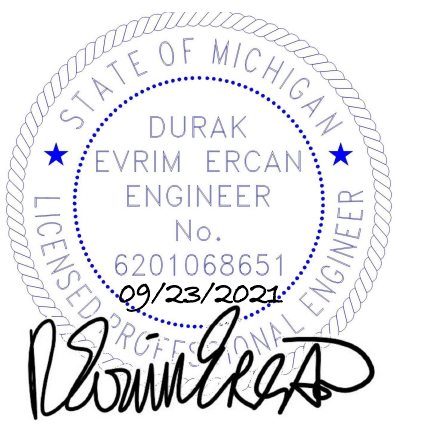


SOUTH CLINTON ST SOLAR

25.99 MWDC - 20.00 MWAC SOLAR PROJECT

SEAL & SIGNATURE:



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 EXCEPT AS PROVIDED UNDER
 DIRECTION OF A LICENSED
 PROFESSIONAL ENGINEER.

THIS DESIGN IS NOT TO BE USED
 FOR CONSTRUCTION UNLESS
 SIGNED, DATED AND NOTED
 "ISSUED FOR CONSTRUCTION"
 ABOVE LAST REVISION.

0	09/14/2021	IC (15%) SUBMITTAL
REV	DATE	DESCRIPTION

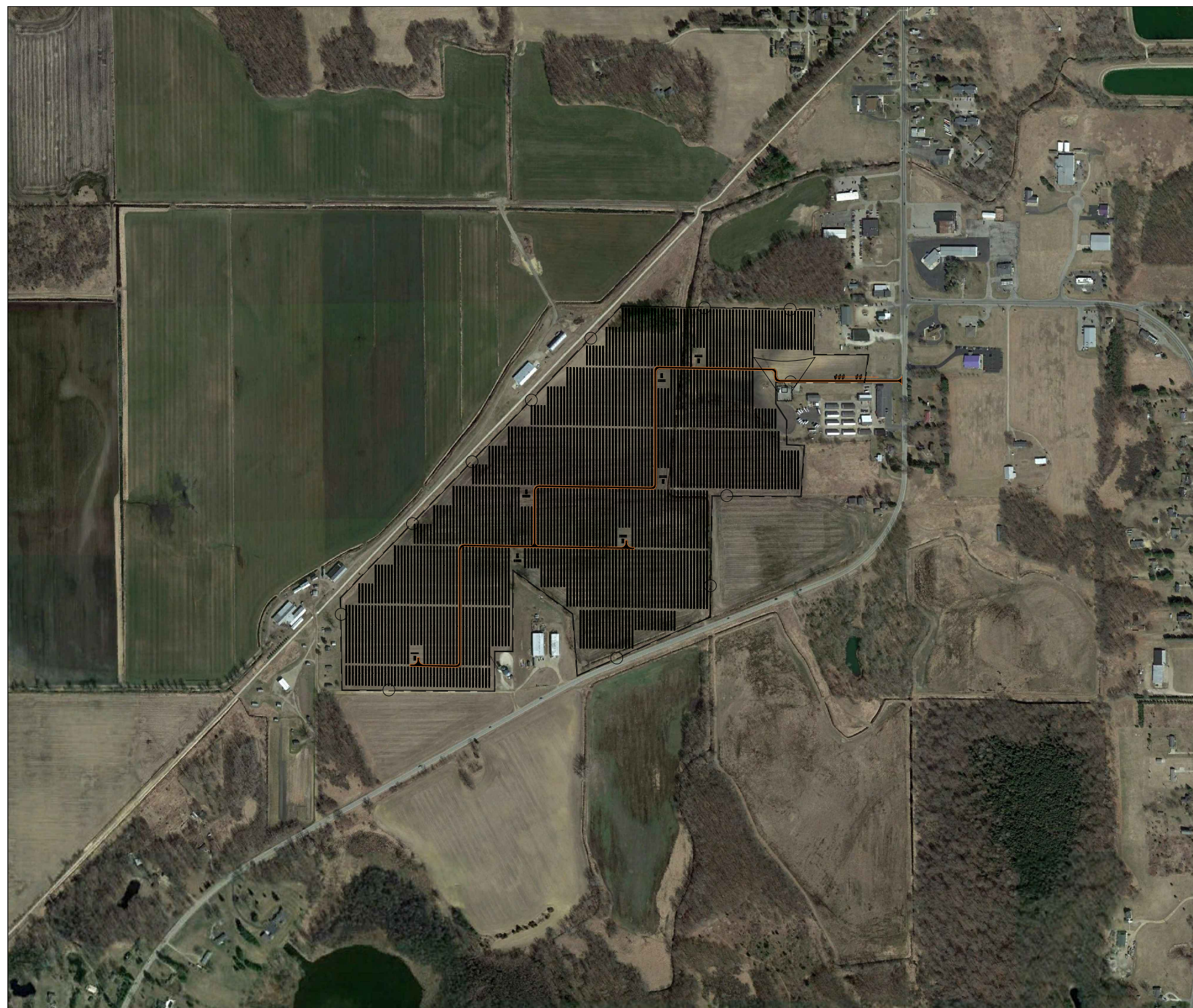
CLIENT:

PROJECT:

PROJECT NUMBER: AE# 1462	
SHEET SIZE: 24x36	DRAWN BY: DS
DESIGNED BY: AC	CHECKED BY: DEE

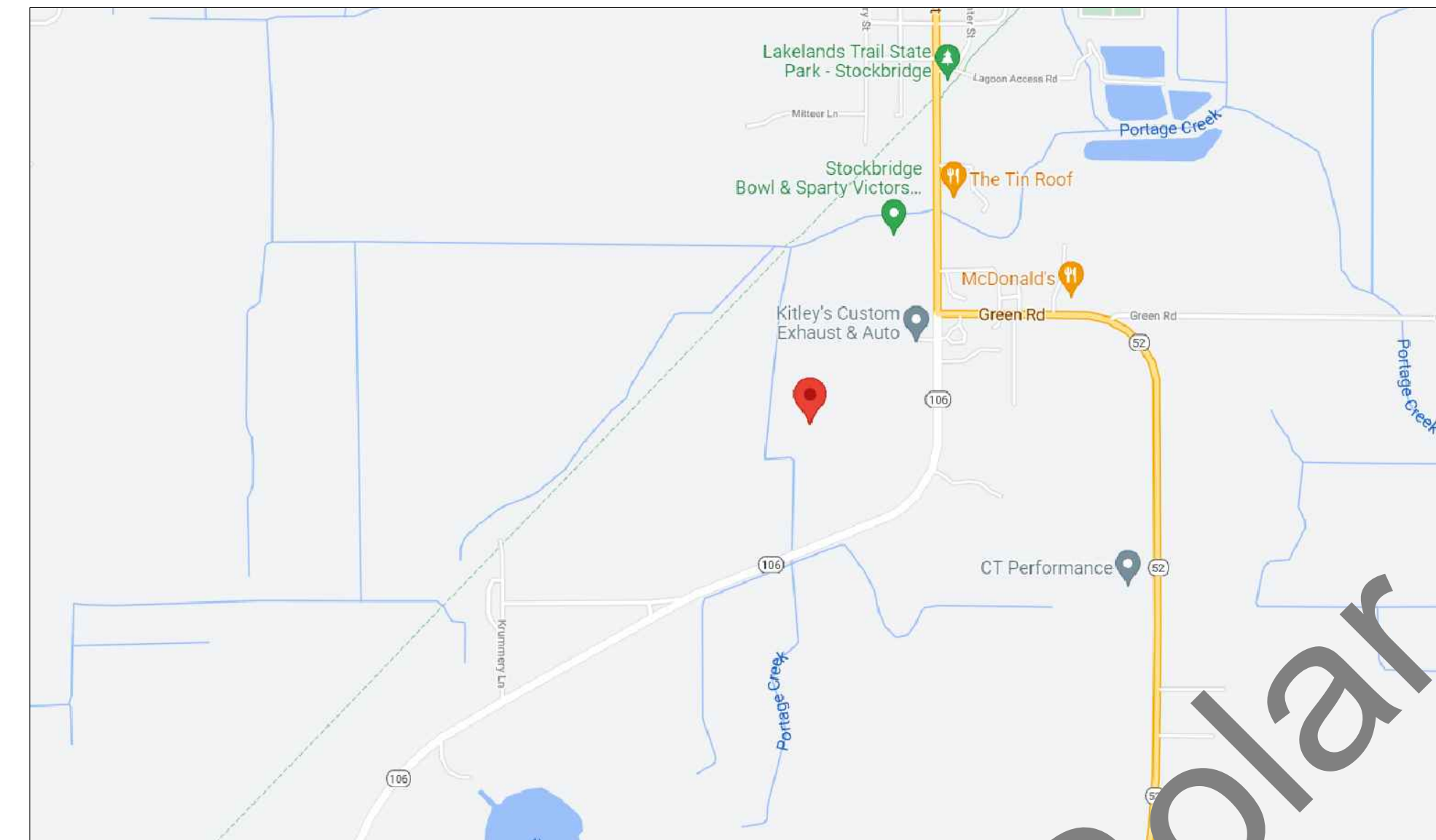
DRAWING TITLE:
COVER SHEET

SHEET NO:
E001



1 SITE OVERVIEW
 E001 SCALE: 1"=800'

SCOPE OF WORK:
 THE PROPOSED PROJECT IS A GROUND MOUNTED SOLAR PV FARM INCORPORATING SINGLE AXIS TRACKER RACKING AND SOLAR BIFACIAL TECHNOLOGY. THE NEW PV SYSTEM IS TO BE INSTALLED ON THE ZONED PROPERTY IN THE TOWN OF STOCKBRIDGE, MICHIGAN. THE PV SYSTEM IS TO BE INTERCONNECTED WITH THE UTILITY GRID, WHEREIN THE GENERATED ENERGY SHALL BE FED IN TO UTILITY POLES.



3 LOCATION MAP
 E001 SCALE: NTS



4 AERIAL VIEW
 E001 SCALE: NTS

DEVELOPER: ENGINEERED BY:

DURAK EVRIM ERCAN, P.E.
 TEL: (201) 920-2899
 EMAIL: INFO@AMPERENGINEERING.COM

SHEET	DESCRIPTION
E000	COVER SHEET
E100	OVERALL SITE PLAN
E200	ONE LINE DIAGRAM - SHEET 1
E201	ONE LINE DIAGRAM - SHEET 2
E202	ONE LINE DIAGRAM - SHEET 3
E450	LABELS

INTERCONNECTION DESIGN (15%) 09/14/21

LEGEND	
UPDATED DRAWING ISSUE	●
UNCHANGED, PREVIOUSLY ISSUED STILL CURRENT	○
DRAWINGS REMOVED FROM SET	✕

2 SCOPE OF WORKS AND PROJECT DETAILS
 E001 SCALE: NTS

PROJECT DETAILS	
PROJECT OWNER:	
PROJECT ADDRESS:	
PROJECT LOCATION:	
TAX ID:	33-16-16-34-200-006, 33-16-16-34-200-009, 33-16-16-34-200-013
LANDOWNER:	
PROJECT AREA:	~ 113.0 ACRES
ROW-TO-ROW SPACING:	22.0 FT
FREE ROW SPACING:	14.2 FT
ARRAY WIDTH:	7.8 FT
SETBACKS:	MIN 15 FT FROM PROJECT BOUNDARY
UTILITY:	CONSUMERS ENERGY

5 SHEET INDEX
 E001 SCALE: NTS



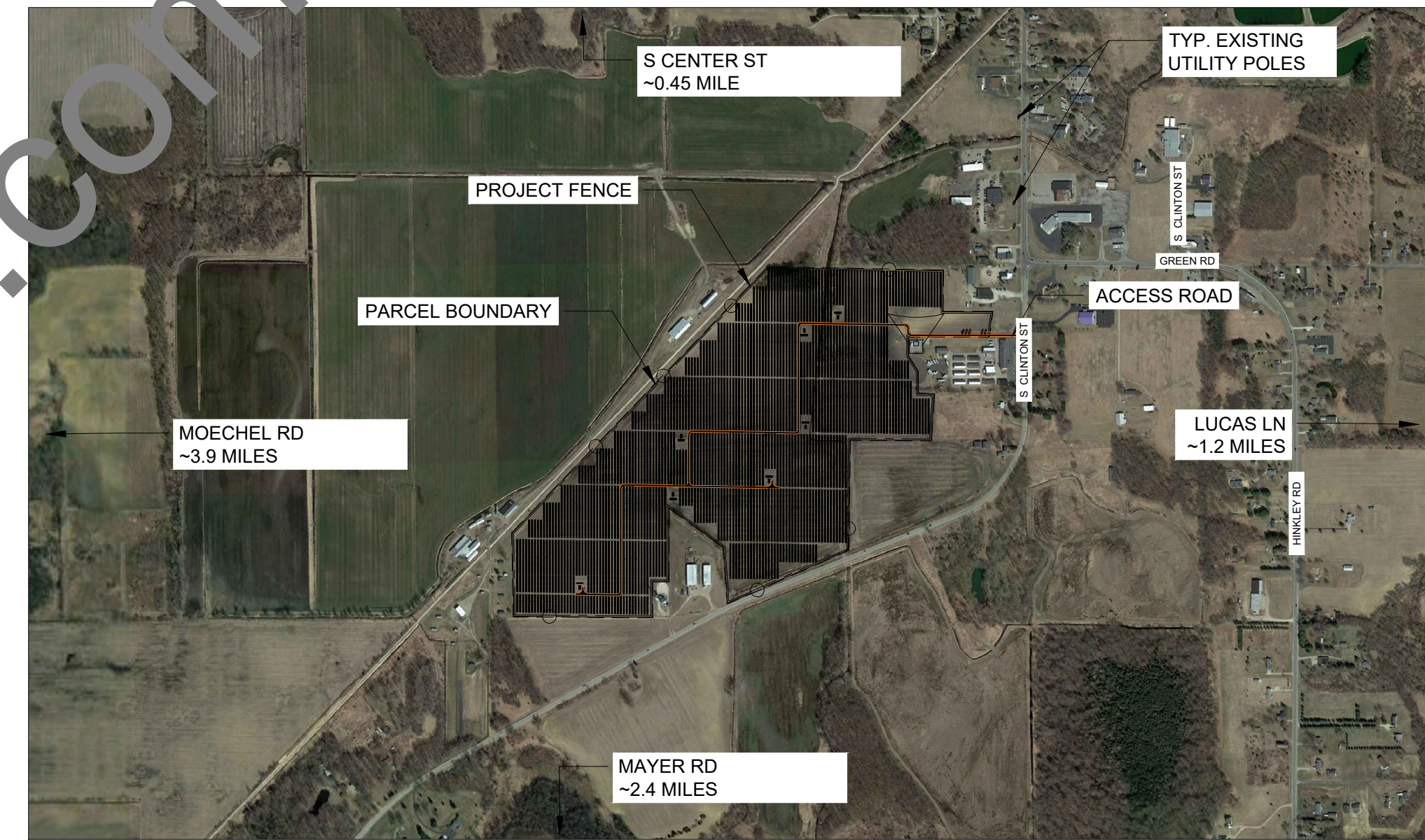
1 OVERALL SITE PLAN
E100 SCALE: 1"=300'

SYSTEM SUMMARY

PV MODULE MANUFACTURER:	TRINA SOLAR
PV MODULE TYPE:	BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULES (TSM-535DEG19C.20)
PV MODULE OUTPUT (STC):	535Wp
TOTAL NO. OF PV MODULES:	48580
TOTAL NO. OF STRINGS:	1388
MODULES PER STRING:	35
MAX VOLTAGE PER MODULE:	42.46 V
MAX VOLTAGE PER STRING:	1486.07 V
INVERTER MANUFACTURER:	CHINT POWER SYSTEMS
INVERTER TYPE:	STRING INVERTER (CPS SCH125KTL-AIO/US-600)
INVERTER AC OUTPUT POWER:	125 kW
TOTAL NO. OF INVERTERS:	160
MOUNTING SYSTEM:	SINGLE AXIS TRACKER AZIMUTH: 180°; TILT: -60°, 60°
ASHRAE DB EXTREME MIN (n=20 YEARS):	-27.9°C
ASHRAE DB EXTREME MAX (n=20 YEARS):	41.2°C
MAX DC SYSTEM VOLTAGE:	1500 V
AC SYSTEM VOLTAGE:	600 V @ INVERTERS OUTPUT; 46kV @ PCC

2 PROJECT SUMMARY

E100 SCALE: NTS



3 OVERALL VIEW

E100 SCALE: 1"=1000'

SEAL & SIGNATURE:



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REV.	DATE	DESCRIPTION
0	09/14/2021	IC (15%) SUBMITTAL

CLIENT:

PROJECT:

PROJECT NUMBER:

AE# 1462

SHEET SIZE:

24x36

DESIGNED BY:

AC

DRAWN BY:

DS

CHECKED BY:

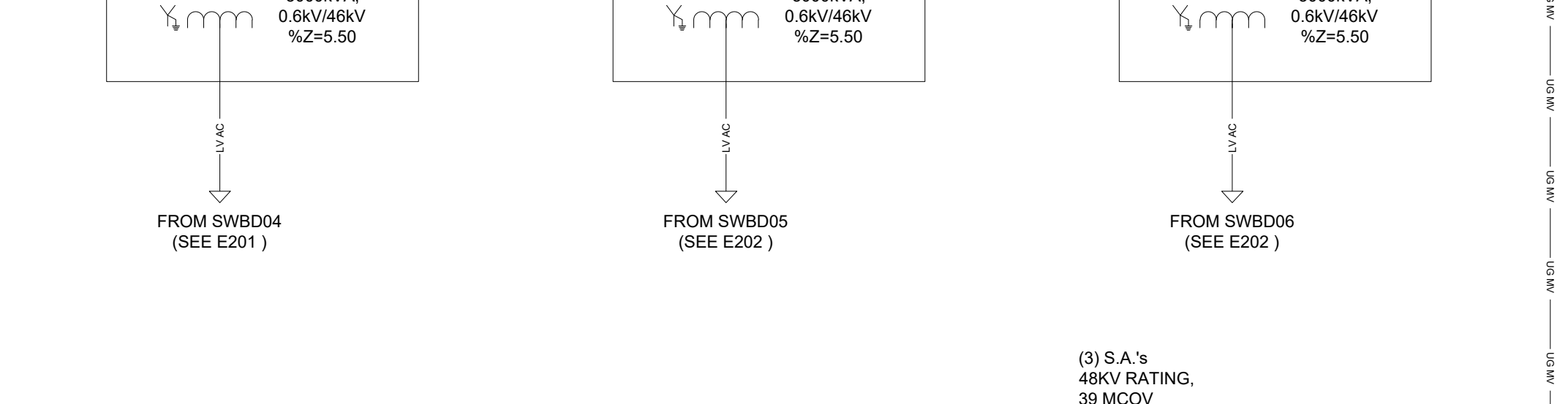
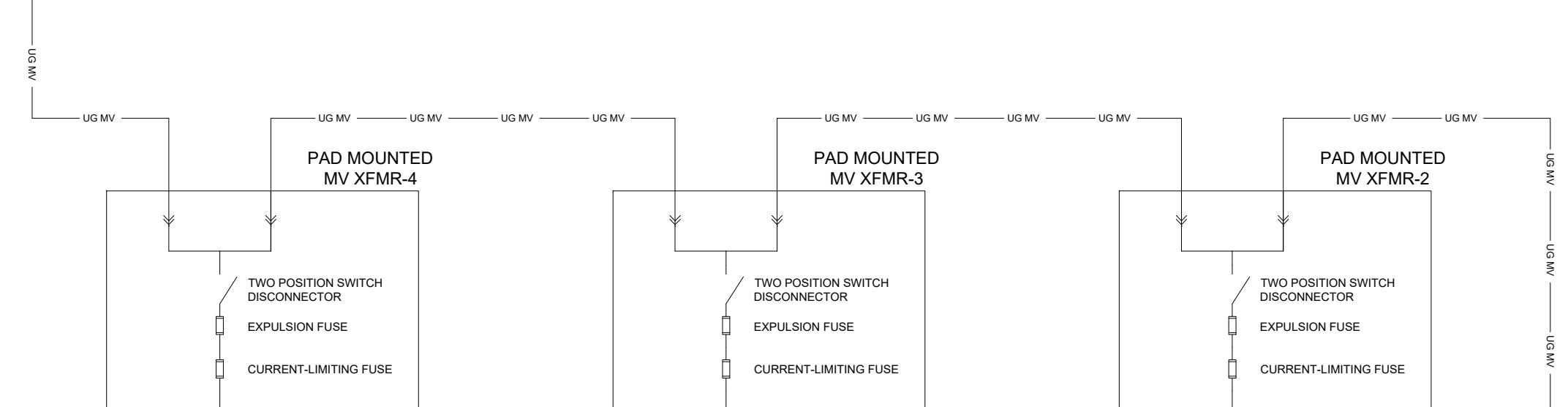
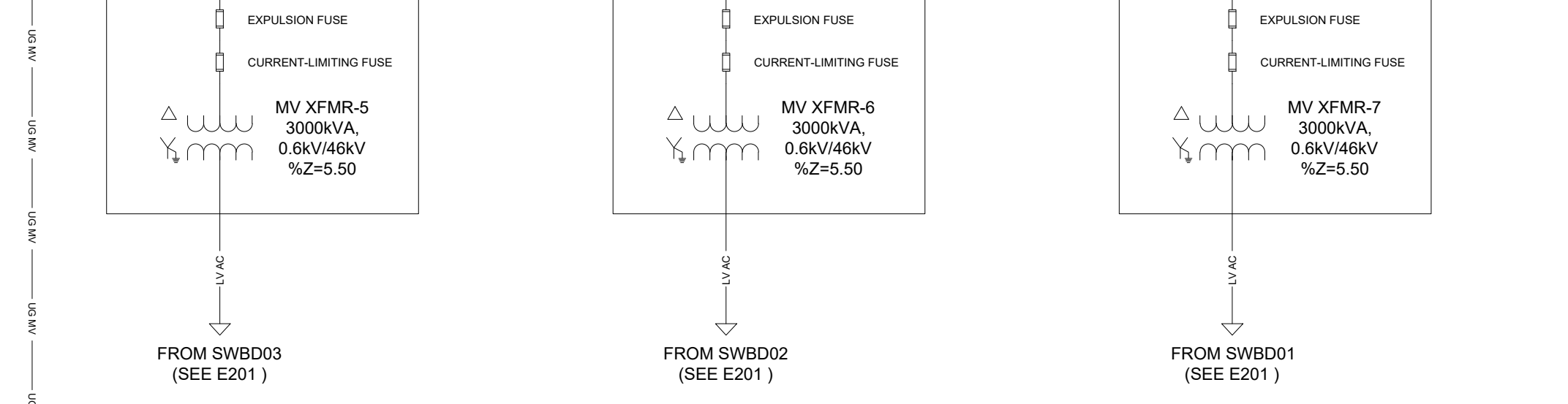
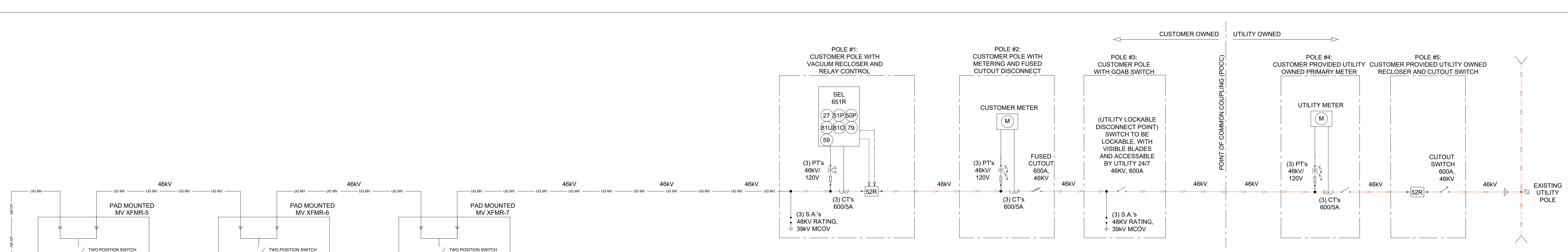
DEE

DRAWING TITLE:

OVERALL SITE PLAN

SHEET NO:

E100



EXTERNAL RELAY SETTINGS (SEL 651R) 46KV

ANSI FUNCTION	PICKUP	NOMINAL VALUE	UNITS	LEVEL	DELAY (SEC)	TOTAL CLEAR TIME (SEC)	CURVE	DESCRIPTION
27	40480	46000	V	88%	1.95	2.00		SLOW UV
27	23000	46000	V	50%	1.05	1.10		FAST UV
59	50500	46000	V	110%	2.00	2.00		SLOW OV
59	55200	46000	V	120%	0.16	0.16		FAST OV
81U-1	56.4	60	HZ	94%	0.11	0.16		FAST OF
81U-2	58.8	60	HZ	98%	299.95	300.00		SLOW OF
81O-1	61.8	60	HZ	103%	0.11	0.16		FAST OF
81O-2	61.2	60	HZ	102%	299.95	300.00		SLOW OF
50P	376.54	37.65	A	1000%	0.00	0.05		INST PU PHASE OC
51P	56.48	37.65	A	150%	1.95	2.00	U4	TIME PU PHASE OC
79	43700	46000	V	95%	299.95	300.00		MIN RECL. VOLTAGE
79	48300	46000	V	105%	299.95	300.00		MAX RECL. VOLTAGE
79	59.4	60	HZ	99%	299.95	300.00		MIN RECL. FREQ
79	60.6	60	HZ	101%	299.95	300.00		MAX RECL. FREQ

INVERTER PROTECTION SETTINGS

ANSI FUNCTION	PICKUP	NOMINAL VALUE	UNITS	LEVEL	TOTAL CLEAR TIME (SEC)	DESCRIPTION
27	528	600	V	88%	2.00	SLOW UV
27	300	600	V	50%	1.10	FAST UV
59	660	600	V	110%	2.00	SLOW OV
59	720	600	V	120%	0.16	FAST OV
81U-1	56.4	60	HZ	94%	0.16	FAST OF
81U-2	58.8	60	HZ	98%	300.00	SLOW OF
81O-1	61.8	60	HZ	103%	0.16	FAST OF
81O-2	61.2	60	HZ	102%	300.00	SLOW OF
79	570	600	V	95%	300.00	MIN RECL. VOLTAGE
79	630	600	V	105%	300.00	MAX RECL. VOLTAGE
79	59.4	60	HZ	99%	300.00	MIN RECL. FREQ
79	60.6	60	HZ	101%	300.00	MAX RECL. FREQ

LEGEND

	3P RECLOSER
	3P CIRCUIT BREAKER
	3P SWITCH DISCONNECT
	3P LOAD BREAK CUTOFF FUSES
	TRANSFORMER
	3P SW SURGE ARRESTOR DEVICE
	METER
	RECLOSER CONTROLLER
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	OVERHEAD POWER LINE
	BUS
	UNDERGROUND MV POWER LINE
	UNDERGROUND LV POWER LINE

ABBREVIATION

A	AMPERE
AUX XFMR	AUXILIARY TRANSFORMER
CB	CIRCUIT BREAKER
CT	CURRENT TRANSFORMER
KW	KILOWATT
LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND
MCOV	MAXIMUM CONTINUOUS OPERATING VOLTAGE
M	METER
SWBD	SWITCHBOARD
SPD	SURGE PROTECTION DEVICE
P	POLE
PH	PHASE
W	WIRE
PT	POTENTIAL TRANSFORMER
XFMR	TRANSFORMER

- ALL WORK SHALL BE IN ACCORDANCE WITH STATE AND LOCAL CODES, UTILITY REQUIREMENTS, AND THE NEC, ESPECIALLY ARTICLE 690 & 705.
- METERING AND SCADA TO BE CONFIRMED BY UTILITY.
- ACCESSIBLE, LOCKABLE, UTILITY AC DISCONNECT WITH VISIBLE BLADES SHALL BE WITHIN 10' OF UTILITY METER.
- PHOTOVOLTAIC SYSTEM TO OPERATE AT PF AS REQUIRED BY UTILITY. INVERTER WILL HAVE CAPABILITY OF .80 TO .80 PF. (LEADING TO LAGGING) EXACT POWER FACTOR/VAR CONTROL OF INVERTERS TO BE DETERMINED BASED ON UTILITY REQUIREMENTS.
- AC AND DC DISCONNECTS SHALL BE LABELED AS SUCH AND READILY ACCESSIBLE IN THEIR APPROPRIATE LOCATIONS.
- SOLAR PV MODULE FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER E.G.C PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEETS.
- ALL JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION.
- THESE DRAWINGS REPRESENT ASSUMED FIELD CONDITIONS. INSTALLATION SPECIFICATIONS MAY NEED TO BE ADJUSTED BASED ON ACTUAL FIELD CONDITIONS.
- INVERTER IS EQUIPPED WITH BOTH DC & AC SURGE PROTECTION TYPE II MOV.
- OUTDOOR EQUIPMENT AND SWITCHGEAR SHALL BE IN ACCORDANCE WITH APPLICABLE INDUSTRY STANDARDS.
- METAL ENCLOSED LOW VOLTAGE SWITCHGEAR SHALL BE AS PER ANSI/IEEE C37.20.1.
- POLE-MOUNTED EQUIPMENT ENCLOSURES SHALL BE AS PER ANSI/IEEE C57.12.31.
- TRANSFORMERS SHALL INCORPORATE LOOP FEED TYPE CONFIGURATION.

PROFESSIONAL ENGINEERING:

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 ENGINEERING | CONSULTING | ESTIMATING
 201-920-2899 | info@AmperEngineering.com

SEAL & SIGNATURE:

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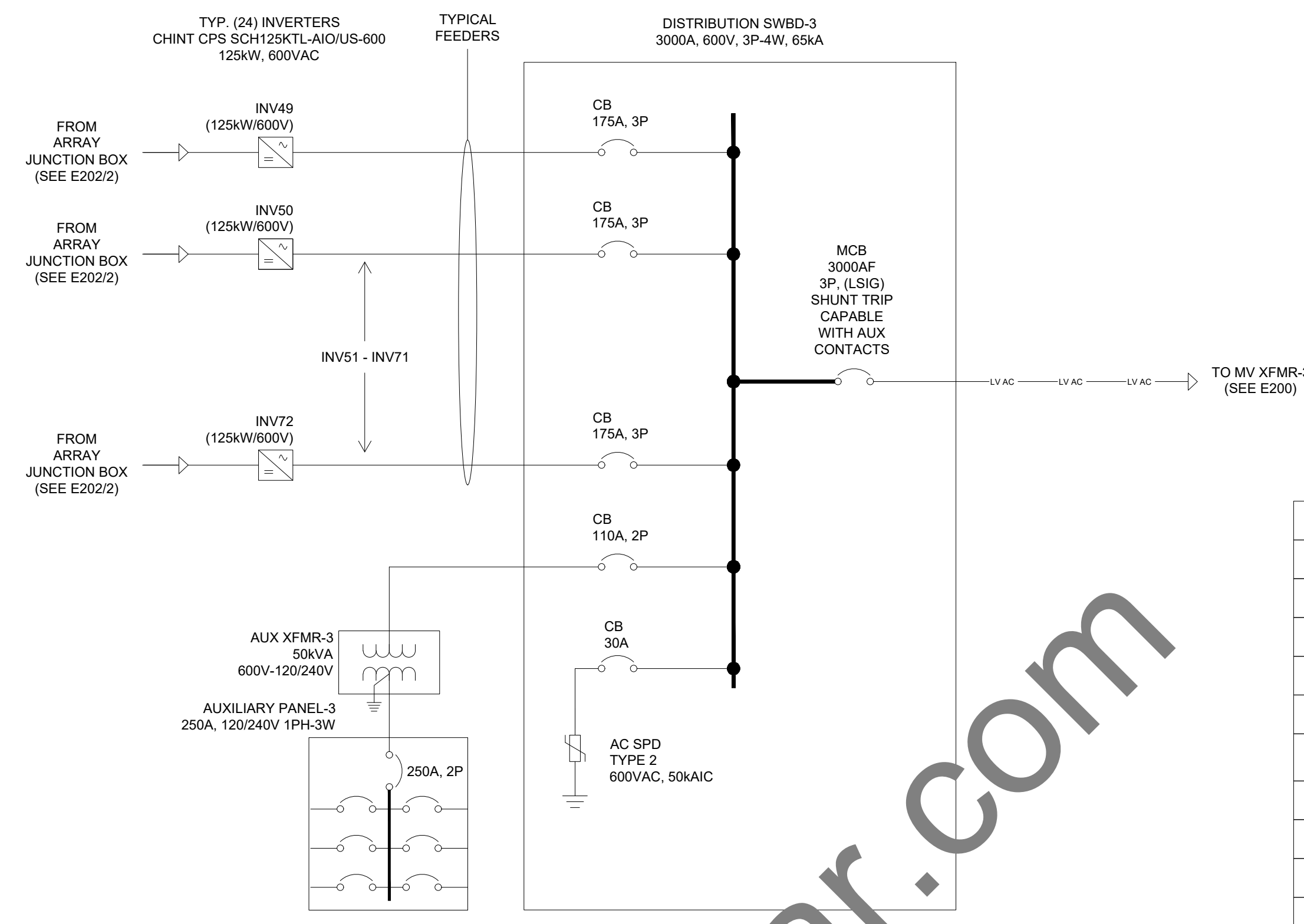
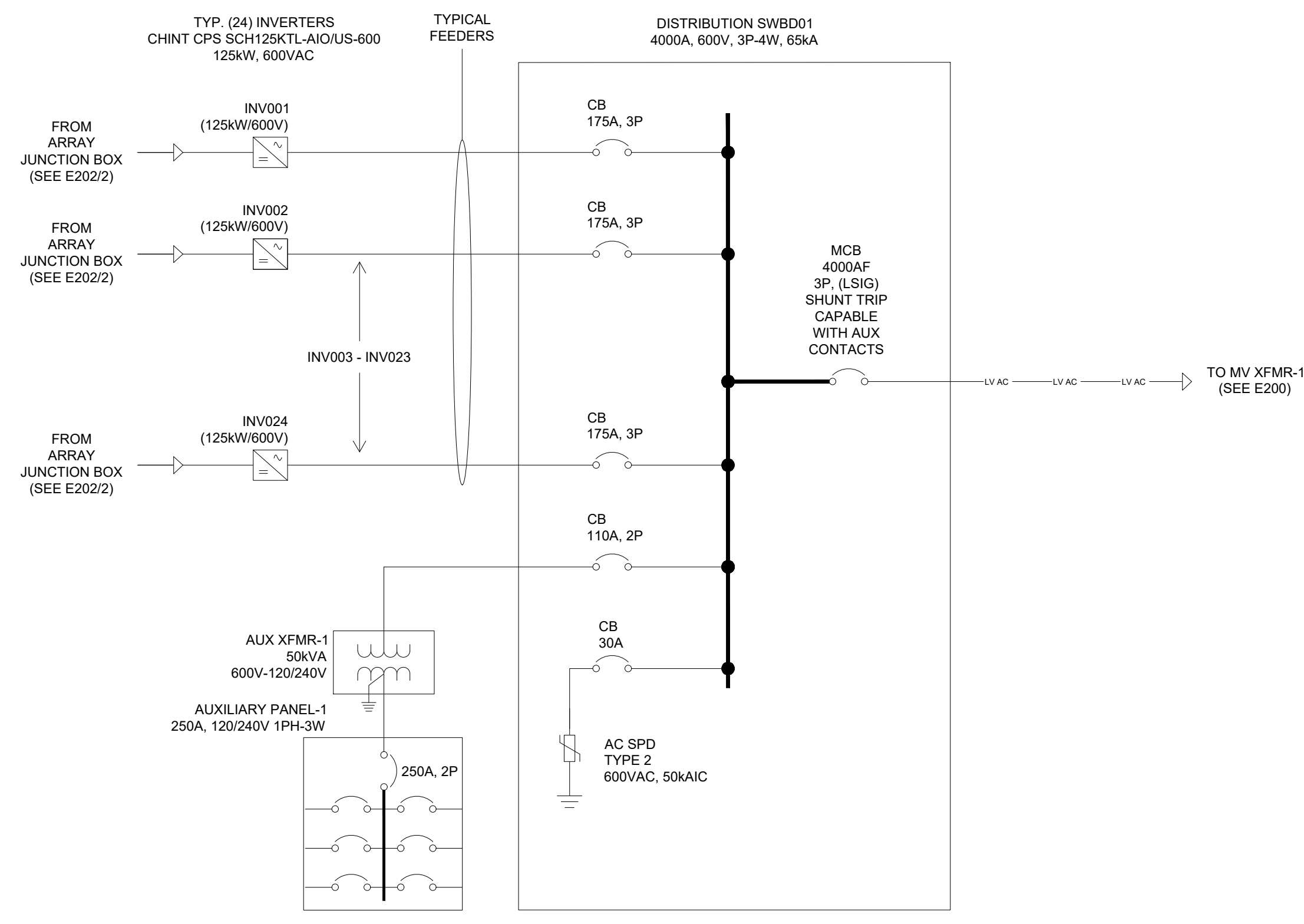
CLIENT:

PROJECT:

PROJECT NUMBER:
AE# 1462

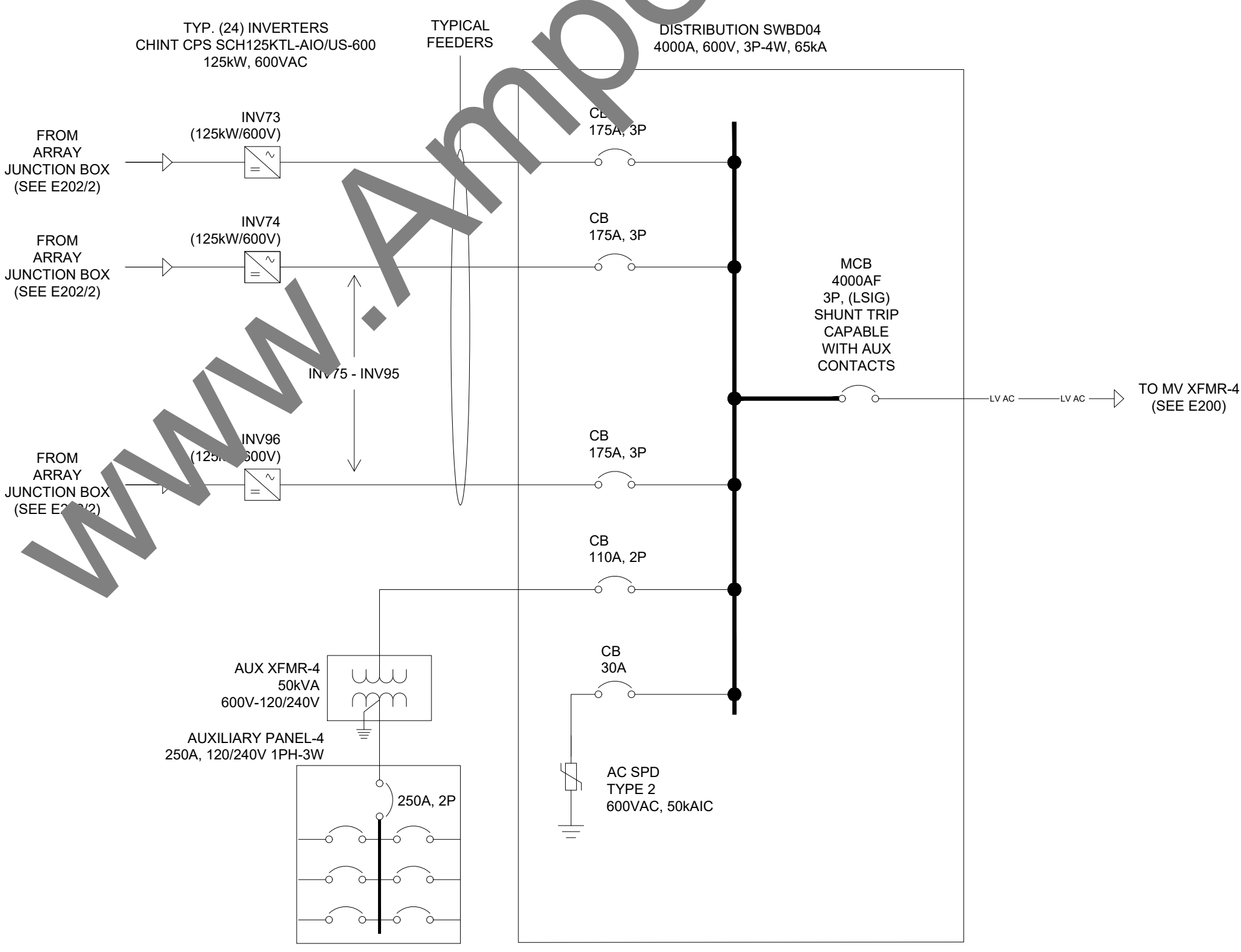
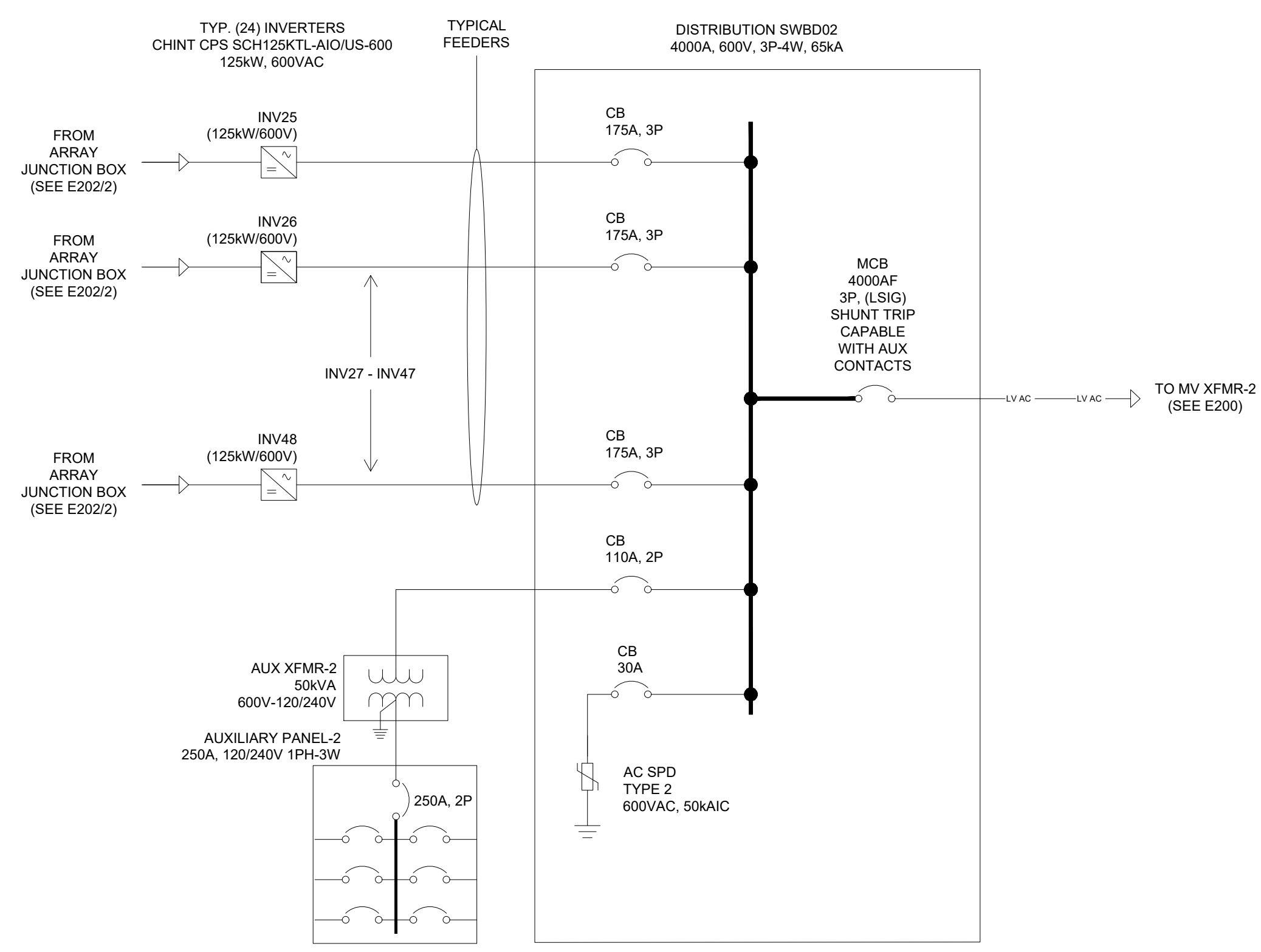
SHEET SIZE: 24x36	DRAWN BY: DS
DESIGNED BY: AC	CHECKED BY: DEE

DRAWING TITLE:
ONE LINE DIAGRAM-SHEET 1



LEGEND	
	GRID INVERTER
	3P RECLOSER
	3P CIRCUIT BREAKER
	3P SWITCH DISCONNECT
	3P LOAD BREAK CUTOFF FUSES
	TRANSFORMER
	3P4W SURGE ARRESTOR DEVICE
	METER
	RECLOSER CONTROLLER
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	OVERHEAD POWER LINE
	BUS
	UNDERGROUND MV POWER LINE
	UNDERGROUND LV POWER LINE

ABBREVIATION	
A	AMPERE
AUX XFMR	AUXILIARY TRANSFORMER
CB	CIRCUIT BREAKER
CT	CURRENT TRANSFORMER
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LSIG	LONG TIME SHORT TIME INSTANTANEOUS GROUND
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SWBD	SWITCHBOARD
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PT	POTENTIAL TRANSFORMER
XFMR	TRANSFORMER



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- METERING AND SCADA TO BE CONFIRMED BY UTILITY.
- ACCESSIBLE, LOCKABLE, UTILITY AC DISCONNECT WITH VISIBLE BLADES SHALL BE WITHIN 10' OF UTILITY METER.
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- THESE DRAWINGS REPRESENT ASSUMED FIELD CONDITIONS. INSTALLATION SPECIFICATIONS MAY NEED TO BE ADJUSTED BASED ON ACTUAL FIELD CONDITIONS.
- INTERACTIVE UTILITY INVERTER IS EQUIPPED WITH BOTH DC & AC SURGE PROTECTION TYPE II MOV.
- OUTDOOR EQUIPMENT AND SWITCHGEAR SHALL BE IN ACCORDANCE WITH APPLICABLE INDUSTRY STANDARDS.
- METAL ENCLOSED LOW VOLTAGE SWITCHGEAR SHALL BE AS PER ANSI/IEEE C37.20.1.

PROFESSIONAL ENGINEERING:

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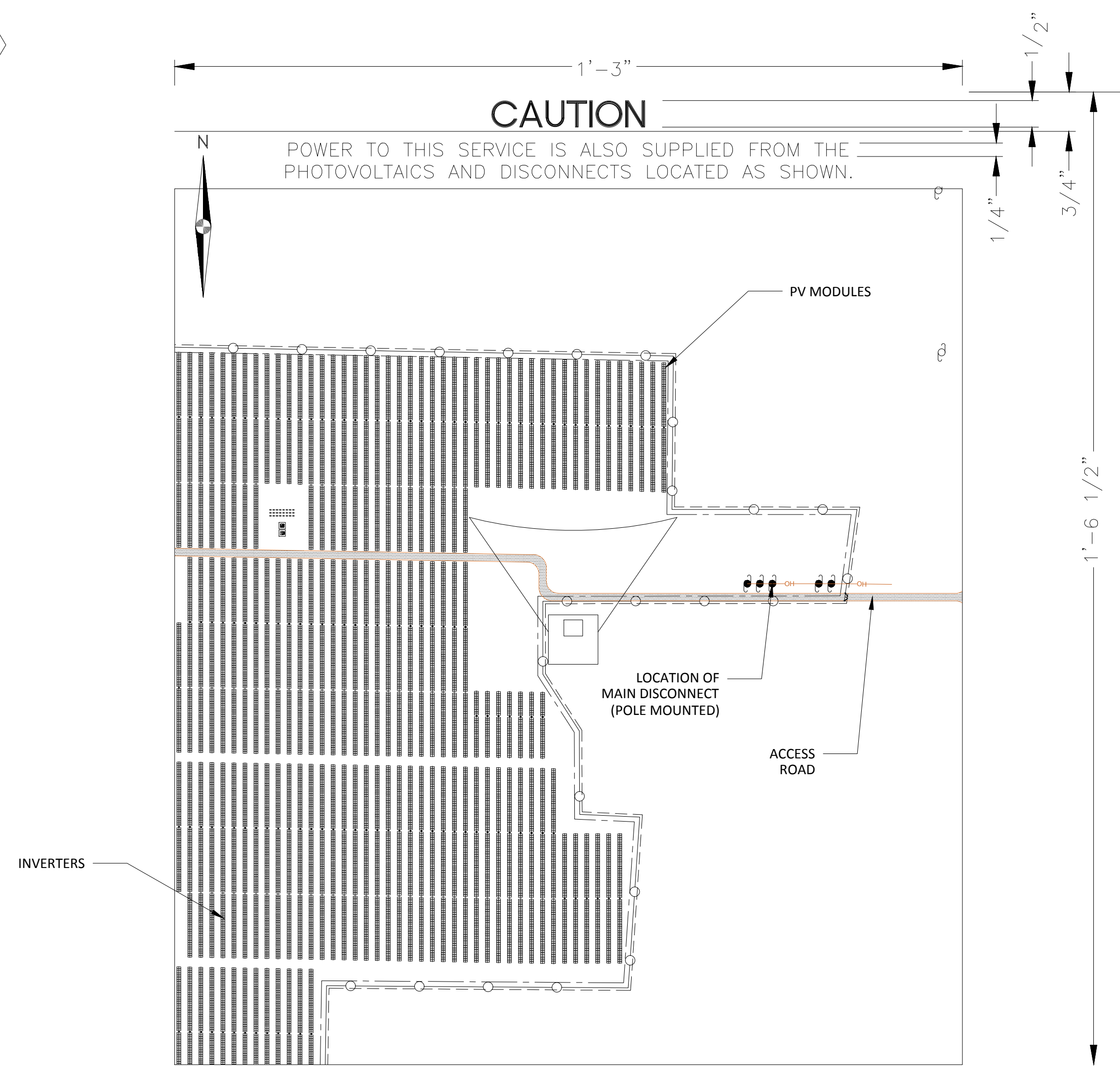
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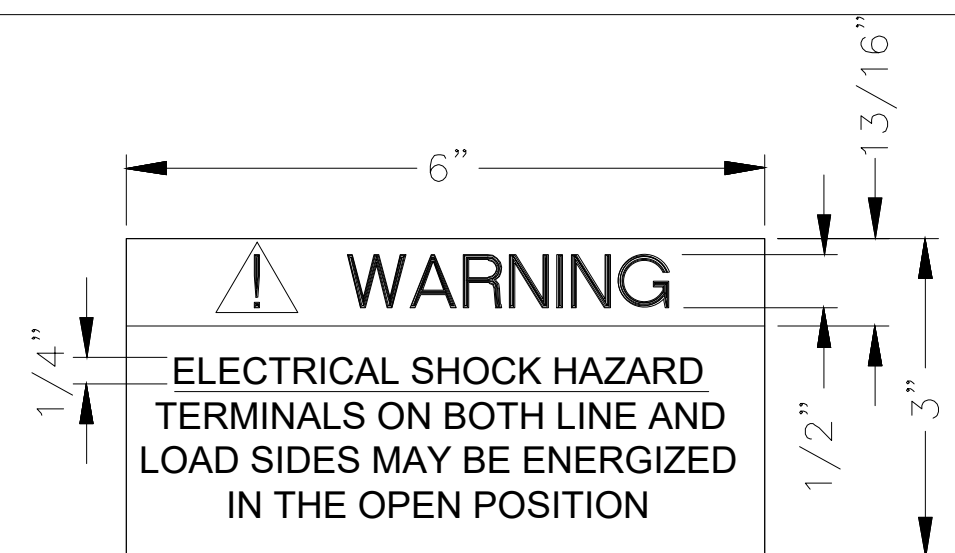
PROJECT NUMBER:
AE# 1462
SHEET SIZE:
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DESIGNED BY:
AC
DRAWN BY:
DS
CHECKED BY:
DEE

DRAWING TITLE:
ONE LINE DIAGRAM-SHEET 2

1



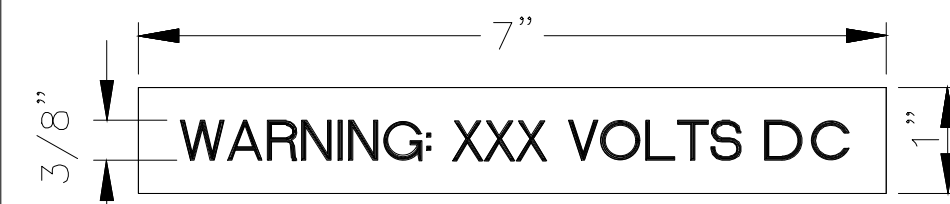
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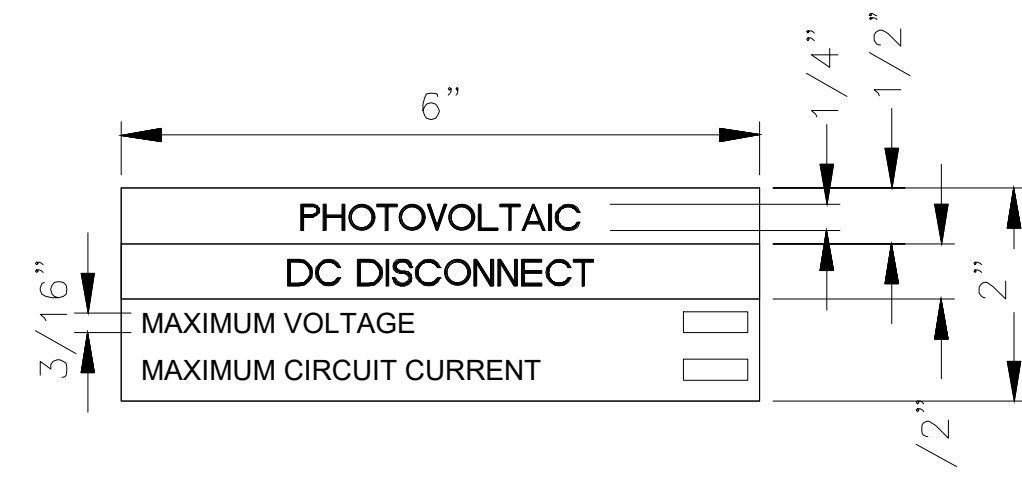
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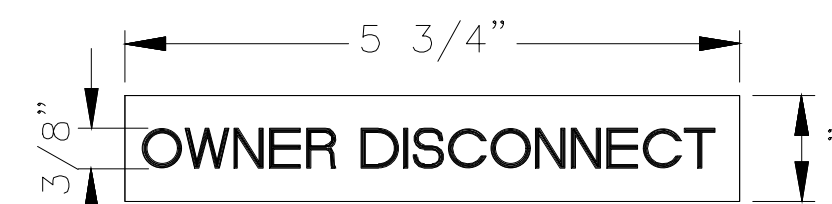
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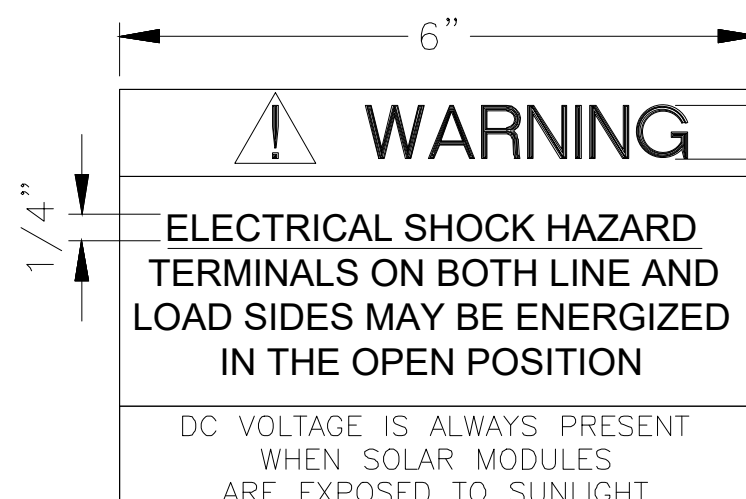
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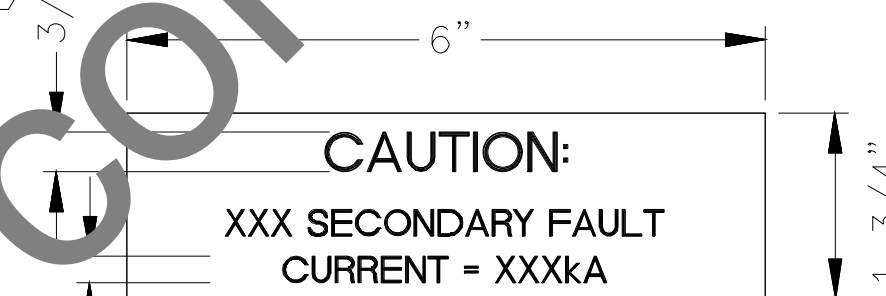
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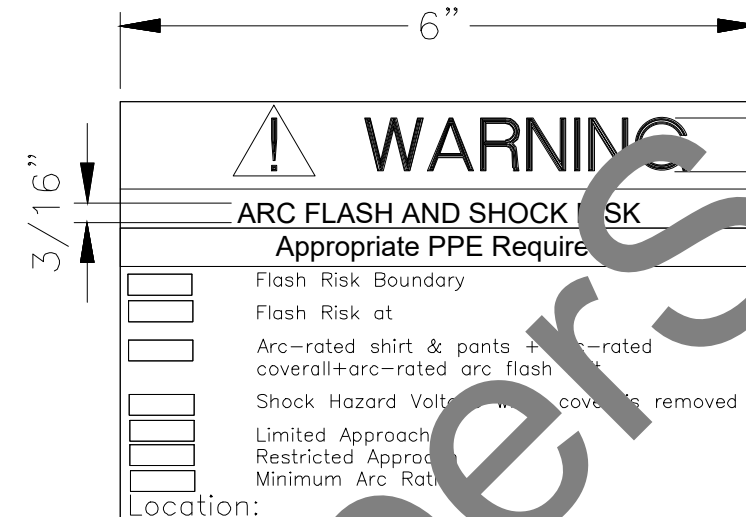
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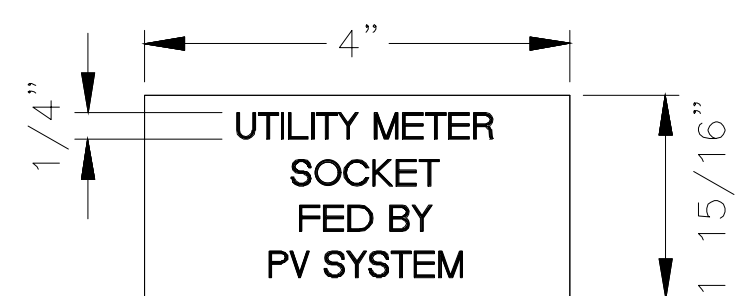


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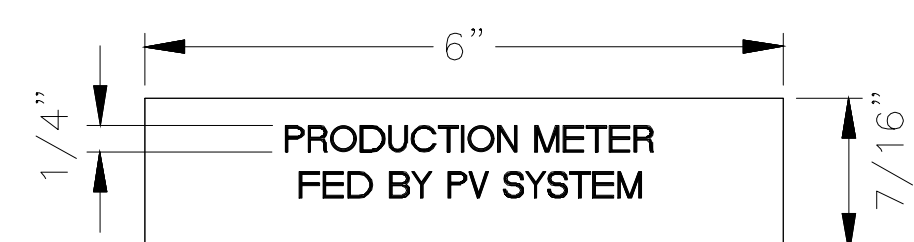


LABEL #	QTY	LABEL LOCATION	DETAILS
1	TBD	MAIN UTILITY SERVICE DISCONNECT AT POCC	<ul style="list-style-type: none"> PLAQUE FOR LOCATING THE MAIN SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC DISCONNECTING MEANS. WHITE BACKGROUND, BLACK LETTERS 690.15(A), 705.10, 690.56(B) FACILITIES WITH UTILITY SERVICE AND PV SYSTEMS.
2	TBD	UTILITY SERVICE METER	<ul style="list-style-type: none"> RED BACKGROUND, WHITE LETTERS
3	TBD	METERS, PULLBOXES, SWITCHGEAR, DISCONNECTS	<ul style="list-style-type: none"> RED BACKGROUND, WHITE LETTERS
4	TBD	PHOTOVOLTAIC DISCONNECTING MEANS AT PROJECT INSTALLED DISCONNECT	<ul style="list-style-type: none"> UTILITY MAIN PV AC DISCONNECT RED BACKGROUND, WHITE LETTERS 690.13(B)
5	TBD	PV PRODUCTION METER	<ul style="list-style-type: none"> RED BACKGROUND, WHITE LETTERS
6	TBD	P&C UTILITY AC DISCONNECTS, INVERTER DISCONNECTS	<ul style="list-style-type: none"> AC UTILITY DISCONNECT SYSTEM DESCRIPTION RED BACKGROUND, WHITE LETTERS
7	TBD	METERS, UTILITY MAIN SERVICE DISCONNECT, FEEDER BREAKERS	<ul style="list-style-type: none"> RED BACKGROUND, WHITE LETTERS
8	TBD	UTILITY MAIN SERVICE DISCONNECT, UTILITY AC PV DISCONNECT	<ul style="list-style-type: none"> FOR DISCONNECTING MEANS WHERE BOTH SIDES MAY BE ENERGIZED IN OPEN POSITIONS. RED BACKGROUND, WHITE LETTERS 690.13(B), 690.15(D)
9	TBD	COMBINER BOXES, RE-COMBINER, INVERTER	<ul style="list-style-type: none"> RED BACKGROUND, WHITE LETTERS 690.53
10	TBD	COMBINER BOXES, RE-COMBINER, DISCONNECTS	<ul style="list-style-type: none"> BUILDING OR STRUCTURE DISCONNECTING MEANS RED BACKGROUND, WHITE LETTERS 690.17(E)
11	TBD	DURING ARC FLASH STUDY IN TRANSFORMER, INVERTER, DISCONNECTS, STUDY PANEL BOARDS, COMBINER BOXES	<ul style="list-style-type: none"> WARNING: ORANGE BACKGROUND, WHITE LETTERS DANGER: RED BACKGROUND, WHITE LETTERS DETAILED TEXT AREA: WHITE BACKGROUND, BLACK LETTERS 110.16
12	TBD	SECURITY FENCE	<ul style="list-style-type: none"> SPACED EVERY 100 FEET AT PERIMETER OF ARRAY. SIGN SHALL BE AT LEAST 14AWG GALVANIZED STEEL, 20 YEAR LIFE WITH RESISTANCE TO UV. INSTALL TO STANDARD ASSEMBLY
13	TBD	PV POWER SOURCE CONDUCTORS ENCLOSURE	<ul style="list-style-type: none"> WHERE PV SOURCE CONDUCTORS ARE CONTAINED: CONDUIT BODIES IN WHICH ANY OF THE AVAILABLE CONDUIT OPENINGS ARE UNUSED. EVERY 10 FEET 690.31(G)(3)
14	TBD	AC CIRCUIT	<ul style="list-style-type: none"> (208V, 480V, 600V) AS NEEDED
15	TBD	SERVICE METER AND PRODUCTION METER	<ul style="list-style-type: none"> AS NEEDED
16	TBD	DISCONNECT	<ul style="list-style-type: none"> ADDITIONAL SIGNAGE REQUIREMENT
17	TBD	MAIN AC SWITCHGEAR	<ul style="list-style-type: none"> PROJECT SPECIFICATION
18	TBD	DC CIRCUIT	<ul style="list-style-type: none"> (600V, 1000V, 1500V) AS NEEDED

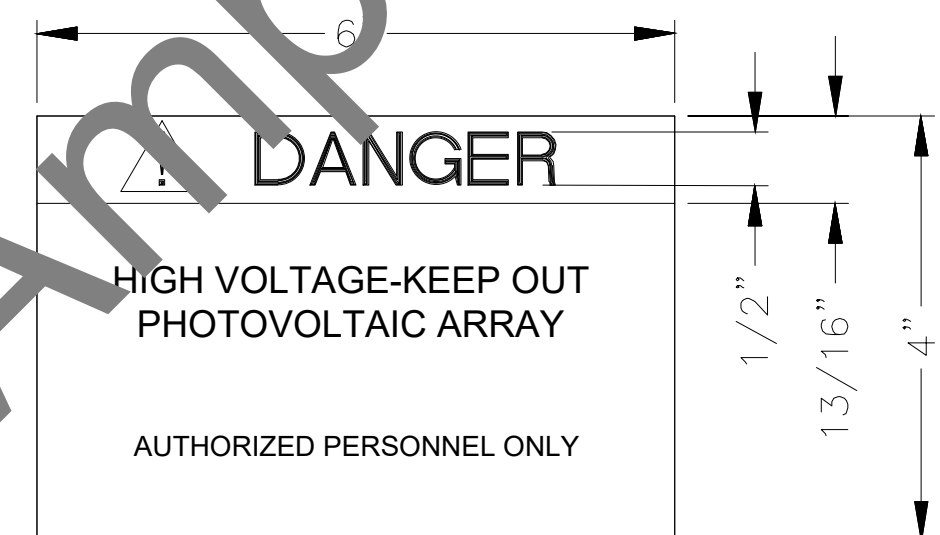
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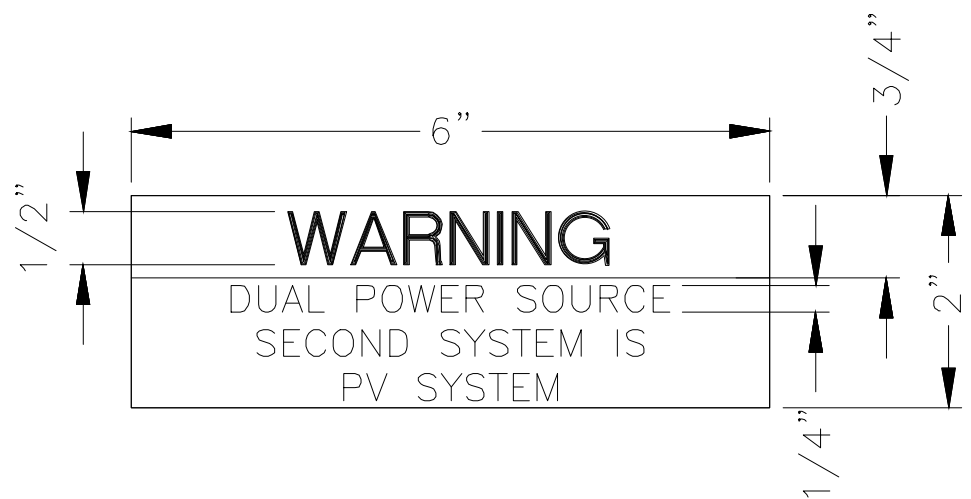
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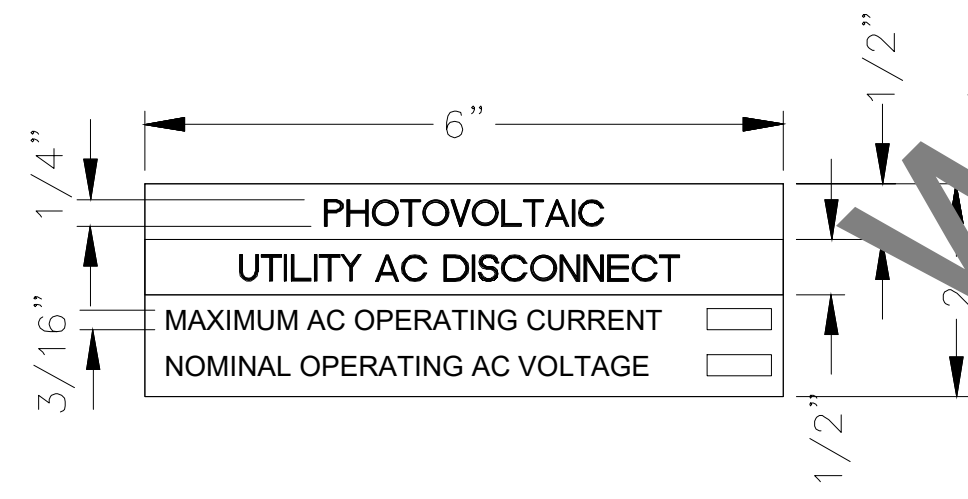
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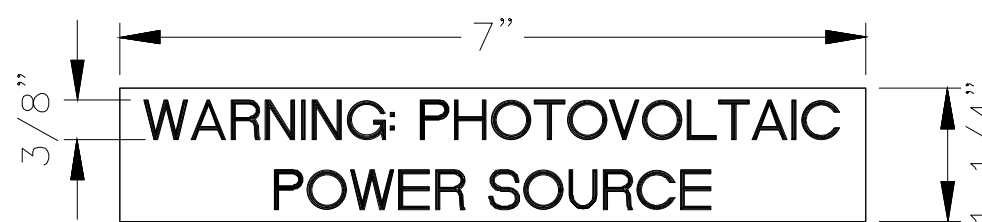
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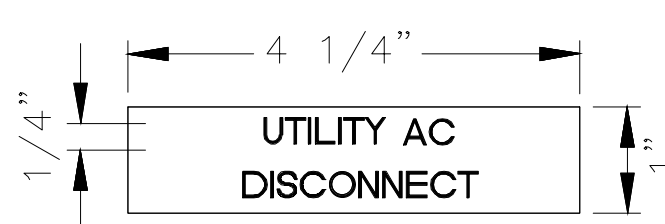
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13



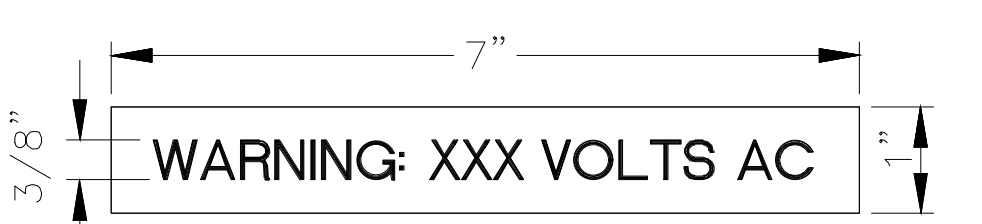
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7



14



GENERAL NOTES:

- ALL SIGNAGE SHALL HAVE ALL CAPITAL LETTERS, ARIAL OR OWNER APPROVED FONT. SIZES AND FORMAT FOR REFERENCE AND OTHER EQUIVALENT LABELS ACCEPTABLE.
- SOLAR PANELS AND INVERTERS ARE EXPECTED TO HAVE NEC REQUIRED LABELING PREVIOUSLY AFFIXED.
- ESTIMATED QUANTITIES PROVIDED HERE ONLY AND FINAL LABEL QUANTITIES TO BE DETERMINED BY CONTRACTOR.
- QUANTITIES ARE BASED ON PER MW PROJECT UNLESS OTHERWISE NOTED.
- UV RESISTANT VINYL LABELS MUST MEET REQUIREMENTS OF UL696.
- MATERIALS ON THIS PAGE ARE CALLED OUT WITH SYMBOL: XX
- ALL LABELS PRINTED ON STOCK HELLERMAN-TYTON LABELS.
- ALL LABELS SHALL BE WEATHERPROOF, DURABLE AND PERMANENTLY MOUNTED.

1

LABELS LAYOUT AND SIZE

E450 SCALE: NTS

2

LABELS DETAILS AND GENERAL NOTES

E450 SCALE: NTS

SEAL & SIGNATURE:



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CLIENT:

PROJECT:

PROJECT NUMBER: AE# 1462	DRAWN BY: DS
SHEET SIZE: 24x36	CHECKED BY: DEE
DESIGNED BY: AC	

DRAWING TITLE:
LABELS

SHEET NO:
E450