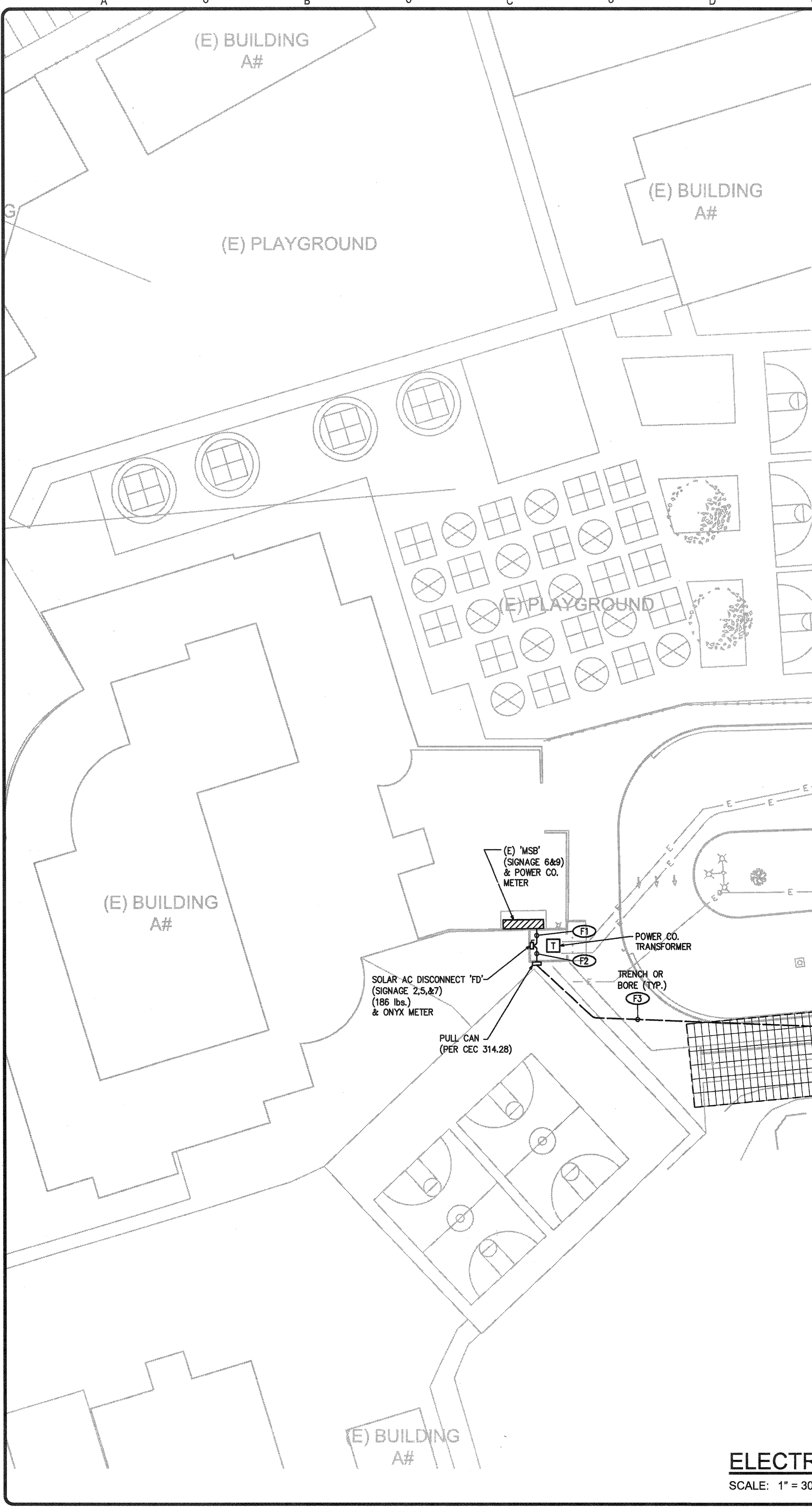


- GENERAL ELECTRICAL NOTES:**
- ALL WORK AND MATERIAL SHALL CONFORM TO 2016 CBC, DSA IR 16-8, 2016 CEC ARTICLE 690 & OTHER APPLICABLE ARTICLES, CODES AND ORDINANCES. IT IS THE INTENTION OF THESE PLANS AND SPECIFICATIONS TO COVER ALL THINGS REQUIRED TO PROVIDE COMPLETE AND OPERATIVE SYSTEMS.
 - ALL EQUIPMENT TO HAVE TESTING LABORATORY LABEL ATTACHED.
 - CONDUCTORS SHALL BE THWN COPPER (CU) UNLESS INDICATED AS ALUMINUM (AL).
 - ELECTRICAL ROUTING IS DIAGRAMMATIC ONLY. ACTUAL ROUTING & PHYSICAL CONDITION MAY VARY. CONTRACTOR TO DETERMINE ACTUAL ROUTING AND PROVIDE ALL RECONNECTIONS & ITEMS NECESSARY FOR COMPLETE & OPERATING SYSTEMS.
 - ALL SOLAR ELECTRICAL EQUIPMENT TO BE UL 1741 LISTED, IEEE 1547 RATED, & APPROVED BY THE CALIFORNIA ENERGY COMMISSION.
 - ELECTRICAL EQUIPMENT (BRANDS "OR EQUAL" NOTE REQUIRED). OR EQUAL MATERIALS NEED TO BE APPROVED BY OWNER OR OWNER'S REPRESENTATIVE. LAYOUT LOCATIONS ARE REPRESENTATIVE AND ARE SUBJECT TO CHANGE WITH APPROVAL OF OWNER AND PERMITTING AUTHORITY, ETC.
 - PROVIDE "CAUTION: SOLAR CIRCUITS" AFFIXED LABEL ON PV CONDUIT RUNS, BOXES, & CONDUIT BODIES INSIDE BUILDING.
 - STRING 1000V DC UL4703 (PV-WIRE) CABLING SHALL BE SUPPORTED TO MODULE & ARRAY STRUCTURE WITH WILEY ACME CABLE CLIPS.
 - ALL INVERTER DC STRING FUSES ARE 15 AMP UNLESS NOTED OTHERWISE.
 - HORIZONTAL DIRECTIONAL BORING OR TRENCHING FOR UNDERGROUND CONDUIT RUNS.
 - WHERE FEEDER CONDUCTORS ARE OVSIZED FOR VOLTAGE DROP, PROVIDE CONDUCTOR REDUCING MEANS TO ACCOMMODATE INVERTER, PANEL, & DISCONNECT LUGS, SIZED PER CEC AMPACITY REQUIREMENTS. THE MINIMUM CONDUCTOR SIZE, FOR CIRCUIT BREAKERS LISTED FOR 75°C TERMINATING, SHALL BE:
 23kW INVERTER #6, #8 GND. (AL)
 28kW INVERTER #4, #6 GND. (AL)
 36kW INVERTER #4, #6 GND. (AL)
 50kW INVERTER #2, #6 GND. (AL)
 60kW INVERTER #2, #6 GND. (AL)

- ELECTRICAL SYMBOLS:**
- CONDUIT OR CABLE RUN ABOVE GRADE
 - CONDUIT OR CABLE RUN UNDERGROUND
 - CONDUIT STUB OUT
 - A-2 HOMERUN OF CONDUIT AND WIRING, CIRCUIT NO. 2 TO PANEL 'A'
 - POWER EQUIPMENT AS NOTED
 - INVERTER AS NOTED
 - JUNCTION BOX
 - GROUND
 - TRANSFORMER
 - CIRCUIT BREAKER
 - 600V 3 POLE LOCKABLE & VERIFIABLE AC DISCONNECT SWITCH
 - FUSE
 - METER
 - PARKING LOT LIGHT, POLE, & CONCRETE BASE
 - LED LIGHT FIXTURE, SURFACE MOUNTED
 - (E) EXISTING
 - (N) NEW



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IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
A# 03-117835
AC: FLS SS: TN
DATE: JAN 17 2017

REVISIONS		
MARK	DATE	DESCRIPTION

PROJECT#
ACCOUNTING #
4 STEEL JOB # 16-1312
DATE 01-13-17
DRAWN BY HDE
CHECKED RJH

ELECTRICAL SITE PLAN
CT-E1.0

NOTE: IF DWG. IS NOT 24 X 36, IT IS NOT FULL SIZE.

FEEDER SCHEDULE

No.	Feeder Origin	Feeder Destination	Potential at Origin (Pi) (Volts)	Phase	Design Current (Amps)	Raceway Type	Sets of Cond.	Conductor Trade Size	Conductor Cross-Sectional Area (CM)	Conductor Material	DC Conductor Material Constant (K)	Q	Distance (ft)	Voltage Drop (Vd) (Volts)	Potential at Load (Pl) (Volts)	Percent Voltage Drop (%Vd)	Total Voltage Drop (%Vd AC)	Conduit & Conductors
F1	MSB	AC Disconnect	480	Three	480	Steel	2	350 kCMIL	700000	CU	12.9	1.0627	15	0.24	479.76	0.05	0.05	TWO: 3" C-4#350 KCMIL, 1#2/0 GND. (CU)
F2	AC Disconnect	Pull Can	480	Three	480	Steel	2	500 kCMIL	1000000	AL	21.2	1.0613	10	0.19	479.81	0.04	0.09	TWO: 3-1/2" C-4#500 KCMIL, 1#2/0 GND. (AL)
F3	Pull Can	Panel 'S'	480	Three	480	PVC	2	500 kCMIL	1000000	AL	21.2	1.0142	230	4.11	475.89	0.86	0.95	TWO: 4" C-4#500 KCMIL, 1#2/0 GND. (AL)
F4	Panel 'S'	Inverter No. 1	480	Three	60	Steel	1	2	66360	AL	21.2	1.0031	10	0.33	479.67	0.07	1.02	1-1/2" C-4#2, 1#6 GND. (AL)
F5	Panel 'S'	Inverter No. 2	480	Three	60	Steel	1	2	66360	AL	21.2	1.0031	35	1.17	478.83	0.24	1.19	1-1/2" C-4#2, 1#6 GND. (AL)
F6	Panel 'S'	Inverter No. 3	480	Three	60	Steel	1	2	66360	AL	21.2	1.0031	35	1.17	478.83	0.24	1.19	1-1/2" C-4#2, 1#6 GND. (AL)
F7	Panel 'S'	Inverter No. 4	480	Three	60	PVC	1	1	83690	AL	21.2	0.9881	195	5.07	474.93	1.06	2.00	1-1/2" C-4#1, 1#6 GND. (AL)
F8	Panel 'S'	Inverter No. 5	480	Three	60	PVC	1	1/0	105600	AL	21.2	0.9950	195	4.05	475.95	0.84	1.79	2" C-4#1/0, 1#4 GND. (AL)
F9	Panel 'S'	Inverter No. 6	480	Three	60	PVC	1	1	83690	AL	21.2	0.9881	195	5.07	474.93	1.06	2.00	1-1/2" C-4#1, 1#6 GND. (AL)
F10	Panel 'S'	Inverter No. 7	480	Three	60	PVC	1	1/0	105600	AL	21.2	0.9950	195	4.05	475.95	0.84	1.79	2" C-4#1/0, 1#4 GND. (AL)
F11	Panel 'S'	Inverter No. 8	480	Three	60	PVC	1	3/0	167800	AL	21.2	1.0317	220	2.98	477.02	0.62	1.57	2" C-4#3/0, 1#4 GND. (AL)

600V HEAVY DUTY AC VERIFIABLE DISCONNECT SCHEDULE (WITH CLASS 'J' CURRENT LIMITING FUSING)

DISCONNECT SIZE (VERIFIABLE)	MANUFACTURER'S CAT NO.	AIC RATING
600A 4PSN 600VAC	SQUARE D #H366 NR	200,000 AIC

SYSTEM SUMMARY

MODULE MODEL	SUN EDISON SILVANTIS F335EzC
MODULE STC DC RATING	335W
TOTAL MODULE COUNT	1440
TOTAL STC DC SYSTEM SIZE	482.4kW
TOTAL AC SYSTEM SIZE	400kW
INVERTER MODEL	(8) CHINT POWER CPS SCA50KTL-DO/US-480
MODULE TILT	7.5°
ARRAY AZIMUTH	174.5° & 177.5°
POINT OF SERVICE FAULT CURRENT CONTRIBUTION	3,480 AIC
POINT OF SERVICE RATING	65,000 AIC

STRING DC WIRE SIZE CALCULATION

Isc: 9.29 x 1.56 = 14.49A
 #10 AWG = 40A (90°C) (PER TABLE CEC 310.16)

21-30 CURRENT CARRYING CONDUCTORS IN A RACEWAY (SHARED CONDUIT) (PER TABLE CEC 310.15(B)(2)(a) = 0.45)

40A x 0.45 = 18.0A > 14.49 A ALLOWABLE
 #10 AWG CONDUCTOR IS ALLOWABLE

STRING VOLTAGE DROP CALCULATION

INVERTER NO. 1
 Vmp: 682.2 VDC, Imp: 8.85 A @ 160 FT (WORST CASE FROM ARRAY TO INVERTER)
 #10 AWG cir. mils. = 10380
 $2 \times 12.9 \times 160 \times 8.85 / 10380 = 3.52 \text{ VDC lost}$
 $3.52 \text{ V} / 682.2 \text{ VDC} = 0.52\% \text{ VOLTAGE DROP}$
 INVERTER NO. 2 = 0.18% VOLTAGE DROP (55')
 INVERTER NO. 3 = 0.50% VOLTAGE DROP (155')
 INVERTER NO. 4 = 0.36% VOLTAGE DROP (110')
 INVERTER NO. 5 = 0.68% VOLTAGE DROP (210')
 INVERTER NO. 6 = 0.36% VOLTAGE DROP (110')
 INVERTER NO. 7 = 0.68% VOLTAGE DROP (210')
 INVERTER NO. 8 = 0.92% VOLTAGE DROP (285')

50 KW INVERTER AC WIRE & OCPD CALCULATION

INVERTER:
 AC Output Power: 60.0A AC Output Current Max
 $60.0A \times 1.25 = 75.0A$
 80 AMP OCPD PER 50kW INVERTER OUTPUT

#2 AWG THWN-2 = 90A (75°C) (PER TABLE CEC 310.16) (CU)

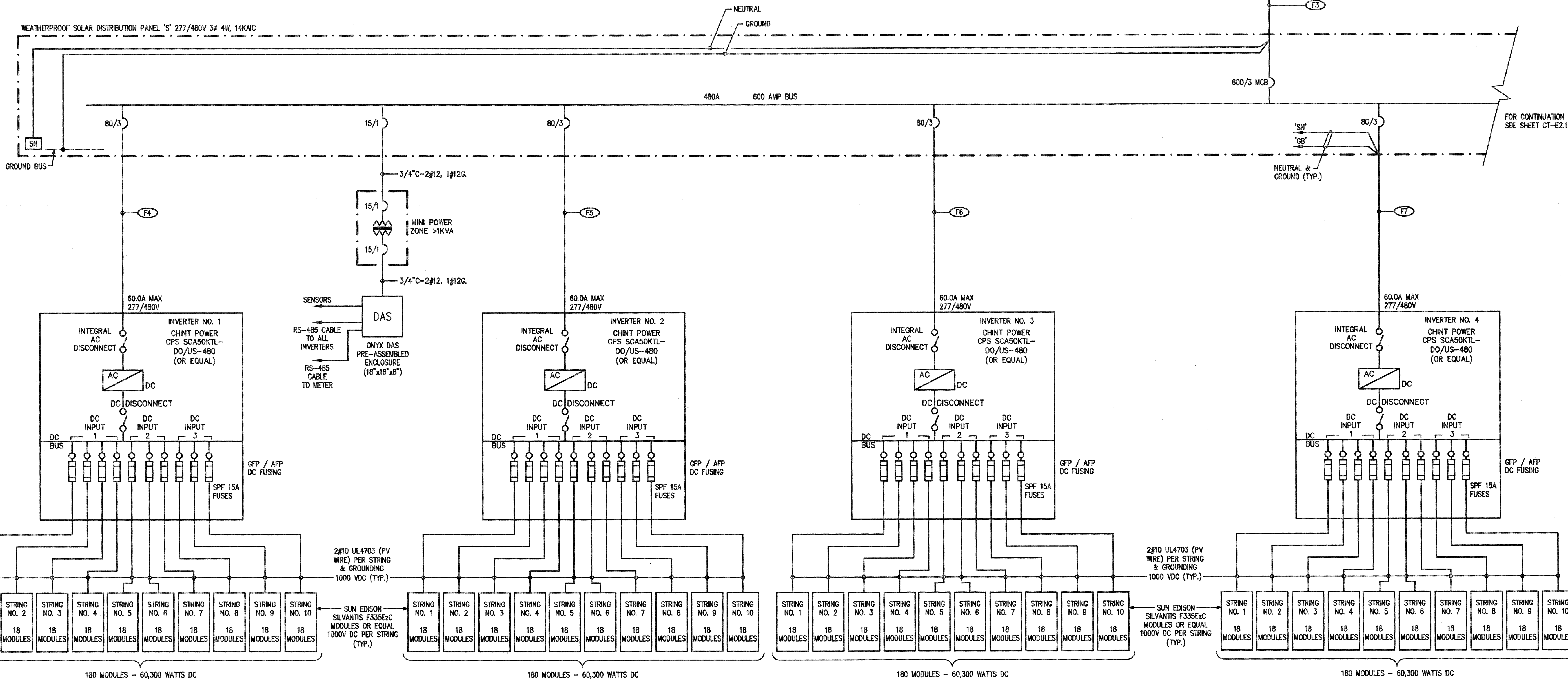
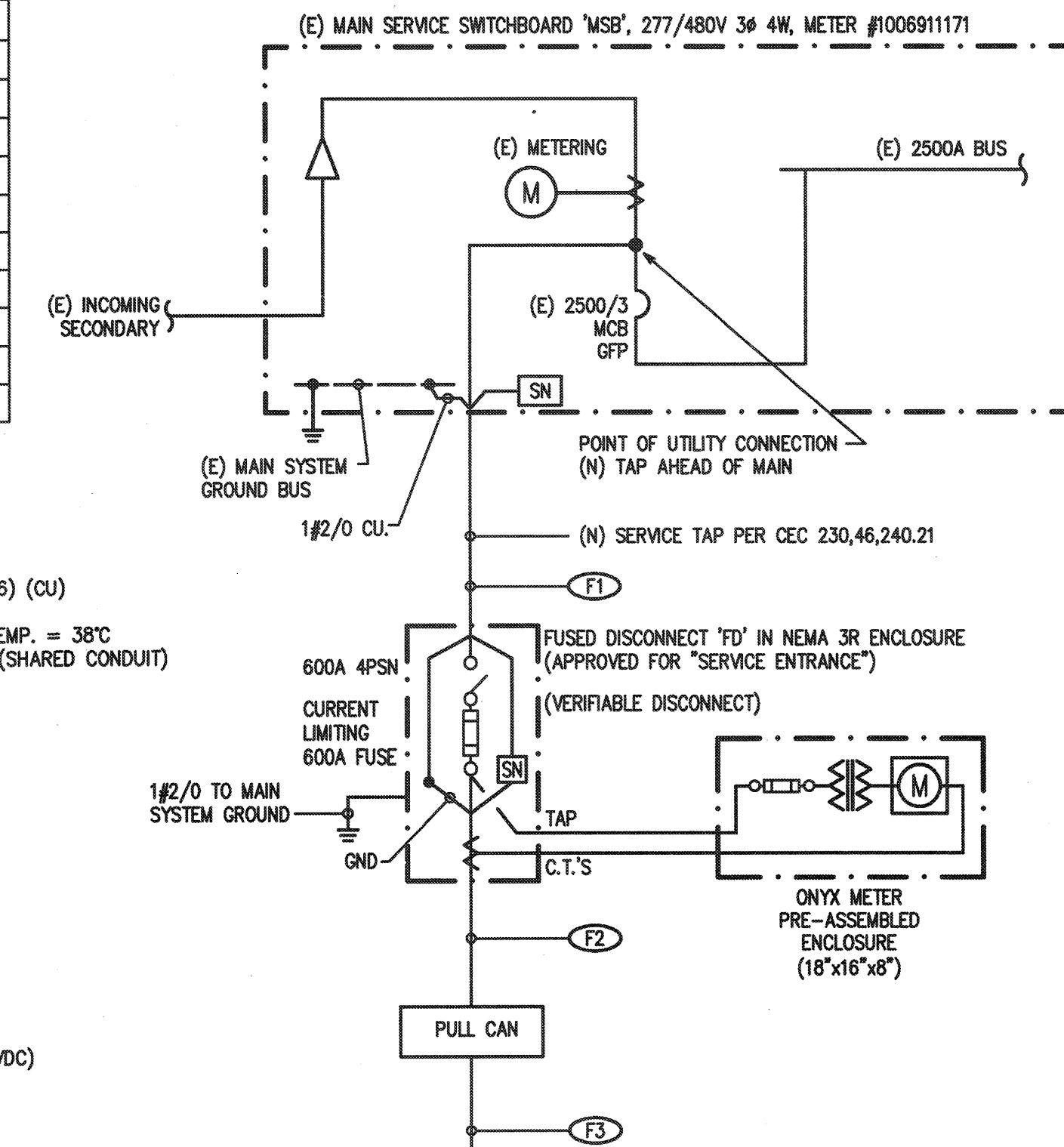
TEMP. CONDITIONS: OUTDOOR WIRE RUN - AMBIENT TEMP. = 38°C
 (3) CURRENT CARRYING CONDUCTORS IN A RACEWAY (SHARED CONDUIT) (PER TABLE CEC 310.15(B)(3)(a) = 1.0)

90A x 1.0 = 90A = 90A TEMP. ADJUSTED
 #2 CURRENT = 90A @ 60°C PER CEC 110.14(C)
 #2 AWG CONDUCTOR IS MINIMUM ALLOWABLE (CU)

MAX/COLD TEMP PV VOLTAGE CALCULATION

SUN EDISON SILVANTIS F335EzC
 Voc: 46.4V
 Temp. Coefficient: -0.33%/°C
 Record Low Temp*: -3.3°C (28.3°F)
 # Modules in Series: 18
 $(46.4 \text{ V}) \times (0.0033 \text{ V/°C}) \times (28.3) = 4.33 \text{ V}\Delta$
 $46.4 \text{ Voc} + 4.33 \text{ V}\Delta = 50.73 \text{ Voc(corr)}$
 $(50.73 \text{ V}) \times (18) = 913.2 \text{ VDC max (this is < 1000 VDC)}$

* = Per ASHRAE table



SINGLE LINE DIAGRAM 482.40 KW TOTAL

SCALE: NONE

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IDENTIFICATION STAMP
 DIV. OF THE STATE ARCHITECT
 A#03-117835
 AC FLS SS TJ
 DATE JAN 17 2017

REVISIONS

MARK	DATE	DESCRIPTION

PROJECT#

ACCOUNTING #

4 STEL JOB # 16-1312

DATE 01-13-17

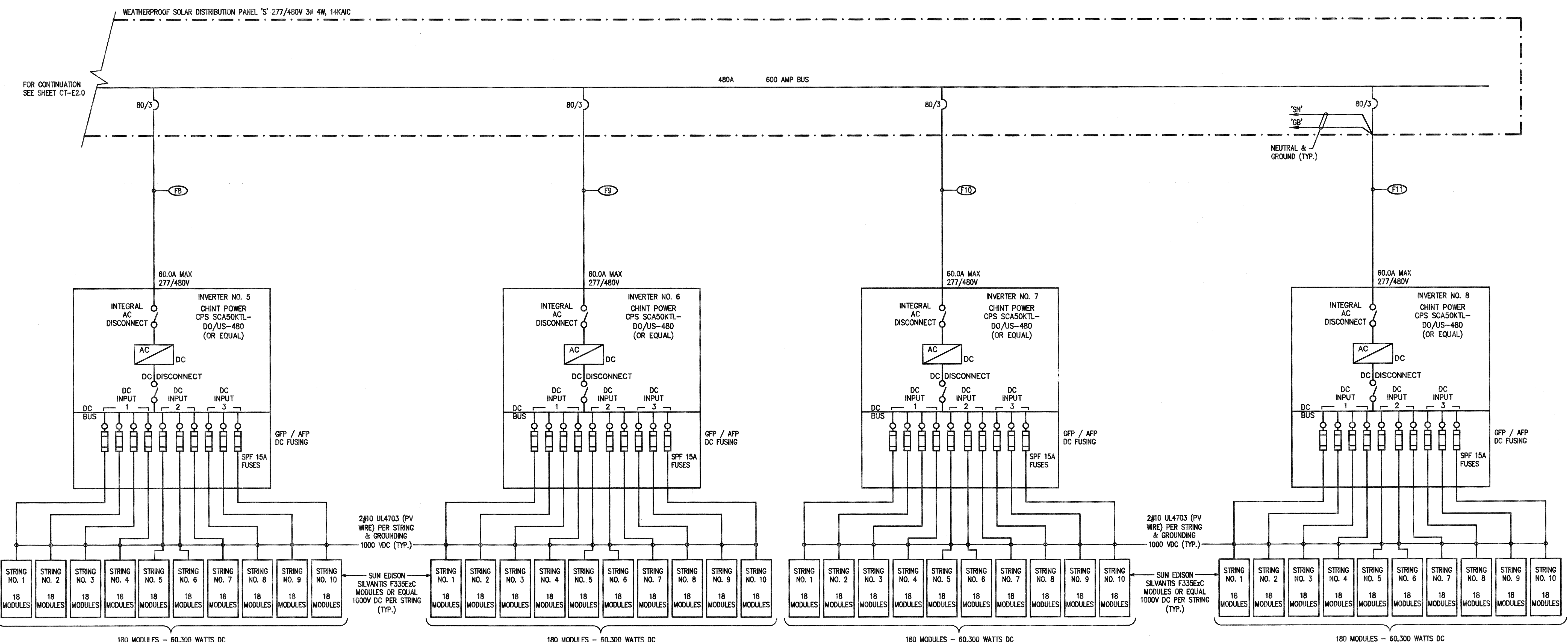
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CHECKED RJH

ELECTRICAL SINGLE LINE DIAGRAM

CT-E2.0

NOTE: IF DWG. IS NOT #4-38, IT IS NOT FULL SIZE



SINGLE LINE DIAGRAM 489.60 KW TOTAL
SCALE: NONE

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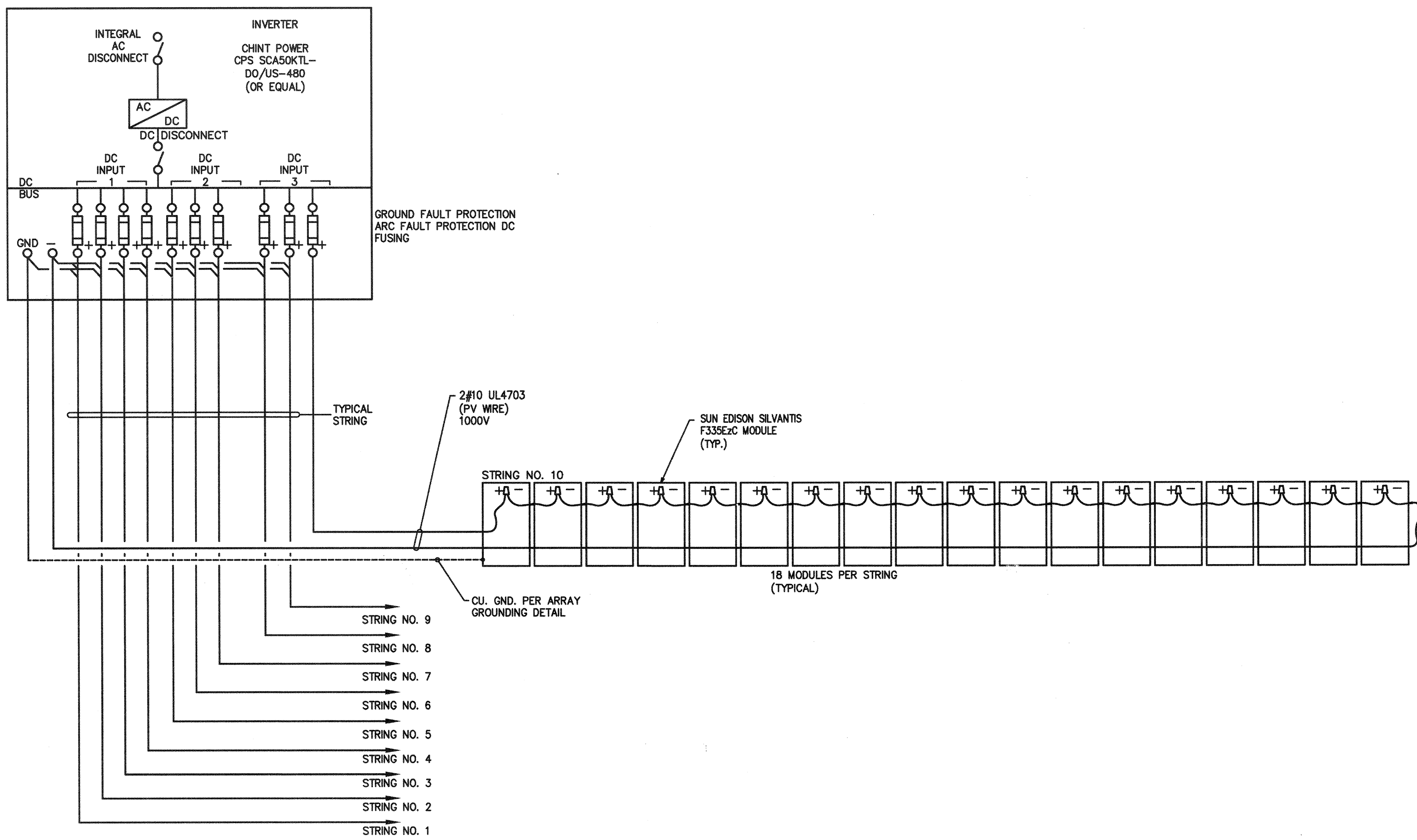
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4 STEEL JOB # 16-1312
DATE 01-13-17
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ELECTRICAL SINGLE LINE DIAGRAM

CT-E2.1

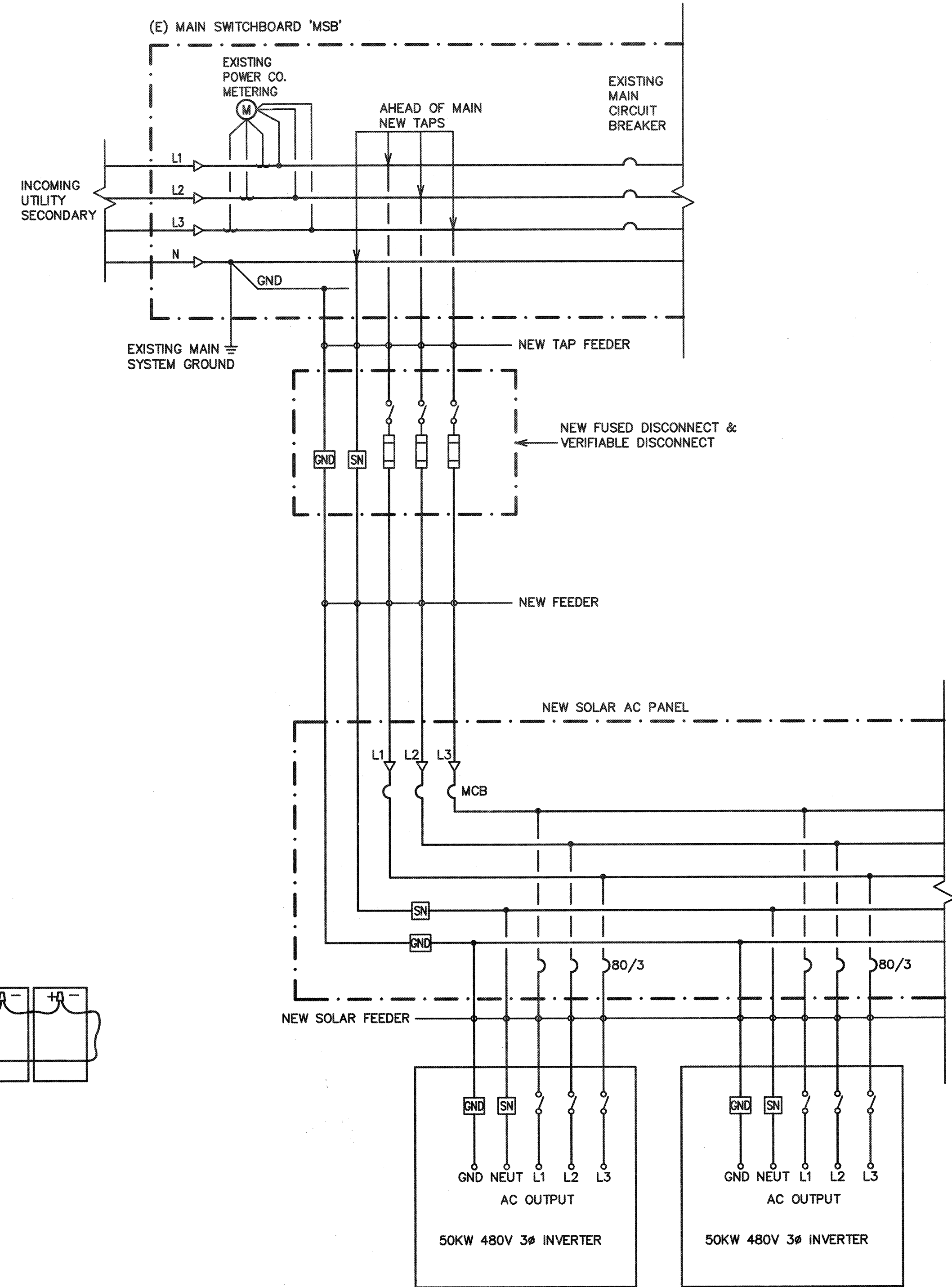
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TYPICAL DC LINE DIAGRAM

SCALE: NONE



TYPICAL THREE LINE DIAGRAM

SCALE: NONE

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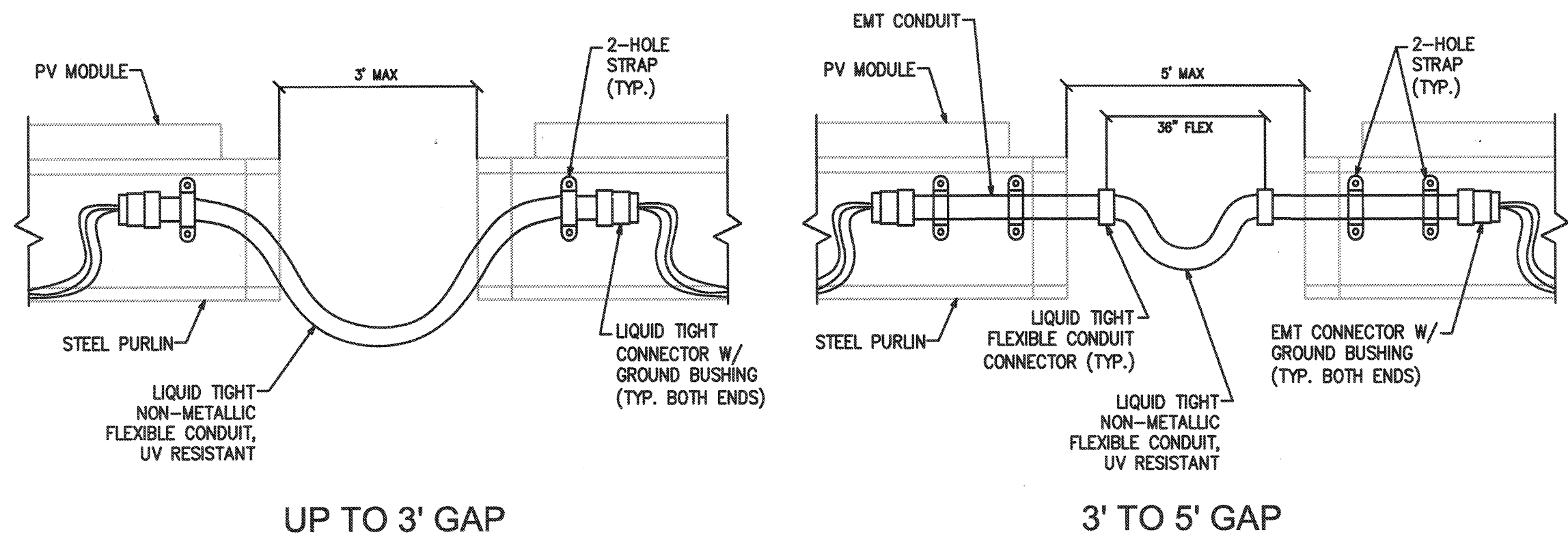
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REVISIONS		
MARK	DATE	DESCRIPTION

PROJECT#
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4 STEL JOB # 16-1312
DATE 01-13-17
DRAWN BY HDE
CHECKED RJH

TYPICAL ELEC. THREE LINE DIAGRAM

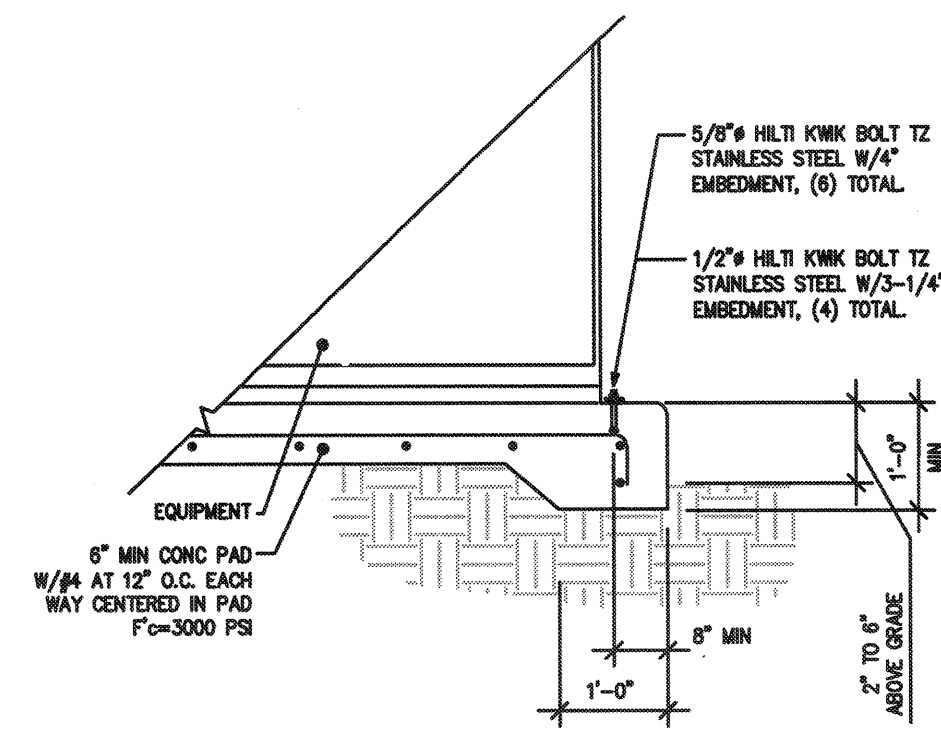
CT-E3.0



WIRING BRIDGE DETAIL

NO SCALE

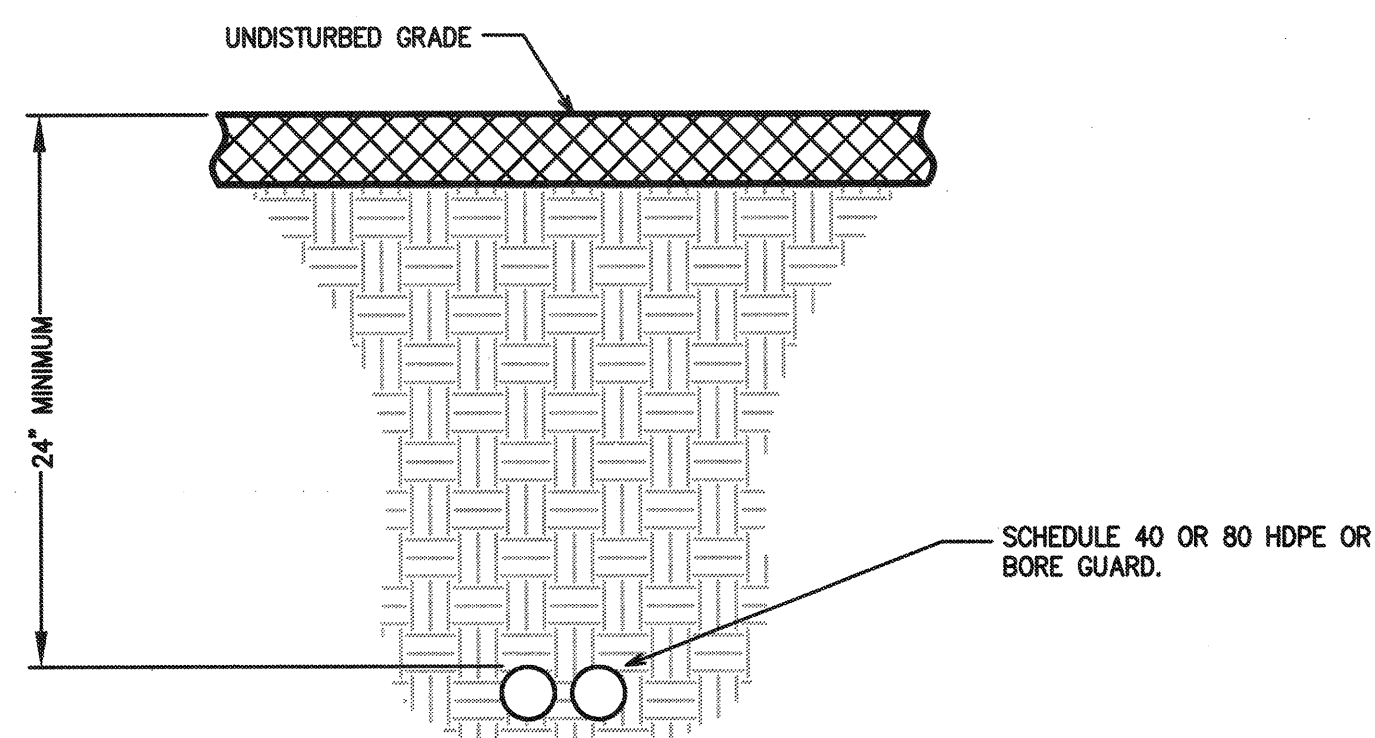
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EQUIPMENT PAD & ANCHORAGE DETAIL

NO SCALE

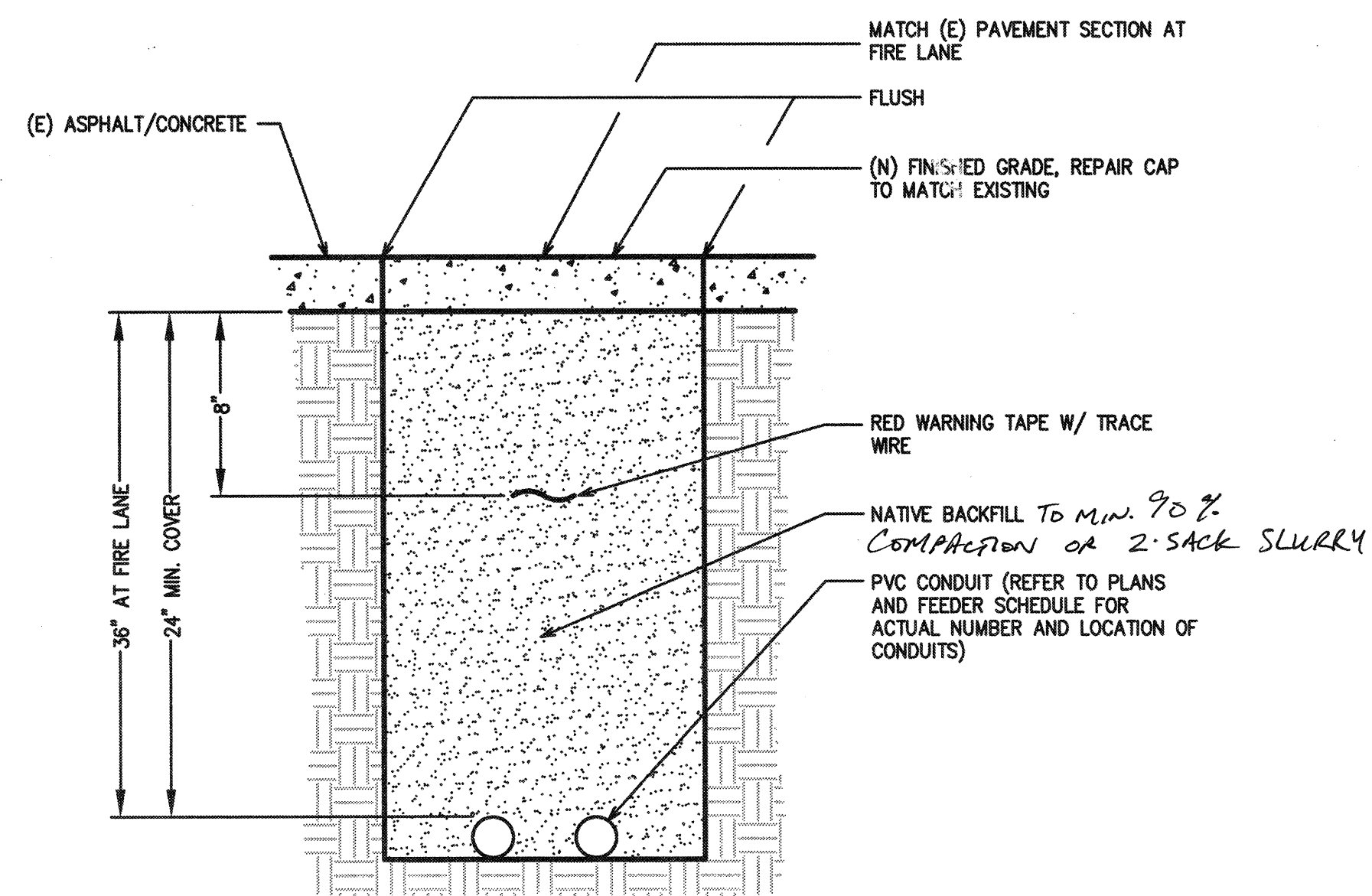
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HORIZONTAL BORE DETAIL

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

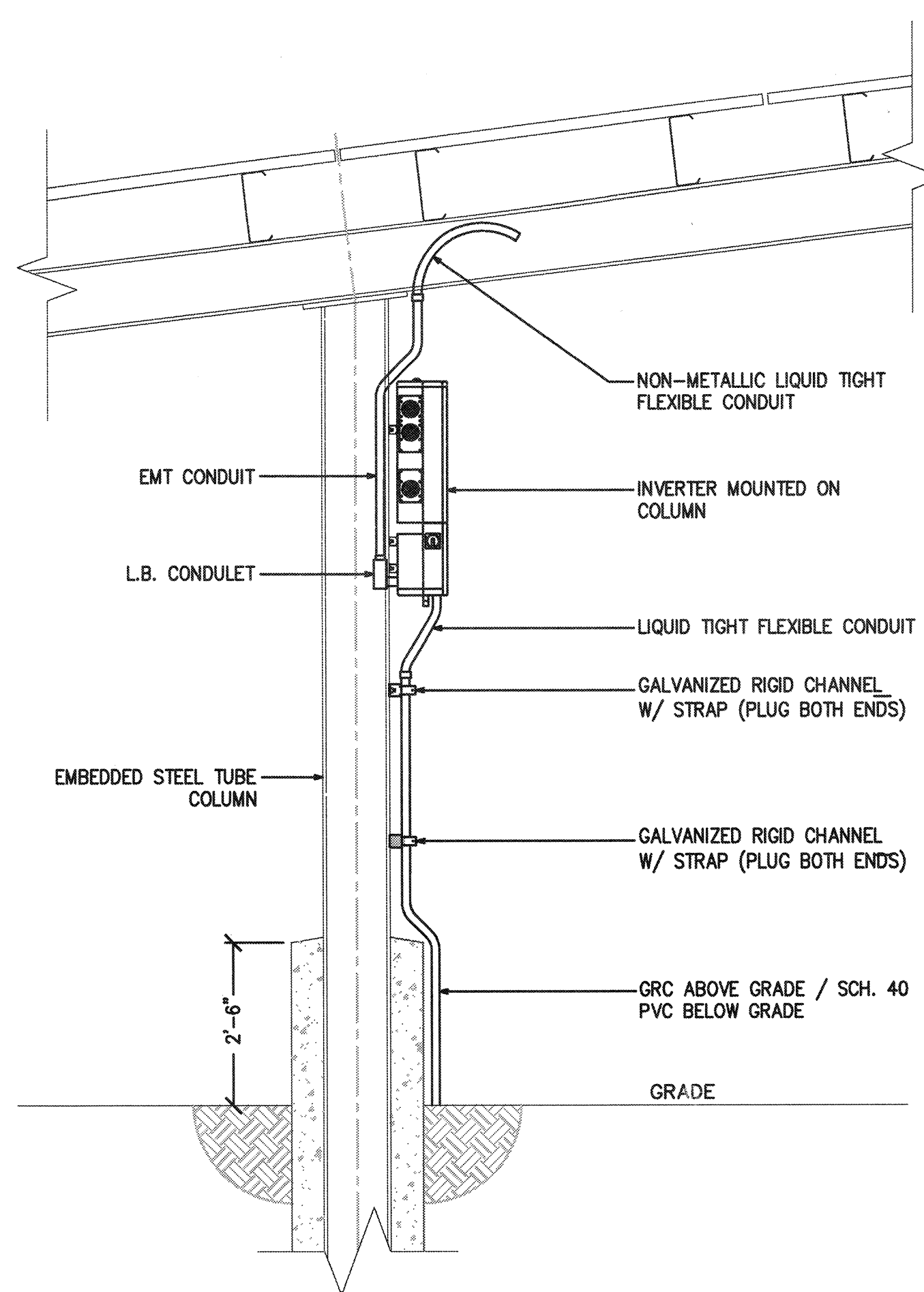
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TRENCH THROUGH PAVEMENT TRAFFIC DETAIL

NO SCALE

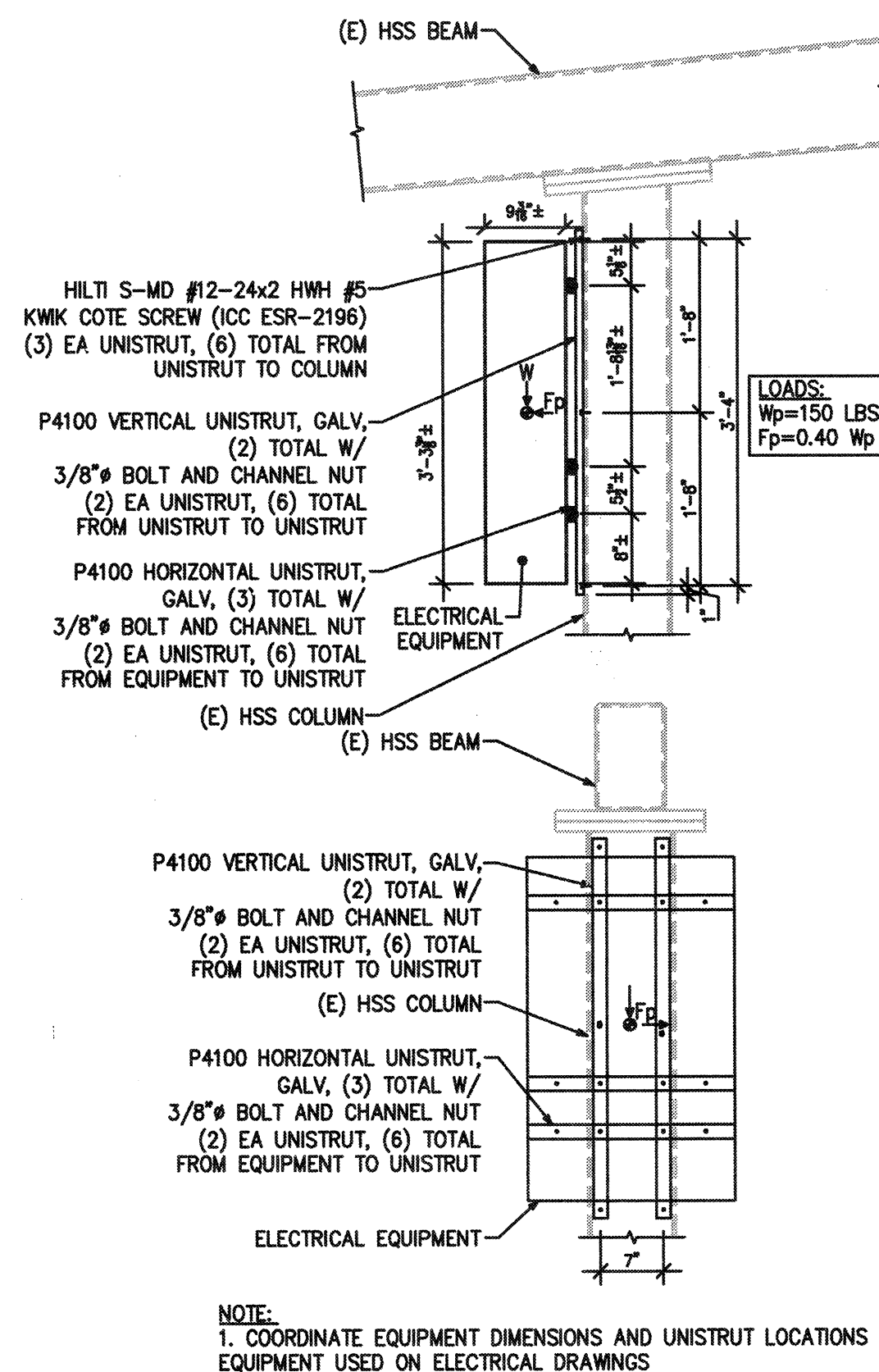
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TYPICAL SHADE STRUCTURE CONDUIT RISER DETAIL

NO SCALE NOTE: ONE REQUIRED PER ARRAY STRUCTURE

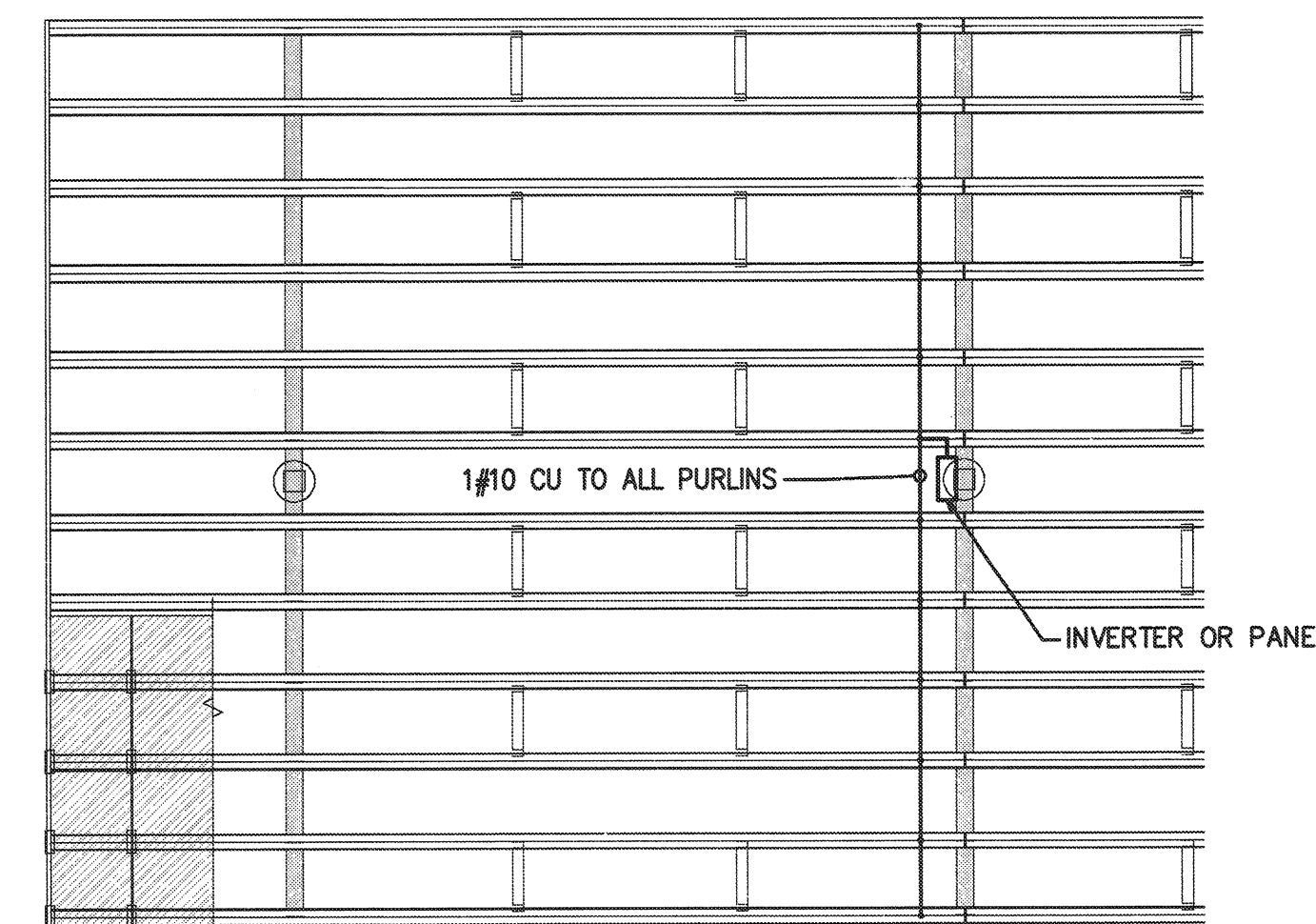
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COLUMN MOUNTED EQUIPMENT ANCHORAGE DETAIL

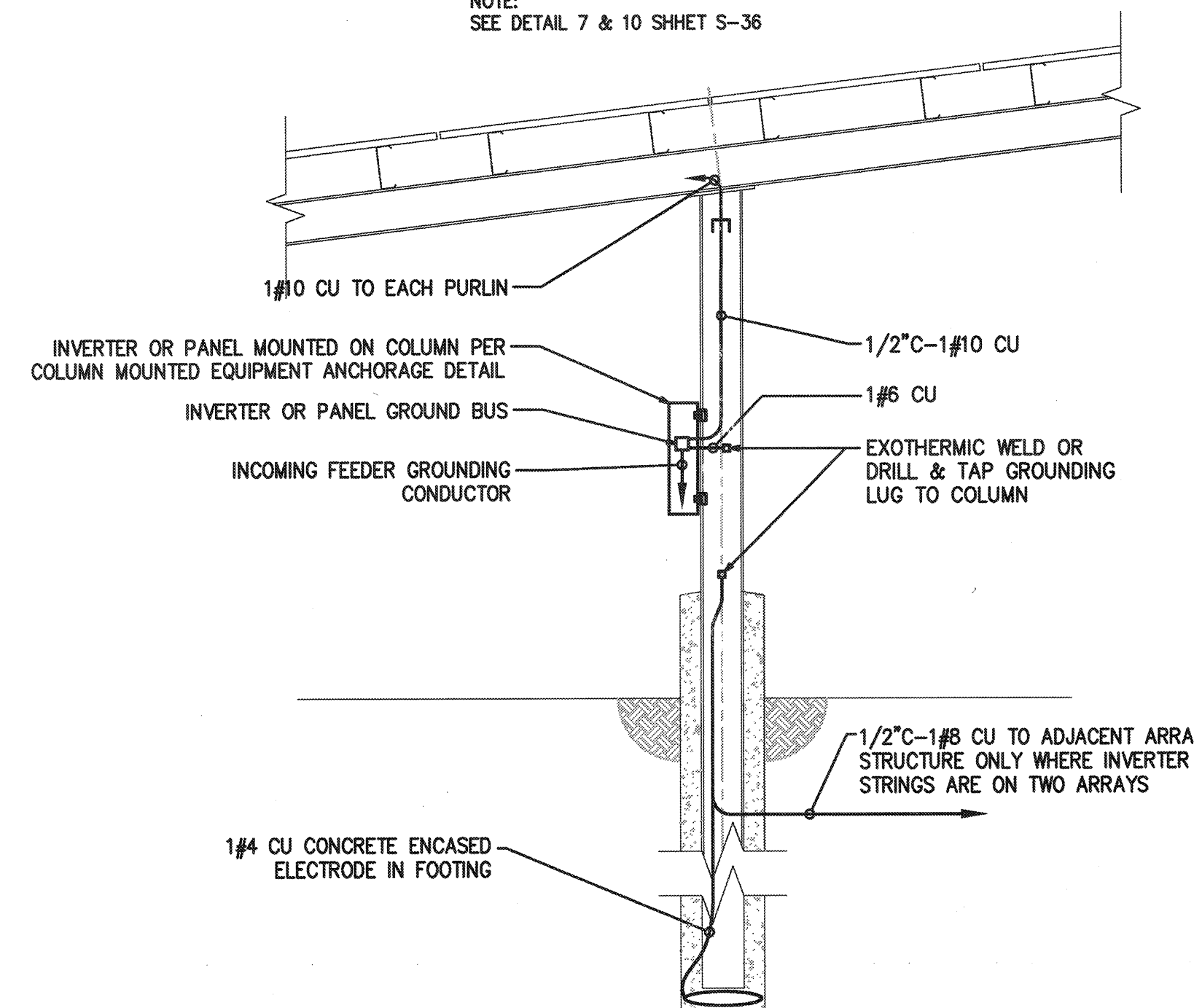
NO SCALE

6



ARRAY GROUNDING DETAIL

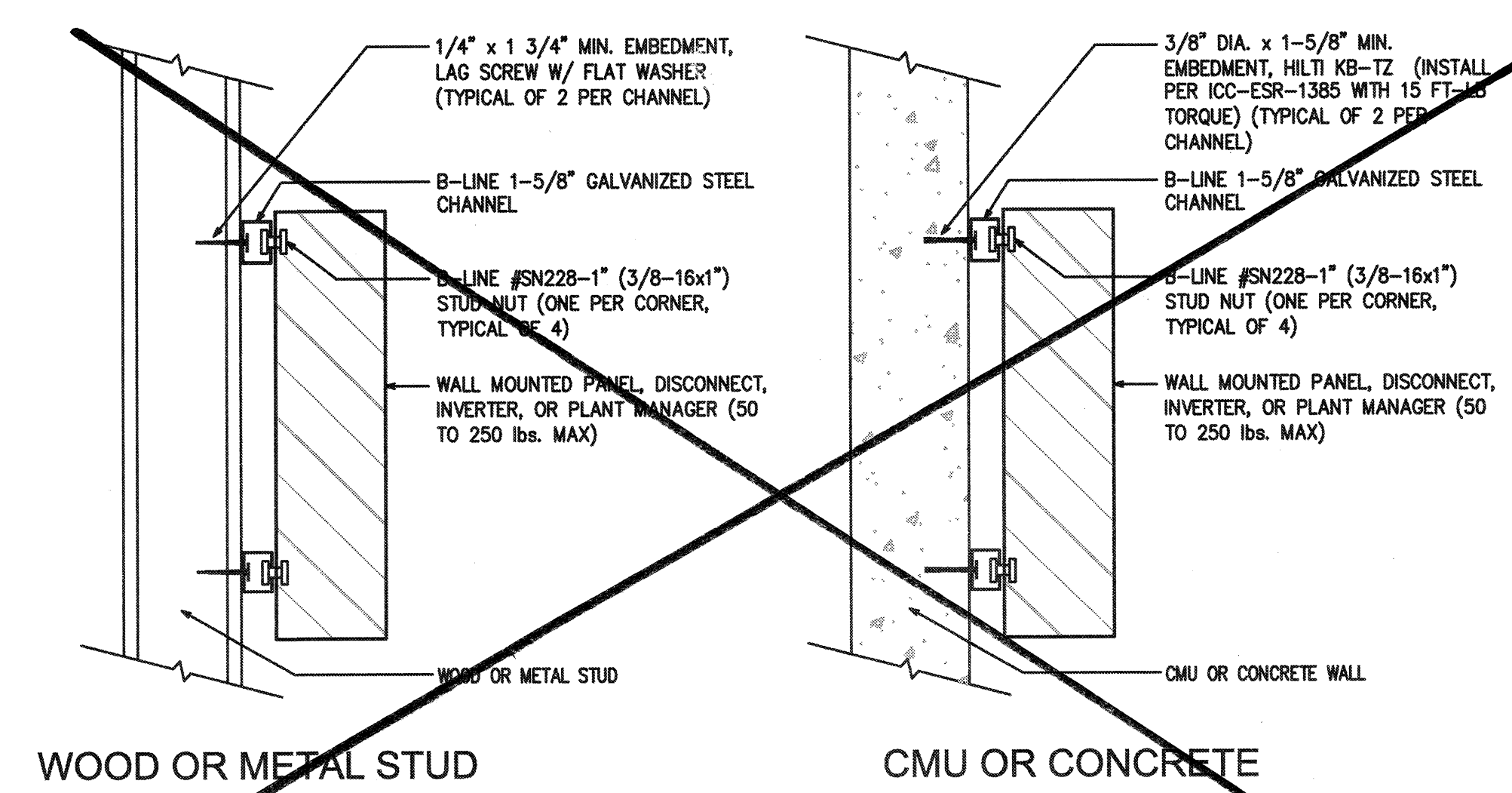
NOTE: SEE DETAIL 7 & 10 SHEET S-36



SHADE STRUCTURE GROUNDING DETAIL

NO SCALE NOTE: ONE REQUIRED PER ARRAY STRUCTURE

7



WALL MOUNTED EQUIPMENT DETAIL

NO SCALE

8

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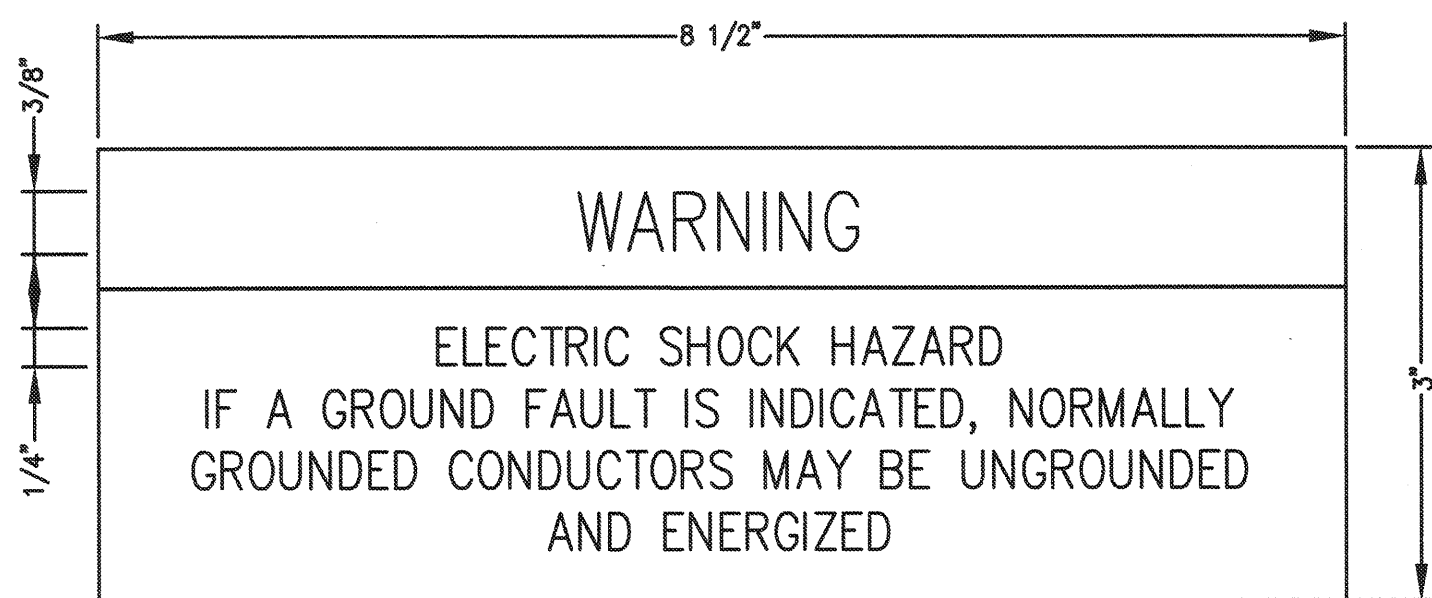
MARK	DATE	DESCRIPTION

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4 STEL JOB # 16-1312
DATE 01-13-17
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ELECTRICAL DETAILS

CT-E4.0

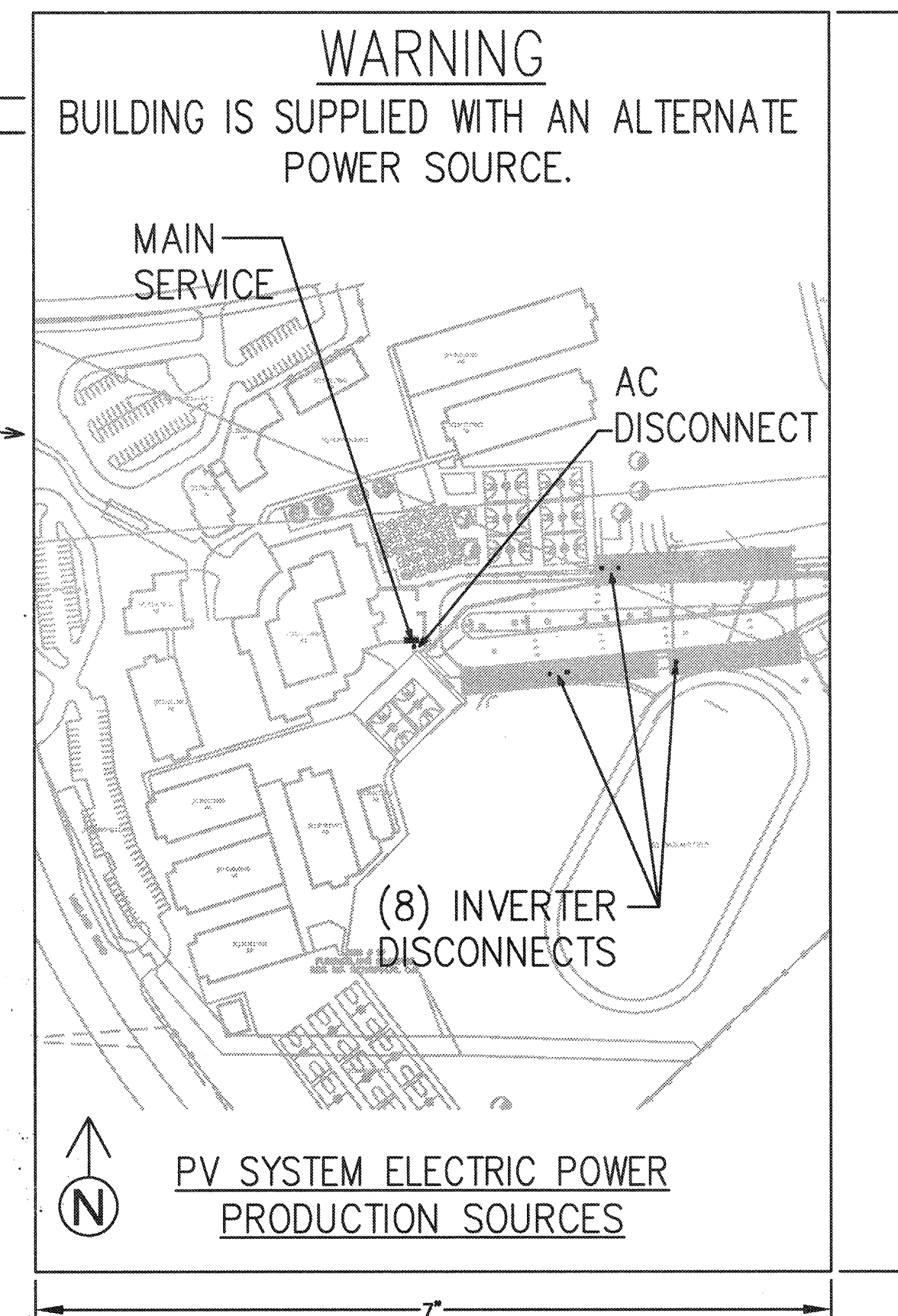
NOTE: IF DWG. IS NOT 24x36, IT IS NOT FULL SIZE



SIGNAGE - 1
SCALE: NTS

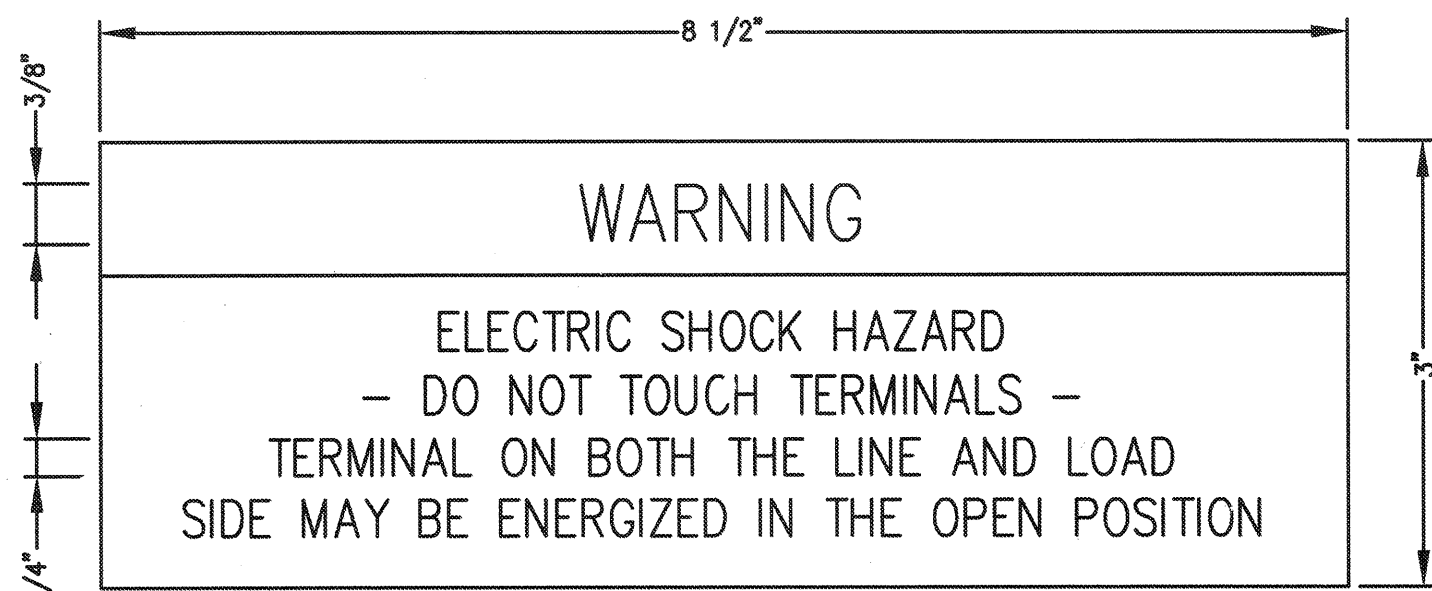
LOCATION:	INVERTERS
BACKGROUND	RED
LETTERING	WHITE
NOTES:	

SITE PLAN WITH LOCATIONS OF MAIN AC DISCONNECT, MAIN SERVICE, & INVERTERS.



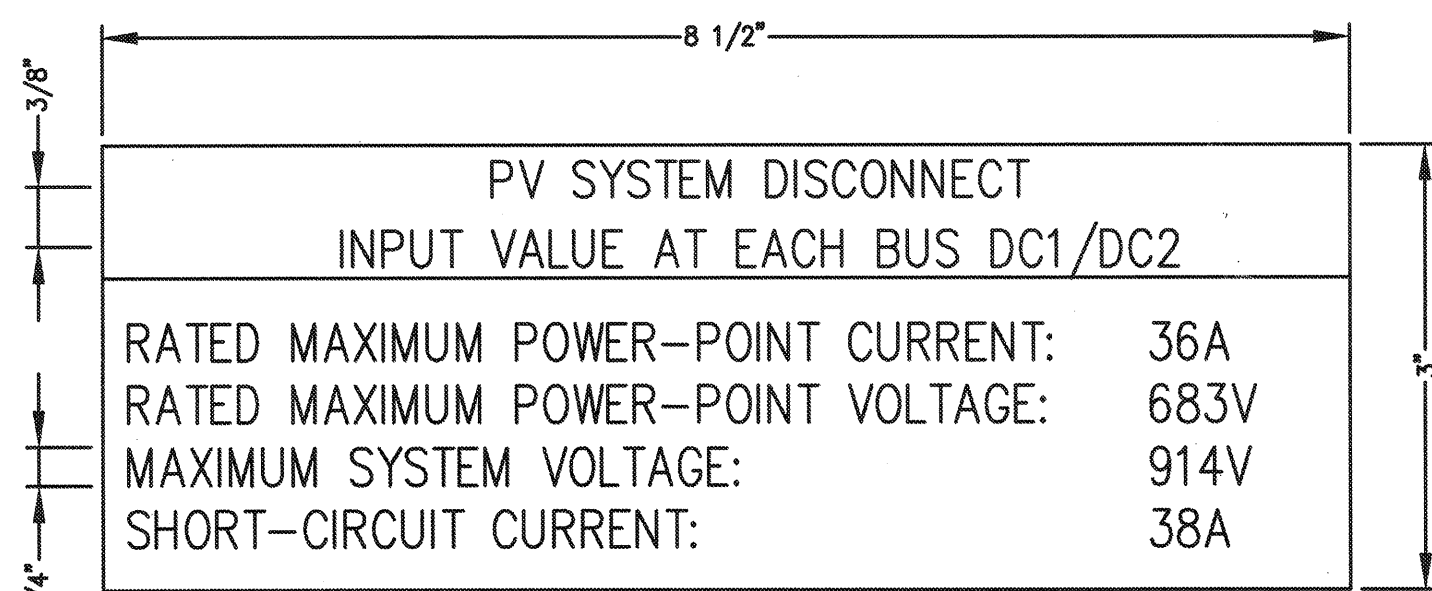
WARNING LABELS & MARKING NOTES:

- MARKING IS REQUIRED ON INTERIOR AND EXTERIOR DIRECT-CURRENT (DC) CONDUIT, ENCLOSURES, RACEWAYS, CABLE ASSEMBLIES, JUNCTION BOXES, COMBINER BOXES AND DISCONNECTS.
- THE MATERIALS USED FOR MARKING SHALL BE REFLECTIVE, WEATHER RESISTANT AND SUITABLE FOR THE ENVIRONMENT. MARKING AS REQUIRED IN SECTIONS 605.11.1.2 THROUGH 605.11.1.4 SHALL HAVE ALL LETTERS CAPITAL SIZED WITH A MINIMUM HEIGHT OF 3/8 INCH (9.5 MM) WHITE ON RED BACKGROUND.
- THE MARKING SHALL CONTAIN THE WORDS "WARNING: PHOTOVOLTAIC POWER SOURCE."
- THE MARKING SHALL BE PLACED ADJACENT TO THE MAIN SERVICE DISCONNECT IN A LOCATION CLEARLY VISIBLE FROM THE LOCATION WHERE THE DISCONNECT IS OPERATED.
- MARKING SHALL BE PLACED ON INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLIES EVERY 10 FEET (3048 MM), WITHIN 1 FOOT (305 MM) OF TURNS OR BENDS AND WITHIN 1 FOOT (305 MM) ABOVE AND BELOW PENETRATIONS OF ROOF/CEILING ASSEMBLIES, WALLS OR BARRIERS.



SIGNAGE - 2
SCALE: NTS

LOCATION:	AC DISCONNECTS & PANELBOARDS
BACKGROUND	RED
LETTERING	WHITE
NOTES:	

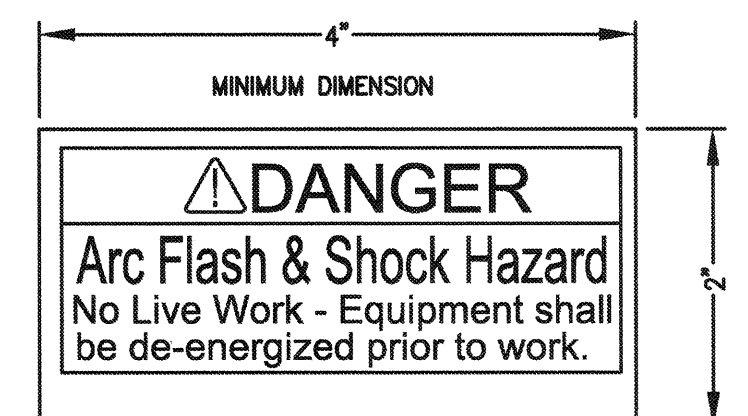


SIGNAGE - 3
SCALE: NTS

LOCATION:	50.0kW INVERTERS
BACKGROUND	RED
LETTERING	WHITE
NOTES:	15-STRING INVERTER

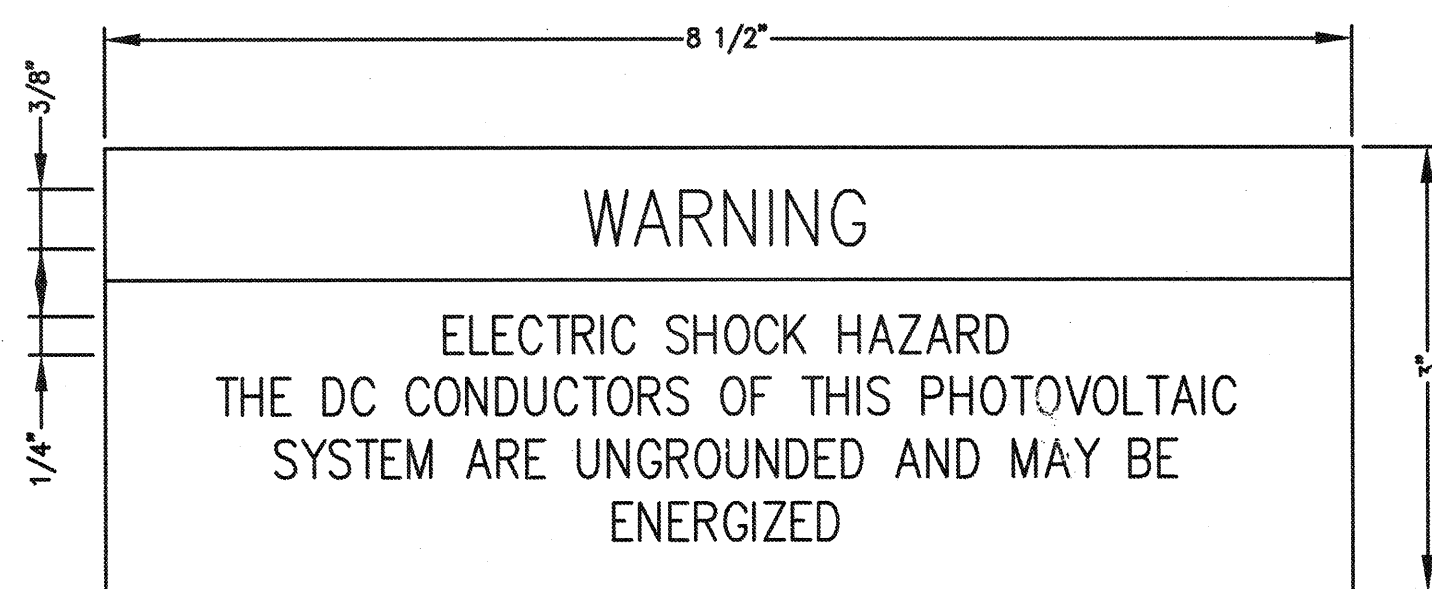
SIGNAGE - 6
SCALE: NTS

LOCATION:	MAIN SERVICE DISCONNECT
BACKGROUND	RED
LETTERING	WHITE
NOTES:	1 SIGN AT (E) SERVICE METER. PLACE ADDITIONAL SIGN AT SOLAR AC SYSTEM DISCONNECT WHERE NOT LOCATED WITHIN 25' & IN VIEW OF (E) SERVICE METER.



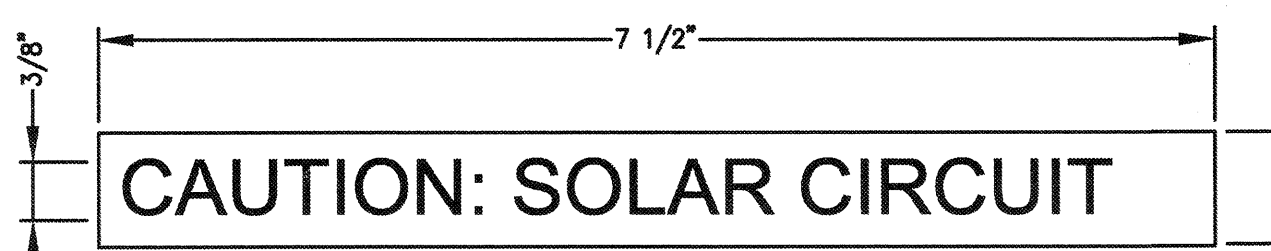
ARC FLASH WITH EXAMPLE TEXT AND DIMENSIONS
SIGNAGE - 7
SCALE: NTS

LOCATION:	INVERTER DISCONNECTS, AC DISCONNECT, PANEL
BACKGROUND	WHITE, RED OR YELLOW
LETTERING	BLACK AND/OR RED
NOTES:	



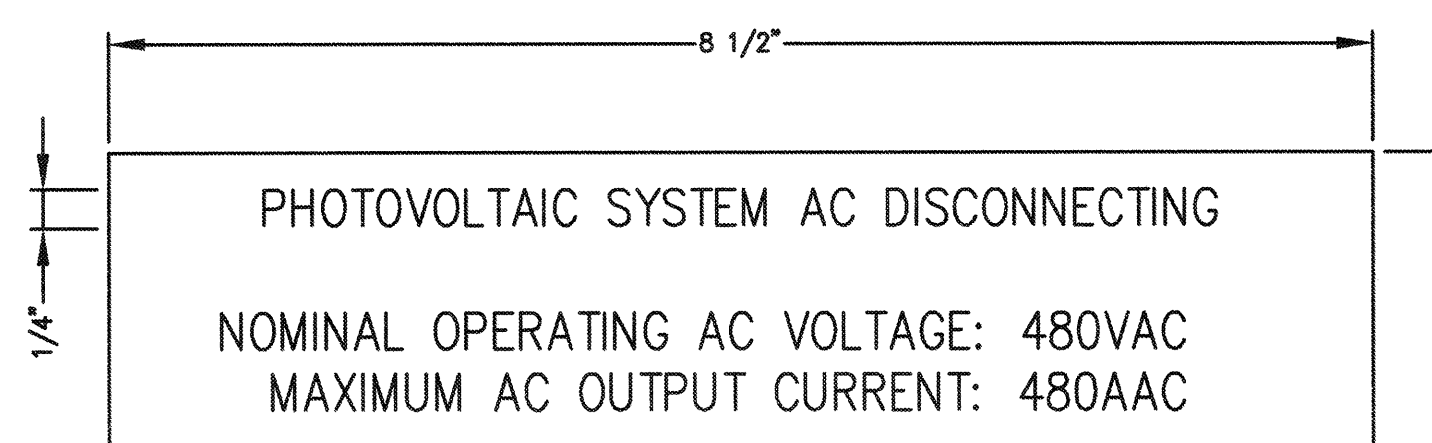
SIGNAGE - 4
SCALE: NTS

LOCATION:	INVERTERS
BACKGROUND	RED
LETTERING	WHITE
NOTES:	



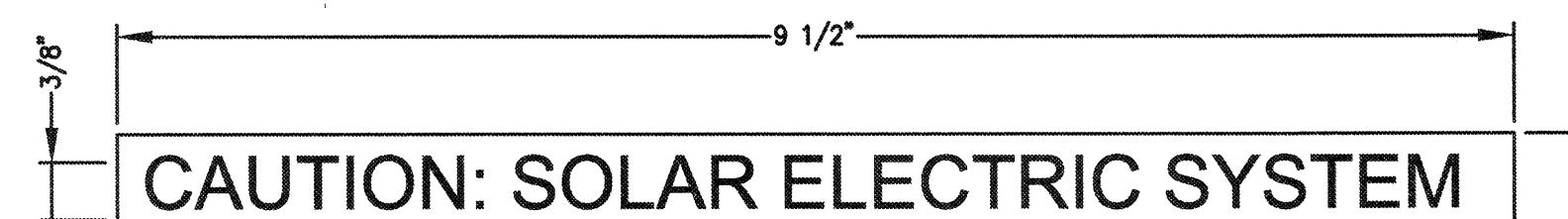
LOCATION:	DC ENCLOSURES, RACEWAYS AND CONDUITS
BACKGROUND	RED
LETTERING	WHITE
NOTES:	EXPOSED CONDUIT EVERY 10 FT.

SIGNAGE - 8
SCALE: NTS



SIGNAGE - 5
SCALE: NTS

LOCATION:	AC DISCONNECT
BACKGROUND	RED
LETTERING	WHITE
NOTES:	



LOCATION:	MAIN SERVICE DISCONNECT
BACKGROUND	RED
LETTERING	WHITE
NOTES:	

SIGNAGE - 9
SCALE: NTS

DISTRICT
1300 BAKER STREET
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REGISTERED PROFESSIONAL ENGINEER
ELECTRICAL
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S 5885
D. K. ROBERTSON

CONSULTANT STAMP
REGISTERED PROFESSIONAL ENGINEER
ELECTRICAL
STATE OF CALIFORNIA
NO. 9125
R. J. HARDON

CATO
MIDDLE SCHOOL
1000 HIGHLAND
KNOLLS DR.
BAKERFIELD, CA 93303

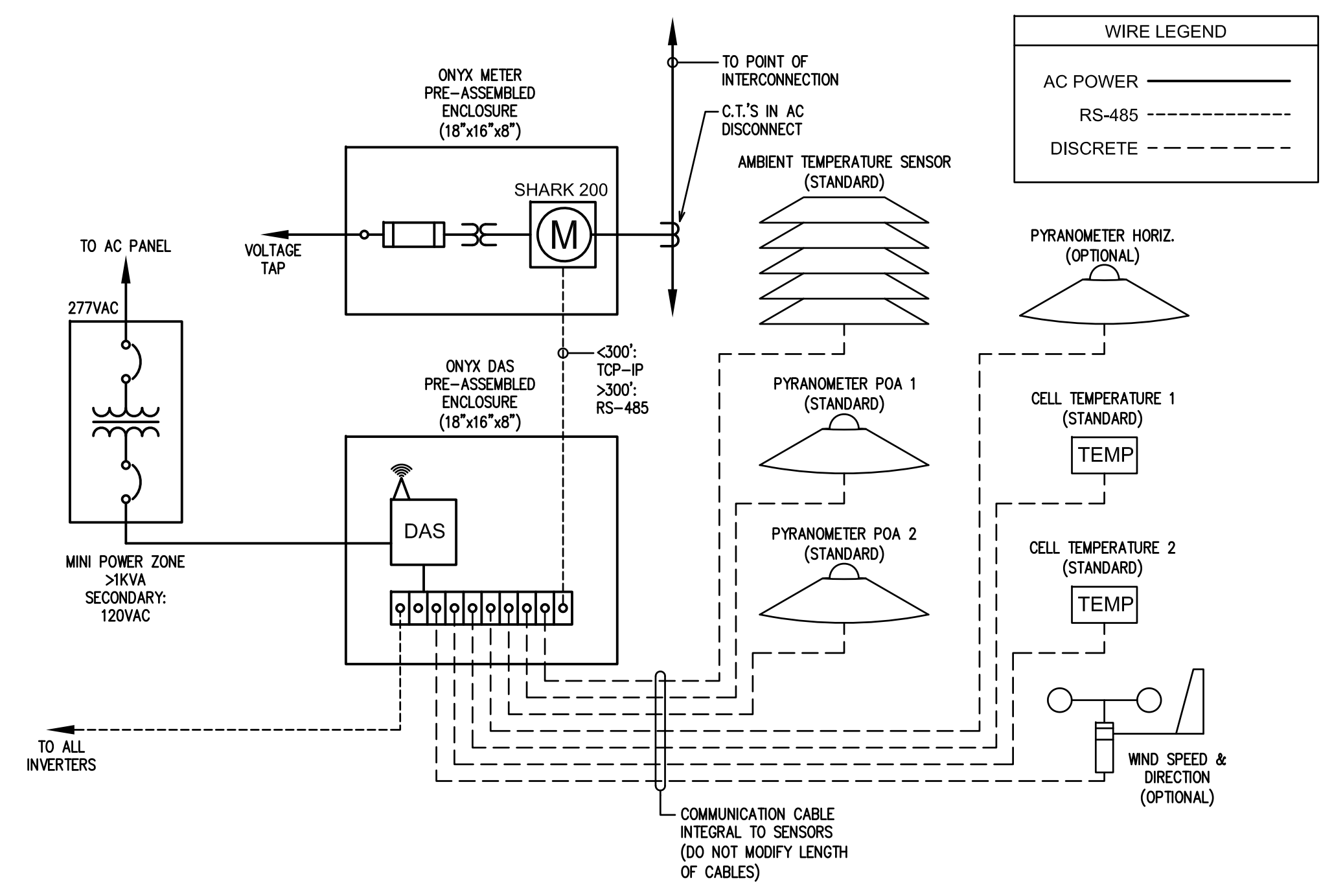
IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
A# 03-117835
AC FLS SS TN
DATE JAN 17 2017

REVISIONS		
MARK	DATE	DESCRIPTION

PROJECT#
ACCOUNTING #
4 STEL JOB # 16-1312
DATE 01-13-17
DRAWN BY HDE
CHECKED RJH

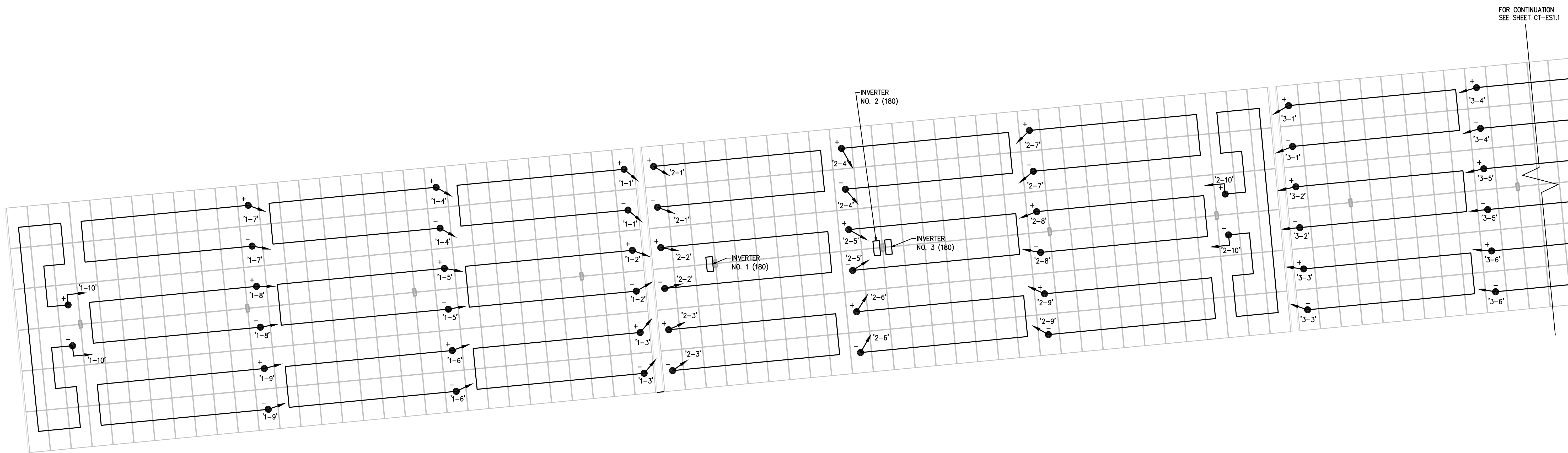
TYPICAL ELEC.
SOLAR WARNING
LABELS

CT-E5.0



TYPICAL MONITORING DATA WIRING DIAGRAM

SCALE: NONE



SOLAR STRING CABLING PLAN

SCALE: 1/8"=1'-0"

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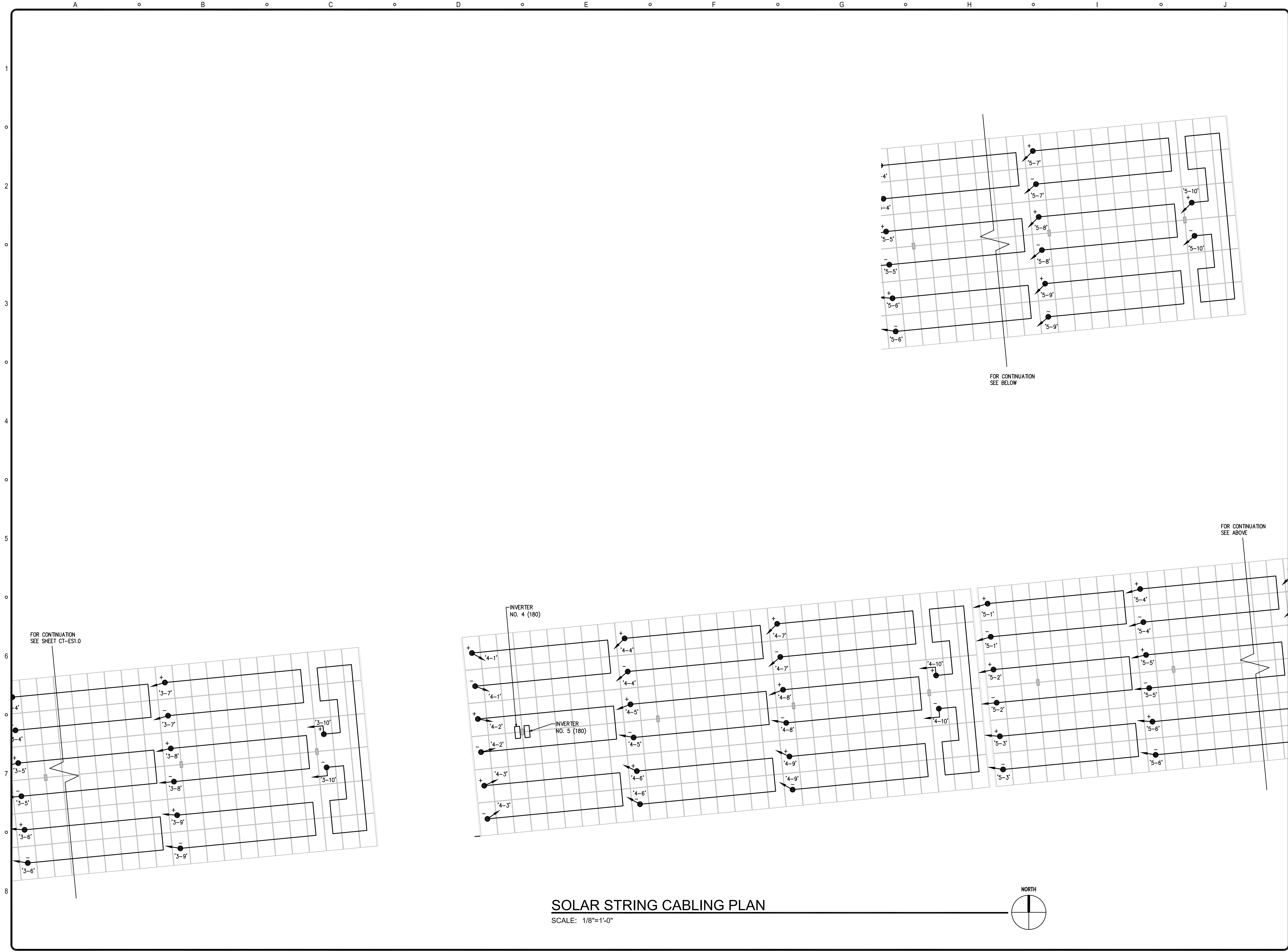
PROJECT# _____
ACCOUNTING # _____
4 STEL JOB # _____ 16-1312
DATE _____ 01-09-17
DRAWN BY _____ HDE
CHECKED _____ RJH

SOLAR STRING CABLING PLAN

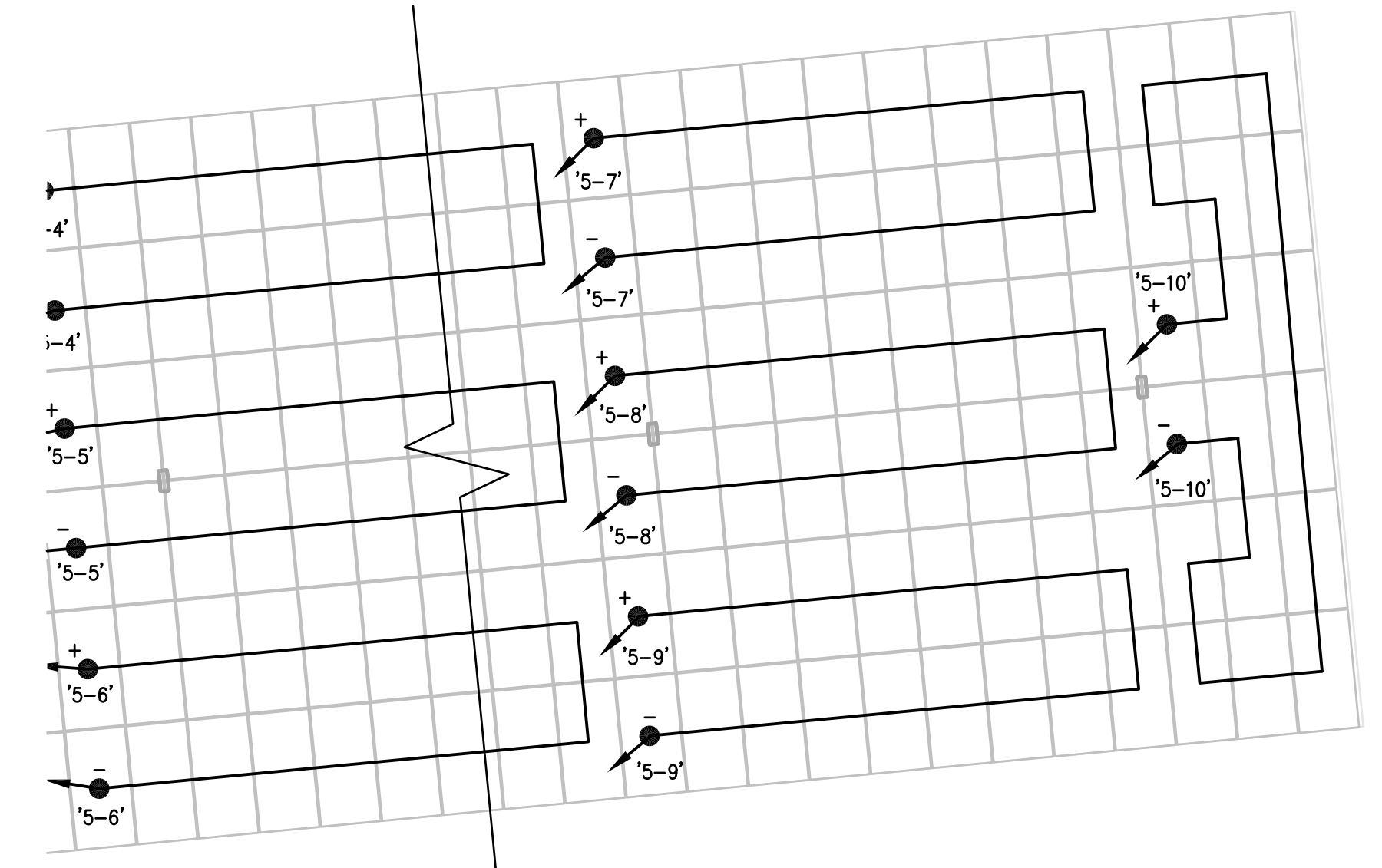
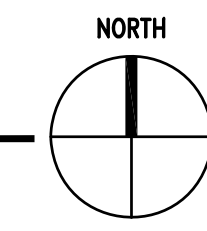
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NOTE: IF DWG. IS NOT 24" x 36" IT IS NOT FULL SIZE

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SOLAR STRING CABLING PLAN
SCALE: 1/8"=1'-0"



FOR CONTINUATION
SEE BELOW

FOR CONTINUATION
SEE ABOVE

FOR CONTINUATION
SEE SHEET CT-ES1.0

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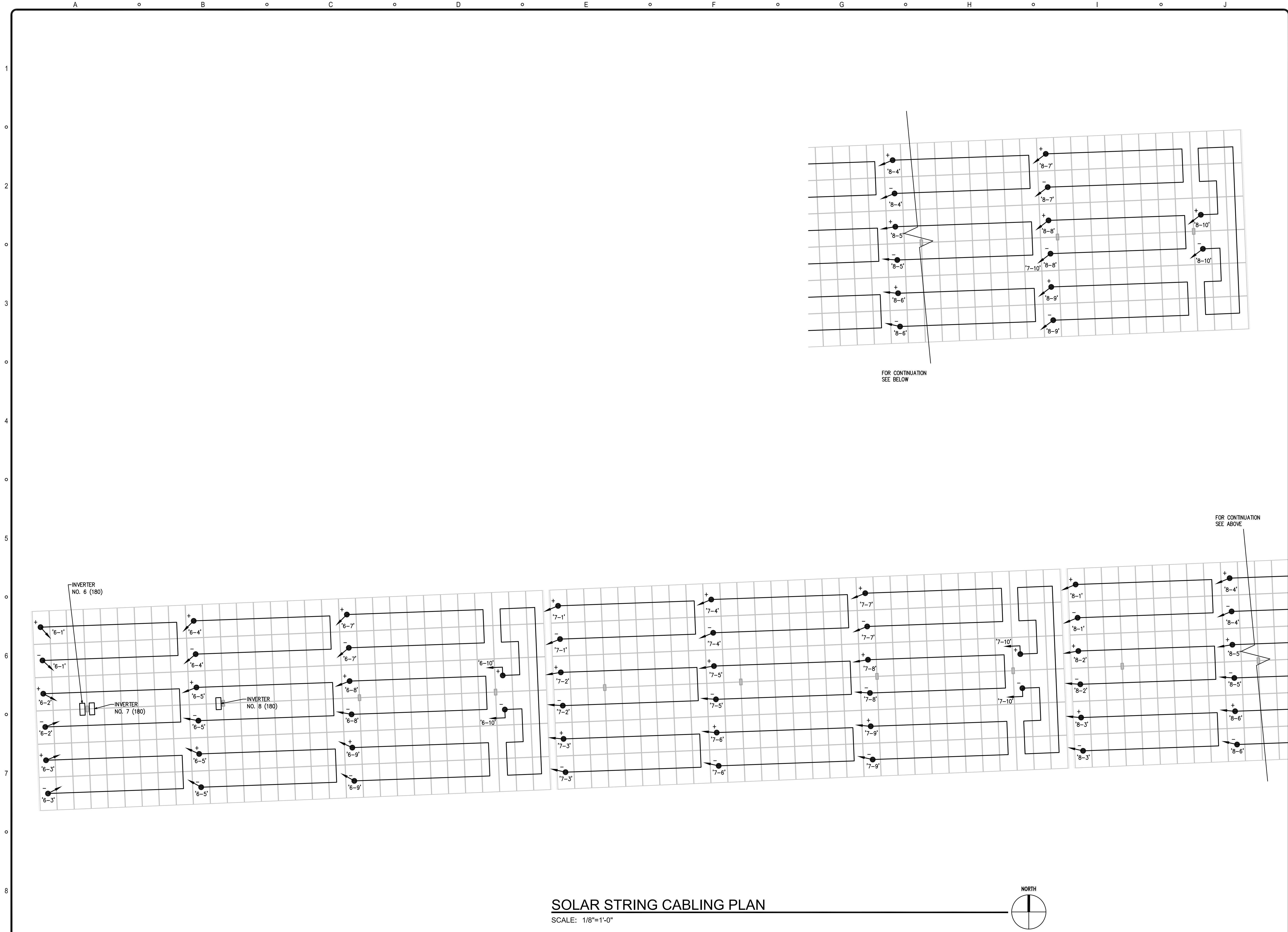
PROJECT# _____
ACCOUNTING # _____
4 STEL JOB # _____ 16-1312
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SOLAR STRING CABLING PLAN

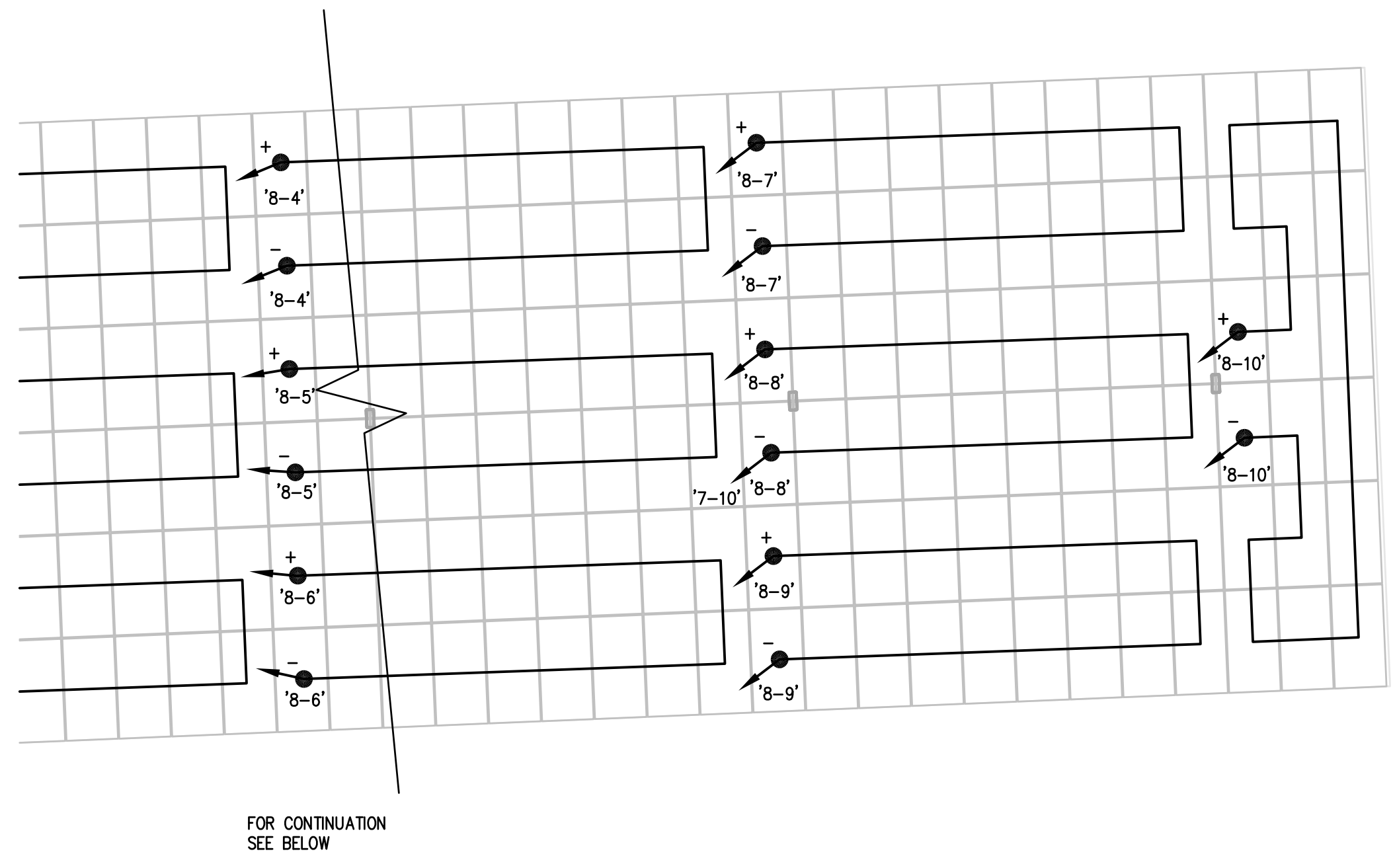
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SOLAR STRING CABLING PLAN
SCALE: 1/8"=1'-0"



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SOLAR STRING CABLING PLAN

CT-ES1.2

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