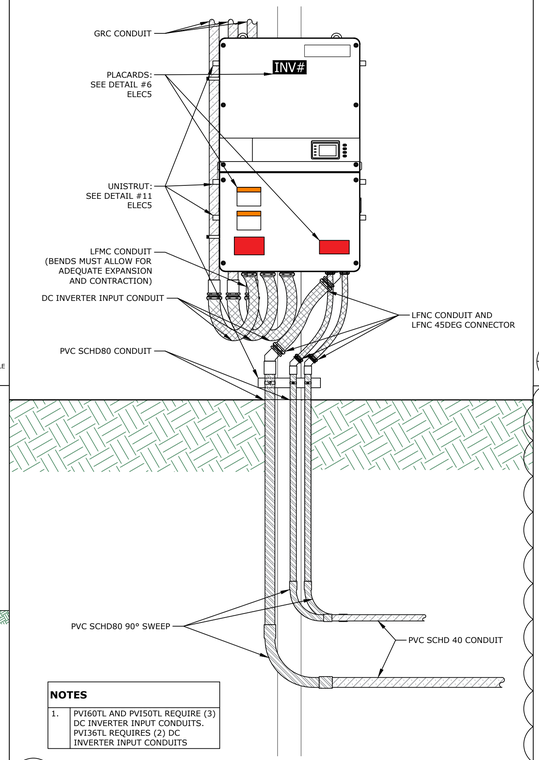
2 ELEC5 ACCP# ELEVATION

SCALE:3/4" = 1'-0"



3 ELEC5 TRANSFORMER AND MAIN DISTRIBUTION SWITCHBOARD ELEVATION

SCALE: NOT TO SCALE



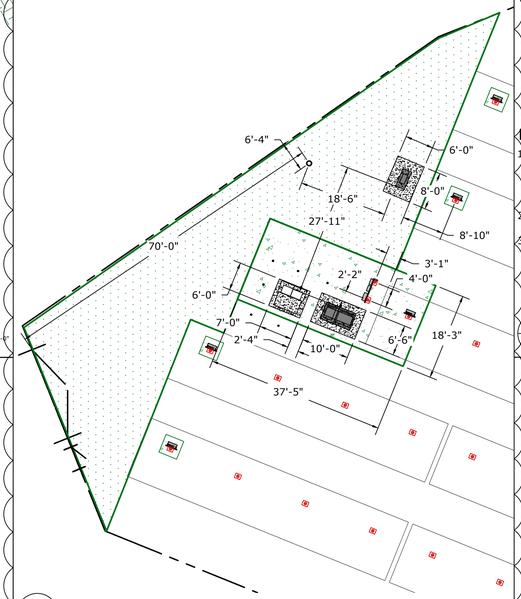
NOTES

1. PVI60TL AND PVI50TL REQUIRE (3) DC INVERTER INPUT CONDUITS. PVI36TL REQUIRES (2) DC INVERTER INPUT CONDUITS

4 ELEC5 INVERTER ELEVATION

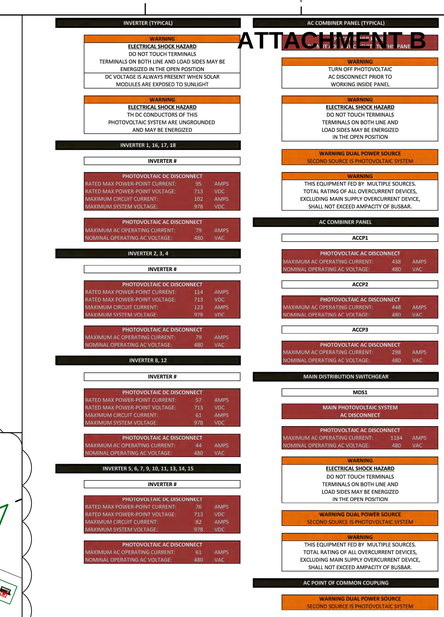
SCALE: 1" = 1'-0"

5 ELEC5 NOT USED



12 ELEC5 EQUIPMENT HUB DIMENSIONS

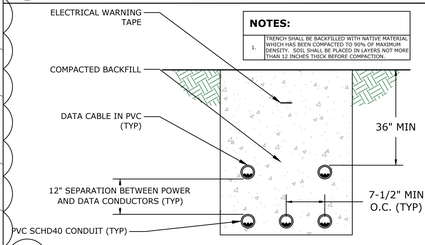
SCALE: 1" = 15'-0"



PLACARD & WIRE LABEL NOTES

1. 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.
2. WHERE APPLICABLE, ALL PLACARDS, LABELS, AND SIGNS SHOULD BE INSTALLED AS SHOWN IN DETAILS.
3. 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: "S[INVERTER #].[STRING #] (POLARITY)"; I.E. "S12.8 (+)". FOR EXACT LABEL DETAILS SEE STRING ID CALLOUTS ON ELECTRICAL PLAN SHEET.

6 ELEC5 PLACARD DETAILS AND NOTES

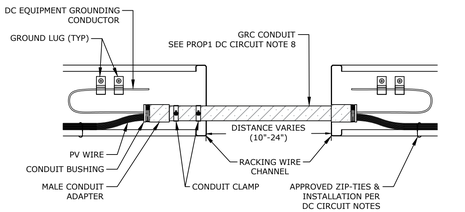


NOTES:

1. TRENCH SHALL BE BACKFILLED WITH NATIVE MATERIAL WHICH HAS BEEN COMPACTED TO 90% OF MAXIMUM DENSITY. SOIL SHALL BE PLACED IN LAYERS NOT MORE THAN 12 INCHES THICK BEFORE COMPACTION.

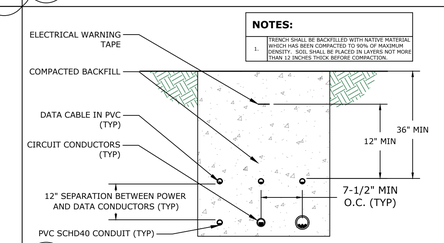
13 ELEC5 ACCP# TO MDS TRENCH SECTION

SCALE: NOT TO SCALE



14 ELEC5 INTER-TABLE NIPPLE

SCALE: 1-1/2" = 1'-0"



NOTES:

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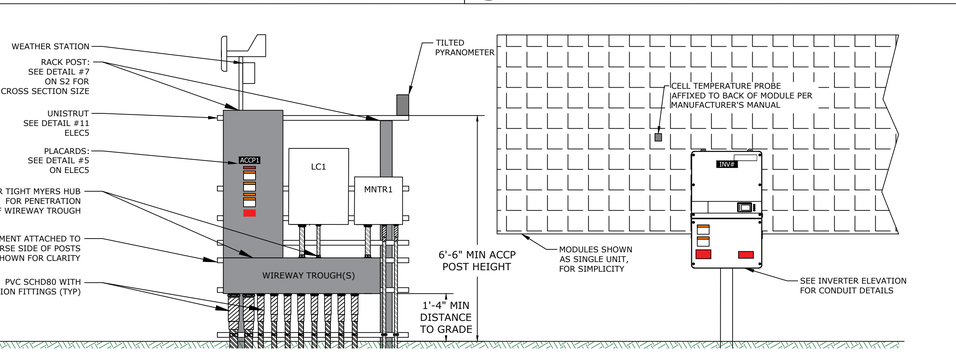
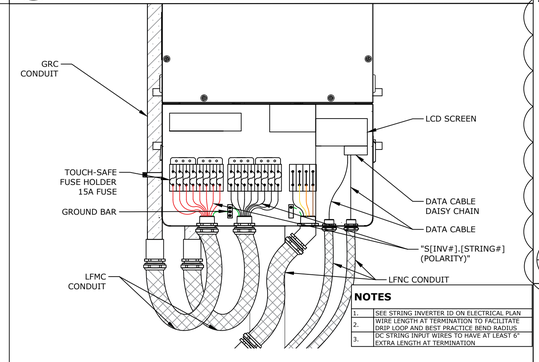
15 ELEC5 INV# TO ACCP# TRENCH SECTION

SCALE: NOT TO SCALE



7 ELEC5 EQUIPMENT HUB NORTH ELEVATION

SCALE: 1/2" = 1'-0"

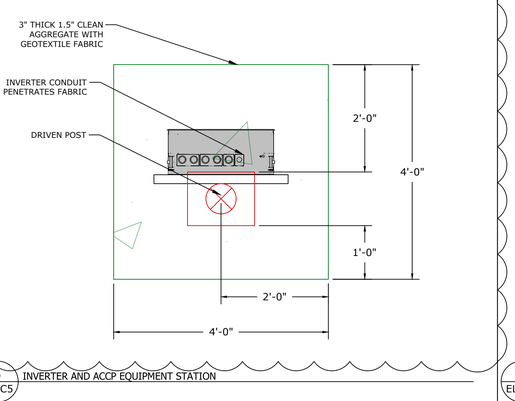


NOTES

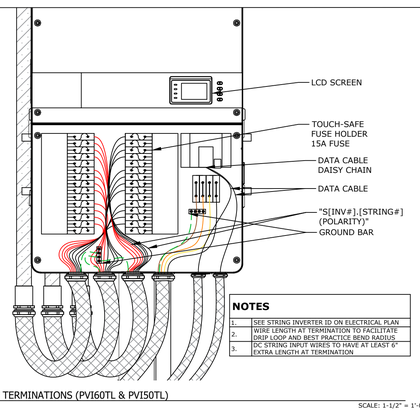
1. SEE STRING INVERTER ID ON ELECTRICAL PLAN
2. WIRE LENGTH AT TERMINATION TO FACILITATE DRIP LOOP AND BEST PRACTICE BEND RADIUS.
3. DC STRING INPUT WIRES TO HAVE AT LEAST 6" EXTRA LENGTH AT TERMINATION

8 ELEC5 INVERTER TERMINATIONS (PVI36TL)

SCALE: 1-1/2" = 1'-0"



9 ELEC5 INVERTER AND ACCP EQUIPMENT STATION

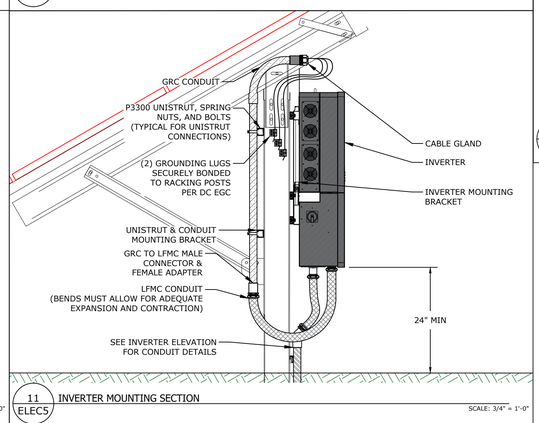


NOTES

1. SEE STRING INVERTER ID ON ELECTRICAL PLAN
2. WIRE LENGTH AT TERMINATION TO FACILITATE DRIP LOOP AND BEST PRACTICE BEND RADIUS
3. DC STRING INPUT WIRES TO HAVE AT LEAST 6" EXTRA LENGTH AT TERMINATION

10 ELEC5 INVERTER TERMINATIONS (PVI60TL & PVI50TL)

SCALE: 1-1/2" = 1'-0"



11 ELEC5 INVERTER MOUNTING SECTION

SCALE: 3/4" = 1'-0"

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED SYSTEM INSPECTOR

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

STATE OF MISSOURI MARC L. LOPATA NUMBER PE-2004023353 PROFESSIONAL ENGINEER MAR 15 2019

OPERATING DIAGRAM

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

MARK UP DRAWING NO.	REV.

DETAILS

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUP'V	ENGR	DESCRIPTION
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C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

Ameren MISSOURI

DRAWING NO. LC-DWG-ELEC-000005

REVISION NO. 0

ATTACHMENT B

ATTACHMENT B

ACCP1 PANELBOARD SCHEDULE

EQUIP ID	BRKR SPCE	CKT BRKR	CKT BRKR	BRKR SPCE	EQUIP ID
600 AMP MAIN BUS					
VOLT SENSE	1	15A/3	35A/2	2	LC1
	3			4	
	5			6	
INV1	7	100A/3	100A/3	8	INV2
	9			10	
	11			12	
INV3	13	100A/3	100A/3	14	INV4
	15			16	
	17			18	
INV7	19	80A/3	80A/3	20	INV11
	21			22	
	23			24	
MAIN	A	600A MAIN LUGS			
	B				
	C				

1 ELEC6 ACCP1 PANELBOARD SCHEDULE

ACCP2 PANELBOARD SCHEDULE

EQUIP ID	BRKR SPCE	CKT BRKR	CKT BRKR	BRKR SPCE	EQUIP ID
600 AMP MAIN BUS					
INV5	1	80A/3	80A/3	2	INV6
	3			4	
	5			6	
INV8	7	60A/3	80A/3	8	INV9
	9			10	
	11			12	
INV10	13	80A/3	60A/3	14	INV12
	15			16	
	17			18	
INV13	19	80A/3	80A/3	20	INV14
	21			22	
	23			24	
MAIN	A	600A MAIN LUGS			
	B				
	C				

2 ELEC6 ACCP2 PANELBOARD SCHEDULE

ACCP3 PANELBOARD SCHEDULE

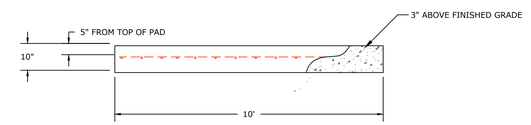
EQUIP ID	BRKR SPCE	CKT BRKR	CKT BRKR	BRKR SPCE	EQUIP ID
400 AMP MAIN BUS					
INV15	1	80A/3	100A/3	2	INV16
	3			4	
	5			6	
INV17	7	100A/3	100A/3	8	INV18
	9			10	
	11			12	
MAIN	A	400A MAIN LUGS			
	B				
	C				

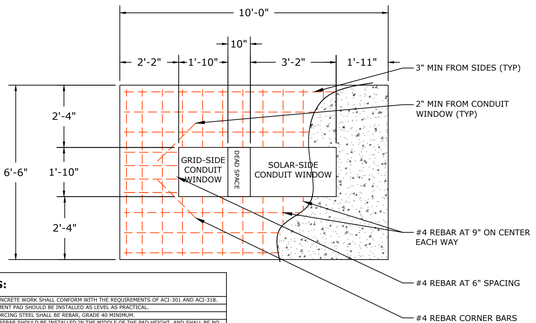
3 ELEC6 ACCP3 PANELBOARD SCHEDULE

MDS1 SWITCHBOARD SCHEDULE

EQUIP ID	BRKR SPCE	CKT BRKR/ FUSE
1600 AMP MAIN BUS		
ACCP1	1	600A/3
	2	
	3	
ACCP2	4	600A/3
	5	
	6	
ACCP3	7	400A/3
	8	
	9	
MAIN PV SYSTEM AC DISCONNECT	A	1600A/3
	B	
	C	

4 ELEC6 MDS1 PANELBOARD SCHEDULE

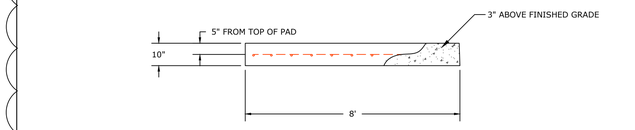


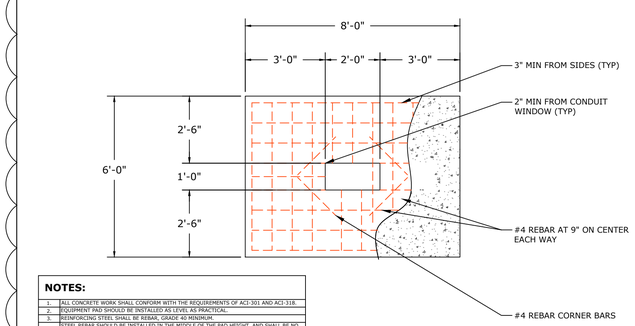


NOTES:

1. ALL CONCRETE WORK SHALL CONFORM WITH THE REQUIREMENTS OF ACI-301 AND ACI-318.
2. EQUIPMENT PAD SHOULD BE INSTALLED AS LEVEL AS PRACTICAL.
3. REINFORCING STEEL SHALL BE REBAR, GRADE 40 MINIMUM.
4. STEEL REBAR SHOULD BE INSTALLED IN THE MIDDLE OF THE PAD HEIGHT, AND SHALL BE NO LESS THAN 4 INCHES FROM TOP OF PAD.
5. STEEL REBAR SHALL BE NO LESS THAN 2 INCHES FROM CONDUIT WINDOW. CONDUIT WINDOWS SHALL BE GROUTED WITH A NON-SHRINK GROUND.
6. STEEL REBAR SHALL BE NO LESS THAN 3 INCHES FROM SIDES OF PAD.
7. STEEL REBAR SHALL BE NO LESS THAN 2 INCHES FROM SIDES OF PIER.
8. LIGHT BROOM FINISH TOP OF PAD. FINISH ALL EXPOSED EDGES WITH A FINISHING TOOL. VERTICAL EDGES SHALL HAVE A 3/4 INCH CHAMFER. SLOPE EXPOSED HORIZONTAL SURFACES TO DRAIN FOR CONCRETE.
9. CONCRETE SHALL BE DESIGNED TO ATTAIN A STRENGTH OF 3,000 PSI AT 28 DAYS. SLUMP FOR CONCRETE SHALL NOT EXCEED 3 INCHES.
10. MOIST-CURE CONCRETE AT LEAST 7 DAYS AFTER POURING. DO NOT INSTALL EQUIPMENT ON PAD FOR AT LEAST 14 DAYS AFTER POURING CONCRETE.
11. PAD SHALL BE PLACED ON FIRM, COMPACTED NATIVE MATERIAL WHICH HAS BEEN COMPACTED TO 90% OF MAXIMUM DENSITY. SOIL SHALL BE PLACED IN LAYERS NOT MORE THAN 12 INCHES THICK BEFORE COMPACTION. AREA UNDER PAD SHALL BE EXCAVATED TO THE REQUIRED GRADE, OR TO A DEPTH REQUIRED TO REACH FIRM, UNDISTURBED MATERIAL, WHICHEVER IS GREATER. MATERIAL SHALL BE CONSIDERED FIRM IF IT CANNOT BE PENETRATED BY THUMB EXCEPT WITH MODERATE EFFORT.
12. CONDUITS FROM AC COMBINER PANELBOARDS SHALL BE CENTERED IN THE SOLAR-SIDE CONDUIT WINDOW.
13. CONDUITS FROM TRANSFORMER SHALL BE CENTERED IN THE GRID-SIDE CONDUIT WINDOW.
14. BELLED ENDS OF CONDUIT SHOULD EXTEND APPROXIMATELY 3 INCHES ABOVE PAD SURFACE.
15. TIES SHALL BE REQUIRED ALONG THE HEIGHT OF THE DRILLED SHAFTS.

5 ELEC6 EQUIPMENT PAD DETAILS — SCALE: 3/8" = 1'-0"





NOTES:

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12. BELLED ENDS OF CONDUIT SHOULD EXTEND APPROXIMATELY 3 INCHES ABOVE PAD SURFACE.
13. TIES SHALL BE REQUIRED ALONG THE HEIGHT OF THE DRILLED SHAFTS.

6 ELEC6 SECURITY ENCLOSURE PAD DETAILS — SCALE: 3/8" = 1'-0"

NABCEP CERTIFIED — PV Installation Professional

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

NABCEP CREDENTIALED SYSTEM INSPECTOR

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

STATE OF MISSOURI — MARC L. LOPATA — MAR 15 2019 — NUMBER PE-2004033353 — PROFESSIONAL ENGINEER

OPERATING DIAGRAM

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

MARK UP DRAWING NO. | REV.: ----

PANELBOARD SCHEDULE

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	DRAFTING CHK'D	SUPV	ENGR	DESCRIPTION
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C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

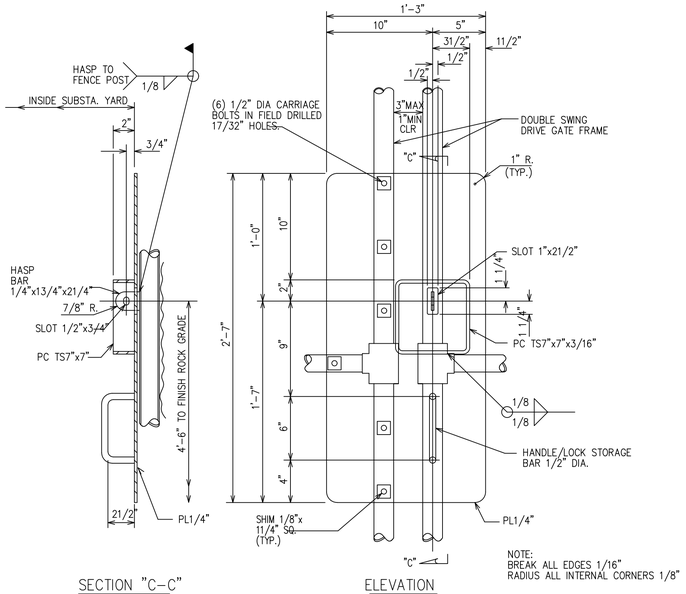
SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

Ameren MISSOURI

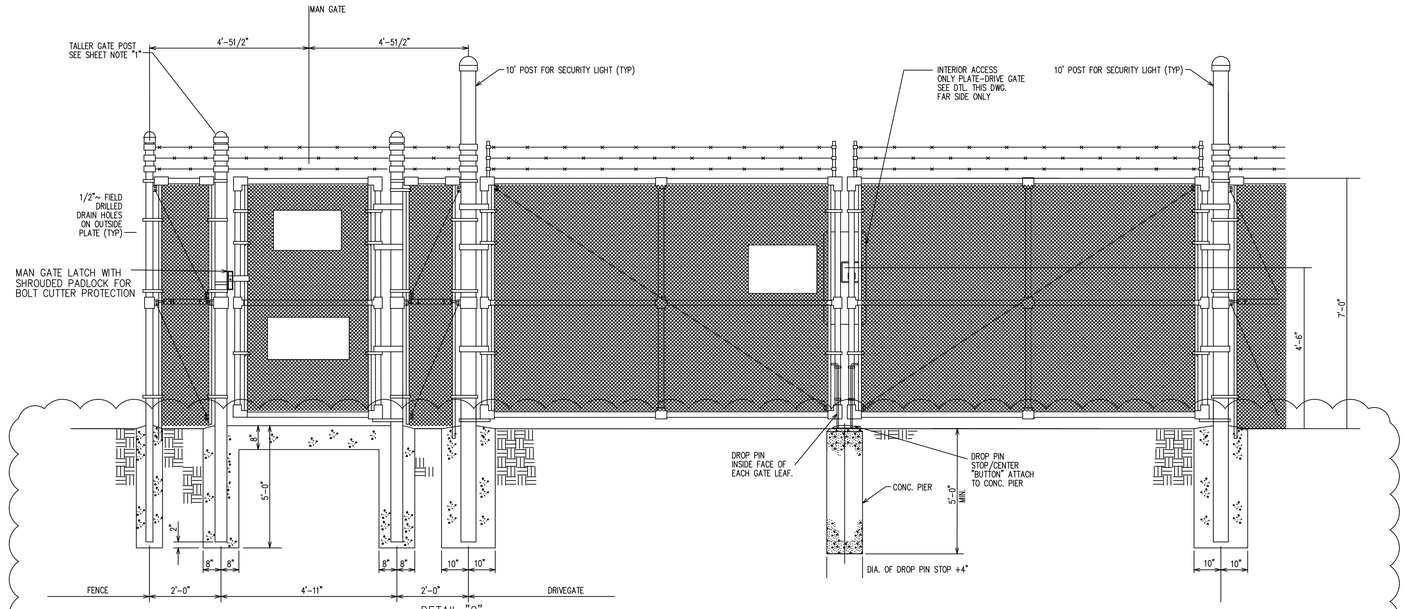
DRAWING NO. LC-DWG-ELEC-000006

REVISION NO. 0

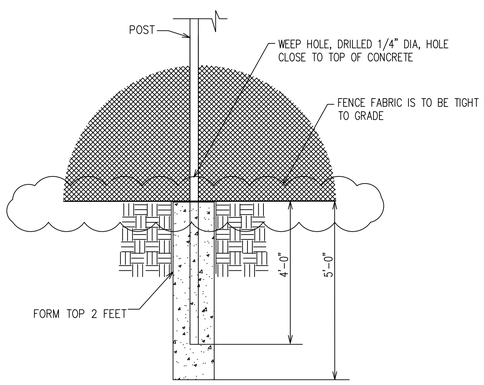
ATTACHMENT B



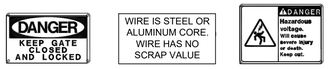
DETAIL "1"
INTERIOR ACCESS ONLY PLATE-DRIVE GATE
NOT TO SCALE



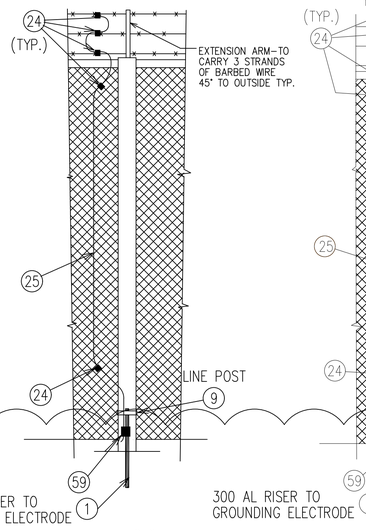
DETAIL "2"
NON-CARD READER ENTRY GATE
(ELEVATION LOOKING FROM OUTSIDE)
NOT TO SCALE



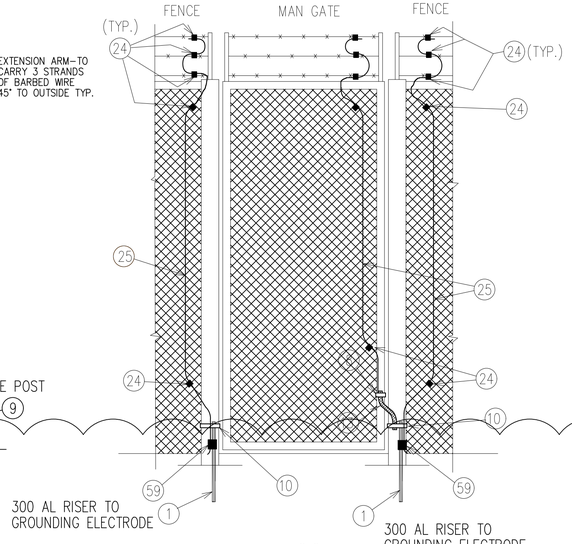
TYPICAL FOUNDATION DETAIL



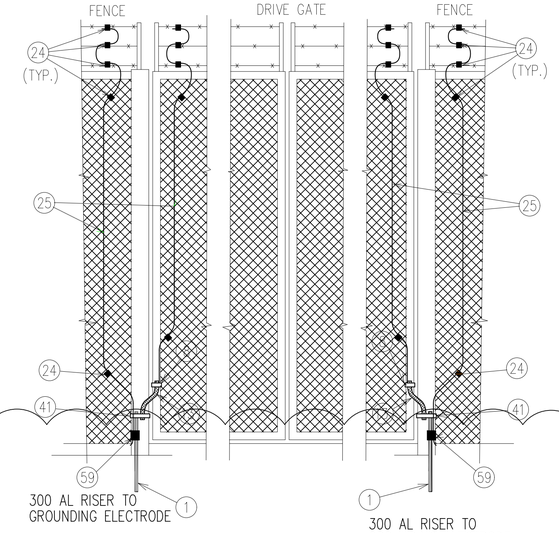
TYPICAL VEHICLE GATE SIGNAGE



DETAIL "4"
FENCE POST GROUNDING



DETAIL "T"
MAN GATE GROUNDING



DETAIL "U"
DRIVE GATE GROUNDING

SHEET NOTES

1.	FENCE GROUNDING SHALL BE COMPLETED WITHIN 50' OF THE POINT WHERE THE MEDIUM VOLTAGE CONDUCTORS OR DUCT BANKS CROSS UNDER THE PERIMETER FENCE, AND SHALL BE BONDED TO 5/8" X 8' GROUNDING ELECTRODE DRIVEN WITHIN SIX(6) FEET OF FENCE LINE. ADDITIONAL FENCE GROUNDING IS NOT REQUIRED.
2.	BONDING OF THE GATES TO THE FENCE POST SHALL BE COMPLETED IN ACCORDANCE WITH THE FENCE DETAILS DRAWING.
3.	WHERE CONCRETE FOUNDATIONS ARE REQUIRED, THEY SHALL BE IN ACCORDANCE WITH THE "TYPICAL FOUNDATION DETAIL" IN THE FENCE DETAILS DRAWING.
4.	THE SECURITY FENCE SHALL BE INSTALLED AT LEAST 9' OUTSIDE THE RACKING FOOTPRINT.
5.	ONE INCH MESH FENCING SHALL BE PROVIDED. FENCING SHALL BE SEVEN (7) FEET TALL WITH CONCRETE FOOTING AT GATES, FENCE CORNERS, LIGHT POSTS, AND AS REQUIRED ON SLOPED TERRAIN TO ENSURE SECURE AND STABLE INSTALLATION. ALL FENCING SHALL BE GALVANIZED MATERIAL.
6.	(4) SECURITY LIGHT POSTS SHALL HAVE 10' REVEAL HEIGHTS FOR MOUNTING SECURITY LIGHTS. SEE SITE PLAN FOR LOCATIONS.
7.	ELECTRICAL SUB-CONTRACTOR RESPONSIBLE FOR CONDUIT AND CABLE/ DATA PULLS TO ELECTRONIC GATES AND UTILITY POLES FROM "EQUIPMENT HUB", AS REQUIRED BY AMEREN MISSOURI.

BILL OF MATERIAL

ITEM NO.	DESCRIPTION
1	300 AL WIRE, BARE, 19 STRAND, SOFT DRAWN (1000')
8	11/4" BRAID TO 2" O.D. PIPE, GROUND CLAMP
9	U-BOLT GROUND CLAMP, 300 TO 2" NOM. PIPE (23/8" O.D.)
10	U-BOLT GROUND CLAMP, 300 TO 31/2" NOM. PIPE (4" O.D.)
13	BRAID, COPPER, FLEXIBLE, TINNED, 1/4"x 11/4", 200A
24	WIRE CONNECTOR, 3/0 TO FENCE MESH, 2 BOLT
25	3/0 AL WIRE, BARE, 7 STRAND, SOFT DRAWN
41	U-BOLT GROUND CLAMP, 300 TO 6" NOM. PIPE (65/8" O.D.)
59	PARALLEL GROOVE CLAMP, #4-300 MAIN, #4-4/0 TAP

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED SOLAR INSTALLER

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

STATE OF MISSOURI MARC L. LOPATA NUMBER PE-2004023353 PROFESSIONAL ENGINEER
MAR 1 5 2019

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.

MARK UP DRAWING NO.	REV.

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

FENCE DETAILS

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

Ameren MISSOURI

DRAWING NO.
LC-DWG-PROP-000004

REVISION NO. 0

ATTACHMENT B

GCL-M6/72H — GCL-Saturn Series Monocrystalline Module 365-400W

Electrical Specification (STC*)

Maximum Power	Pmax(W)	365	370	375	380	385	390	395	400
Maximum Power Voltage	Vmp(V)	39.20	39.40	39.60	39.80	39.98	40.17	40.35	40.53
Maximum Power Current	Imp(A)	9.31	9.39	9.47	9.55	9.63	9.71	9.79	9.87
Open Circuit Voltage	Voc(V)	47.60	47.80	48.00	48.20	48.40	48.60	48.80	49.00
Short Circuit Current	Isc(A)	9.89	9.97	10.05	10.13	10.21	10.29	10.37	10.45
Module Efficiency	(%)	18.8	19.1	19.3	19.6	19.8	20.1	20.4	20.6
Power Output Tolerance	(W)	0~+5							

* Irradiance 1000W/m², Module Temperature 25°C, Air Mass 1.5

Electrical Specification (NOCT*)

Maximum Power	Pmax (W)	270.75	274.43	278.50	282.22	285.98	288.97	292.76	296.58
Maximum Power Voltage	Vmp (V)	36.10	36.30	36.50	36.70	36.90	37.00	37.20	37.40
Maximum Power Current	Imp (A)	7.50	7.56	7.63	7.69	7.75	7.81	7.87	7.93
Open Circuit Voltage	Voc(V)	44.20	44.30	44.50	44.70	44.90	45.10	45.30	45.50
Short Circuit Current	Isc (A)	8.00	8.06	8.12	8.19	8.25	8.32	8.39	8.46

* Irradiance 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s

Mechanical Data

Solar Cell Type	Mono 156.75×156.75mm (6 inches)
Number of Cells	72 Cells (6×12)
Dimensions of Module L*W*H (mm)	1956×992×35mm (77 × 39.05 × 1.38 inches)
Weight (kg)	22.2 kg
Glass	High transparency solar glass 3.2mm (0.13 inches)
Backsheet	White
Frame	Silver, anodized aluminium alloy
J-Box	IP68 Rated
Cable	4.0mm² (0.006 inches2), 1200mm (47.24 inches)
Number of diodes	3
Wind/ Snow Load	2400Pa/5400Pa*
Connector	QC10.4

* For more details please check the installation manual of GCLSI

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	45±2°C
Temperature Coefficient of Isc	+0.06%/°C
Temperature Coefficient of Voc	-0.30%/°C
Temperature Coefficient of PMAX	-0.39%/°C

Maximum Ratings

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC-(H)
Max Series Fuse Rating	15A

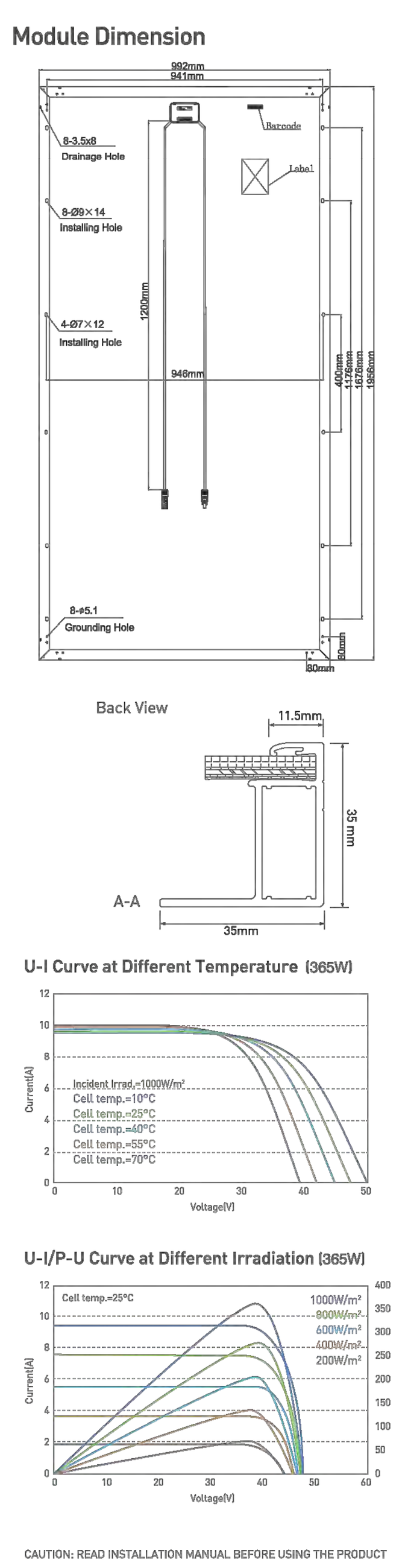
Packaging Configuration

Module per box	30 pieces
Module per 40' container	720 pieces

Optional

Connector:	☐ Original MC4

Module Dimension



Contact Us for More Information

website: en.gclsi.com email: gclsisales@gclsi.com

GCL

Bringing Green Power To Life

GCL-EN-M6/72H-2018-V2.0

A FPD1 MODULE DATA SHEET

PVI 50TL & PVI 60TL

Specifications

	PVI 50TL	PVI 60TL
DC Input		
Absolute Maximum Input Voltage	1000 VDC	1000 VDC
Maximum Power Input Voltage Range (MPPT)	480-850 VDC	540-850 VDC
Operating Voltage Range (MPPT)	200-950 VDC	200-950 VDC
Maximum Operating Input Current	108 A (36 A per MPPT)	114 A (38 A per MPPT)
Number of MPP Trackers	3	3
Maximum Available PV Current (Isc x 1.25)	204 A (68 A per MPPT)	204 A (68 A per MPPT)
Maximum PV Power	75 kW (30 kW per MPPT)	90 kW (33 kW per MPPT)
Start Voltage	330 V	330 V
AC Output		
Nominal Output Voltage	480 VAC, 3-Ph/PE/N	480 VAC, 3-Ph/PE/N
AC Voltage Range (Standard)	-12/+10%	-12/+10%
PF=1.00 - Real/Apparent Power/Output Current	50 kW / 50 kVA / 60.2 A	60 kW / 60 kVA / 72.3 A
PF=+/-0.91 - Real/Apparent Power/Output Current	50 kW / 55 kVA / 66.2 A	60 kW / 66 kVA / 79.4 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 to 0.8 lagging)	Unity, >0.99 (Adjustable 0.8 leading to 0.8 lagging)
Fault Current Contribution (1 Cycle RMS)	55 A	55 A
Total Harmonic Distortion (THD) @ Rated Load	<3%	<3%
Recommended OCPD Device	90 A	100 A
AC Surge Protection	Type II MOV, 1240Vc, 15kA Itm (8/20μ)	
Efficiency		
Peak Efficiency	99.0%	99.0%
CEC Efficiency	98.5%	98.5%
Tare Loss	< 2 W	< 2 W
Integrated String Combiner		
Fused Inputs	15 Fused Positions (5 Positions per MPPT) 15 A Standard (20, 25, 30 A accepted)**	
Temperature		
Ambient Temperature Range	-22°F to +140°F (-30°C to +60°C); Derating occurs over +122°F (+50°C)	
Storage Temperature Range	No low temp minimum to +158°F (+70°C)	
Relative Humidity (non-condensing)	0-95%	
Operating Altitude	13,123 ft (4,000 m) Derating occurs from 9,842.5 ft (3,000 m)	
Communications		
Data Logger Hardware	Standard, Internal	
SolrenView Web-Based Monitoring Service	Optional	
Revenue Grade Metering	Optional, External	
Communication Interface	RS-485 Modbus RTU	
Remote Firmware Upgrades	Standard	
Remote Diagnostics	Standard	
Features & Protections		
Arc-Fault	Standard	
Smart Grid Features	L/HVRT, L/HFRT, Volt-Var, Frequency-Watt and Volt-Watt, Soft-Start, Soft-Step	
Testing & Certifications		
Safety Listings & Certifications	UL 1741SA-2016, UL1699B, CSA-C22.2 #107.1, IEEE1547a-2014	
Advanced Grid Support Functionality	Rule 21, UL 1741SA	
Testing Agency	ETL	
FCC Compliance	FCC Part 15	
Warranty		
Standard Limited Warranty	10 Years	
Enclosure		
Acoustic Noise Rating	< 60 dBA @ 1 m at room temperature	
AC/DC Disconnect	Standard, fully-integrated	
Mounting Angle***	0-90° from horizontal (vertical, angled, flat)	
Dimensions (H x W x D)	39.4 in. x 23.6 in. x 10.2 in (1,000 mm x 600 mm x 260 mm)	
Weight	Inverter: 123.5 lbs (56 kg); Wiring Box: 33 lbs (15 kg)	
Enclosure Rating and Finish	Type 4X; Polyester Powder Coated Aluminum	

***Please inquire about compatible Module-Level Power Electronics (MLPE)**
****Yaskawa Solectria Solar does not supply optional fuses sizes**
*****Shade cover accessory required for installation of 75° or less**

SOLECTRIA SOLAR

Yaskawa Solectria Solar
360 Merrimack Street
Lawrence, MA 01843
solectria.com

1-978-683-9700
inverters@solectria.com

DOCR-070642-F | November 2018
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YASKAWA

B FPD1 INVERTER DATA SHEET

SPECIFICATIONS	PVI 14TL	PVI 20TL	PVI 23TL	PVI 28TL	PVI 36TL
DC Input					
Absolute Maximum Open Circuit Voltage	600 VDC		1000 VDC		
Operating Voltage Range	180-580 VDC	260-580 VDC	300-900 VDC		240-950 VDC
Max Power Input Voltage Range (MPPT)	300-540 VDC	300-550 VDC	500-800 VDC		540-800 VDC
MPP Trackers	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 (Isc 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
Strike Voltage	300 V		330 V		
AC Output					
Nominal Output Voltage	208 VAC, 3-Ph	480 VAC, 3-Ph			
AC Voltage Range (Standard)	-12%/+10%				
Continuous Output Power	14 kW	20 kW	23 kW	28 kW	36 kW
Maximum Output Current	39 A	25.5 A	27.7 A	33.7 A	43.5 A
Maximum Backfeed Current	0 A				
Nominal Output Frequency	60 Hz				
Output Frequency Range	59.3-60.5 Hz (adjustable 55-65 Hz)				57-63 Hz
Power Factor	Unity, >0.99 (±0.8 adjustable)	Unity, >0.99 (±0.9 adjustable)	Unity, >0.99 (±0.8 adjustable)		
Fault Current Contribution (1 Cycle RMS)	70.4 A	43.3 A	69.6 A		73.2 A
Total Harmonic Distortion (THD) @ Rated Load	< 3%				
Grid Connection Type	3ø+/N/GND (4-wire)				
Efficiency					
Peak Efficiency	96.6%	97.4%	98.6%		98.5%
CEC Efficiency	96.0%	97.0%	98.0%		
Tare Loss	4 W	2 W			
Integrated String Combiner					
Fused Positions	8 fused positions (4 positions per MPPT) 15 A (fuse by-pass available)				10 fused positions (5 positions per MPPT) 15 or 30 A (30A only for combined inputs)
Temperature					
Ambient Temperature Range	-13°F to +140°F (-25°C to +60°C) Derating occurs over +50°C		-22°F to +140°F (-30°C to +60°C) Derating occurs over +45°C		
Storage Temperature Range	-22°F to +158°F (-30°C to +70°C)				-40°F to +158°F (-40°C to +70°C)
Relative Humidity (non-condensing)	0-95%				
Operating Altitude	13,123 ft/4,000 m (derating from 6,562 ft/2,000 m)				
Data Monitoring					
Optional SolrenView Web-based Monitoring	Integrated				
Optional Revenue Grade Monitoring	External				
External Communication Interface	RS-485 Modbus RTU				
Testing & Certifications					
Safety Listings & Certifications	UL 1741/IEEE 1547, CSA C22.2#107.1, FCC part 15 B				
Testing Agency	ETL		CSA		
Warranty					
Standard	10 year				
Optional	15, 20 year; extended service agreement				
Enclosure					
dBA (Decibel) Rating	< 50 dBA @ 3 m				
AC/DC Disconnect	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)		
Weight	141 lbs (64 kg)	132 lbs (60 kg)	104 lbs (47.2 kg)		121 lbs (55kg)
Enclosure Rating	Type 4				Type 4X
Enclosure Finish	Polyester powder coated aluminum				

YASKAWA SOLECTRIA SOLAR www.solectria.com | inverters@solectria.com | 978.683.9700

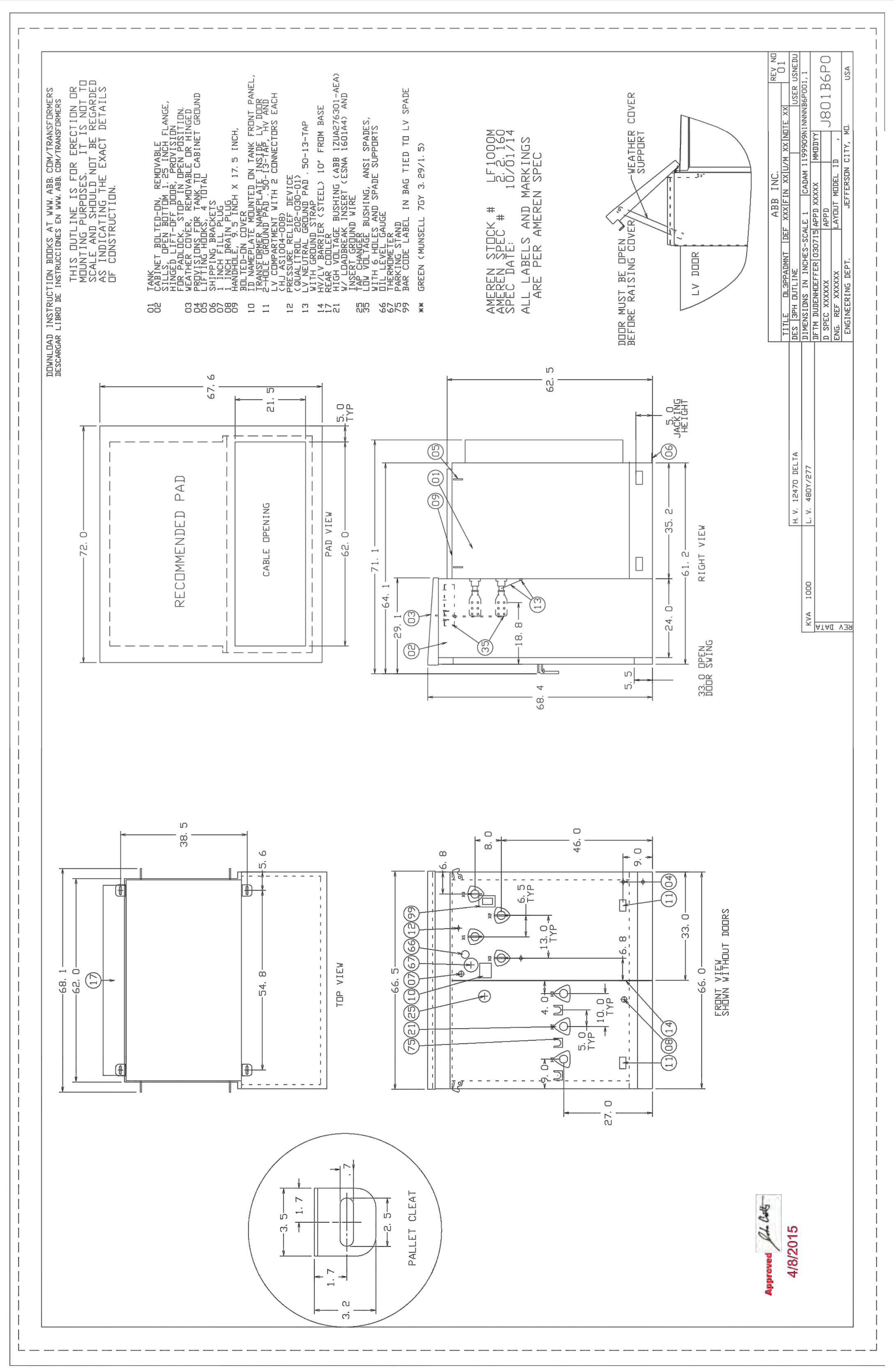
C FPD1 INVERTER DATA SHEET

SOLAR FLEXRACK — A Division of Northern States Metals

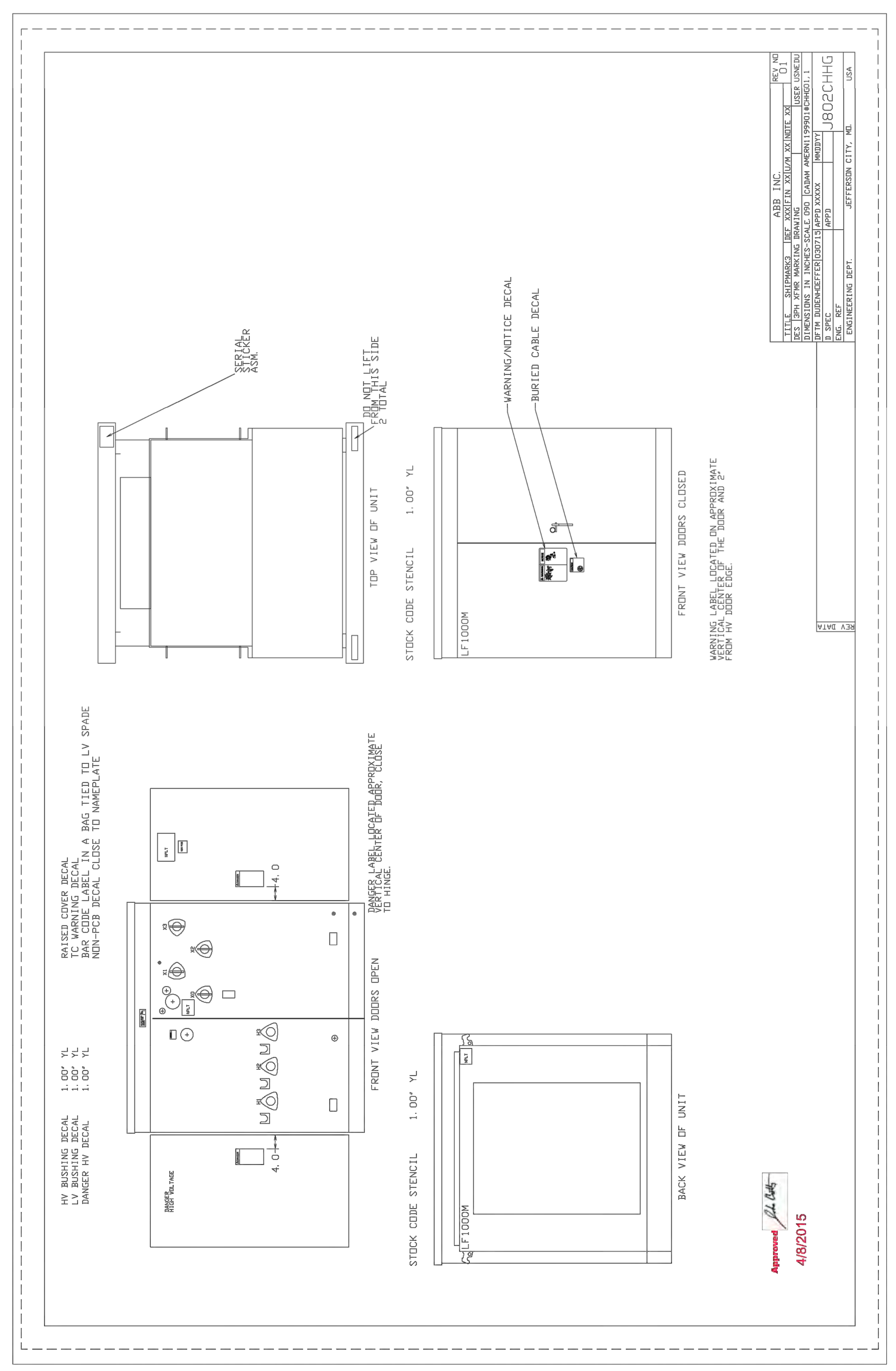
FLEXRACK SERIES G3L | Specifications

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

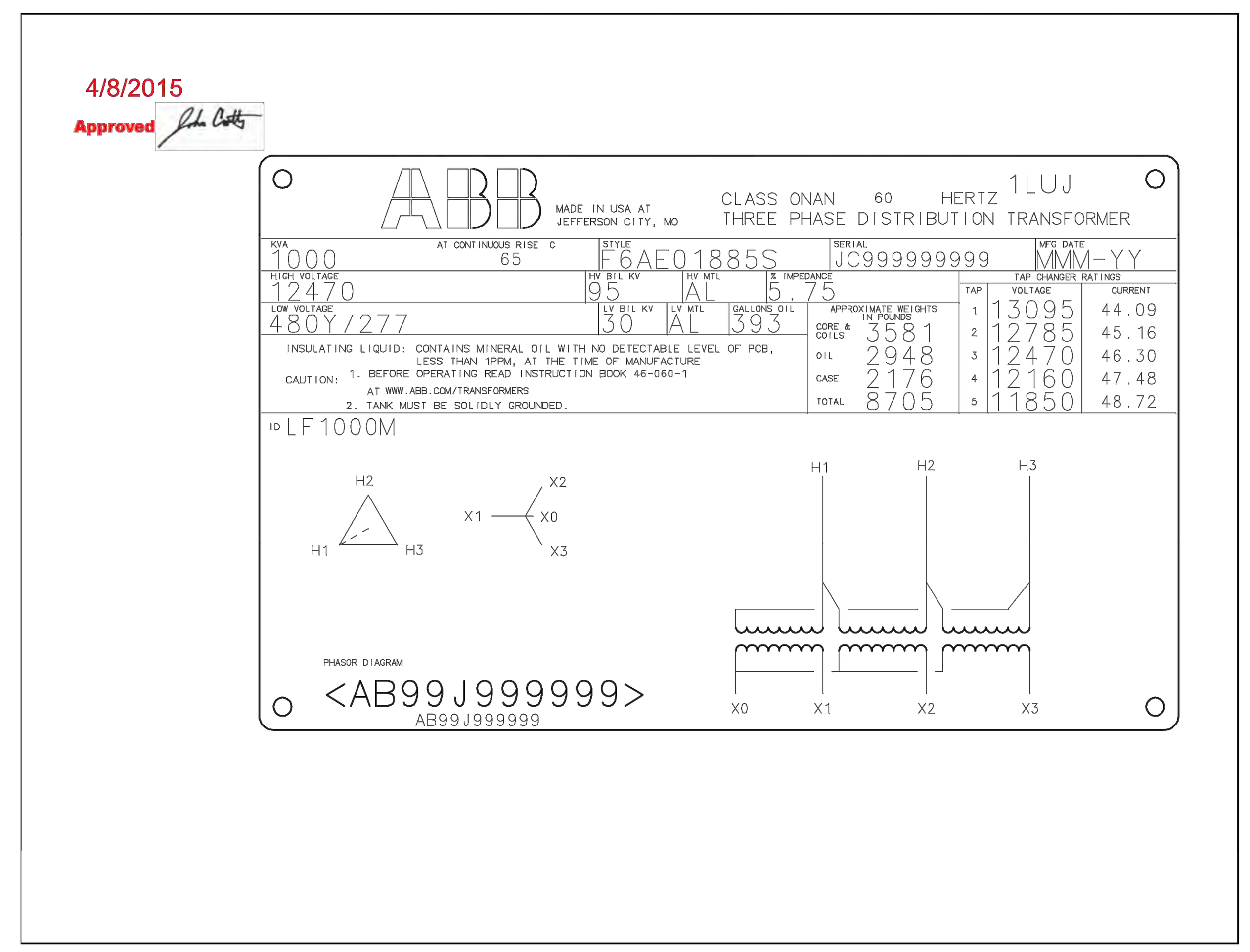
D FPD1 RACKING DATA SHEET



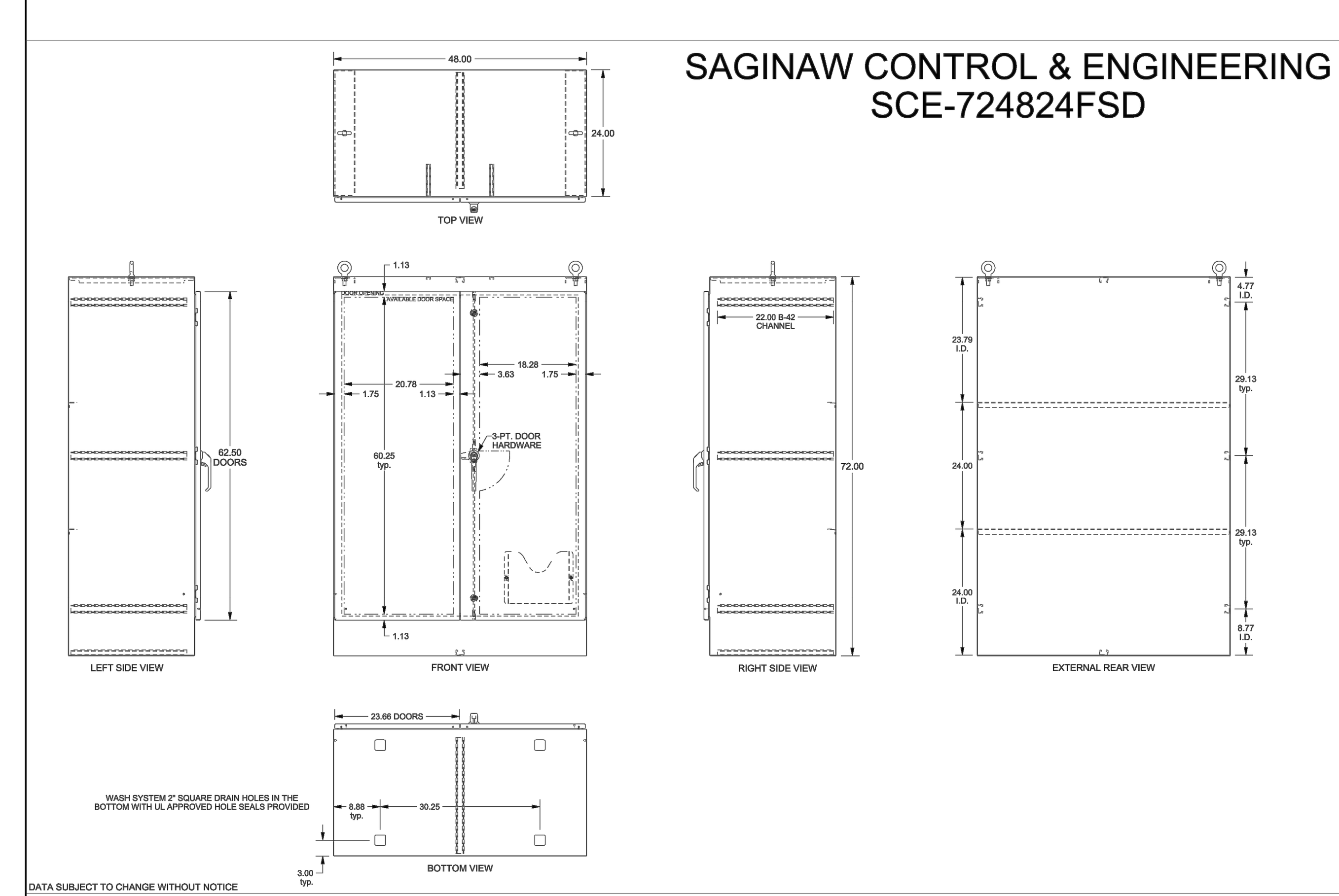
E FPD1 TRANSFORMER DATA SHEET 1



F FPD1 TRANSFORMER DATA SHEET 2



G FPD1 TRANSFORMER DATA SHEET 3



H FPD1 AMEREN SECURITY ENCLOSURE

NABCEP CERTIFIED PV Installation Professional — CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241 DANIEL STROH, EIT CERT# 042013-130

NABCEP CREDENTIALED SYSTEM INSPECTOR — CERTIFICANTS: MARC LOPATA, PE CERT# PVSI-120917-006937

STATE OF MISSOURI — MARC L. LOPATA — MAR 15 2019 — NUMBER PE-2004023353 — PROFESSIONAL ENGINEER

OPERATING DIAGRAM

NOTICE OF LIMITED RESPONSIBILITY

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

MARK UP DRAWING NO.	REV.

DATA SHEETS

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

Ameren MISSOURI

DRAWING NO. LC-DWG-FPD-000001

REVISION NO. 0

ATTACHMENT B

AMEREN COMMUNITY SOLAR (MISSOURI BOTTOMS)
AZIMUTH ENERGY
EST118387

SYMBOLS

- CONTINUATION PAGE WMXXX REFERENCE ##
- REFERENCE NOTE NUMBER ## SAME PAGE
- REFERENCE PAGE WMXXX FIGURE ##
- DEVICE OR LOCATION TAG
- CIRCUIT BREAKER
- FUSE
- ANTENNA
- MODULE TEMPERATURE SENSOR
- AMBIENT TEMPERATURE SENSOR
- WIND SPEED AND DIRECTION SENSOR
- PYRANOMETER - GLOBAL HORIZONTAL IRRADIANCE (GHI) SENSOR
- PYRANOMETER - PLANE OF ARRAY (POA) SENSOR
- REFERENCE CELL - PLANE OF ARRAY
- PRECIPITATION SENSOR
- RELATIVE HUMIDITY SENSOR
- BAROMETRIC PRESSURE SENSOR

PROJECT DESCRIPTION

SITE NAME	AMEREN COMMUNITY SOLAR (MISSOURI BOTTOMS)
SITE ADDRESS	11519 MISSOURI BOTTOM ROAD, ST. LOUIS, MO 63145, UNITED STATES
SITE OWNER	AZIMUTH ENERGY
EPC NAME	-
SYSTEM SIZE	1080 KW DC
SYSTEM TYPE	MONITORING/STANDARD
TECH CONTACT NAME	AZIMUTH ENERGY - CORY BRENNAN
TECH CONTACT EMAIL	CORY@AZIMUTH.ENERGY
TECH CONTACT PHONE	618.691.9123
ALSOENERGY SALES REP.	ELI TIFFAULT
ALSOENERGY ACCT. MGR.	SARAH MARGOLIN-ROSS

TECHNICAL SUPPORT

SUPPORT CONTACTS: 866-303-5668 SUPPORT@ALSOENERGY.COM
WEEKDAYS/(M-F): 8AM-6PM US-ET, WEEKENDS: 11AM-7PM US-ET

CONTACT YOUR ACCOUNT REPRESENTATIVE TO PURCHASE ON-SITE COMMISSIONING OR ONSITESERVICE@ALSOENERGY.COM TO SCHEDULE PREVIOUSLY PURCHASED SERVICES.

SHEET INDEX

⚠ WARNINGS / AVERTISSEMENTS ⚠

[EN] LINE VOLTAGES UP TO 600 VRMS ARE PRESENT ON THE INPUT TERMINALS OF THE DEVICE AND THROUGHOUT THE CONNECTED LINE CIRCUITS DURING NORMAL OPERATION. THESE VOLTAGES MAY CAUSE SEVERE INJURY OR DEATH. INSTALLATION AND SERVICING SHOULD BE PERFORMED ONLY BY QUALIFIED, PROPERLY TRAINED PERSONNEL. THIS IS A CLASS B MEASUREMENT DEVICE.

[FR] DES TENSIONS DE LIGNE JUSQU'À 600 VRMS SONT PRÉSENTES SUR LES BORNES D'ENTRÉE DE L'APPAREIL ET DANS TOUS LES CIRCUITS DE LIGNE RACCORDÉS PENDANT LE FONCTIONNEMENT NORMAL. CES TENSIONS PEUVENT CAUSER DES BLESSURES GRAVES OU LA MORT. L'INSTALLATION ET L'ENTRETIEN DOIVENT ÊTRE EFFECTUÉS UNIQUEMENT PAR DU PERSONNEL QUALIFIÉ ET CORRECTEMENT FORMÉ. CECI EST UN APPAREIL DE MESURE DE CLASSE III.

ABBREVIATIONS

A	AMPS	MCE	MAIN COMMUNICATION ENCLOSURE
AC	ALTERNATING CURRENT	MIN	MINIMUM
ACD	AC DISCONNECT	MV	MEDIUM VOLTAGE
AWG	AMERICAN WIRE GAUGE	NEC	NATIONAL ELECTRIC CODE
C	CELSIUS	NEG	NEGATIVE
CB	CIRCUIT BREAKER	OCP	OVERCURRENT PROTECTION
CT	CURRENT TRANSFORMER	OD	OUTSIDE DIAMETER
CU	COPPER	POA	PLANE OF ARRAY
DAS	DATA ACQUISITION SYSTEM	PB	PANELBOARD
DC	DIRECT CURRENT	PCC/PCCC	POINT OF COMMON COUPLING
DCD	DC DISCONNECT	POS	POSITIVE
DISC	DISCONNECT	PV	PHOTOVOLTAIC
EGC	EQUIPMENT GROUNDING CONDUCTOR	SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
F	FAHRENHEIT	SCH	SCHEDULE
FO	FIBER OPTIC	TYP	TYPICAL
GHI	GLOBAL HORIZONTAL IRRADIANCE	UL	UNDERWRITERS LABORATORIES
GND	GROUND	V	VOLTS
HV	HIGH VOLTAGE	VAC	VOLTS AC
ID	INSIDE DIAMETER	VAR	VOLT-AMPERE REACTIVE
INV	INVERTER	VDC	VOLTS DC
JB	JUNCTION BOX	W	WATTS
KV	KILOVOLT	WS	WEATHER STATION
KW	KILOWATT	XFMR	TRANSFORMER
KWH	KILOWATT-HOUR		
LV	LOW VOLTAGE		
MAX	MAXIMUM		

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH APPLICABLE CODE.
2. THIS SYSTEM HAS BEEN DESIGNED TO ALSOENERGY SPECIFICATIONS. MODIFICATIONS MADE TO THE SYSTEM MAY CAUSE IMPROPER OPERATION UNLESS YOU NOTIFY ALSOENERGY OF THE CHANGES.
3. INTERNAL DEVICES ARE SUPPLIED PRE-WIRED BY ALSO ENERGY WITH IP AND MODBUS ADDRESSING CONFIGURED.
4. THE RS-485 BUS USES DAISY-CHAINED CONFIGURATION FOR ALL DEVICES, I.E. NO MORE THAN TWO WIRES ON ANY TERMINAL.
5. FOR RS-485 CONNECTIONS, GROUND THE DRAIN WIRE OF THE SHIELDED CABLE AT ONE END ONLY. DO NOT GROUND THE DRAIN WIRE AT BOTH ENDS OF A CABLE RUN.
6. RS-485 CABLE SHALL MEET OR EXCEED BELDEN 3106A SPECIFICATIONS. 4000FT (1220M) MAX LENGTH PER BUS, 1000FT (305M) MAX BETWEEN EACH DEVICE.
7. ETHERNET NETWORK CABLE (CAT5E or CAT6) SHALL MEET OR EXCEED BELDEN 7919A SPECIFICATIONS, 300FT (90M) MAX BETWEEN EACH ACTIVE DEVICE.
8. SINGLE MODE FIBER CABLE WILL BE OS2 WITH LC CONNECTORS.
9. MULTI-MODE FIBER CABLE WILL BE 50/125µm OR 62.5/125µm WITH SC CONNECTORS. (PRE-TERMINATED WITH PULL RING RECOMMENDED FOR EASE OF INSTALL)
10. SENSOR CABLES ARE CALIBRATED. LENGTH SHOULD NOT BE MODIFIED WITHOUT APPROVAL FROM ALSOENERGY.
11. RADIO CONNECTIONS MUST BE LINE OF SIGHT.
12. WARRANTY IS VOID IF HOLES ARE MADE ANYWHERE OTHER THAN BOTTOM OF ENCLOSURE OR IF BOTTOM HOLES ARE MADE WITHIN 1" (25.4MM) OF EDGES.

AlsoEnergy
Boulder, CO 80301
866-303-5668 USA
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DRAWN BY: AK
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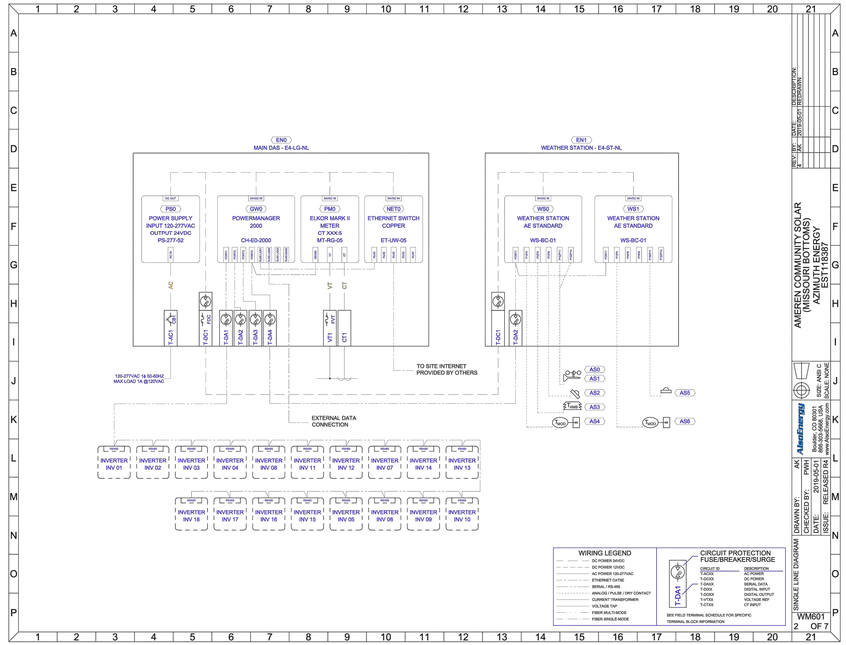
DATE: 2019-05-01
ISSUE: RELEASED R4

COVER SHEET
WM043
1 OF 7

1 / FPD2 ALSO ENERGY DETAILS: COVERR SHEET



2 / FPD2 ALSO ENERGY DETAILS: SINGLE LINE DIAGRAM

DEVICE	ID	DESCRIPTION	COMMUNICATIONS PROTOCOL	COMMUNICATION PORT / CHANNEL	MASTER	UNIT ID	IP ADDRESS	SUPPLIER
DATALOGGER AND GATEWAY	GW0	POWERMANAGER 2000	TCP/IP	LAN1	POWERTRACK	-	STATIC TBD	ALSOENERGY
PRODUCTION METER	PM0	ELKOR MARK II	MODBUS RTU	T-DA4	GW0	41	-	ALSOENERGY
INVERTER 1	PV0	SOLECTRIA PVI-60TL-480	MODBUS RTU	T-DA1	GW0	51	-	BY OTHERS
INVERTER 2	PV1	SOLECTRIA PVI-60TL-480	MODBUS RTU	T-DA1	GW0	52	-	BY OTHERS
INVERTER 3	PV2	SOLECTRIA PVI-60TL-480	MODBUS RTU	T-DA1	GW0	53	-	BY OTHERS
INVERTER 4	PV3	SOLECTRIA PVI-60TL-480	MODBUS RTU	T-DA1	GW0	54	-	BY OTHERS
INVERTER 5	PV4	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	55	-	BY OTHERS
INVERTER 6	PV5	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	56	-	BY OTHERS
INVERTER 7	PV6	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	57	-	BY OTHERS
INVERTER 8	PV7	SOLECTRIA PVI-36TL-480	MODBUS RTU	T-DA1	GW0	58	-	BY OTHERS
INVERTER 9	PV8	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	59	-	BY OTHERS
INVERTER 10	PV9	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	60	-	BY OTHERS
INVERTER 11	PV10	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	61	-	BY OTHERS
INVERTER 12	PV11	SOLECTRIA PVI-36TL-480	MODBUS RTU	T-DA1	GW0	62	-	BY OTHERS
INVERTER 13	PV12	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	63	-	BY OTHERS
INVERTER 14	PV13	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	64	-	BY OTHERS
INVERTER 15	PV14	SOLECTRIA PVI-50TL-480	MODBUS RTU	T-DA1	GW0	65	-	BY OTHERS
INVERTER 16	PV15	SOLECTRIA PVI-60TL-480	MODBUS RTU	T-DA1	GW0	66	-	BY OTHERS
INVERTER 17	PV16	SOLECTRIA PVI-60TL-480	MODBUS RTU	T-DA1	GW0	67	-	BY OTHERS
INVERTER 18	PV17	SOLECTRIA PVI-60TL-480	MODBUS RTU	T-DA1	GW0	68	-	BY OTHERS
WEATHER STATION 1	WS0	ALSOENERGY WEATHER STATION	MODBUS RTU	T-DA4	GW0	16	-	ALSOENERGY
WEATHER STATION 2	WS1	ALSOENERGY WEATHER STATION	MODBUS RTU	T-DA4	GW0	17	-	ALSOENERGY
WIND SPEED	AS0	DAVIS ANEMOMETER	ANALOG PULSE	P12 / P14	WS0	-	-	ALSOENERGY
WIND DIRECTION	AS1	DAVIS ANEMOMETER	ANALOG mV	P10 / P11	WS0	-	-	ALSOENERGY
POA PYRANOMETER	AS2	APOGEE	ANALOG mV	P7 / P8	WS0	-	-	ALSOENERGY
AMBIENT TEMP	AS3	BAPI AMBIENT	ANALOG mA	P2 / P6	WS0	-	-	ALSOENERGY
MODULE TEMPERATURE 1	AS4	BAPI MODULE	ANALOG mA	P1 / P4	WS0	-	-	ALSOENERGY
GHI PYRANOMETER	AS5	APOGEE	ANALOG mV	P10 / P11	WS1	-	-	ALSOENERGY
MODULE TEMPERATURE 2	AS6	BAPI MODULE	ANALOG mA	P1 / P4	WS1	-	-	ALSOENERGY

STATIC IP ADDRESSES ARE REQUIRED AS INDICATED FOR DEVICE COMMUNICATION.
THE FOLLOWING ARE REQUIRED FOR SITE COMMUNICATION:
- DEFAULT GATEWAY.
- SUBNET MASK.
- STATIC IP FOR ALL DEVICES INDICATED IN THE COMMUNICATIONS SCHEDULE.

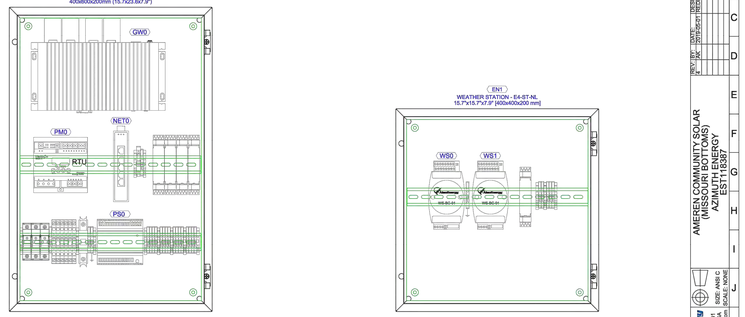
FIELD TERMINALS		
ID	TB#	SIGNAL
T-AC1	1	INPUT POWER LINE 120-277VAC
	4	INPUT POWER NEUTRAL
T-DC1	5	EGC
	6	DC POWER +24VDC
	7	DC POWER COMMON
T-DA1	10	RS485 COMMON
	11	RS485 DATA+
	12	RS485 DATA-
	13	RS485 SHIELD
T-DA2	14	RS485 COMMON
	15	RS485 DATA+
	16	RS485 DATA-
	17	RS485 SHIELD
T-DA3	20	RS485 COMMON
	21	RS485 DATA+
	22	RS485 DATA-
	23	RS485 SHIELD
T-DA4	24	RS485 COMMON
	25	RS485 DATA+
	26	RS485 DATA-
	27	RS485 SHIELD
T-VT1	40	VT PHASE A
	41	VT PHASE B
	42	VT PHASE C
T-CT1	43	VT NEUTRAL
	44	CT PHASE A X1
	45	CT PHASE A X2
	46	CT PHASE B X1
	47	CT PHASE B X2
	48	CT PHASE C X1
	49	CT PHASE C X2

LAN1	
GATEWAY	TBD
SUBNET MASK	TBD

FUSE / BREAKER TABLE		
ID	TYPE	RATING
FVT	CLASS CC	0.6A
FDC	5X20mm FAST FUSE	4A
CB1	SINGLE POLE CIRCUIT BREAKER - DC RATED	6A

SCHEDULES
WM621
3 OF 7

3 / FPD2 ALSO ENERGY DETAILS: SCHEDULES



ID	PART NUMBER	DESCRIPTION	SUPPLIED BY
END	E4-LG-NL	NEMA 4 ENCLOSURE - 24"X16"X8"	ALSOENERGY
GW0	CH-E0-2000	INDUSTRIAL DATA LOGGER	ALSOENERGY
PS0	PS-277-52	DC POWER SUPPLY - INPUT 120-277VAC - OUTPUT 24VDC 52W MAX	ALSOENERGY
PM0	MT-RG-05	REVENUE GRADE ENERGY METER	ALSOENERGY
NET0	ET-UW-05	INDUSTRIAL ETHERNET SWITCH - 5 COPPER RJ45	ALSOENERGY
ALL OTHER INTERNAL COMPONENTS INCLUDING CABLES, CONDUCTORS, TERMINAL BLOCKS, DIN RAIL AND PROTECTIVE DEVICES TO BE SUPPLIED BY ALSOENERGY			

ID	PART NUMBER	DESCRIPTION	SUPPLIED BY
EN1	E4-ST-NL	NEMA 4 ENCLOSURE - 16"X16"X8"	ALSOENERGY
WS0	WS-BC-01	ALSOENERGY INTEGRATED WEATHER STATION - 4 ANALOG, 2 PULSE INPUTS	ALSOENERGY
WS1	WS-BC-01	ALSOENERGY INTEGRATED WEATHER STATION - 4 ANALOG, 2 PULSE INPUTS	ALSOENERGY
ALL OTHER INTERNAL COMPONENTS INCLUDING CABLES, CONDUCTORS, TERMINAL BLOCKS, DIN RAIL AND PROTECTIVE DEVICES TO BE SUPPLIED BY ALSOENERGY			

PANEL LAYOUT
WM651
4 OF 7

4 / FPD2 ALSO ENERGY DETAILS: PANEL LAYOUT

NABCEP CERTIFIED PV Installation Professional

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

NABCEP CREDENTIALED SYSTEM INSPECTION

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

STATE OF MISSOURI
MARC L. LOPATA
MAR 15 2019
NUMBER PE-2004023353
PROFESSIONAL ENGINEER

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 ADDENDUMS OR OTHER DOCUMENTS ASSOCIATED WITH THE PROJECT WHICH DO NOT BEAR HIS/HER SEAL, SIGNATURE OR INITIALS.

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

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

MONITORING DETAILS

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

DRAWING RECORD

REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	3/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

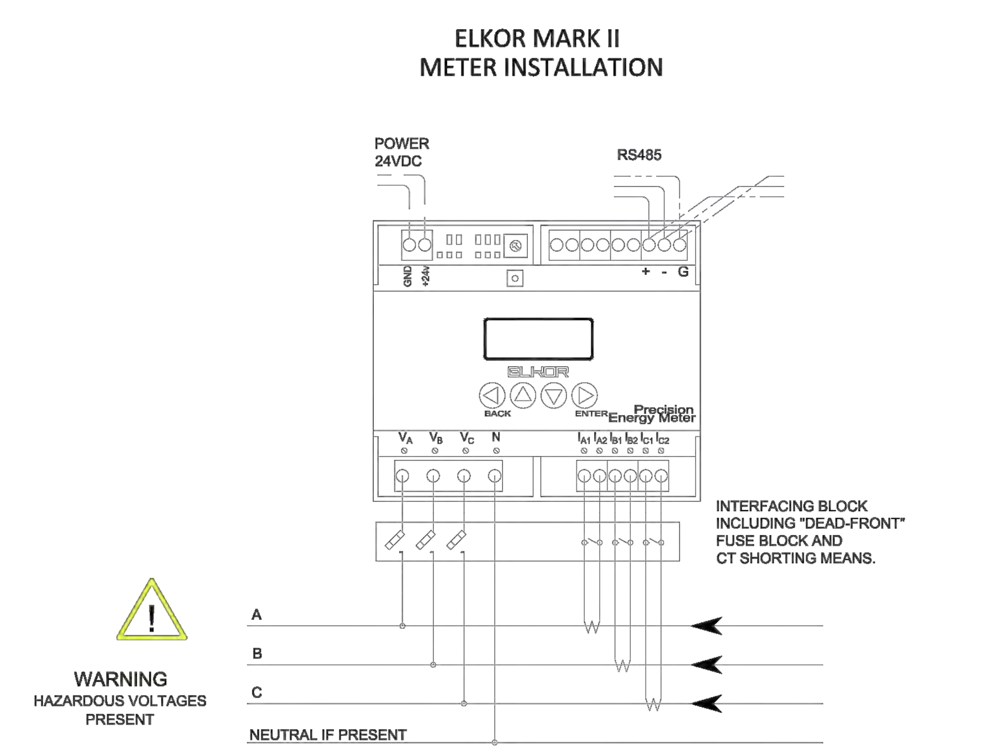
Ameren MISSOURI

DRAWING NO.
LC-DWG-FPD-000002
REVISION NO. 0

ATTACHMENT B

1 ALSO ENERGY DETAILS: DETAIL ELKOR METER (FPD3)

ELKOR MARK II METER INSTALLATION

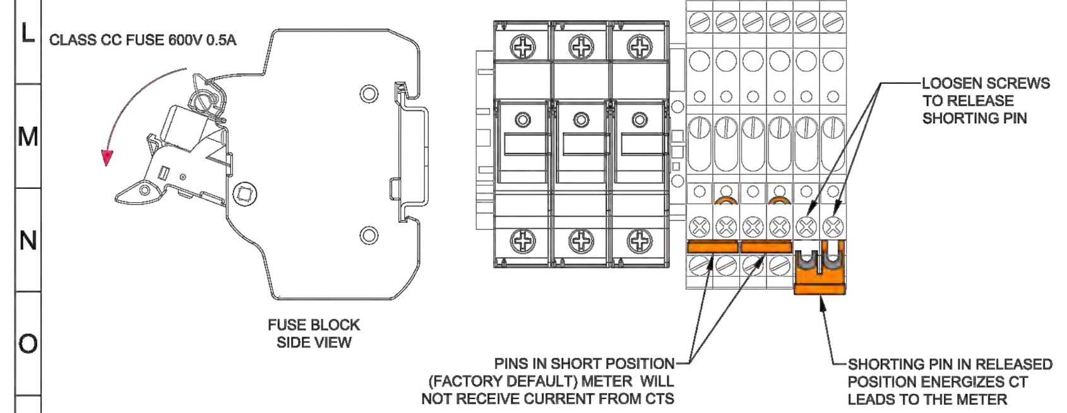


INTERFACING BLOCK

CT SHORTING PINS ARE USED TO DE-ENERGIZE CT LEADS INTO THE METER. ENCLOSURES ARE SHIPPED WITH PINS IN THE SHORTED POSITION FOR INSTALLATION. AFTER CT LEADS HAVE BEEN CONNECTED THE PINS MUST BE RELEASED FOR PROPER METER OPERATION.

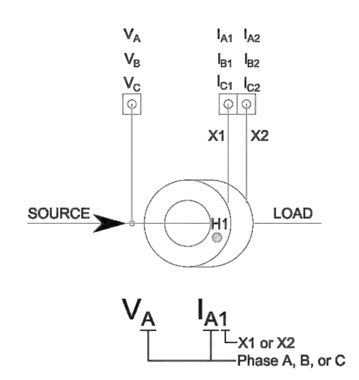
PULL DOWN TABS ON THE DEAD-FRONT FUSE BLOCK TO RELEASE FUSES AND DISCONNECT VOLTAGE TAPS AT THE BLOCK.

IMPORTANT: CTS ARE ENERGIZED EVEN IF SHORTING PINS ARE ENGAGED, ALWAYS DE-ENERGIZE FEEDER BEFORE INSTALLING OR DISCONNECTING CTS.



METER TERMINAL BLOCKS					
FIRST METER		SECOND METER		THIRD METER	
TERMINAL BLOCK #	SIGNAL	TERMINAL BLOCK #	SIGNAL	TERMINAL BLOCK #	SIGNAL
40	VOLTAGE PHASE A	50	VOLTAGE PHASE A	60	VOLTAGE PHASE A
41	VOLTAGE PHASE B	51	VOLTAGE PHASE B	61	VOLTAGE PHASE B
42	VOLTAGE PHASE C	52	VOLTAGE PHASE C	62	VOLTAGE PHASE C
43	VOLTAGE NEUTRAL (IF PRESENT)	53	VOLTAGE NEUTRAL (IF PRESENT)	63	VOLTAGE NEUTRAL (IF PRESENT)
44	CT X1 PHASE A	54	CT X1 PHASE A	64	CT X1 PHASE A
45	CT X2 PHASE A	55	CT X2 PHASE A	65	CT X2 PHASE A
46	CT X1 PHASE B	56	CT X1 PHASE B	66	CT X1 PHASE B
47	CT X2 PHASE B	57	CT X2 PHASE B	67	CT X2 PHASE B
48	CT X1 PHASE C	58	CT X1 PHASE C	68	CT X1 PHASE C
49	CT X2 PHASE C	59	CT X2 PHASE C	69	CT X2 PHASE C

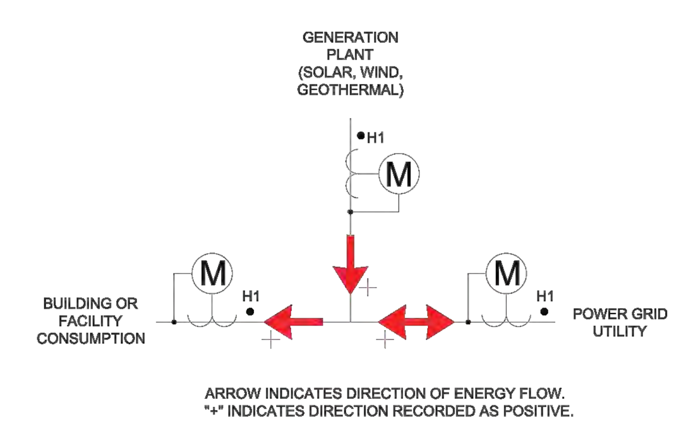
VOLTAGE TAP AND CURRENT TRANSFORMER INSTALLATION



- MOUNT CT SO THAT DOT OR "H1" MARK FACES THE ENERGY SOURCE. FOR GENERATION SYSTEMS THIS WILL BE THE SOLAR ARRAY OR SIMILAR GENERATION SOURCE SO THAT ENERGY GENERATED IS MEASURED AS POSITIVE. FOR CONSUMPTION OR NET METERS THE MARK WILL POINT TOWARDS THE GRID SO THAT ENERGY SUPPLIED FROM THE GRID IS MEASURED AS POSITIVE.
- VOLTAGE TAPS AND CTS ARE PHASE-SPECIFIC AND MUST BE MATCHED WHEN CONNECTING TO THE METER. THE VOLTAGE TAP "V_A" MUST CONNECT TO THE SAME PHASE THAT IS BEING MEASURED BY THE CT CONNECTED TO "I_{A1}" AND "I_{A2}". SIMILARLY "V_B" IS ASSOCIATED WITH "I_{B1}" AND "I_{B2}" AND "V_C" WITH "I_{C1}" AND "I_{C2}".
- OBSERVE CORRECT POLARITY OF CT LEADS. X1 AND X2 WILL BE LABELED OR COLOR CODED BY THE CT MANUFACTURER, SEE MANUFACTURER DATA SHEET FOR SPECIFIC CT INFORMATION.

ORIENT CT DOT OR "H1" MARK TOWARDS THE ENERGY SOURCE.

- PRODUCTION / GENERATION METER - MEASURES ENERGY PRODUCED BY SOLAR PLANT OR OTHER GENERATION SOURCE, CT MARK POINTS TOWARD THE GENERATION SOURCE.
- NET/ GRID / UTILITY METER - MEASURES ENERGY RECEIVED AND DELIVERED, CT MARK POINTS TOWARDS THE GRID.ENERGY IS REPORTED AS POSITIVE WHEN IT IS CONSUMED FROM THE GRID AND NEGATIVE WHEN GENERATION EXCEEDS DEMAND AND ENERGY IS RETURNED TO THE GRID.
- CONSUMPTION / DEMAND METER - MEASURES ENERGY CONSUMED BY BUILDING AND FACILITY LOADS, CT MARK POINTS TOWARD THE GRID.



AMEREN COMMUNITY SOLAR (MISSOURI BOTTOMS) AZIMUTH ENERGY EST118387

REV: 4 BY: AK DATE: 2019-05-01 DESCRIPTION: REDRAWN

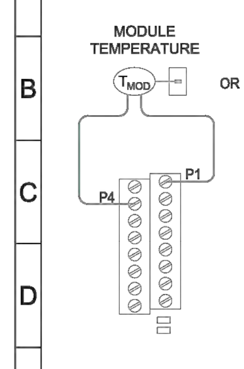
SIZE: ANSI C SCALE: NONE

AlsoEnergy Boulder, CO 80301 866-303-5668, USA www.AlsoEnergy.com

DRAWN BY: AK CHECKED BY: PWH DATE: 2019-05-01 ISSUE: RELEASED R4

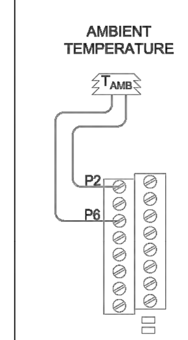
DETAIL ELKOR METER WM701 5 OF 7

2 ALSO ENERGY DETAILS: DETAIL ALSO ENERGY WEATHER STATION (FPD3)



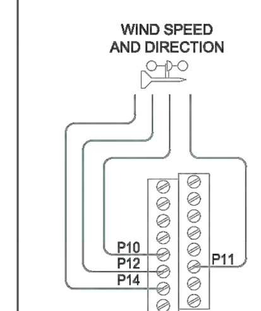
- MOUNT THE BAPI MODULE TEMPERATURE ENCLOSURE AND EXTEND THE MODULE TEMPERATURE SENSOR TO THE CENTER OF A CELL IN THE MIDDLE OF A MODULE ON THE BACK SIDE. MAKE SURE THE ADHESIVE USED FOR THE SENSOR MODULE IS RATED FOR UP TO 180° F. ALSOENERGY RECOMMENDS HIGH TEMPERATURE EPOXY. PLUG ANY HOLES IN THE BAPI ENCLOSURE TO MAKE IT WEATHER TIGHT.
- DO NOT SPLICE OR EXTEND THE WIRE BETWEEN THE SENSOR AND THE BAPI ENCLOSURE, IT HAS BEEN CALIBRATED TO PROVIDE ACCURATE MEASUREMENTS. THE WIRE LEADING TO THE WEATHER STATION FROM THE BAPI ENCLOSURE CAN BE EXTENDED UP TO 500FT USING 22AWG WIRE.
- MOUNT THE BAPI RELATIVE HUMIDITY ENCLOSURE OUTDOORS WITH THE SENSOR POINTING DOWN. PLUG ANY HOLES IN THE ENCLOSURE TO MAKE IT WEATHER-TIGHT. INSIDE THE COVER ARE RED AND BLACK WIRES WHICH MUST BE EXTENDED TO THE WEATHER STATION ENCLOSURE. ALSOENERGY RECOMMENDS USING OUTDOOR SHIELDED CAT 5, AND SPLICING WITH *FILLED* 3M SCOTCHLOK CONNECTORS. CONNECT HUMIDITY SENSOR WIRES TO THE TERMINALS ON THE WEATHER STATION PER THE TABLE BELOW.

DEVICE	MODULE TEMPERATURE		RELATIVE HUMIDITY	
PIN	P1	P4	P1	P4
WIRE COLOR	RED	BLACK	RED	BLACK



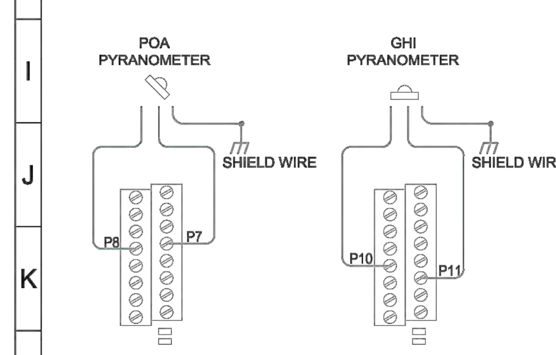
- MOUNT THE BAPI ENCLOSURE OUTDOORS IN A NORTH-FACING, ALWAYS-SHADED LOCATION WITH THE SENSOR POINTING DOWN. PLUG ANY HOLES IN THE ENCLOSURE TO MAKE IT WEATHER TIGHT. INSIDE THE COVER ARE RED AND BLACK WIRES WHICH MUST BE EXTENDED TO THE WEATHER STATION ENCLOSURE. ALSOENERGY RECOMMENDS USING OUTDOOR SHIELDED CAT 5, AND SPLICING WITH *FILLED* 3M SCOTCHLOK CONNECTORS. CONNECT TEMP SENSOR WIRES TO THE TERMINALS ON THE WEATHER STATION PER THE TABLE BELOW.
- DO NOT SPLICE OR EXTEND THE WIRE BETWEEN THE SENSOR AND THE BAPI ENCLOSURE, IT HAS BEEN CALIBRATED TO PROVIDE ACCURATE MEASUREMENTS. THE WIRE LEADING TO THE WEATHER STATION FROM THE BAPI ENCLOSURE CAN BE EXTENDED UP TO 500FT USING 22AWG WIRE.
- THIS BAROMETRIC PRESSURE SENSOR IS DESIGNED TO BE MOUNTED INDOORS, AND WILL BE MOUNTED AND WIRED IN THE WEATHER STATION ENCLOSURE PRIOR TO SHIPPING.
- IF THE BAROMETRIC PRESSURE SENSOR IS FIELD INSTALLED, CONNECT THE SENSOR WIRES TO THE TERMINALS ON THE WEATHER STATION PER THE TABLE BELOW.

DEVICE	AMBIENT TEMPERATURE		SECONDARY MODULE TEMPERATURE		BAROMETRIC PRESSURE	
PIN	P2	P6	P2	P6	P2	P6
WIRE COLOR	RED	BLACK	RED	BLACK	RED	WHITE



- FOLLOW THE DIRECTIONS THAT COME WITH THE ANEMOMETER TO ASSEMBLE AND MOUNT THE SENSOR. MAKE SURE TO POSITION THE ANEMOMETER MOUNT POINTING TRUE NORTH ADJUSTING FOR MAGNETIC DECLINATION. CONNECT THE ANEMOMETER TO THE CORRECT TERMINALS ON THE WEATHER STATION PER THE TABLE BELOW.

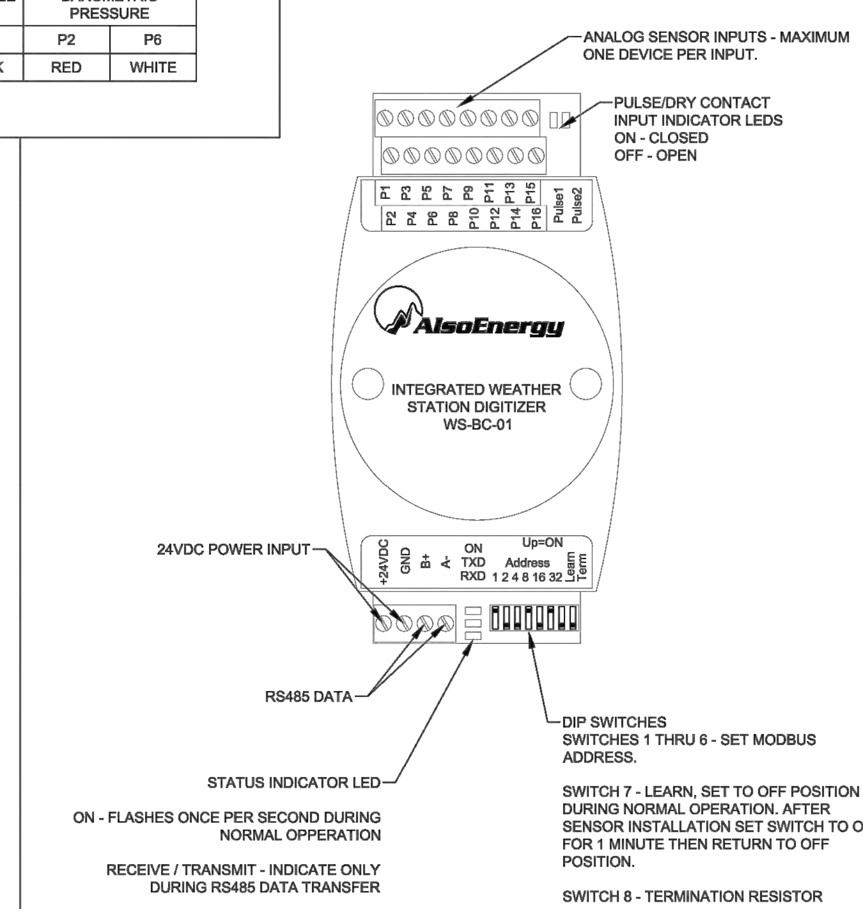
DEVICE	WIND DIRECTION		WIND SPEED	
PIN	P10	P11	P12	P14
WIRE COLOR	GREEN	RED	YELLOW	BLACK



- MOUNT THE PYRANOMETER USING THE INCLUDED BRACKETS AND MOUNTING HARDWARE WITH THE WIRE POINTING NORTH. CONNECT SENSOR LEADS TO THE CORRECT TERMINALS ON WEATHER STATION PER TO THE TABLE BELOW.
- PLANE OF ARRAY (POA) - MOUNT THE PYRANOMETER ON TOP OF THE NORTH SIDE OF THE ARRAY AT THE SAME ANGLE AS THE PANELS. THE PYRANOMETER MUST NOT BE SHADED AT ANY TIME OF THE DAY.
- GLOBAL HORIZONTAL IRRADIANCE (GHI) - MOUNT THE PYRANOMETER ABOVE ANY SURROUNDING OBSTRUCTIONS TO PREVENT SHADING AND AWAY FROM ANY LIGHT-COLORED OR REFLECTIVE WALLS. ENSURE THAT THE PYRANOMETER IS LEVEL IN ALL DIRECTIONS.

POA PYRANOMETER											
MAKE	APOGEE			KIPP AND ZONEN - CMP			HUKSEFLUX			LI-COR	
PIN	P7	P8	EGC	P7	P8	EGC	P7	P8	EGC	P7	P8
WIRE COLOR	BLACK	RED	CLEAR	BLUE	RED	BLACK	GREEN	WHITE	BLACK	CLEAR	BRAID

GHI PYRANOMETER											
MAKE	APOGEE			KIPP AND ZONEN - CMP			HUKSEFLUX			LI-COR	
PIN	P11	P10	EGC	P11	P10	EGC	P11	P10	EGC	P11	P10
WIRE COLOR	BLACK	RED	CLEAR	BLUE	RED	BLACK	GREEN	WHITE	BLACK	CLEAR	BRAID



AMEREN COMMUNITY SOLAR (MISSOURI BOTTOMS) AZIMUTH ENERGY EST118387

REV: 4 BY: AK DATE: 2019-05-01 DESCRIPTION: REDRAWN

SIZE: ANSI C SCALE: NONE

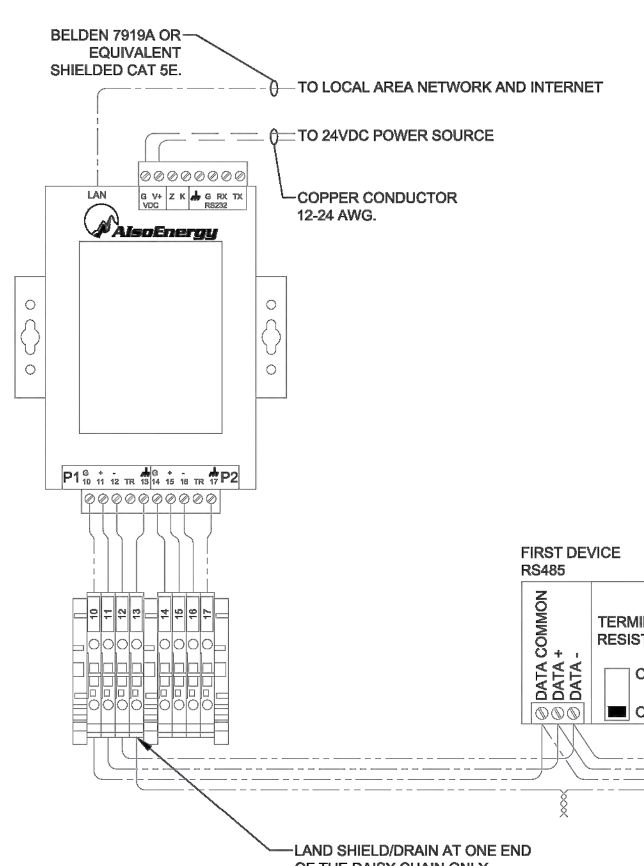
AlsoEnergy Boulder, CO 80301 866-303-5668, USA www.AlsoEnergy.com

DRAWN BY: AK CHECKED BY: PWH DATE: 2019-05-01 ISSUE: RELEASED R4

DETAIL ALSOENERGY WEATHER STATION WM702 6 OF 7

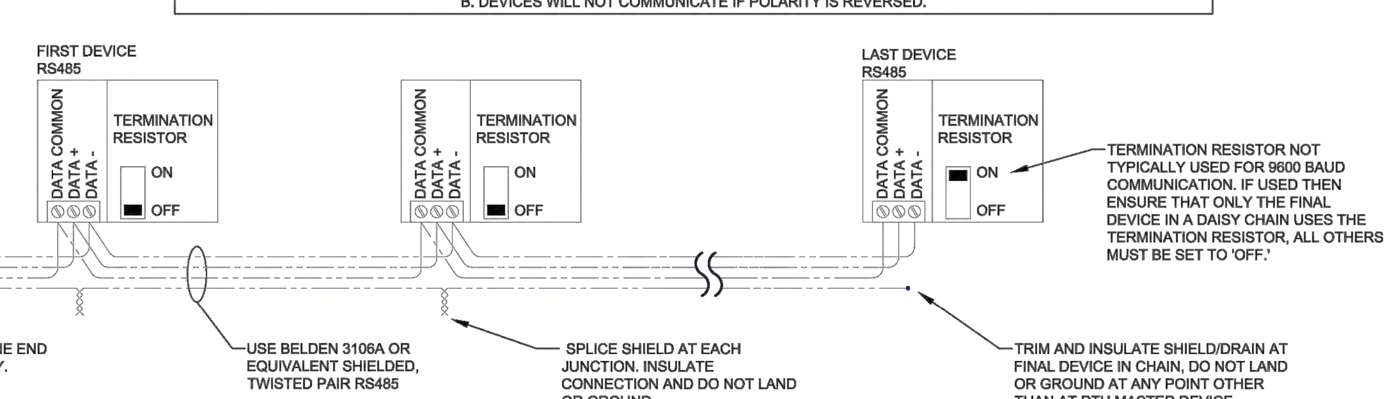
3 ALSO ENERGY DETAILS: DETAIL RS485 WIRING (FPD3)

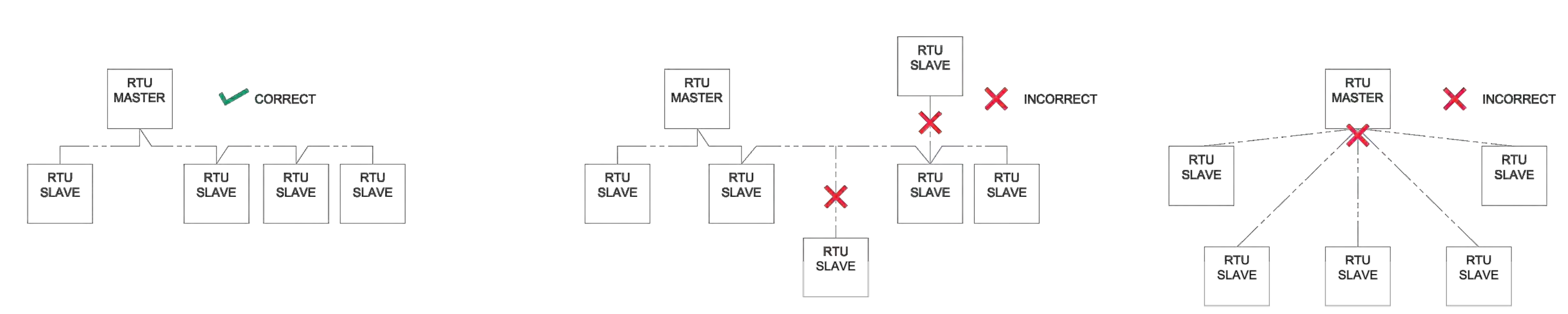
RS485 WIRING



- EACH RS485 BUS MAY SUPPORT A SINGLE DAISY CHAIN. DO NOT WIRE AS A STAR CONFIGURATION AND ENSURE THAT ALL STUBS ARE LESS THAN 50 FEET. IRREGULAR COMMUNICATION AND DATA LOSS MAY RESULT IF COMMUNICATION LINES ARE NOT WIRED IN A DAISY CHAIN TOPOLOGY.
- THE MAXIMUM DISTANCE BETWEEN DEVICES IS 1000 FEET AND THE TOTAL LENGTH OF THE DAISY CHAIN SHOULD NOT EXCEED 4000 FEET.
- ALSOENERGY RECOMMENDS THAT NO MORE THAN 20 DEVICES BE CONNECTED TO A SINGLE RS485 BUS.
- EACH DEVICE ON A BUS MUST HAVE A UNIQUE ADDRESS.
- AVOID CONNECTING DEVICES USING DIFFERENT BAUD RATES OR PROTOCOLS TOGETHER ON AN RS485 BUS. THE DEFAULT BUS CONFIGURATION FOR ALSOENERGY DATALOGGERS IS 9600 BAUD, 8 DATA BITS, NO PARITY, 1 STOP BIT (8N1).

RS485 DATA TERMINAL BLOCKS				
SIGNAL	RS485 PORT 1 TERMINAL BLOCK #	RS485 PORT 2 TERMINAL BLOCK #	RS485 PORT 3 TERMINAL BLOCK #	RS485 PORT 4 TERMINAL BLOCK #
DATA COMMON	10	14	20	24
DATA +	11	15	21	25
DATA -	12	16	22	26
SHIELD/DRAIN	13	17	23	27
NOTE: DATA +/- MAY BE LABELED AS DATA A/B ON SOME DEVICES, HOWEVER THE POLARITY OF A AND B IS NOT STANDARDIZED. ALWAYS REFER TO MANUFACTURER DOCUMENTS TO DETERMINE PROPER POLARITY AND WIRE ACCORDING TO POSITIVE / NEGATIVE RATHER THAN A / B. DEVICES WILL NOT COMMUNICATE IF POLARITY IS REVERSED.				





AMEREN COMMUNITY SOLAR (MISSOURI BOTTOMS) AZIMUTH ENERGY EST118387

REV: 4 BY: AK DATE: 2019-05-01 DESCRIPTION: REDRAWN

SIZE: ANSI C SCALE: NONE

AlsoEnergy Boulder, CO 80301 866-303-5668, USA www.AlsoEnergy.com

DRAWN BY: AK CHECKED BY: PWH DATE: 2019-05-01 ISSUE: RELEASED R4

DETAIL RS485 WIRING WM703 7 OF 7

NABCEP CERTIFIED PV Installation Professional — CERTIFICANTS: MARC LOPATA, PE CERT# 091110-241; DANIEL STROH, EIT CERT# 042013-130

NABCEP CREDENTIALED SYSTEM INSPECTOR — CERTIFICANTS: MARC LOPATA, PE CERT# PVSI-120917-006937

STATE OF MISSOURI — MARC L. LOPATA — MAR 1 5 2019 — NUMBER PE-2004023353 — PROFESSIONAL ENGINEER

OPERATING DIAGRAM

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

MARK UP DRAWING NO.	REV.

MONITORING DETAILS

DRAWING RECORD							
REV.	DATE	PROJECT NO.	DRAFTING DRFTR	CHK'D	SUPV	ENGR	DESCRIPTION
A	03/04/19	1704-101	CJB	DIR	DAS	ML	CONSTRUCTION DRAWINGS
B	3/15/2019	1704-101	CJB	DAS	DAS	ML	FENCE UPDATES
C	5/6/2019	1704-101	CJB				MONITORING UPDATES
D	5/21/2019	1704-101	CJB				SECURITY ENCLOSURE

SITE: AMEREN MISSOURI LAMBERT COMMUNITY SOLAR CENTER

Ameren MISSOURI

DRAWING NO. LC-DWG-FPD-000003

REVISION NO. 0

LC-DWG-FPD-000004

PROPOSED SOLAR POWER SITES:

AMEREN PROJECT
11601 MISSOURI BOTTOM RD.
SAINT LOUIS, MO 63145

NORTH

PROJECT SITE

DRAWING INDEX: G3L–X RACK

S1	4X9 RACK PLAN VIEW, ELEVATIONS, AND NOTES	●	●	●	●
S2	TILT BRACKET COMPONENTS, CONNECTIONS & FOUNDATION DETAILS	○	○	●	●
S3	CONNECTIONS	○	○	●	●
S4	HARDWARE	○	○	●	●
		SIGN–OFF JAN. 9, 2019	REV SIGN–OFF JAN. 21, 2019	REV 2 SIGN–OFF JAN. 24, 2019	STAMPED SET FEB. 1, 2019
		ISSUANCE/REVISION			

LEGEND:
● ISSUED
○ REVISED, BUT NOT ISSUED

PREPARED FOR:

AZIMUTH ENERGY
4220 DUNCAN AVE. STE 201
ST. LOUIS, MO 63110

GENERAL NOTES:

1. CODES AND STANDARDS
   IBC 2012
   NEC 2017
   AISC 360–10
   AISI S100–10
   ASCE 7–10

2. 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

3. 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

4. EARTHQUAKE DESIGN PARAMETERS:
   RISK CATEGORY – I
   SEISMIC IMPORTANCE FACTOR, Ie – 1.0
   MAPPED SPECTRAL RESPONSE ACCELERATION PARAMETERS,
   SS –0.374g
   S1 –0.152g
   SITE CLASS – D
   DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETERS,
   SDS –0.374g
   SD1 –0.222g
   SEISMIC DESIGN CATEGORY – D
   BASIC SEISMIC FORCE–RESISTING SYSTEM – SOLAR RACKING SYSTEM
   DESIGN BASE SHEARS – 0.337 KIP
   SEISMIC RESPONSE COEFFICIENT, Cs – 0.187
   RESPONSE MODIFICATION COEFFICIENT, R – 2
   ANALYSIS PROCEDURE– EQUIVALENT LATERAL FORCE PROCEDURE

5. FOUNDATION DESIGN PARAMETERS:
   FOUNDATION DESIGN DERIVED FROM GEOTECHNICAL REPORT PROVIDED BY REITZ & JENS, INC. DATED JUNE 28, 2017 (REPORT NO: 2017012415)

6. POST INSTALLATION TOLERANCES AT TOP OF POST:
   VERTICAL: +/–1" (SEE NOTE BELOW)
   MAX TWIST: +/–2°
   EAST/WEST: +/–2.5"
   NORTH/SOUTH: +/–1"
   MAX OUT OF PLUMB: +/– 1°

(POST INSTALLATION TOLERANCES ACCOUNT FOR STACKED MANUFACTURING TOLERANCES)

RECOMMENDATIONS FOR SETTING POST ELEVATIONS:
A. 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.
B. THE CONTROL POST DOESN'T NECESSARILY HAVE TO BE THE 1ST POST WITHIN EACH RACK.
C. FOR AREAS WITH TERRAIN CHANGE, CONTROL POINTS CAN BE TAKEN AT THE MID–POINT BETWEEN THE LAST POST OF RACK AND FIRST POST OF THE NEXT RACK. TEMPORARY T–POSTS (INSTALLED PLUMB LEVEL) CAN BE USED FOR THESE CONTROL POINTS.
D. A TAUT STRING–LINE SHALL THEN BE PLACED FROM TOP CENTER OF FIRST CONTROL POST TO TOP CENTER OF NEXT CONTROL POST.
E. THE MAXIMUM SLOPE OF THE STRING–LINE SHALL BE LESS THAN OR EQUAL TO +/– 20%
F. THE REMAINING POSTS TO BE INSTALLED WITHIN +/– 1" FROM STRING LINE.
G. 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".

PREPARED BY:

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

7. 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.

8. CONNECTIONS:
   ALL CONNECTIONS TO BE SNUG TIGHT UNLESS OTHERWISE NOTED. SOME ½"–13 ASTM A325T BOLTS MUST BE FASTENED BY TURN OF THE NUT METHOD PER THE RESEARCH COUNCIL OF STRUCTURAL CONNECTIONS (RCSC). ALL MODULE AND RACKING HARDWARE TO BE TORQUED AS SPECIFIED AND MARKED WITH AN INDELIBLE MARKER. SEE SHEET S2–S3 FOR DETAILS.

9. PV MODULE INFORMATION:
   NAME/MODEL: GCL–M6/72H 370W
   DIMENSIONS: 77.008" LONG X 39.055" WIDE X 1.378" TALL
   WEIGHT 48.94 LBS.

10. 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. ½"ø TO BE A325 HOT DIPPED GALVANIZED PER ASTM A153.
II. ⅜"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. ¼"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–S2 FOR THE GRADE OF STEEL FOR EACH MEMBER.

ABBREVIATIONS:

INT	INTERIOR	C–C	CENTER TO CENTER
MIN	MINIMUM	℄	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

CUSTOMER: AZIMUTH ENERGY
Ameren Project
St. Louis, MO 63145

DATE: 2/1/2019 | JOB #: 8883 | CHECK BY?: DK | DRAWN BY: JS | SHEET: S0 | PAGE: S0 of S4

COVER SHEET

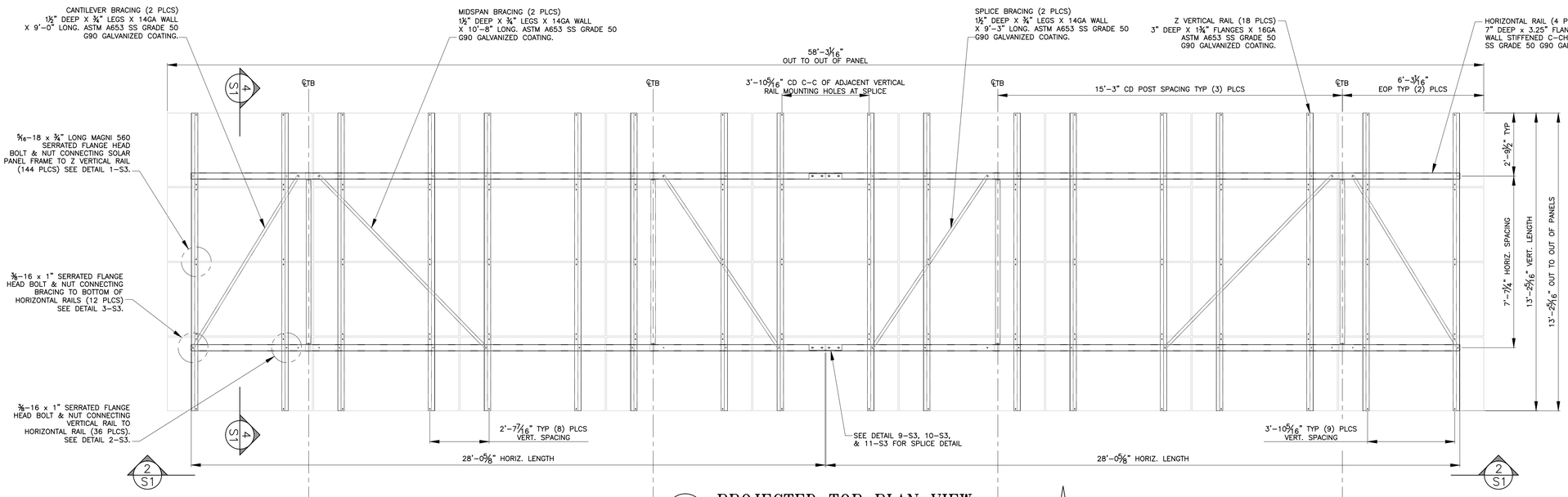
SOLAR FLEXRACK
A Division of Northern States Metals
3207 Innovation Place
Youngstown, OH 44509-4023
Phone (888) 380-8138

REV	DESCRIPTION	CHK. BY	DATE

STATE OF MISSOURI
BRIAN M. FLOOD
NUMBER PE-2017026114
PROFESSIONAL ENGINEER

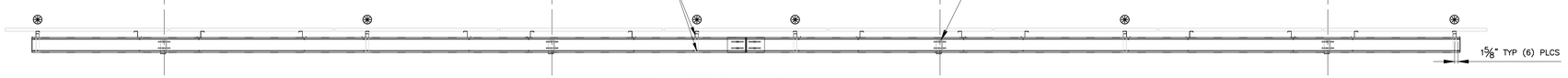
LC-DWG-FPD-000005

ATTACHMENT B



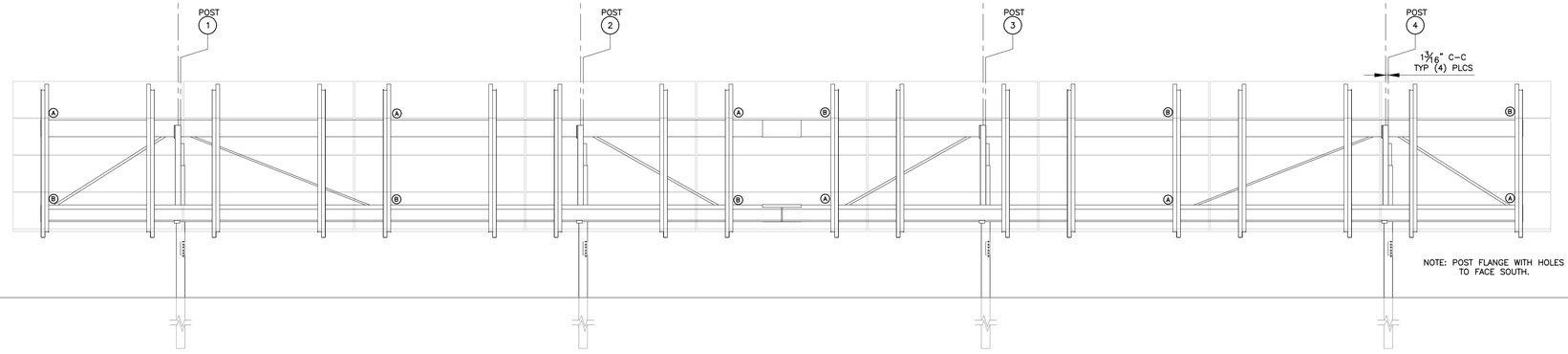
1 S1 **PROJECTED TOP PLAN VIEW**
SCALE: 3/8" = 1'-0"

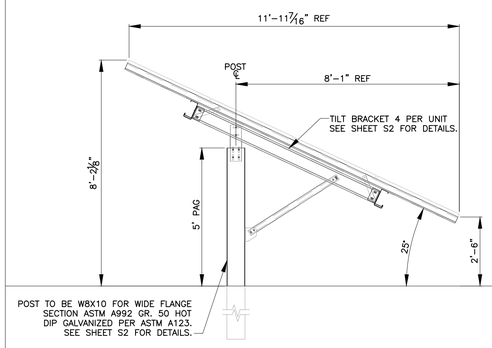
PROJECT NORTH



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

⊛ INDICATES TORSION BRACE LOCATIONS
Ⓐ = "A" TORSION BRACE S/C: 3922
Ⓑ = "B" TORSION BRACE S/C: 3969





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

3 S1 **FRONT ELEVATION VIEW**
SCALE: 3/8" = 1'-0"

AZIMUTH ENERGY
Ameren Project
St. Louis, MO 63145

CUSTOMER:
DATE: 2/1/2019
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JOB #: 8883
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PAGE: S1 of S4

GCL-M6/72H 370W MODULE
4X9 SOLAR FLEXRACK G3L-X

SOLAR FLEXRACK
A Division of Northern States Metals

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

REV	DESCRIPTION	DRG. BY	DATE

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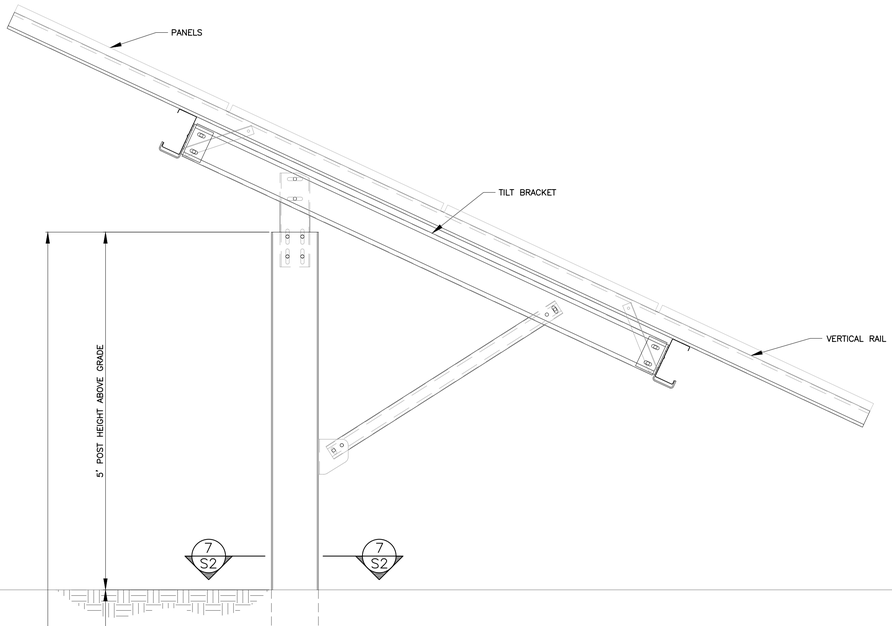
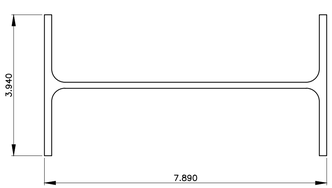
NUMBER PE-2017026114
PROFESSIONAL ENGINEER

LC-DWG-FPD-000006

ATTACHMENT B



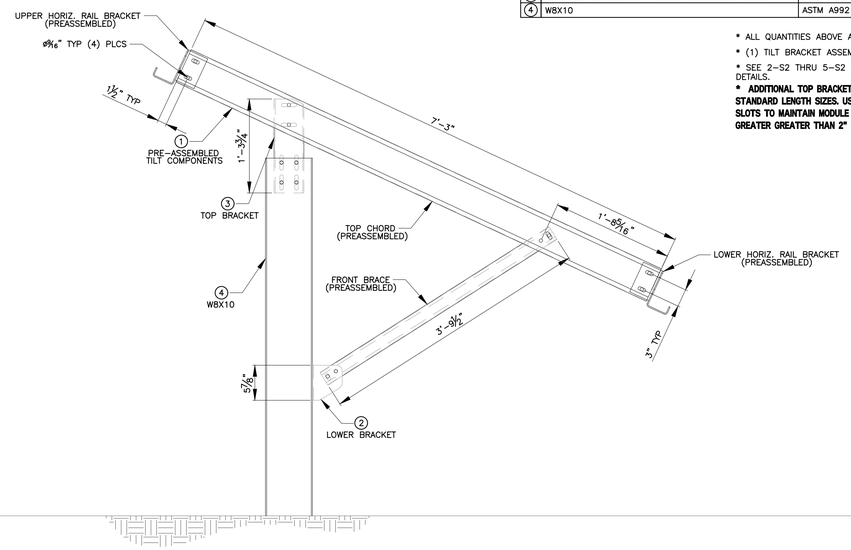
6/S2 FOUNDATION DETAIL
SCALE: 1" = 1'-0"



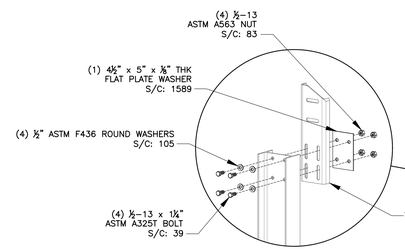
7/S2 W8X10 CROSS SECTION
SCALE: 6" = 1'-0"

ITEM	DESCRIPTION	MATERIAL	QTY
1	TOP CHORD 6 DEEP x 2.5 LEG x 14GA THK C	ASTM A653 SS GRADE 50 G90	1
	FRONT BRACE 2.5 DEEP x 1.75 LEG x 14GA THK C	ASTM A653 SS GRADE 50 G90	
	LOWER HORIZ. RAIL BRACKET 6.457 x 3.68 x 0.188 THK	ASTM A36 HOT-DIP GALVANIZED	
	UPPER HORIZ. RAIL BRACKET 6.457 x 3.68 x 0.188 THK	ASTM A36 HOT-DIP GALVANIZED	
2	LOWER BRACKET 5 x 2.5 x 0.18 BENT PLATE	ASTM A36 HOT-DIP GALVANIZED	1
3	TOP POST BRACKET 5 x 1.5 x 0.188 BENT PLATE	ASTM A36 HOT-DIP GALVANIZED	1
4	W8X10	ASTM A992 GR. 50 HOT-DIP GALVANIZED	1

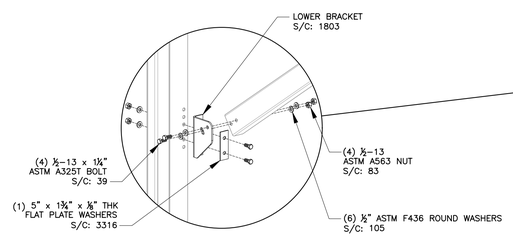
* ALL QUANTITIES ABOVE ARE FOR ONE (1) TILT BRACKET ASSEMBLY
* (1) TILT BRACKET ASSEMBLY PER POST
* SEE 2-S2 THRU 5-S2 FOR ALL TILT BRACKET CONNECTION DETAILS.
* **ADDITIONAL TOP BRACKET LENGTHS ARE AVAILABLE IN 4" AND 8" OVER STANDARD LENGTH SIZES. USE VARYING TOP BRACKET SIZES AND HEIGHT SLOTS TO MAINTAIN MODULE SEPARATION BETWEEN ADJACENT RACKS TO GREATER GREATER THAN 2" DIFFERENCE.**



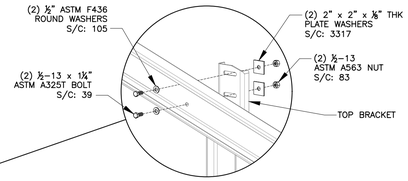
1/S2 TILT BRACKET SIDE ELEVATION
SCALE: 1" = 1'-0"



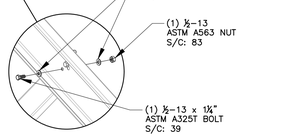
4/S2 POST TO TOP BRACKET CONNECTION
SCALE: NTS
½-13 ASTM A325T BOLTS CONNECTING TOP BRACKET TO POST SHALL BE FASTENED BY TURN OF THE NUT METHOD. (⅓ TURN PAST SNUG TIGHT)



5/S2 BRACE TO LOWER BRACKET CONNECTION
SCALE: NTS
½-13 ASTM A325T BOLTS CONNECTING LOWER BRACKET TO POST SHALL BE FASTENED BY TURN OF THE NUT METHOD. (⅓ TURN PAST SNUG TIGHT)



2/S2 TOP CHORD TO TOP BRACKET CONNECTION
SCALE: NTS
½-13 ASTM A325T BOLTS CONNECTING TILT BRACKET TOP CHORD TO TOP BRACKET SHALL BE FASTENED BY TURN OF THE NUT METHOD. (⅓ TURN PAST SNUG TIGHT)



3/S2 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.

CUSTOMER: AZIMUTH ENERGY
Ameren Project
St. Louis, MO 63145

DATE: 2/1/2019 | DRAWN BY: JS | JOB #: 8883 | CHECK BY?: DK | Sheet: S2 of S4

TILT BRACKET COMPONENTS, CONNECTIONS & FOUNDATION DETAILS

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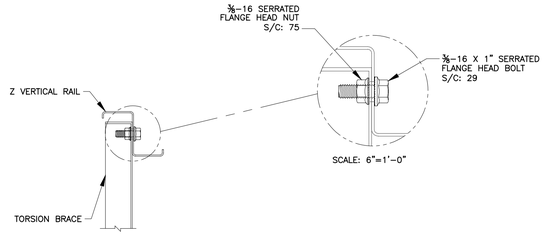
Phone (888) 380-8138

REV	DESCRIPTION	CHG. BY	DATE

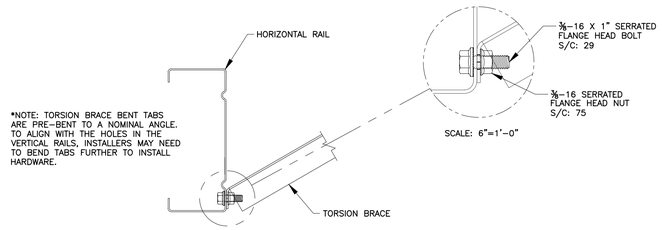
STATE OF MISSOURI
BRIAN M. FLOOD
NUMBER PE-2017026114
PROFESSIONAL ENGINEER

LC-DWG-FPD-000007

ATTACHMENT B

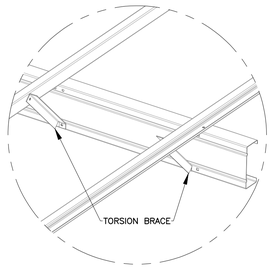


6 S3 VERTICAL RAIL TO TORSION BRACE
SCALE: 3" = 1'–0"

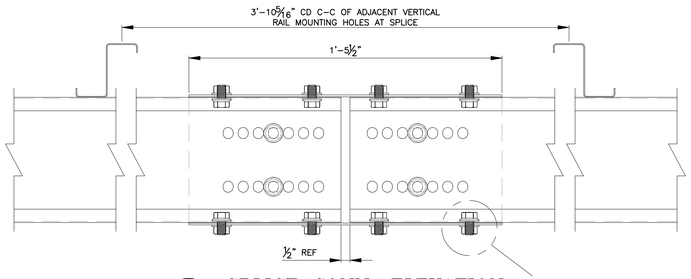


*NOTE: TORSION BRACE BENT TABS ARE PRE–BENT TO A NOMINAL ANGLE. TO ALIGN WITH THE HOLES IN THE VERTICAL RAILS, INSTALLERS MAY NEED TO BEND TABS FURTHER TO INSTALL HARDWARE.

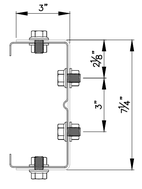
7 S3 HORIZ. RAIL TO TORSION BRACE
SCALE: 3" = 1'–0"



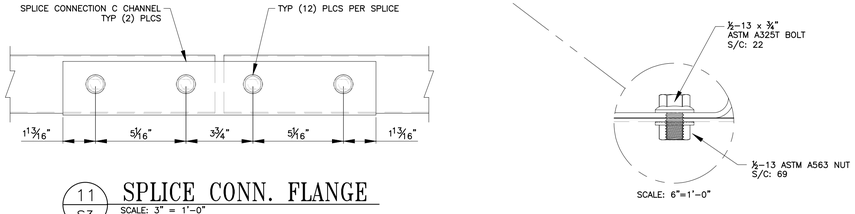
8 S3 TORSION BRACE CONNECTIONS ISO VIEW
SCALE: NTS



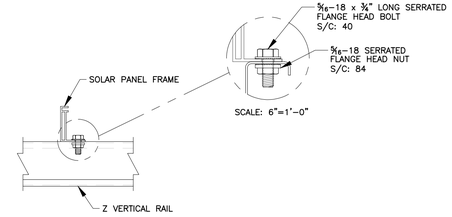
10 S3 SPLICE CONN. ELEVATION
SCALE: 3" = 1'–0"



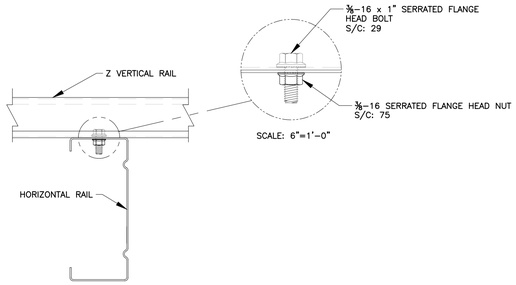
9 S3 SPLICE PROFILE
SCALE: 3" = 1'–0"



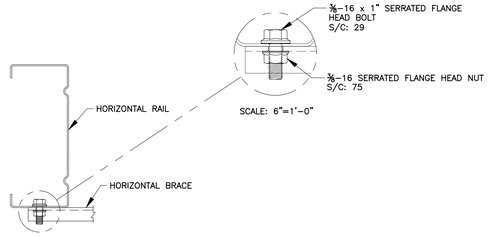
11 S3 SPLICE CONN. FLANGE
SCALE: 3" = 1'–0"
MATERIAL: ASTM A653 SS GRADE 50
FINISH: G–90 PRE–GALVANIZED



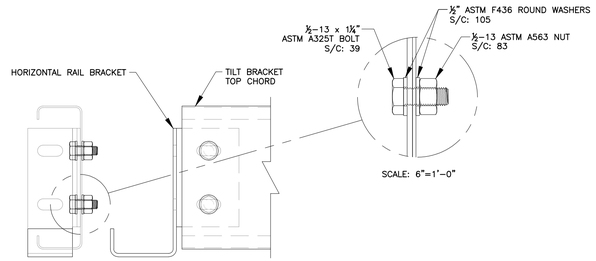
1 S3 SOLAR PANEL TO VERTICAL CONN.
SCALE: 3" = 1'–0"
TORQUE: 8–14 Ft–lbs



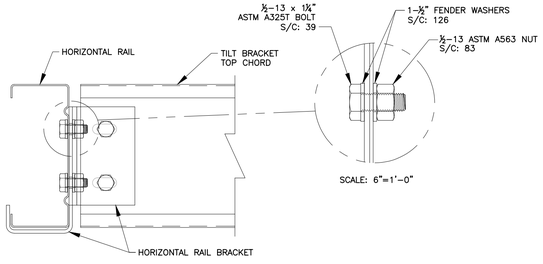
2 S3 Z PURLIN TO HORIZ. RAIL CONN.
SCALE: 3" = 1'–0"



3 S3 HORIZ. RAIL TO HORIZ. BRACING CONN.
SCALE: 3" = 1'–0"



4 S3 HORIZ. RAIL BRACKET TO TILT BRACKET CONN.
SCALE: 3" = 1'–0" (PRE–ASSEMBLED NEEDS TIGHTENED)



5 S3 TILT BRACKET TO HORIZ. CONN.
SCALE: 3" = 1'–0"

CUSTOMER:

AZIMUTH ENERGY
Ameren Project
St. Louis, MO 63145

JOB #: 8883
DATE: 2/1/2019
DRAWN BY: JS
CHECK BY: DK
Sheet: S3 of S4

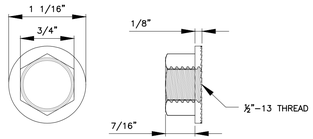
CONNECTIONS

SOLAR FLEX RACK
A Division of Northern States Metals

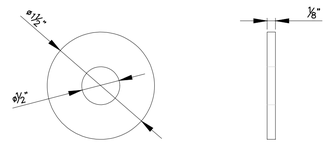
3207 Innovation Place
Youngstown, OH 44509-4023
Phone (888) 380-8138

REV	DESCRIPTION	CHG. BY	DATE

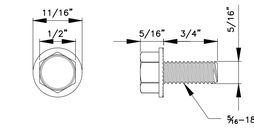
STATE OF MISSOURI
BRIAN M. FLOOD
NUMBER PE-2017026114
PROFESSIONAL ENGINEER



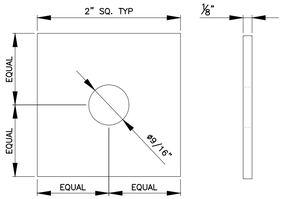
10 / S4 **1/2-13 SERRATED FLANGE NUT (S/C 69)**
SCALE: 1'-0" = 1'-0"
QTY: 24-PCS
MATERIAL: MAGNI 560



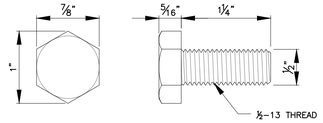
6 / S4 **1-1/2" FENDER WASHER (S/C 126)**
SCALE: 1'-0" = 1'-0"
QTY: 32-PCS
MATERIAL: 1035/1065 SPRING STEEL
FINISH: MECHANICAL GALVANIZE



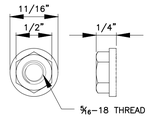
1 / S4 **5/16-18 X 3/4" BOLT (S/C 40)**
SCALE: 1'-0" = 1'-0"
QTY: 144-PIECES
MATERIAL: MAGNI 560



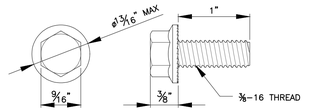
11 / S4 **2" X 2" PLATE WASHER (S/C 3317)**
SCALE: 1'-0" = 1'-0"
QTY: 8-PIECES
MATERIAL: ASTM A653 STEEL
FINISH: HOT-DIPPED GALVANIZED



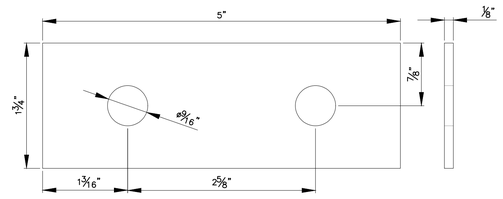
7 / S4 **1/2-13 X 1-1/4" BOLT (S/C 39)**
SCALE: 1'-0" = 1'-0"
QTY: 60-PIECES
MATERIAL: ASTM A325T HEAVY HEX BOLT
FINISH: HOT-DIPPED GALVANIZED



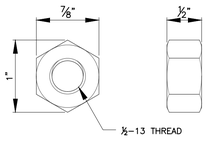
2 / S4 **5/16-18 NUT (S/C 84)**
SCALE: 1'-0" = 1'-0"
QTY: 144-PIECES
MATERIAL: MAGNI 560



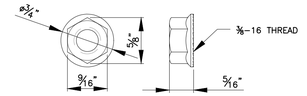
3 / S4 **3/8-16 X 1" BOLT (S/C 29)**
SCALE: 1'-0" = 1'-0"
QTY: 72-PIECES
MATERIAL: ASTM A449 (SAE J429) GRADE 5 OR BETTER
FINISH: MAGNI 560



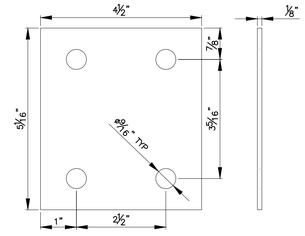
12 / S4 **5" X 1-3/4" PLATE WASHER (S/C 3316)**
SCALE: 1'-0" = 1'-0"
QTY: 4-PIECES
MATERIAL: ASTM A653 STEEL
FINISH: HOT-DIPPED GALVANIZED



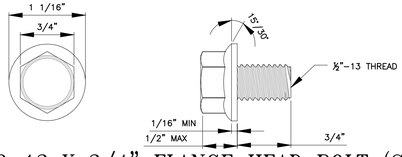
8 / S4 **1/2-13 NUT (S/C 83)**
SCALE: 1'-0" = 1'-0"
QTY: 60-PIECES
MATERIAL: ASTM A563 HEAVY HEX NUT
FINISH: HOT-DIPPED GALVANIZED



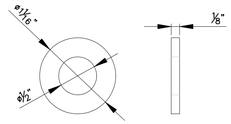
4 / S4 **3/8-16 NUT (S/C 75)**
SCALE: 1'-0" = 1'-0"
QTY: 72-PIECES
MATERIAL: ASTM A563 GRADE F
FINISH: MAGNI 560



13 / S4 **4-1/2" X 5" PLATE WASHER (S/C 1589)**
SCALE: 6" = 1'-0"
QTY: 4-PCS
MATERIAL: ASTM A653 STEEL
FINISH: G140 PRE-GALV



9 / S4 **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
FINISH: MAGNI 560



5 / S4 **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

HARDWARE

CUSTOMER:
AZIMUTH ENERGY
Ameren Project
St. Louis, MO 63145

JOB #: 8883
DATE: 2/1/2019
DRAWN BY: JS
CHECK BY?: DK
Sheet: S4 of S4

SOLAR FLEX RACK
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Youngstown, OH 44509-4023
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PROFESSIONAL ENGINEER