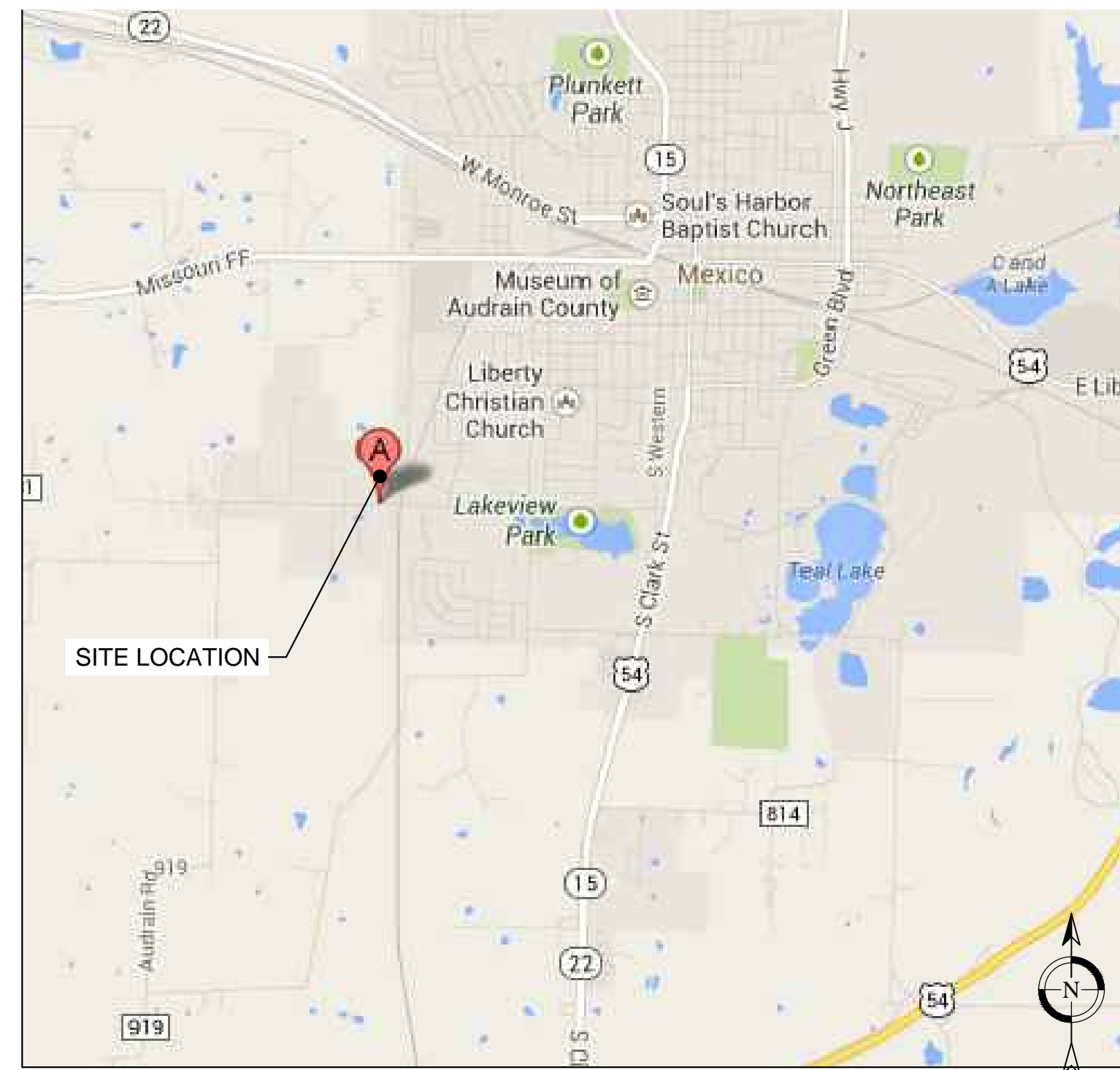
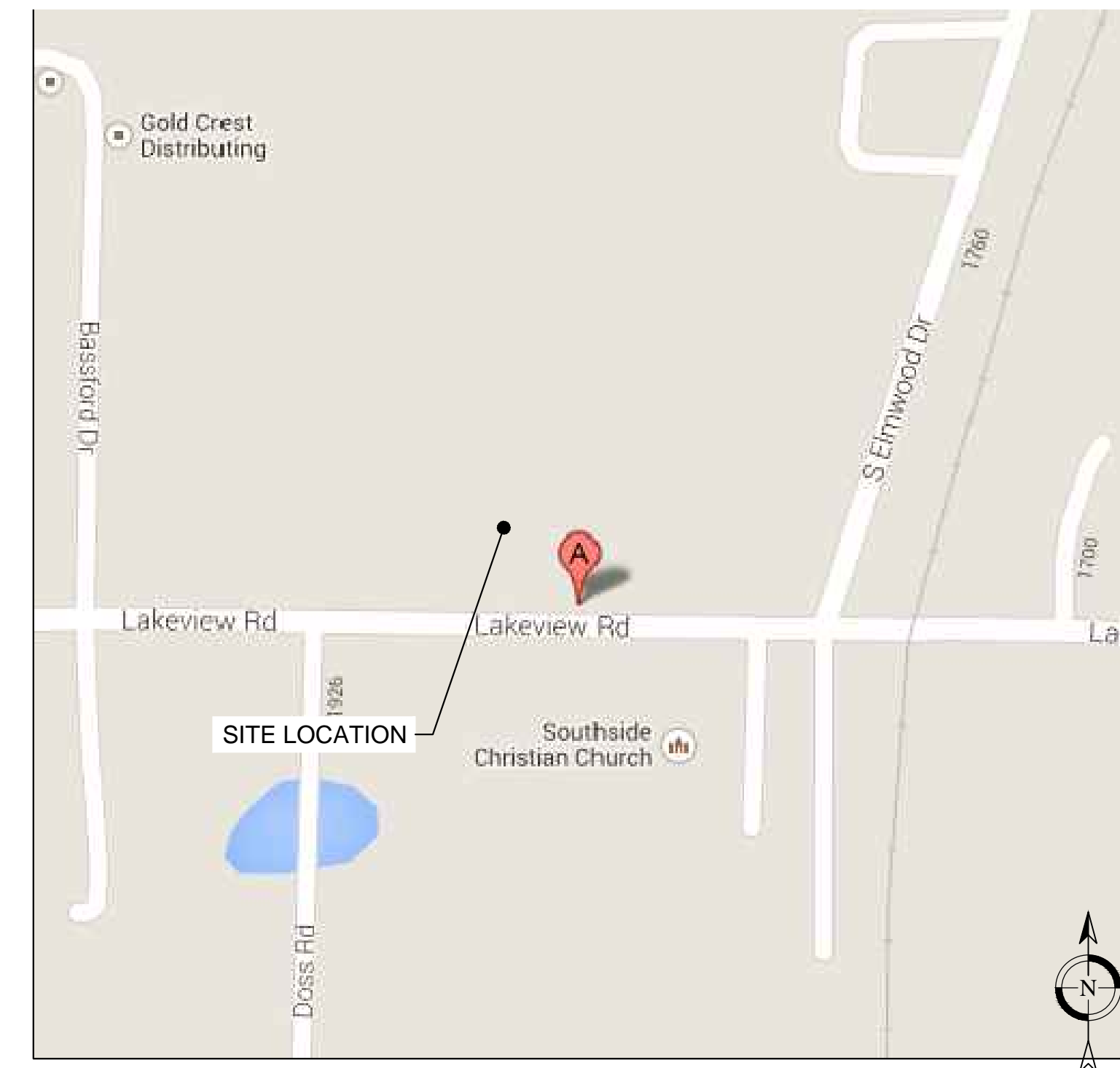


SOLAR ELECTRIC SYSTEM FOR MEXICO SCHOOL DISTRICT ADMINISTRATION BUILDING



VICINITY MAP



LOCAL MAP

SITE INFORMATION:

OWNER: ADMINISTRATION BUILDING
2101 LAKEVIEW RD
MEXICO, MO 65265

CLIENT CONTACT: BRIGHTERGY, LLC
1617 MAIN ST.
KANSAS CITY, MO 64108

UTILITY COMPANY: AMEREN

ACCOUNT NUMBER: 3040005561
METER NUMBER: 09412524

CONTACT INFORMATION:

PROPERTY REPRESENTATIVE: KEVIN FREEMAN
573 581 3773

PROJECT MANAGER: MIKE RIEHL - BRIGHTERGY, LLC
(314) 403-0564

GENERAL EXECUTIVE: LISA COSGROVE
AMEREN MISSOURI (314) 554-2649

SHEET INDEX:

- T1 TITLE SHEET
- ST1 SITE PLAN
- E1 ELECTRICAL LAYOUT
- E2 ELECTRICAL DETAILS
- E3 ELECTRICAL LINE DIAGRAM
- E4 NEC REQUIRED LABELS
- S1 RACKING LAYOUT
- S2 RACKING DETAIL

APPROVALS:

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE CONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN. ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

BRIGHTERGY: _____ **DATE:** _____

CONTRACTOR / LEAD INSTALLER: _____ **DATE:** _____

NOTE:
CONTRACTOR SHALL NOT COMMENCE WORK UNTIL A PERMIT AND INTERCONNECTION APPROVAL HAS BEEN OBTAINED WITH NO EXCEPTIONS



SOLAR SOLUTIONS
1617 Main St.
Kansas City MO, 64108
PH. (816) 866-0555

PROJECT INFORMATION:

**ADMINISTRATION
BUILDING
24.705kW PV System**

2101 LAKEVIEW RD
MEXICO, MO 65265

ISSUE DATE:

01/24/2014

REV: _____ DATE: _____ BY: _____

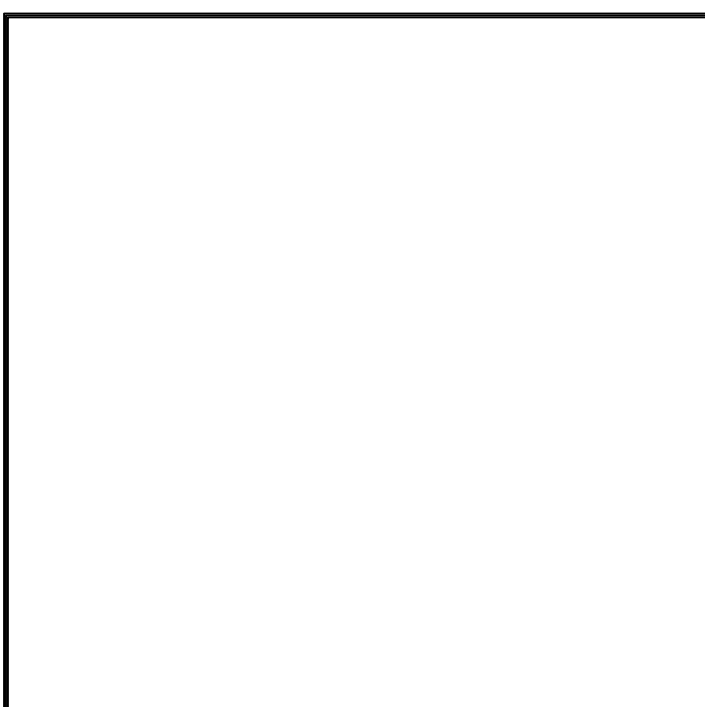
ENGINEER:

GERALD CHARLTON, P.E.
BRIGHTERGY, LLC
1617 MAIN STREET 3RD FLOOR
KANSAS CITY, MO 64108
PH. 816-866-0555

DRAWN BY: _____ CHK.: _____ APV.: _____

ALM	AJN	MR
-----	-----	----

STAMP:



SHEET TITLE:

**TITLE
SHEET**

SHEET NUMBER:

T1



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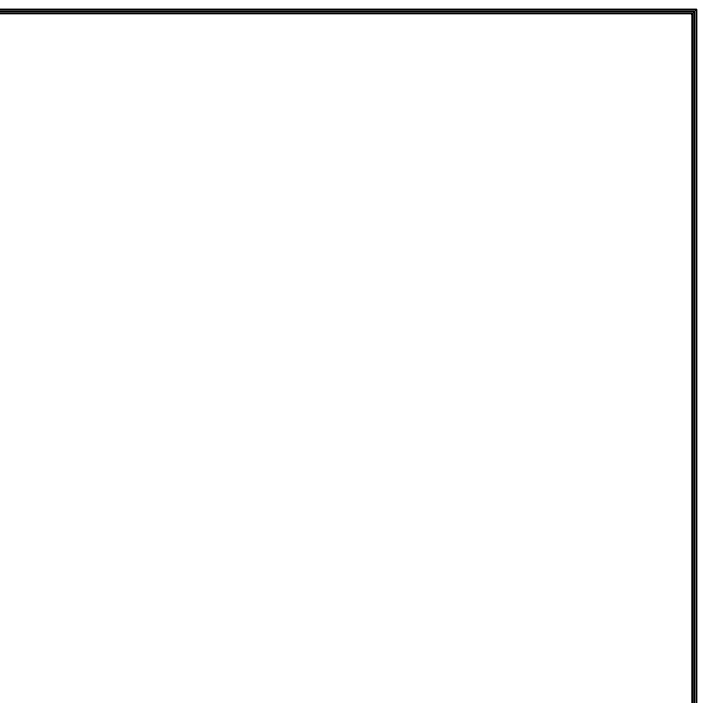
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STAMP:

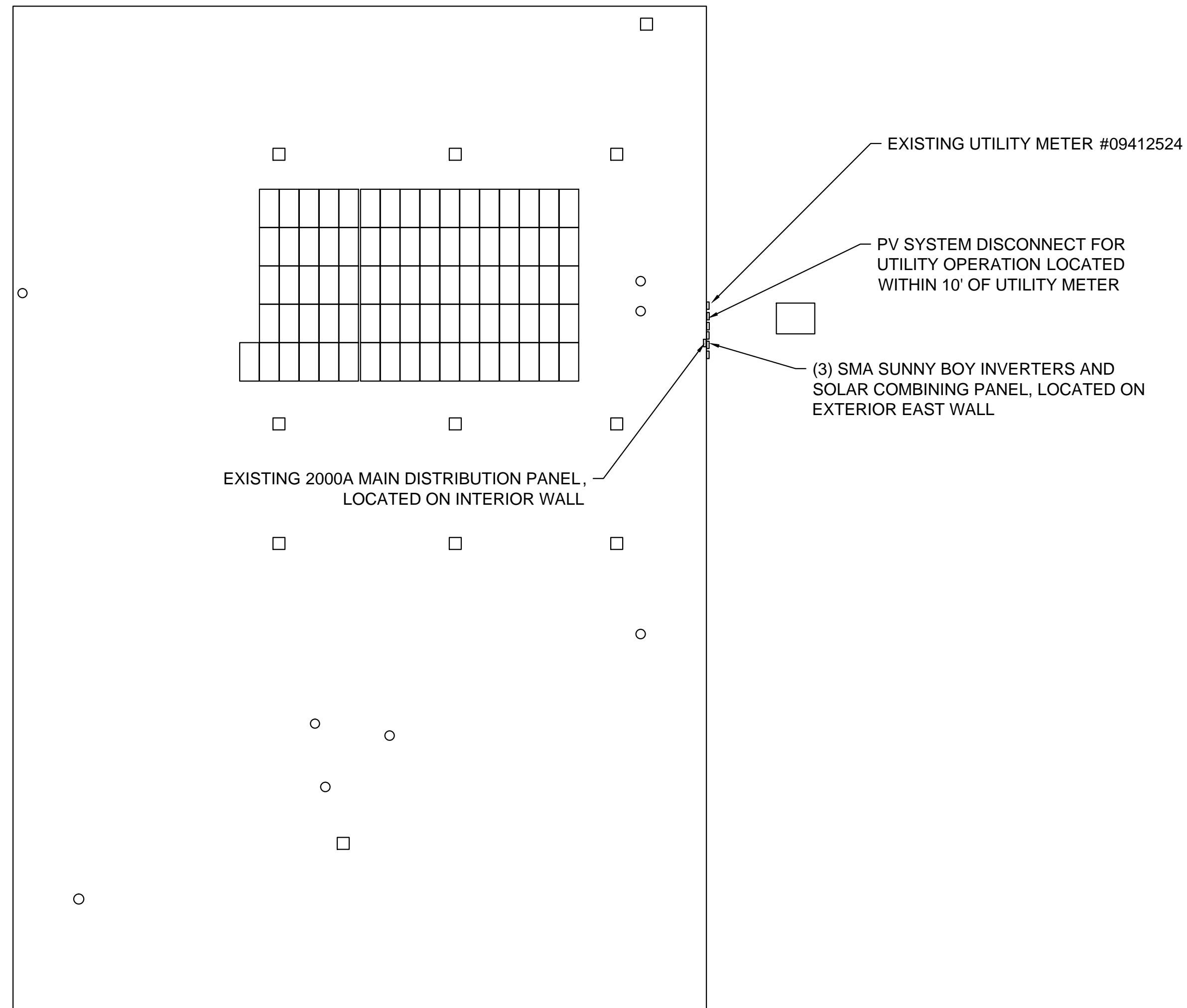


SHEET TITLE:

SITE
PLAN

SHEET NUMBER:

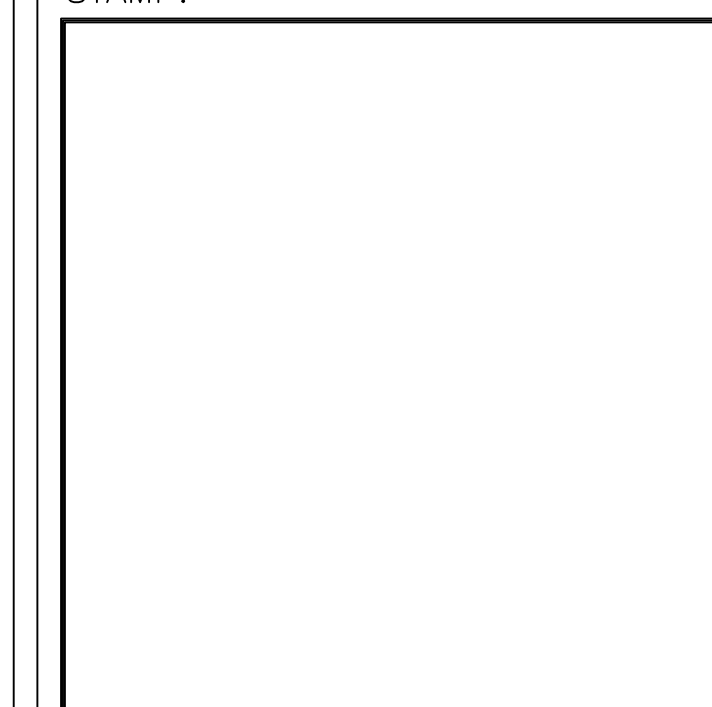
ST1



LAKEVIEW DR

1 SITE PLAN
SCALE: 1/16" = 1'-0"





WIRING NOTES:

ROOF SURFACE:

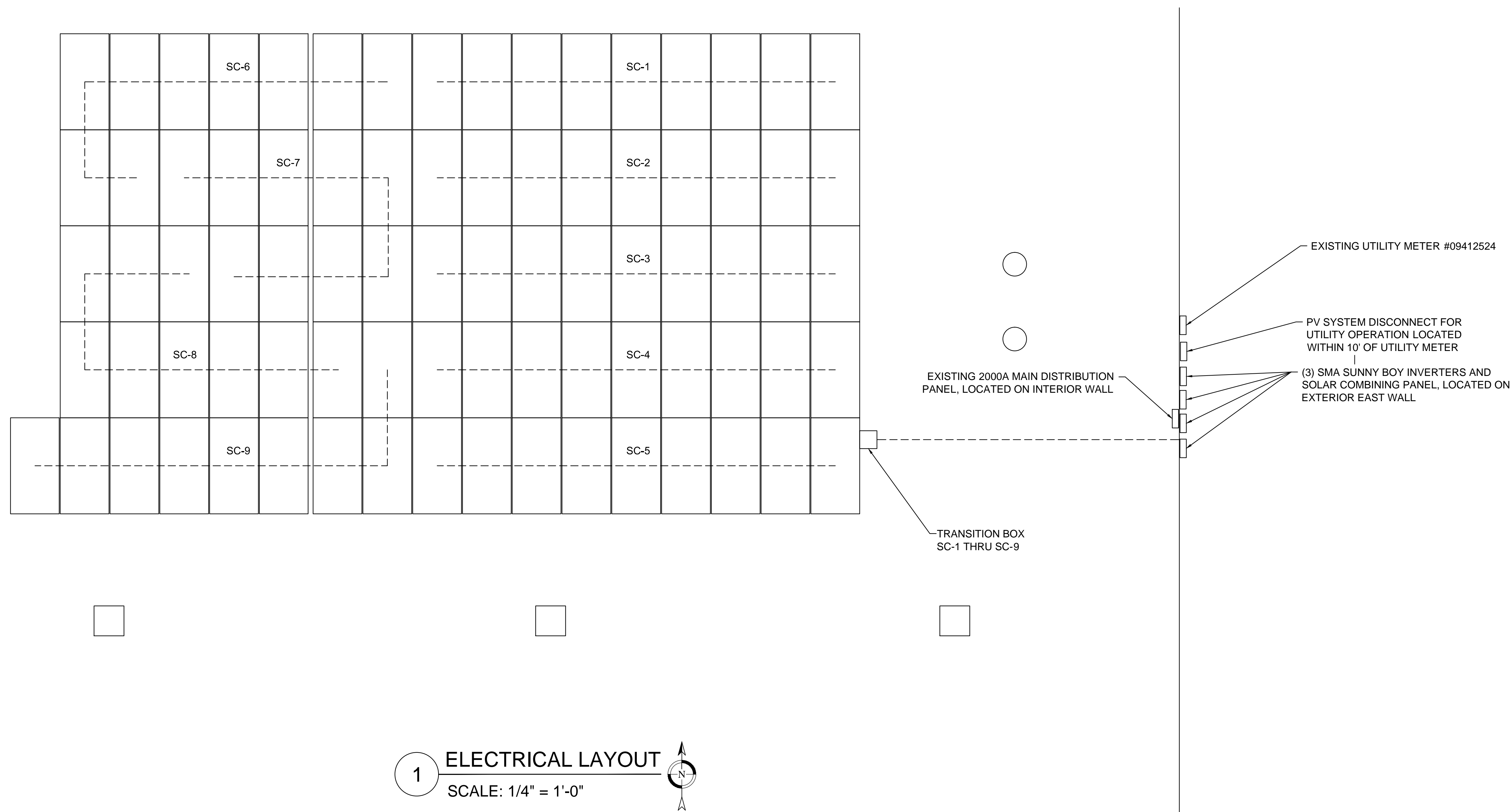
- EXPOSED WIRING SHALL BE SUNLIGHT RESISTANT AND SECURED FIRMLY IN A CLEAN AND WORKMANLIKE MANOR.
- SURFACE CONDUIT CONNECTING SUB ARRAYS CONTAINING SOURCE CIRCUIT HOME RUN WIRES, SHALL BE 1" IN SIZE AND NOT CONTAIN MORE THAN (6) #10AWG CONDUCTORS AND (1) #6AWG BARE COPPER GROUND.
- CONDUIT SHALL BE SUPPORTED EVERY 10' O.C., MINIMUM OF 3-1/2" ABOVE ROOF SURFACE, AND ROUTED ALONG WALLS AND PARAPETS TO MINIMIZE SUN EXPOSURE AND TRIP HAZARDS.

BUILDING INTERIOR:

- WIRING SHALL BE CONTAINED IN METAL RACEWAYS, TYPE "MC" METAL-CLAD CABLE, THAT PROVIDES AN EFFECTIVE GROUND-FAULT CURRENT PATH PER NEC 250.118(10).
- CIRCUIT WIRING BENEATH THE ROOF SURFACE SHALL NOT BE INSTALLED WITHIN 10" OF THE ROOF DECKING OR SHEATHING, EXCEPT WHERE LOCATED DIRECTLY BELOW THE ROOF SURFACE COVERED BY PV MODULES PER NEC 690.31(E)(1).

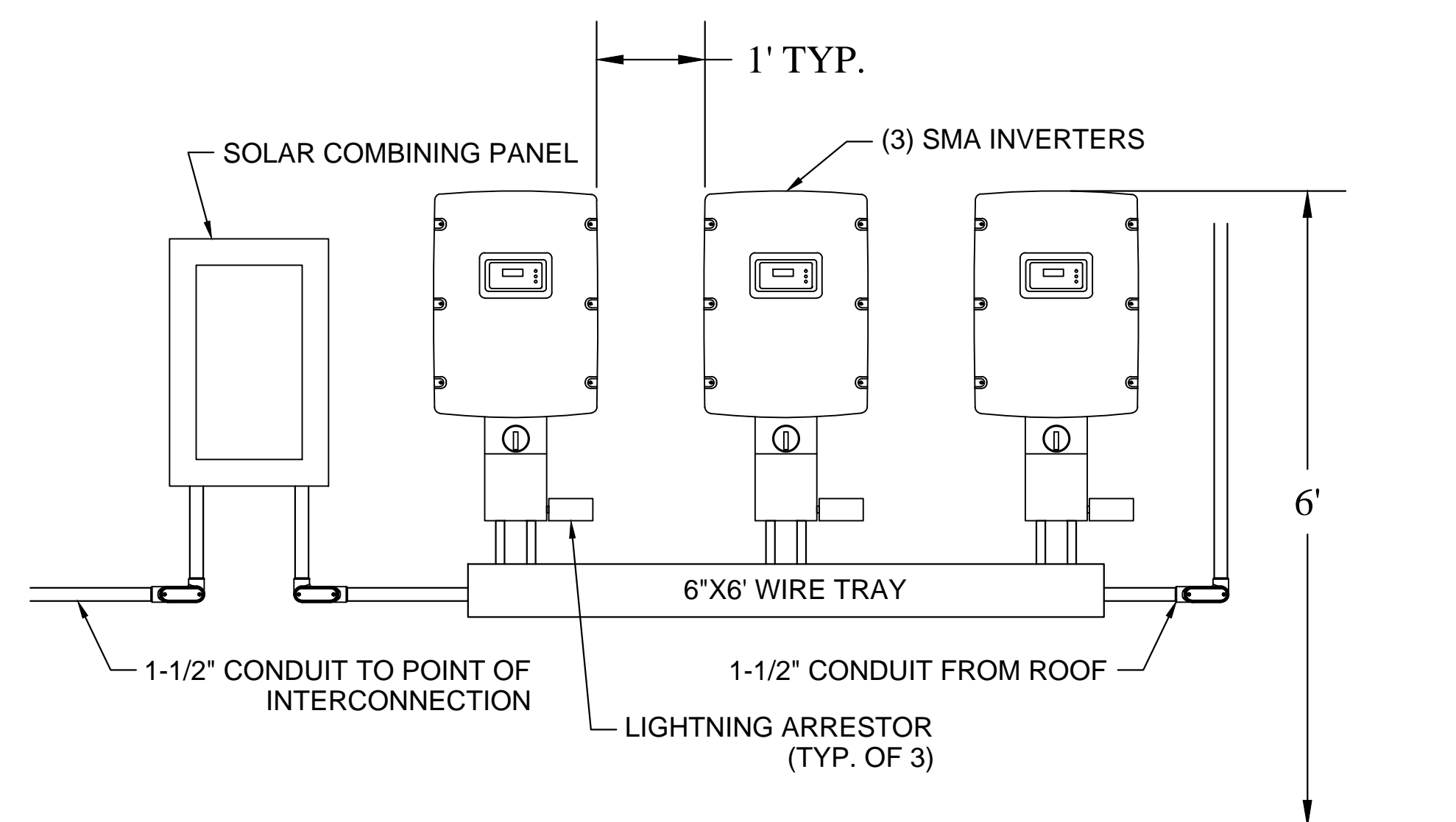
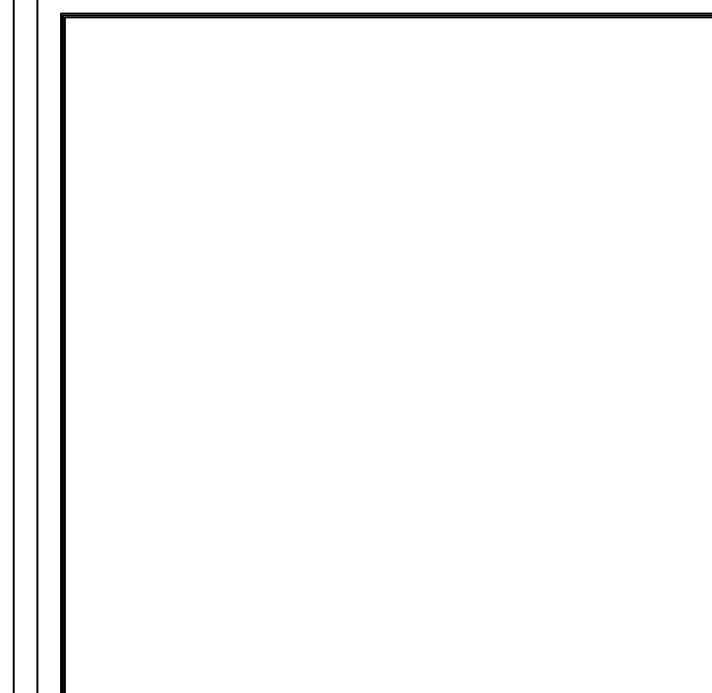
EQUIPMENT GROUNDING:

- MODULES SHALL BE BONDED TO ALUMINUM SUPPORT RAIL USING WEEB-CCR CLIPS AT A MINIMUM OF 2 POINTS PER MODULE, PER MANUFACTURER'S INSTRUCTIONS.
- BONDING JUMPERS REQUIRED AT EVERY ALUMINUM RAIL SPLICE AND EXPANSION GAP, PER MANUFACTURER'S INSTRUCTIONS.
- WEEBLUG REQUIRED FOR ALL FREE, UNSPLICED ALUMINUM RAIL, BONDED TOGETHER FOR CONTINUITY VIA SOLID #6AWG BARE COPPER GROUND WIRE, PER NEC250.120(C).
- ALL PROJECT ASSOCIATED EQUIPMENT SHALL BE GROUNDED PER NEC SPECIFICATIONS.

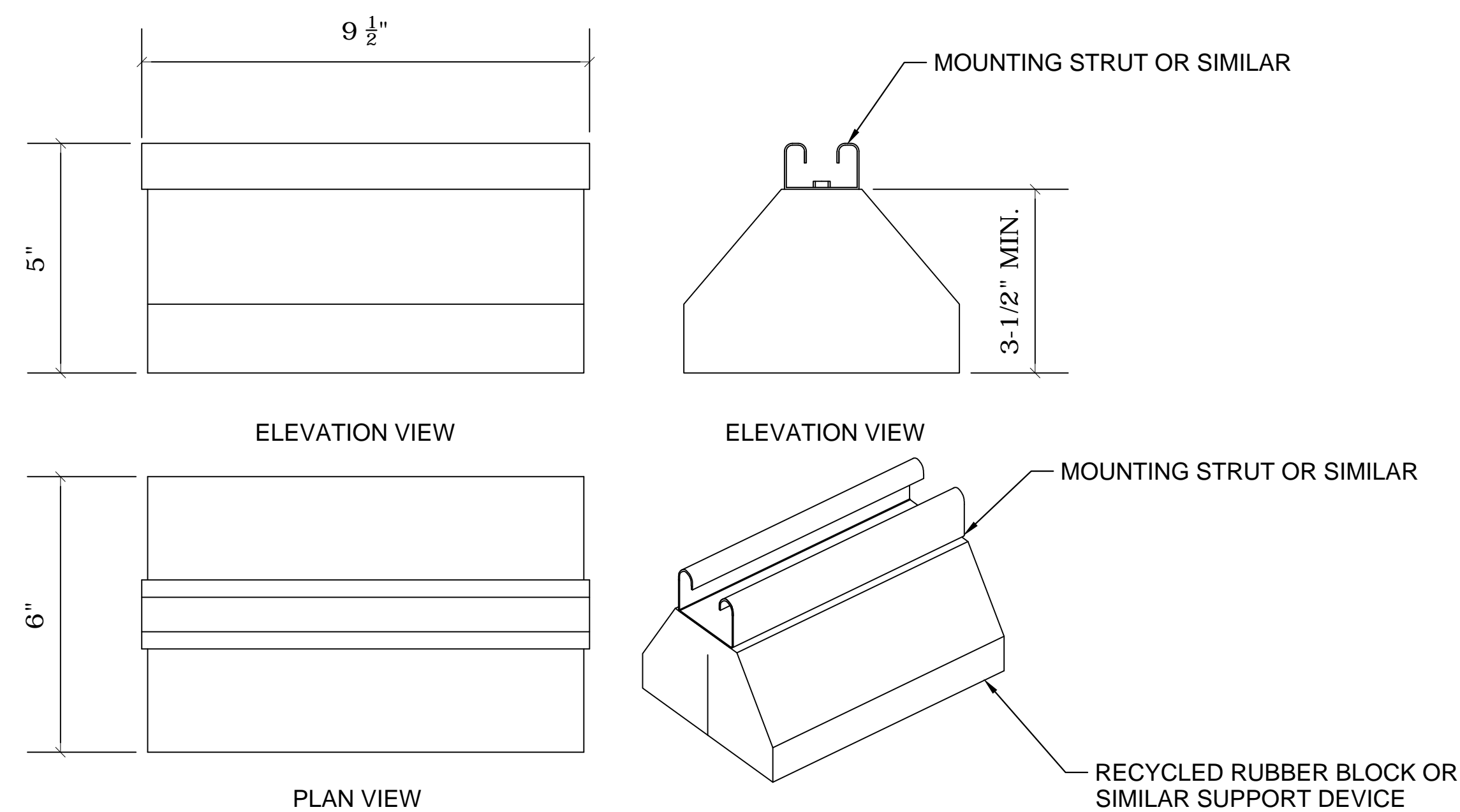


1 ELECTRICAL LAYOUT
SCALE: 1/4" = 1'-0"



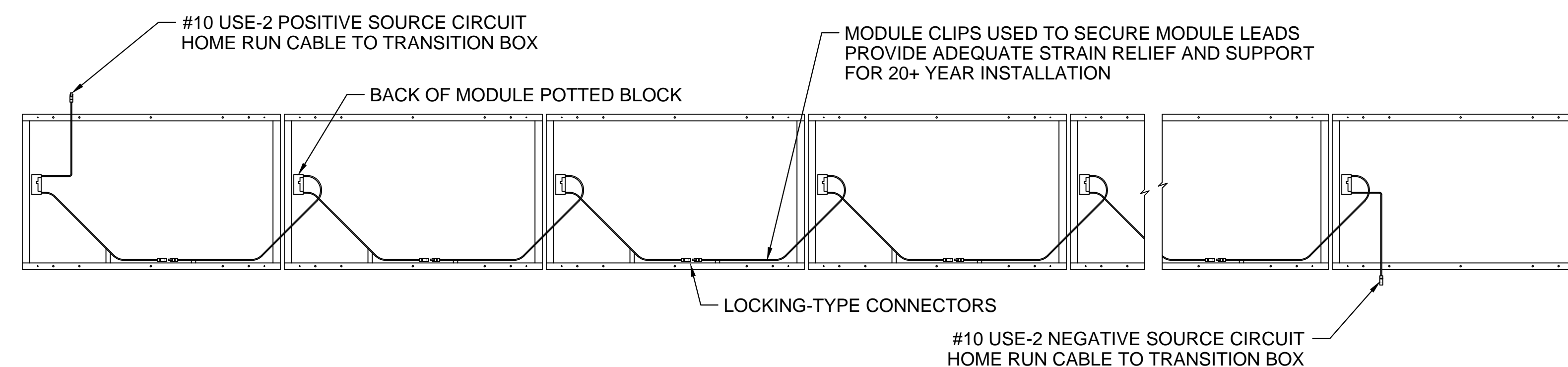


1 EQUIPMENT ELEVATION
SCALE: 3/4" = 1'-0"

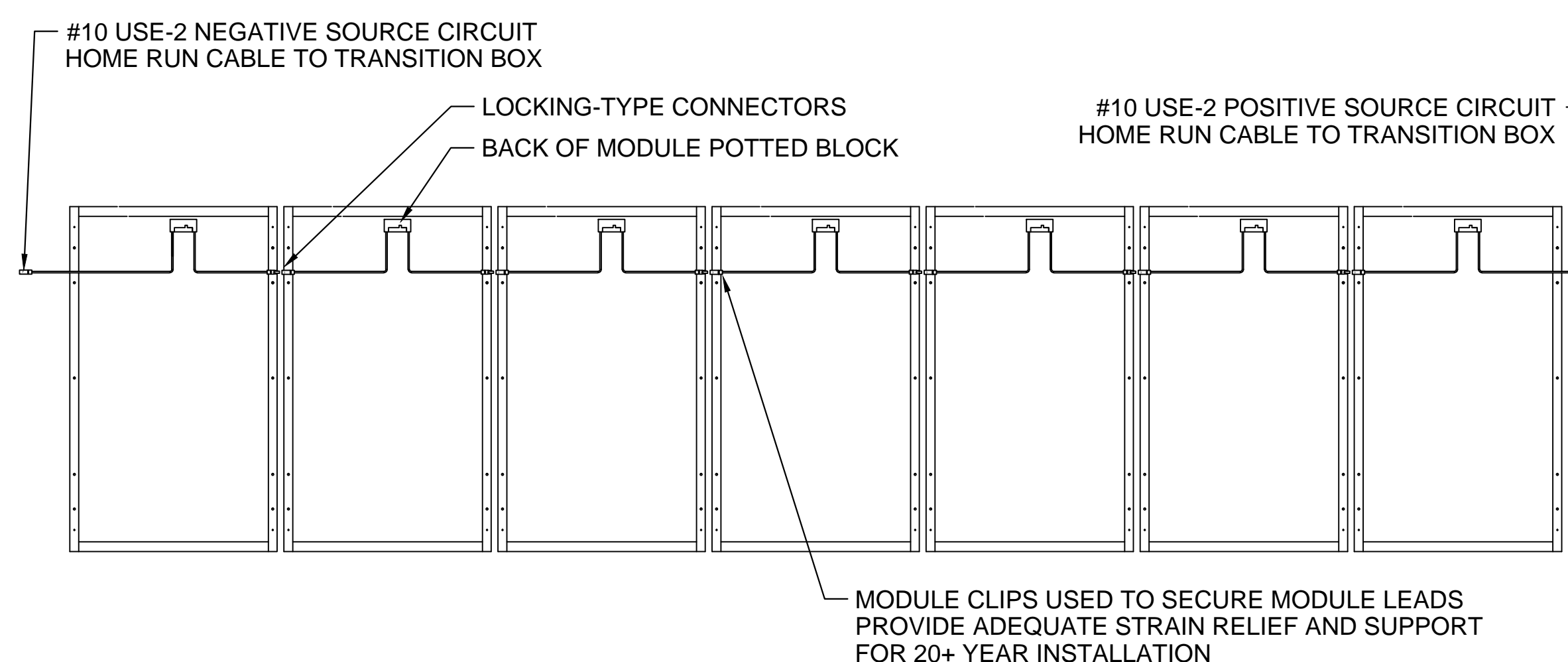


NOTE: PROVIDE QUANTITY AS REQUIRED TO SUPPORT EXTERNAL CONDUIT

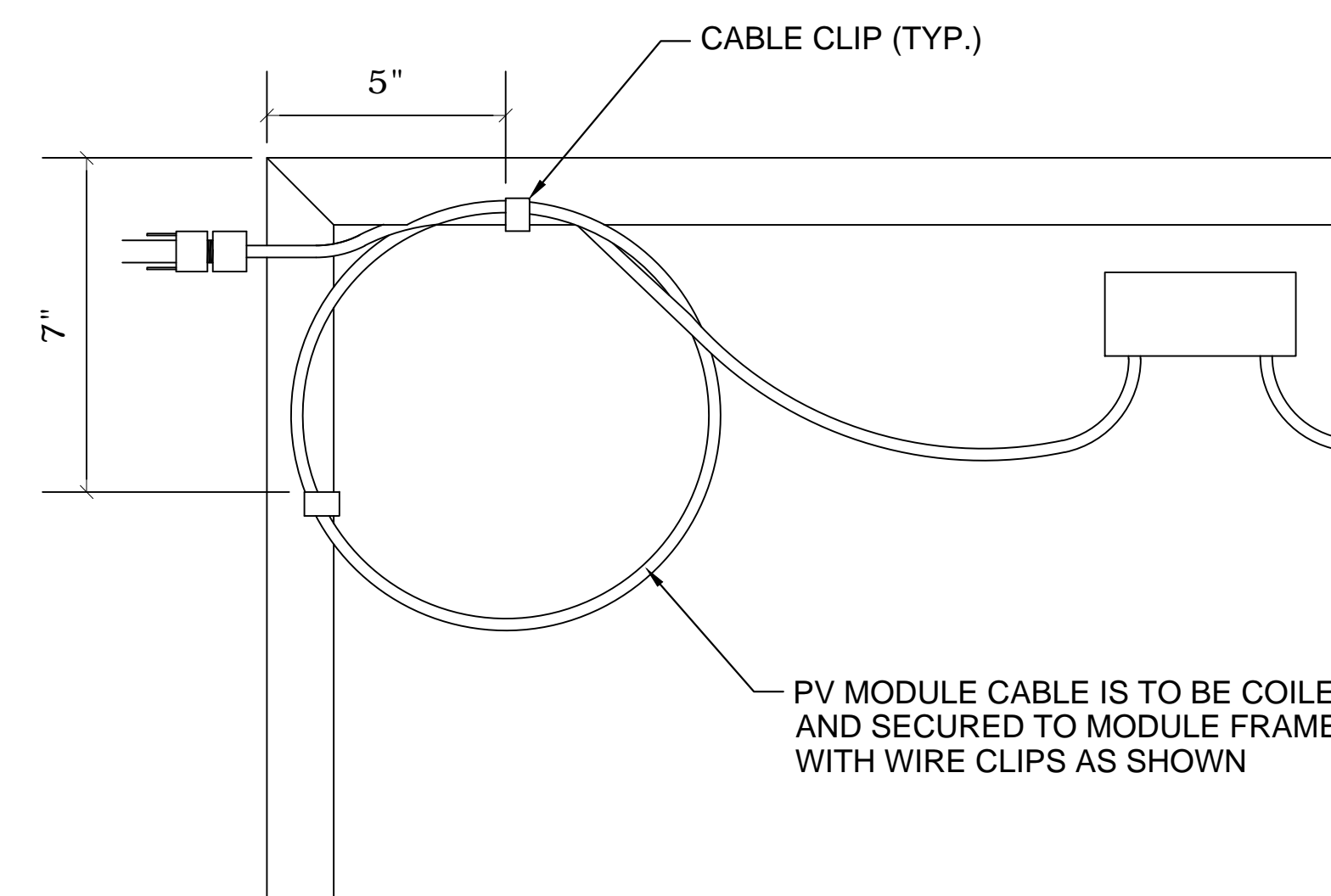
5 CONDUIT SUPPORT DETAIL
NTS



2 PV STRING WIRING DETAIL
NTS



3 PV STRING WIRING DETAIL
NTS



4 PV WIRE MANAGEMENT DETAIL
NTS

ADMINISTRATION BUILDING 24.705kW PV System

2101 LAKEVIEW RD
MEXICO, MO 65265

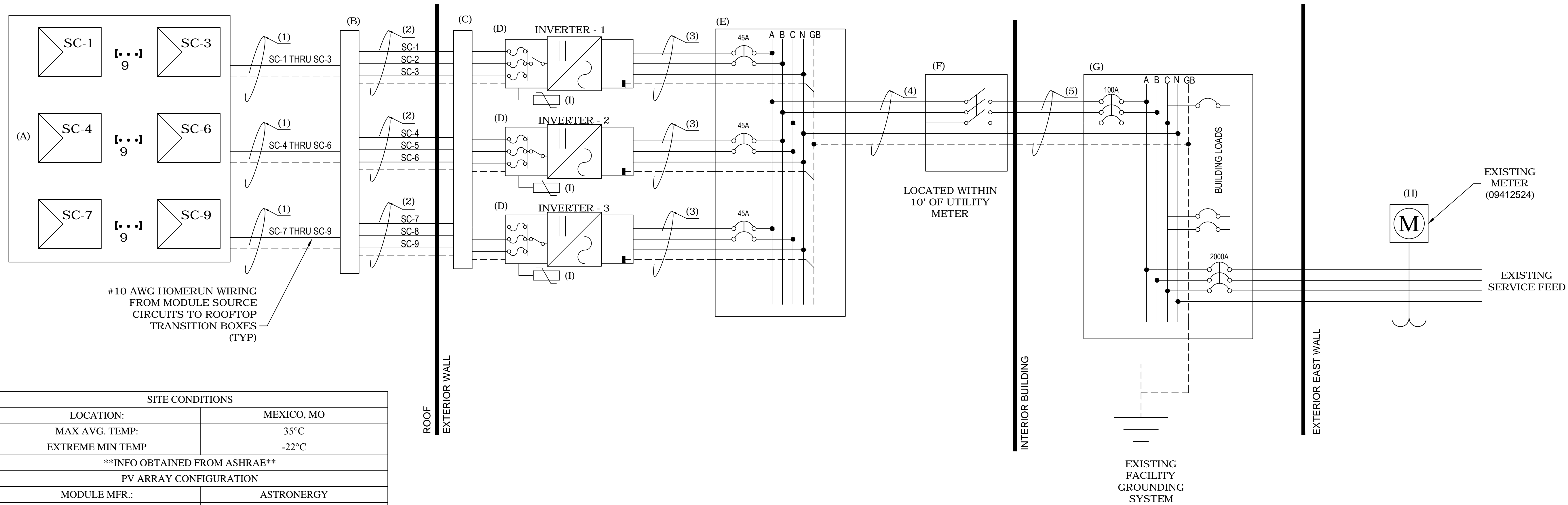
01/24/2014

GERALD CHARLTON, P.E.
BRIGHTERGY, LLC
1617 MAIN STREET 3RD FLOOR
KANSAS CITY, MO 64108
PH. 816-866-0555

ALM AJN MR

ELECTRICAL LINE DIAGRAM

E3



#10 AWG HOMERUN WIRING FROM MODULE SOURCE CIRCUITS TO ROOFTOP TRANSITION BOXES (TYP)

SITE CONDITIONS	
LOCATION:	MEXICO, MO
MAX AVG. TEMP:	35°C
EXTREME MIN TEMP	-22°C
INFO OBTAINED FROM ASHRAE	
PV ARRAY CONFIGURATION	
MODULE MFR.:	ASTRONERGY
MODULE MFR. MODELS:	CHSM6612P-305
MODULE QTY.:	81
MODULES PER SOURCE CIRCUIT:	9
TOTAL SOURCE CIRCUITS:	9
TRANSITION BOX QTY.:	1
PV MODULE OUTPUT FOR ASTRONERGY CHSM6612P-305*	
VOC:	45.29 Vdc
TEMP. COEFFICIENT OF Voc	-0.322 %/°C
ISC	8.95 Adc
VMP	35.77 Vdc
IMP	8.53 Adc
PV SOURCE CIRCUIT OUTPUT FOR SC-1 THRU SC-9*	
VOC:	407.6 Vdc
TEMP. ADJUSTED	469.3 Vdc
ISC	8.95 Adc
VMP	321.9 Vdc
IMP	8.53 Adc
INDIVIDUAL 7KW INVERTER OUTPUT	
TYPE"	SMA SB 7000US
RATED POWER:	7.0 KWac
OPERATING AC VOLTAGE:	208 Vac
MAX. CURRENT:	34 Aac
OUTPUT FREQUENCY	60 Hz
BASED ON MODULE PERFORMANCE AT STANDARD TEST CONDITIONS (STC)	

ID	DESCRIPTION	QTY
(A)	ASTRONERGY CHSM6612P-305 MODULES, NEGATIVE GROUNDED	81
(B)	TRANSITION BOX, SIZE: 12"x12"x6", NEMA 4, ADJACENT TO ARRAY	1
(C)	WIREWAY, 6"x6"x6", NEMA 3R, BELOW INVERTERS	1
(D)	SMA SUNNYBOY 7.0 kW UTILITY INTERACTIVE DC-TO-AC INVERTER, 1-PHASE 3-WIRE, 208VAC, NEMA 3R W/ INTEGRAL DC COMBINER	3
(E)	SOLAR COMBINING PANEL, 225A 250V, 3P, 4W, NEMA 1	1
(F)	PV SYSTEM DISCONNECT FOR UTILITY OPERATION, 100A, NEMA 3R	1
(G)	EXISTING 2000A, 208V, 3P 4W, MAIN DISTRIBUTION PANEL, POINT OF INTERCONNECTION IN SPARE 100A BREAKER	1
(H)	EXISTING BILLING METER	1
(I)	LIGHTNING SUPPRESSOR(S) - PART #LA602 (DC)	3

- NOTES**
- (1) ALL HOMERUN WIRES TO TRANSITION BOXES ARE #10 AWG USE-2/RHW-2 DUAL RATED WIRES. ROUTED AS REQUIRED
 - (2) ALL CONDUIT TO BE EMT, UNLESS OTHERWISE SPECIFIED BY LOCAL AHJ.
 - (3) ALL EQUIPMENT TO BE LABELLED PER NEC REQUIREMENTS
 - (4) SYSTEM TO BE INSTALLED WITH ADEQUATE AC AND DC TRANSIENT VOLTAGE SURGE SUPPRESSION.

ID	MAX AMPERAGE	EST. MAX LENGTH	# OF WIRES	WIRE SIZE (AWG)	VOLTAGE DROP	GROUND SIZE	CONDUIT SIZE
(1)	13.96 Adc	80'	6	#10 USE-2		#6	FREE AIR
(2)	13.96 Adc	40'	6	#10 THWN-2		#6	1-1/2"
(3)	42.5 Aac	10'	3	#8 THWN-2	0.23	#6	1-1/2"
(4)	73.5 Aac	10'	4	#4 THWN-2	0.14	#6	1-1/2"
(5)	73.5 Aac	10'	4	#4 THWN-2	0.14	#6	1-1/2"

- * ALL DC CURRENTS ARE SHORT CIRCUIT VALUES.
- * ALL AC CURRENTS ARE NOMINAL PER-PHASE VALUES.
- * WIRE AMPACITY IS BASED ON NUMBER OF WIRES PER CONDUIT AND HEIGHT ABOVE ROOF. IF CONDUITS ARE INSTALLED DIFFERENTLY THAN SHOWN ABOVE WIRE SIZES MAY BE AFFECTED.
- * ALL CONDUCTORS ARE COPPER 90° C RATED.
- * DUAL RATED (THHN/THWN-2) CONDUCTORS ARE FAVORABLE.

INVERTERS (3), AC DISCONNECTS (1), MAIN PANELBOARD (1), SOLAR COMBINING PANEL (1), & TRANSITION BOXES SHALL REQUIRE THE FOLLOWING LABEL (7)

AUTHORIZED PERSONNEL ONLY

THE UTILITY INTERACTIVE INVERTER(S) SHALL BE LABELED WITH THE FOLLOWING PER NEC ARTICLE 690.5(C) (3 REQUIRED)

WARNING
ELECTRIC SHOCK HAZARD
IF A GROUND FAULT IS INDICATED,
NORMALLY GROUNDED CONDUCTORS MAY
BE UNGROUNDED AND ENERGIZED

THE DC COMBINERS / DC DISCONNECTS & AC DISCONNECTS SHALL BE LABELED WITH THE FOLLOWING PER NEC ARTICLE 690.14(C)(2) & 690.17 (4 REQUIRED)

WARNING!
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND LOAD
SIDES MAY BE ENERGIZED IN THE OPEN
POSITION

THE PV DAS SHALL BE LABELED WITH THE FOLLOWING INFORMATION PER NEC ARTICLE 690.4(D) (1 REQUIRED)

**PHOTOVOLTAIC SYSTEM DATA
ACQUISITION SYSTEM
AUTHORIZED PERSONNEL ONLY**

AC COMBINING PANEL SHALL REQUIRE THE FOLLOWING LABELING (1 REQUIRED PER BRANCH CIRCUIT)

**SOLAR FED BREAKER
INVERTER #1**

**SOLAR FED BREAKER
INVERTER #2**

**SOLAR FED BREAKER
INVERTER #3**

MAIN DISTRIBUTION PANEL SHALL REQUIRE THE FOLLOWING LABELING (1 REQUIRED PER BRANCH CIRCUIT)

SOLAR FED BREAKER

MARKING: 2012 INTERNATIONAL FIRE CODE (IFC) 605.11.1

- THE FOLLOWING LABEL IS REQUIRED ON ALL INTERIOR AND EXTERIOR DIRECT CURRENT (DC) CONDUIT, ENCLOSURES, RACEWAYS AND CABLE ASSEMBLIES EVERY 10 FEET, WITHIN 1 FOOT OF TURNS OR BENDS AND WITHIN 1 FOOT ABOVE AND BELOW PENETRATIONS OF ROOF/CEILING ASSEMBLIES, WALLS OR BARRIERS.

- LABELS ALSO REQUIRED ON ALL DIRECT CURRENT (DC) JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS.

- AN ADDITIONAL LABEL SHALL BE PLACED ADJACENT TO THE MAIN SERVICE DISCONNECT IN A LOCATION CLEARLY VISIBLE FROM THE LOCATION WHERE THE DISCONNECT IS OPERATED.

- MATERIAL SHALL BE REFLECTIVE, WEATHER RESISTANT AND SUITABLE FOR THE ENVIRONMENT. LETTERS SHALL BE CAPITALIZED WITH A MIN. HEIGHT OF 3/8" (9.5MM) WHITE ON RED BACKGROUND.

**WARNING:
PHOTOVOLTAIC POWER SOURCE**

PHOTOVOLTAIC SYSTEM INTERCONNECTION TO MDP & SOLAR COMBINING PANEL SHALL REQUIRE THE FOLLOWING LABELING 690.54 (2 REQUIRED)

**PHOTOVOLTAIC INTERACTIVE SYSTEM
POINT OF INTERCONNECTION**
OPERATING AC VOLTAGE: 208Vac, 3-PHASE
RATED AC OUTPUT CURRENT: 58.8Aac

PHOTOVOLTAIC SYSTEM AC DISCONNECTS SHALL REQUIRE THE FOLLOWING LABELING 690.14(C)(2) & 690.54 (1 REQUIRED)

PHOTOVOLTAIC SYSTEM AC DISCONNECT
OPERATING AC VOLTAGE: 208Vac, 3-PHASE
MAXIMUM OPERATING CURRENT: 58.8Aac

PV OUTPUT CIRCUIT SHALL BE LABELED ON 5-POLE COMBINER / INVERTER'S DC DISCONNECT WITH THE FOLLOWING INFORMATION PER NEC ARTICLE 690.53 & 690.4(B) (3 REQUIRED, 1 PER INVERTER)

**INVERTER #1
GRID TIED PHOTOVOLTAIC POWER SOURCE**
1) MAXIMUM POWER-POINT CURRENT: 25.59Adc
2) MAXIMUM POWER-POINT VOLTAGE: 321.9Vdc
3) MAXIMUM SYSTEM VOLTAGE (ADJUSTED): 469.3Vdc
4) SHORT CIRCUIT CURRENT (ADJUSTED): 33.56Adc

**INVERTER #2
GRID TIED PHOTOVOLTAIC POWER SOURCE**
1) MAXIMUM POWER-POINT CURRENT: 25.59Adc
2) MAXIMUM POWER-POINT VOLTAGE: 321.9Vdc
3) MAXIMUM SYSTEM VOLTAGE (ADJUSTED): 469.3Vdc
4) SHORT CIRCUIT CURRENT (ADJUSTED): 33.56Adc

**INVERTER #3
GRID TIED PHOTOVOLTAIC POWER SOURCE**
1) MAXIMUM POWER-POINT CURRENT: 25.59Adc
2) MAXIMUM POWER-POINT VOLTAGE: 321.9Vdc
3) MAXIMUM SYSTEM VOLTAGE (ADJUSTED): 469.3Vdc
4) SHORT CIRCUIT CURRENT (ADJUSTED): 33.56Adc

WHEN PANELBOARD IS RATED FOR LESS THAN THE SUM OF THE AMPERE RATINGS OF ALL OCPD'S SUPPLYING IT, PV INTERCONNECT BREAKER SHALL BE LABELED AS FOLLOWS, PER NEC 705.12(D)6 (1 REQUIRED)

**WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE**

UTILITY BILLING METER, POINT OF INTERCONNECTION (& MDP, IF SEPARATE), AC COMBINING PANEL, & MAIN PV DISCONNECT SHALL RECEIVE A PERMANENT LABEL, DENOTING ALL ELECTRICAL POWER SOURCES PER NEC ARTICLE 705.12(D)(4) & 705.10 (4 REQUIRED)

**EQUIPMENT FED BY TWO SOURCES:
UTILITY AND PHOTOVOLTAIC SYSTEM,
WITH PV PANELS ON ROOF, AND
INVERTERS LOCATED ON EXTERIOR EAST
WALL**

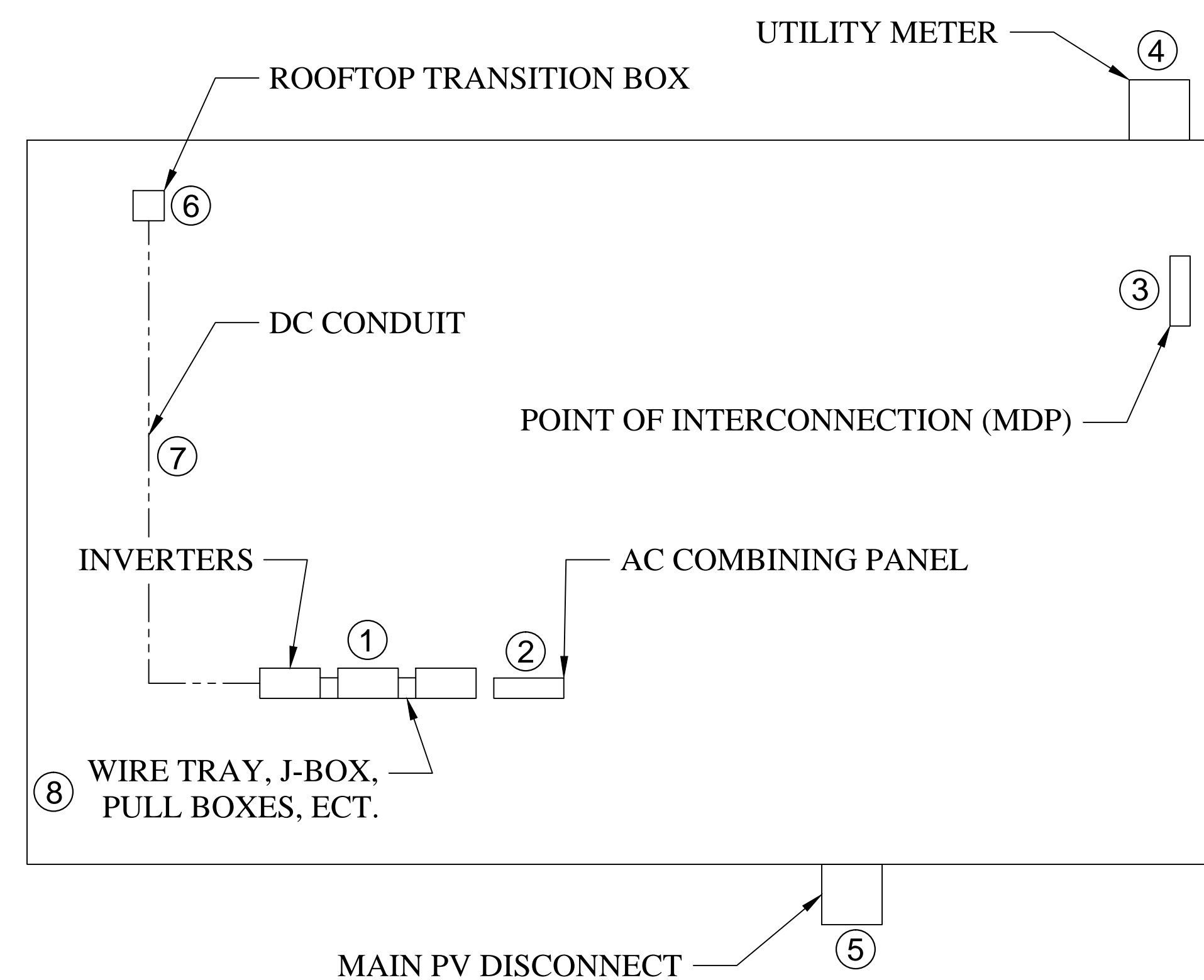
UTILITY ACCESSIBLE DISCONNECT SHALL RECEIVE A PERMANENT ENGRAVED PLAQUE, 3/8" MIN. LETTERING, PER UTILITY REQUIREMENTS (1 REQUIRED)

**PV SYSTEM DISCONNECT
FOR UTILITY OPERATION**

UTILITY BILLING METER & POINT OF INTERCONNECTION (& MDP, IF SEPARATE), SHALL RECEIVE A PERMANENT LABEL, DENOTING ALL ELECTRICAL POWER SOURCES PER NEC ARTICLE 705.12(D)(4) & 705.10 (2 REQUIRED)

**EQUIPMENT FED BY TWO SOURCES:
UTILITY AND PHOTOVOLTAIC SYSTEM,
WITH MAIN PV DISCONNECT LOCATED
ADJACENT TO METER ON EXTERIOR EAST
WALL**

****SAMPLE LAYOUT FOR REFERENCE ONLY****



Brightergy

SOLAR SOLUTIONS

1617 Main St.
Kansas City MO, 64108
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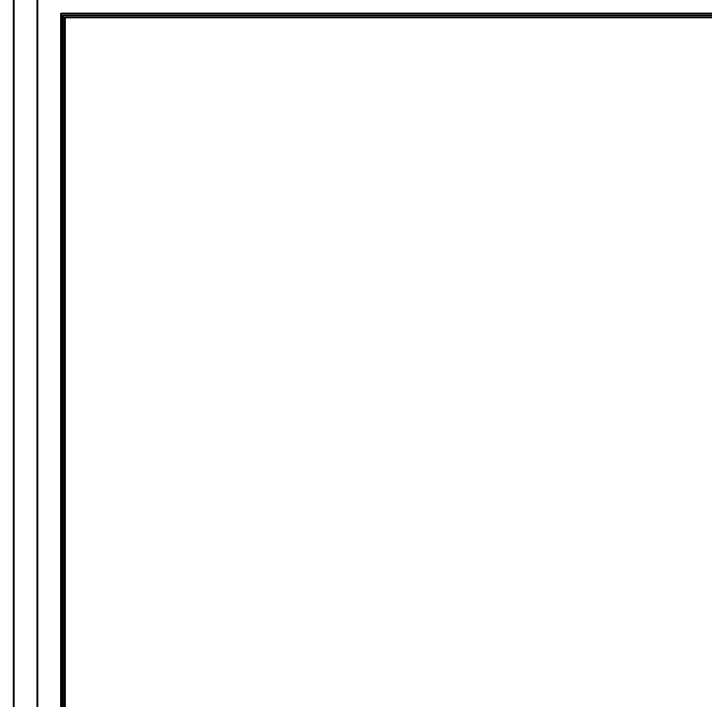
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KANSAS CITY, MO 64108
PH. 816-866-0555

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ALM AJN MR

STAMP:



SHEET TITLE:

**NEC REQUIRED
LABELS**

SHEET NUMBER:

E4

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**ADMINISTRATION
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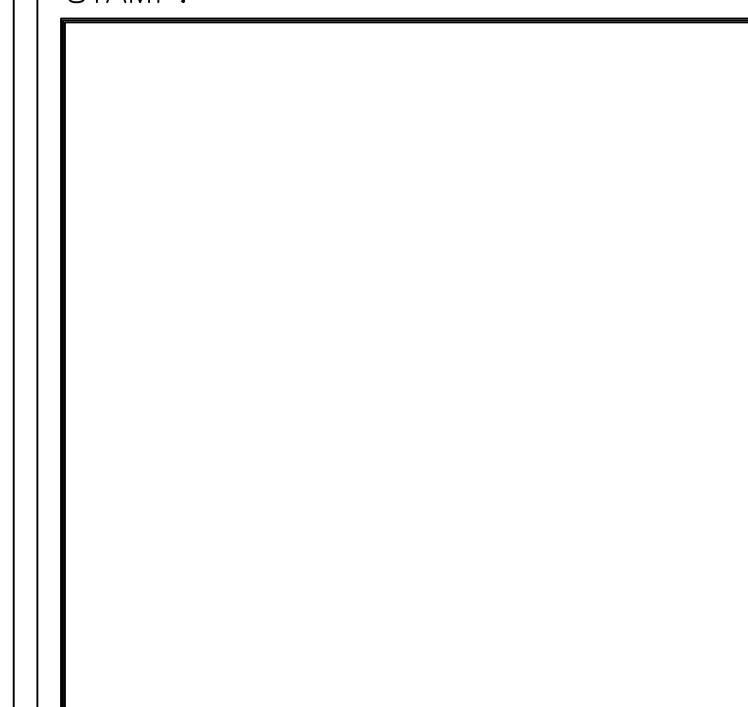
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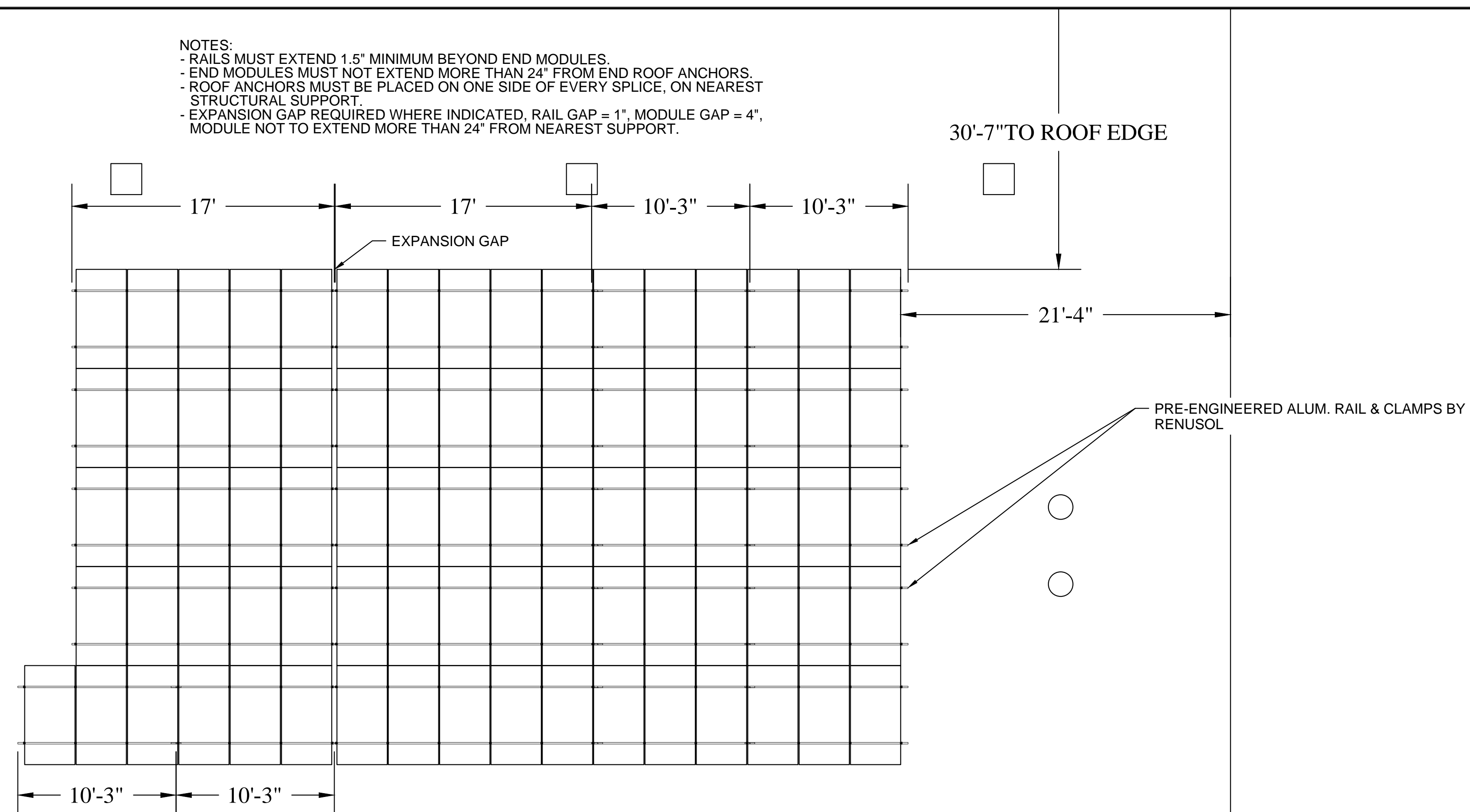
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**RACKING
LAYOUT**

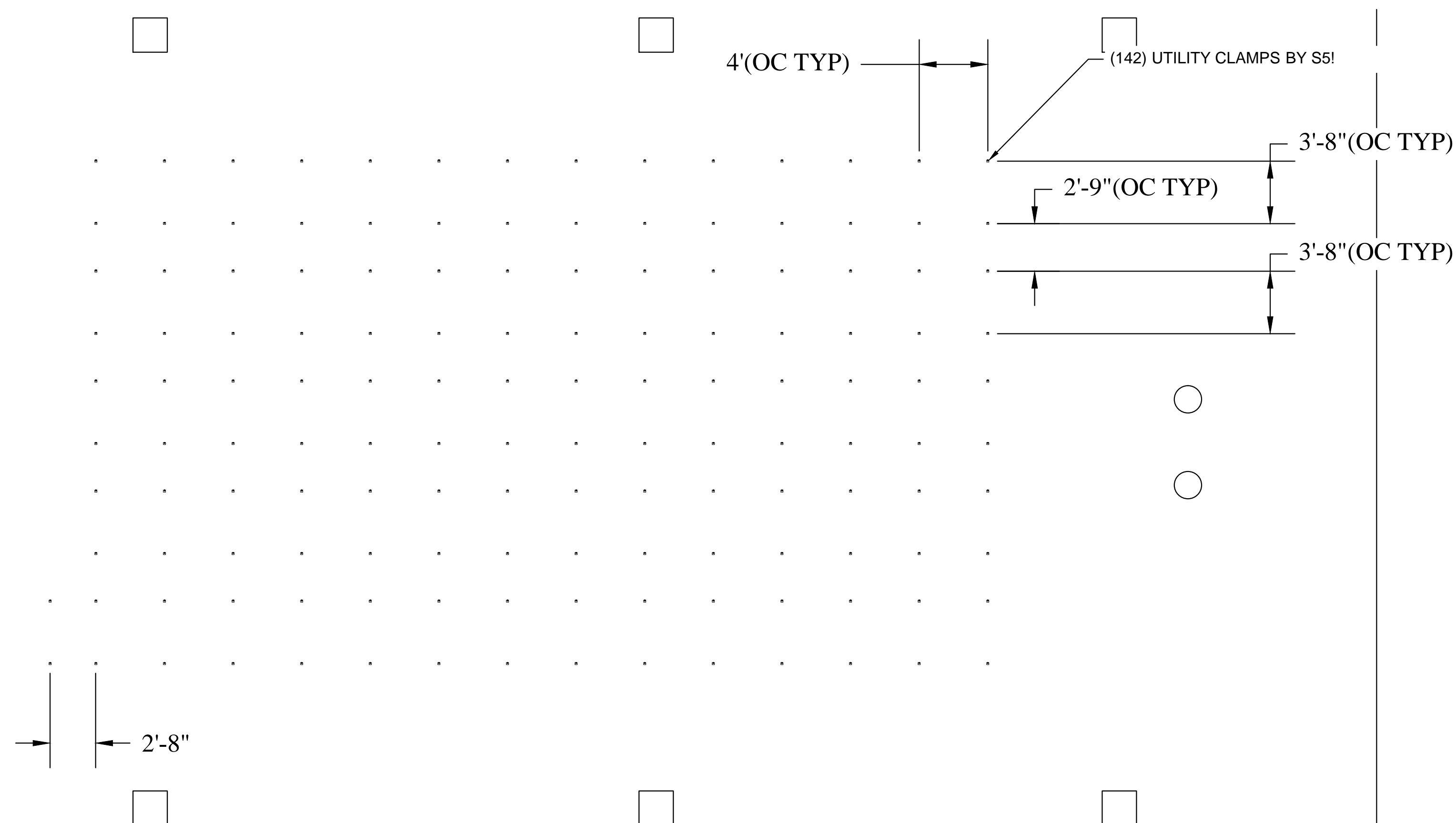
SHEET NUMBER:

S1

- NOTES:
 - RAILS MUST EXTEND 1.5" MINIMUM BEYOND END MODULES.
 - END MODULES MUST NOT EXTEND MORE THAN 24" FROM END ROOF ANCHORS.
 - ROOF ANCHORS MUST BE PLACED ON ONE SIDE OF EVERY SPLICE, ON NEAREST STRUCTURAL SUPPORT.
 - EXPANSION GAP REQUIRED WHERE INDICATED, RAIL GAP = 1", MODULE GAP = 4", MODULE NOT TO EXTEND MORE THAN 24" FROM NEAREST SUPPORT.



1 ARRAY RACKING LAYOUT
SCALE: 3/16" = 1'-0"



2 ROOF ANCHOR LAYOUT
SCALE: 3/16" = 1'-0"

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REV	DATE	BY

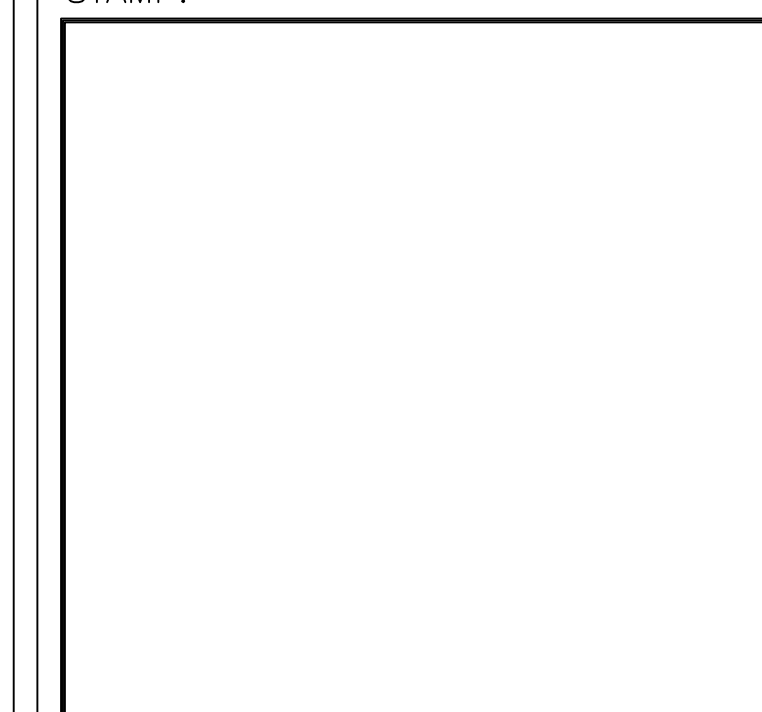
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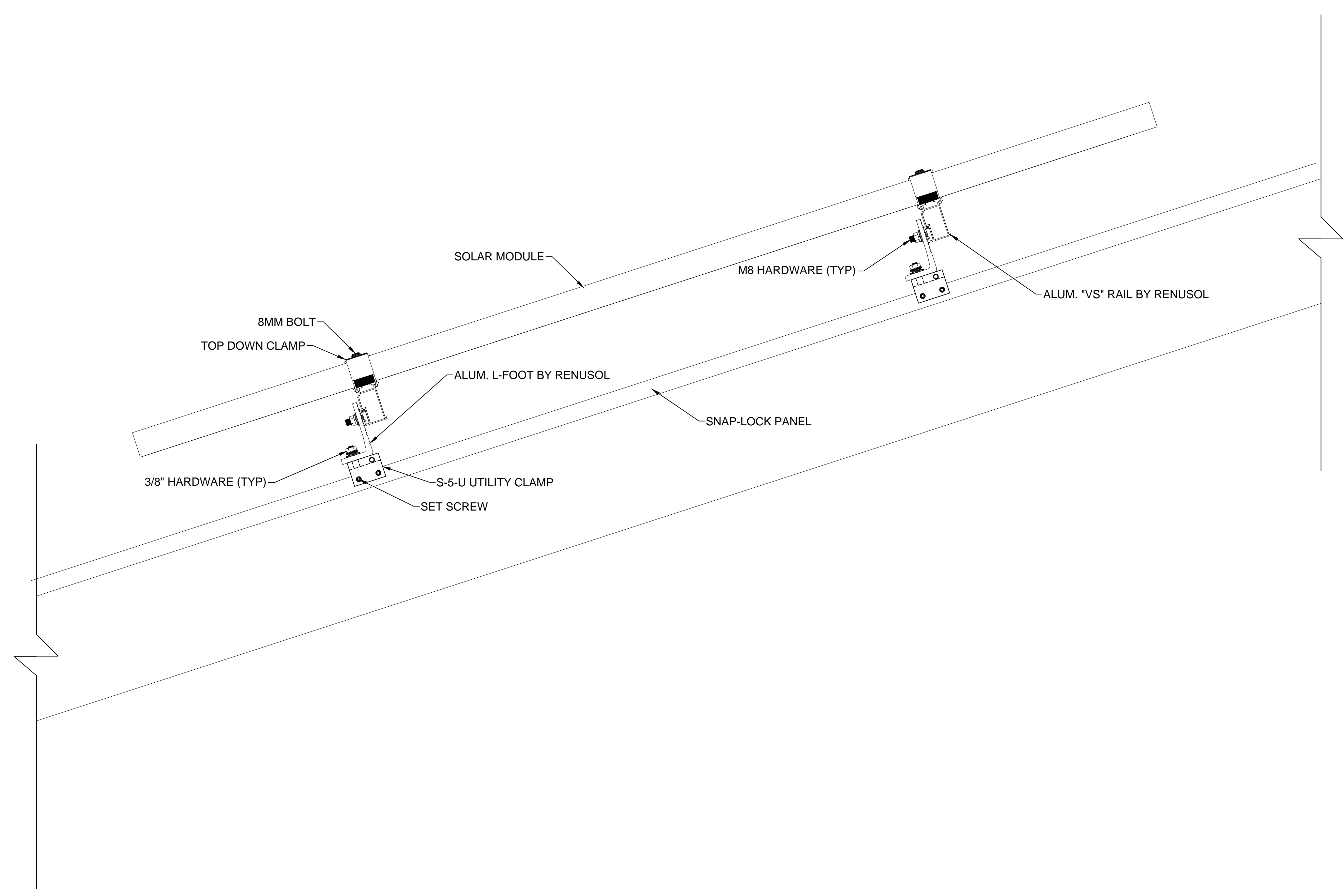


SHEET TITLE:

**RACKING
DETAILS**

SHEET NUMBER:

S2



1 RACKING DETAILS
SCALE: 3" = 1'-0"