404 TACONIC MICROGRID - PHOTOVOLTAIC ENERGY SYSTEM

THIS 186.2 KWSTC, ROOF MOUNTED PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED AT [redacted]
THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A BACK-FED BREAKER IN THE MAIN SERVICE PANEL. THIS PROJECT INCLUDES 880 KWH OF ENERGY STORAGE BATTERIES.

SHEET INDEX

COMPONENTS LIST

ELECTRICAL

QTY	NAME	DESCRIPTION	QTY	NAME	DESCRIPTION
532	PV MODULE	SUNPOWER SPR-X21-350-BLK (TOTAL: 9,331 SQ. FT.)	1	FUSE BOX	480 VAC, 200 A, NEMA 3R
3	PV INVERTER	SOLECTRIA PVI 50TL 50.0 KW, 480 VAC, 66.2 A	1	ZREC METER	480 VAC, 400 A, NEMA 3R
532	RAPID SHUTDOWN	APSMART RSD-S-PLC	1	ESS METER	480 VAC, 200 A, NEMA 3R
2	AC DISCONNECT	480 VAC, 400 A, NEMA 3R	1	TRANS-FORMER	150 KVA, NEMA 3R ESS-SIDE: 480 VAC, UTILITY-SIDE: 277/480 VAC
1	AC COM-BINER PANEL	480 VAC, 400 A, NEMA 3R	1	TRANS-FORMER	223 KVA, NEMA 3R BACKUP-SIDE: 120/208 VAC, UTILITY-SIDE: 277/480 VAC
1	AC COM-BINER PANEL	480 VAC, 400 A, NEMA 3R	1	TRANS-FORMER	300 KVA, NEMA 3R CUSTOMER-SIDE: 120/208 VAC, UTILITY-SIDE: 277/480 VAC
1	AC COM-BINER PANEL	480 VAC, 600 A, NEMA 3R	1	TRANS-FORMER	1 KVA, NEMA 3R PRIMARY-SIDE: 480 VAC, SECONDARY-SIDE: 120 VAC
1	AC COM-BINER PANEL	208 VAC, 400 A, NEMA 3R	1	MICROGRID CONTROLLER	ELM FIELDSIGHT CONTROLLER
1	AC COM-BINER PANEL	208 VAC, 800 A, NEMA 3R	1	ENERGY STORAGE SYSTEM	ELM MG125 ESS 125 KW, 220 KWH (110 KWH PER RACK), NEMA 3R
1	CONTACTOR	ABB AC NON REVERSING CONTACTOR 480 VAC, 600 A, NEMA 3R	3	BATTERY EXPANSION	ELM MG125 EXPANSION 220 KWH (110 KWH PER RACK), NEMA 3R
			1	SWITCHGEAR	480 VAC, 1200 A, NEMA 3R

GOVERNING CODES & STANDARDS

2017 NATIONAL ELECTRICAL CODE
2015 INTERNATIONAL BUILDING CODE
2015 INTERNATIONAL ENERGY CONSERVATION CODE
2015 INTERNATIONAL MECHANICAL CODE
UNDERWRITERS LABORATORIES (UL) STANDARDS
OSHA 29 CFR 1910.269

SITE SPECIFICATIONS

EXPOSURE CATEGORY: C
RISK CATEGORY: II
WIND SPEED (ASCE 7-10): 117 MPH
SNOW LOAD (ASCE 7-10): 30 PSF

PARCEL MAP 1

AERIAL MAP 2

PROJECT LOCATION

VICINITY MAP 3

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

Engineering Approval:

REVISIONS

DESCRIPTION	DATE	REV
60% DELIVERABLE	11/29/2021	1
90% DELIVERABLE	12/10/2021	2
PERMIT SET	1/25/2022	A
AHJ COMMENTS	3/11/2022	B
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Sheet Title:
COVER

Sheet Number:
T1.0

Sheet Size:
ARCH D - 36" x 24"

Design & Drafting by:
ALEXANDER MORAN
Alexander Moran

"Always remember: never accept the world as it appears to be. Dare to see it for what it could be."
- Harold Winston

Reviewed & Approved by:
RD

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 DISTRIBUITION 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.

11.) 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.) ALL PV SOURCE CIRCUIT CONDUCTORS AND CONNECTORS SHALL BE SUPPORTED AND SECURED WITHOUT EXCESSIVE STRESS. NO WIRING SHALL BE PERMITTED TO TOUCH THE ROOF SURFACE.

6.) 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.

7.) 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.

8.) WHERE EXPOSED TO SUNLIGHT, CONDUCTORS SHALL BE LISTED AND MARKED AS SUNLIGHT RESISTANT.

9.) 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.

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 ELECTRIAL EQUPMENT 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.

11.) 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.

12.) 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.

13.) ALL CONDUIT SHALL BE MOUNTED AT A MINIMUM OF 1 INCHES ABOVE THE ROOF SURFACE.

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, RATED FOR 90°C WET ENVIRONMENT, AND 1000 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)
- G = GROUND TERMINAL (PHASED GREEN)

ELEC. LEGEND - 480 VAC

- L1 = LINE 1 TERMINAL (PHASED BROWN)
- L2 = LINE 2 TERMINAL (PHASED ORANGE)
- L3 = LINE 3 TERMINAL (PHASED YELLOW)
- N = NEUTRAL TERMINAL (PHASED WHITE)
- G = GROUND TERMINAL (PHASED GREEN)

ELEC. LEGEND - 208 VAC

- L1 = LINE 1 TERMINAL (PHASED BLACK)
- L2 = LINE 2 TERMINAL (PHASED RED)
- L3 = LINE 3 TERMINAL (PHASED BLUE)
- N = NEUTRAL TERMINAL (PHASED WHITE)
- G = GROUND TERMINAL (PHASED GREEN)

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

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

Engineering Approval:

REVISIONS

DESCRIPTION	DATE	REV
60% DELIVERABLE	11/29/2021	1
90% DELIVERABLE	12/10/2021	2
PERMIT SET	1/25/2022	A
AHJ COMMENTS	3/11/2022	B
NEW EQUIPMENT PAD	10/7/2022	C
AS-BUILTS	8/13/2024	D

Sheet Title:
PROJECT NOTES

Sheet Number:
T1.1

Sheet Size:
ARCH D - 36" x 24"

Design & Drafting by:
ALEXANDER MORAN
Alexander Moran

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- Harold Winston

Reviewed & Approved by:
RD

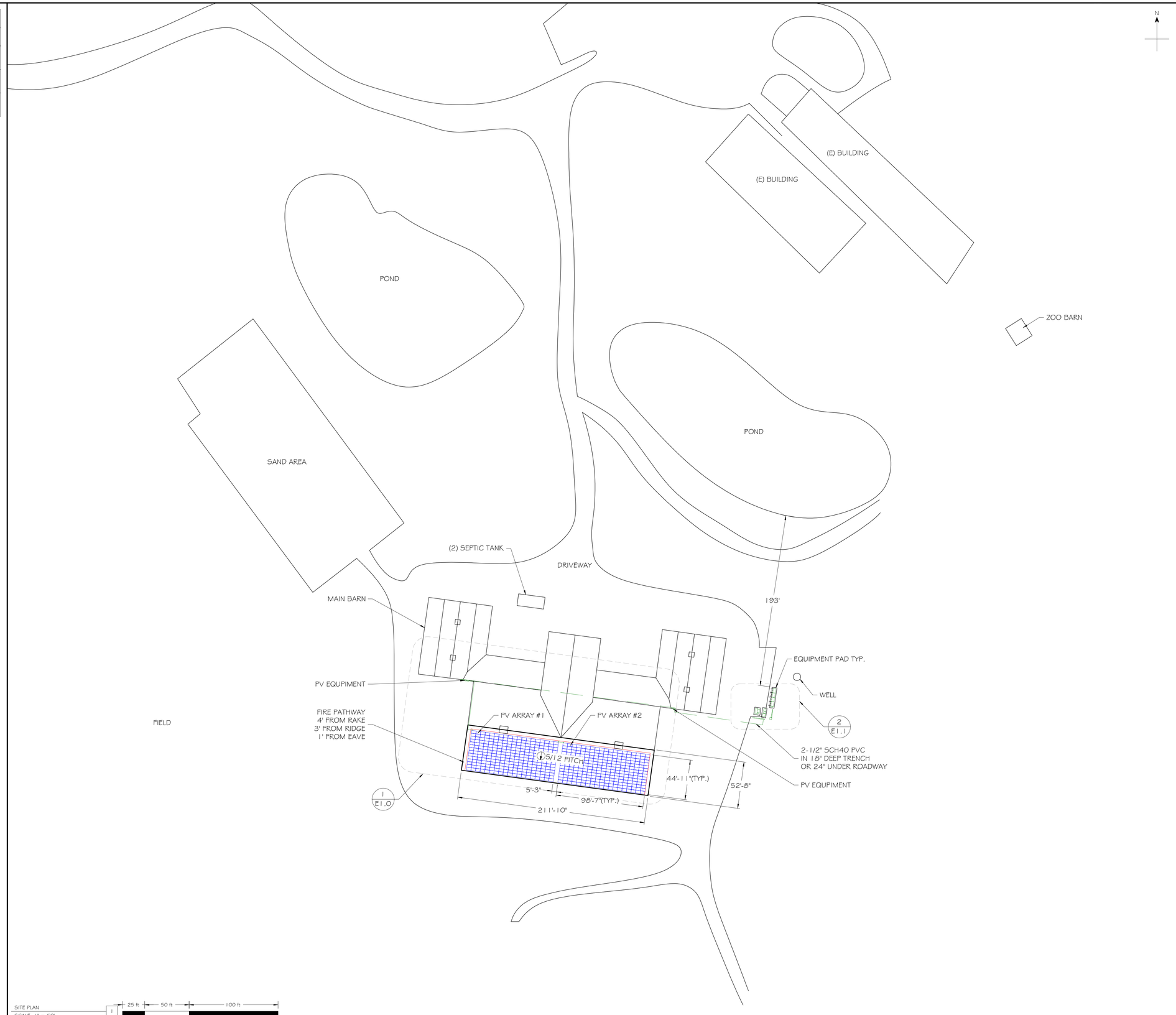
SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	ROOFTOP PV MOD.	SPR X21 350 BLK DC
	FIRE SETBACK	FIRE REQUIRED PATHWAYS
	ROOF VENT	

NOTE:

1. SITE DIMENSIONS DERIVED FROM GOOGLE AERIAL IMAGERY: RESOLUTION OF 6", DIMENSIONS PRECISE UP TO 1m (CE-90)
2. BUILDING DIMENSIONS DERIVED FROM AS-BUILT STRUCTURAL OR ARCHITECTURAL DRAWINGS
3. TRENCHING WITHIN 25 FEET OF SEPTIC TANKS WILL BE BACKFILLED WITH NON-FREE DRAINING MATERIAL AND WILL BE AT LEAST 5 FEET AWAY FROM THE TANKS
4. TRENCHING WITHIN 25 FEET OF AWELL WILL BE BACKFILLED WITH NON-FREE DRAINING MATERIAL AND WILL BE AT LEAST 5 FEET AWAY FROM THE WELL

PV SYSTEM SUMMARY TABLE					
Array ID	Inverter ID	Mod Qty.	kW size	Tilt	Azimuth
1	Inv #1 & #2	266	93.10	23°	188°
2	Inv #1 & #3	266	93.10	23°	188°
Totals:		532	186.2		

SYSTEM SUMMARY:
(532) SUNPOWER SPR-X21-350-BLK
(3) SOLECTRIA PV1 50TL (480V)
186.2 kWstc, 150 kW AC



SITE PLAN
SCALE: 1" = 50'

25 ft 50 ft 100 ft

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

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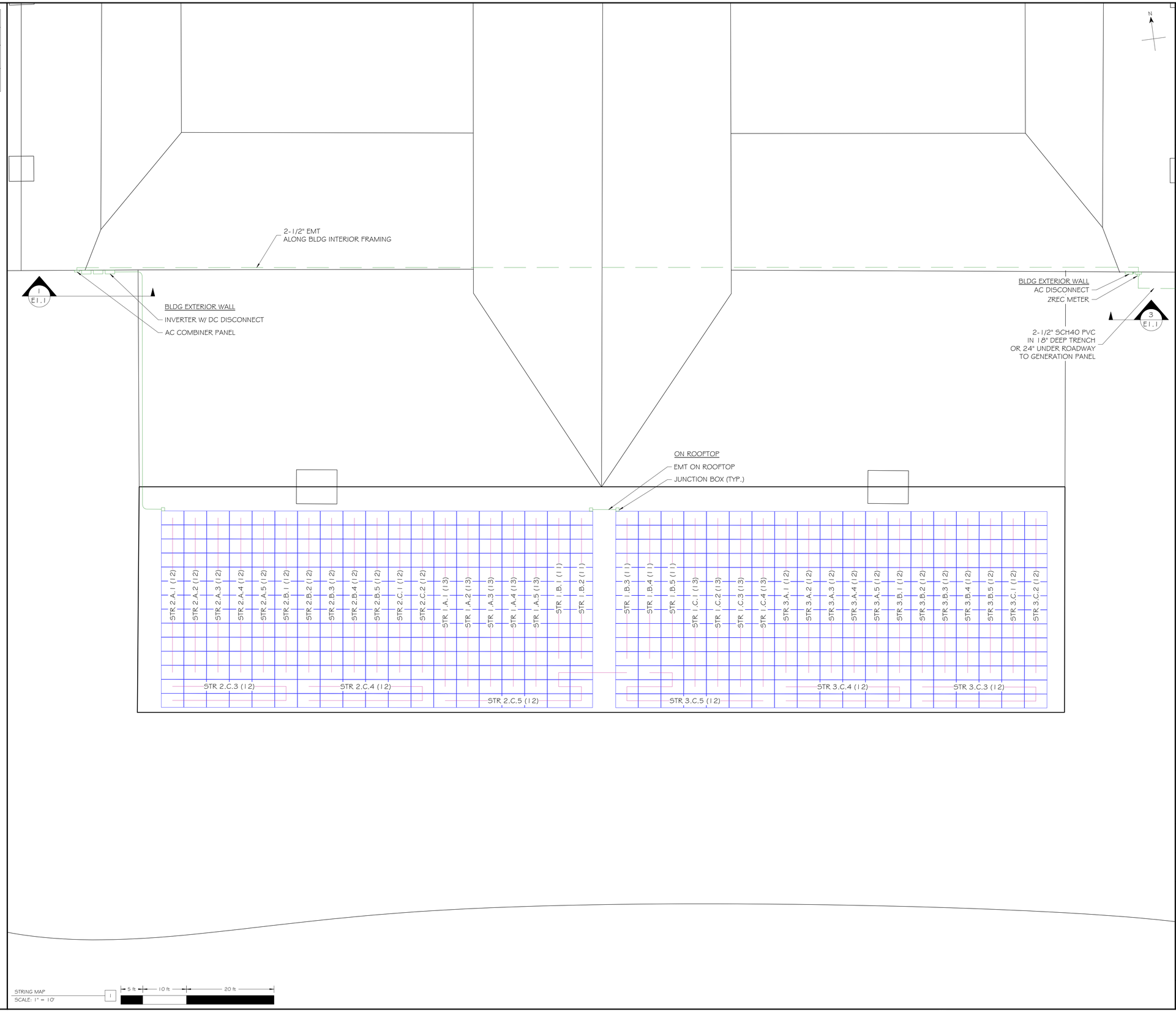
SYMBOL LEGEND		
SYMBOL	NAME	DESCRIPTION
	ROOFTOP PV MOD.	SPR X21 350 BLK DC
	ROOF VENT	

STRING LEGEND:

1.A.2 (13)

- 13 — STRING LENGTH
- 2 — STRING ID #
- A — MPPT (A, B, OR C)
- 1 — INVERTER ID #



STRING MAP
SCALE: 1" = 10'

1 — 5 ft — 10 ft — 20 ft

Contractor:

Project:
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[redacted]

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ELECTRICAL LAYOUT

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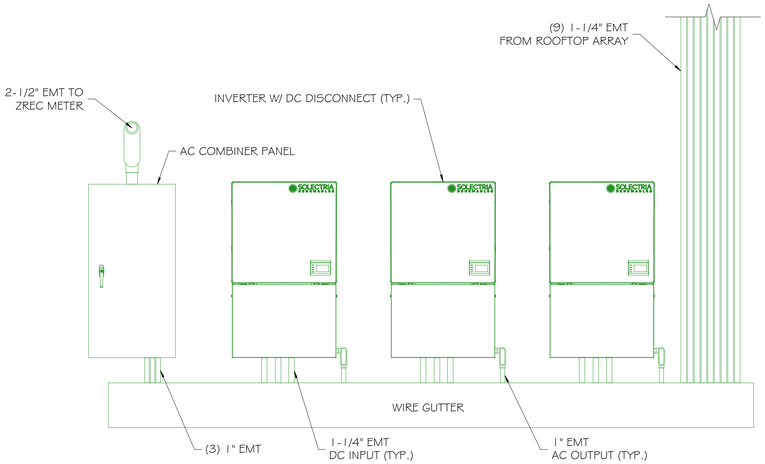
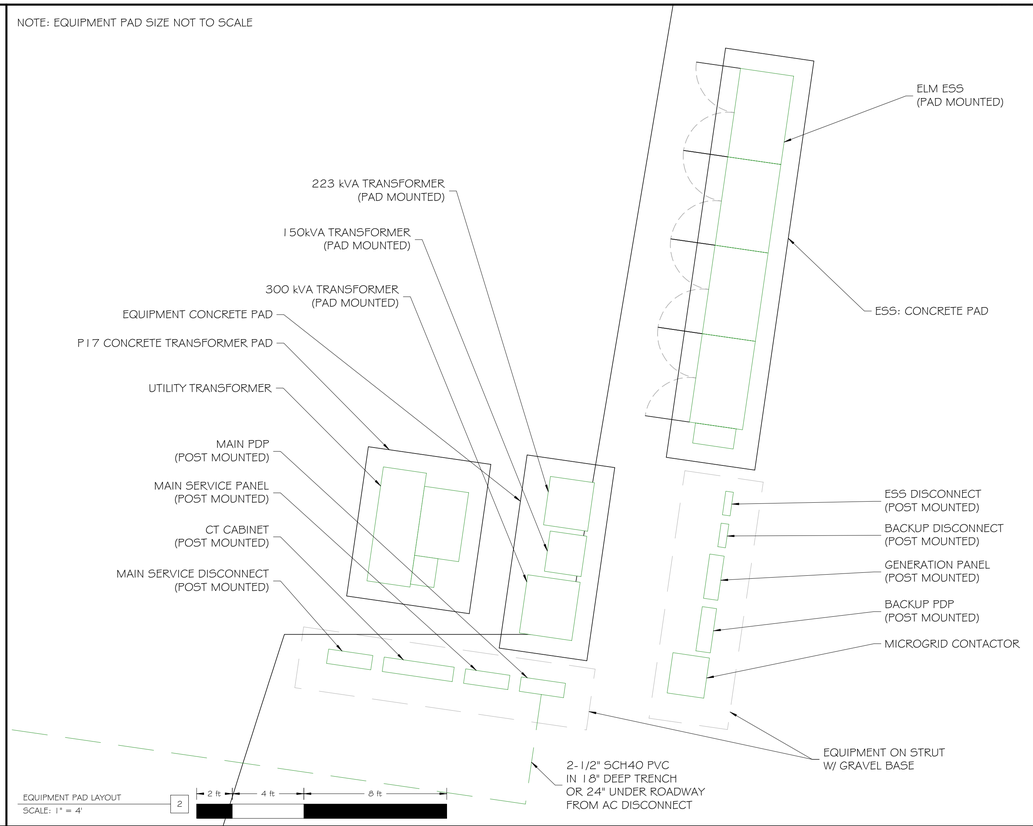
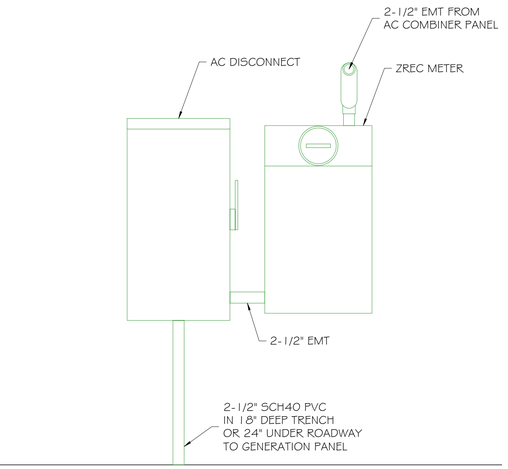


INVERTER ELEVATION
SCALE: 1" = 16"
1
8 in
16 in
32 in

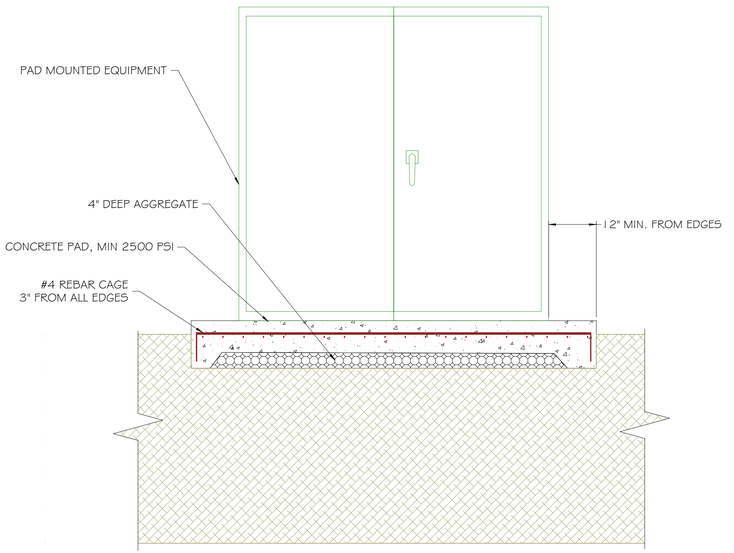
NOTE: EQUIPMENT PAD SIZE NOT TO SCALE



EQUIPMENT PAD LAYOUT
SCALE: 1" = 4'
2
2 ft
4 ft
8 ft



AC DISCONNECT ELEVATION
SCALE: 1" = 16"
3
8 in
16 in
32 in



TYPICAL PAD DETAILS
SCALE: 1" = 18"
4
9 in
18 in
36 in

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

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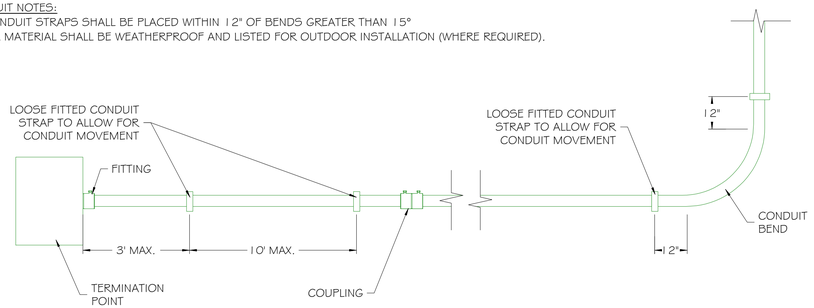
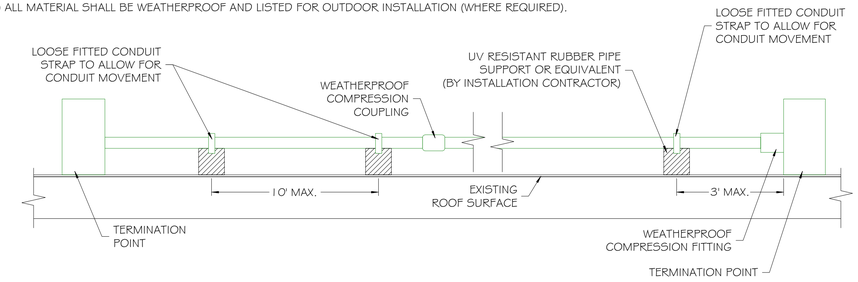
CONDUIT NOTES:
1.) CONDUIT STRAPS SHALL BE PLACED WITHIN 12" OF BENDS GREATER THAN 15°
2.) ALL MATERIAL SHALL BE WEATHERPROOF AND LISTED FOR OUTDOOR INSTALLATION (WHERE REQUIRED).

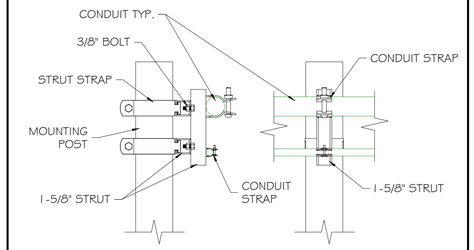


CONDUIT DETAIL
SCALE: NTS
1A

CONDUIT NOTES:
1.) CONDUIT SHALL HAVE MIN. 1" CLEARANCE ABOVE ROOF SURFACE.
2.) CONDUIT MOUNTING HEIGHT SPECIFIED IN CALCULATIONS ON ELECTRICAL DIAGRAM.
3.) CONDUIT SUPPORTS SHALL BE PLACED WITHIN 12" OF BENDS GREATER THAN 15°
4.) ALL MATERIAL SHALL BE WEATHERPROOF AND LISTED FOR OUTDOOR INSTALLATION (WHERE REQUIRED).



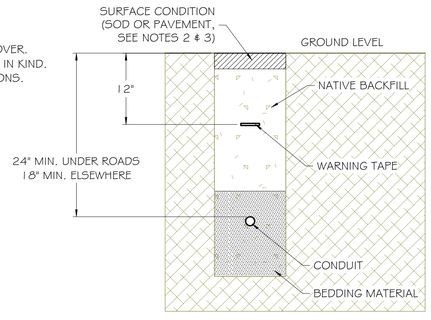
CONDUIT DETAIL
SCALE: NTS
1B



CONDUIT POLE MOUNT
SCALE: NTS
3A

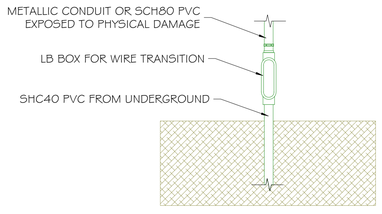
NOTES:
1.) BACKFILL WITH NATIVE MATERIAL IN COMPLIANCE WITH NEC 300.5(F).
NATIVE MATERIAL SHALL BE APPROVED BY THE OWNERS REP. PRIOR TO USE.
IF NOT ACCEPTABLE, USE FINE GRANULAR MATERIAL FOR BEDDING AND SIDE/TOP COVER.
2.) ASPHALT TO BE SAWCUT PRIOR TO TRENCHING. PAVEMENT SHALL BE REPLACED IN KIND.
3.) UNPAVED SURFACES SHALL BE RESTORED IN KIND TO MATCH EXISTING CONDITIONS.
4.) DETECTABLE WARNING TAPE SHALL BE INSTALLED 12" BELOW GRADE.
5.) REFER TO ELECTRICAL DRAWINGS FOR SIZE AND TYPE OF CONDUIT.
6.) NOTIFY UTILITY COMPANY PRIOR TO DIGGING PER "DIG SAFE" REQUIREMENTS.

811 Know what's **below.** **Call** before you dig.

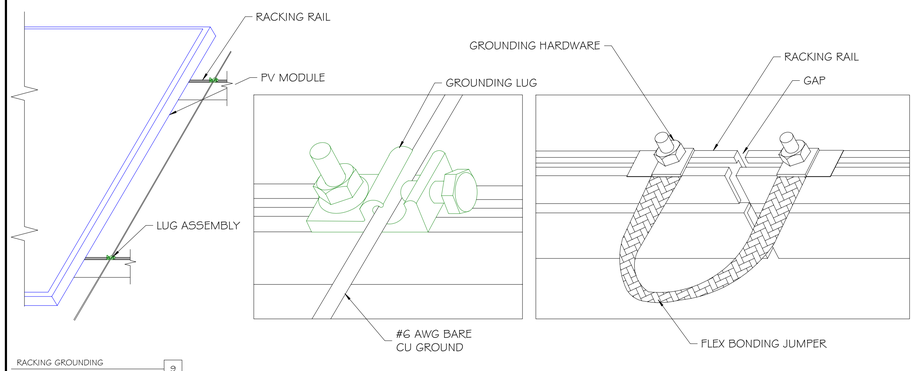


TRENCH CROSS-SECTION
SCALE: NTS
5

NOTES:
1.) CONDUIT SHALL BE INSTALLED WHERE 1000V CONDUCTORS ARE RAN 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.

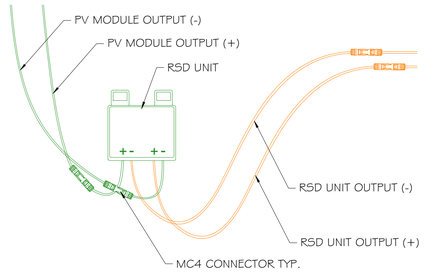


CONDUIT BODY TRANSITION
SCALE: NTS
7B



RACKING GROUNDING
SCALE: NTS
9

NOTE:
1.) RSD UNIT SHALL PROVIDE MODULE-LEVEL RAPID SHUTDOWN FUNCTIONALITY PER NEC 690.12 WHEN INSTALLED PER MANUFACTURER INSTRUCTIONS.
2.) DEVICE SHALL BE CONTROLLED BY MANUFACTURER-APPROVED METHODS.



RSD DETAIL
SCALE: NTS
10

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

Engineering Approval:

REVISIONS

DESCRIPTION	DATE	REV
60% DELIVERABLE	11/29/2021	1
90% DELIVERABLE	12/10/2021	2
PERMIT SET	1/25/2022	A
AHJ COMMENTS	3/11/2022	B
NEW EQUIPMENT PAD	10/7/2022	C
AS-BUILTS	8/13/2024	D

Sheet Title:
CONSTRUCTION DETAILS

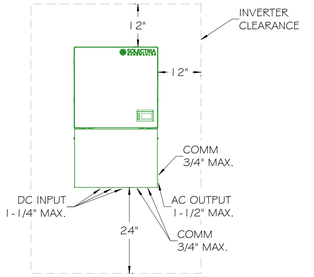
Sheet Number:
E1.2

Sheet Size:
ARCH D - 36" x 24"

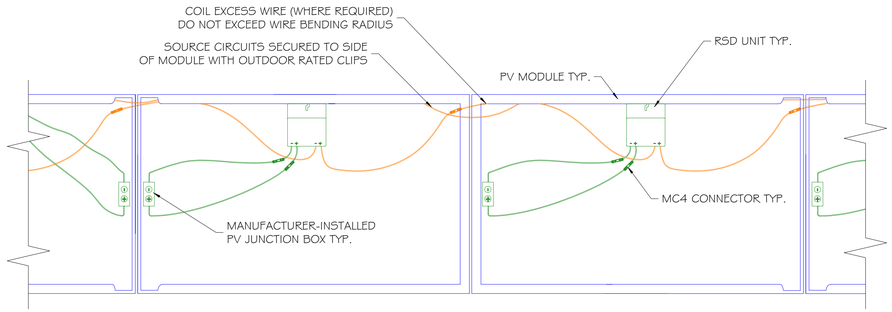
Design & Drafting by:
ALEXANDER MORAN

"Always remember: never accept the world as it appears to be. Dare to see it for what it could be."
- Harold Winston

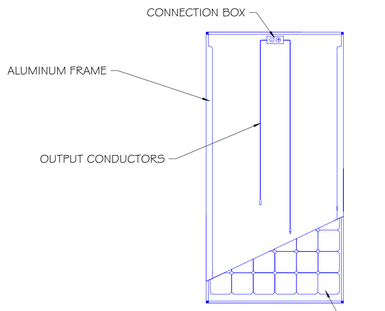
Reviewed & Approved by:
RD



SOLECTRIA INVERTER
SCALE: NTS — 1C

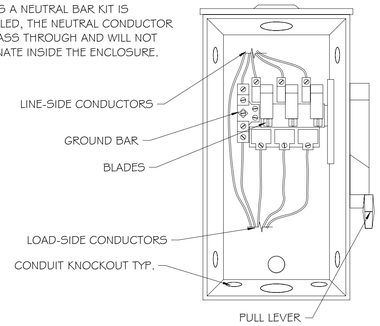


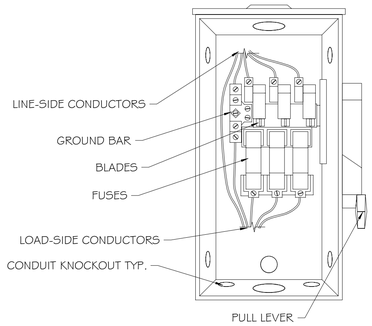
STRINGING W/ RAPID SHUTDOWN
SCALE: NTS — 3D



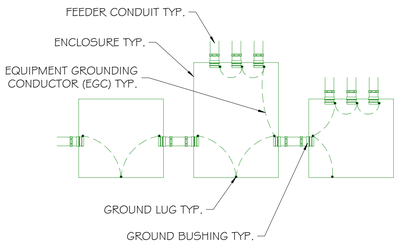
MODULE DETAIL
SCALE: NTS — 4

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

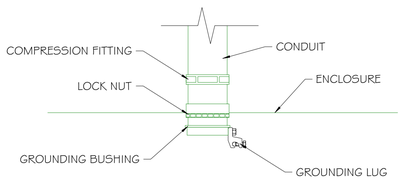




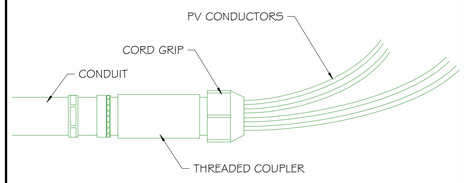
AC DISCONNECT
SCALE: NTS — 5B



EQUIPMENT GROUNDING
SCALE: NTS — 8

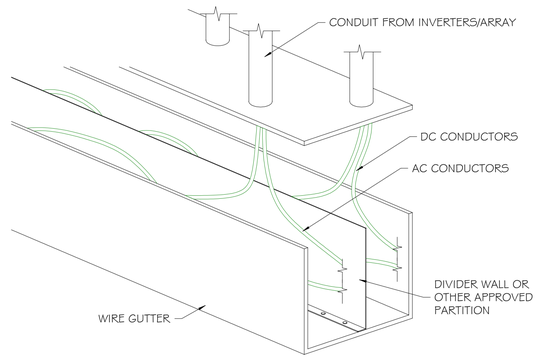


CONDUIT GROUNDING
SCALE: NTS — 9



CONDUIT CORD CONNECTOR
SCALE: NTS — 10

WIRE GUTTER NOTES:
1.) WIRE GUTTERS SHALL BE INSTALLED PER NEC 314.
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 — 11

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
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[redacted]

Engineering Approval:

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Sheet Title:
CONSTRUCTION DETAILS

Sheet Number:
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Design & Drafting by:
ALEXANDER MORAN
Alexander Moran

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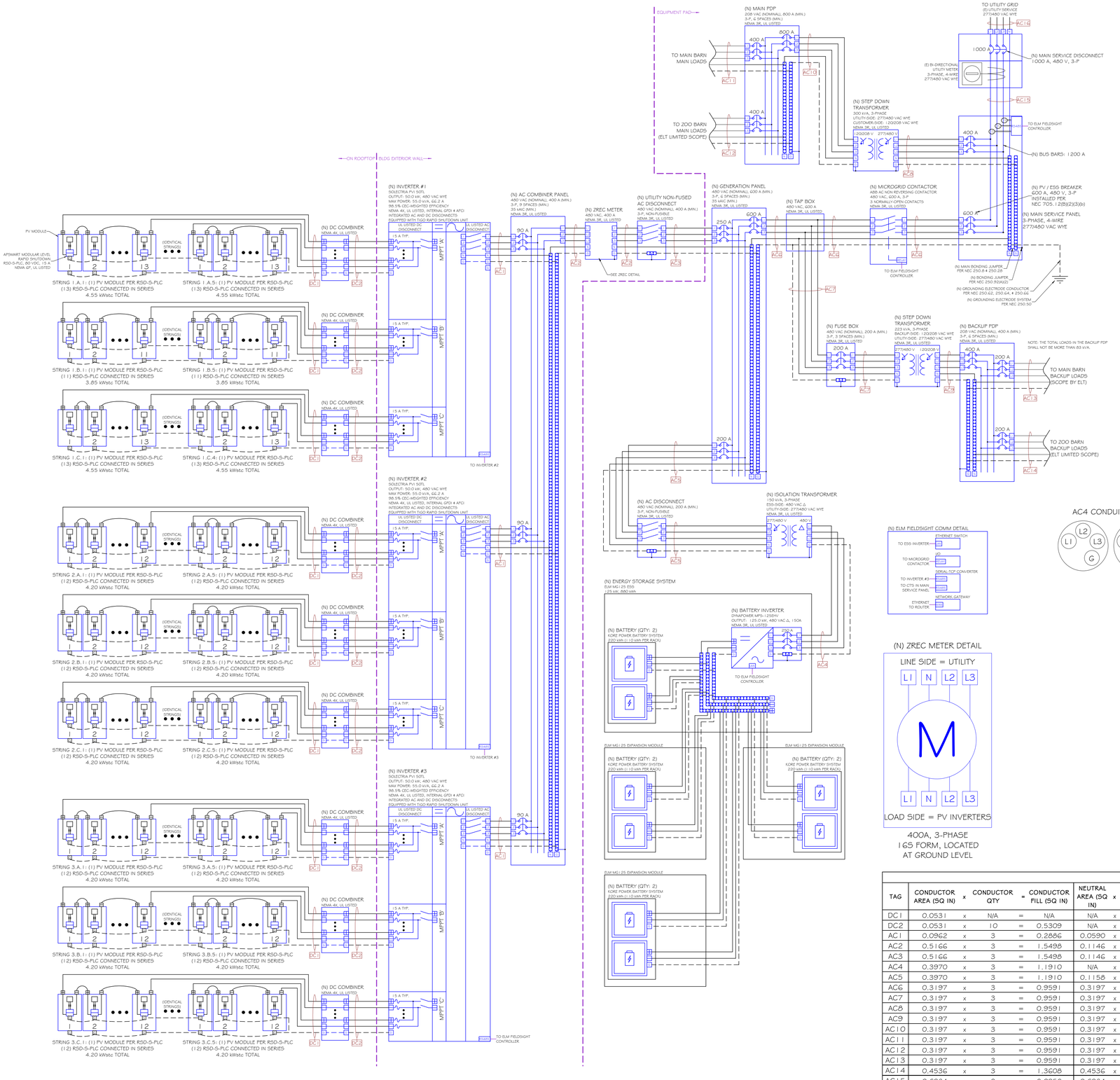
Reviewed & Approved by:
RD

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)
208V	- - - - = EQUIP. GROUNDING CONDUCTOR	——— = CIRCUIT CONDUCTOR	= FUSE	= CIRCUIT BREAKER	(N) = NEW EQUIP.	(E) = EXISTING EQUIP.	L1 = LINE 1 (BLACK)	L2 = LINE 2 (RED)	L3 = LINE 3 (BLUE)	N = NEUTRAL (WHITE)	G = GROUND (GREEN)	+ = POSITIVE (RED)	— = NEGATIVE (BLACK)



PV Module Specifications	
Model Number:	SUNPOWER SPR-X21-350-BLK
Weight (lbs):	41.0
Dimensions (in):	61.3 x 41.2 x 1.8
Power @ STC (W):	350
Voc (VDC):	68.2
Vmp (VDC):	57.3
Isc (A):	6.50
Imp (A):	6.11
Voc Temp Coeff (%/°C):	-0.29
Max Voltage (VDC):	1,000
Module Quantity:	532

Inverter #1 - #3 Specifications			
Model Number:	SOLECTRIA PVI 50TL		
Nominal Power (kW AC):	50.00	Max App. Pwr (kVA AC):	55.00
Nominal AC Voltage (V):	480	(3/N/PE)	
Max Output Current (A):	60.2		
CEC Weighted Efficiency:	98.5%		
Maximum DC Voltage (V):	1000	Max Current MPPT A:	36.0
DC Start Voltage (V):	330	Max Current MPPT B:	36.0
Max. MPPT Voltage (V):	850	Max Current MPPT C:	36.0
Min. MPPT Voltage (V):	480		
MPPT Quantity:	3		
Inverter Quantity:	3		

PV AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	181 Amps
MAX CURRENT PER 690.8(B):	226 Amps

Array Configuration			
System: 186.2 kWstc, 150 kW AC			
Total PV Module Qty: 532			
	Inverter I.D. #	Inv #1	Inv #2	Inv #3
	Inverter AC Power (kW):	50.00	50.00	50.00
	PV Power (kWstc):	60.20	63.00	63.00
	Inverter DC:AC Ratio	1.20	1.26	1.26
	Module Total Qty:	172	180	180
MPPT "A"	String Qty:	5	5	5
	String Length:	13	12	12
	Max Open Circuit Voltage:	995	918	918
	Min Open Circuit Voltage:	776	716	716
	Max Operating Voltage:	730	674	674
	Min Operating Voltage:	652	602	602
	Max Short Circuit Current:	40.6	40.6	40.6
	Operating Current:	30.6	30.6	30.6
MPPT "B"	String Qty:	5	5	5
	String Length:	11	12	12
	Max Open Circuit Voltage:	842	918	918
	Min Open Circuit Voltage:	657	716	716
	Max Operating Voltage:	618	674	674
	Min Operating Voltage:	552	602	602
	Max Short Circuit Current:	40.6	40.6	40.6
	Operating Current:	30.6	30.6	30.6
MPPT "C"	String Qty:	4	5	5
	String Length:	13	12	12
	Max Open Circuit Voltage:	995	918	918
	Min Open Circuit Voltage:	776	716	716
	Max Operating Voltage:	730	674	674
	Min Operating Voltage:	652	602	602
	Max Short Circuit Current:	32.5	40.6	40.6
	Operating Current:	24.4	30.6	30.6

PV System Maximum Voltage Calculation per NEC 690.7(A)

Local ASHRAE Min Temp: **-17 °C** — Data Source: **WHITE PLAINS WESTCHESTER CO A**

Voc Temp Coefficient		25°C - ASHRAE Min Temp.		+ 1 =	Voc Correction Factor		Voc Correction Factor	x	Voc	x	Max # of Modules in Series	=	Temperature Corrected Open Circuit Voltage
0.29%/°C	x	42°C	+ 1 =		1.122		1.122	x	68.2	x	13	=	994.6 Volts DC

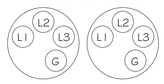
120% Rule Calculation per NEC 705.12(B)(2)(3)(b)

Main Busbar Rating:	1200	Amps
Main Service Breaker Rating:	1000	Amps
PV Backfeeding Current:	225.75	Amps

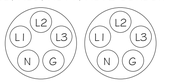
BUSBAR x 120%	- MAIN BREAKER =	MAX ALLOWABLE PV CURRENT
1440	- 1000 =	440

NOTE:
WHERE CONDUCTORS ARE INSTALLED IN PARALLEL, AN EGC/GEC GROUND CONDUCTOR MUST BE PRESENT IN EACH CONDUIT PER NEC 250.122(F).

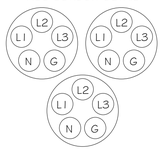
AC4 CONDUIT DETAIL



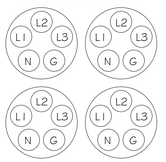
AC5, AC8, AC9, AC11, AC12 CONDUIT DETAIL



AC6 CONDUIT DETAIL



AC10 CONDUIT DETAIL



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	N/A	1	AWG #6	BARE CU	135
DC2	(1)	1-1/4"	EMT	10	AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	PV-WIRE	180
AC1	(1)	1-1/4"	EMT	3	AWG #3	XHHW-2	1	AWG #6	XHHW-2	1	AWG #6	XHHW-2	10
AC2	(1)	3"	EMT	3	350 kcmil	XHHW-2	1	AWG #2	XHHW-2	1	AWG #2	XHHW-2	280
AC3	(1)	3"	SCH40 PVC	3	350 kcmil	XHHW-2	1	AWG #2	XHHW-2	1	AWG #2	XHHW-2	125
AC4	(1)	3"	EMT	3	250 kcmil	THHN	0	N/A	N/A	1	AWG #2	XHHW-2	25
AC5	(1)	3"	SCH40 PVC	3	250 kcmil	THHN	1	AWG #2	THHN	1	AWG #2	XHHW-2	25
AC6	(3)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #2/0	XHHW-2	25
AC7	(1)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #4	XHHW-2	25
AC8	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	25
AC9	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	25
AC10	(4)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #3/0	XHHW-2	25
AC11	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	340
AC12	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	440
AC13	(1)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #4	XHHW-2	340
AC14	(2)	3"	SCH40 PVC	3	300 kcmil	XHHW-2	1	300 kcmil	XHHW-2	1	AWG #4	XHHW-2	440
AC15	(4)	4"	SCH40 PVC	3	500 kcmil	XHHW-2	1	500 kcmil	XHHW-2	1	AWG #2/0	XHHW-2	25
AC16	(3)	4"	SCH40 PVC	3	400 kcmil	THWN-2	1	400 kcmil	THWN-2	1	AWG #2/0	THWN-2	25

CONDUIT FILL CALCULATIONS

TAG	CONDUCTOR AREA (SQ IN)	x	CONDUCTOR QTY	=	CONDUCTOR FILL (SQ IN)	NEUTRAL AREA (SQ IN)	x	NEUTRAL QTY	=	NEUTRAL FILL (SQ IN)	GROUND AREA (SQ IN)	x	GROUND QTY	=	GROUND FILL (SQ IN)	TOTAL WIRE FILL	CONDUIT TYPE	CONDUIT SIZE	CONDUIT AREA (SQ IN)	x 40% =	MAX CONDUIT FILL	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	x .4 =	N/A	N/A
DC2	0.0531	x	10	=	0.5309	N/A	x	0	=	0.0000	0.0531	x	1	=	0.0531	0.5840	EMT	1-1/4"	1.496	x .4 =	0.5984	39.0%
AC1	0.0962	x	3	=	0.2886	0.0590	x	1	=	0.0590	0.0590	x	1	=	0.0590	0.4066	EMT	1-1/4"	1.496	x .4 =	0.5984	27.2%
AC2	0.5166	x	3	=	1.5498	0.1146	x	1	=	0.1146	0.1146	x	1	=	0.1146	1.7790	EMT	3"	8.846	x .4 =	3.5384	20.1%
AC3	0.5166	x	3	=	1.5498	0.1146	x	1	=	0.1146	0.1146	x	1	=	0.1146	1.7790	SCH40 PVC	3"	7.268	x .4 =	2.9072	24.5%
AC4	0.3970	x	3	=	1.1910	N/A	x	0	=	0.0000	0.1146	x	1	=	0.1146	1.3056	EMT	3"	8.846	x .4 =	3.5384	14.8%
AC5	0.3970	x	3	=	1.1910	0.1158	x	1	=	0.1158	0.1146	x	1	=	0.1146	1.4214	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.6%
AC6	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.2190	x	1	=	0.2190	1.4978	SCH40 PVC	3"	7.268	x .4 =	2.9072	20.6%
AC7	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.0814	x	1	=	0.0814	1.3602	SCH40 PVC	3"	7.268	x .4 =	2.9072	18.7%
AC8	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC9	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC10	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.2642	x	1	=	0.2642	1.5430	SCH40 PVC	3"	7.268	x .4 =	2.9072	21.2%
AC11	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC12	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC13	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.0814	x	1	=	0.0814	1.3602	SCH40 PVC	3"	7.268	x .4 =	2.9072	18.7%
AC14	0.4536	x	3	=	1.3608	0.4536	x	1	=	0.4536	0.0814	x	1	=	0.0814	1.8958	SCH40 PVC	3"	7.268	x .4 =	2.9072	26.1%
AC15	0.6984	x	3	=	2.0952	0.6984	x	1	=	0.6984	0.2190	x	1	=	0.2190	3.0126	SCH40 PVC	4"	12.554	x .4 =	5.0216	24.0%
AC16	0.5863	x	3	=	1.7589	0.5863	x	1	=	0.5863	0.2223	x	1	=	0.2223	2.5675	SCH40 PVC	4"	12.554	x .4 =	5.0216	20.5%

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

Engineering Approval:

REVISIONS		
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60% DELIVERABLE	11/29/2021	1
90% DELIVERABLE	12/10/2021	2
PERMIT SET	1/25/2022	A
AHJ COMMENTS	3/11/2022	B
NEW EQUIPMENT PAD	10/7/2022	C
AS-BUILTS	8/13/2024	D

Sheet Title:
ELECTRICAL DIAGRAM

Sheet Number:
E2.0

Sheet Size:
ARCH D - 36" x 24"

Design & Drafting by:
ALEXANDER MORAN
Alexander Moran
"Always remember: never accept the world as it appears to be. Dare to see it for what it could be."
- Harold Winston

Reviewed & Approved by:
RD

Array Configuration			
System: 186.2 kWstc, 150 kW AC			
Total PV Module Qty: 532			
Inverter I.D. #	Inv #1	Inv #2	Inv #3
Inverter AC Power (kW):	50.00	50.00	50.00
PV Power (kWstc):	60.20	63.00	63.00
Inverter DC:AC Ratio	1.20	1.26	1.26
Module Total Qty:	172	180	180
MPPT "A" String Qty:	5	5	5
MPPT "A" String Length:	13	12	12
MPPT "A" Max Open Circuit Voltage:	995	918	918
MPPT "A" Min Open Circuit Voltage:	776	716	716
MPPT "A" Max Operating Voltage:	730	674	674
MPPT "A" Min Operating Voltage:	652	602	602
MPPT "A" Max Short Circuit Current:	40.6	40.6	40.6
MPPT "A" Operating Current:	30.6	30.6	30.6
MPPT "B" String Qty:	5	5	5
MPPT "B" String Length:	11	12	12
MPPT "B" Max Open Circuit Voltage:	842	918	918
MPPT "B" Min Open Circuit Voltage:	657	716	716
MPPT "B" Max Operating Voltage:	618	674	674
MPPT "B" Min Operating Voltage:	552	602	602
MPPT "B" Max Short Circuit Current:	40.6	40.6	40.6
MPPT "B" Operating Current:	30.6	30.6	30.6
MPPT "C" String Qty:	4	5	5
MPPT "C" String Length:	13	12	12
MPPT "C" Max Open Circuit Voltage:	995	918	918
MPPT "C" Min Open Circuit Voltage:	776	716	716
MPPT "C" Max Operating Voltage:	730	674	674
MPPT "C" Min Operating Voltage:	652	602	602
MPPT "C" Max Short Circuit Current:	32.5	40.6	40.6
MPPT "C" Operating Current:	24.4	30.6	30.6

PV Module Specifications			
Model Number:	SUNPOWER SPR-X21-350-BLK		
Weight (lbs):	41.0		
Dimensions (in):	61.3 x 41.2 x 1.8		
Power @ STC (W):	350		
Voc (VDC):	68.2		
Vmp (VDC):	57.3	Voc Temp Coeff (%/°C):	-0.29
Isc (A):	6.50	Max Voltage (VDC):	1,000
Imp (A):	6.11	Module Quantity:	532

Inverter #1 - #3 Specifications			
Model Number:	SOLECTRIA PVI 50TL		
Nominal Power (kW AC):	50.00	Max App. Pwr (kVA AC):	55.00
Nominal AC Voltage (V):	480	(3/N/PE)	
Max Output Current (A):	60.2		
CEC Weighted Efficiency:	98.5%		
Maximum DC Voltage (V):	1000	Max Current MPPT A:	36.0
DC Start Voltage (V):	330	Max Current MPPT B:	36.0
Max. MPPT Voltage (V):	850	Max Current MPPT C:	36.0
Min. MPPT Voltage (V):	480		
MPPT Quantity:	3		
Inverter Quantity:	3		

PV System Maximum Voltage Calculation per NEC 690.7(A)

Local ASHRAE Min Temp: -17 °C — Data Source: WHITE PLAINS WESTCHESTER CO A

Voc Temp Coefficient		25°C - ASHRAE Min Temp.		1	=	Voc Correction Factor
0.29%/°C	x	42°C	+	1	=	1.122

Voc Correction Factor		Voc		Max # of Modules in Series	=	Temperature Corrected Open Circuit Voltage	
1.122	x	68.2	x	13	=	994.6	Volts DC

PV AC System Summary	
NOMINAL SYSTEM VOLTAGE:	480 Volts AC
MAX CURRENT PER 690.8(A):	181 Amps
MAX CURRENT PER 690.8(B):	226 Amps

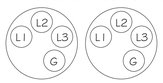
120% Rule Calculation per NEC 705.12(B)(2)(3)(b)

Main Busbar Rating:	1200	Amps
Main Service Breaker Rating:	1000	Amps
PV Backfeeding Current:	225.75	Amps

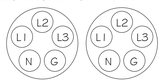
BUSBAR x 120%	-	MAIN BREAKER	=	MAX ALLOWABLE PV CURRENT
1440	-	1000	=	440

NOTE:
WHERE CONDUCTORS ARE INSTALLED IN PARALLEL, AN EGC/GEC GROUND CONDUCTOR MUST BE PRESENT IN EACH CONDUIT PER NEC 250.122(F).

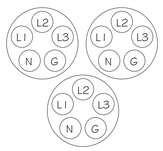
AC4 CONDUIT DETAIL



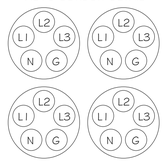
AC5, AC8, AC9, AC11, AC12 CONDUIT DETAIL



AC6 CONDUIT DETAIL



AC10 CONDUIT DETAIL



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	N/A	1	AWG #6	BARE CU	135
DC2	(1)	1-1/4"	EMT	10	AWG #10	PV-WIRE	N/A	N/A	N/A	1	AWG #10	PV-WIRE	180
AC1	(1)	1-1/4"	EMT	3	AWG #3	XHHW-2	1	AWG #6	XHHW-2	1	AWG #6	XHHW-2	10
AC2	(1)	3"	EMT	3	350 kcmil	XHHW-2	1	AWG #2	XHHW-2	1	AWG #2	XHHW-2	280
AC3	(1)	3"	SCH40 PVC	3	350 kcmil	XHHW-2	1	AWG #2	XHHW-2	1	AWG #2	XHHW-2	125
AC4	(1)	3"	EMT	3	250 kcmil	THHN	0	N/A	N/A	1	AWG #2	XHHW-2	25
AC5	(1)	3"	SCH40 PVC	3	250 kcmil	THHN	1	AWG #2	THHN	1	AWG #2	XHHW-2	25
AC6	(3)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #2/0	XHHW-2	25
AC7	(1)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #4	XHHW-2	25
AC8	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	25
AC9	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	25
AC10	(4)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #3/0	XHHW-2	25
AC11	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	340
AC12	(2)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #1	XHHW-2	440
AC13	(1)	3"	SCH40 PVC	3	AWG #4/0	XHHW-2	1	AWG #4/0	XHHW-2	1	AWG #4	XHHW-2	340
AC14	(2)	3"	SCH40 PVC	3	300 kcmil	XHHW-2	1	300 kcmil	XHHW-2	1	AWG #4	XHHW-2	440
AC15	(4)	4"	SCH40 PVC	3	500 kcmil	XHHW-2	1	500 kcmil	XHHW-2	1	AWG #2/0	XHHW-2	25
AC16	(3)	4"	SCH40 PVC	3	400 kcmil	THWN-2	1	400 kcmil	THWN-2	1	AWG #2/0	THWN-2	25

CONDUIT FILL CALCULATIONS

TAG	CONDUCTOR AREA (SQ IN)	x	CONDUCTOR QTY	=	CONDUCTOR FILL (SQ IN)	NEUTRAL AREA (SQ IN)	x	NEUTRAL QTY	=	NEUTRAL FILL (SQ IN)	GROUND AREA (SQ IN)	x	GROUND QTY	=	GROUND FILL (SQ IN)	TOTAL WIRE FILL	CONDUIT TYPE	CONDUIT SIZE	CONDUIT AREA (SQ IN)	x 40% =	MAX CONDUIT FILL	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	x .4 =	N/A	N/A
DC2	0.0531	x	10	=	0.5309	N/A	x	0	=	0.0000	0.0531	x	1	=	0.0531	0.5840	EMT	1-1/4"	1.496	x .4 =	0.5984	39.0%
AC1	0.0962	x	3	=	0.2886	0.0590	x	1	=	0.0590	0.0590	x	1	=	0.0590	0.4066	EMT	1-1/4"	1.496	x .4 =	0.5984	27.2%
AC2	0.5166	x	3	=	1.5498	0.1146	x	1	=	0.1146	0.1146	x	1	=	0.1146	1.7790	EMT	3"	8.846	x .4 =	3.5384	20.1%
AC3	0.5166	x	3	=	1.5498	0.1146	x	1	=	0.1146	0.1146	x	1	=	0.1146	1.7790	SCH40 PVC	3"	7.268	x .4 =	2.9072	24.5%
AC4	0.3970	x	3	=	1.1910	N/A	x	0	=	0.0000	0.1146	x	1	=	0.1146	1.3056	EMT	3"	8.846	x .4 =	3.5384	14.8%
AC5	0.3970	x	3	=	1.1910	0.1158	x	1	=	0.1158	0.1146	x	1	=	0.1146	1.4214	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.6%
AC6	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.2190	x	1	=	0.2190	1.4978	SCH40 PVC	3"	7.268	x .4 =	2.9072	20.6%
AC7	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.0814	x	1	=	0.0814	1.3602	SCH40 PVC	3"	7.268	x .4 =	2.9072	18.7%
AC8	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC9	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC10	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.2642	x	1	=	0.2642	1.5430	SCH40 PVC	3"	7.268	x .4 =	2.9072	21.2%
AC11	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC12	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.1534	x	1	=	0.1534	1.4322	SCH40 PVC	3"	7.268	x .4 =	2.9072	19.7%
AC13	0.3197	x	3	=	0.9591	0.3197	x	1	=	0.3197	0.0814	x	1	=	0.0814	1.3602	SCH40 PVC	3"	7.268	x .4 =	2.9072	18.7%
AC14	0.4536	x	3	=	1.3608	0.4536	x	1	=	0.4536	0.0814	x	1	=	0.0814	1.8958	SCH40 PVC	3"	7.268	x .4 =	2.9072	26.1%
AC15	0.6984	x	3	=	2.0952	0.6984	x	1	=	0.6984	0.2190	x	1	=	0.2190	3.0126	SCH40 PVC	4"	12.554	x .4 =	5.0216	24.0%
AC16	0.5863	x	3	=	1.7589	0.5863	x	1	=	0.5863	0.2223	x	1	=	0.2223	2.5675	SCH40 PVC	4"	12.554	x .4 =	5.0216	20.5%

TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS			AMPACITY PER 310.15(B)(16) & 310.15(B)(17)	REQUIRED CONDUCTOR AMPACITY				AMPACITY CHECK #1	CONDUCTOR TEMPERATURE DERATING					CONDUIT FILL DERATING		CORRECTED AMPACITY CALCULATION							AMPACITY CHECK #2		VOLTAGE DROP	
			MATERIAL	CONN. TEMP. RATING	TRADE SIZE		MAX CURRENT 690.8(A)(1)	x Isc (Amps)	# OF COMBINED STRINGS	= MAX CURRENT PER 690.8(A)(1)	MAX CURRENT PER 690.8(B)(1) < CONDUCTOR AMPACITY	CIRCUIT ENVIRONMENT	LOCAL 2% AVG. HIGH TEMP (°C)	HEIGHT ABOVE ROOF (in)	TEMP. ADDER PER 310.15(B)(3)(c)	EXPECTED OPERATING TEMP (°C)	AMPACITY CORRECTION 310.15(B)(2)(a)	# OF UNGROUNDED CONDUCTORS	AMPACITY CORRECTION 310.15(B)(3)(a)	90°C CONDUCTOR AMPACITY	x TEMP DERATE	x CONDUIT FILL DERATE	= DERATED CONDUCTOR AMPACITY	MAX CURRENT PER 690.8(B)(2)	< DERATED CONDUCTOR AMPACITY	EST. ONE-WAY DISTANCE	VOLTAGE DROP
DC1	PV STRING	JUNCTION BOX	COPPER	90°C	AWG #10	55 Amps	1.25	x 6.50	x 1	= 8.1 Amps	10.1 Amps < 55.0 Amps	ROOFTOP, FREE AIR	32	-	N/A	32	0.96	N/A	1.00	55	x 0.96	x 1.00	= 52.8 Amps	8.1 Amps	< 52.8 Amps	135 ft	0.44%
DC2	JUNCTION BOX	INVERTER	COPPER	75°C	AWG #10	35 Amps	1.25	x 6.50	x 1	= 8.1 Amps	10.1 Amps < 35.0 Amps	ROOFTOP, IN CONDUIT	32	1	0	32	0.96	10	0.50	40	x 0.96	x 0.50	= 19.2 Amps	8.1 Amps	< 19.2 Amps	180 ft	0.56%

TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS					REQUIRED CONDUCTOR AMPACITY						AMPACITY CHECK #1	CONDUCTOR TEMPERATURE DERATING				CONDUIT FILL DERATING		CORRECTED AMPACITY CALCULATION							AMPACITY CHECK #2		VOLTAGE DROP	
			MATERIAL	TERMINAL TEMP. RATING	TRADE SIZE	NUMBER OF PARALLEL CONDUCTORS	AMPACITY PER 310.15(B)(16) & 310.15(B)(17)	INVERTER OUTPUT CURRENT	x # OF INVERTERS	= MAX CURRENT PER 690.8(A)(3)	x CONT. OPERATION 690.8(B)(1)	= MAX CURRENT PER 690.8(B)(1)		MAX CURRENT PER 690.8(B)(1) < CONDUCTOR AMPACITY	CIRCUIT ENVIRONMENT	LOCAL 2% AVG. HIGH TEMP (°C)	EXPECTED OPERATING TEMP (°C)	AMPACITY CORRECTION 310.15(B)(2)(a)	# OF UNGROUNDED CONDUCTORS	AMPACITY CORRECTION 310.15(B)(3)(a)	90°C CONDUCTOR AMPACITY	x TEMP DERATE	x CONDUIT FILL DERATE	= DERATED CONDUCTOR AMPACITY	MAX CURRENT PER 690.8(B)(2)	< DERATED CONDUCTOR AMPACITY	EST. ONE-WAY DISTANCE	VOLTAGE DROP
AC1	INVERTER	AC COMBINER PANEL	ALUM	75°C	AWG #3	1	75 Amps	60.2	x 1	= 60.2 Amps	x 1.25	= 75.3 Amps		75.3 Amps > 75 Amps	EXT. BLDG. WALL (+15°C)	32	47	0.82	3	1.00	85	x 0.82	x 1.00	= 69.7 Amps	60.2 Amps	< 69.7 Amps	10 ft	0.09%
AC2	AC COMBINER PANEL	AC DISCONNECT	ALUM	75°C	350 kcmil	1	250 Amps	60.2	x 3	= 180.6 Amps	x 1.25	= 225.8 Amps		225.8 Amps < 250 Amps	INDOORS (+0°C)	32	32	0.96	3	1.00	280	x 0.96	x 1.00	= 268.8 Amps	180.6 Amps	< 268.8 Amps	280 ft	1.11%
AC3	AC DISCONNECT	GENERATION PANEL	ALUM	75°C	350 kcmil	1	250 Amps	60.2	x 3	= 180.6 Amps	x 1.25	= 225.8 Amps		225.8 Amps < 250 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	280	x 0.96	x 1.00	= 268.8 Amps	180.6 Amps	< 268.8 Amps	125 ft	0.49%
AC4	STORAGE SYSTEM	ISOLATION XFMR	COPPER	75°C	250 kcmil	1	255 Amps	150.0	x 1	= 150.0 Amps	x 1.25	= 187.5 Amps		187.5 Amps < 255 Amps	DIRECT SUNLIGHT (+15°C)	32	47	0.82	3	1.00	290	x 0.82	x 1.00	= 237.8 Amps	150.0 Amps	< 237.8 Amps	25 ft	0.07%
AC5	ISOLATION XFMR	GENERATION PANEL	COPPER	75°C	250 kcmil	1	255 Amps	150.0	x 1	= 150.0 Amps	x 1.25	= 187.5 Amps		187.5 Amps < 255 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	290	x 0.96	x 1.00	= 278.4 Amps	150.0 Amps	< 278.4 Amps	25 ft	0.07%

TAG	CIRCUIT ORIGIN	CIRCUIT DESTINATION	CONDUCTOR SPECIFICATIONS					CONDUCTOR TEMPERATURE DERATING				CONDUIT FILL DERATING		CORRECTED AMPACITY CALCULATION					AMPACITY CHECK			VOLTAGE DROP	
			MATERIAL	TERMINAL TEMP. RATING	TRADE SIZE	NUMBER OF PARALLEL CONDUCTORS	AMPACITY PER 310.15(B)(16) & 310.15(B)(17)	CIRCUIT ENVIRONMENT	LOCAL 2% AVG. HIGH TEMP (°C)	EXPECTED OPERATING TEMP (°C)	AMPACITY CORRECTION 310.15(B)(2)(a)	# OF UNGROUNDED CONDUCTORS	AMPACITY CORRECTION 310.15(B)(3)(a)	90°C CONDUCTOR AMPACITY	x TEMP DERATE	x CONDUIT FILL DERATE	= DERATED CONDUCTOR AMPACITY	SPECIFIED OCPD RATING	NEXT STD. OCPD SIZE DOWN, 240.4	< DERATED CONDUCTOR AMPACITY	EST. ONE-WAY DISTANCE	VOLTAGE DROP
AC6	GENERATION PANEL	MAIN SERVICE PANEL	ALUM	75°C	AWG #4/0	3	540 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	615	x 0.96	x 1.00	= 590.4 Amps	600 Amps	500 Amps	< 590.4 Amps	25 ft	0.16%
AC7	TAP BOX	TRANSFORMER	ALUM	75°C	AWG #4/0	1	180 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	205	x 0.96	x 1.00	= 196.8 Amps	200 Amps	175 Amps	< 196.8 Amps	25 ft	0.16%
AC8	MAIN SERVICE PANEL	TRANSFORMER	ALUM	75°C	AWG #4/0	2	360 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	410	x 0.96	x 1.00	= 393.6 Amps	400 Amps	350 Amps	< 393.6 Amps	25 ft	0.16%
AC9	TRANSFORMER	BACKUP PDP	ALUM	75°C	AWG #4/0	2	360 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	410	x 0.96	x 1.00	= 393.6 Amps	400 Amps	350 Amps	< 393.6 Amps	25 ft	0.16%
AC10	TRANSFORMER	MAIN PDP	ALUM	75°C	AWG #4/0	4	720 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	820	x 0.96	x 1.00	= 787.2 Amps	800 Amps	700 Amps	< 787.2 Amps	25 ft	0.16%
AC11	MAIN PDP	MAIN BARN MAIN LOADS	ALUM	75°C	AWG #4/0	2	360 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	410	x 0.96	x 1.00	= 393.6 Amps	400 Amps	350 Amps	< 393.6 Amps	340 ft	2.21%
AC12	MAIN PDP	ZOO BARN MAIN LOADS	ALUM	75°C	AWG #4/0	2	360 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	410	x 0.96	x 1.00	= 393.6 Amps	400 Amps	350 Amps	< 393.6 Amps	440 ft	2.86%
AC13	BACKUP PDP	MAIN BARN BACKUP LOADS	ALUM	75°C	AWG #4/0	1	180 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	205	x 0.96	x 1.00	= 196.8 Amps	200 Amps	175 Amps	< 196.8 Amps	340 ft	2.21%
AC14	BACKUP PDP	ZOO BARN BACKUP LOADS	ALUM	75°C	300 kcmil	2	460 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	520	x 0.96	x 1.00	= 499.2 Amps	200 Amps	175 Amps	< 499.2 Amps	440 ft	1.12%
AC15	MAIN SERVICE PANEL	MAIN SERVICE DISCONNECT	ALUM	75°C	500 kcmil	4	1240 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	1400	x 0.96	x 1.00	= 1344 Amps	1000 Amps	800 Amps	< 1344.0 Amps	25 ft	0.47%
AC16	MAIN SERVICE DISCONNECT	UTILITY SERVICE	COPPER	75°C	400 kcmil	3	1005 Amps	UNDERGROUND (+0°C)	32	32	0.96	3	1.00	1140	x 0.96	x 1.00	= 1094 Amps	1000 Amps	800 Amps	< 1094.4 Amps	25 ft	0.29%

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

Engineering Approval:

REVISIONS

DESCRIPTION	DATE	REV
60% DELIVERABLE	11/29/2021	1
90% DELIVERABLE	12/10/2021	2
PERMIT SET	1/25/2022	A
AHJ COMMENTS	3/11/2022	B
NEW EQUIPMENT PAD	10/7/2022	C
AS-BUILTS	8/13/2024	D

Sheet Title:
ELECTRICAL CALCULATIONS

Sheet Number:
E2.1

Sheet Size:
ARCH D - 36" x 24"

Design & Drafting by:
ALEXANDER MORAN
Alexander Moran

"Always remember: never accept the world as it appears to be. Dare to see it for what it could be."
- Harold Winston

Reviewed & Approved by:
RD

SOLAR AC DISCONNECT

REQD BY: NEC 690.13(B) — 1
APPLY TO:
AC DISCONNECT SWITCHES

SOLAR DC DISCONNECT

REQD BY: NEC 690.13(B) — 2
APPLY TO:
DC DISCONNECT SWITCHES

⚠ WARNING
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

REQD BY: NEC 690.13(B) — 3
APPLY TO:
DISCONNECTS, FUSES, CIRCUIT BREAKERS

WARNING: PHOTOVOLTAIC POWER SOURCE

REQD BY: NEC 690.31(G)(3) — 4
APPLY TO:
JUNCTION BOXES, RACEWAYS, CABLE TRAYS, CONDUIT BODIES WITH AVAILABLE OPENINGS, EVERY 10', WITHIN 1' OF TURNS/PENETRATIONS

⚠ WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

REQD BY: NEC 705.12(B)(3) — 5
APPLY TO:
ANY/ALL ELECTRICAL PANELS CONNECTED TO MULTIPLE POWER SOURCES

⚠ WARNING
POWER SOURCE OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

REQD BY: NEC 705.12(B)(2)(3)(b) — 6
APPLY TO:
PV BACKFED CIRCUIT BREAKER(S)

⚠ WARNING
THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.

REQD BY: NEC 705.12(B)(2)(3)(c) — 7
APPLY TO:
AC COMBINER PANEL

⚠ CAUTION ⚠
DO NOT INSTALL ADDITIONAL LOADS IN THIS PANEL

REQD BY: NEC 705.12(B)(2)(3)(c) — 8
APPLY TO:
AC COMBINER PANEL

⚠ WARNING
ARC FLASH HAZARD
APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY CAN RESULT IN INJURY OR DEATH. REFER TO NFPA 70E.

REQD BY: NEC 110.16, NFPA 70E — 9
APPLY TO:
AC COMBINER PANEL

PHOTOVOLTAIC SYSTEM DISCONNECT
AC CURRENT: 248 A
VOLTAGE: 480 VAC

REQD BY: NEC 690.54 — 10
APPLY TO:
POINT OF INTERCONNECTION

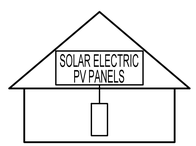
GRID TIED PHOTOVOLTAIC POWER SOURCE
MAX SYSTEM VOLTAGE: 995 V
MAX SYSTEM CURRENT: 113.7 A
MAX INVERTER OUTPUT:
50 kW, 66.2 A, 480 VAC

REQD BY: NEC 690.53 — 11
APPLY TO:
INVERTER #1

GRID TIED PHOTOVOLTAIC POWER SOURCE
MAX SYSTEM VOLTAGE: 918 V
MAX SYSTEM CURRENT: 121.8 A
MAX INVERTER OUTPUT:
50 kW, 66.2 A, 480 VAC

REQD BY: NEC 690.53 — 12
APPLY TO:
INVERTER #2 - #3

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN



TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY

REQD BY: NEC 690.12 & 690.56(C) — 13
APPLY TO:
RAPID SHUTDOWN INITIATION SWITCH

SIGNAGE REQUIREMENTS

1.) RED BACKGROUND W/ WHITE LETTERING, OR:
2.) WHITE BACKGROUND W/ BLACK LETTERING
3.) MIN. 3/8" LETTER HEIGHT
4.) ALL CAPITAL LETTERS
5.) ARIAL OR SIMILAR FONT
6.) WEATHER RESISTANT MATERIAL, PER UL 969

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

Engineering Approval:

REVISIONS

DESCRIPTION	DATE	REV
60% DELIVERABLE	11/29/2021	1
90% DELIVERABLE	12/10/2021	2
PERMIT SET	1/25/2022	A
AHJ COMMENTS	3/11/2022	B
NEW EQUIPMENT PAD	10/7/2022	C
AS-BUILTS	8/13/2024	D

Sheet Title:
SAFETY PLACARDS

Sheet Number:
E3.0

Sheet Size:
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SUNPOWER®

SunPower X-Series: X21-350-BLK

SunPower® Residential DC Panel

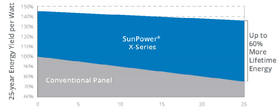
SunPower X-Series panels combine the top efficiency, durability and warranty available in the market today, resulting in more long-term energy and savings. [1,2]

Premium Aesthetics

SunPower® Signature™ Black X-Series panels blend harmoniously into your roof. The most elegant choice for your home.

Highest Lifetime Energy and Savings

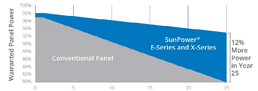
Designed to deliver 60% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures. [2]



Best Reliability, Best Warranty

With more than 25 million panels deployed around the world, SunPower technology is proven to last. That's why we stand behind our panel with the industry's best 25-year Combined Power and Product Warranty, including the highest Power Warranty in solar.

25 yr SunPower Complete Confidence



Fundamentally Different. And Better.

The SunPower Maxeon® Solar Cell

- Enables highest efficiency panels available [1]
- Unmatched reliability [3]
- Patented solid metal foundation prevents breakage and corrosion

As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard [4]
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition [5]
- Contributes to more LEED categories than conventional panels [6]

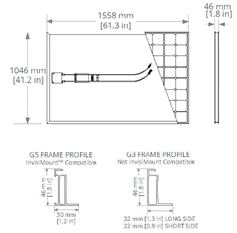
sunpower.com

X-Series: X21-350-BLK SunPower® Residential DC Panel

Electrical Data	SPR.X21-350-BLK	SPR.X21-335-BLK
Nominal Power (Pnom) [7]	350 W	335 W
Power Tolerance	+5/-0%	+5/-0%
Panel Efficiency	21.5%	20.6%
Rated Voltage (Vmpp)	57.3 V	57.3 V
Rated Current (Impp)	6.11 A	5.85 A
Open-Circuit Voltage (Voc)	68.2 V	67.9 V
Short-Circuit Current (Isc)	6.50 A	6.23 A
Max. System Voltage	600 V UL & 1000 V IEC	
Maximum Series Fuse	15 A	
Power Temp Coef.	-0.29% / °C	
Voltage Temp Coef.	-167.4 mV / °C	
Current Temp Coef.	2.9 mA / °C	

Operating Condition And Mechanical Data	
Temperature	-40° F to +185° F (-40° C to +85° C)
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)
Appearance	Class A+
Solar Cells	96 Monocrystalline Maxeon Gen III
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, MC4 compatible
Weight	41 lbs (18.6 kg)
Max. Load	G5 Frame: Wind: 62 psf, 3000 Pa front & back Snow: 125 psf, 6000 Pa front G3 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 113 psf, 5400 Pa front
Frame	Class 1 black anodized (highest AAMA rating)

Tests And Certifications	
Standard Tests [8]	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1000V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TLV, MCS, PSEC, CEC



G5 frames have no mounting holes. Please read the safety and installation guide.

1 SunPower 360 W compared to a Conventional Panel on same-sized arrays (260 W, 16% efficient, approx. 1.6 m²). 4% more energy per watt (based on PVSyst pan files). 0.7%/yr slower degradation (Campeau, Z. et al. "SunPower Module Degradation Rate." SunPower white paper., 2013).
2 Based on search of datasheet values from websites of top 10 manufacturers per IHS, as of January 2017.
3 #1 rank in "Fraunhofer PV Durability Initiative for Solar Modules: Part 3", PVTech Power Magazine, 2015. Campeau, Z. et al. "SunPower Module Degradation Rate." SunPower white paper. 2013.
4 SunPower is rated #1 on Silicon Valley Toxics Coalition's Solar Scorecard.
5 Cradle to Cradle Certified is a multi-attribute certification program that assesses products and materials for safety to human and environmental health, design for future use cycles, and sustainable manufacturing.
6 X-Series and E-Series panels additionally contribute to LEED Materials and Resources credit categories.
7 Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25° C), NREL calibration Standard; SOMS current, LACCS FF and Voltage.
8 Type 2 fire rating per UL1703:2013. Class C fire rating per UL1703:2002.

See www.sunpower.com/company for more reference information.
For more details, see extended datasheet: www.sunpower.com/solar-resources.
Specifications included in this datasheet are subject to change without notice.

1-800-SUNPOWER

SUNPOWER®

527835 Rev A / LTR_US

sunpower.com

YASKAWA

PVI 50TL & PVI 60TL

3-Ph Transformerless Commercial String Inverters

Features

- Integrated arc fault protection
- UL 1741SA listed
- 3 MPPTs with 5 inputs each
- Integrated DC and AC disconnects
- AC terminals compatible with copper and aluminum conductors
- Modbus communications
- Internal data logger
- 0 - 90° installation orientation
- Remote firmware upgrades
- Remote diagnostics
- Compatible with certain MLPE for module-level rapid shutdown*

Options

- Shade cover
- DC fuse bypass
- Web-based monitoring

Yaskawa Solectria Solar's PVI 50TL and PVI 60TL are grid-tied, transformerless three-phase inverters designed for ground mount, rooftop and carport arrays and can be installed from 0 - 90 degrees. The PVI 50/60TL inverters are the most reliable, efficient and cost effective in their class. They come standard with AC and DC disconnects, three MPPTs, a 15-position string combiner, remote diagnostics, remote firmware upgrades and various protection features. Options include shade cover, DC combiner fuse bypass, and web-based monitoring.

SOLECTRIA SOLAR

PVI 50TL & PVI 60TL

Specifications

	PVI 50TL	PVI 60TL
DC Input		
Absolute Maximum Input Voltage	1000 VDC	1000 VDC
Maximum Power Input Voltage Range (MPPT)	480-850 VDC	540-850 VDC
Operating Voltage Range (MPPT)	200-950 VDC	200-950 VDC
Maximum Operating Input Current	108 A (36 A per MPPT)	114 A (38 A per MPPT)
Number of MPP Trackers	3	3
Maximum Available PV Current (Isc x 1.25)	204 A (68 A per MPPT)	204 A (68 A per MPPT)
Maximum PV Power	75 kW (30 kW per MPPT)	90 kW (33 kW per MPPT)
Start Voltage	330 V	330 V
AC Output		
Nominal Output Voltage	480 VAC, 3-Ph/PE/N	480 VAC, 3-Ph/PE/N
AC Voltage Range (Standard)	-12/+10%	-12/+10%
PF=1.00 - Real/Apparent Power/Output Current	50 kW / 50 kVA / 60.2 A	60 kW / 60 kVA / 72.3 A
PF=+/-0.91 - Real/Apparent Power/Output Current	50 kW / 55 kVA / 66.2 A	60 kW / 66 kVA / 79.4 A
Nominal Output Frequency	60 Hz	60 Hz
Output Frequency Range	57-63 Hz	57-63 Hz
Power Factor	Unity; >0.99 (Adjustable 0.8 leading to 0.8 lagging)	Unity; >0.99 (Adjustable 0.8 leading to 0.8 lagging)
Fault Current Contribution (1 Cycle RMS)	55 A	55 A
Total Harmonic Distortion (THD) @ Rated Load	<3%	<3%
Recommended OCPD Device	90 A	100 A
AC Surge Protection	Type II MOV, 1240Vac, 15kA (8/20µ)	
Efficiency		
Peak Efficiency	99.0%	99.0%
CEC Efficiency	98.5%	98.5%
Tare Loss	< 2 W	< 2 W
Integrated String Combiner		
Fused Inputs	15 Fused Positions (5 Positions per MPPT) 15 A Standard (20, 25, 30 A accepted)**	
Temperature		
Ambient Temperature Range	-22°F to +140°F (-30°C to +60°C); Derating occurs over +122°F (+50°C)	
Storage Temperature Range	No low temp minimum to +158°F (+70°C)	
Relative Humidity (non-condensing)	0-95%	
Operating Altitude	13,123 ft (4,000 m) Derating occurs from 9,842.5 ft (3,000 m)	
Communications		
Modbus Protocol	SunSpec (PW 11.0 +) / Proprietary	
SolarView Web-Based Monitoring Service	Optional	
Revenue Grade Metering	Optional, External	
Communication Interface	RS-485 Modbus RTU and Ethernet TCP/IP	
Remote Firmware Upgrades	Standard	
Remote Diagnostics	Standard	
Features & Protections		
Arc-Fault	Standard	
Smart Grid Features	L/HVRT, L/HFRT, Volt-Var, Frequency-Watt and Volt-Watt, Soft-Start, Soft-Step	
Testing & Certifications		
Safety Listings & Certifications	UL 1741SA-2016, UL1699B, CSA-C22.2 #107.1, IEEE1547a-2014	
Advanced Grid Support Functionality	Rule 21, UL 1741SA	
Testing Agency	CSA	
FCC Compliance	FCC Part 15	
Warranty		
Standard Limited Warranty	10 Years	
Enclosure		
Acoustic Noise Rating	< 60 dBA @ 1 m at room temperature	
AC/DC Disconnect	Standard, fully integrated	
Mounting Angle***	0-90° from horizontal (vertical, angled, flat)	
Dimensions (H x W x D)	39.4 in. x 23.6 in. x 10.2 in (1,000 mm x 600 mm x 260 mm)	
Weight	Inverter: 123.5 lbs (56 kg); Wiring Box: 33 lbs (15 kg)	
Enclosure Rating and Finish	Type 4X, Polyester Powder Coated Aluminum	

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

SOLECTRIA SOLAR

Yaskawa Solectria Solar
360 Merrimack Street
Lawrence, MA 01843
solectria.com
1-978-683-9700
inverters@solectria.com

DOCR-070642-S | November 2019

YASKAWA

APsmart

Raising the bar in innovative DC MLPE solar power systems

RSD-S-PLC

- Meets NEC 2017 & 2020 (690.12) requirements
- Executes rapid shutdown of system when Transmitter-PLC signal is absent
- Meets SunSpec requirements

The RSD-S-PLC meets SunSpec requirements,maintaining normal function by continually receiving a heartbeat signal from the APsmart Transmitter. The RSD executes rapid system shutdown when the Transmitter signal is absent. Users can manually execute rapid shutdown using Transmitter breaker switch.

> RSD-S-PLC TECHNICAL DATA

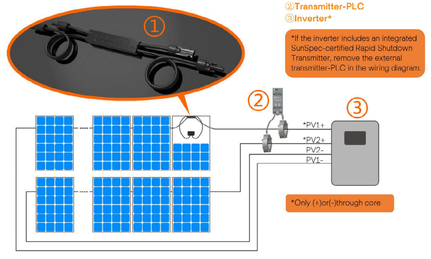
MODEL	RSD-S-PLC
INPUT DATA (DC)	
Input Operating Voltage Range	8-80V
Maximum Cont. Input Current (Imax)	15A
Maximum Short Circuit Current (Isc)	25A
OUTPUT DATA (DC)	
Output Operating Voltage Range	8-80V
Maximum System Voltage	1000V/1500V
Maximum Series Fuse Rating	30A
MECHANICAL DATA	
Operating Ambient Temperature Range	-40°F to +185°F (-40 °C to + 85 °C)
Dimensions (without cable & connectors)	5" x 1.2" x 0.6"(129 mm x 30 mm x 16 mm)
Cable Length	Input 250mm/Output 1200mm
Cable Cross Section Size	UL:12AWG
Connector	Stäubli MC4 PV-KBT4&KST4 or Customize
Enclosure Rating	NEMA Type 6P/IP68
Over Temperature Protection	Yes
FEATURES & COMPLIANCE	
Communication	PLC
Safety Compliance	NEC 2017 & 2020 (690.12); UL1741; CSA C22.2 No. 330-17; IEC/EN62109-1; 2PFG2305
EMC Compliance	FCC Part15; ICES-003/IEC/EN61000-6-1/-2/-3/-4

Rapid Shutdown CERTIFIED

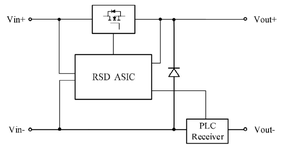
REV 2.3 2021-11-11

APsmart

> RSD-S-PLC WIRING DIAGRAM



> WORKING SCHEMATIC DIAGRAM



ORDERING INFORMATION	
415002	1500V UL, 1.2m cable, Stäubli MC4 PV-KBT4&KST4
415001	1000V UL, 1.2m cable, Customized connector

APsmart
600 Ericksen Ave NE, Suite 200 Seattle, WA 98110 | +1-737-218-8486 | +1-866-374-8538 | support@APsmartGlobal.com | APsmartGlobal.com

REV 2.3 2021-11-11

MG Series Technical Specifications

	MG30	MG125	MG250	MG500	MG1000
Three Phase Operation					
AC Voltage	480 VAC	480 VAC	480 VAC	480 VAC	480 VAC
AC Input/Output Current	36A	150A	300A	600A	1255A
AC Output Power (Discharge)	30kW	125kW	250kW	500kW	1000kW
AC Input Power (Charge)	30kW	125kW	250kW	500kW	1000kW
Battery Capacity	78kWh	220kWh	660kWh	1,100kWh	2,640kWh
AC Frequency (Field Settable)	60 Hz	60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
MAX AC Overcurrent Protection	200A	250A	400A	800A	1600A
Peak Efficiency	97%	97%	97%	97%	97%
AC Connection	3 Phase, 3 Wire	3 Phase, 3 Wire	3 Phase, 3 Wire	3 Phase, 3 Wire	3 Phase, 3 Wire
Equipment Specifications					
External Dimensions(L x W x H)	60" x 36" 84"	60" x 36" 104"	124" x 75" 111"	170" x 75" x 111"(201" length includes HVAC)	(2) 170" x 75" x 111"(201" with HVAC) + INV
Weight	4,300 lbs.	5,500 lbs.	17,000 lbs.	25,000 lbs.	56,000 lbs.
Lifting Provisions	Pallet Jack/Fork Lift	Fork Lift Slots	Fork Lift Slots	Fork Truck or Lift Strap	Fork Truck or Lift Strap
Paint Tested	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray
Fire Suppression	3M Novec 1230	3M Novec 1230	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water
Handles	Stainless Steel Lockable	Stainless Steel Lockable	Reversible/Lockable	Reversible/Lockable	Reversible/Lockable
Temperature Range	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C
MG Series Expansion Modules					
Max kWh	156kWh	220kWh	880kWh	1,320kWh	1,320kWh
External Dimensions(L x W x H)	60" x 36" 84"	60" x 36" 104"	124" x 75" 106"	170" x 75" x 111"(201" length includes HVAC)	170" x 75" x 111"(201" length includes HVAC)
Weight	4,050 lbs.	5,250 lbs.	16,750 lbs.	25,000 lbs.	28,000 lbs.
Lifting Provisions	Pallet Jack/Fork Lift	Fork Lift Slots	Fork Lift Slots	Fork Truck or Lift Strap	Fork Truck or Lift Strap
Paint Tested	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray
Fire Suppression	3M Novec 1230	3M Novec 1230	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water
Handles	Stainless Steel Lockable	Stainless Steel Lockable	Reversible/Lockable	Reversible/Lockable	Reversible/Lockable
Temperature Range	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C

ALL MG SERIES PRODUCTS	
Control Software	
ELM Autonomous MicroGrid Site Control System	☑
Access & Alerts on Desktop & Mobile 24/7	☑
Asset Monitoring System Level & Individual	☑
Individual Microgrid Component Pages	☑
Local HMI IP 65 Touchscreen	☑
Communications: Wifi, Ethernet, Cellular	☑
Operation Parameters	
Islanded Mode	Off Grid Applications
Grid Tied Mode	Peak Shaving Backup Power Demand Response
Distributed Generation	Time of Use Operation
Key System Components	
NEMA 3R Enclosure	☑
Bi Directional Storage Inverter	☑
DC Disconnect (Battery)	☑
AC Disconnect (Inverter)	☑
AC Disconnect (Utility Interconnect)	☑
AC Circuit Breaker (Load Panel)	☑
PV Disconnect	☑
Utility Disconnect	☑
Climate Controls	☑
Certifications	
Batteries	UL 1973, UL 9540A
Inverter	UL 1741 SA
System	UL 9540

Contractor:

Project:
404 TACONIC MICROGRID
[redacted]

Project Details:
186.20 kWstc, 150.00 kW AC
[redacted]

Engineering Approval:

REVISIONS

DESCRIPTION	DATE	REV
60% DELIVERABLE	11/29/2021	1
90% DELIVERABLE	12/10/2021	2
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EQUIPMENT DATA SHEETS

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