

COLLEGE - PHOTOVOLTAIC ENERGY SYSTEM

THIS 2359.53 KWSTC, GROUND MOUNTED PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED AT THE SCHOOL IN [REDACTED] THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A SPLICE INTO EXISTING FEEDERS ON THE CUSTOMER SIDE OF THE MAIN SERVICE DISCONNECT. PROJECT INCLUDES 1,500 KW AC OF ENERGY STORAGE BATTERIES.

SHEET INDEX

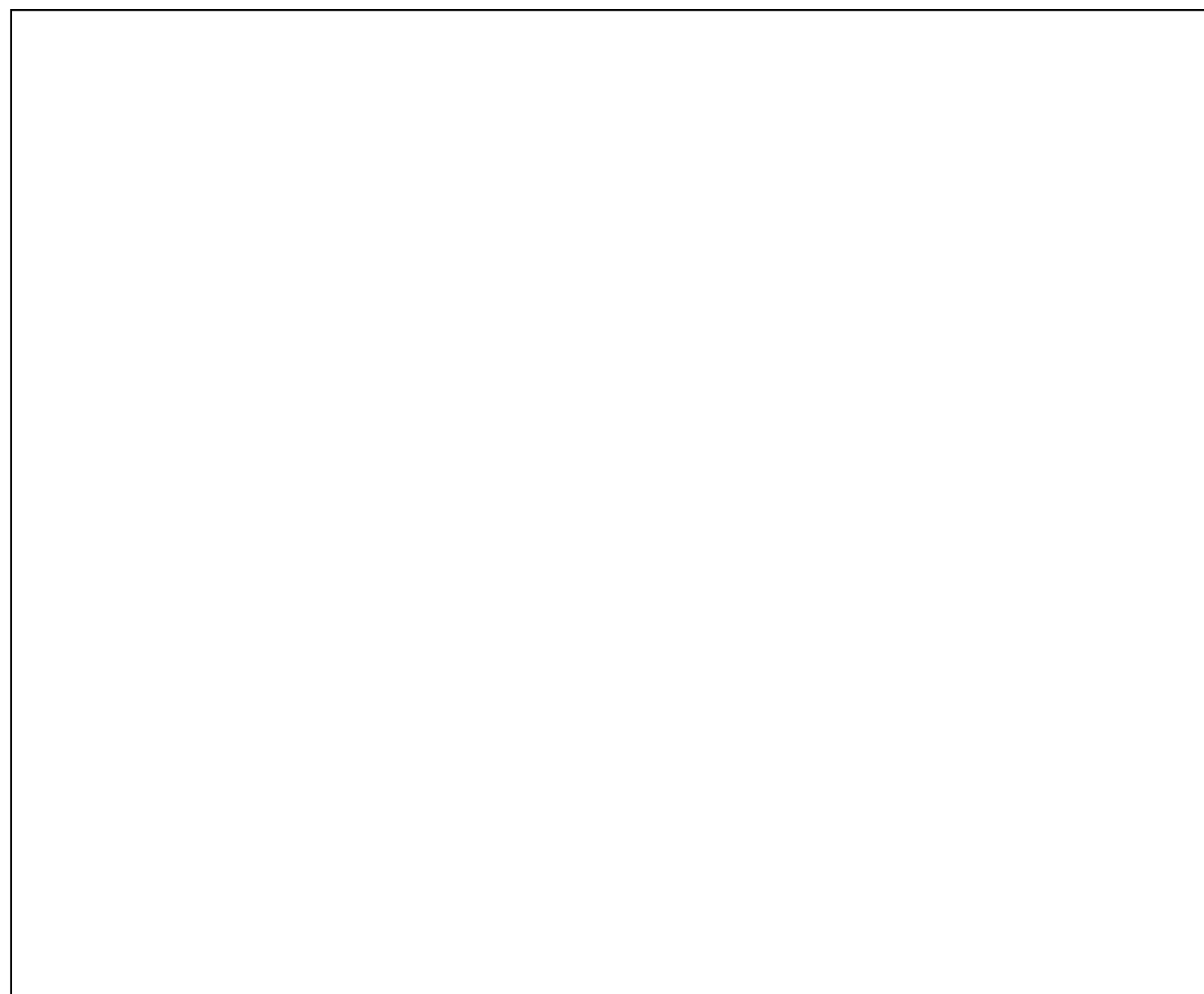
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COMPONENTS LIST

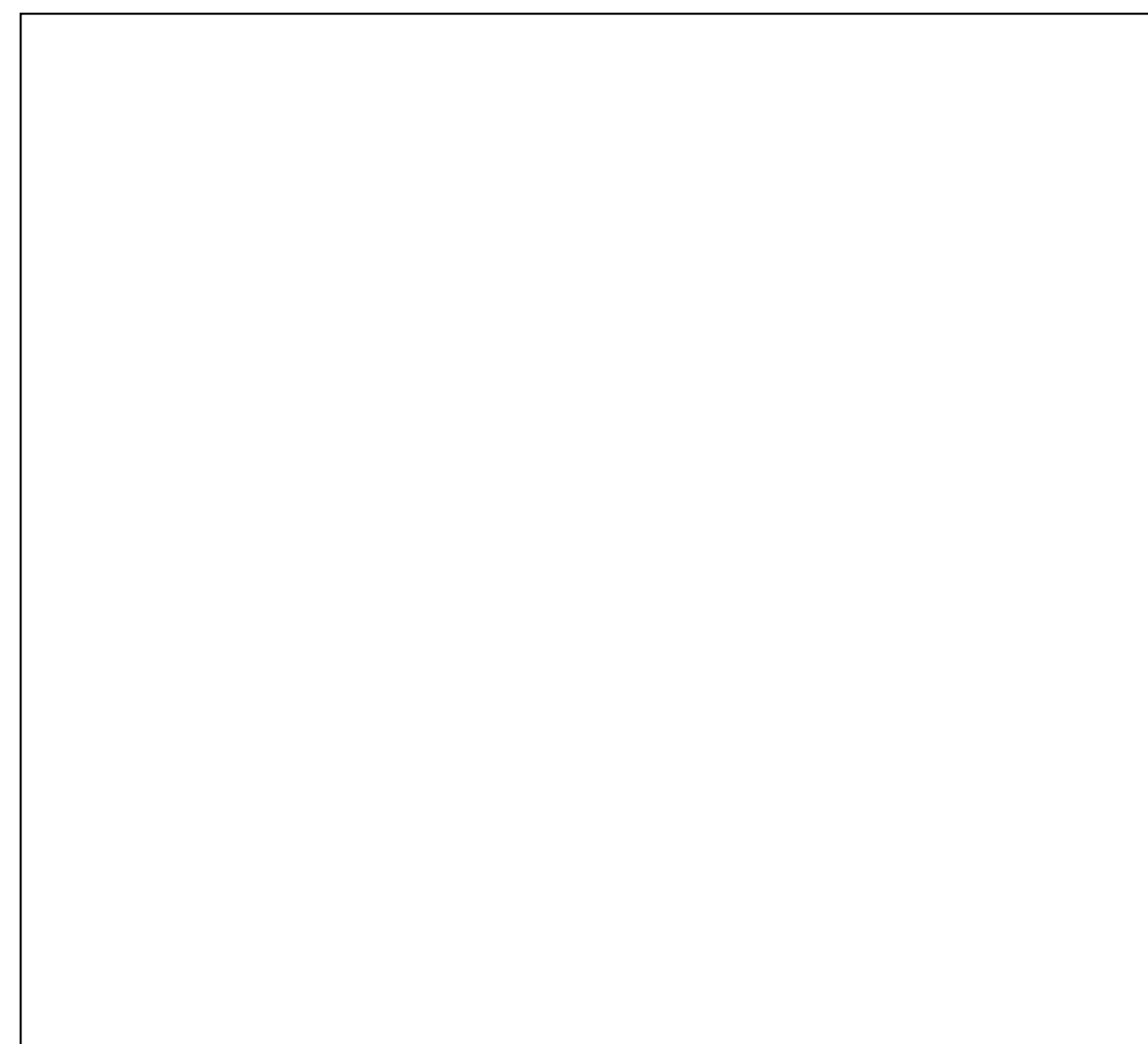
ELECTRICAL		
QTY	NAME	DESCRIPTION
5826	PV MODULE	JA SOLAR JAM72510 405/MR (TOTAL: 125,768 SQ. FT.)
2	PV INVERTER	CHINT CPS SCAGOKTL-DO/US-480 60.0 KW, 480 VAC, 72.2 A
2	PV INVERTER	CHINT CPS SCH100KTL-DO/US-480 75.0 KW, 480 VAC, 90.2 A (DERATED)
13	PV INVERTER	CHINT CPS SCH100KTL-DO/US-480 100.0 KW, 480 VAC, 126.7 A
1	AC COMBINER PANEL	480 VAC, 3000 A, NEMA 3R
2	AC COMBINER PANEL	480 VAC, 2500 A, NEMA 3R
6	ESS UNIT	SUNGROW ST556KWH-250UD 250.0 KW, 480 VAC, 317.2 A
1	SYSTEM METER	480 VAC, 2500 A, NEMA 3R
2	TRANSFORMER	2500 KVA, NEMA 3R PV-SIDE: 277/480 VAC, UTILITY-SIDE: 12.47 VAC
1	TRANSFORMER	1500 KVA, NEMA 3R ESS-SIDE: 480 VAC, UTILITY-SIDE: 277/480 VAC

GOVERNING CODES & STANDARDS

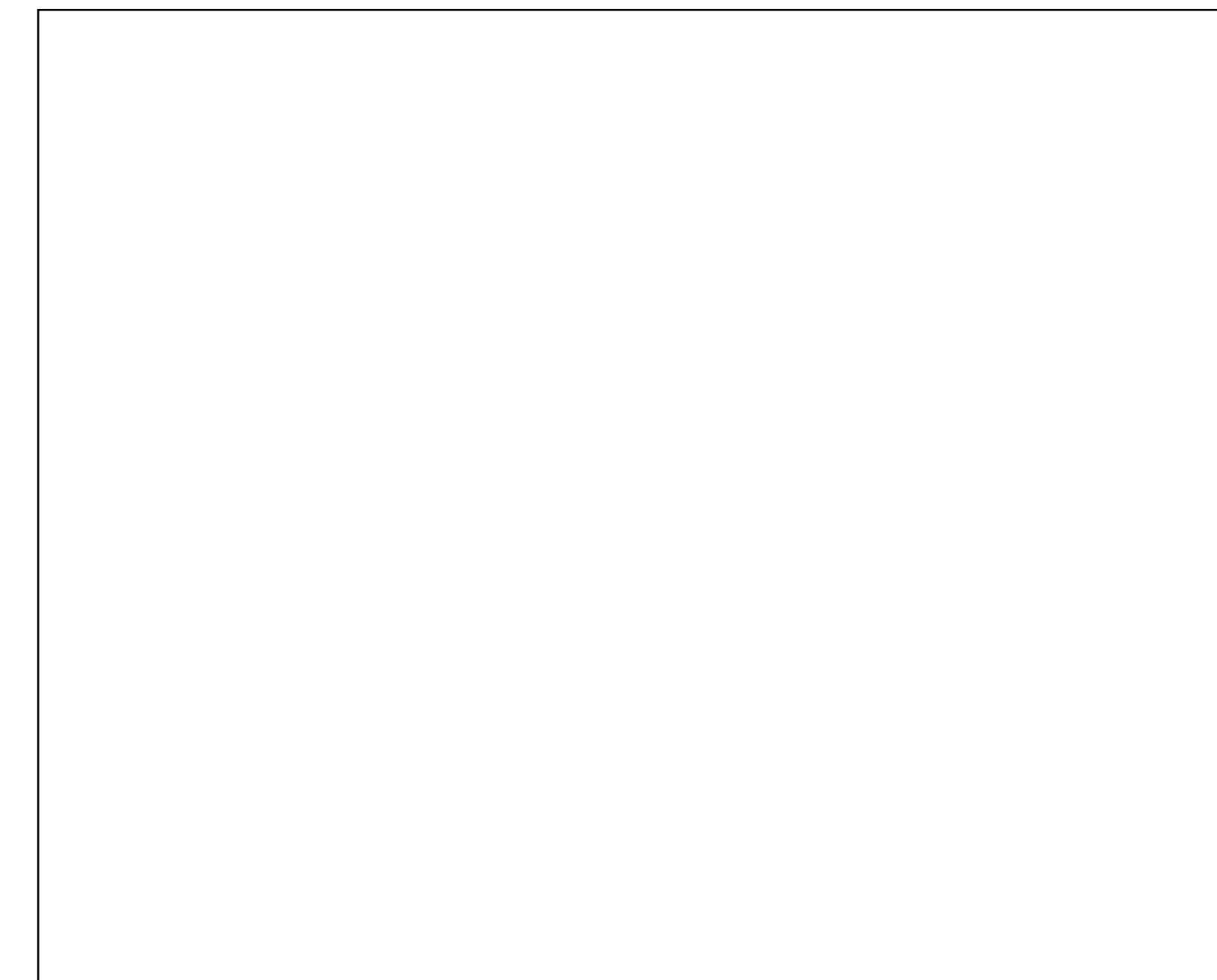
2019 CA ELECTRICAL CODE: § 110, 240, 250, 690, 705
 2019 CA BUILDING CODE: § 1507.17, 1510.7, 3111
 2019 CA FIRE CODE: § 1204
 UNDERWRITERS LABORATORIES (UL) STANDARDS
 OSHA 29 CFR 1910.269



PARCEL MAP 1



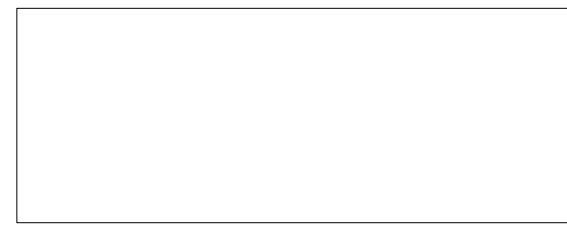
AERIAL MAP 2



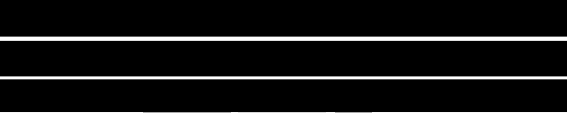
PROJECT LOCATION 3

dsa

client



Project Name & Location



Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

revisions

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

sheet name
 COVER

sheet number
 T1.0

plot date

CONTRACTOR NOTES:

- 1.) THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND NOTIFY THE SYSTEM DESIGN ENGINEER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND DRAWINGS.
- 2.) THE CONTRACTOR SHALL SUPPLY AND INSTALL ALL WORK AS SHOWN IN THE CONSTRUCTION DOCUMENTS UNLESS OTHERWISE NOTED. ALL WORK SHALL BE PERFORMED IN AN ORDERLY, WORKMAN-LIKE AND SAFE MANNER BY WORKERS SKILLED AND EXPERIENCED IN THEIR TRADES.
- 3.) THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL INSPECTIONS TO BE WITNESSED BY THE AHJ AND/OR THE OWNER. THE CONTRACTOR SHALL WORK WITH THE OWNER'S INSPECTION AGENCY TO PLAN THE INSPECTIONS, AND NOTIFY ALL PARTIES INVOLVED SUFFICIENTLY IN ADVANCE TO ALLOW THE INSPECTIONS TO TAKE PLACE IN A TIMELY MANNER AND NOT DELAY THE PROGRESS OF THE WORK. THE OWNER AND SYSTEM DESIGN ENGINEER WILL NOT BE RESPONSIBLE FOR SCHEDULING, ARRANGING OR COORDINATING THE INSPECTIONS.
- 4.) THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE AREAS WHERE WORK IS TAKING PLACE, AS WELL AS ANY ADJOINING AREAS WHICH MAY BE AFFECTED BY THE WORK, TO PREVENT SUBJECTING THE OCCUPANTS, STRUCTURES, VEHICLES, EQUIPMENT, OR ANY OTHER PARTS OR CONTENTS OF THE SITE TO HAZARD OR DAMAGE.
- 5.) CONTRACTOR SHALL FURNISH ALL NECESSARY BOXES, OUTLETS, SUPPORTS, CONDUITS, FITTINGS, AND ACCESSORIES TO FULFILL APPLICABLE CODES, REGULATIONS, BUILDING STANDARDS, AND THE BEST PRACTICE OF THE TRADE FOR THE INSTALLATION OF ELECTRICAL WORK.
- 6.) THE CONTRACTOR SHALL, AT ALL TIMES DURING THE WORK, MAINTAIN ACCESSIBILITY FROM THE STREET TO ALL FIRE HYDRANTS, POWER OR LIGHT POLES, AND SIMILAR UTILITY AND PUBLIC SERVICE ITEMS WITHIN OR ADJACENT TO THE CONSTRUCTION SITE.
- 7.) WORK SHALL NOT RESTRICT CLEAR AND UNOBSTRUCTED ACCESS TO ANY WATER OR POWER DISTRIBUTION FACILITIES (POWER POLES, PULLBOXES, TRANSFORMERS, VAULTS, PUMPS, VALVES, METERS, APPURTENANCES, ETC.) OR TO THE LOCATION OF THE HOOKUP.
- 8.) THE OWNERS AND THE AHJ SHALL BE NOTIFIED IN WRITING IN ADVANCE OF ANY REQUIRED CONSTRUCTION OPERATION THAT WILL INVOLVE INTERRUPTION OF THE HEATING, WATER, FIRE PROTECTION SYSTEMS, TELEPHONE, GAS OR ELECTRICAL SERVICES TO THE OTHER BUILDINGS AND AREAS OF THE SITE. THE CONTRACTOR SHALL COORDINATE ANY REQUIRED SHUTDOWN OF THE UTILITIES WITH THE OWNERS, THE AHJ, AND THE UTILITY COMPANY.
- 9.) UPON REVIEW OF ELECTRICAL DRAWINGS, THE ELECTRICAL CONTRACTOR SHALL INFORM THE SYSTEM DESIGN ENGINEER OF ANY DISCREPANCIES OR REQUEST CLARIFICATION, IF NECESSARY, CONCERNING THE INTENT OF THE PLANS AND SPECIFICATIONS TO PROVIDE A COMPLETE ELECTRICAL INSTALLATION.
- 10.) THE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER CONTRACTORS WHOSE WORK MIGHT AFFECT THIS INSTALLATION. CONTRACTORS SHALL ARRANGE ALL PARTS OF THIS WORK AND EQUIPMENT IN PROPER RELATION TO THE WORK AND EQUIPMENT OF OTHERS AND WITH BUILDING CONSTRUCTION AND ARCHITECTURAL FINISH SO THAT IT WILL HARMONIZE IN SERVICE AND APPEARANCE.
 - 1.) THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE OWNER'S INSPECTION AGENCY TO ARRANGE FOR INSPECTIONS RELATED TO ALL SPECIAL INSPECTIONS IN A TIMELY MANNER, AND SHALL BE PRESENT AS REQUIRED AT THE INSPECTIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSURING THAT THE APPROPRIATE SUBCONTRACTORS ARE PRESENT DURING TESTS AND INSPECTIONS OF THE SYSTEMS FOR WHICH THE SUBCONTRACTORS ARE RESPONSIBLE.

PHOTOVOLTAIC NOTES:

- 1.) ALL ASPECTS OF WORK RELATED TO THE SOLAR PHOTOVOLTAIC (PV) SYSTEM SHALL BE IN ACCORDANCE WITH ALL STATE AND LOCAL CODES, UTILITY REQUIREMENTS, AND THE NEC, ESPECIALLY ARTICLE 690 AND ARTICLE 705.
- 2.) SOLAR PV MODULE FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER E.G.C. PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEET.
- 3.) SOLAR PV SYSTEMS SHALL BE GROUNDED IN ACCORDANCE WITH NEC 690 PART V: GROUNDING.
- 4.) COMBINER BOXES, FUSING, WIRE SIZES, QUANTITIES AND CONDUIT SIZES BETWEEN SOLAR ARRAYS AND INVERTERS TO BE VERIFIED BY CONTRACTOR WITH SOLAR MODULE AND INVERTER MANUFACTURERS BEFORE INSTALLATION.
- 5.) PV SOURCE CIRCUIT CONDUCTORS EXPOSED BETWEEN ARRAYS SHALL BE SECURED ON BOTH SIDES, AND BE PROTECTED FROM PHYSICAL DAMAGE AND ABRASION, INCLUDING FROM EDGES OF RACKING, CHANNEL EDGES, WIRE TRAYS, ETC.
- 6.) ANY CABLE TIES USED SHALL BE HEAT STABILIZED (-40C TO 105C), UV STABILIZED AND OUTDOOR RATED, SUITABLE AND DURABLE FOR THE ENVIRONMENT AND LIFE OF THE PV SYSTEM.
- 7.) WHERE EXPOSED TO SUNLIGHT, CONDUCTORS SHALL BE LISTED AND MARKED AS SUNLIGHT RESISTANT.
- 8.) ALL EQUIPMENT GROUND CONDUCTORS SMALLER THAN AWG #6 SHALL BE PROTECTED FROM PHYSICAL DAMAGE BY AN IDENTIFIED RACEWAY OR CABLE ARMOR UNLESS INSTALLED WITHIN THE HOLLOW SPACES OF THE FRAMING MEMBERS OF BUILDINGS OR STRUCTURES AND WHERE NOT SUBJECT TO PHYSICAL DAMAGE.
- 9.) ALL PROVISIONS FOUND IN THE CALIFORNIA ELECTRIC CODE (CEC) FOR PHOTOVOLTAIC SYSTEMS SHALL APPLY. THESE CEC PROVISIONS INCLUDE, BUT ARE NOT LIMITED TO, ARTICLE 250, 310, AND 690. (DSA IR 16-B ITEM 3.3)
- 10.) PV PANELS ARE LISTED TO: UL 1703; INVERTERS: UL 1741 (CBC 311.3.1). SEE DATASHEETS ON D1.0.





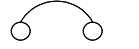
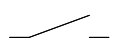
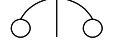
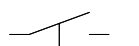
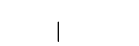


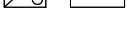
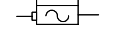
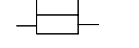
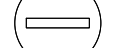



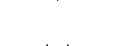
EQUIPMENT NOTES:

- 1.) ALL MATERIALS, SUPPLIES, AND EQUIPMENT SHALL BE LISTED, USED, AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS, AND APPLICABLE NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) REQUIREMENTS.
- 2.) ALL EQUIPMENT SHALL BE RATED FOR THE ENVIRONMENT IN WHICH IT IS INSTALLED.
- 3.) WORKING SPACE AROUND ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- 4.) THE APPROXIMATE LOCATIONS OF ALL JUNCTION BOXES, COMBINER BOXES, CONDUITS, ETC. SHALL BE DETERMINED FROM THE DRAWINGS, AND VERIFIED BY THE CONTRACTOR FOR INSTALLATION.
- 5.) ALL JUNCTION BOXES, COMBINER BOXES, AND DISCONNECTS SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION.
- 6.) PROVIDE NEMA 3R RATED EQUIPMENT OR BETTER WHERE EXPOSED TO OUTDOORS.
- 7.) WHERE SIZES OF RACEWAYS OR BOXES ARE NOT INDICATED ON THE DRAWINGS, THE CONTRACTOR SHALL SIZE THESE ITEMS AS REQUIRED FOR THE INSTALLATION.
- 8.) ALL VERTICAL RUNS OF CONDUIT OR TUBING TERMINATING IN THE BOTTOM OF WALL BOXES OR CABINETS OR SIMILAR LOCATIONS, SHALL BE PROTECTED FROM THE ENTRANCE OF FOREIGN MATERIAL PRIOR TO THE INSTALLATION OF CONDUCTORS.
- 9.) METAL RACEWAYS, METAL ENCLOSURES OF ELECTRICAL DEVICES AND EQUIPMENT, MODULE FRAMES, AND OTHER EQUIPMENT SHALL BE COMPLETELY GROUNDED IN ACCORDANCE WITH THE NEC.
- 10.) PROPER HARDWARE FOR A COMPLETE GROUNDING AND BONDING SYSTEM SHALL BE INSTALLED BY THE CONTRACTOR, IF NECESSARY.
 - 1.) GROUNDING RODS SHALL HAVE A RESISTANCE TO GROUND OF 25 OHMS OR LESS AND SHALL BE 5/8" x 8' MIN, COPPER-BONDED STEEL. ALL GROUND CLAMPS USED SHALL BE UL 467 LISTED.
 - 2.) ALL PVC CONDUIT EXPOSED TO SUNLIGHT SHALL BE SCHEDULE 80 AND MARKED AS SUNLIGHT RESISTANT. ALL UNDERGROUND PVC CONDUIT SHALL BE SCHEDULE 40 OR 80.




ELECTRICAL NOTES:

- 1.) ELECTRICAL POWER MUST BE SHUT OFF PRIOR TO THE CONTRACTOR PERFORMING ANY WORK IN RACEWAYS WITH LIVE ELECTRICAL CIRCUITS OR ANY OTHER EQUIPMENT. WHEN SWITCHES OR CIRCUIT BREAKERS ARE OPENED FOR WORK ON ELECTRICAL EQUIPMENT OR WIRING, SIGNS OR TAGS SHOULD BE INSTALLED AT THE SWITCH OR BREAKER STATING THAT WORK IS BEING PERFORMED ON THEM. INCLUDE THE TIME, DATE, AND CONTRACTOR'S NAME ON THE SIGN OR TAG. IF DEVICE IS LOCKABLE, IT SHOULD BE PADLOCKED.
- 2.) THE ELECTRICAL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE AHJ, NATIONAL FIRE PROTECTION AGENCY (NFPA), NATIONAL ELECTRICAL CODE (NEC), AND OSHA.
- 3.) PHASING OF NEW CONDUCTORS TO MATCH EXISTING CONDUCTORS. IF INSTALLATING A NEW CIRCUIT, THEN CONTRACTOR SHALL FOLLOW THE PHASING SCHEMES PROVIDED IN THE ELECTRICAL DIAGRAM.
- 4.) ALL CONDUCTORS SHALL BE COPPER OR ALUMINUM, RATED FOR 90°C WET ENVIRONMENT, AND 1500 VOLTS DC OR 600 VOLTS AC, UNLESS OTHERWISE NOTED.
- 5.) GROUNDING ELECTRODE CONDUCTOR (G.E.C.) SHALL BE CONTINUOUS AND/OR IRREVERSIBLY SPLICED/WELDED.
- 6.) FLEXIBLE, FINE-STRANDED CABLES SHALL BE TERMINATED ONLY WITH TERMINALS, LUGS, DEVICES, OR CONNECTORS THAT ARE IDENTIFIED AND LISTED FOR SUCH USE PER NEC 690.31(F).
- 7.) ALL WIRES SHALL BE IDENTIFIED BY CIRCUITS IN ALL CABINETS, BOXES, WIRING TROUGHs, AND OTHER ENCLOSURES, AND AT ALL TERMINAL POINTS, I.E., RECEPTACLES, MECHANICAL LUGS, COMPRESSION FITTINGS. THE CIRCUIT DESIGNATIONS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS OR AS DIRECTED BY THE SYSTEM DESIGN ENGINEER. LABELS OR TAGS SHALL BE APPLIED TO WIRES SO THAT THEY WILL BE READILY VISIBLE.
- 8.) BREAKERS SHALL BE 80% RATED UNLESS OTHERWISE SPECIFIED.
- 9.) FUSES FOR SWITCHES SHALL BE CURRENT-LIMITING TYPE WITH A MINIMUM INTERRUPTING CAPACITY OF 200,000 AMPERES RMS (UNLESS OTHERWISE NOTED) AND OF THE CONTINUOUS CURRENT RATINGS AS INDICATED ON THE DRAWINGS OR AS RECOMMENDED BY THE MANUFACTURER.
- 10.) THE SHORT-CIRCUIT INTERRUPTING RATING OF ALL NEW EQUIPMENT SHALL BE NO LESS THAN THE INTERRUPTING RATING OF THE EXISTING SERVICE EQUIPMENT, UNLESS A MINIMUM VALUE WAS CALCULATED AND SPECIFIED ON THE PLANS FOR THE NEW EQUIPMENT.






ELECTRICAL LEGEND

-  = CIRCUIT CONDUCTORS
-  = EQUIPMENT GROUNDING CONDUCTORS
-  = TERMINAL BLOCK
-  = FUSE
-  = CIRCUIT BREAKER
-  = THROW SWITCH (KNIFE-BLADE)
-  = RECLOSING CIRCUIT BREAKER
-  = RECLOSING DISCONNECT/RELAY
-  = GROUNDING ELECTRODE SYSTEM
-  = PV MODULE
-  = INVERTER
-  = MICROINVERTER
-  = POWER OPTIMIZER
-  = METER/MONITORING DEVICE
-  = TRANSFORMER
-  = GENERATOR
-  = TRANSFER SWITCH
-  = BATTERY
-  = CURRENT TRANSFORMER (CT)






ELECTRICAL LEGEND - DC

-  = POSITIVE TERMINAL (PHASED RED)
-  = NEGATIVE TERMINAL (PHASED BLACK)
-  = GROUND TERMINAL (PHASED GREEN)

ELEC. LEGEND - 480 VAC


-  = LINE 1 TERMINAL (PHASED BROWN)
-  = LINE 2 TERMINAL (PHASED ORANGE)
-  = LINE 3 TERMINAL (PHASED YELLOW)
-  = NEUTRAL TERMINAL (PHASED WHITE)
-  = GROUND TERMINAL (PHASED GREEN)

ELEC. LEGEND - 240 VAC

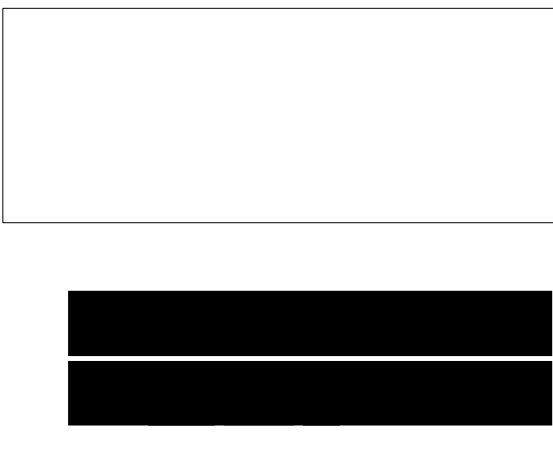
-  = LINE 1 TERMINAL (PHASED BLACK)
-  = LINE 2 TERMINAL (PHASED RED)
-  = LINE 3 TERMINAL (PHASED BLUE)
-  = NEUTRAL TERMINAL (PHASED WHITE)
-  = GROUND TERMINAL (PHASED GREEN)

NOTE: FOR DELTA HIGH-LEG SYSTEMS, THE HIGH-LEG SHALL BE IDENTIFIED AND PHASED ORANGE

SITE/ARRAY PLAN LEGEND

-  = CONDUIT ROUTES
-  = CONDUIT ROUTES (UGND OR INDOORS)
-  = PV MODULE
-  = PV EQUIPMENT
-  = RAFTER/TRUSS
-  = STANDING SEAM
-  = VENT
-  = CHIMNEY
-  = SKYLIGHT
-  = HVAC UNIT
-  = ROOF HATCH
-  = PV ATTACHMENT FLASHING
-  = RACKING RAIL
-  = SETBACKS/PATHWAYS
-  = SWINGING DOOR
-  = TREE/BUSH

client



Project Name & Location



Design & Management

Engineer

Project Number: 006371

Drawn By: AM

Checked By: RD

revisions

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

**100% Package
1/31/2024**

stamp

sheet name

PROJECT NOTES

sheet number

T1.1

plot date

SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM725 I O 405/MR
	1500V DC	NEW CONDUIT FOR PV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM
	1500V DC (JUMPER)	NEW CONDUIT FOR PV SYSTEM ARRAY JUMPER CONDUCTORS

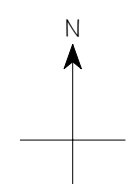
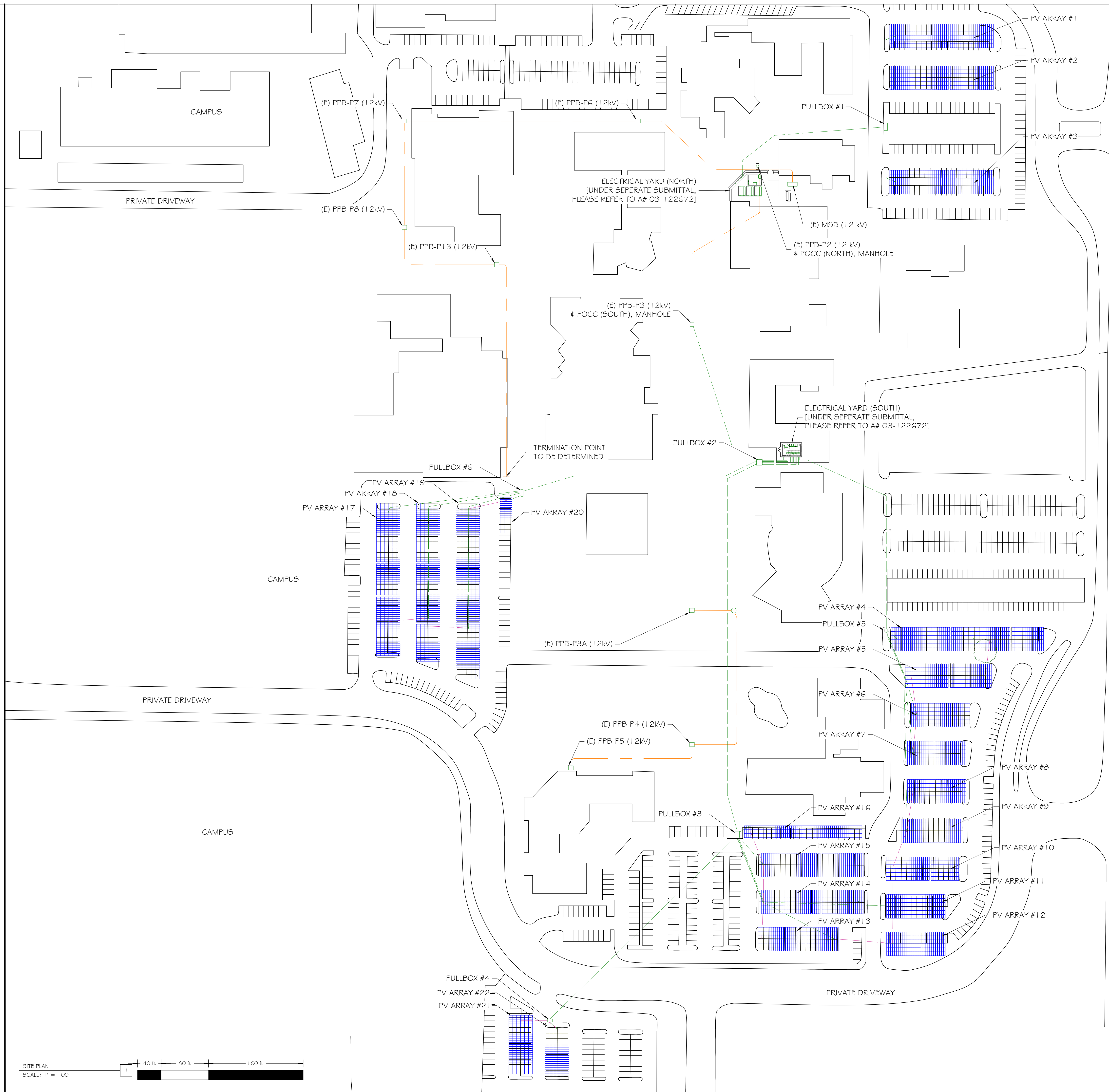
NOTE:
SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)

NORTH PV SYSTEM SUMMARY TABLE					
Array ID	Inverter ID	Mod Qty.	kW size	Tilt	Azimuth
1	Inv 1	312	126.36	7°	180°
2	Inv 2	312	126.36	7°	180°
3	Inv 3	312	126.36	7°	180°
Totals:		936	379.08		

SYSTEM SUMMARY:
(936) JA SOLAR JAM725 I O 405/MR
(3) CHINT CP5 SCH100KTL-DOUS-480 (480V)
379.08 kWstc, 300 kW AC

SOUTH PV SYSTEM SUMMARY TABLE					
Array ID	Inverter ID	Mod Qty.	kW size	Tilt	Azimuth
4	Inv 4A, 4B	456	184.68	7°	180°
5	Inv 4B, 5A	258	104.49	7°	180°
6	Inv 5A	180	72.90	7°	180°
7	Inv 5A, 5B	180	72.90	7°	180°
8	Inv 5B, 6A	180	72.90	7°	180°
9	Inv 6A	180	72.90	7°	180°
10	Inv 6A, 6B	216	87.48	7°	180°
11	Inv 6B	180	72.90	7°	180°
12	Inv 6B, 7A	180	72.90	7°	180°
13	Inv 7A, 7B	240	97.20	7°	180°
14	Inv 7B, 8A	306	123.93	7°	180°
15	Inv 8A, 8B	306	123.93	7°	180°
16	Inv 8B	180	72.90	7°	180°
17	Inv 9A, 9B	456	184.68	7°	90°
18	Inv 9B, 10B, 11	474	191.97	7°	90°
19	Inv 10A, 10B	528	213.84	7°	90°
20	Inv 12	54	21.87	7°	90°
21	Inv 13	180	72.90	7°	90°
22	Inv 13	156	63.18	7°	90°
Totals:		4890	1980.45		

SYSTEM SUMMARY:
(4890) JA SOLAR JAM725 I O 405/MR
(2) CHINT CP5 SCH100KTL-DOUS-480 (480V) (DERATED TO 75kW)
(13) CHINT CP5 SCH100KTL-DOUS-480 (480V)
(2) CHINT CP5 SCA60KTL-DOUS-480 (480V)
1980.45 kWstc, 1570 kW AC



05a

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

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0	10/31/2022	ISSUED FOR DSA REVIEW
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2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
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100% Package
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stamp

sheet name
SITE PLAN

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E.I.O.

plot date

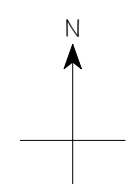
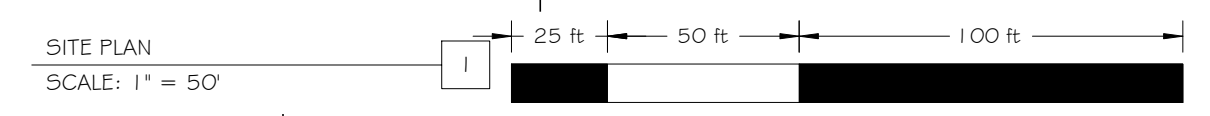
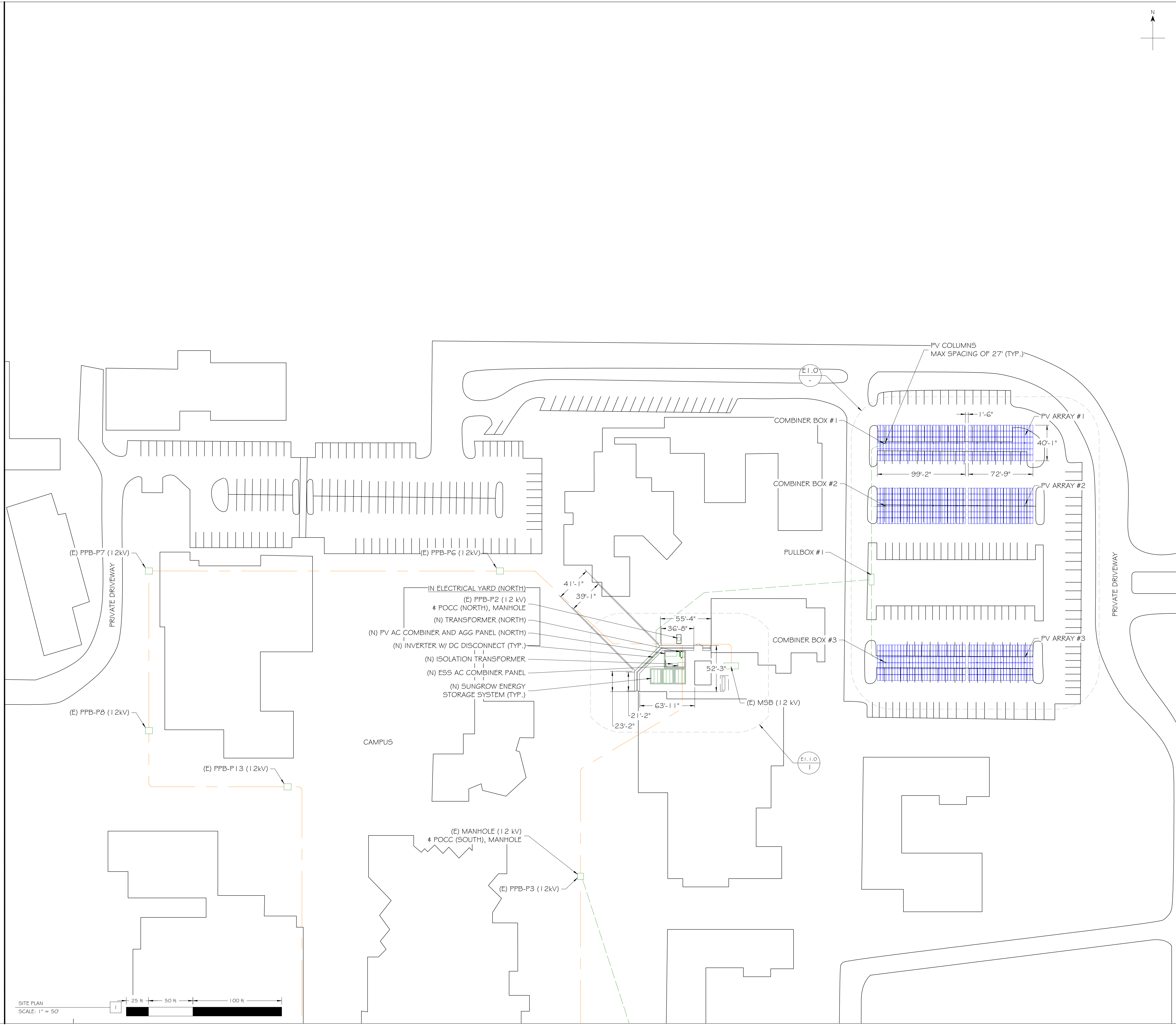
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SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM72S 10 405/MR
	1500V DC	NEW CONDUIT FOR PV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM

NOTE:
 SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
 RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)

NORTH PV SYSTEM SUMMARY TABLE					
Array ID	Inverter ID	Mod Qty.	kW size	Tilt	Azimuth
1	Inv 1	312	126.36	7°	180°
2	Inv 2	312	126.36	7°	180°
3	Inv 3	312	126.36	7°	180°
Totals:		936	379.08		

SYSTEM SUMMARY:
 (936) JA SOLAR JAM72S 10 405/MR
 (3) CHINT CPS 5CH100KTL-DOUS-480 (480V)
 379.08 kWstc, 300 kW AC



dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

sheet name
 NORTH PV LAYOUT

sheet number
 E1.1

plot date

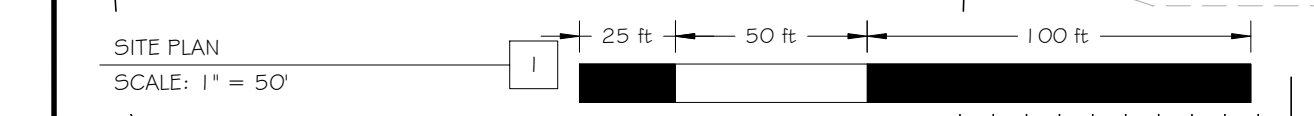
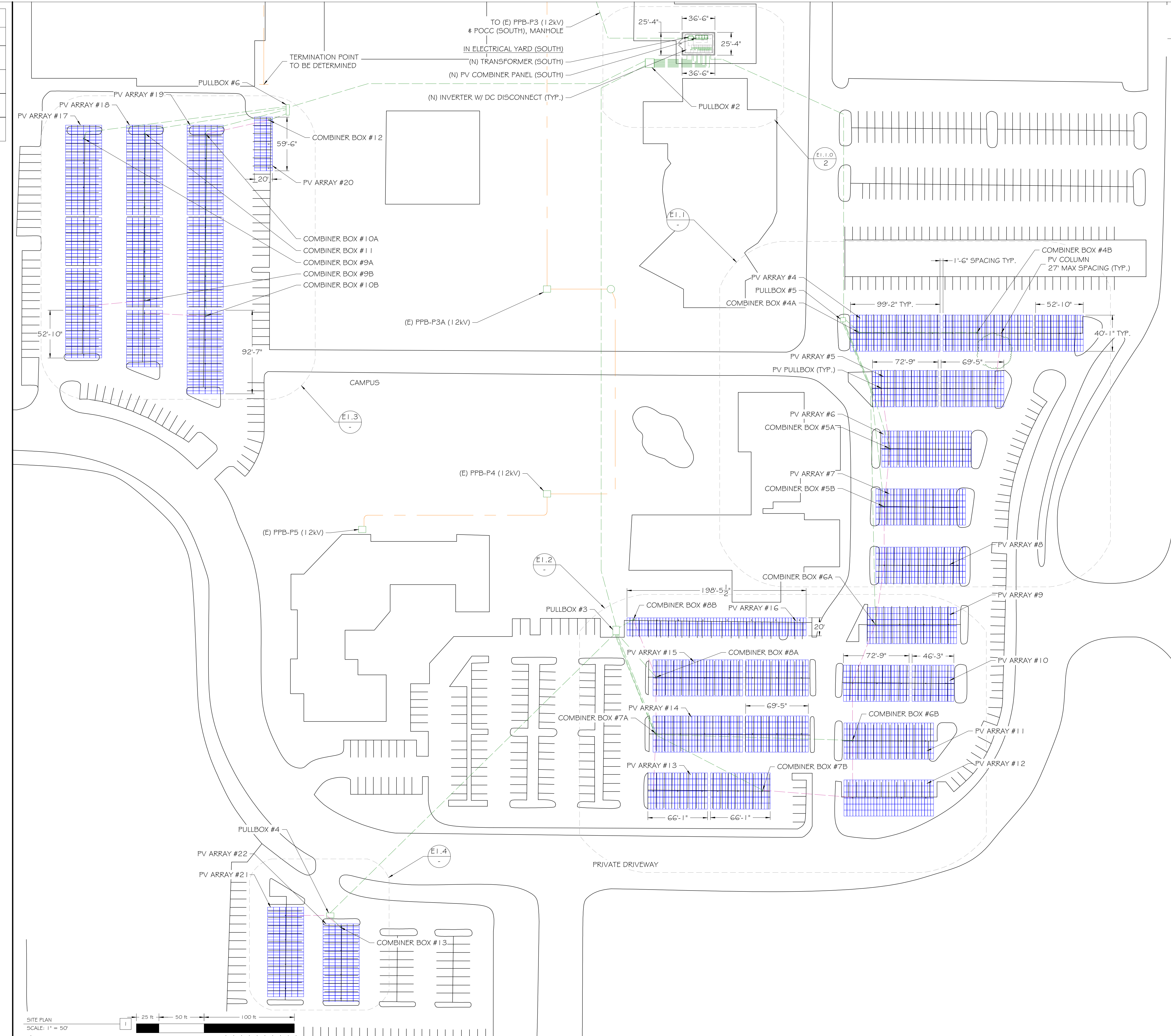
C:\Temp\220602-AH001 - Overall Site Plan-A01-SITE.dwg

SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND FV MOD.	JA SOLAR JAM72S1 O 405/MR
	1500V DC	NEW CONDUIT FOR FV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM
	1500V DC (JUMPER)	NEW CONDUIT FOR FV SYSTEM ARRAY JUMPER CONDUCTORS

NOTE:
SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)

SOUTH PV SYSTEM SUMMARY TABLE					
Array ID	Inverter ID	Mod Qty.	kW size	Tilt	Azimuth
4	Inv 4A, 4B	456	184.68	7°	180°
5	Inv 4B, 5A	258	104.49	7°	180°
6	Inv 5A	180	72.90	7°	180°
7	Inv 5A, 5B	180	72.90	7°	180°
8	Inv 5B, 6A	180	72.90	7°	180°
9	Inv 6A	180	72.90	7°	180°
10	Inv 6A, 6B	216	87.48	7°	180°
11	Inv 6B	180	72.90	7°	180°
12	Inv 6B, 7A	180	72.90	7°	180°
13	Inv 7A, 7B	240	97.20	7°	180°
14	Inv 7B, 8A	306	123.93	7°	180°
15	Inv 8A, 8B	306	123.93	7°	180°
16	Inv 8B	180	72.90	7°	180°
17	Inv 9A, 9B	456	184.68	7°	90°
18	Inv 9B, 10A, 11	474	191.97	7°	90°
19	Inv 10A, 10B	528	213.84	7°	90°
20	Inv 12	54	21.87	7°	90°
21	Inv 13	180	72.90	7°	90°
22	Inv 13	156	63.18	7°	90°
Totals:		4890	1980.45		

SYSTEM SUMMARY:
(4890) JA SOLAR JAM72S1 O 405/MR
(2) CHINT CPS SCH100KTL-DOU5-480 (480V) (DERATED TO 75kW)
(13) CHINT CPS SCH100KTL-DOU5-480 (480V)
(2) CHINT CPS SCAGOKTL-DOU5-480 (480V)
1980.45 kWdc, 1570 kW AC



client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

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0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

sheet name



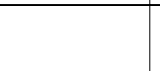
SOUTH PV LAYOUT

sheet number

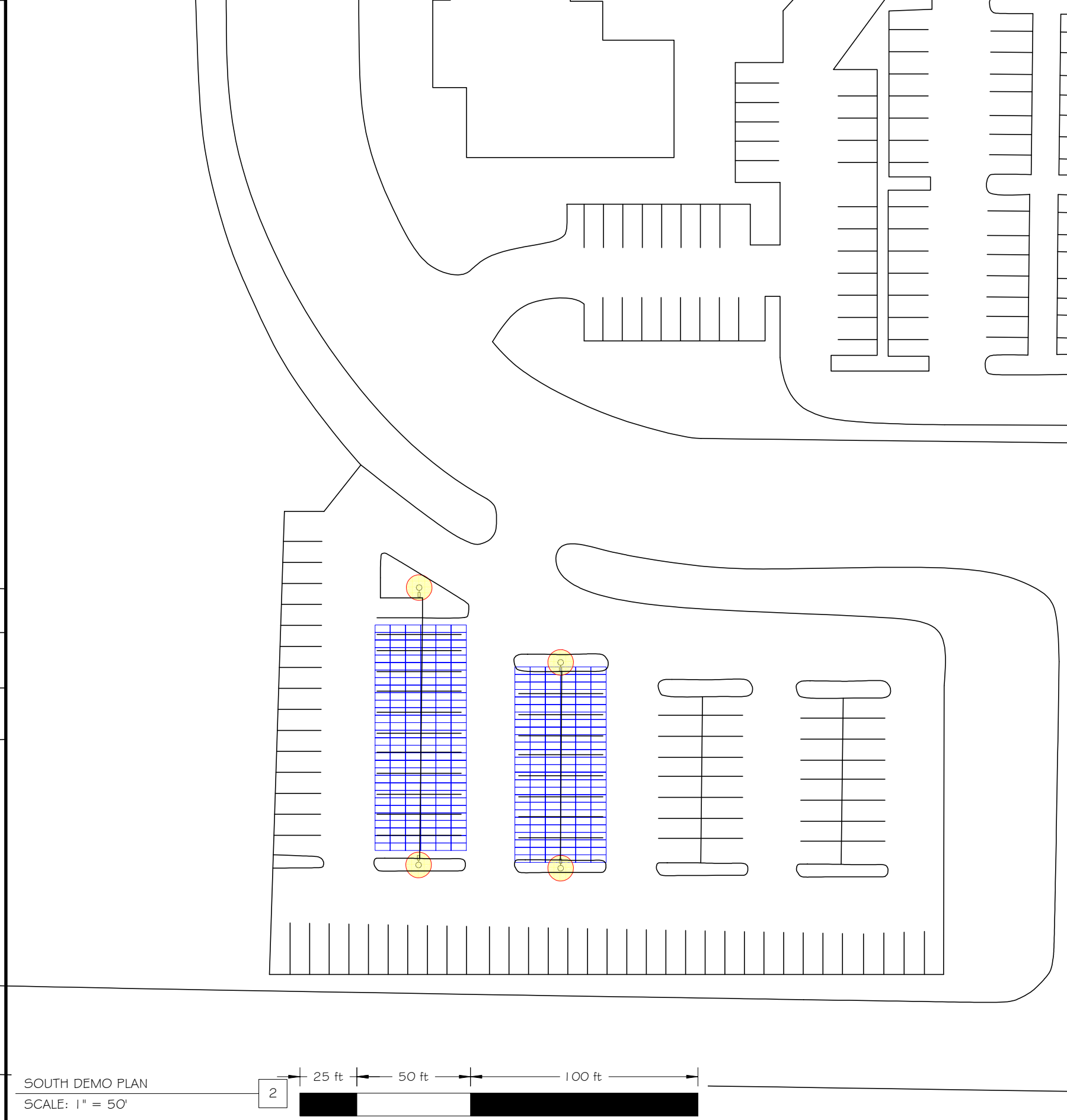
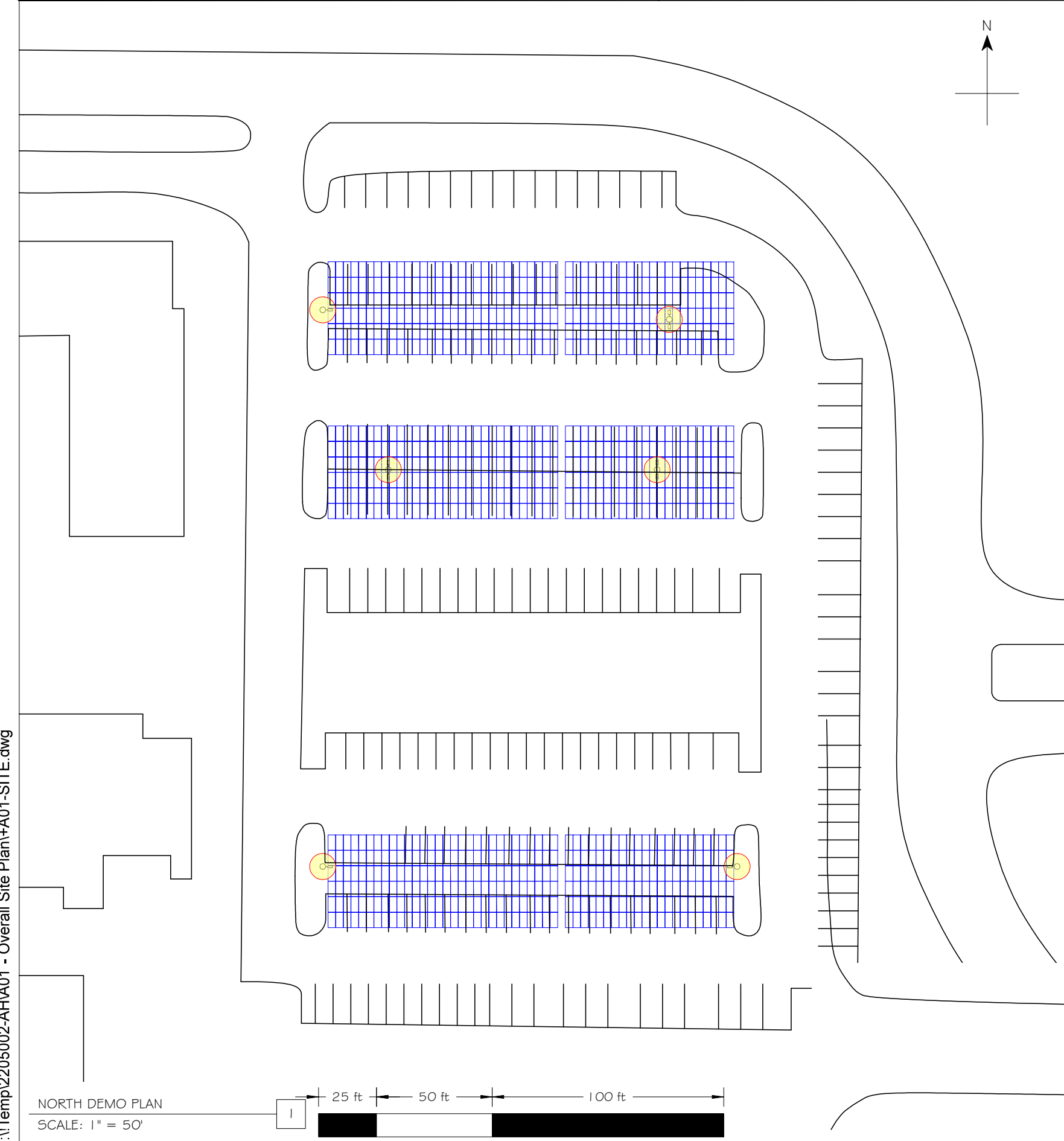
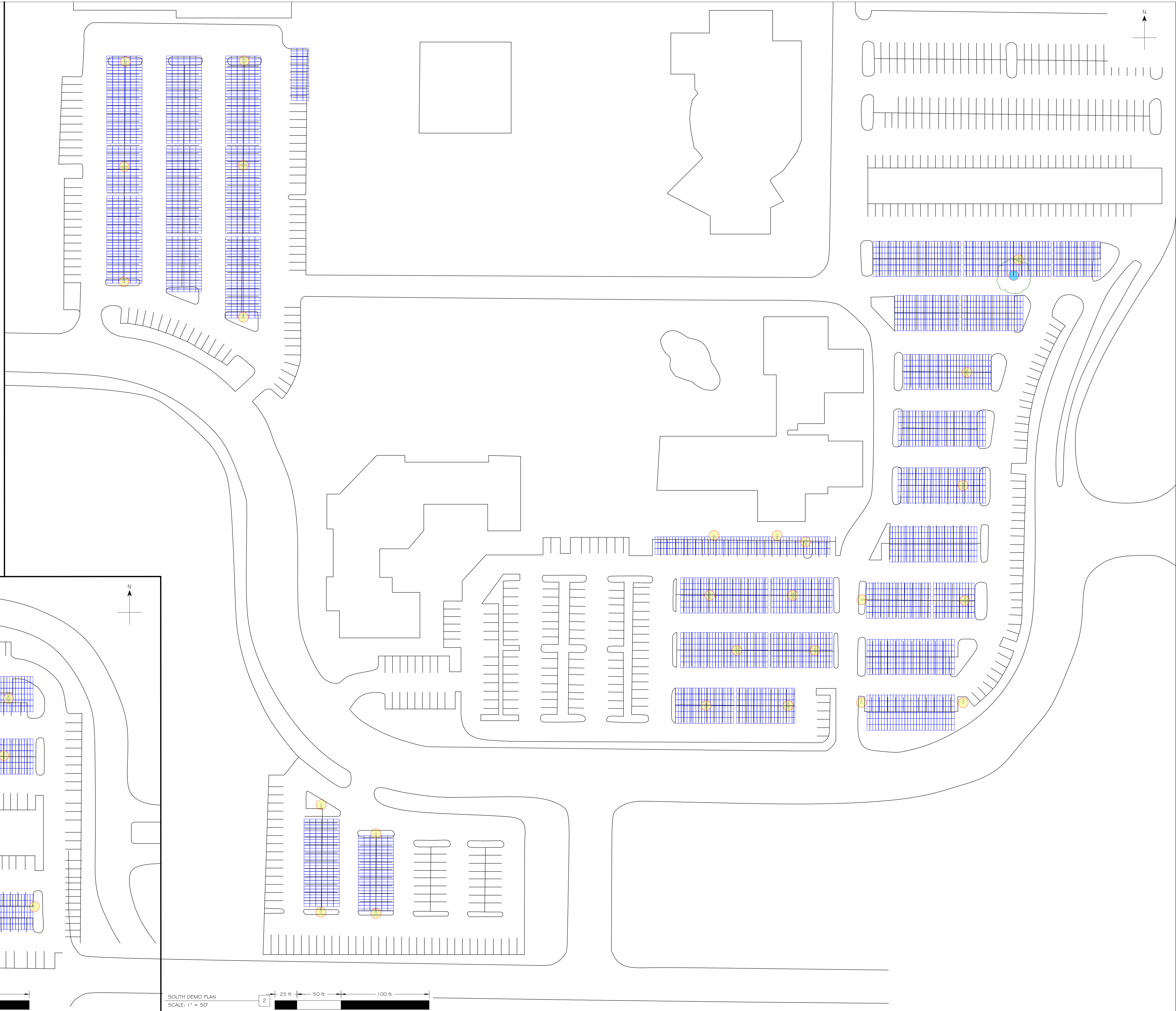
E1.2

plot date

C:\Temp\220502-4H\A01 - Overall Site Plan\A01-SITE.dwg

SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM72S 1 O 405/MR
	TREE REMOVAL	
	LIGHT REMOVAL	

NOTE:
 SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
 RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)



1 NORTH DEMO PLAN
 SCALE: 1" = 50'

2 SOUTH DEMO PLAN
 SCALE: 1" = 50'

dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
 1/31/2024

stamp

sheet name

**TREE & LIGHT
 DEMOLITION PLAN**

sheet number

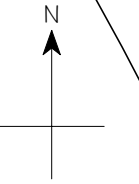
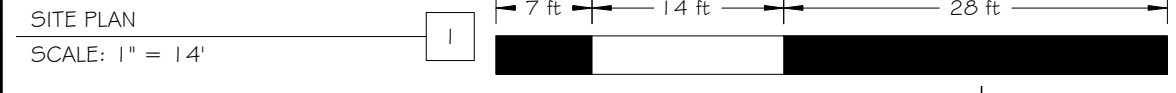
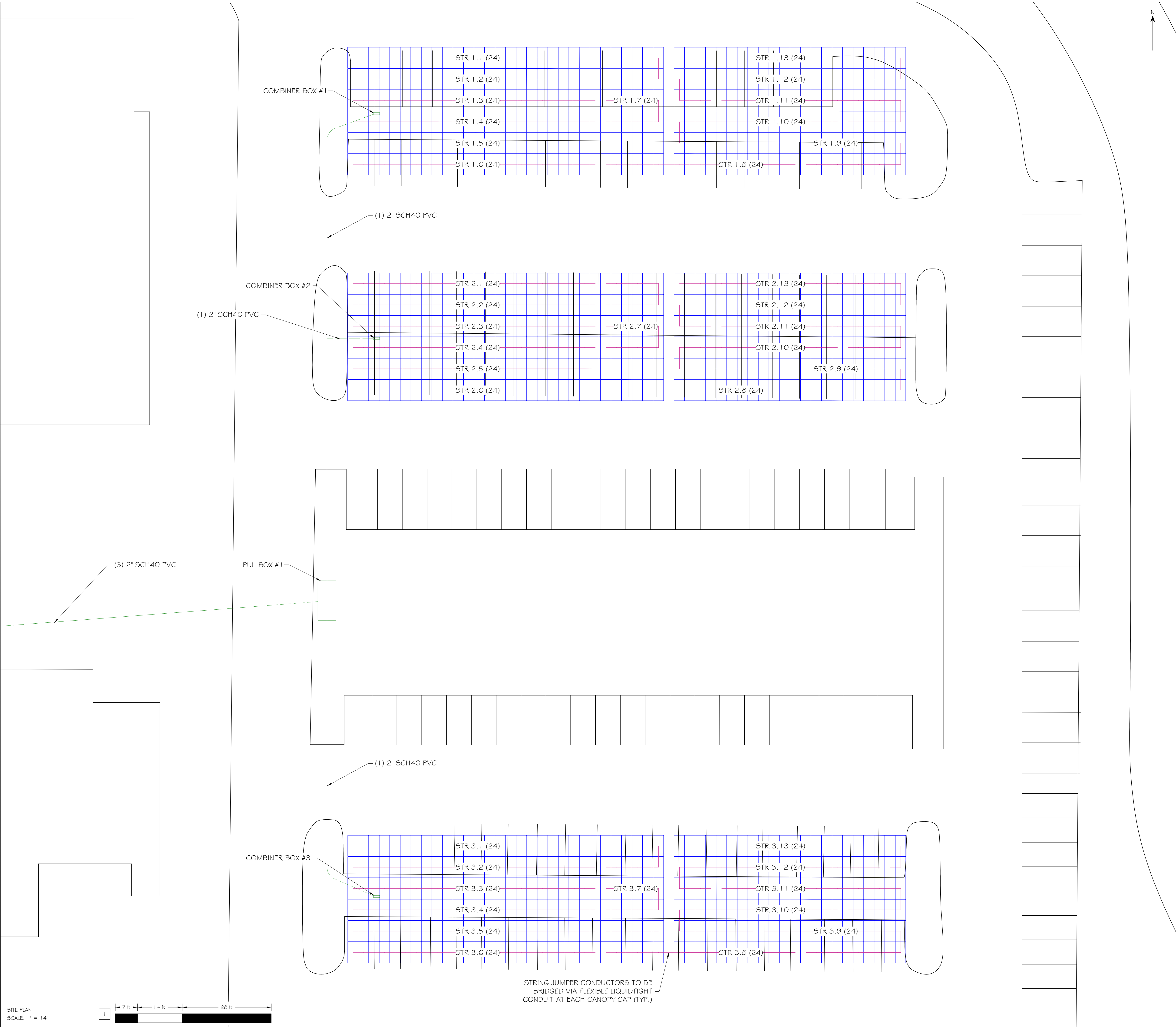
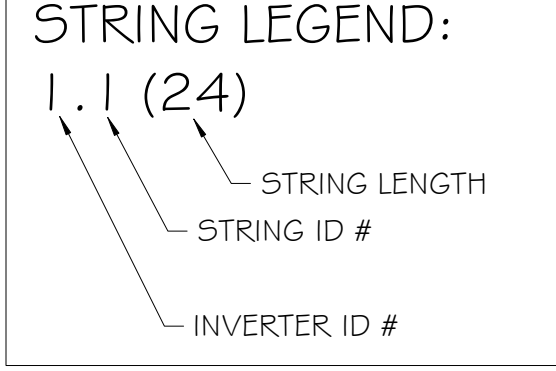
E2.0

plot date

C:\Temp\220602-AH\A01 - Overall Site Plan\A01-SITE.dwg

SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM72S 10 405/MR
	1500V DC	NEW CONDUIT FOR PV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM
	1500V DC (JUMPER)	NEW CONDUIT FOR PV SYSTEM ARRAY JUMPER CONDUCTORS

NOTE:
 SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
 RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)



dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
 1/31/2024

stamp

sheet name

STRING LAYOUT

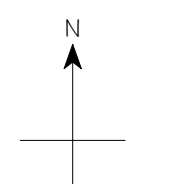
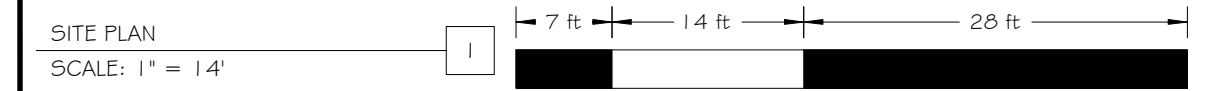
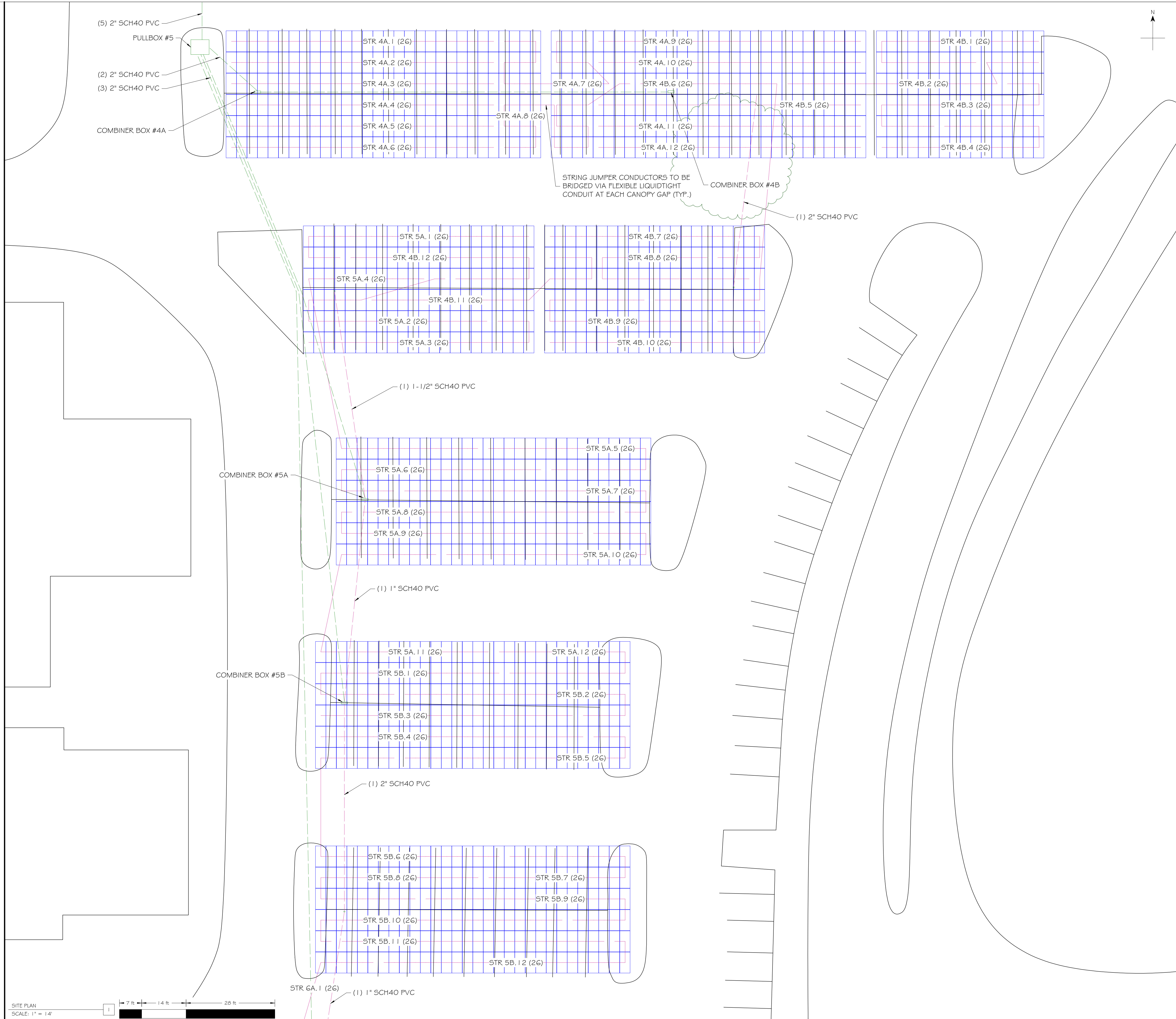
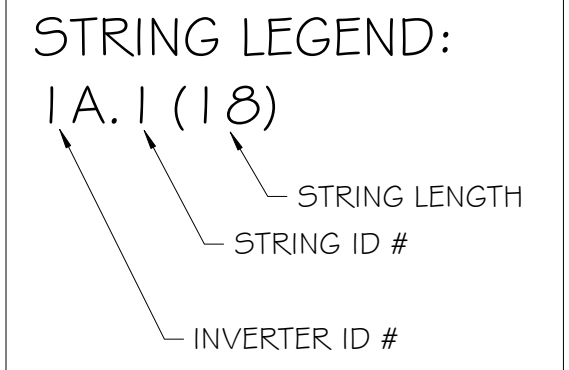
sheet number

E3.0.0

plot date

SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM72S 10 405/MR
	1500V DC	NEW CONDUIT FOR PV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM
	1500V DC (JUMPER)	NEW CONDUIT FOR PV SYSTEM ARRAY JUMPER CONDUCTORS

NOTE:
SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)



dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371

Drawn By: AM

Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
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3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package

1/31/2024

stamp

sheet name

STRING LAYOUT

sheet number

E3.O.1

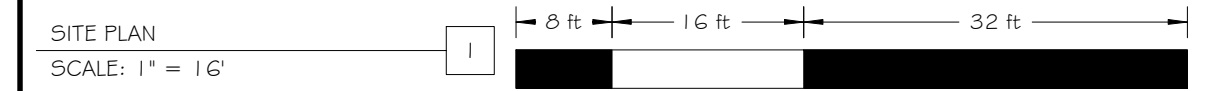
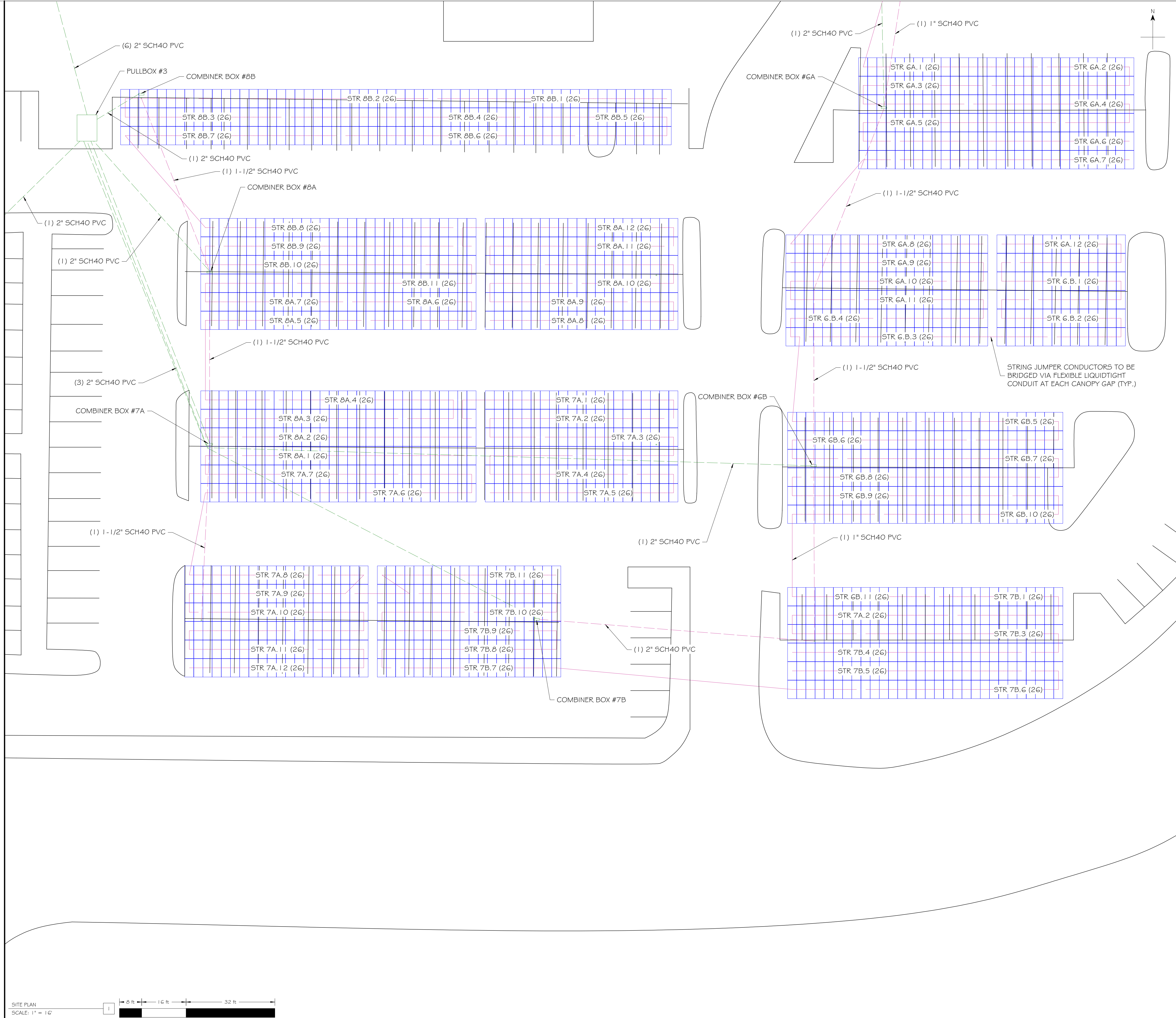
plot date

C:\Temp\220602-AH\A01 - Overall Site Plan-A01-SITE.dwg

SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM72S 10 405/MR
	1500V DC	NEW CONDUIT FOR PV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM
	1500V DC (JUMPER)	NEW CONDUIT FOR PV SYSTEM ARRAY JUMPER CONDUCTORS

NOTE:
SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)

STRING LEGEND:	
	A.1 (18)
	STRING LENGTH
	STRING ID #
	INVERTER ID #



05a

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
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3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

sheet name

STRING LAYOUT

sheet number

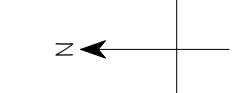
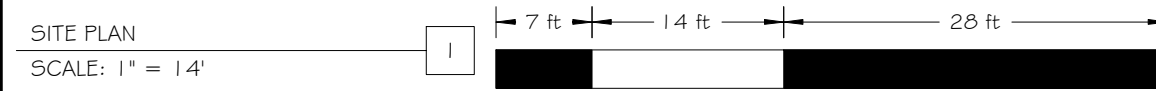
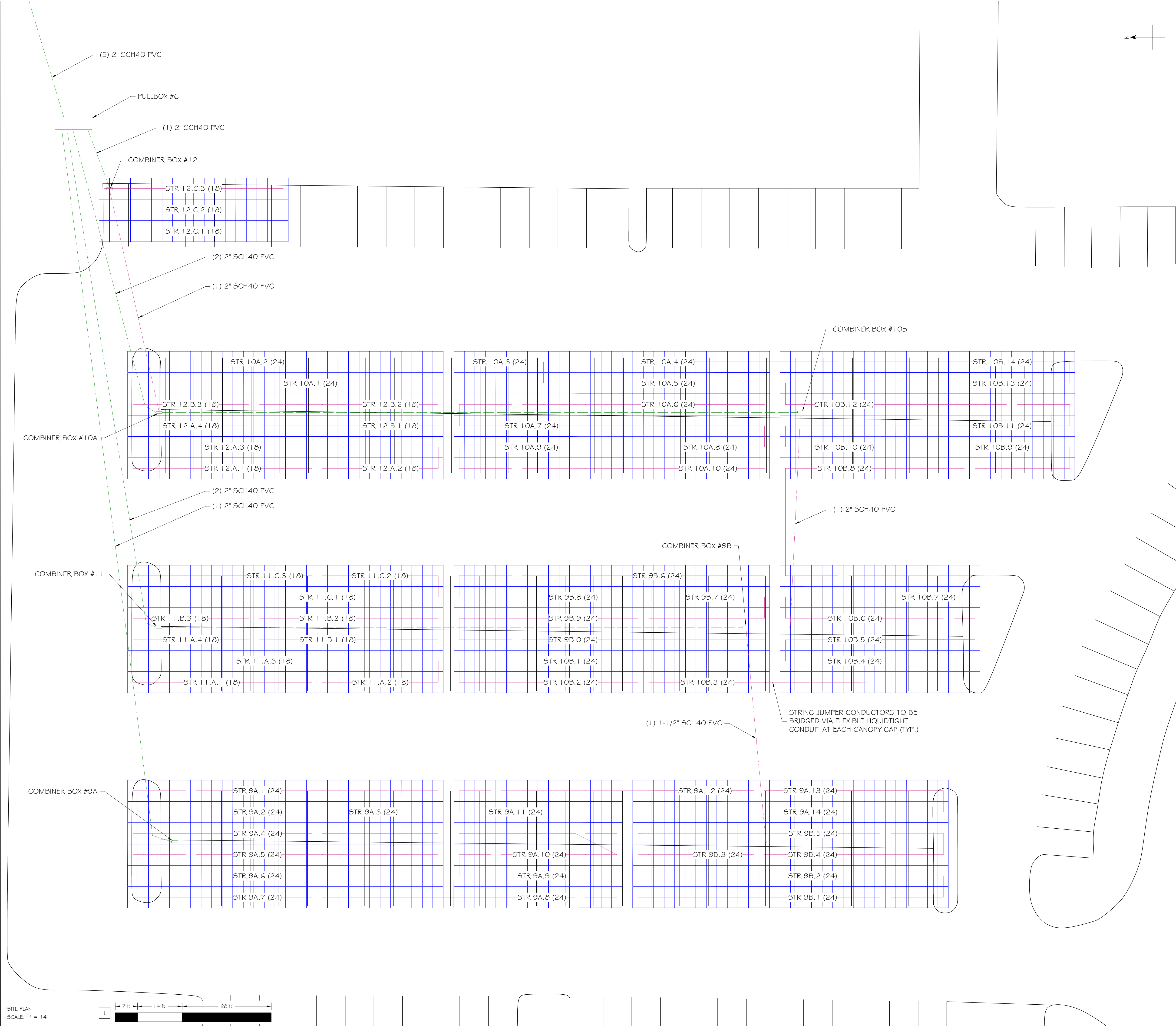
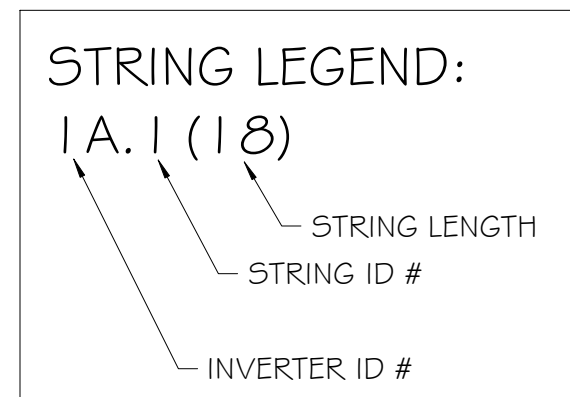
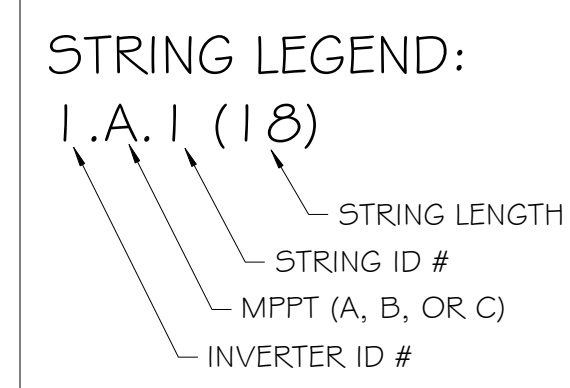
E3.0.2

plot date

C:\Temp\220602-AH001 - Overall Site Plan-A01-SITE.dwg

SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM72S 10 405/MR
	1500V DC	NEW CONDUIT FOR PV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM
	1500V DC (JUMPER)	NEW CONDUIT FOR PV SYSTEM ARRAY JUMPER CONDUCTORS

NOTE:
SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)



dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

sheet name

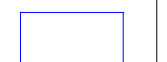



STRING LAYOUT

sheet number

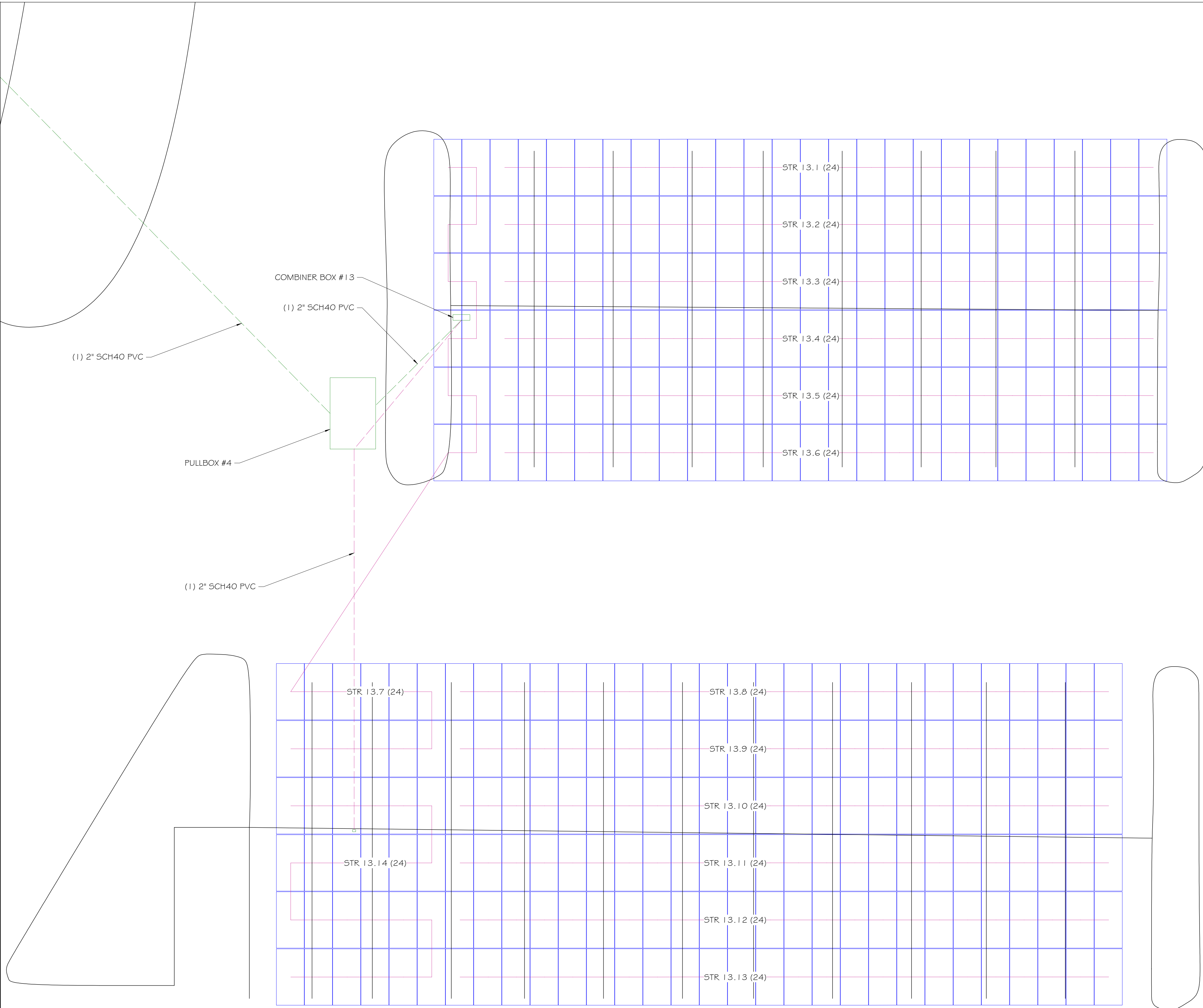
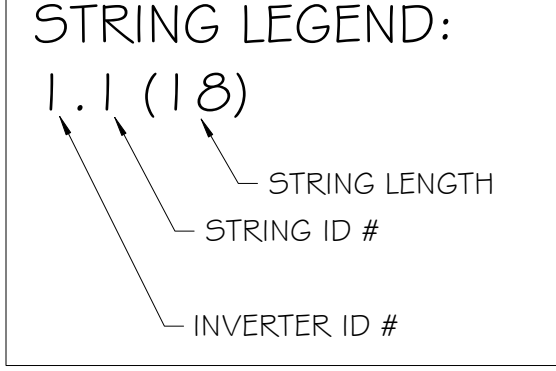
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plot date

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SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	GROUND PV MOD.	JA SOLAR JAM72S 10 405/MR
	1500V DC	NEW CONDUIT FOR PV CIRCUIT CONDUCTORS
	12 kV	EXISTING ELECTRICAL SYSTEM
	1500V DC (JUMPER)	NEW CONDUIT FOR PV SYSTEM ARRAY JUMPER CONDUCTORS

NOTE:
 SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY:
 RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)



dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
 1/31/2024

stamp

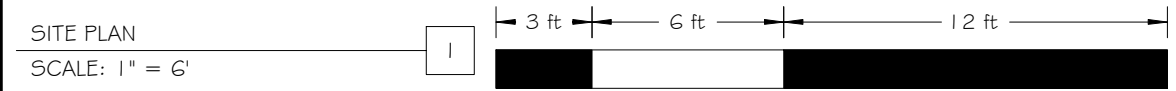
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STRING LAYOUT

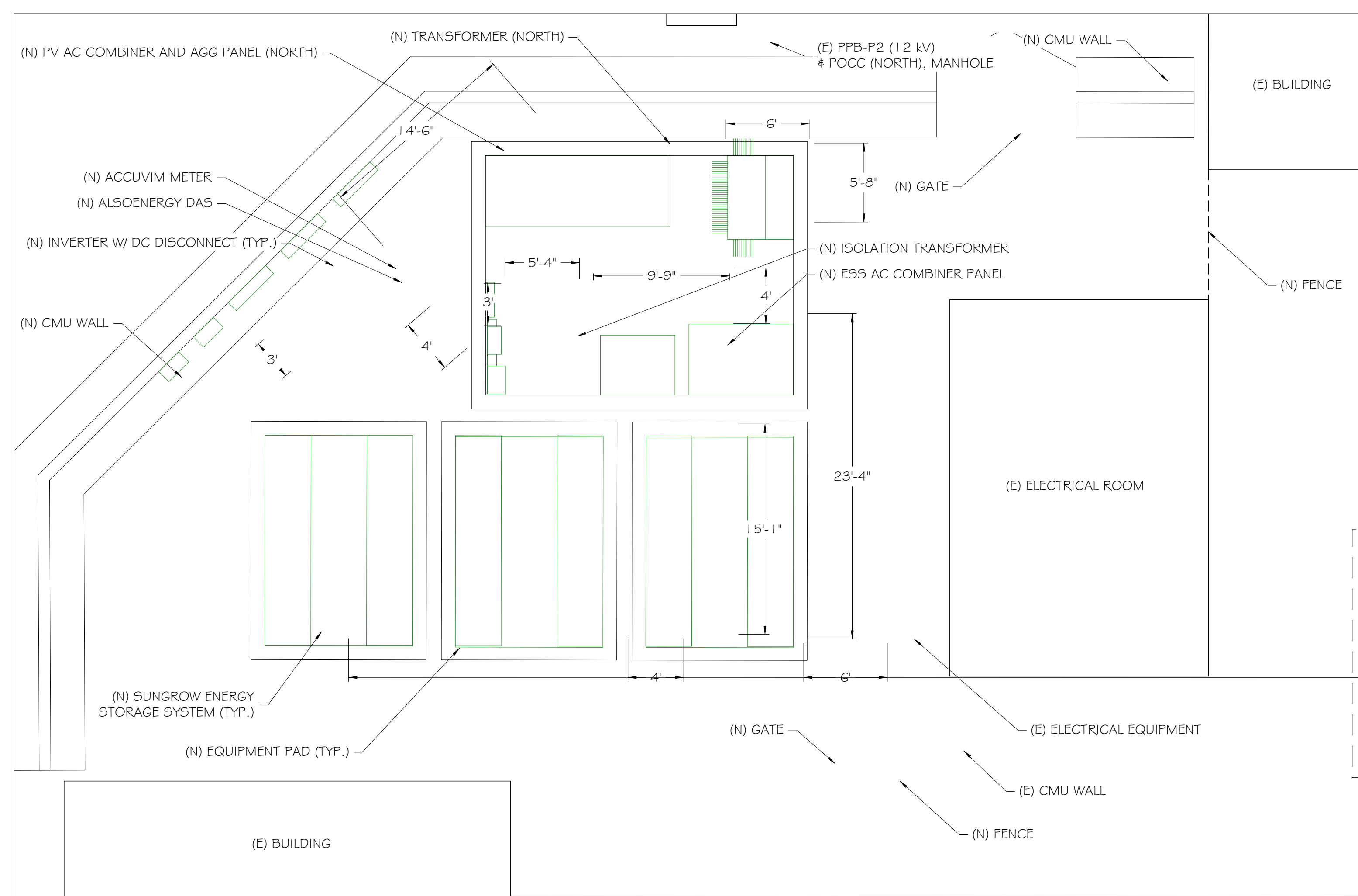
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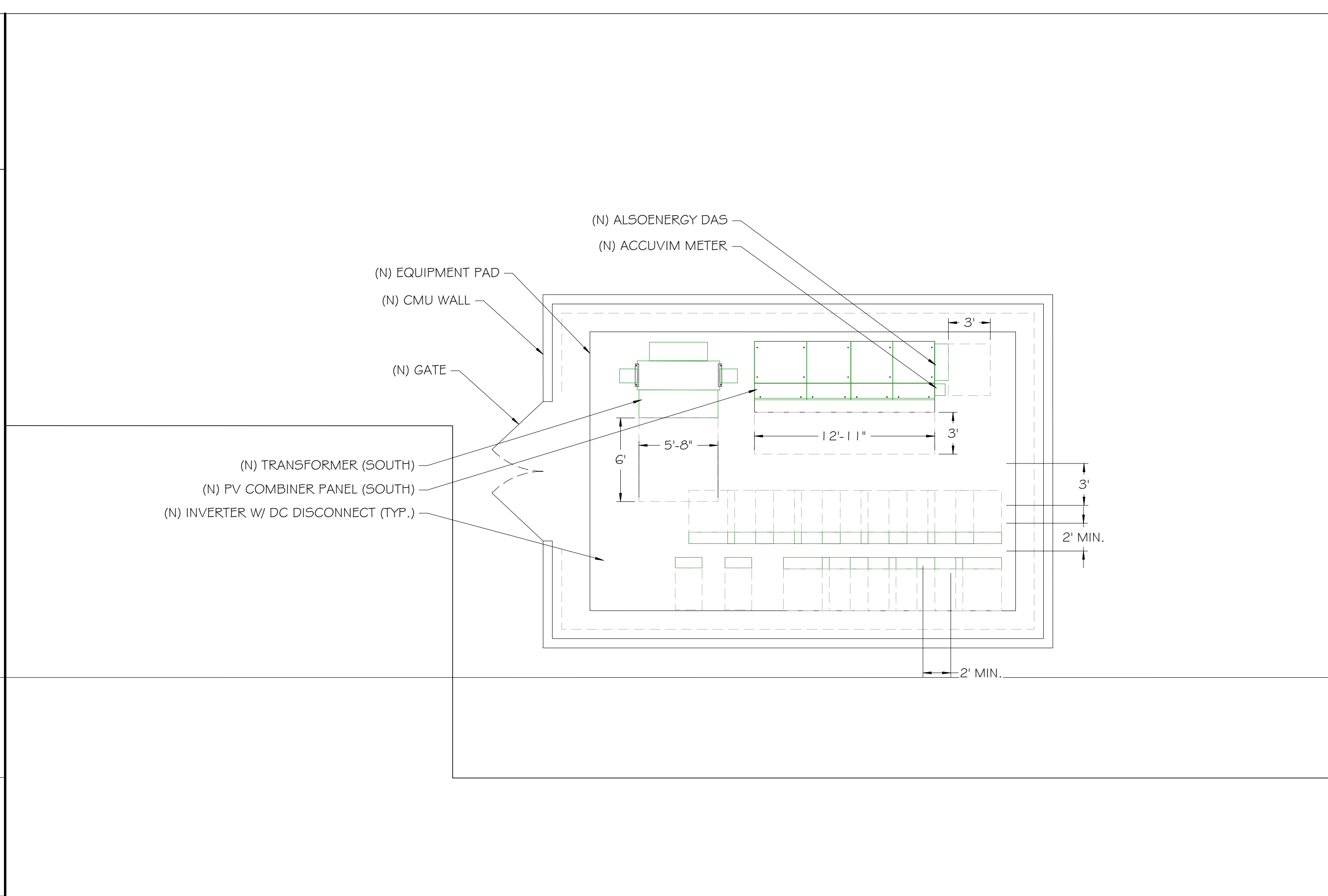
plot date



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ELECTRICAL LAYOUT (NORTH)
SCALE: 1" = 6'



ELECTRICAL LAYOUT (SOUTH)
SCALE: 1" = 6'

dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

sheet name

ELECTRICAL LAYOUT

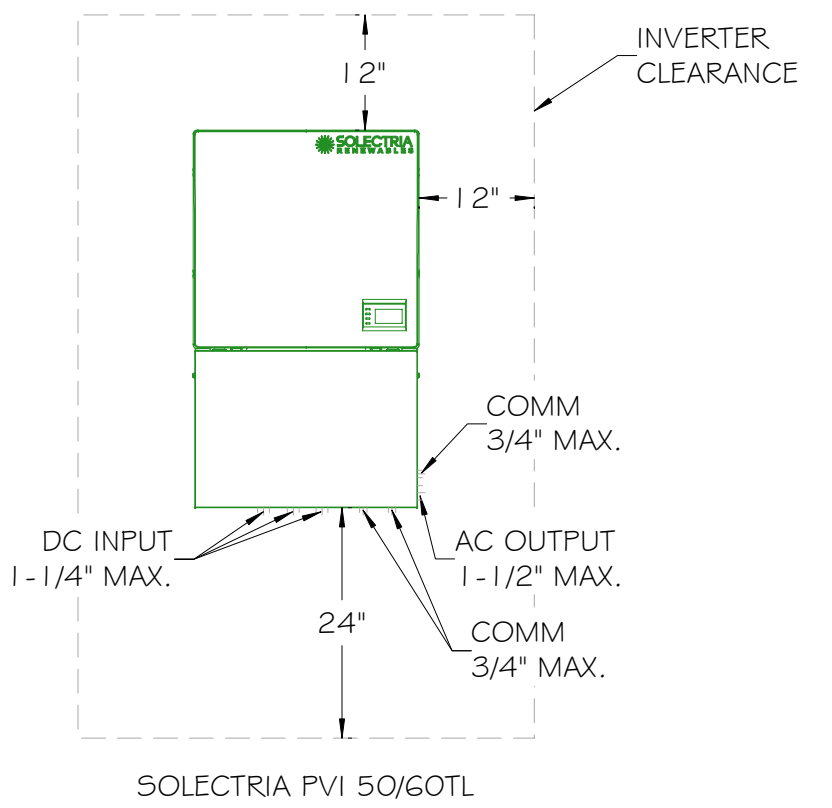
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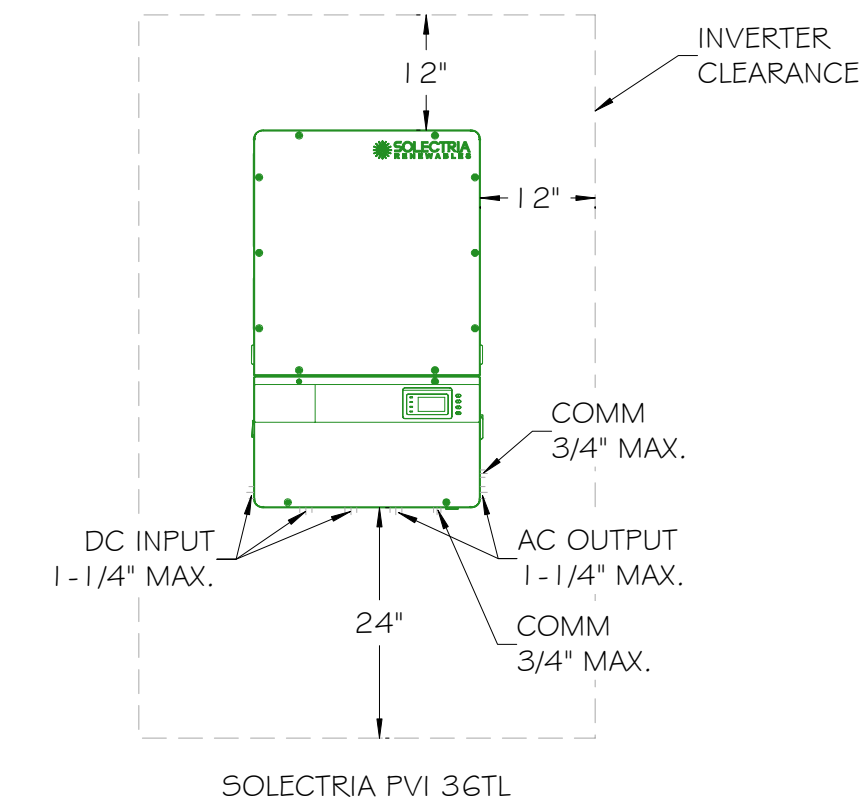
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C:\Temp\220602-AHP01 - Overall Site Plan-A01-SITE.dwg

NOTE: FOR COLUMN-MOUNTED EQUIPMENT DETAILS, SEE DETAILS 4A AND 4B ON SHEET 58.0
FOR STRUT-MOUNTED EQUIPMENT, SEE DETAILS 2 AND 6 ON SHEET 55.0

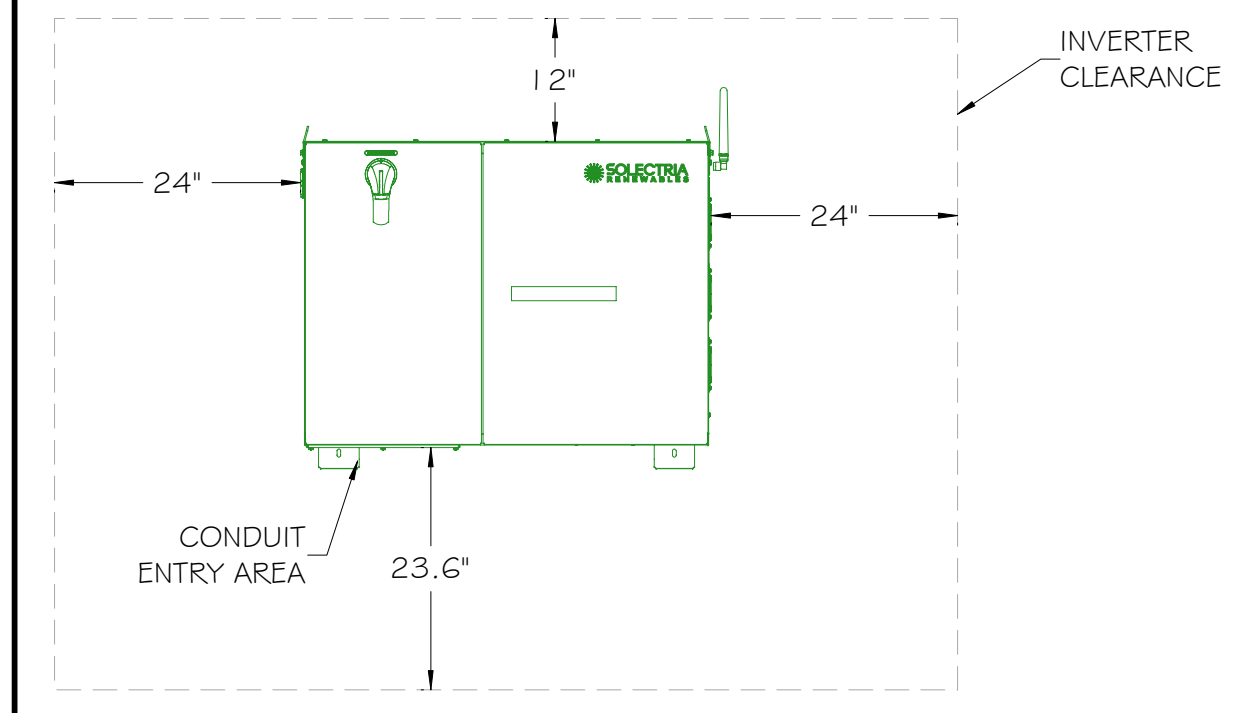


SOLECTRIA INVERTER
SCALE: NTS



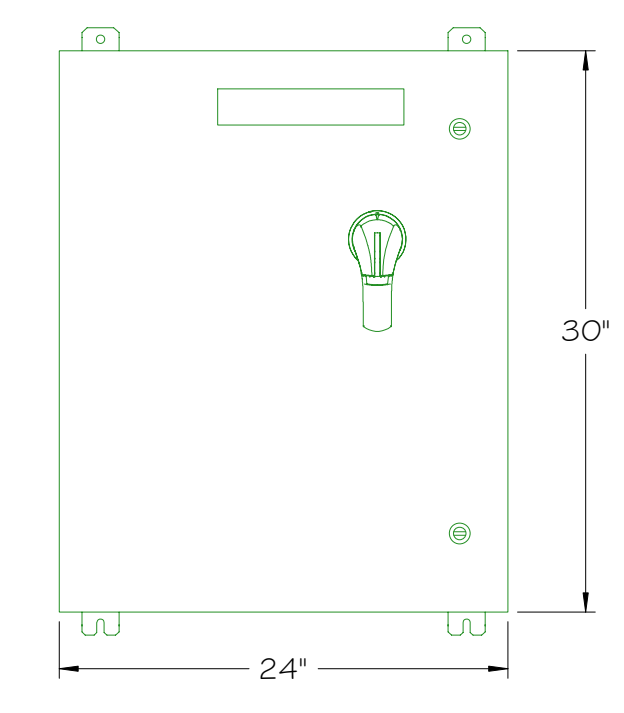
SOLECTRIA FVI 36TL
SCALE: NTS

NOTE: FOR COLUMN-MOUNTED EQUIPMENT DETAILS, SEE DETAILS 4A AND 4B ON SHEET 58.0
FOR STRUT-MOUNTED EQUIPMENT, SEE DETAILS 2 AND 6 ON SHEET 55.0
FOR WALL-MOUNTED EQUIPMENT, SEE DETAIL 5 ON SHEET 58.0

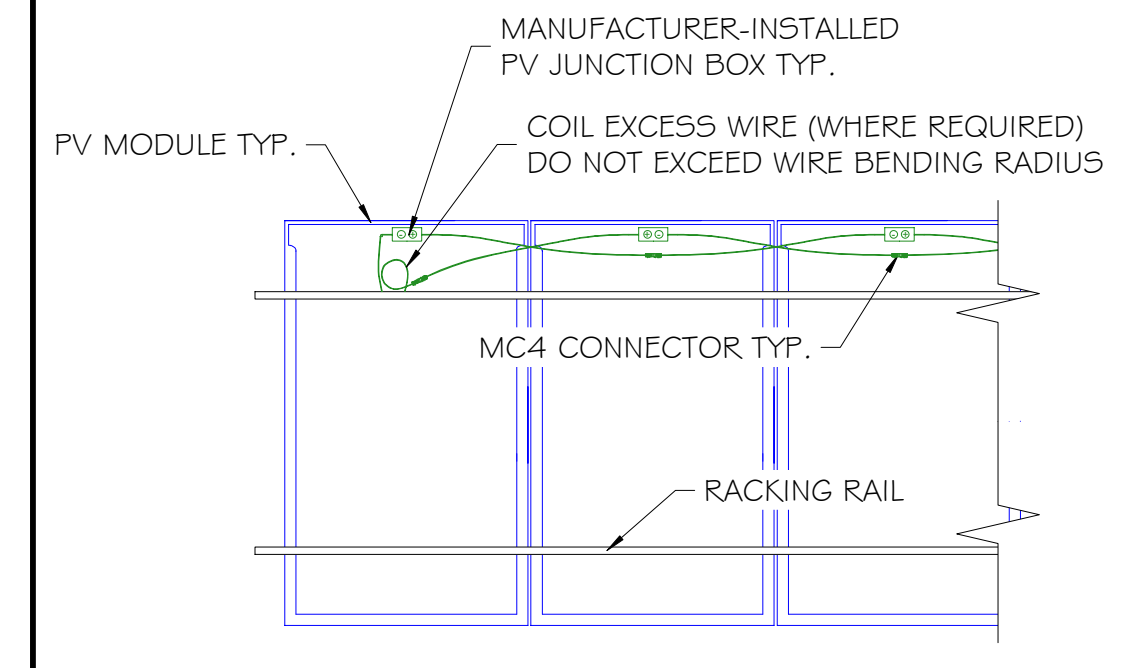


SOLECTRIA XGI 1500 COMBINER
SCALE: NTS

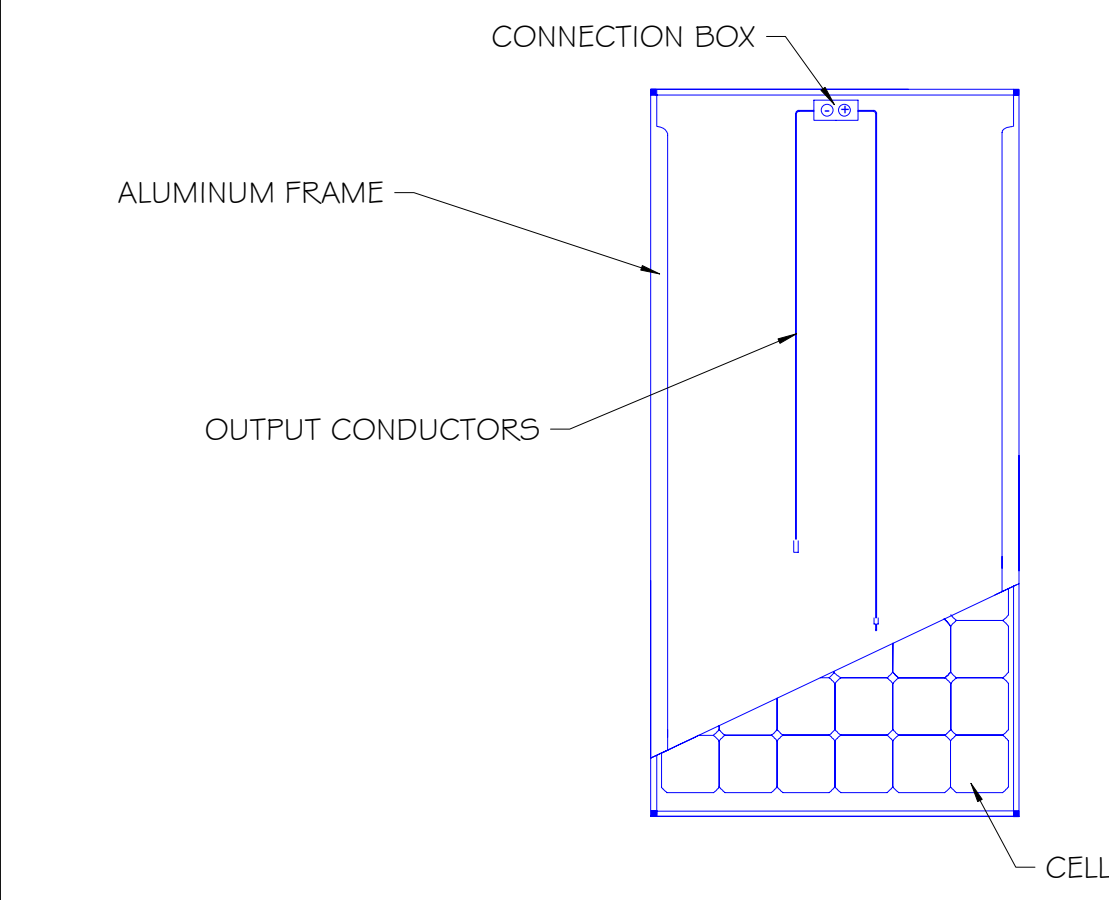
NOTE: FOR COLUMN-MOUNTED EQUIPMENT DETAILS, SEE DETAILS 4A AND 4B ON SHEET 58.0
FOR STRUT-MOUNTED EQUIPMENT, SEE DETAILS 2 AND 6 ON SHEET 55.0



SOLECTRIA XGI 1500 COMBINER
SCALE: NTS

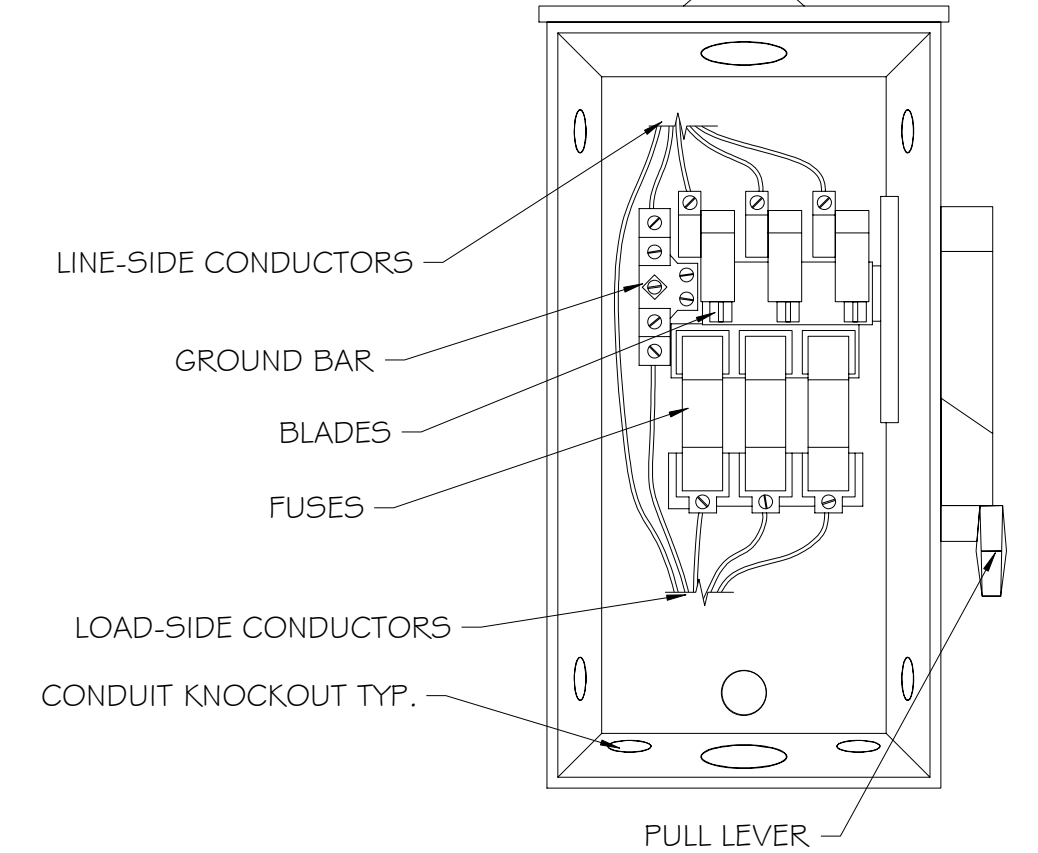


STRINGING
SCALE: NTS



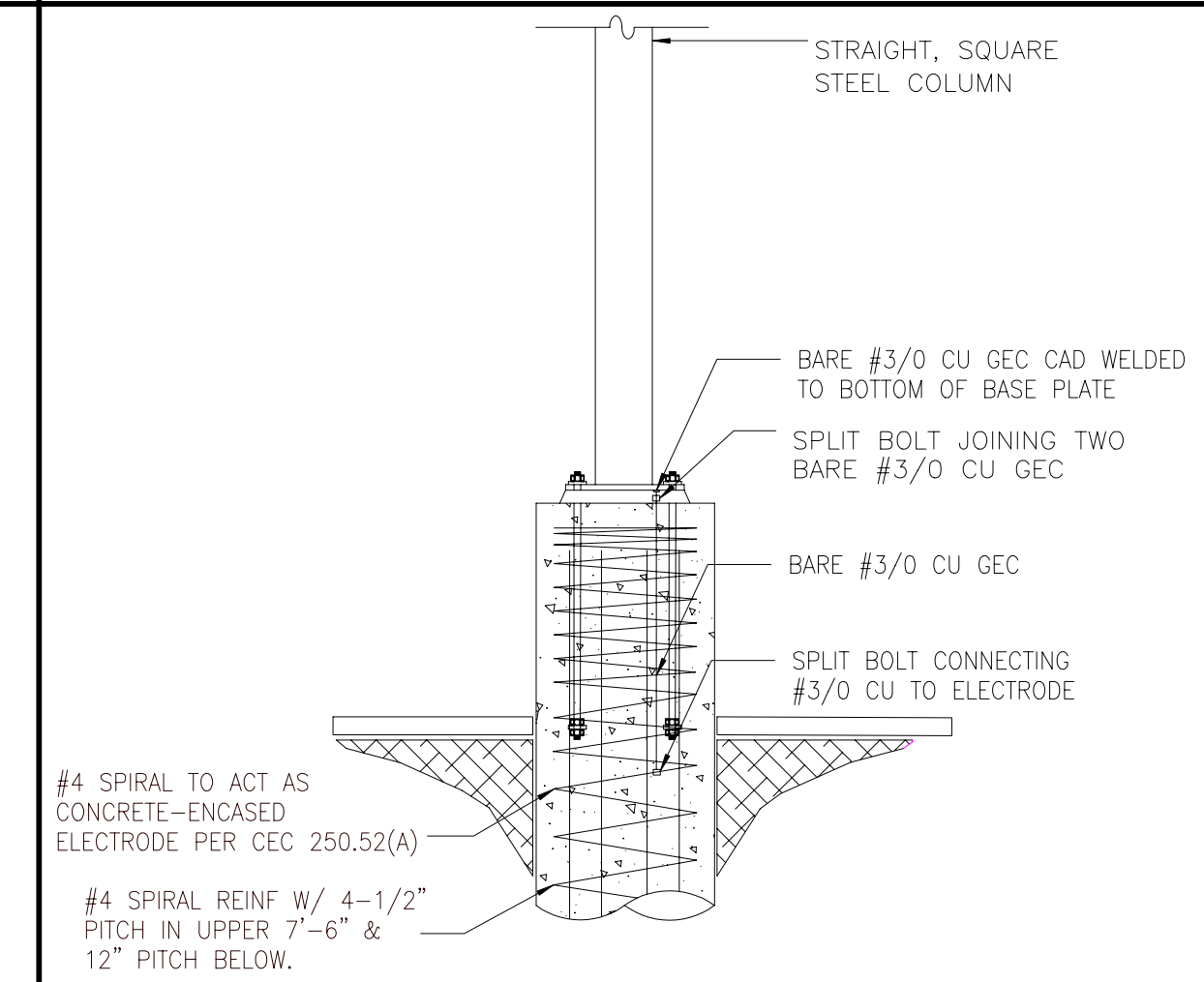
MODULE DETAIL
SCALE: NTS

NOTE: UNLESS A NEUTRAL BAR KIT IS INSTALLED, THE NEUTRAL CONDUCTOR WILL PASS THROUGH AND WILL NOT TERMINATE INSIDE THE ENCLOSURE.



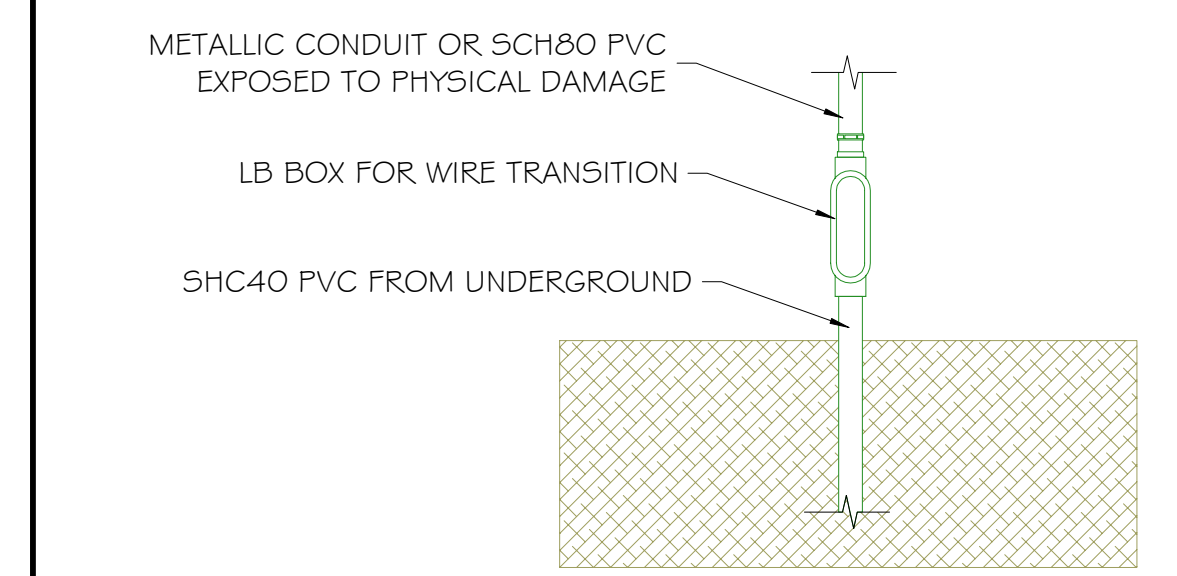
AC DISCONNECT
SCALE: NTS

NOTE: FOR COLUMN-MOUNTED EQUIPMENT DETAILS, SEE DETAILS 4A AND 4B ON SHEET 58.0
FOR STRUT-MOUNTED EQUIPMENT, SEE DETAILS 2 AND 6 ON SHEET 55.0
FOR WALL-MOUNTED EQUIPMENT, SEE DETAIL 5 ON SHEET 58.0

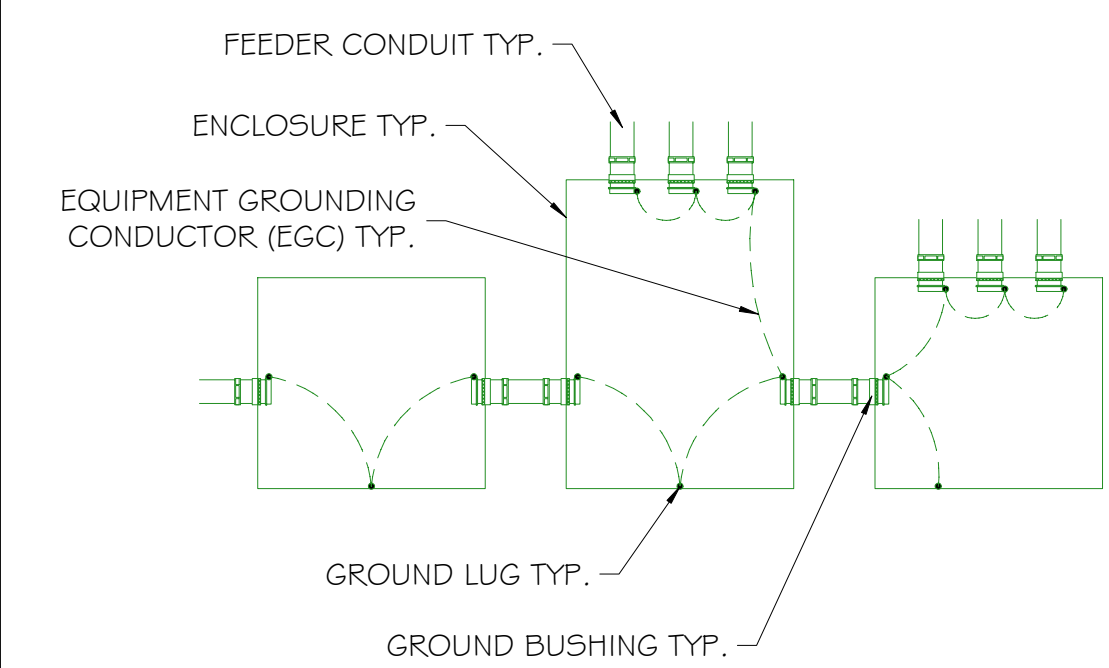


CARPORT GROUNDING DETAIL
SCALE: NTS

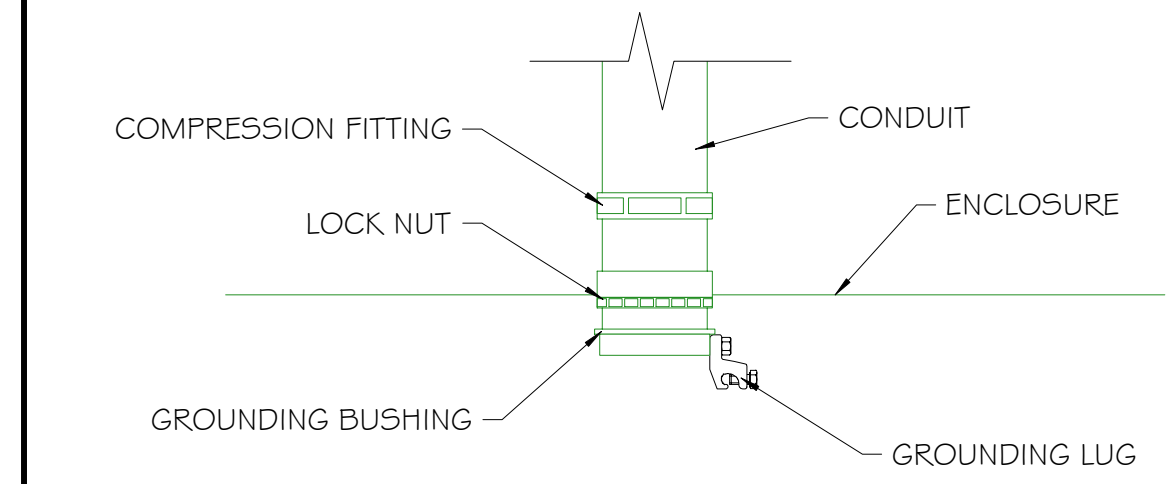
NOTES:
1.) CONDUIT SHALL BE INSTALLED WHERE 1000V OR GREATER CONDUCTORS ARE RUN IN AN ACCESSIBLE LOCATION.
2.) WHERE EXPOSED TO PHYSICAL DAMAGE, SCH40 PVC SHALL TRANSITION TO AN APPROVED METALLIC CONDUIT OR SCH80 PVC WITHIN A REASONABLE DISTANCE FROM WHERE THE CONDUIT EXITS THE EARTH.
3.) SCH80 PVC IS PERMITTED WHERE EXPOSED TO PHYSICAL DAMAGE.



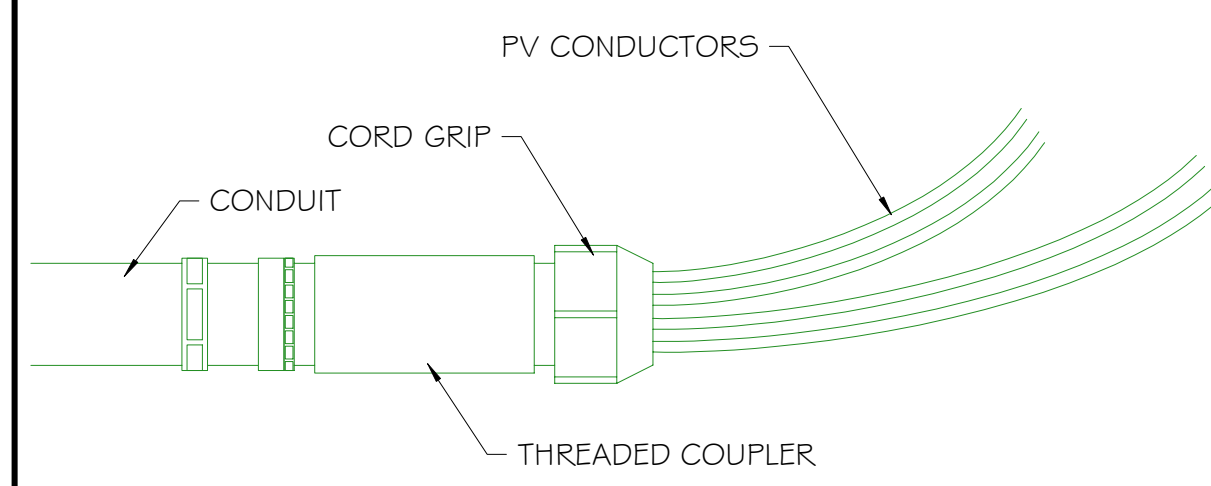
CONDUIT BODY TRANSITION
SCALE: NTS



EQUIPMENT GROUNDING
SCALE: NTS

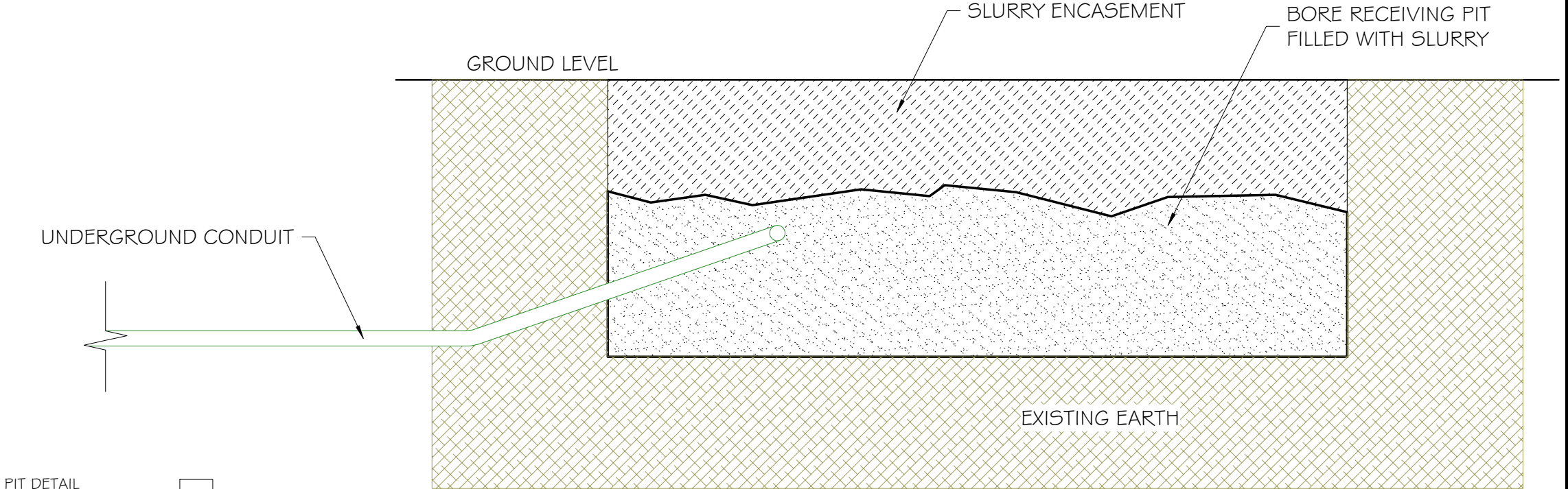


CONDUIT GROUNDING
SCALE: NTS



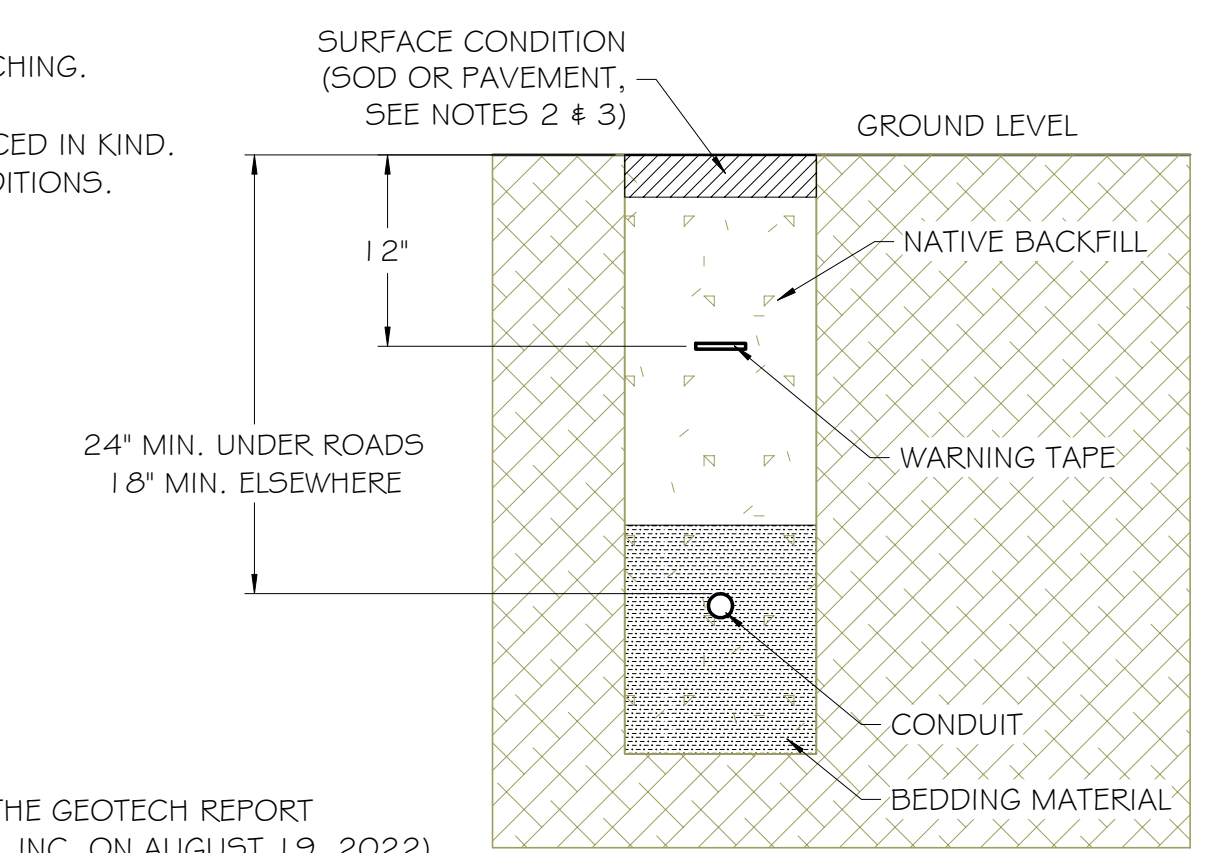
CONDUIT CORD CONNECTOR
SCALE: NTS

BORE ENTRY PIT NOTES:
1.) SIZE AND SPACING OF BORE ENTRY PIT SHALL BE DETERMINED BY CONTRACTOR AND ON-SITE CONDITIONS
2.) CONDUIT SHALL BE SCH40 PVC W/ BOREGUARD
3.) REFER TO ELECTRICAL DRAWINGS FOR SIZE AND TYPE OF CONDUIT
4.) BORE ENTRY PIT SHALL BE BACKFILLED WITH NATIVE MATERIAL IN COMPLIANCE WITH NEC 300.5(F).
5.) ASPHALT TO BE SAWCUT PRIOR TO TRENCHING. PAVEMENT SHALL BE REPLACED IN KIND.
6.) UNPAVED SURFACES SHALL BE RESTORED IN KIND TO MATCH EXISTING CONDITIONS



BORE ENTRY PIT DETAIL
SCALE: NTS

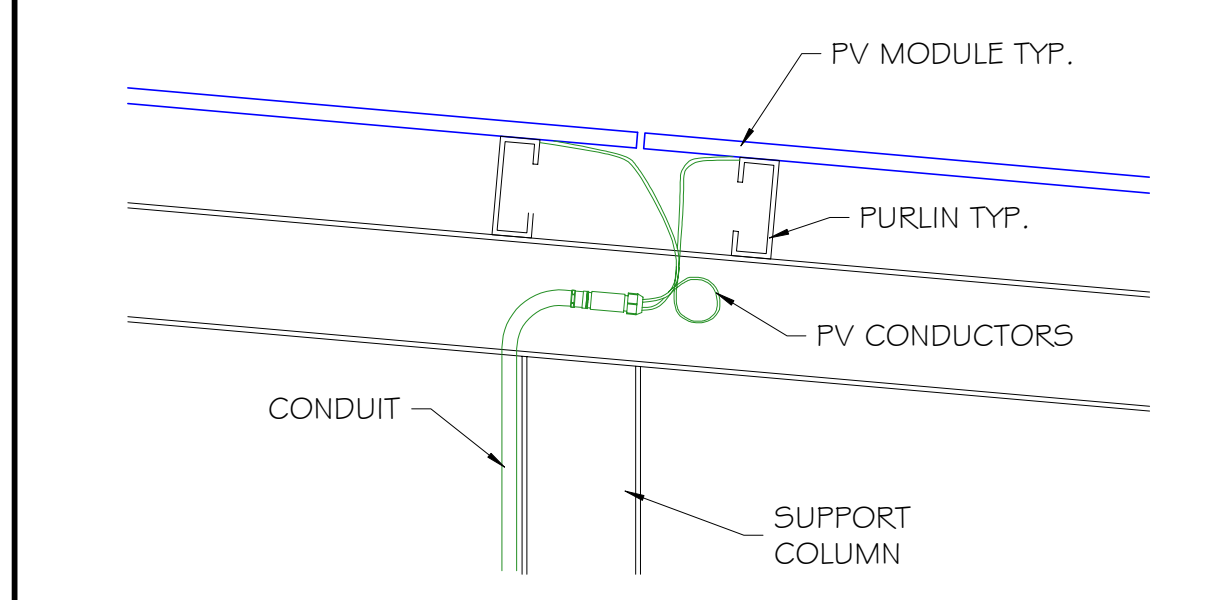
NOTES:
1.) UNDERGROUND CONDUIT TO BE INSTALLED VIA DIRECTIONAL BORE OR TRENCHING.
2.) BACKFILL WITH NATIVE MATERIAL IN COMPLIANCE WITH NEC 300.5(F).
3.) ASPHALT TO BE SAWCUT PRIOR TO TRENCHING. PAVEMENT SHALL BE REPLACED IN KIND.
4.) UNPAVED SURFACES SHALL BE RESTORED IN KIND TO MATCH EXISTING CONDITIONS.
5.) DETECTABLE WARNING TAPE SHALL BE INSTALLED 12" BELOW GRADE.
6.) REFER TO ELECTRICAL DRAWINGS FOR SIZE AND TYPE OF CONDUIT.
7.) NOTIFY UTILITY COMPANY PRIOR TO DIGGING PER 'DIG SAFE' REQUIREMENTS.



TRENCH CROSS-SECTION
SCALE: NTS

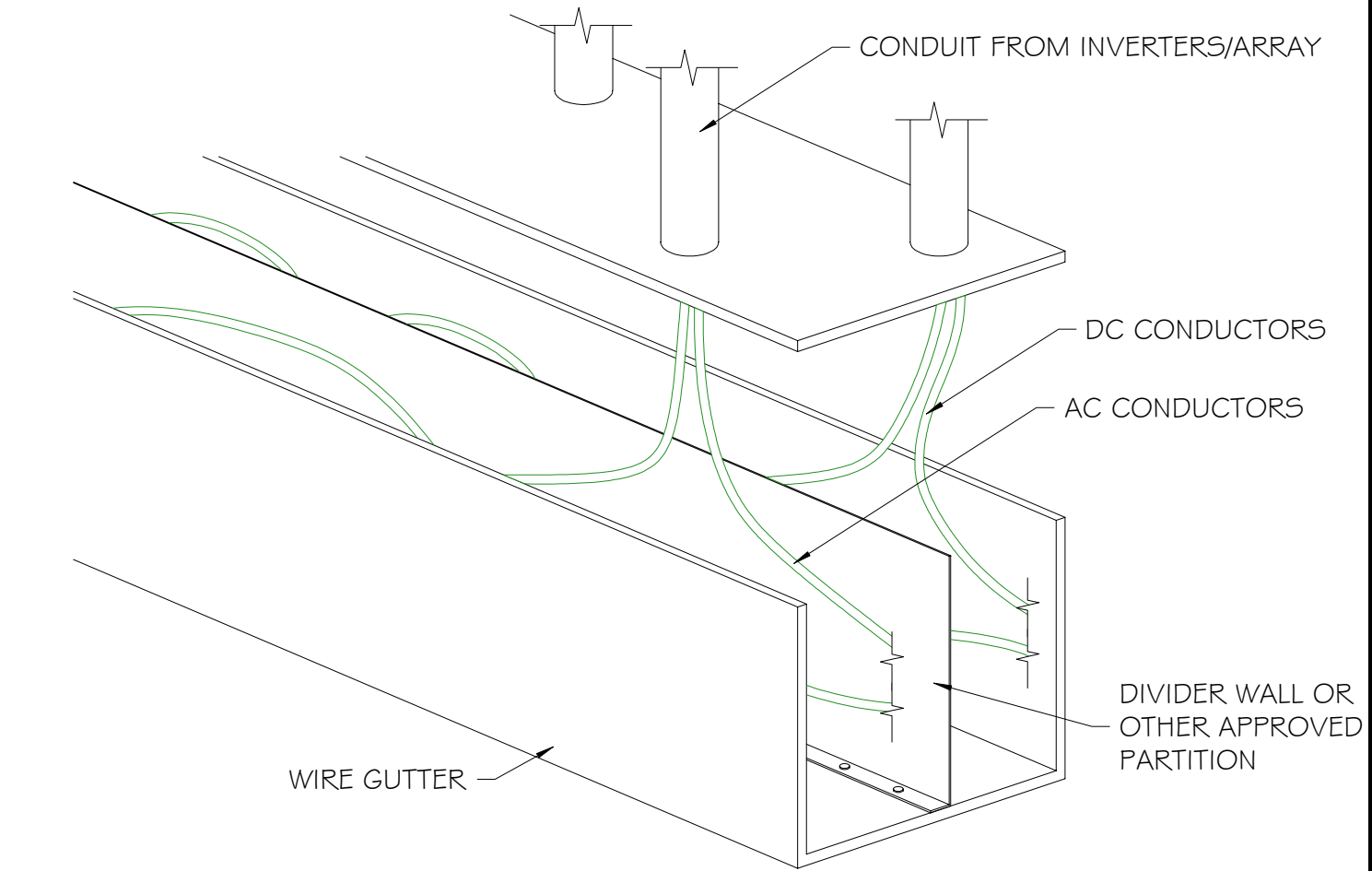
NOTE: REFERENCE APPENDIX C OF THE GEOTECH REPORT (VERSION 2, PREPARED BY GEOTEK, INC. ON AUGUST 19, 2022) FOR SPECIFICATIONS AND RECOMMENDATIONS REGARDING SUBGRADE PREPARATION.

NOTE:
1.) CONDUCTORS SHALL BE ROUTED TO ENSURE ISOLATION OF THE EGC/GEC FROM DISSIMILAR METALS.
2.) CONDUCTORS SHALL BE PROTECTED FROM AREAS WHERE THEY ARE LIKELY TO COME IN CONTACT WITH SHARP EDGES.
3.) CONDUIT SHALL BE ATTACHED TO STRUCTURE VIA PIPE CLAMPS & STRUT WHERE NECESSARY.



CONDUIT CABLE ENTRY
SCALE: NTS

WIRE GUTTER NOTES:
1.) WIRE GUTTERS SHALL BE INSTALLED PER NEC 314.4.
2.) WIRE GUTTERS SHALL BE SIZED PER TABLE 314.28.
3.) PARTITIONS SHALL BE INSTALLED TO SEPARATE PV DC AND AC CONDUCTORS, PER 690.31(B).
4.) WHERE BARRIERS ARE INSTALLED IN A BOX, EACH SECTION SHALL BE CONSIDERED AS A SEPARATE BOX.
5.) WIRE GUTTERS SHALL BE CONSTRUCTED OF MATERIALS AND IN A MANNER COMPLIANT WITH NEC 314.40.



WIRE GUTTER SEPARATION DETAIL
SCALE: NTS

Client: [Redacted]

Project Name & Location: [Redacted]

Design & Management: [Redacted]

Engineer: [Redacted]

Project Number: 006371
Drawn By: AM
Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

Project status: 100% Package 1/31/2024

stamp: [Redacted]


sheet name: CONSTRUCTION DETAILS

sheet number: E3.2

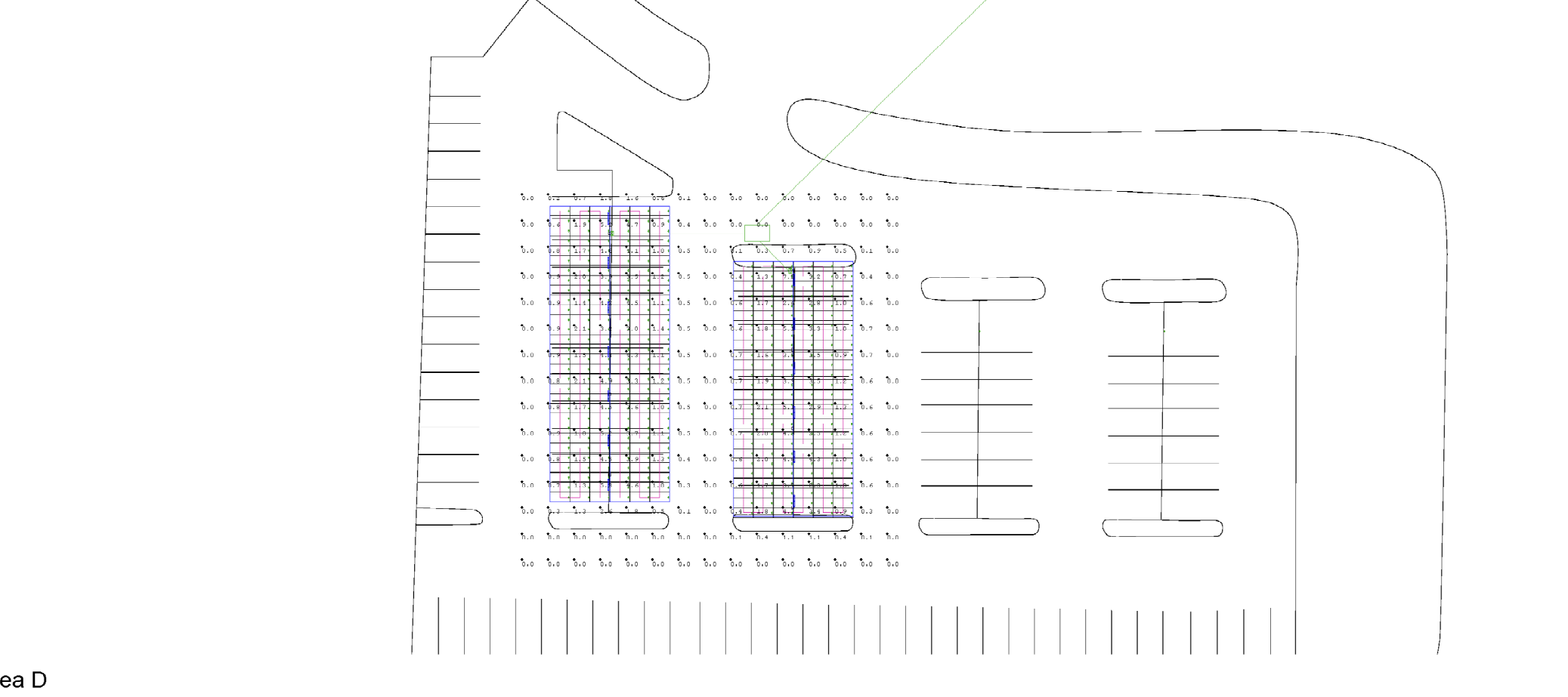
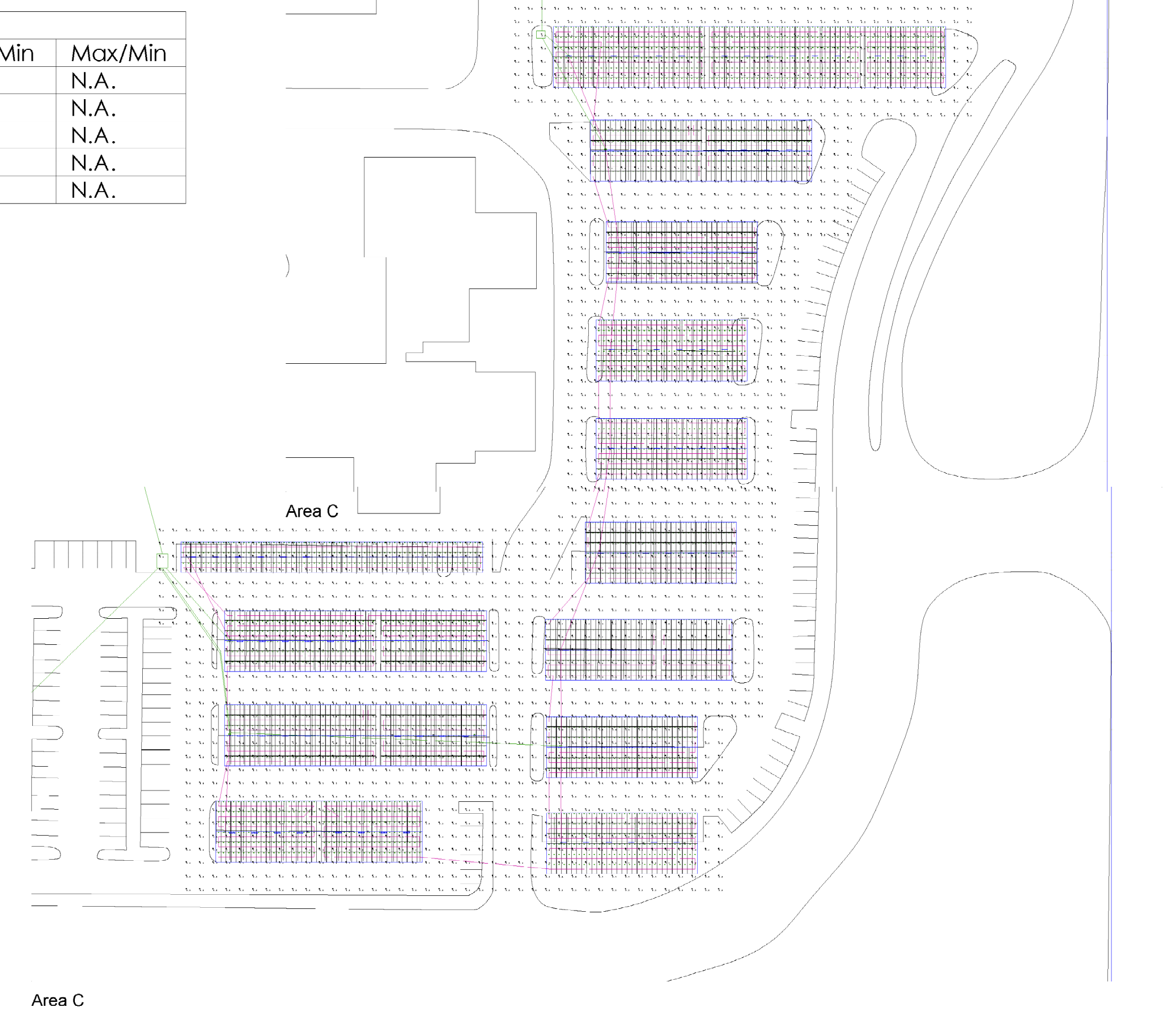
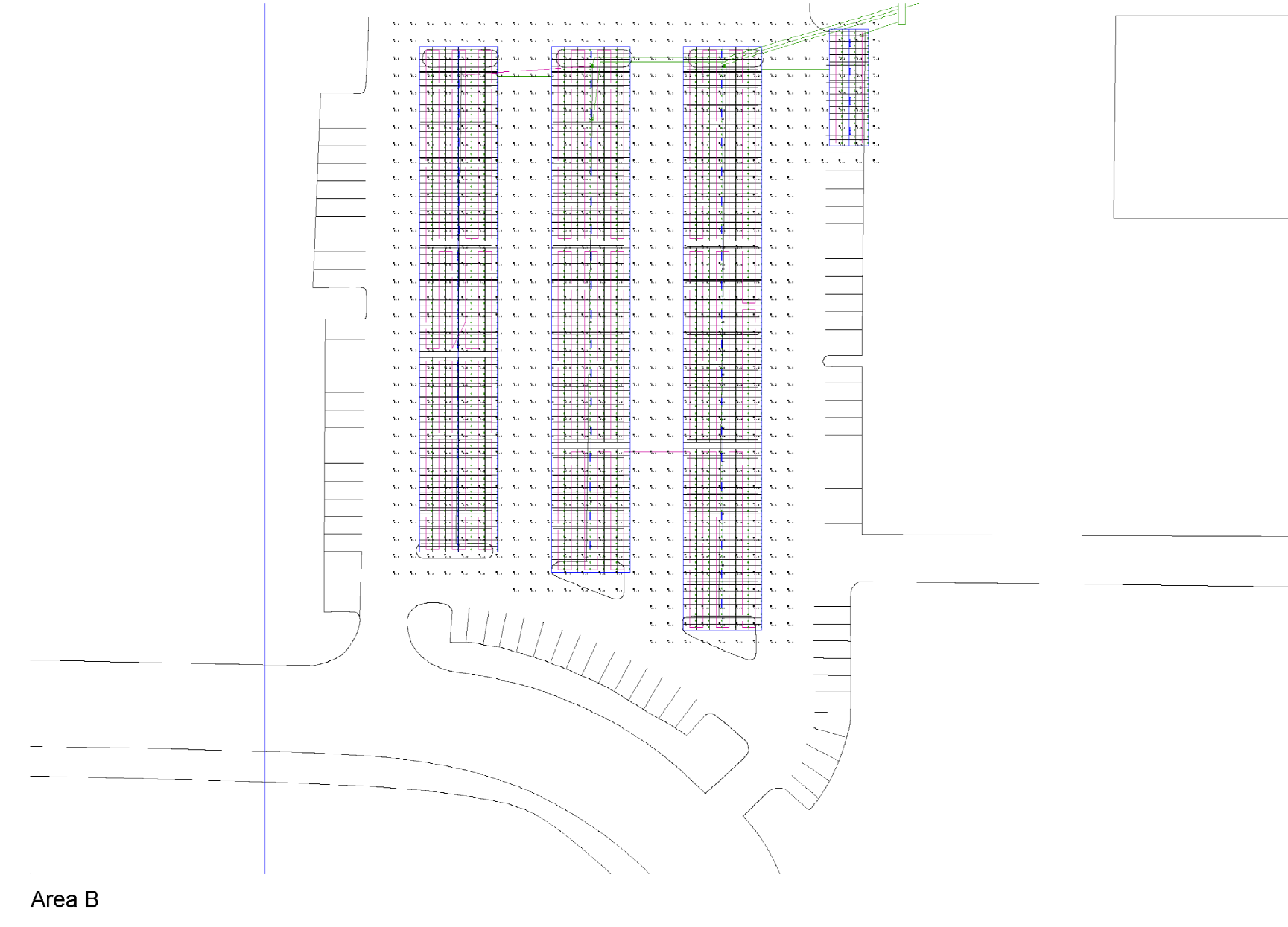
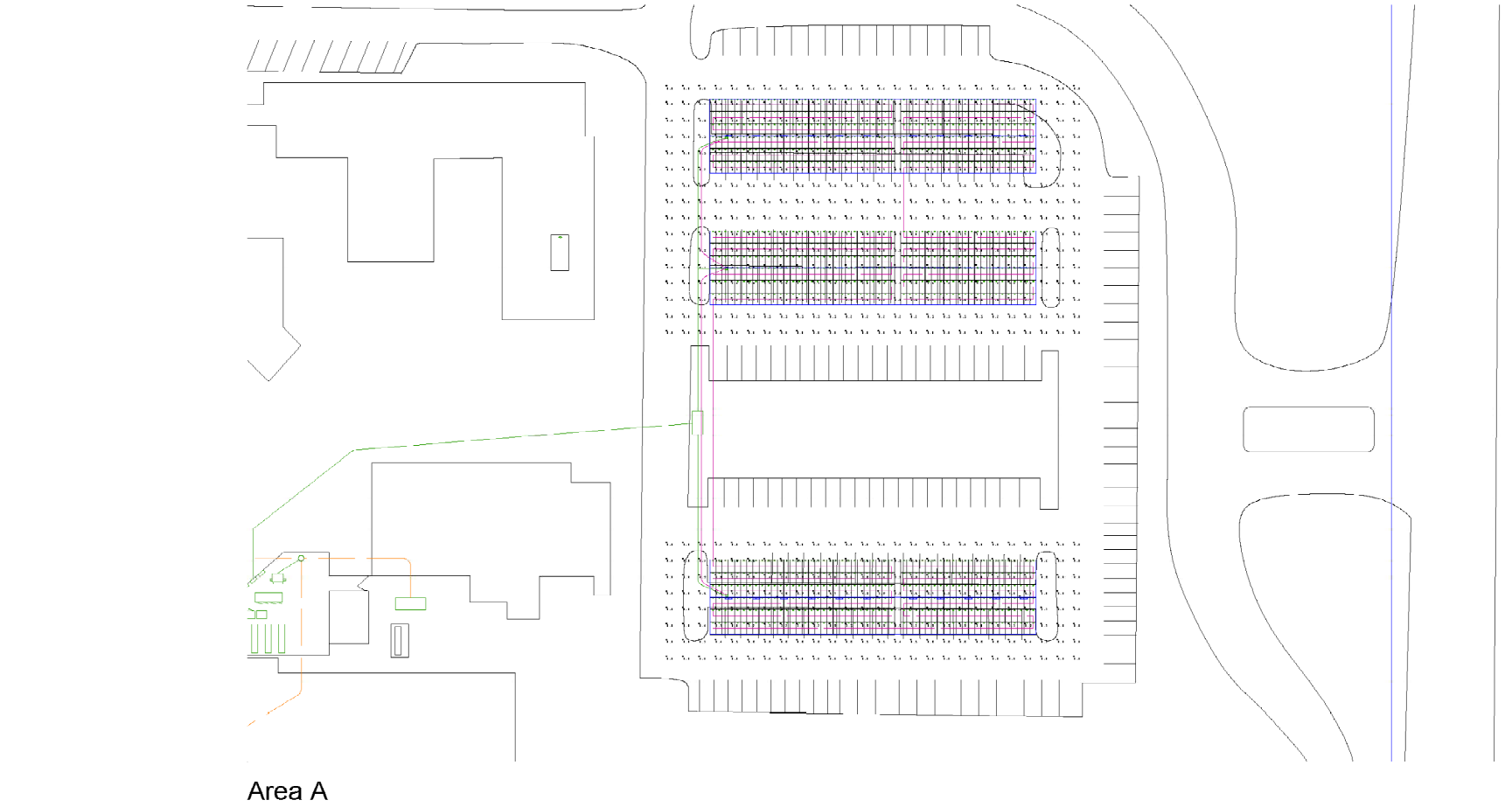
plot date: [Redacted]



C:\Temp\220602-44901 - Overall Site Plan-A01-SITE.dwg

Luminaire Schedule						LLF
Symbol	Qty	Label	Arrangement	Lumens Per Lamp	Description	
	213	A	Single	5330	4-OW1IP-LED-5000L-DIM10-MVOLT-40K-85	0.900

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Site Plan_Planar	Illuminance	Fc	1.30	9.1	0.0	N.A.	N.A.
Area A	Illuminance	Fc	1.15	8.2	0.0	N.A.	N.A.
Area B	Illuminance	Fc	1.63	9.1	0.0	N.A.	N.A.
Area C	Illuminance	Fc	1.21	8.3	0.0	N.A.	N.A.
Area D	Illuminance	Fc	1.20	7.2	0.0	N.A.	N.A.



PROJECT: [REDACTED]
LOCATION: [REDACTED]
CONTACT: Cecilia Jones
DATE: 9/7/2022

Page Number:
1

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

sheet name

PHOTOMETRIC
 SITE PLAN

sheet number

E3.3

plot date

Ownership and copyright for all documents created by LED Spot hereunder shall remain the exclusive property of LED Spot. They are not to be used by the Owner or Client on other projects or on extensions of this project except by agreement in writing and with appropriate compensation to LED Spot. The lighting designer shall not be responsible for the means, methods, techniques, sequences, or procedures on construction or installation, or for the acts and omissions of the Client. This design is based on .IES files that were lab tested or computer generated. This lighting design is based on information supplied by others. Changes in electrical supply, area geometry and/or objects within the lighted area may produce illumination values different from the predicted results shown on this layout.

FOR PURCHASING INFORMATION OF APPROVED EQUIPMENT SPECIFIED ON THIS PLAN CONTACT:

LED Spot
 5620 S. Willow Dr.
 Houston, TX 77035
 PH: 281-972-5006

STATE OF CALIFORNIA
Outdoor Lighting
 NRCC-LTO-E (Created 01/21) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE
 This document is used to demonstrate compliance with requirements in §110.9, §130.0, §130.2, §140.7, and §141.0(b)(2) for outdoor lighting scopes using the prescriptive path.
 Project Name: [REDACTED] Report Page: Page 1 of 6
 Project Address: [REDACTED] Date Prepared: 11/1/2022

A. GENERAL INFORMATION
 01 Project Location (city) [REDACTED] 04 Total Illuminated Hardscape Area (ft²) 127,194.3
 02 Climate Zone 5
 03 Outdoor Lighting Zone per Title 24, Part 1 §10.114 or as designated by Authority Having Jurisdiction (AHJ):
 LZ-0: Very Low - Undeveloped Parkland LZ-2: Moderate - Rural Areas LZ-4: High - Must be reviewed by CA Energy Commission for Approval
 LZ-1: Low - Developed Parkland LZ-3: Moderately High - Urban Areas

B. PROJECT SCOPE
 Table Instructions: Include any outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in §140.7 or §141.0(b)(2) for alterations.
 My project consists of:
 New Lighting System Must Comply with Allowances from §140.7.
 Altered Lighting System Is your alteration increasing the connected lighting load (Watts)? Yes No
 03 % of Existing Luminaires Being Altered 04 Sum Total of Luminaires Being Added or Altered 05 Calculation Method
 *FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100

C. COMPLIANCE RESULTS
 Table Instructions: If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.
 Calculation of Total Allowed Lighting Power (Watts) §140.7 or §141.0(b)(2)

01	02	03	04	05	06	07	08	09
General Hardscape Allowance §140.7(d)1 (See Table I)	Per Application §140.7(d)2 (See Table J)	Sales Frontage §140.7(d)2 (See Table K)	Ornamental §140.7(d)2 (See Table L)	Per Specific Area §140.7(d)2 (See Table M)	Existing Power §141.0(b)(2) (See Table N)	Total Allowed (Watts)	Total Actual (Watts)	07 Must be ≥ 08
+	+	+	+	+	OR	=	≥	
						7,668	36	COMPLIES

Cutoff Compliance (See Table G for Details) Not Applicable
 Controls Compliance (See Table H for Details) COMPLIES with Exceptional Conditions

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: <http://www.energy.ca.gov/title24/2019standards> January 2021

STATE OF CALIFORNIA
Outdoor Lighting
 NRCC-LTO-E (Created 01/21) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE
 Project Name: [REDACTED] Report Page: Page 2 of 6
 Project Address: [REDACTED] Date Prepared: 11/1/2022

D. EXCEPTIONAL CONDITIONS
 This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.
 Table H. Outdoor Lighting Controls Permit Applicant Notes:
 Parking Lot Canopy: Luminaires under 40W, EXCEPTION 1 to Section 130.2(c)3
 Linear lighting has been indicated on Table F. For these luminaires, wattage reported in F03 is in "W/lf" and Total Number Luminaires reported in F05 indicates total linear feet (lf) of that luminaire type.

E. ADDITIONAL REMARKS
 This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

F. OUTDOOR LIGHTING FIXTURE SCHEDULE
 Table Instructions: For new or altered lighting systems demonstrating compliance with §140.7 (ie Table I has expanded for input), include all luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application in the Table below. For altered lighting systems using the Existing Power method per §141.0(b)(2) (ie Table N has expanded for input), include only new luminaires being installed and replacement luminaires being installed as part of the project scope (ie, do not include existing luminaires remaining or existing luminaires being moved).
 Designated Wattage:

01	02	03	04	05	06	07	08	09	10
Name or Item Tag	Complete Luminaire Description	Watts per luminaire ^{1,2}	How Wattage is determined	Total number luminaires ²	Luminaire Status ³	Excluded per §140.7(a)	Design Watts	Cutoff Req. ≥ 6,200 initial lumen output §130.2(b) ⁴	Field Inspector
1	Oracle Lighting 5000L Linear	9	Mfr. Spec ¹	4	New		36		Pass Fail
Total Design Watts:							36		

* NOTES: Selections with a * require a note in the space below explaining how compliance is achieved.
 EX: Luminaire is lighting a statue; EXCEPTION 2 to §130.2(b).
 *FOOTNOTES: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per §130.0(c).
 *For linear luminaires, wattage should be indicated as W/lf instead of Watts/luminaire. Total linear feet for the luminaire should be indicated in column 05 instead of number of luminaires.
 *Select "New" for new luminaires in a new outdoor lighting project or for added luminaires in an alteration. Select "Altered" for replacement luminaires in an alteration. Select "Existing to Remain" for existing luminaires within the project scope that are not being altered and are remaining. Select "Existing Reinstalled" for existing luminaires which are being removed and reinstalled as part of the project scope.
 *Compliance with mandatory cutoff requirements is required for luminaires with initial lumen output ≥ 6,200 unless exempted by §130.2(b).

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: <http://www.energy.ca.gov/title24/2019standards> January 2021

STATE OF CALIFORNIA
Outdoor Lighting
 NRCC-LTO-E (Created 01/21) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE
 Project Name: [REDACTED] Report Page: Page 3 of 6
 Project Address: [REDACTED] Date Prepared: 11/1/2022

G. CUTOFF REQUIREMENTS (BUG)
 This Section Does Not Apply

H. OUTDOOR LIGHTING CONTROLS
 Table Instructions: Complete this table demonstrating compliance with controls requirements for all new or altered luminaires installed as part of the permit application. For alteration projects, luminaires which are existing to remain (ie untouched) and luminaires which are removed and reinstalled (wiring only) do not need to be included in this table even if they are within the spaces covered by the permit application.
 When an option having a * is selected, the notes section of this table must be completed. The lighting controls section of the Compliance Summary Table on the first page will show "DOES NOT COMPLY" if the notes are left blank. For each requirement in columns 02 through 04, do not leave the field blank, instead select NA or Exempt* from the dropdown list to indicate not applicable or an exemption.

Mandatory Controls	02	03	04	05
Area Description	Shut-Off §130.2(c)1	Auto-Schedule §130.2(c)2	Motion Sensor §130.2(c)3	Field Inspector
Parking Lot Canopy	Astronomical Timer	Yes	Exempt *	Pass Fail
Parking Lot Canopy	Luminaires under 40W, EXCEPTION 1 to Section 130.2(c)3			

*NOTES: Controls with a * require a note in the space below explaining how compliance is achieved.
 EX: Not permitted by health & safety to be turned off; EXCEPTION 1 to §130.2(c).

I. LIGHTING POWER ALLOWANCE (per §140.7)
 Table Instructions: Please complete this table for areas using the allowance calculations per §140.7. General Hardscape Allowance is per Table §140.7-A while "Use it or lose it" Allowances are per Table §140.7-B. Indicate which allowances are being used to expand sections for user input. Luminaires that qualify for one of the "Use it or lose it" allowances shall not qualify for another "Use it or lose it" allowance.

01 "Use it or lose it" Allowances (select all that apply)				
<input type="checkbox"/> General Hardscape Allowance	<input type="checkbox"/> Per Application	<input type="checkbox"/> Sales Frontage	<input type="checkbox"/> Ornamental	<input checked="" type="checkbox"/> Per Specific Area
Table I (below)	Table J	Table K	Table L	Table M

J. LIGHTING ALLOWANCE: PER APPLICATION
 This Section Does Not Apply

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: <http://www.energy.ca.gov/title24/2019standards> January 2021

STATE OF CALIFORNIA
Outdoor Lighting
 NRCC-LTO-E (Created 01/21) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE
 Project Name: [REDACTED] Report Page: Page 4 of 6
 Project Address: [REDACTED] Date Prepared: 11/1/2022

K. LIGHTING ALLOWANCE: SALES FRONTAGE
 This Section Does Not Apply

L. LIGHTING ALLOWANCE: ORNAMENTAL
 This Section Does Not Apply

M. LIGHTING ALLOWANCE: PER SPECIFIC AREA
 Table Instructions: Please complete this table for areas using the wattage allowance per specific area type from Table 140.7-B. More than one specific area allowance may be taken in a single project, if applicable. However, multiple specific area allowances may not be taken for the exact same area on the site.

01	02	03	04	05	06	07	08	09	10
Area Description	Specific Area Type per Table 140.7-B	CALCULATED ALLOWANCE (Watts) Specific Area (ft²) ¹	Allowed Density (W/ft²) ²	Extra Allowance (Watts)	Luminaire Name or Item Tag	Watts per Luminaire ³	# of Luminaires ²	Design Watts	Additional Allowance (Watts)
Area A	Non-sales Canopies/Tunnels	20,668.41	0.27	5,580.4707	1	9	132	1,188	
Total Design Watts for this Area:							1,188	1,188	
Area B	Non-sales Canopies/Tunnels	33,385.25	0.27	9,014.0175	1	9	240	2,160	
Total Design Watts for this Area:							2,160	2,160	
Area C	Non-sales Canopies/Tunnels	65,720.96	0.27	17,744.659	1	9	428	3,852	
Total Design Watts for this Area:							3,852	3,852	
Area D	Non-sales Canopies/Tunnels	7,419.68	0.27	2,003.3136	1	9	52	468	
Total Design Watts for this Area:							468	468	
Total Allowance (Watts) All Areas:							7,668		

Table Continued

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: <http://www.energy.ca.gov/title24/2019standards> January 2021

STATE OF CALIFORNIA
Outdoor Lighting
 NRCC-LTO-E (Created 01/21) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE
 Project Name: [REDACTED] Report Page: Page 5 of 6
 Project Address: [REDACTED] Date Prepared: 11/1/2022

N. EXISTING CONDITIONS POWER ALLOWANCE (alterations only)
 This Section Does Not Apply

O. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION
 Table Instructions: Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online at https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCL.

YES	NO	Form/Title	Field Inspector
<input checked="" type="radio"/>	<input type="radio"/>	NRCC-LTO-01-E - Must be submitted for all buildings.	Pass Fail
<input checked="" type="radio"/>	<input type="radio"/>	NRCC-LTO-02-E - Must be submitted for a lighting control system; or for an Energy Management Control System (EMCS), to be recognized for compliance.	Pass Fail

P. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE
 Table Instructions: Selections have been made based on information provided in previous tables of this document. If any selection needs to be changed, please explain why in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: <http://www.energy.ca.gov/title24/attcp/providers.html>

YES	NO	Form/Title	Field Inspector
<input checked="" type="radio"/>	<input type="radio"/>	NRCC-LTO-02-A - Must be submitted for all outdoor lighting controls except for alterations where controls area added to ≤ 20 luminaires.	Pass Fail

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: <http://www.energy.ca.gov/title24/2019standards> January 2021

STATE OF CALIFORNIA
Outdoor Lighting
 NRCC-LTO-E (Created 01/21) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE
 Project Name: [REDACTED] Report Page: Page 6 of 6
 Project Address: [REDACTED] Date Prepared: 11/1/2022

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT
 I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Alan Chew	Documentation Author Signature: Alan Chew
Company: [REDACTED]	Signature Date: 11/1/2022
Address: [REDACTED]	CEA/ HERS Certification Identification (if applicable):
City/State/Zip: [REDACTED]	Phone: 510-940-9750

RESPONSIBLE PERSON'S DECLARATION STATEMENT
 I certify the following under penalty of perjury, under the laws of the State of California:
 1. The information provided on this Certificate of Compliance is true and correct.
 2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
 3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
 4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
 5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Richard Dobbins	Responsible Designer Signature:
Company: [REDACTED]	Date Signed:
Address: [REDACTED]	License:
City/State/Zip: [REDACTED]	Phone: 510-940-9750

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: <http://www.energy.ca.gov/title24/2019standards> January 2021

05a

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

revisions

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
 1/31/2024

stamp

sheet name

TITLE 24
 CALCULATIONS

sheet number

E3.4

plot date

North System - Array Configuration			
System: 379.08 kWstc, 300 kW AC			
Total PV Module Qty: 936			
Inverter I.D. #	Inv #1	Inv #2	Inv #3
Inverter AC Power (kW)	100.00	100.00	100.00
PV Power (kWstc)	126.36	126.36	126.36
Inverter DC:AC Ratio	1.26	1.26	1.26
Module Total Qty:	312	312	312
String Qty:	13	13	13
String Length:	24	24	24
Max Open Circuit Voltage:	1288	1288	1288
Min Open Circuit Voltage:	1079	1079	1079
Max Operating Voltage:	998	998	998
Min Operating Voltage:	901	901	901
Max Short Circuit Current:	168.8	168.8	168.8
Operating Current:	126.6	126.6	126.6

Inverter #1 - #3 Specifications	
Model Number:	CHINT CPS SCH100KTL-DO/US-480 [S11-JUN20]
Nominal Power (kW AC):	100.00
Nominal AC Voltage (V):	480 (3/N/PE)
Max Output Current (A):	126.7
CEC Weighted Efficiency:	98.0%
Maximum DC Voltage (V):	1500
DC Start Voltage (V):	900
Max. MPPT Voltage (V):	1450
Min. MPPT Voltage (V):	750
MPPT Quantity:	1
Inverter Quantity:	3

ESS Specifications	
Model Number:	SUNGROW ST556KWH-250UD
Nominal Power (kW AC):	250
Max AC Power (kW AC):	264
Battery Capacity (kWh):	556
DC Voltage Range (V):	806-1046
Nominal AC Voltage (V):	480
Max Output Current (A):	317.2
CEC Weighted Efficiency:	98.0%
Maximum DC Voltage (V):	1500
DC Start Voltage (V):	700
DC Charge Current (A):	386
Battery Quantity:	6

PV System Maximum Voltage Calculation per NEC 690.7(A)	
Local ASHRAE Min Temp:	-3 °C
Data Source:	SANTA MARIA PUBLIC ARPT
Voc Temp Coefficient	0.272%/°C
Voc	25°C
Correction Factor	+1
Max # of Modules in Series	24
Temperature Correction Factor	1.076
Corrected Open Circuit Voltage	1287.8
Units	Volts DC

Transformer Calculations	
PV Voltage:	480 VAC
Util. Voltage:	12470 VAC
PV Current:	2283.3 Amps
Util. Current:	87.9 Amps
Minimum Transformer kVA Rating:	1500.0 kVA

CEC Rating Calculation	
Module PTC Rating (W)	379.3 W
No. of Modules	936
Average Inverter CEC Efficiency	98.0%
CEC System Size	347.92 kW AC

PV-side AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	380 Amps
MAX CURRENT PER 690.8(B):	475 Amps

ESS AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	1903 Amps
MAX CURRENT PER 690.8(B):	2379 Amps

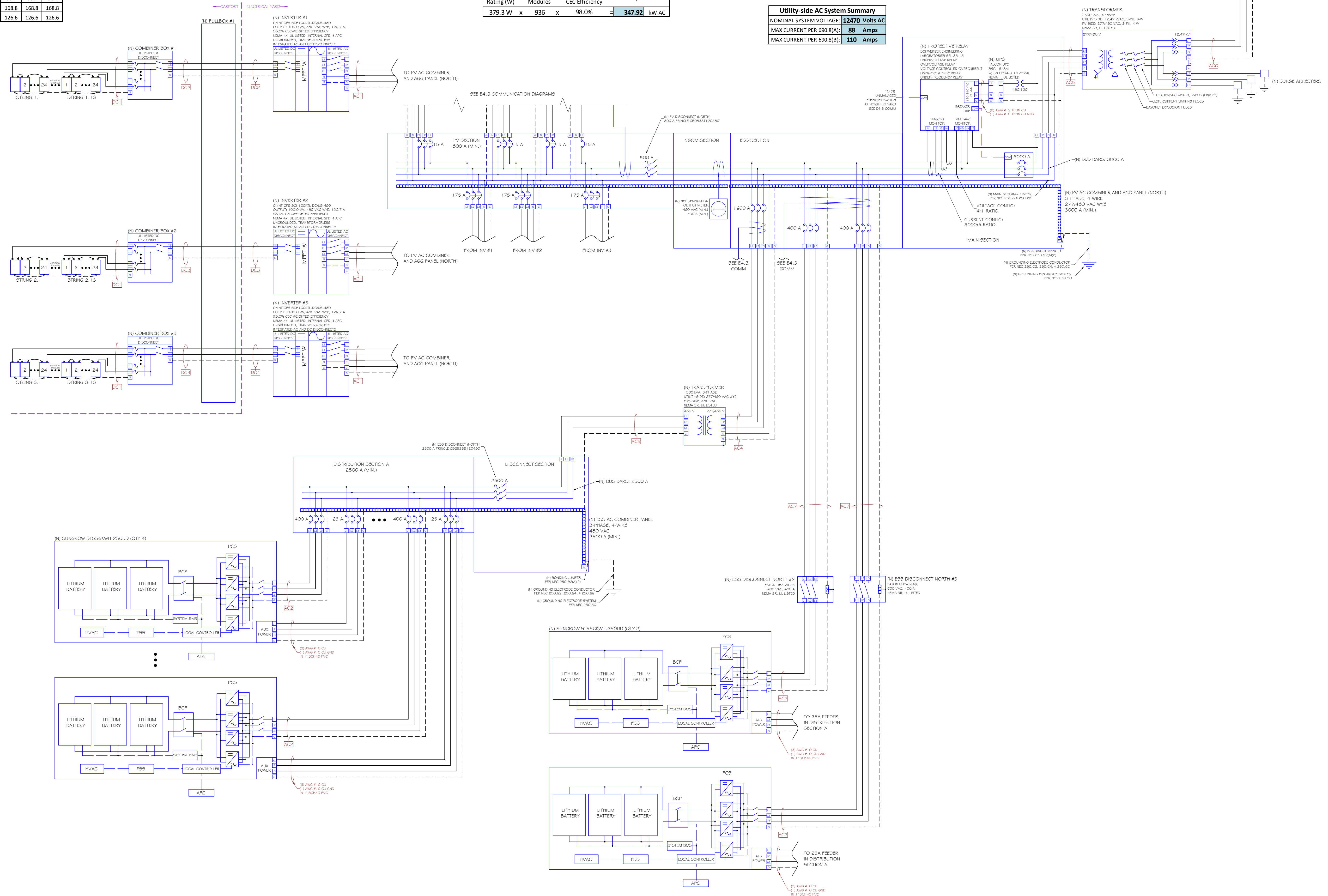
Total AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	2283 Amps
MAX CURRENT PER 690.8(B):	2854 Amps

Utility-side AC System Summary	
NOMINAL SYSTEM VOLTAGE:	12470 Volts AC
MAX CURRENT PER 690.8(A):	88 Amps
MAX CURRENT PER 690.8(B):	110 Amps

NOTE: CANOPY STRUCTURE SHALL BE GROUNDED PER NEC 250.50 & 250.50. SEE DETAIL G ON SHEET E1.2

SYSTEM-WIDE INVERTER/MODULE BREAKOUT (4986) / (16) CPS SCH 100KTL INVERTERS (480) / (2) CPS SCH 100KTL INVERTERS DERATED TO 75 kW (360) / (2) CPS SCAGOKTL INVERTERS

NORTH LOTS SUBSYSTEM (936) / (3) CPS SCH 100KTL INVERTERS



client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
 1/31/2024

stamp

sheet name

ELECTRICAL
 DIAGRAM (NORTH)

sheet number
 E4.0.0

plot date

480V --- = EQUIP. GROUNDING CONDUCTOR --- = CIRCUIT CONDUCTOR = FUSE = CIRCUIT BREAKER (N) = NEW EQUIP. (E) = EXISTING EQUIP. L1 = LINE 1 (BROWN) L2 = LINE 2 (ORANGE) L3 = LINE 3 (YELLOW) N = NEUTRAL (WHITE) G = GROUND (GREEN) + = POSITIVE (RED) - = NEGATIVE (BLACK)

North System - Array Configuration			
System: 379.08 kWdc, 300 kW AC			
Total PV Module Qty: 936			
Inverter I.D. #	Inv #1	Inv #2	Inv #3
Inverter AC Power (kW)	100.00	100.00	100.00
PV Power (kWstc)	126.36	126.36	126.36
Inverter DC:AC Ratio	1.26	1.26	1.26
Module Total Qty:	312	312	312
String Qty:	13	13	13
String Length:	24	24	24
Max Open Circuit Voltage:	1288	1288	1288
Min Open Circuit Voltage:	1079	1079	1079
Max Operating Voltage:	998	998	998
Min Operating Voltage:	901	901	901
Max Short Circuit Current:	168.8	168.8	168.8
Operating Current:	126.6	126.6	126.6

Inverter #1 - #3 Specifications	
Model Number:	CHINT CPS SCH100KTL-DO/US-480 [S11-JUN20]
Nominal Power (kW AC):	100.00
Nominal AC Voltage (V):	480 (3/N/PE)
Max Output Current (A):	126.7
CEC Weighted Efficiency:	98.0%
Maximum DC Voltage (V):	1500
DC Start Voltage (V):	900
Max. MPPT Voltage (V):	1450
Min. MPPT Voltage (V):	750
MPPT Quantity:	1
Inverter Quantity:	3

ESS Specifications	
Model Number:	SUNGROW ST556KWH-250UD
Nominal Power (kW AC):	250
Max AC Power (kW AC):	264
Battery Capacity (kWh):	556
DC Voltage Range (V):	806-1046
Nominal AC Voltage (V):	480
Max Output Current (A):	317.2
CEC Weighted Efficiency:	98.0%
Maximum DC Voltage (V):	1500
DC Start Voltage (V):	700
DC Charge Current (A):	386
Battery Quantity:	6

PV System Maximum Voltage Calculation per NEC 690.7(A)	
Local ASHRAE Min Temp:	-3 °C
Data Source:	SANTA MARIA PUBLIC ARPT
Voc Temp Coefficient	25°C - ASHRAE + 1 = Correction Factor
Voc	1.076 x 49.9 x 24 = 1287.8
Temperature	24
Corrected Open Circuit Voltage	1287.8

Transformer Calculations	
PV Voltage:	480 VAC Util. Voltage: 12470 VAC
PV Current:	2283.3 Amps Util. Current: 87.9 Amps
Minimum Transformer kVA Rating:	1500.0 kVA

CEC Rating Calculation	
Module PTC Rating (W)	379.3 W
No. of Modules	936
Average Inverter CEC Efficiency	98.0%
CEC System Size	347.92 kW AC

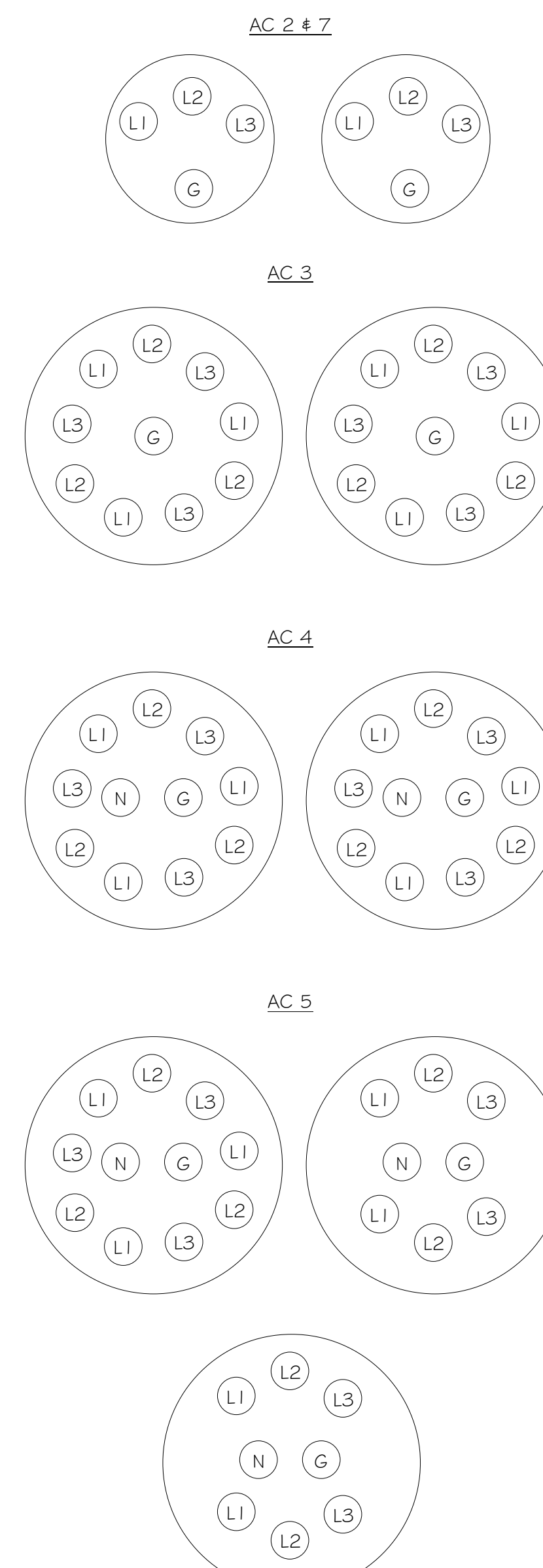
PV-side AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	380 Amps
MAX CURRENT PER 690.8(B):	475 Amps

ESS AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	1903 Amps
MAX CURRENT PER 690.8(B):	2379 Amps

Total AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	2283 Amps
MAX CURRENT PER 690.8(B):	2854 Amps

Utility-side AC System Summary	
NOMINAL SYSTEM VOLTAGE:	12470 Volts AC
MAX CURRENT PER 690.8(A):	88 Amps
MAX CURRENT PER 690.8(B):	110 Amps

CONDUIT FILL DETAIL



NOTE:
LINES AND OBJECTS THAT ARE IN BLUE ARE NEW AND BLACK IS EXISTING. TYPICAL FOR ALL E DRAWINGS

NOTE:
UNDERGROUND CONDUITS SHALL TRANSITION TO APPROPRIATE CONDUITS ABOVE GROUND. CONDUITS SHALL BE RMC UP TO & MAX ABOVE GROUND. SEE DETAIL 14B ON SHEET E1.2

NOTE:
WHERE CONDUCTORS ARE INSTALLED IN PARALLEL, AN EGC/GEC GROUND CONDUCTOR MUST BE PRESENT IN EACH CONDUIT PER NEC 250.122(F). LISTED RAIN-TIGHT FITTINGS SHALL BE USED WITH EMT CONDUITS.

WIRE AND CONDUIT SCHEDULE									
TAG	# OF PARALLEL CONDUITS	CONDUIT SIZE	CONDUIT TYPE	PHASE CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT	NEUTRAL CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT	GROUND CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT	EST. DIST.		
DC1	(1)	N/A	N/A	2/STRING AWG #10 PV-WIRE	N/A	N/A	200		
DC2	(1)	2"	SCH40 PVC	2 300 kcmil PV-WIRE	N/A	N/A	490		
DC3	(1)	2"	SCH40 PVC	2 300 kcmil PV-WIRE	N/A	N/A	430		
DC4	(1)	2"	SCH40 PVC	2 300 kcmil PV-WIRE	N/A	N/A	430		
AC1	(1)	1-1/2"	SCH40 PVC	3 AWG #2/0 THWN-2	1 AWG #6 THWN-2	1 AWG #6 THWN-2	20		
AC2	(2)	2"	SCH40 PVC	3 AWG #3/0 THWN-2	0 N/A	1 AWG #3 THWN-2	20		
AC3	(2)	4"	SCH40 PVC	9 300 kcmil THWN-2	0 N/A	1 AWG #4/0 THWN-2	20		
AC4	(2)	4"	SCH40 PVC	9 300 kcmil THWN-2	1 AWG #4/0 THWN-2	1 AWG #4/0 THWN-2	20		
AC5	(3)	6"	SCH40 PVC	9 600 kcmil THWN-2	1 400 KCMIL THWN-2	1 400 KCMIL THWN-2	20		
AC6	(1)	2-1/2"	SCH40 PVC	3 AWG #2 MV-90	0 N/A	1 AWG #8 THWN-2	20		
AC7	(2)	2"	SCH40 PVC	3 AWG #3/0 THWN-2	0 N/A	1 AWG #3 THWN-2	20		

CONDUIT FILL CALCULATIONS														
TAG	CONDUCTOR AREA (SQ IN)	CONDUCTOR QTY	CONDUCTOR FILL (SQ IN)	NEUTRAL AREA (SQ IN)	NEUTRAL QTY	NEUTRAL FILL (SQ IN)	GROUND AREA (SQ IN)	GROUND QTY	GROUND FILL (SQ IN)	TOTAL WIRE FILL	CONDUIT TYPE	CONDUIT SIZE	CONDUIT AREA (SQ IN)	CONDUIT FILL PERCENT
DC1	0.0531	x N/A	= N/A	N/A	x 0	= 0.0000	0.0206	x 1	= 0.0206	N/A	N/A	N/A	N/A	N/A
DC2	0.5451	x 2	= 1.0902	N/A	x 0	= 0.0000	0.0824	x 1	= 0.0824	1.1726	SCH40 PVC	2"	3.291	35.6%
DC3	0.5451	x 2	= 1.0902	N/A	x 0	= 0.0000	0.0824	x 1	= 0.0824	1.1726	SCH40 PVC	2"	3.291	35.6%
DC4	0.5451	x 2	= 1.0902	N/A	x 0	= 0.0000	0.0824	x 1	= 0.0824	1.1726	SCH40 PVC	2"	3.291	35.6%
AC1	0.2223	x 3	= 0.6669	0.0507	x 1	= 0.0507	0.0507	x 1	= 0.0507	0.7683	SCH40 PVC	1-1/2"	1.986	38.7%
AC2	0.2679	x 3	= 0.8037	N/A	x 0	= 0.0000	0.0973	x 1	= 0.0973	0.9010	SCH40 PVC	2"	3.291	27.4%
AC3	0.4608	x 9	= 4.1472	N/A	x 0	= 0.0000	0.3237	x 1	= 0.3237	4.4709	SCH40 PVC	4"	12.554	35.6%
AC4	0.4608	x 9	= 4.1472	0.3237	x 1	= 0.3237	0.3237	x 1	= 0.3237	4.7946	SCH40 PVC	4"	12.554	38.2%
AC5	0.8676	x 9	= 7.8084	0.5863	x 1	= 0.5863	0.5863	x 1	= 0.5863	8.9810	SCH40 PVC	6"	28.567	31.4%
AC6	0.4778	x 3	= 1.4335	N/A	x 0	= 0.0000	0.0366	x 1	= 0.0366	1.4701	SCH40 PVC	2-1/2"	4.695	31.3%
AC7	0.2679	x 3	= 0.8037	N/A	x 0	= 0.0000	0.0973	x 1	= 0.0973	0.9010	SCH40 PVC	2"	3.291	27.4%

TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS			REQUIRED CONDUCTOR AMPACITY			AMPACTY CHECK #1	
			MATERIAL	TEMP. RATING	TRADE SIZE	AMPACTY PER 310.15(B)(16) & 310.15(B)(17)	MAX CURRENT PER 690.8(A)(1)	1 ^{sc} x COMBINED STRINGS	CONT. OPERATION = CURRENT PER 690.8(B)(1)	MAX CURRENT PER 690.8(B)(1)
DC1	PV STRING (24)	COMBINER BOX	COPPER	90°C	AWG #10	55 Amps	1.25 x 10.39 x 1	= 13.0 Amps	1.25 = 16.3 Amps	16.3 Amps < 55.0 Amps
DC2	COMBINER BOX #1	INVERTER #1	ALUM	75°C	300 kcmil	230 Amps	1.25 x 10.39 x 13	= 168.8 Amps	1.25 = 211.0 Amps	211.0 Amps < 230.0 Amps
DC3	COMBINER BOX #2	INVERTER #2	ALUM	75°C	300 kcmil	230 Amps	1.25 x 10.39 x 13	= 168.8 Amps	1.25 = 211.0 Amps	211.0 Amps < 230.0 Amps
DC4	COMBINER BOX #3	INVERTER #3	ALUM	75°C	300 kcmil	230 Amps	1.25 x 10.39 x 13	= 168.8 Amps	1.25 = 211.0 Amps	211.0 Amps < 230.0 Amps

TAG	CIRCUIT ENVIRONMENT	CONDUCTOR TEMPERATURE DERATING				CONDUIT FILL DERATING		CORRECTED AMPACITY CALCULATION		AMPACTY CHECK #2		VOLTAGE DROP	
		LOCAL 2% AVG. HIGH TEMP (°C)	HEIGHT ABOVE ROOF (ft)	TEMP. ADDED PER OPERATING TEMP (°C)	EXPECTED OPERATING TEMP (°C)	AMPACTY CORRECTION 310.15(B)(2)(a)	# OF UNGROUNDED CONDUCTORS	AMPACTY CORRECTION 310.15(B)(3)(a)	90°C CONDUCTOR x AMPACITY	TEMP DERATE x CONDUIT FILL = CORRECTED AMPACITY	MAX CURRENT PER 690.8(B)(2)	DERATED CONDUCTOR AMPACITY	EST. ONE-WAY DISTANCE
	FREE AIR (+15°C)	25	-	N/A	40	0.91	N/A	1.00	55 x 0.91 x 1.00 = 50.1 Amps	13.0 Amps < 50.1 Amps	200 ft	0.49%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	2	1.00	260 x 1.04 x 1.00 = 270.4 Amps	168.8 Amps < 270.4 Amps	490 ft	0.88%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	2	1.00	260 x 1.04 x 1.00 = 270.4 Amps	168.8 Amps < 270.4 Amps	430 ft	0.77%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	2	1.00	260 x 1.04 x 1.00 = 270.4 Amps	168.8 Amps < 270.4 Amps	430 ft	0.77%	

NOTE:
DC2 - DC4 DISTANCE AND VOLTAGE DROP CALCULATIONS ARE REPRESENTATIVE OF DISTANCE AND VOLTAGE DROP FROM COMBINER BOX TO RESPECTIVE INVERTER.

TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS			REQUIRED CONDUCTOR AMPACITY			AMPACTY CHECK #1	
			MATERIAL	TEMP. RATING	TRADE SIZE	AMPACTY PER 310.15(B)(16) & 310.15(B)(17)	INVERTER OUTPUT CURRENT	# OF INVERTERS	MAX CURRENT PER 690.8(A)(3) x OPERATION = CURRENT PER 690.8(B)(1)	CONT. OPERATION = CURRENT PER 690.8(B)(1)
AC1	INVERTER #1 - #3	PV AC COMBINER PANEL	COPPER	75°C	AWG #2/0	175 Amps	126.7 x 1	= 126.7 Amps	1.25 = 158.4 Amps	158.4 Amps < 175 Amps
AC2	SUNGROW ESS UNIT	ESS COMBINER PANEL	COPPER	75°C	AWG #3/0	2 400 Amps	317.2 x 1	= 317.2 Amps	1.25 = 396.5 Amps	396.5 Amps < 400 Amps
AC3	ESS COMBINER PANEL	ESS TRANSFORMER	COPPER	75°C	300 kcmil	6 1710 Amps	317.2 x 4	= 1268.8 Amps	1.25 = 1586.0 Amps	1586.0 Amps < 1710 Amps
AC4	ESS TRANSFORMER	PV & ESS COMBINER PANEL	COPPER	75°C	300 kcmil	6 1710 Amps	317.2 x 4	= 1268.8 Amps	1.25 = 1586.0 Amps	1586.0 Amps < 1710 Amps
AC5	PV & ESS COMBINER PANEL	TRANSFORMER	COPPER	75°C	600 kcmil	7 2940 Amps	2283 x 1	= 2283.3 Amps	1.25 = 2854.1 Amps	2854.1 Amps < 2940 Amps
AC6	TRANSFORMER	LINE SIDE CONN.	COPPER	75°C	AWG #2	1 115 Amps	SEE XFMR CALCS	= 87.9 Amps	1.25 = 109.9 Amps	109.9 Amps < 115 Amps
AC7	SUNGROW ESS UNIT	PV & ESS COMBINER PANEL	COPPER	75°C	AWG #3/0	2 400 Amps	317.2 x 1	= 317.2 Amps	1.25 = 396.5 Amps	396.5 Amps < 400 Amps

TAG	CIRCUIT ENVIRONMENT	CONDUCTOR TEMPERATURE DERATING				CONDUIT FILL DERATING		CORRECTED AMPACITY CALCULATION		AMPACTY CHECK #2		VOLTAGE DROP	
		LOCAL 2% AVG. HIGH TEMP (°C)	HEIGHT ABOVE ROOF (ft)	TEMP. ADDED PER OPERATING TEMP (°C)	EXPECTED OPERATING TEMP (°C)	AMPACTY CORRECTION 310.15(B)(2)(a)	# OF UNGROUNDED CONDUCTORS	AMPACTY CORRECTION 310.15(B)(3)(a)	90°C CONDUCTOR x AMPACITY	TEMP DERATE x CONDUIT FILL = CORRECTED AMPACITY	MAX CURRENT PER 690.8(B)(2)	DERATED CONDUCTOR AMPACITY	EST. ONE-WAY DISTANCE
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	3	1.00	195 x 1.04 x 1.00 = 202.8 Amps	126.7 Amps < 202.8 Amps	20 ft	0.09%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	3	1.00	450 x 1.04 x 1.00 = 468 Amps	317.2 Amps < 468.0 Amps	20 ft	0.09%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	9	0.70	1920 x 1.04 x 0.70 = 1398 Amps	1268.8 Amps < 1397.8 Amps	20 ft	0.07%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	9	0.70	1920 x 1.04 x 0.70 = 1398 Amps	1268.8 Amps < 1397.8 Amps	20 ft	0.07%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	9	0.70	3325 x 1.04 x 0.70 = 2421 Amps	2283.3 Amps < 2420.6 Amps	20 ft	0.05%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	3	1.00	130 x 1.04 x 1.00 = 135.2 Amps	87.9 Amps < 135.2 Amps	20 ft	0.12%	
	UNDERGROUND (+0°C)	25	-	N/A	25	1.04	3	1.00	450 x 1.04 x 1.00 = 468 Amps	317.2 Amps < 468.0 Amps	20 ft	0.09%	

MAXIMUM VOLTAGE DROP TOTALS			
COMBINER	FROM STRINGING	TO INVERTER	TOTAL
1	0.49%	0.88%	1.37%
2	0.49%	0.77%	1.26%
3	0.49%	0.77%	1.26%

dsa

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371

Drawn By: AM

Checked By: RD

revisions

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024</	

North System - Array Configuration																			
System: 1980.45 kWstc, 1570 kW AC																			
Total PV Module Qty: 4890																			
Inverter I.D. #	Inv #4A	Inv #4B	Inv #5A	Inv #5B	Inv #6A	Inv #6B	Inv #7A	Inv #7B	Inv #8A	Inv #8B	Inv #9A	Inv #9B	Inv #10A	Inv #10B	Inv #11	Inv #12	Inv #13		
Inverter AC Power (kW):	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	75.00	75.00	100.00	60.00	60.00	100.00			
PV Power (kWstc):	126.36	126.36	126.36	126.36	126.36	115.83	126.36	115.83	126.36	115.83	136.08	97.20	136.08	72.90	72.90	136.08			
Inverter DC:AC Ratio:	1.26	1.26	1.26	1.26	1.26	1.16	1.26	1.16	1.26	1.16	1.36	1.30	1.36	1.22	1.22	1.36			
Module Total Qty:	312	312	312	312	312	286	312	286	312	286	336	240	336	180	180	336			
String Qty:	12	12	12	12	12	11	12	11	12	11	14	10	14	4	4	14			
String Length:	26	26	26	26	26	26	26	26	26	26	24	24	24	18	18	24			
Max Open Circuit Voltage:	1395	1395	1395	1395	1395	1395	1395	1395	1395	1395	1288	1288	1288	966	966	1288			
Min Open Circuit Voltage:	1169	1169	1169	1169	1169	1169	1169	1169	1169	1169	1079	1079	1079	810	810	1079			
Max Operating Voltage:	1082	1082	1082	1082	1082	1082	1082	1082	1082	1082	998	998	998	749	749	998			
Min Operating Voltage:	976	976	976	976	976	976	976	976	976	976	901	901	901	675	675	901			
Max Short Circuit Current:	155.9	155.9	155.9	155.9	155.9	142.9	155.9	142.9	155.9	142.9	181.8	129.9	181.8	52.0	52.0	181.8			
Operating Current:	116.9	116.9	116.9	116.9	116.9	107.1	116.9	107.1	116.9	107.1	136.4	97.4	136.4	39.0	39.0	136.4			
String Qty:	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
String Length:	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18			
Max Open Circuit Voltage:	966	966	966	966	966	966	966	966	966	966	900	900	900	750	750	900			
Min Open Circuit Voltage:	810	810	810	810	810	810	810	810	810	810	750	750	750	675	675	750			
Max Operating Voltage:	749	749	749	749	749	749	749	749	749	749	675	675	675	675	675	749			
Min Operating Voltage:	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675			
Max Short Circuit Current:	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0			
Operating Current:	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2			
String Qty:	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
String Length:	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18			
Max Open Circuit Voltage:	966	966	966	966	966	966	966	966	966	966	900	900	900	750	750	900			
Min Open Circuit Voltage:	810	810	810	810	810	810	810	810	810	810	750	750	750	675	675	750			
Max Operating Voltage:	749	749	749	749	749	749	749	749	749	749	675	675	675	675	675	749			
Min Operating Voltage:	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675	675			
Max Short Circuit Current:	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0			
Operating Current:	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2			

PV Module Specifications	
Model Number:	JA SOLAR JAM72510 405/MR
Weight (lbs):	50.0
Dimensions (in):	79.3 x 39.2 x 1.6
Power @ STC (W):	405
Voc (VDC):	49.9
Vmp (VDC):	41.6
Isc (A):	10.39
Imp (A):	9.74
Voc Temp Coeff (%/°C):	-0.27
Max Voltage (VDC):	1,500
Module Quantity:	4,890

Inverter #9B, #10A Specifications	
Model Number:	CHINT CPS SCH100KTL-DO-US-480 [S1-JUN20]
Nominal Power (kW AC):	75.00
Nominal AC Voltage (V):	480 (3/N/PE)
Max Output Current (A):	90.2 (DERATED)
CEC Weighted Efficiency:	98.0%
Maximum DC Voltage (V):	1500
DC Start Voltage (V):	900
Max. MPPT Voltage (V):	1450
Min. MPPT Voltage (V):	750
MPPT Quantity:	1
Inverter Quantity:	2
Max Current MPPT A:	275.0

Inverter #4A - #9A, #10B, #13 Specifications	
Model Number:	CHINT CPS SCH100KTL-DO-US-480 [S1-JUN20]
Nominal Power (kW AC):	100.00
Nominal AC Voltage (V):	480 (3/N/PE)
Max Output Current (A):	126.7
CEC Weighted Efficiency:	98.0%
Maximum DC Voltage (V):	1500
DC Start Voltage (V):	900
Max. MPPT Voltage (V):	1450
Min. MPPT Voltage (V):	750
MPPT Quantity:	1
Inverter Quantity:	13
Max Current MPPT A:	275.0

Inverter #11, #12 Specifications	
Model Number:	CHINT CPS SCAG60KTL-DO-US-480 [S1-JUN20]
Nominal Power (kW AC):	60.00
Nominal AC Voltage (V):	480 (3/N/PE)
Max Output Current (A):	72.2
CEC Weighted Efficiency:	98.5%
Maximum DC Voltage (V):	1000
DC Start Voltage (V):	350
Max. MPPT Voltage (V):	850
Min. MPPT Voltage (V):	50
MPPT Quantity:	3
Inverter Quantity:	2
Max Current MPPT A:	68.0
Max Current MPPT B:	68.0
Max Current MPPT C:	68.0

PV System Maximum Voltage Calculation per NEC 690.7(A)	
Local ASHRAE Min Temp:	-3 °C
Data Source:	SANTA MARIA PUBLIC ARPT
Voc Temp Coefficient	25°C - ASHRAE + 1 = Correction Factor
Voc	2777.480 V
Correction Factor	1.076
Max # of Series	26
Temperature Correction	1.076 x 49.9 x 26 = 1395.1
Corrected Open Circuit Voltage	1395.1 Volts DC

Transformer Calculations	
PV Voltage:	480 VAC
Util. Voltage:	12470 VAC
PV Current:	1971.9 Amps
Util. Current:	75.9 Amps
Minimum Transformer kVA Rating:	1500.0 kVA

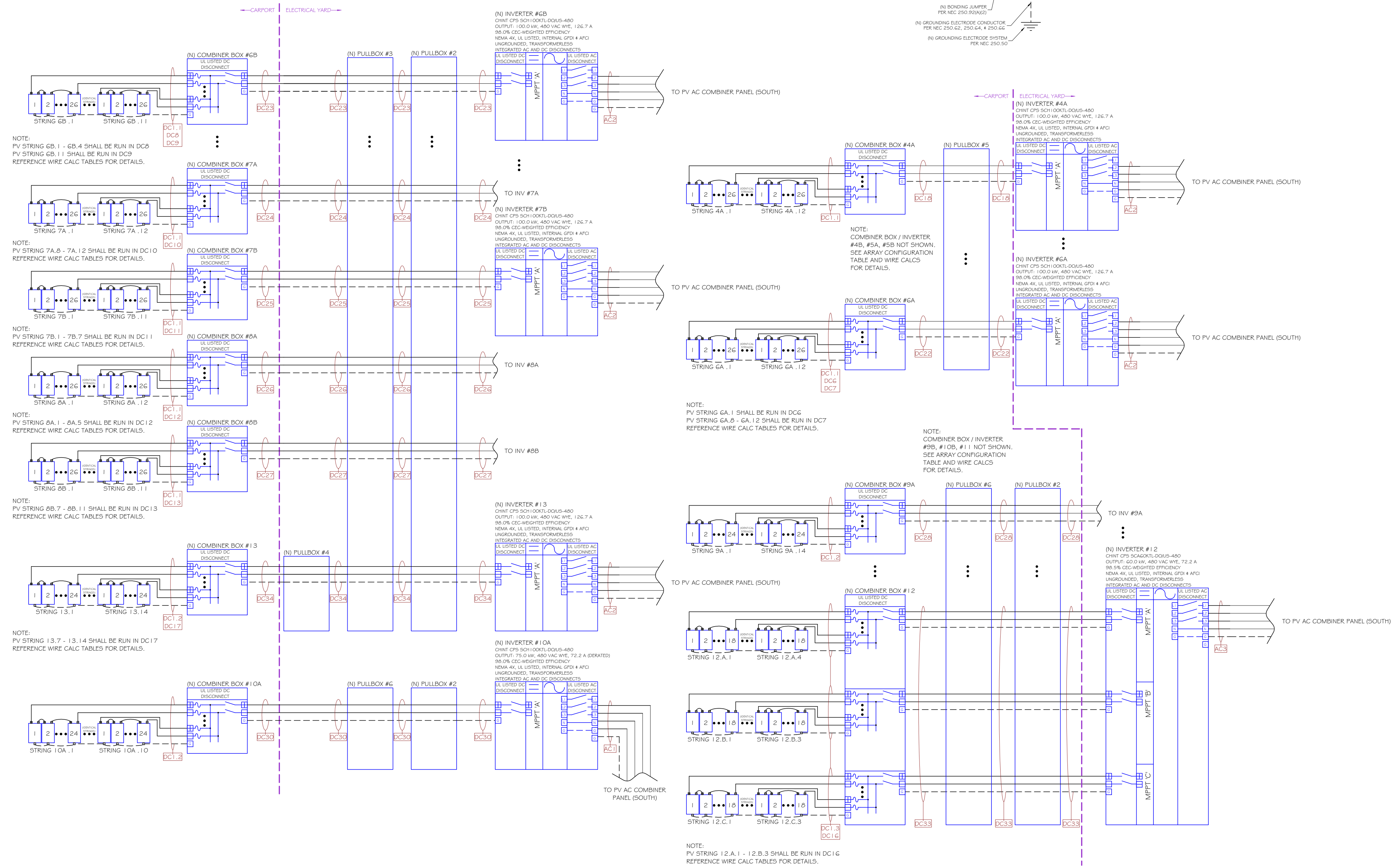
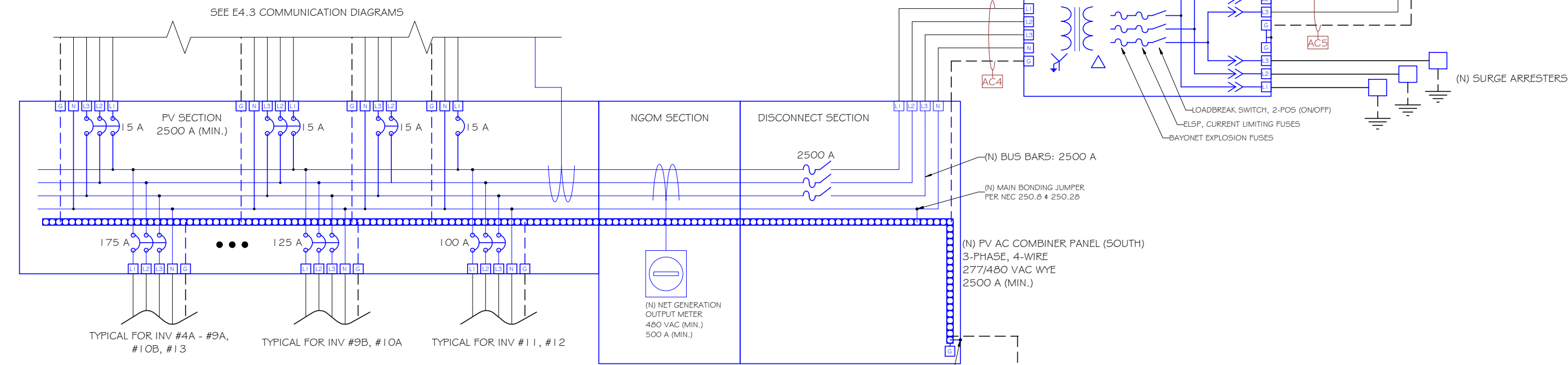
CEC Rating Calculation	
Module PTC Rating (W)	379.3 W
No. of Modules	4890
Average Inverter CEC Efficiency	98.1%
CEC System Size	1818.77 kW AC

PV-side AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
CURRENT PER 690.8(A):	1972 Amps
CURRENT PER 690.8(B):	2465 Amps

Utility-side AC System Summary	
NOMINAL SYSTEM VOLTAGE:	12470 Volts AC
CURRENT PER 690.8(A):	76 Amps
CURRENT PER 690.8(B):	95 Amps

NOTE:
CANOPY STRUCTURE SHALL BE GROUNDED PER NEC 250.50 & 250.60. SEE DETAIL G ON SHEET E.1.2

SOUTH LOTS SUBSYSTEM
(4050) / (13) CPS SCH 100KTL INVERTERS
(480) / (2) CPS SCH 100KTL INVERTERS DERATED TO 75 kW
(360) / (2) CPS SCAG60KTL INVERTERS



480V --- = EQUIP. GROUNDING CONDUCTOR --- = CIRCUIT CONDUCTOR = FUSE = CIRCUIT BREAKER (N) = NEW EQUIP. (E) = EXISTING EQUIP. L1 = LINE 1 (BROWN) L2 = LINE 2 (ORANGE) L3 = LINE 3 (YELLOW) N = NEUTRAL (WHITE) G = GROUND (GREEN) + = POSITIVE (RED) - = NEGATIVE (BLACK)

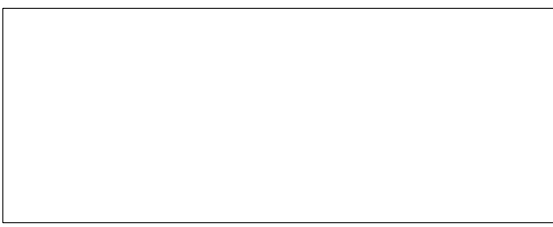
NOTE:
LINES AND OBJECTS THAT ARE IN BLUE ARE NEW AND BLACK IS EXISTING.
TYPICAL FOR ALL E DRAWINGS

NOTE:
UNDERGROUND CONDUITS SHALL TRANSITION TO APPROPRIATE CONDUITS ABOVE GROUND.
CONDUITS SHALL BE RMC UP TO 8' MAX ABOVE GROUND.
SEE DETAIL 14B ON SHEET E1.2

NOTE:
WHERE CONDUCTORS ARE INSTALLED IN PARALLEL, AN EGC/GEC GROUND CONDUCTOR MUST BE PRESENT IN EACH CONDUIT PER NEC 250.122(F).
LISTED RAIN-TIGHT FITTINGS SHALL BE USED WITH EMT CONDUITS.

WIRE AND CONDUIT SCHEDULE												
TAG	# OF PARALLEL CONDUITS	CONDUIT SIZE	CONDUIT TYPE	PHASE CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT	NEUTRAL CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT	GROUND CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT	EST. DIST.					
DC1.1	(1)	N/A	N/A	2/STRING AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #6	BARE CU	250
DC1.2	(1)	N/A	N/A	2/STRING AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #6	BARE CU	290
DC1.3	(1)	N/A	N/A	2/STRING AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #6	BARE CU	115
DC2	(1)	2"	SCH40 PVC	14 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	255
DC3	(1)	1-1/2"	SCH40 PVC	8 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	180
DC4	(1)	1"	SCH40 PVC	4 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	245
DC5	(1)	2"	SCH40 PVC	14 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	200
DC6	(1)	1"	SCH40 PVC	2 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	270
DC7	(1)	1-1/2"	SCH40 PVC	10 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	220
DC8	(1)	1-1/2"	SCH40 PVC	8 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	325
DC9	(1)	1"	SCH40 PVC	2 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	205
DC10	(1)	1-1/2"	SCH40 PVC	10 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	250
DC11	(1)	2"	SCH40 PVC	14 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	360
DC12	(1)	1-1/2"	SCH40 PVC	10 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	350
DC13	(1)	1-1/2"	SCH40 PVC	10 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	380
DC14	(1)	1-1/2"	SCH40 PVC	10 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	160
DC15	(1)	2"	SCH40 PVC	16 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	340
DC16	(1)	2"	SCH40 PVC	14 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	160
DC17	(1)	2"	SCH40 PVC	16 AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	THWN-2	210
DC18	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	480
DC19	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	630
DC20	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	600
DC21	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	665
DC22	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	800
DC23	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #4	THWN-2	1145
DC24	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	925
DC25	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #4	THWN-2	1065
DC26	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	875
DC27	(1)	2"	SCH40 PVC	2 250 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	830
DC28	(1)	2"	SCH40 PVC	2 300 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #4	THWN-2	765
DC29	(1)	2"	SCH40 PVC	2 AWG #40	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	880
DC30	(1)	2"	SCH40 PVC	2 AWG #40	PV-WIRE	N/A	N/A	N/A	1	AWG #6	THWN-2	635
DC31	(1)	2"	SCH40 PVC	2 300 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #4	THWN-2	835
DC32	(1)	2"	SCH40 PVC	6 AWG #3	PV-WIRE	N/A	N/A	N/A	3	AWG #6	THWN-2	705
DC33	(1)	2"	SCH40 PVC	6 AWG #3	PV-WIRE	N/A	N/A	N/A	3	AWG #6	THWN-2	565
DC34	(1)	2"	SCH40 PVC	2 350 kcmil	PV-WIRE	N/A	N/A	N/A	1	AWG #3	THWN-2	1265
AC1	(1)	1-1/4"	SCH40 PVC	3 AWG #2	THWN-2	1	AWG #6	THWN-2	1	AWG #6	THWN-2	45
AC2	(1)	1-1/2"	SCH40 PVC	3 AWG #20	THWN-2	1	AWG #6	THWN-2	1	AWG #6	THWN-2	55
AC3	(1)	1-1/4"	SCH40 PVC	3 AWG #3	THWN-2	1	AWG #6	THWN-2	1	AWG #6	THWN-2	55
AC4	(6)	4"	SCH40 PVC	3 600 kcmil	THWN-2	1	350 KCMIL	THWN-2	1	350 KCMIL	THWN-2	25
AC5	(1)	2-1/2"	SCH40 PVC	3 AWG #2	MV-90	0	N/A	N/A	1	AWG #8	THWN-2	300

CONDUIT FILL CALCULATIONS																								
CONDUIT TAG	CONDUCTOR AREA (SQ IN)	CONDUCTOR R QTY	CONDUCTOR FILL (SQ IN)	NEUTRAL L AREA (SQ IN)	NEUTRAL QTY	NEUTRAL FILL (SQ IN)	GROUND AREA (SQ IN)	GROUND QTY	GROUND FILL (SQ IN)	TOTAL WIRE FILL	CONDUIT TYPE	CONDUIT SIZE	CONDUIT AREA (SQ IN)	MAX CONDUIT FILL	CONDUIT FILL PERCENT									
DC1.1	0.0531	x	N/A	=	N/A	N/A	x	0	=	0.0000	0.0206	x	1	=	0.0206	N/A	N/A	N/A	N/A	x	4	=	N/A	N/A
DC1.2	0.0531	x	N/A	=	N/A	N/A	x	0	=	0.0000	0.0206	x	1	=	0.0206	N/A	N/A	N/A	N/A	x	4	=	N/A	N/A
DC1.3	0.0531	x	N/A	=	N/A	N/A	x	0	=	0.0000	0.0206	x	1	=	0.0206	N/A	N/A	N/A	N/A	x	4	=	N/A	N/A
DC2	0.0531	x	14	=	0.7433	N/A	x	0	=	0.0000	0.7644	SCH40 PVC	2"	3.291	x	4	=	1.3164	23.2%					
DC3	0.0531	x	8	=	0.4247	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.4458	SCH40 PVC	1-1/2"	1.986	x	4	=	0.7944	22.4%
DC4	0.0531	x	4	=	0.2124	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.2335	SCH40 PVC	1"	0.832	x	4	=	0.3328	26.1%
DC5	0.0531	x	14	=	0.7433	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.7644	SCH40 PVC	2"	3.291	x	4	=	1.3164	23.2%
DC6	0.0531	x	2	=	0.1062	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.1273	SCH40 PVC	1"	0.832	x	4	=	0.3328	15.3%
DC7	0.0531	x	10	=	0.5309	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.5520	SCH40 PVC	1-1/2"	1.986	x	4	=	0.7944	27.8%
DC8	0.0531	x	8	=	0.4247	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.4458	SCH40 PVC	1-1/2"	1.986	x	4	=	0.7944	22.4%
DC9	0.0531	x	2	=	0.1062	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.1273	SCH40 PVC	1"	0.832	x	4	=	0.3328	15.3%
DC10	0.0531	x	10	=	0.5309	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.5520	SCH40 PVC	1-1/2"	1.986	x	4	=	0.7944	27.8%
DC11	0.0531	x	14	=	0.7433	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.7644	SCH40 PVC	2"	3.291	x	4	=	1.3164	23.2%
DC12	0.0531	x	10	=	0.5309	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.5520	SCH40 PVC	1-1/2"	1.986	x	4	=	0.7944	27.8%
DC13	0.0531	x	10	=	0.5309	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.5520	SCH40 PVC	1-1/2"	1.986	x	4	=	0.7944	27.8%
DC14	0.0531	x	10	=	0.5309	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.5520	SCH40 PVC	1-1/2"	1.986	x	4	=	0.7944	27.8%
DC15	0.0531	x	16	=	0.8495	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.8706	SCH40 PVC	2"	3.291	x	4	=	1.3164	26.5%
DC16	0.0531	x	14	=	0.7433	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.7644	SCH40 PVC	2"	3.291	x	4	=	1.3164	23.2%
DC17	0.0531	x	16	=	0.8495	N/A	x	0	=	0.0000	0.0211	x	1	=	0.0211	0.8706	SCH40 PVC	2"	3.291	x	4	=	1.3164	26.5%
DC18	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC19	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC20	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC21	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC22	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC23	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0824	x	1	=	0.0824	1.0898	SCH40 PVC	2"	3.291	x	4	=	1.3164	33.1%
DC24	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC25	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0824	x	1	=	0.0824	1.0898	SCH40 PVC	2"	3.291	x	4	=	1.3164	33.1%
DC26	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC27	0.5037	x	2	=	1.0074	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	1.0581	SCH40 PVC	2"	3.291	x	4	=	1.3164	32.2%
DC28	0.5451	x	2	=	1.0902	N/A	x	0	=	0.0000	0.0824	x	1	=	0.0824	1.1726	SCH40 PVC	2"	3.291	x	4	=	1.3164	35.6%
DC29	0.4072	x	2	=	0.8143	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	0.8650	SCH40 PVC	2"	3.291	x	4	=	1.3164	26.3%
DC30	0.4072	x	2	=	0.8143	N/A	x	0	=	0.0000	0.0507	x	1	=	0.0507	0.8650	SCH40 PVC	2"	3.291	x	4	=	1.3164	26.3%
DC31	0.5451	x	2	=	1.0902	N/A	x	0	=	0.0000	0.0824	x	1	=	0.0824	1.1726	SCH40 PVC	2"	3.291	x	4	=	1.3164	35.6%
DC32	0.1412	x	6	=	0.8472	N/A	x	0	=	0.0000	0.0507	x	3	=	0.1521	0.9993	SCH40 PVC	2"	3.291	x	4	=	1.3164	30.4%
DC33	0.1412	x	6	=	0.8472	N/A	x	0	=	0.0000	0.0507	x	3	=	0.1521	0.9993	SCH40 PVC	2"	3.291	x	4	=	1.3164	30.4%
DC34	0.5806	x	2	=	1.1612	N/A	x	0	=	0.0000	0.0973	x	1	=	0.0973	1.2585	SCH40 PVC	2"	3.291	x	4	=	1.3164	38.2%
AC1	0.1158	x	3	=	0.3474	0.0507	x	1	=	0.0507	0.0507	x	1	=	0.0507	0.4488	SCH40 PVC	1-1/4"	1.453	x	4	=	0.5812	30.9%
AC2	0.2223	x	3	=	0.6669	0.0507	x																	



Project Number: 006371
Drawn By: AM
Checked By: RD

revisions

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
1/31/2024

stamp

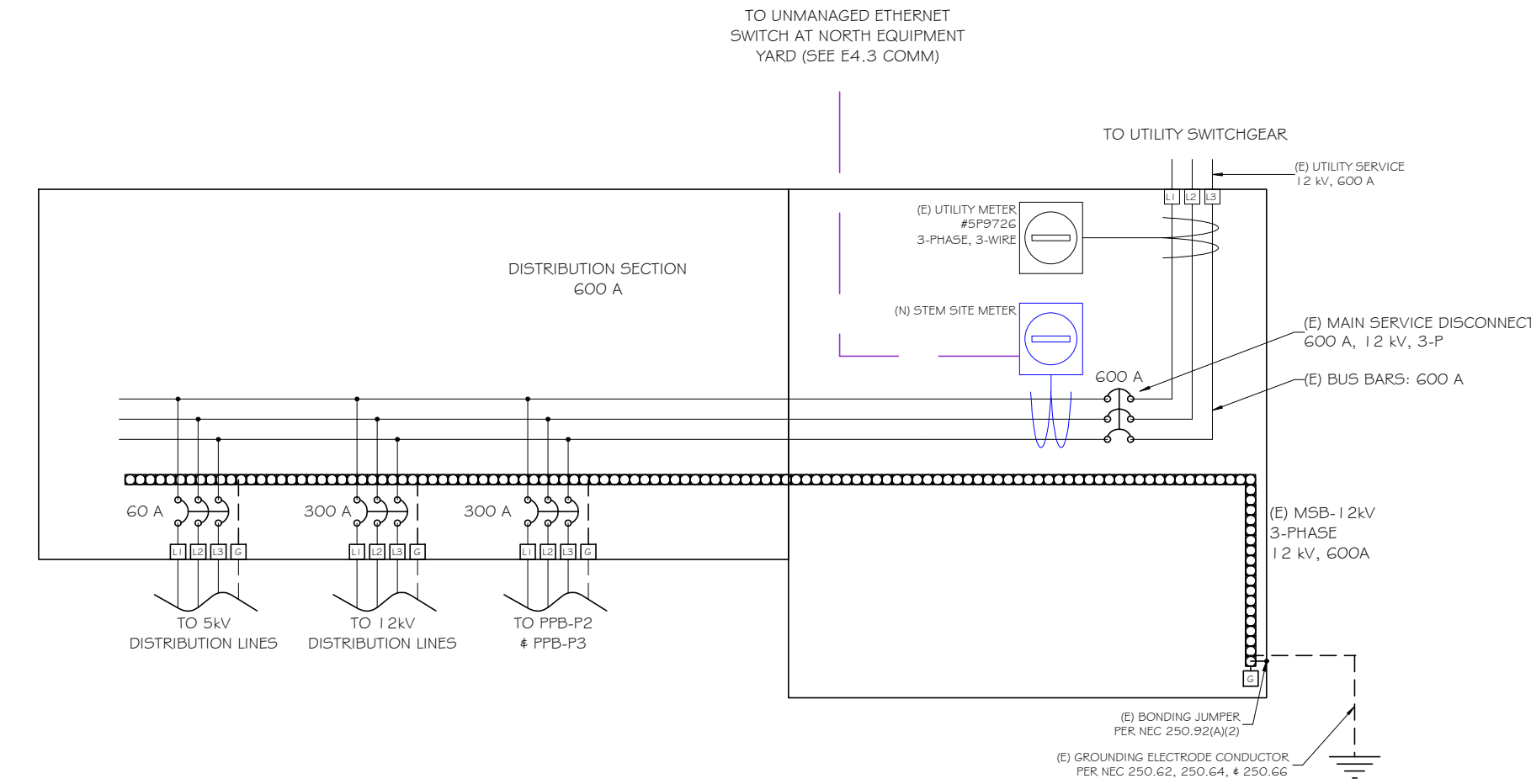
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MSB-1 2kV
ELEC. DIAGRAM

sheet number

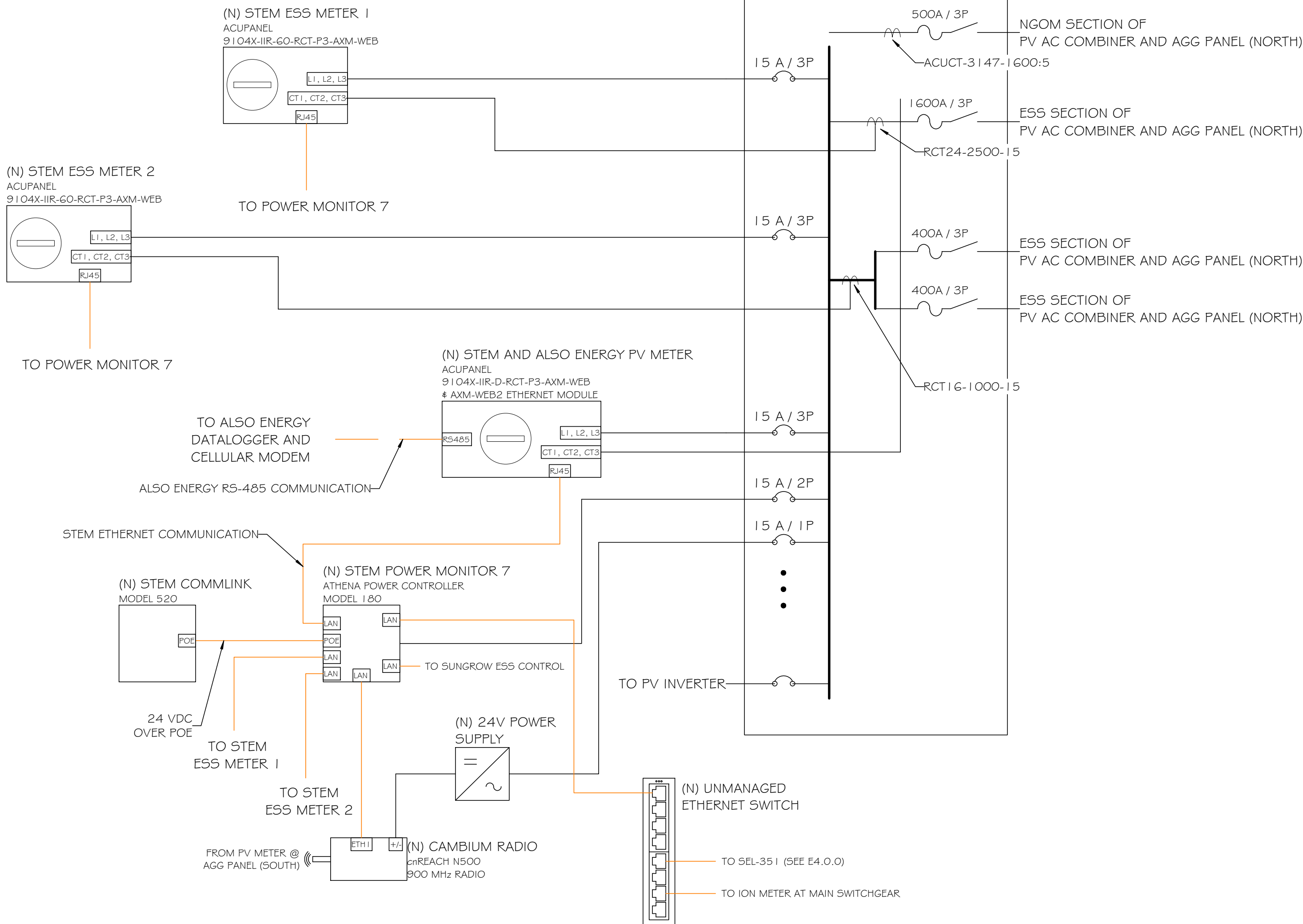
E4.2

plot date



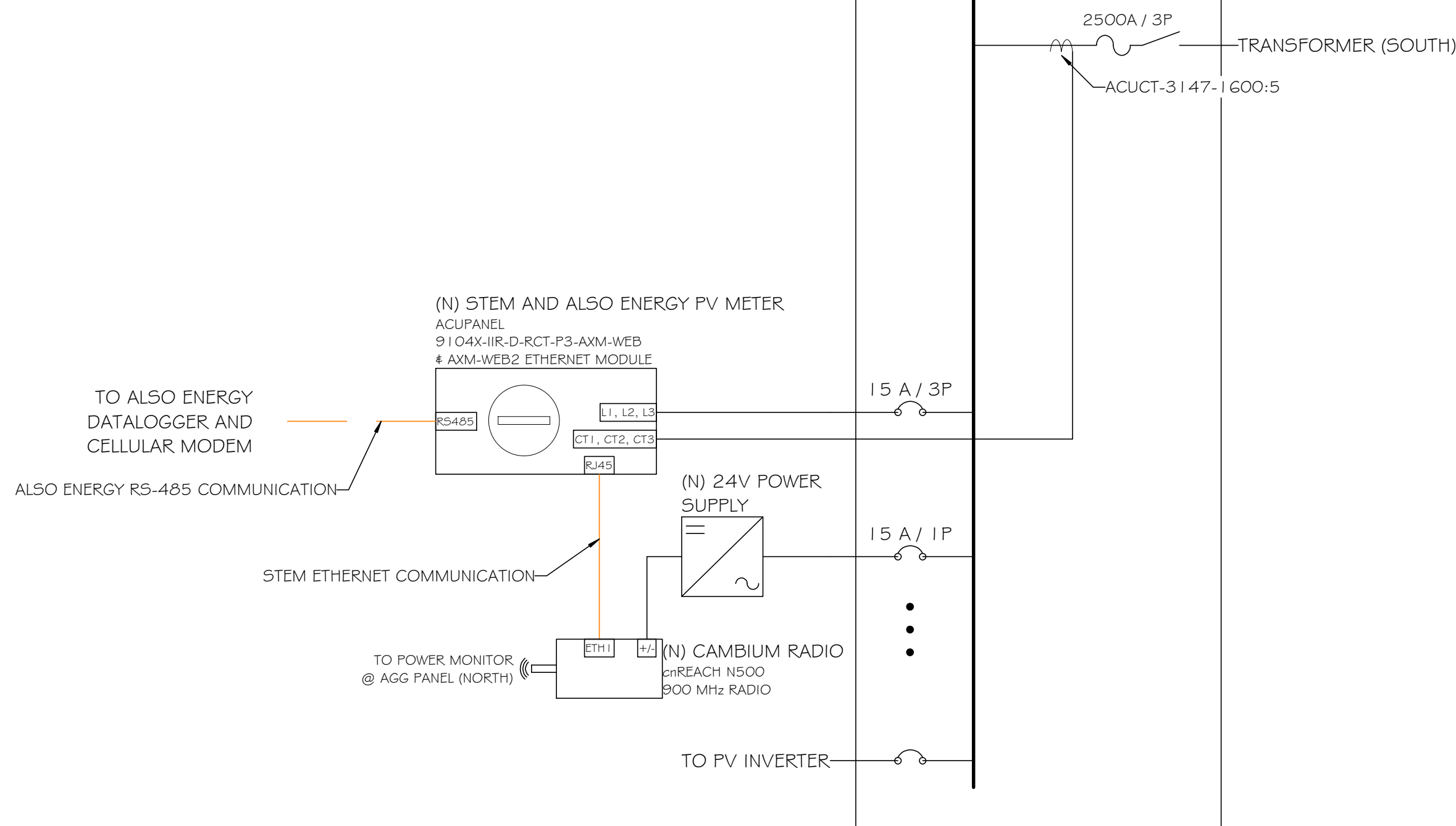
no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

(N) PV SECTION OF PV AC COMBINER AND AGG PANEL (NORTH)



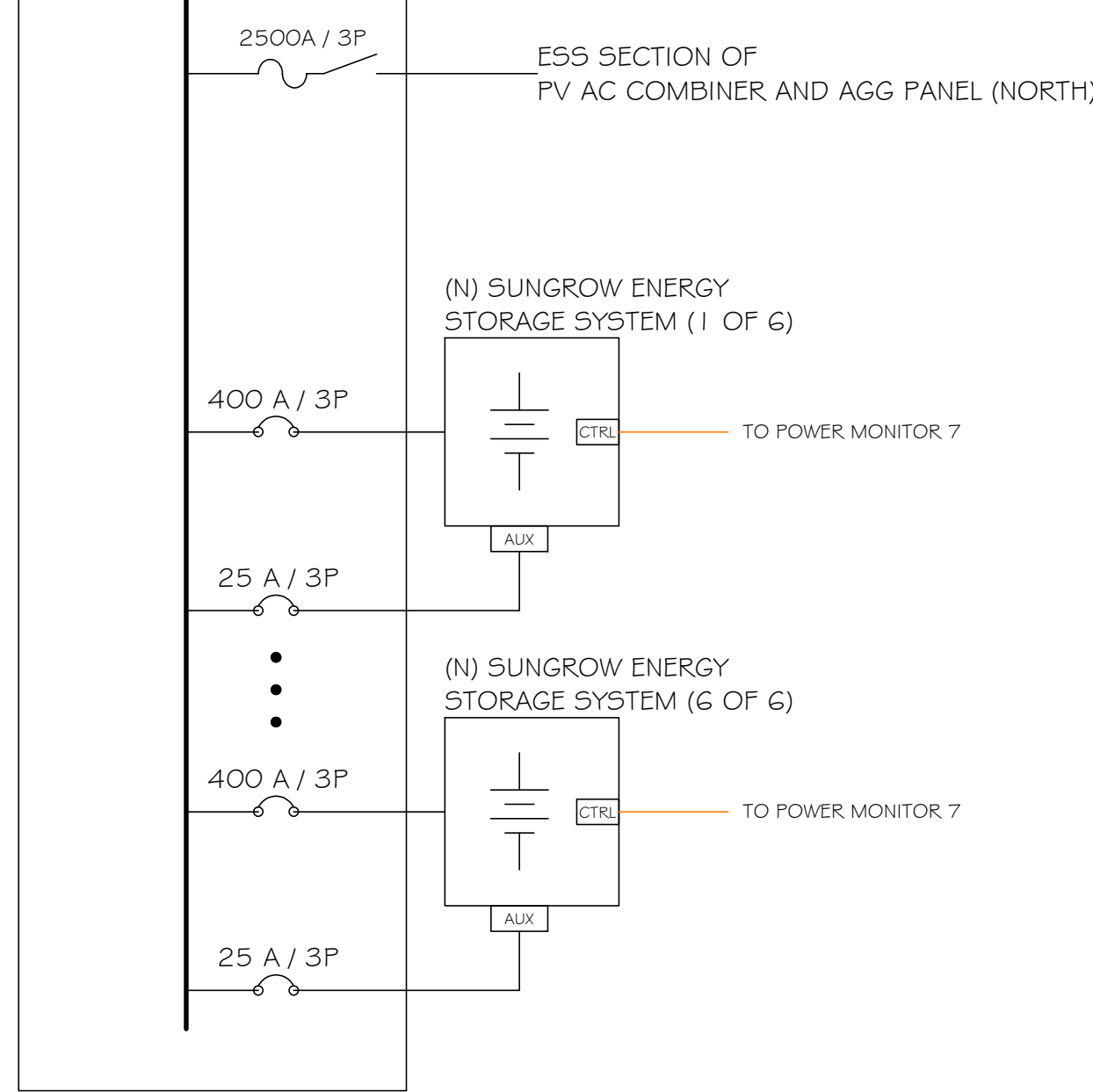
NORTH PV COMM DIAGRAM 1

(N) PV AC COMBINER PANEL (SOUTH)



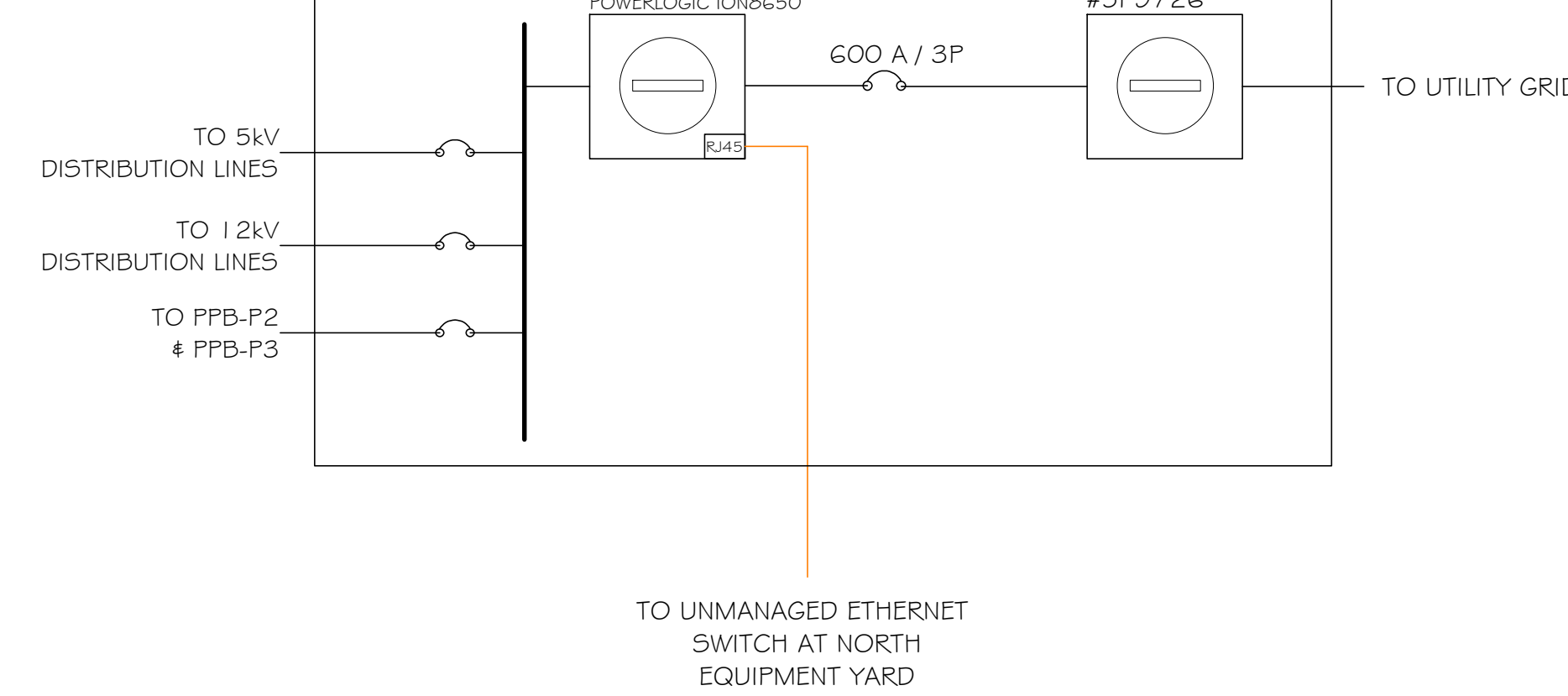
SOUTH PV COMM DIAGRAM 2

(N) ESS AC COMBINER PANEL



ESS COMM DIAGRAM 3

(E) MV SWITCHGEAR



MV SWITCHGEAR COMM DIAGRAM 4

Harvest the Sunshine



Mono 420W MBB Half-Cell Module

JAM72S10 400-420/MR

Introduction

Assembled with multi-junction PERC cells, the half-cell configuration of the modules offers the advantages of higher power output, better temperature-dependent performance, reduced shading effect on the energy generation, lower risk of hot spot, as well as enhanced tolerance for mechanical loading.

- Higher output power
- Lower LCOE
- Less shading and lower resistive loss
- Better mechanical loading tolerance

Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty

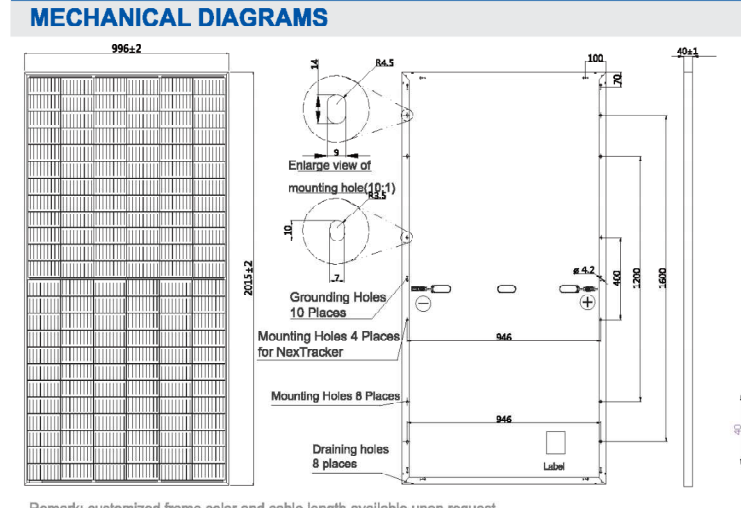
Comprehensive Certificates

- IEC 61215, IEC 61730
- ISO 9001:2015 Quality management systems
- ISO 14001:2015 Environmental management systems
- CHSAS 18001:2007 Occupational health and safety management systems
- IEC TS 62941:2016 Terrestrial photovoltaic (PV) modules - Guidelines for increased confidence in PV module design qualification and type approval

www.jasolar.com

JAM72S10 400-420/MR

MECHANICAL DIAGRAMS



SPECIFICATIONS

Cell	Mono
Weight	22.7kg±3%
Dimensions	2016±2mm×996±2mm×40±1mm
Cable Cross Section Size	4mm ²
No. of cells	144 (6×24)
Junction Box	IP68, 3 diodes
Connector	QC 4.1 (1000V) QC 4.1-30 (1000V)
Cable Length (Including Connector)	Portrait: 300mm±(J400mm)- Landscape: 1200mm±(J1200mm)-
Packaging Configuration	27 Per Pallet

ELECTRICAL PARAMETERS AT STC

TYPE	JAM72S10-400MR	JAM72S10-405MR	JAM72S10-410MR	JAM72S10-415MR	JAM72S10-420MR
Rated Maximum Power(P _{max}) [W]	400	405	410	415	420
Open Circuit Voltage(V _{oc}) [V]	49.58	49.86	50.12	50.41	50.70
Maximum Power Voltage(V _{mp}) [V]	41.33	41.80	41.88	42.18	42.47
Short Circuit Current(I _{sc}) [A]	10.33	10.39	10.45	10.51	10.56
Maximum Power Current(I _{mp}) [A]	9.68	9.74	9.79	9.84	9.89
Module Efficiency [%]	19.9	20.2	20.4	20.7	20.9
Power Tolerance	0~±5W				
Temperature Coefficient of Isc(α _{Isc})	+0.044%/°C				
Temperature Coefficient of Voc(α _{Voc})	-0.272%/°C				
Temperature Coefficient of Pmax(α _{Pmax})	-0.350%/°C				

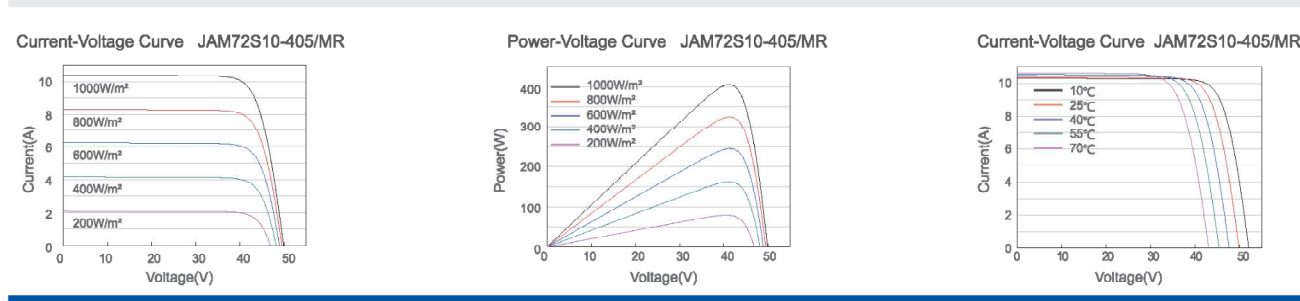
ELECTRICAL PARAMETERS AT NOCT

TYPE	JAM72S10-400MR	JAM72S10-405MR	JAM72S10-410MR	JAM72S10-415MR	JAM72S10-420MR
Rated Max Power(P _{max}) [W]	392	398	404	410	416
Open Circuit Voltage(V _{oc}) [V]	46.41	46.68	46.91	47.16	47.38
Max Power Voltage(V _{mp}) [V]	38.55	38.90	39.16	39.41	39.60
Short Circuit Current(I _{sc}) [A]	8.25	8.31	8.36	8.41	8.46
Max Power Current(I _{mp}) [A]	7.81	7.87	7.92	7.97	8.03

OPERATING CONDITIONS

Maximum System Voltage	1000V/1000V DC(IEC)
Operating Temperature	-40°C~+85°C
Maximum Series Fuse	20A
Maximum Static Load,Front ¹	5400Pa
Maximum Static Load,Back ²	2400Pa
NOCT	45±2°C
Safety Class	Class II

CHARACTERISTICS



Premium Cells, Premium Modules

100kW, 1500Vdc/480Vac String Inverters for North America



Key Features

- NFPA 70 and NEC compliant
- Touch-safe DC fuse holders adds convenience and safety
- CPS FlexOM Gateway enables remote firmware upgrades
- Integrated AC & DC disconnect switches
- 1 MPPT with 20 fused inputs for maximum flexibility
- Copper and Aluminum compatible AC connections
- NEMA Type 4X outdoor rated, tough tested enclosure
- Advanced Smart Grid features (CA Rule 21 certified)
- KVA headroom yields 100kW @ 0.95PF
- Generous DC/AC inverter load ratio
- Separable wire-box design for fast service
- Standard 5-year warranty with extensions to 20 years



100KTL Standard Wire-box | 100KTL Centralized Wire-box

CPS SCH100KTL-DOUS-480

DC Input

Max. DC input voltage	1500Vdc
Operating DC input voltage range	750-1450Vdc
Start-up DC input voltage / power	900Vdc / 200W
Number of MPP trackers	1
MPPT voltage range @ PF=0.99 ¹	760-1300Vdc
Max. PV input current (I _{sc} x1.25)	27.5A

DC Output

Rated AC output power @ PF=0.99	100kW
Max. AC apparent power ²	100KVA (105.3KVA @ PF=0.95)
Rated output voltage	480Vdc
Output voltage range ³	424-528Vdc
Grid connection type ⁴	3-Phase / PE / N (neutral optional)
Max. AC output current @ 480Vdc	120.3A / 126.7A
Rated output frequency	60Hz
Output frequency range ⁵	57-63Hz
Power factor	>0.99 (±0.8 adjustable)
Current THD @ rated load	<3%
Max. fault current contribution (1 cycle RMS)	41.4kA
Max. OCPD rating	200A
AC disconnection type	Load-rated AC switch
AC surge protection	Type II MOV (with indicator/remote signaling), Up-2.5kV, In=20kA (8/20µs)

System and Performance

Topology	Transformerless
Max. efficiency	98.9%
CEC efficiency	98.0%
Stand-by / night consumption	<4W

Environment

Enclosure protection degree	NEMA Type 4X
Cooling method	Variable speed-cooling fans
Operating temperature range	-22°F to +140°F / -30°C to +60°C (derating from +108°F / +42°C)
Non-operating temperature range ⁶	No low temperature to +158°F / +70°C maximum
Operating humidity	0-100%
Operating altitude	8202ft / 2500m (no derating)
Audible noise	<65dBA @ 1m and 25°C

Display and Communication

User interface and display	LED indicators, WiFi + APP
Inverter monitoring	Modbus RS485
Site level monitoring	CPS FlexOM Gateway (1 per 32 inverters)
Modbus data mapping	SanSpec / CPS
Remote diagnostics / firmware upgrade functions	Standard / (with FlexOM Gateway)

Mechanical

Dimensions (W x H x D)	45.28 x 24.25 x 9.84in (1150 x 616 x 250mm) with Standard Wire-box 39.37x24.25x9.84in (1000x616x250mm) with Centralized Wire-box
Weight	Inverter: 121 lbs / 55kg; Wire-box: 5 lbs / 2.3kg (Standard Wire-box); 3 lbs / 1.5kg (Centralized Wire-box)
Mounting / installation angle	15-90 degrees from horizontal (vertical or angled)
AC termination	M10 stud type terminal (30) (wire range: 1.0AWG - 500kcmil CU/AL, lugs not supplied) Screw clamp terminal block (N) (#12 - 1.0AWG CU/AL)
DC termination	Screw clamp fuse holder (wire range: #12 - #6AWG CU) with Standard Wire-box Busbar, M10 bolts (wire range: #1AWG - 500kcmil CU/AL, 1 termination per pole), #1AWG - 300kcmil CU/AL (2 terminations per pole), lugs not supplied; with Centralized Wire-box 20A fuses provided (fuse values up to 30A acceptable)
Fused string inputs	20A fuses provided (fuse values up to 30A acceptable)
Safety	UL1741-SA/SB Ed. 3, CSA-22.2 NO.107-1-01, IEEE1547-2018, FCC PART15 IEE 1547a-2014, IEE 1547-2018 ⁷ , CA Rule 21, ISO-NE, HECO Rule 14H
Smart-grid features	Volt-Ride Thru, Freq-Ride Thru, Ramp-Rate, Specified-PF, Volt-VAR, Freq-Watt, Volt-Watt
Warranty	Standard: 5 years 10, 15, and 20 Years
Extended terms	1) See user manual for information regarding MPPT voltage range when operating at non-unity PF. 2) Max. AC apparent power rating valid within MPPT voltage range and temperature range of 0°C to +40°C (-22°F to +104°F). 3) The "output voltage range" and "output frequency range" may differ according to the specific grid standard. 4) Wire material provided. Data may not be correct or updated. 5) See user manual for further requirements regarding non-operating conditions. 6) Firmware version 1.2.0 or later required.

50/60kW, 1000Vdc String Inverters for North America



Key Features

- NEC 2017/2020 PVRS certified for rapid shutdown
- 55 & 66kVA rating allows max rated active power @0.91PF
- Selectable max AC apparent power of 50/55kVA and 60/66kVA
- NEC-compliant & UL listed Arc-Fault circuit protection
- 15-90° Mounting orientation for low profile roof installs
- Optional FlexOM Gateway enables remote firmware upgrades
- Integrated AC & DC disconnect switches
- 3 MPPTs with 5 inputs each for maximum flexibility
- NFMA Type 4X outdoor rated enclosure
- UL 1741-SA certified to CA Rule 21, including SA8-SA18
- UL 1741-SB and IEEE 1547-2018 certified
- Separable wire-box design for fast service
- Standard 10-year warranty with extensions up to 20 years



50/60KTL Standard Wire-box | 50/60KTL Rapid Shutdown Wire-box

Tigo | APsmart

CPS SCA50KTL-DOUS-480 | CPS SCA60KTL-DOUS-480

DC Input

Max. PV power	90kW (30kW per MPPT)
Max. DC input voltage	1000Vdc
Operating DC input voltage range	200-850Vdc
Start-up DC input voltage / power	330V / 80W
Number of MPP trackers	3
MPPT voltage range @ PF=0.99	400-850Vdc
Max. PV short-circuit current (I _{sc} x 1.25)	204A (68A per MPPT)
Number of DC inputs	15 inputs, 5 per MPPT
DC disconnection type	Load-rated DC switch
DC surge protection	Type II MOV, 1240V _c , 15kA _I (8/20µs)

AC Output

Rated AC output power @ PF=0.99 to 0.91 ¹	50kW	60kW
Max. AC apparent power (selectable)	50/55kVA	60/66kVA
Rated output voltage	480Vdc	
Output voltage range ²	422-528Vdc	
Grid connection type	3Φ / PE / N (neutral optional)	
Max. AC output current @ 480Vdc	60.2/66.2A	72.2/79.4A
Rated output frequency	60Hz	
Output frequency range ³	57-63Hz	
Power factor	>0.99 (±0.8 adjustable)	
Current THD @ rated load	<3%	
Max. fault current contribution (1 cycle RMS)	64.1A (1.06x I _{sc} PU)	125A
Max. OCPD rating	110A	125A
AC disconnection type	Load-break rated AC switch	
AC surge protection	Type II MOV, 1240V _c , 15kA _I (8/20µs)	

System and Performance

Topology	Transformerless
Max. efficiency	98.9%
CEC efficiency	98.5%
Stand-by / night consumption	<1W

Environment

Enclosure protection degree	NEMA Type 4X
Cooling method	Variable speed cooling fans
Operating temperature range ⁴	-22°F to +140°F / -30°C to +60°C
Non-operating temperature range ⁶	No low temp minimum to +158°F / +70°C maximum
Operating humidity	0 to 100%
Operating altitude	13,123.4ft / 4000m (derating from 9842.5ft / 3000m)
Audible noise	<60dBA @ 1m and 25°C

Display and Communication

User interface and display	LCD + LED
Inverter monitoring	SanSpec, Modbus RS485
Site level monitoring	CPS FlexOM Gateway (1 per 32 inverters)
Modbus data mapping	CPS
Remote diagnostics / firmware upgrade functions	Standard / (with FlexOM Gateway)

Mechanical

Dimensions (H x W x D)	39.4 x 23.6 x 10.24in (1000 x 600 x 260mm)
Weight	Inverter: 123.5lbs/56kg; Wire-box: 33lbs/15kg
Mounting / installation angle ⁵	15 to 90 degrees from horizontal (vertical or angled)
AC termination	M8 stud type terminal block (wire range: #6 - 30AWG CU/AL; lugs not supplied)
DC termination ⁶	Screw clamp, neg. busbar (RSD version ⁷), wire range #14 - #6AWG CU
Fused string inputs (5 per MPPT) ⁷	RSD ⁸ and Standard Wire-box: 20A fuses provided (fuse values up to 30A acceptable)
Safety	UL1741-SA/SB Ed. 3, UL 16998, CSA-C22.2 NO.107-1-01, IEEE1547-2018, FCC PART15
Certifications and standards	Selectable grid standard
Smart-grid features	Volt-Ride Thru, Freq-Ride Thru, Ramp-Rate, Specified-PF, Volt-VAR, Freq-Watt, Volt-Watt
Warranty	Standard: 10 years Extended terms: 15 and 20 years

1) Active power derating begins at PF=0.91 to 0.9 when max AC apparent power is set to 55 or 66kVA.
2) The "output voltage range" and "output frequency range" may differ according to the specific grid standard.
3) Active power derating begins at 40°C when PF=0.9 and MPPT active, and at 50°C when PF=1 and MPPT V = 700Vdc.
4) See user manual for further requirements regarding non-operating conditions.
5) Mounting angle requires required installation angle of 15 degrees or less.
6) RSD wire-box only includes fuseholders on the positive polarity, compliant with NEC 2017/2020.
7) Fuse values above 20A have additional spacing requirements or require the use of the "Central Terminal Block, See user manual for details.
8) Firmware version 1.7 or later required.

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

100% Package
1/31/2024

EQUIPMENT
DATA SHEETS

D.I.O

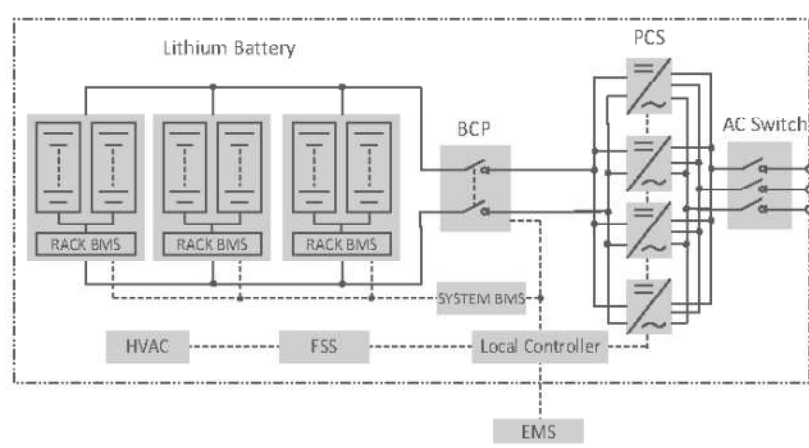


ST556KWH-250UD



- HIGH INTEGRATION**
- Highly integrated ESS with outdoor cabinet design provides high protection class
 - Advanced integration technology ensures optimal system performance and lower cost
- EFFICIENT AND FLEXIBLE**
- Top-mounted HVAC and cell-level temperature control ensures longer battery life cycle
 - Modular design supports parallel connection and easy system expansion
- SAFE AND RELIABLE**
- DC electric circuit safety management includes fast breaking and anti-arc protection
 - Multi-state monitoring and linkage actions ensure battery system safety
- SMART AND FRIENDLY**
- Integrated local controller enables single point of communication interface
 - Fast state monitoring and faults record enables pre-alarm and faults location

CIRCUIT DIAGRAM



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System Type	ST556KWH-250UD
Battery Data	
Cell type	Samsung SDI Mega E3, 3.68 V / 100 Ah
Configuration of system	2S26P
Battery capacity (RCL)	556 kWh
Battery voltage range	806 ~ 1045 V
BMS communication interfaces	RS485, Ethernet
BMS communication protocols	Modbus RTU, Modbus TCP
AC Data	
Nominal AC power	250 kW
Max. AC power	264 kW
Max. THD of current	< 3% (at nominal power)
DC component	< 0.5% (at nominal power)
Nominal grid voltage	480 V
Grid voltage range	432 ~ 528 V
Power factor	> 0.99 (at nominal power)
Adjustable power factor	1 leading ~ 1 lagging
Nominal grid frequency	60 Hz
Grid frequency range	55 ~ 65 Hz
Isolation method	Transformerless
Nominal output voltage of off-grid	480 V
Max. THD of off-grid output voltage	< 3% (linear load)
General Data	
Dimensions (W*H*D)	4,600*2,400*1,000 mm / 181.1*94.5*39.4"
Weight (with / without battery)	5.7 T / 2.6 T 12,566 lbs / 5,871 lbs
Degree of protection	IP54 / NEMA 3R
Operating temperature range	-30 to 50 °C / -22 to 122 °F (> 45 °C / 113 °F derating)
Relative humidity	0 ~ 95% (non-condensing)
Max. working altitude	3,000 m / 9,842 ft
Cooling concept of battery chamber	Heating, Ventilation and Air Conditioning
Cooling concept of PCS chamber	Temperature controlled forced air cooling
Fire suppression system of battery unit	FM200 extinguishment system
Communication interfaces	RS485, Ethernet
Communication protocols	Modbus RTU, Modbus TCP, IEC 104
Certificates	UL964G, UL964DA, UL973, UL1741-SA, IEEE 1547

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1000VDC Disconnect Combiners



SolarBOS Disconnect Combiners take multiple source circuits and combine them in a single output. Each combiner has an integrated load-break switch. This allows system integrators to greatly simplify the installation of a PV system. All SolarBOS Disconnect Combiners are ETL listed to UL-1741 for 600 VDC and 1000 VDC photovoltaic systems.

SPECIFICATIONS

- ETL listed to UL-1741
- 10kAIC rating
- Up to 36 input circuits
- 200, 250, 320, and 400 amp integrated disconnects
- 75/90C output terminals
- Touch-safe fuse holders
- Cover doors with poured-in-place seamless gaskets
- NEMA-3R, 4 & 4X rated enclosure options

AVAILABLE OPTIONS

- Transient surge suppression
- Provisions for compression output lugs
- Dual output lugs
- Floating and bi-polar configurations
- NEC 2017 compliant configurations
- Pre-terminated input conductors
- Lexan deadfront cover
- Breather and drain vents



SolarBOS Disconnect Combiner, 1000VDC, 250A disconnect switch, 18 input circuits, dual output lugs, NEMA-4 powder coated steel enclosure



Disconnect Ampacity	200 Amps	250 Amps	320 Amp	400 Amps
Number of Input Circuits	8 to 20	12 to 24	12 to 28	12 to 36
Input Conductor Size (AWG)	#14-8	#14-8	#14-8	#14-8
Max Fuse Size (Amps)	30	30	30	30
Max Rated Current (ADC Continuous)	200	250	320	400
Number of Output Conductors	1 or 2	1 or 2	1 or 2	1 or 2
Output Conductor Size Range (AWG) *	#6 to 350	#6 to 350	#2 to 600	#2 to 600
Steel Enclosure Dimensions (Inches) *	20x20x6 / 24x24x8	24x24x8	24x24x8 / 30x24x8	24x24x8 / 30x24x8 / 30x30x8
Approx. Weight - Powder Coated or Stainless Steel (Pounds) *	50	55	55	55
Fiberglass Enclosure Internal Dimensions (Inches) *	24x20x8 / 24x24x8	24x24x8	24x24x8 / 30x24x8	24x24x8 / 30x24x8 / 30x30x8
Approx. Weight - Fiberglass (Pounds) *	33	38	45	65
Enclosure NEMA Ratings	3R / 4 / 4X	3R / 4 / 4X	3R / 4 / 4X	3R / 4 / 4X

* Other options available upon request. Please note dimensions and weight may vary for any custom solutions. Contact SolarBOS for details.

SolarBOS, Inc. | T: 925-456-7744 | sales@solarbos.com | www.solarbos.com

1500 VDC Disconnect Combiners



SolarBOS Disconnect Combiners for 1500 VDC photovoltaic systems are ETL listed to UL-1741. They provide direct cost savings by increasing the number of modules per source circuit(s), resulting in fewer circuits and fewer BOS components. The combiners feature load break disconnect switches up to 400A and can be customized to fit the solar integrators' specific needs.

PRODUCT FEATURES

- ETL listed to UL-1741
- 10kAIC rating
- Up to 36 input circuits
- 90C terminals
- NEMA-3R, 4 & 4X enclosures

AVAILABLE OPTIONS

- Transient surge suppression
- Provisions for compression lugs
- Dual output lugs
- Floating / Bi-polar configurations
- Pre-terminated input conductors
- Touch safe cover over live parts
- Breather and drain vents
- Padlockable enclosures



SolarBOS Floating Disconnect Combiner, 1500VDC, 275A disconnect, 15 input circuits, transient surge protection, NEMA-4X fiberglass enclosure



Disconnect Ampacity	275 A / 320 A / 400 A		
Maximum Number of Input Circuits	18	28	36
Input Conductor Size (AWG)	#14-8	#14-8	#14-8
Max Fuse Size (Amps)	32	32	32
Max Rated Current (ADC Continuous)	275 / 320 / 400		
Number of Output Conductors (Per Polarity)	1 or 2		1 or 2
Output Conductor Size Range (AWG) *	#6 to 350	#2 to 600	#2 to 600
Steel Enclosure Internal Dimensions (Inches) *	24x24x8	30x24x8	30x30x8
Approx. Weight - Powder Coated or Stainless Steel (Pounds) *	55	65	95
Fiberglass Enclosure Internal Dimensions (Inches) *	24x24x8	30x24x8	30x30x8
Approx. Weight - Fiberglass (Pounds) *	50	60	90
Enclosure NEMA Ratings	3R / 4 / 4X	3R / 4 / 4X	3R / 4 / 4X

* Other options available upon request. Please note dimensions and weight may vary for any custom solutions. Contact SolarBOS for details.

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SEL-351-5, -6, -7 Protection System

Optimize Protection, Automation, and Breaker Control



SEL-351 Protection System shown with front-panel USB port and SafeLock® trip/close pushbuttons with high-visibility breaker status LEDs.

Key Features and Benefits

The SEL-351 Protection System provides an exceptional package of protection, monitoring, control, and fault locating features.

Protection Functions

- Second-harmonic blocking secures relay during transformer energization.
- High-speed breaker failure element and native breaker failure logic enhance breaker failure detection.
- Phase, negative-sequence, residual-ground, and neutral-ground overcurrent elements with directional control optimize radial and looped network protection for lines and equipment. Load-encroachment logic provides additional security to distinguish between heavy load and three-phase faults.
- Under- and overfrequency and under- and overvoltage elements and powerful SEL logic® control equations help implement load shedding and other control schemes.
- Built-in communications-assisted trip scheme logic permits fast trip times, reducing fault duration that adversely impacts system loads and power system equipment.
- SEL logic control equations permit custom programming for traditional and unique protection and control functions.
- Directional power elements on SEL-351-7.
- Four levels of rate-of-change-of-frequency elements help detect rapid frequency changes to initiate load shedding or network decoupling.

Schweitzer Engineering Laboratories, Inc. SEL-351-5, -6, -7 Data Sheet

2

Automatic Reclosing and Synchronism Check

- Program as many as four shots of automatic reclosing with two selectable reclose formats.
- Control reclosing schemes for trip saving or fuse saving, and inhibit reclosing for hot-line maintenance.
- Supervise manual or automatic reclosing with synchronism check and voltage condition logic.

Synchrophasors

- Improve operator awareness of system conditions with standard IEEE C37.118-2005 Level 1 synchrophasors at as many as 60 messages per second.
- Synchronize 128 sample-per-cycle oscillography and event reports to the microsecond to reconstruct complex disturbances. Synchronize meter reports to verify proper phasing.
- Use the "MRI of the power system" to replace state estimation with state measurement.

Metering and Monitoring

- Eliminate expensive, separately mounted metering devices with built-in, high-accuracy metering and harmonic metering functions: Load Profile recording on SEL-351-6 and SEL-351-7.
- Improve maintenance scheduling using circuit breaker contact wear monitor and substation battery voltage monitors. Record relay and external trips and total interrupted current for each pole.
- Use alarm elements to inhibit reclosing and provide local and remote alarm indication.
- Analyze oscillographic and Sequential Events Recorder (SER) reports for rapid commissioning, testing, and post-fault diagnostics.
- Use unsolicited SER protocol to allow station-wide collection of binary SER messages with original time stamp for easy chronological analysis.
- Synchronize all reports with IRIG-B on the standard rear-panel BNC or on serial Port 2, from Simple Network Time Protocol (SNTP) on the standard or optional Ethernet connections, or via DNP serial or Ethernet protocols. Connect all possible time sources and the relay automatically selects the best.
- Use Voltage Sag, Swell, and Interrupt (VSSI) for power quality monitoring on SEL-351-7.

Fault Locator

- Reduce fault location and repair time with built-in impedance-based fault locator and faulted phase indication.
- Efficiently dispatch line crews to quickly isolate line problems and restore service faster.

Operator Interface and Controls

- Standard target LEDs announce trip and status indication and fault type.
- Two-line, large font rotating LCD display provides added operator information with programmable display points.
- Optional SafeLock trip/close pushbuttons with high-visibility breaker status LEDs eliminate expensive panel-mounted breaker control switches and position indicating lights. The breaker status LED clusters are bright and easy to see from all viewing angles.

Communications Protocols

- Optional IEC 61850 MMS and GOOSE. As many as 6 MMS sessions, guaranteed GOOSE performance with 24 subscriptions and 8 publications.
- Standard Modbus with label-based map settings (serial and Ethernet)—as many as three sessions.
- Standard DNP3 Level 2 with label-based map settings (serial and Ethernet)—as many as six sessions.
- IEEE C37.118-2005 Synchrophasor Protocol (serial and Ethernet).

Schweitzer Engineering Laboratories, Inc. SEL-351-5, -6, -7 Data Sheet

3

- ASCII, SEL Fast Meter, SEL Fast Message, SEL Unsolicited SER, SEL Fast Operate, and SEL Distributed Port Switch (LMD) serial protocols are all standard.
- Standard Telnet and integrated web server on Ethernet.
- Dual-channel MIRRORED BITS® communications on SEL-351-6 and SEL-351-7.
- Parallel redundancy protocol (when supported by hardware).

Communications Hardware

- Two 10/100BASE-T Ethernet ports with RJ45 connector included.
- One or two 10/100BASE-FX Ethernet ports with LC multimode fiber-optic connectors optional.
- One 10/100BASE-T Ethernet port and one 10/100BASE-FX Ethernet port with LC multimode fiber-optic connectors optional.
- Front-panel high-speed USB Type-B port included.
- Front-panel EIA-232 DB-9 serial port included.
- Two rear-panel EIA-232 DB-9 ports included.
- One optional rear-panel EIA-485 port with five-position compression terminal block.
- One optional SEL-2812-compatible fiber-optic serial port.

Single-Phase or Three-Phase Wye- or Delta-Connected Voltage Inputs

- Settings allow either single-phase or three-phase wye or three-phase delta voltage inputs.
- Single-phase voltage input permits phantom phase voltage for balanced three-phase metering and other limited voltage-dependent functions.
- The VS voltage input can be used for either synchronism-check or broken-delta (zero-sequence) voltage connection to the relay.

Other Features and Options

Model	Complete Protection and Control Functions With ACCELERATOR QuickSet Support	Load Profile and MIRRORED BITS Communications	Voltage Sag, Swell, Interruption Reports	Power Elements
SEL-351-5	x			
SEL-351-6	x	x		
SEL-351-7	x	x	x	x

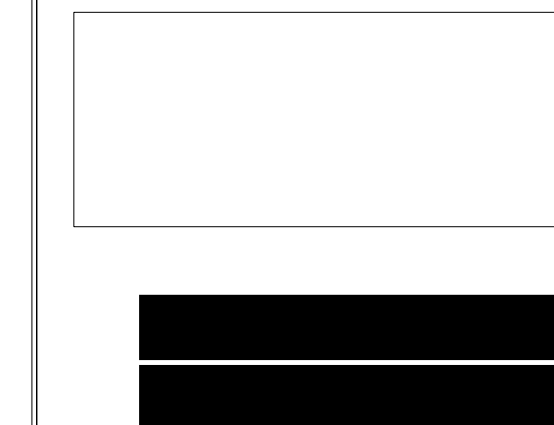
- Available 750 KB of on-board storage space for ACCELERATOR QuickSet® SEL-5030 Software settings file, QuickSet Design Template, or anything else you choose.
- Expanded I/O is available. Order any one of the following I/O options:
 - Option X: No extra I/O board
 - Option 2: Additional 8 Inputs and 12 Standard Outputs
 - Option 4: Additional 16 Inputs and 4 Standard Outputs
 - Option 6: Additional 8 Inputs and 12 High Interrupting Current Outputs
- Nominal 5 A or 1 A current inputs: 5 A phase, 5 A neutral; 5 A phase, 1 A neutral; 1 A phase, 1 A neutral; 0.05 A neutral for nondirectional sensitive earth fault (SEF) protection; or 0.2 A neutral for directional ground protection on low-impedance grounded, ungrounded, high-impedance grounded, and Petersen Coil grounded systems.

NOTE: The 0.2 A nominal channel can also provide nondirectional SEF protection. The 0.05 A nominal neutral channel (N) option is a legacy nondirectional SEF option.

Schweitzer Engineering Laboratories, Inc. SEL-351-5, -6, -7 Data Sheet

05a

client



Project Name & Location



Design & Management



Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

revisions

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
 1/31/2024

stamp

sheet name

EQUIPMENT DATA SHEETS

sheet number

D1.1

plot date

AcuPanel 9104/9104X

Pre-Wired Power & Energy Panel Meter Datasheet



DESCRIPTION

The AcuPanel 9104/9104X is a convenient, pre-configured meter enclosure that delivers streamlined meter deployment in OEM or retrofit projects. It is ideal for when installation inside an electrical distribution panel is unavailable, in harsh environments to safeguard instrumentation against the elements, or to limit the time and complexity of installation. Each AcuPanel undergoes rigorous quality testing to ensure years of dependable service.

FEATURES

- Choose from a NEMA 3 rated industrial steel enclosure or NEMA 4X rated polycarbonate enclosure suitable for both indoor and outdoor use
- The lockable, plug-and-play housing provides protection against unwanted tampering and the elements
- Clean, factory pre-wiring for fast, reliable installation. All necessary fuses, shorting blocks, & terminal blocks are pre-installed and labeled.
- Self-powered panel does not require a separate power supply
- Wires can be run through pluggable, pre-cut holes
- Simple grounding is included inside each enclosure
- No control transformer needed
- Compatible with the Acuvim II Series, Acuvim IIBN, Acuvim L, and EV300 meters

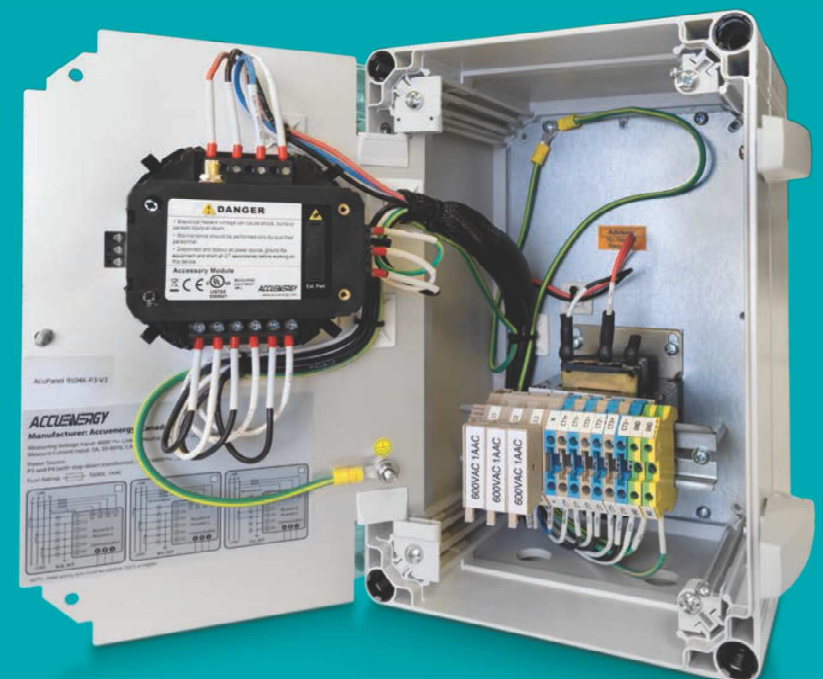
ACUPANEL SPECIFICATIONS

	AcuPanel 9104X	AcuPanel 9104
Compatible Meters	Acuvim II, Acuvim IIBN, Acuvim L, EV300	Acuvim II, Acuvim IIBN, Acuvim L, EV300
Application	Indoor or outdoor installations that require exceptional environmental protection and weather resistance	Indoor installations that require rugged protection, but not weather resistance
Safety Certifications	UL508A, UL61010-1	UL508A, UL61010-1
NEMA Rating	NEMA 4X	NEMA 3 [†]
Material	Polycarbonate	Steel
Anti-Corrosive	•	•
Dust Proof	•	•
Suitable for Indoor Use	•	•
Suitable for Outdoor Use	•	•
Pre-Wired	•	•
Pre-Configured	•	•

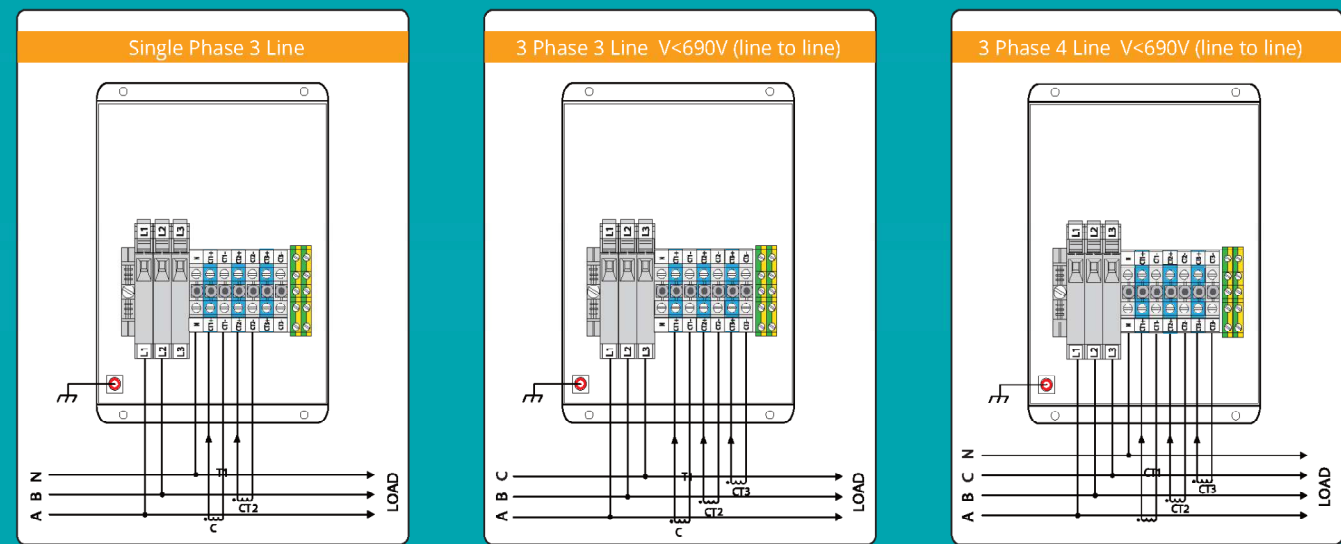
[†] AcuPanel 9104 is NEMA 3 by default. To increase the rating to NEMA 4, add the 96-IP66 protective cover.

EACH STANDARD, PRE-WIRED ENCLOSURE INCLUDES:

- Terminal blocks for current transformer input
- Shorting blocks for current transformers
- Terminal blocks for voltage inputs
- Three industrial-grade fuses

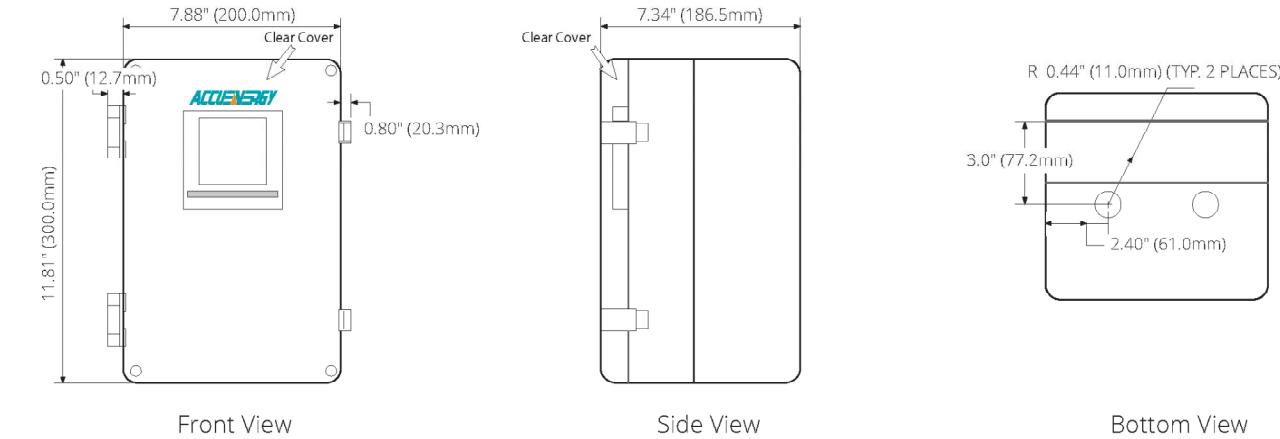


WIRING DIAGRAMS 9104/9104X

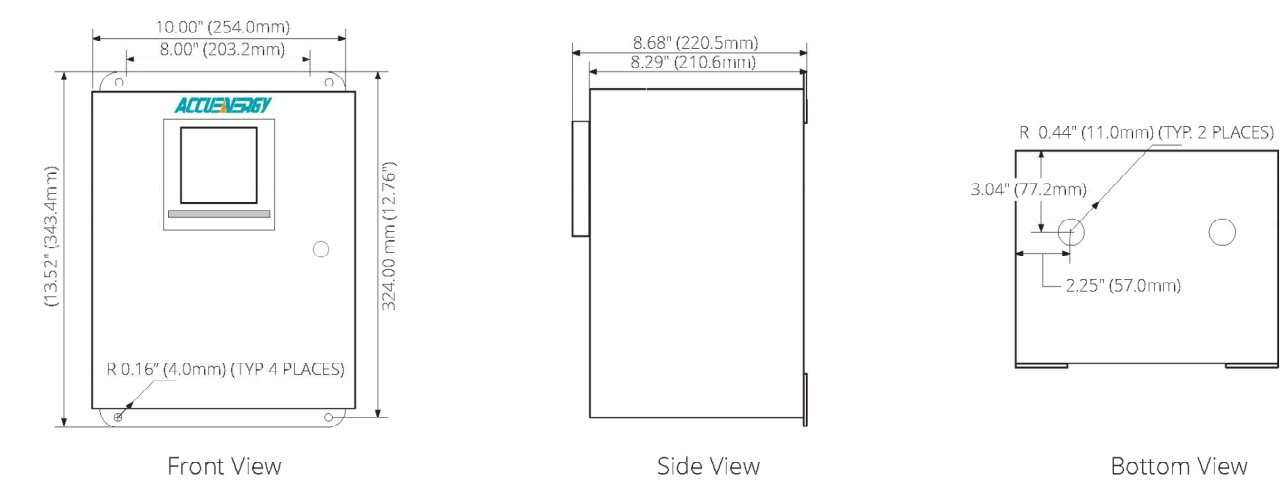


DIMENSIONS

AcuPanel 9104X Waterproof Polycarbonate Panel



AcuPanel 9104 Steel Panel

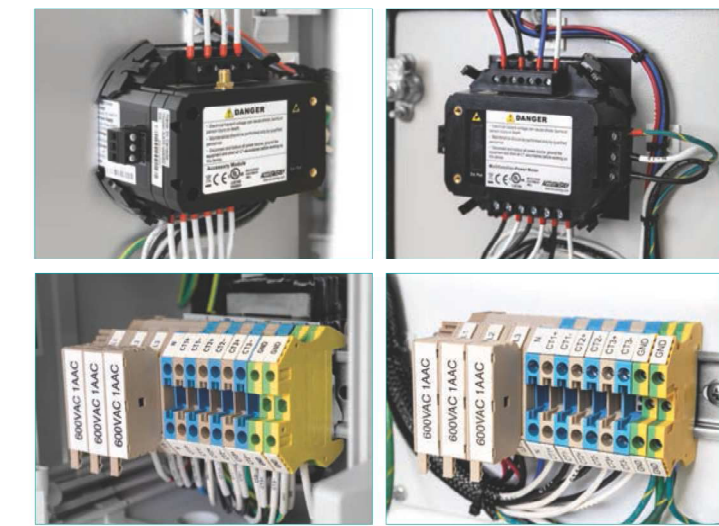


AcuPanel 9104/9104X Pre-Wired Power & Energy Panel Meter | Datasheet | 3

CUSTOM OEM SOLUTIONS

Partner with Accuenergy to design a custom, OEM panel to suit any metering application.

- Showcase your logo with custom branding
- Adapt the panel to your application with specialized OEM components such as gateways, cellular modems, or power supplies
- Suit your space or equipment needs with custom panel dimensions
- Contact our energy metering specialists to help customize a panel solution for any unique application



ACCESSORIES

Protective Display Cover

The 96-IP66 Protective Display Cover is designed for Acuvim II, Acuvim IIBN, Acuvim L, EV300, or other 96mm by 96mm display panel meters. Crucial in harsh environments, it increases the IP environmental rating of a meter's display to IP66 or NEMA 4X. It can be used with the AcuPanel 9104 to increase environmental rating of the enclosure from NEMA 3 to NEMA 4.



ORDERING INFORMATION

Acuvim II Pre-Wired Panel

Pre-Wired Panel	Meter Model	Current Input	Power Supply	Communication Module Option [†]	2nd I/O Option	3rd I/O Option
AcuPanel 9104: NEMA 4 [†] or NEMA 3 Indoor Steel Panel	IIB: Revenue Grade Multifunction Power Meter	5A: 5A or 1A Nominal Current Input	P1: 100-415Vac, 100-300Vdc	0: None	0: None	0: None
AcuPanel 9104X: NEMA 4X Indoor / Outdoor Waterproof Polycarbonate Panel	IIR: Acuvim II with 4MB of Data Logging memory	RCT: Rogowski Coil CT Input	P2: 20-60Vdc	WEB2: Modbus-TCP/IP, BACnet-IP, SNMP-V3, DNP-3.0 V2, IEC 61850 2nd Edition, SMTP, HTTP, HTTPS, MQTT, FTP, Post, iFTP, server, HTTPs webserver, Dual RJ45, WiFi	IO1: 6DI, 2RO, 1 DI Power Supply	IO1: 6DI, 2RO, 1 DI Power Supply
	IIE: Acuvim II with 4 Tariff TMB	333mV: 333mV Nominal CT Input	P3: 480Vac	WEB PUSH: Modbus-TCP/IP, HTTPs, Webserver, HTTP/HTTPS Post, FTP Post, SMTP, Sntp	IO2: 4DI, 2AO, 2DO	IO2: 4DI, 2AO, 2DO
	IIV: 80mA, 100mA, or 200mA Nominal CT Input	P4: 600Vac		PROFIB: PROFIBUS-DP	IO3: 4DI, 2RO, 2AI	IO3: 4DI, 2RO, 2AI
				RS485: Second RS485 Port		
				IO1: 6DI, 2RO, 1 DI Power Supply		
				IO2: 4DI, 2AO, 2DO		
				IO3: 4DI, 2RO, 2AI		

Ordering Example: AcuPanel 9104X-IIR-5A-P1-WEB-PUSH-IO1-IO3
[†]No more than 2 of the same I/O modules may be attached to the meter (example: Two AMM-R22). The same two I/O modules must be a different component number.
[†]AcuPanel 9104 is NEMA 3 by default. To increase the rating to NEMA 4, add the 96-IP66 protective cover.

AcuPanel 9104/9104X Pre-Wired Power & Energy Panel Meter | Datasheet | 4

ORDERING INFORMATION

Acuvim IIBN Pre-Wired Panel

Pre-Wired Panel	Meter Model	Current Input	Power Supply
AcuPanel 9104: NEMA 4 [†] or NEMA 3 Indoor Steel Panel	IIBN: Revenue Grade Multifunction Power Meter with BACnet-IP built-in	5A: 5A or 1A Nominal Current Input	P1: 100-415Vac, 100-300Vdc
AcuPanel 9104X: NEMA 4X Indoor / Outdoor Waterproof Polycarbonate Panel	RCT: Rogowski Coil CT Input	P2: 20-60Vdc	
	333mV: 333mV Nominal CT Input	P3: 480Vac	
	mA: 80mA, 100mA, or 200mA Nominal CT Input	P4: 600Vac	

Ordering Example: AcuPanel 9104X-IIBN-5A-P1
[†]AcuPanel 9104 is NEMA 3 by default. To increase the rating to NEMA 4, add the 96-IP66 protective cover.

Acuvim L Pre-Wired Panel

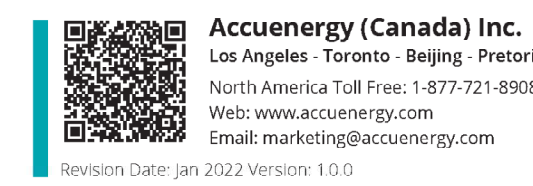
Pre-Wired Panel	Model	Current Input	Power Supply	Module Option [†]
AcuPanel 9104: NEMA 4 [†] or NEMA 3 Indoor Steel Panel	BL: Power meter with built-in DO, no communication	5A: 5A or 1A Nominal Current Input	P1V3: 100-415Vac, 50-60Hz, 100-300Vdc	0: None
AcuPanel 9104X: NEMA 4X Indoor / Outdoor Waterproof Polycarbonate Panel	CL: General Meter	RCT: Rogowski Coil CT Input	P2V3: 20-60Vdc	L-WEB: Modbus-TCP/IP, DNP 3.0 Over IP V2, BACnet-IP, SNMP V3, HTTP/HTTPS, post, iFTP, post, SMTP, FTP, HTTPs, webserver, 4GB Data Logging
	EL: CL + TOU and PO parameters	333mV: 333mV Nominal CT Input	P3V3: 480Vac	L-X1: 4DI+2DO
		P4V3: 600Vac		L-X2: 4DI+2DO+Second RS485
				L-X3: PROFIBUS
				L-X4: 4DI+2DO+PROFIBUS
				L-X5: 4DI+2RO
				L-X6: 4DI+2RO+Second RS485

Ordering Example: AcuPanel 9104X-EL-5A-P1V3-L-WEB
[†]Note: Acuvim BL does not support additional modules.
[†]AcuPanel 9104 is NEMA 3 by default. To increase the rating to NEMA 4, add the 96-IP66 protective cover.

EV300 Pre-Wired Panel

Pre-Wired Panel	Model	I/O Option	Power Supply	Accessories (Optional)
AcuPanel 9104: NEMA 4 [†] or NEMA 3 Indoor Steel Panel	EV387-V, L E + Modbus	EO: 2DI	P1: 100-415Vac, 100-300Vdc	IP66/NEMA4X: Environmental Protection Cover
AcuPanel 9104X: NEMA 4X Indoor / Outdoor Waterproof Polycarbonate Panel	EV390: Power Meter + Modbus	E1: 6DI + 2RO + P5	P2: 20-60Vdc	Ordering Example: IP66/NEMA4X
		E2: 6DI + 2DO + P5	P3: 480Vac	
		E3: 6DI + 2DO + 2AO	P4: 600Vac	
		E4: 6DI + 2RO + 2AO		

Ordering Example: AcuPanel 9104X-EV390-E2-P1
[†]AcuPanel 9104 is NEMA 3 by default. To increase the rating to NEMA 4, add the 96-IP66 protective cover.



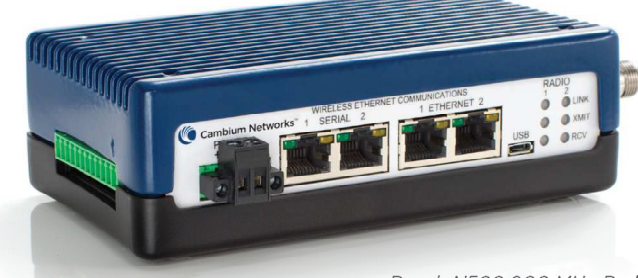
AcuPanel 9104/9104X Pre-Wired Power & Energy Panel Meter | Datasheet | 5



cnReach N500 900 MHz Radio SPECIFICATION SHEET

cnReach™ N500 900 MHz Radio

For outdoor critical infrastructure operations, cnReach transports process monitoring and control data from the remote sensor back to the operations center supporting real-time automated decision making and on-going analytics. Covering large geographic areas, hard to reach terrain and challenging spectrum environments, cnReach delivers reliable, secure connectivity to the petrochemical, electric utility, water/wastewater/stormwater and transportation industries. cnReach eases the migration to modern networks by combining legacy serial and analog/digital I/O with TCP/IP and Ethernet connectivity. Fully integrated into a single pane-of-glass management platform (cnMaestro™) cnReach helps bridge the IT/OT sides of complex organizations. Combining cnReach's licensed and unlicensed narrow-band radios with Cambium Networks' broadband technologies, industrial organizations are delivering end-to-end industrial Internet of Things solutions today.



- Licensed and unlicensed 900 MHz (cnReach is also available in 700 MHz licensed)
- Secure communications with AES 128/256-bit encryption with password authentication
- Highly reliable communications with access point synchronization and adaptive modulation
- Single and dual radio configurations for advanced relay and store-and-forward applications.
- Extensive I/O capabilities easing the transition from serial to all-IP networks with multiple serial ports, Ethernet ports and analog/digital I/O built-in.
- Sophisticated network planning with LINKPlanner, a no-charge planning tool enabling network designers to predict both capacity and availability of networks crossing all of Cambium's technologies.
- Supported by cnMaestro software for monitoring the status of entire networks carrying traffic across sensors

PRODUCT	PRODUCT DESCRIPTION	MODEL NUMBERS
	N500 900 MHz Single	NB-N50090A-US
	N500 900 MHz Single with IO	NB-N50091A-US
	N500 900 MHz Dual	NB-N50092A-US
	N500 900 MHz Dual with IO	NB-N50093A-US
	N500 IO Expander	NB-N50000A-US

cnReach N500 900 MHz Radio SS 09042016

Specifications

cnReach N500 900 MHz Radio SPECIFICATION SHEET

RADIO PERFORMANCE	ISM MODE	MAS MODE
Frequency Range	902 - 928 MHz	928 - 960 MHz
Output Power	10 mW to 1 W (0 dBm to 30 dBm)	10 mW to 3 W (0 dBm to 34.8 dBm)
Step Size	10 mW	10 mW
Modulations	MSK / ZFSK / BPSK / QPSK / BPSK / 16PSK / 16QAM / 32QAM	MSK / 4FSK / BPSK / QPSK / 16QAM / 32QAM / 64QAM
Capacity	57 kbps up to 4.4 Mbps	10 kbps up to 200 kbps
Channel Bandwidths	FHSS: 76 / 154 / 307 / 310 kHz DFS: 600 / 1200 kHz	12.5 / 75 / 50 kHz
Range	Up to 70 miles	Up to 70 miles

RECEIVE SENSITIVITY (MAS MODE)	12.5 KHZ CHANNEL	25 KHZ CHANNEL	50 KHZ CHANNEL
Rx Sensitivity (dBm)	-114	-115	-112
Capacity (kbps)	10	19	39
MSK	-106	-101	-99
4FSK	-108	-103	-101
QPSK	-108	-103	-101
BPSK	-101	-96	-93
16QAM	-97	-92	-90
32QAM	-91	-86	-84
64QAM	-84	-79	-77

RECEIVE SENSITIVITY (ISM MODE)	76 KHZ CHANNEL	154 KHZ CHANNEL	207 KHZ CHANNEL	310 KHZ CHANNEL
Receive Sensitivity (dBm)	-111	-109	-108	-106
Capacity (kbps)	57	114	153	229

	600 KHZ CHANNEL	1200 KHZ CHANNEL
Rx Sensitivity (dBm)	-101	-99
Capacity (kbps)	530	884
BPSK	-98	-97
QPSK	-93	-91
16QAM	-90	-88
32QAM	-84	-82

DATA CAPABILITIES	
Packet handling	Layer 2 bridge Layer 3 static routes VLAN support
Error Correction	Up to 32 bit CRC, Retransmit on error
Data Encryption	128/256-bit AES
I/O and Serial Data Access	Optional I/O allows seamless integration of Modbus RTU, Modbus TCP and DNP3 protocols

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Specifications

cnReach N500 900 MHz Radio SPECIFICATION SHEET

MANAGEMENT	
Web-based Interface via HTML5/HTTPS	
Remote Management via SNMP	
cnMaestro integration (roadmap)	
Support for configuration files, remote software upgrades	
Built-in diagnostic tools via web interface such as RF Ping and RF Throughput	

INTERFACES	
Ethernet Interfaces	2 x RJ-45
	10/100Base-T, Full Duplex, rate auto negotiated (802.3 compliant)
Serial Interfaces	2 x RJ-45
	RS-232C/422/485, up to 230.4 kbps
Analog/Digital I/O (optional)	8 pins for analog input/output and digital input/output

POWER	
Input	10-32VDC with reverse polarity protection
Power Consumption (DVDC average)	ISM (TW) MAS (TW)
	Transmit Receive Idle Transmit Receive Idle
Single Radio Configuration (mA)	335 290 270 495 380 270
Dual Radio Configuration (mA)	385 300 292 580 421 293
IO Expander (mA)	233 mA

PHYSICAL	
Dimensions	6.625" x 3.45" x 1.835" (168 mm x 87.6 mm x 46.6 mm)
Weight	Single Radio Configuration: 1.54 lbs. (0.70 kg) Dual Radio Configuration: 1.61 lbs. (0.73 kg)

ENVIRONMENTAL	
Operating Temperature	-40C to +60C
Humidity	95% operating humidity @ 40C non-condensing
HAZ/DOC	UL-Approved to Class 1 / Div 2

REGULATORY	
UL	Approved
FCC ID	Z9H89FT0025
IC ID	109W-0025

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 cnReach N500 900 MHz Radio SS 09042016

client

Project Name & Location

Design & Management

Engineer

Project Number: 006371
 Drawn By: AM
 Checked By: RD

revisions

no.	date	revision
0	10/31/2022	ISSUED FOR DSA REVIEW
1	11/18/2022	INVERTER/STRINGING REDESIGN
2	1/31/2024	NORTH EQUIP. ROOM REDESIGN
3	3/21/2024	COMM DIAGRAM CHANGES

project status

100% Package
 1/31/2024

stamp

sheet name

EQUIPMENT
 DATA SHEETS

sheet number

D1.2

plot date