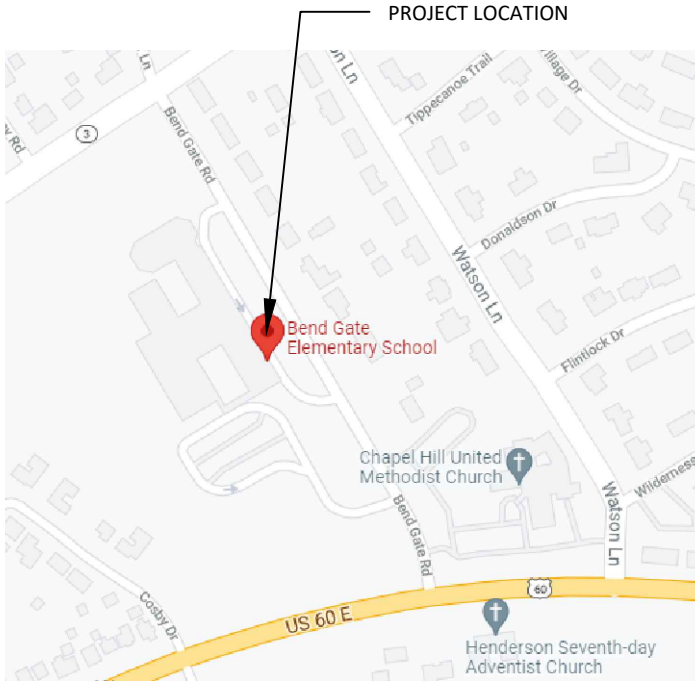
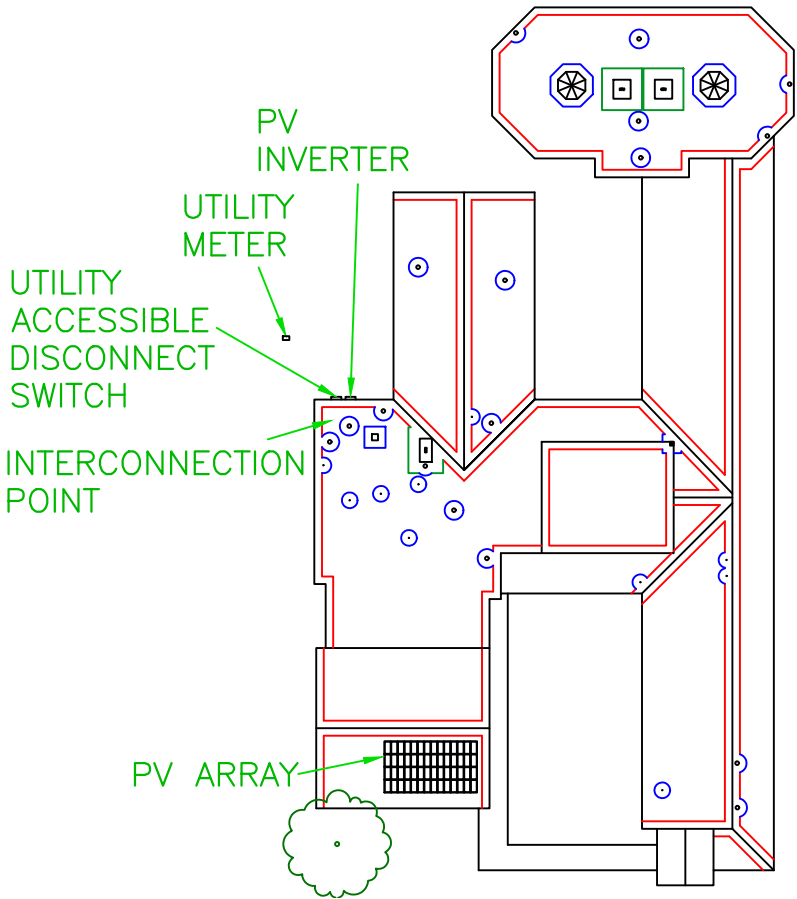


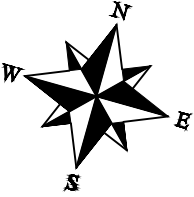
24.36kW DC PHOTOVOLTAIC
PITCHED ROOF SYSTEM
FOR
HENDERSON COUNTY SCHOOLS
GUARANTEED ENERGY SAVINGS CONTRACT



3 VICINTY MAP



1 SITE OVERVIEW



2 ROOFTOP VIEW OF SITE

INDEX

SHEET #	SHEET TITLE
PV1.0	COVER SHEET
PV1.1	GENERAL NOTES
PV1.2	SITE PLAN
PV1.3	PLOT PLAN
PV1.4	STAGING AREA
PV1.5	PHOTO MAP
PV1.6	ROOF A BALLAST & STRINGS
E1.0	UAD & INVERTER RISER
E1.1	EXTERIOR CONDUIT PLAN
E1.2	SINGLE LINE DIAGRAM
E1.3	SAFETY PLACARDS & SIGNAGE



BID
DOCUMENTS

Bend Gate Elementary School
Henderson County Schools
920 Bend Gate Rd
Henderson, KY 42420

COVER SHEET

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

PV 1.0



GENERAL NOTES:

1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.

BID
DOCUMENTS

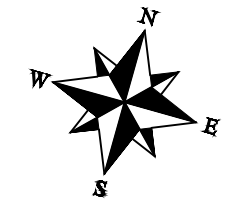
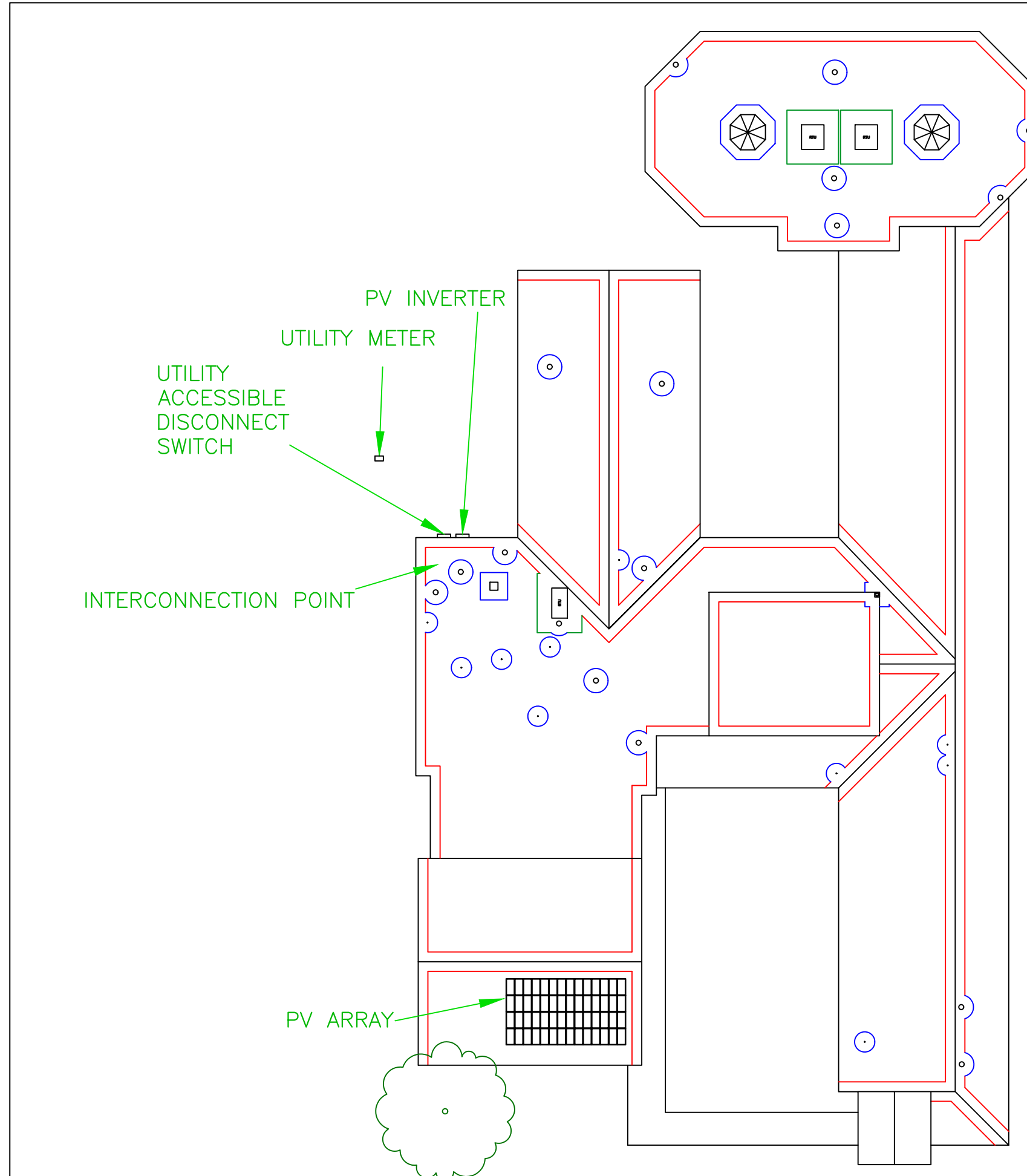
Bend Gate Elementary School
Henderson County Schools
920 Bend Gate Rd
Henderson, KY 42420

GENERAL NOTES

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

PV 1.1



System Summary

Electrical Equipment:

- 56 – SunPower 435W Commercial Solar Module
- 28 – SolarEdge P1101 Power Optimizer
- 1 – SolarEdge 20kW Three Phase Inverter

24.36kW DC System Size
20kW AC System Size

Roof Details:

Roof Type: Standing Seam

Racking Type: Standard Rail System with S5! Attachments

Module Tilt: 5 Degrees

Azimuth: 149 Degrees

- Key:
- Solar Module
 - 4ft Roof Edge Setback
 - 4ft Obstruction Setback
 - 6ft Equipment Setback
 - Roof Drain
 - Roof Vent
 - Roof Top Unit



BID DOCUMENTS

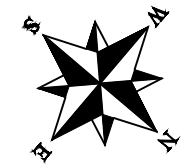
Bend Gate Elementary School
Henderson County Schools
920 Bend Gate Rd
Henderson, KY 42420

SITE PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS	
1.	Bidding 3/3/2022

PV 1.2



BID
DOCUMENTS

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PLOT PLAN

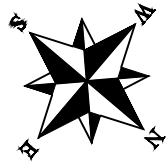
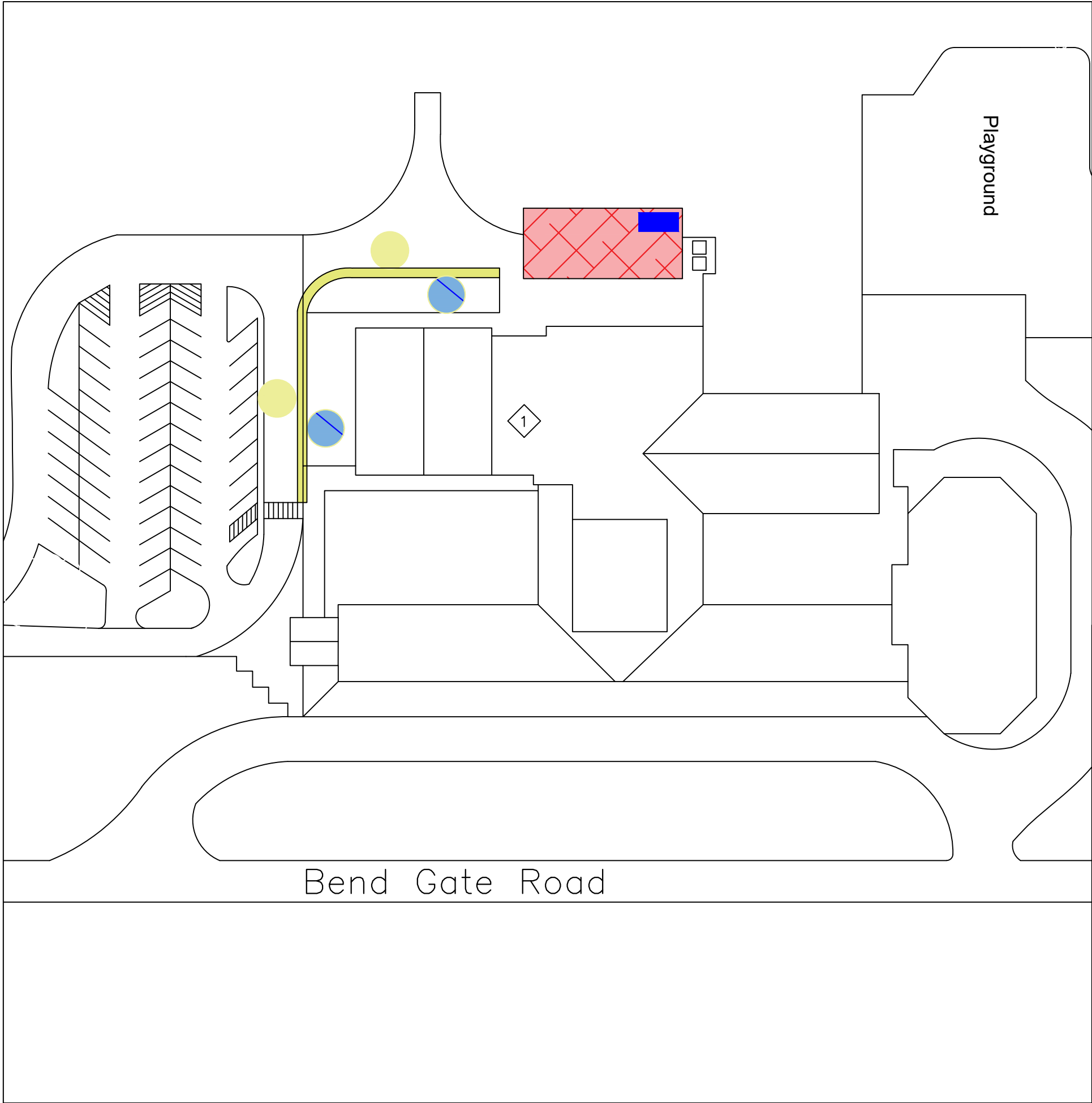
Bend Gate Road

Playground

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS	
1.	Bidding 3/3/2022

PV 1.3



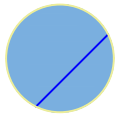
BID
DOCUMENTS

TAG NOTES/KEY:



SUBCONTRACTOR TO USE
TIE-OFF POINTS ON ROOF RIDGE
FOR FALL PROTECTION

KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 6' FROM
ROOF EDGE DURING PV INSTALL

Bend Gate Elementary School
Henderson County Schools
920 Bend Gate Rd
Henderson, KY 42420

SAFETY AND STAGING AREA

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

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PV 1.4



BID
DOCUMENTS

Bend Gate Elementary School
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920 Bend Gate Rd
Henderson, KY 42420

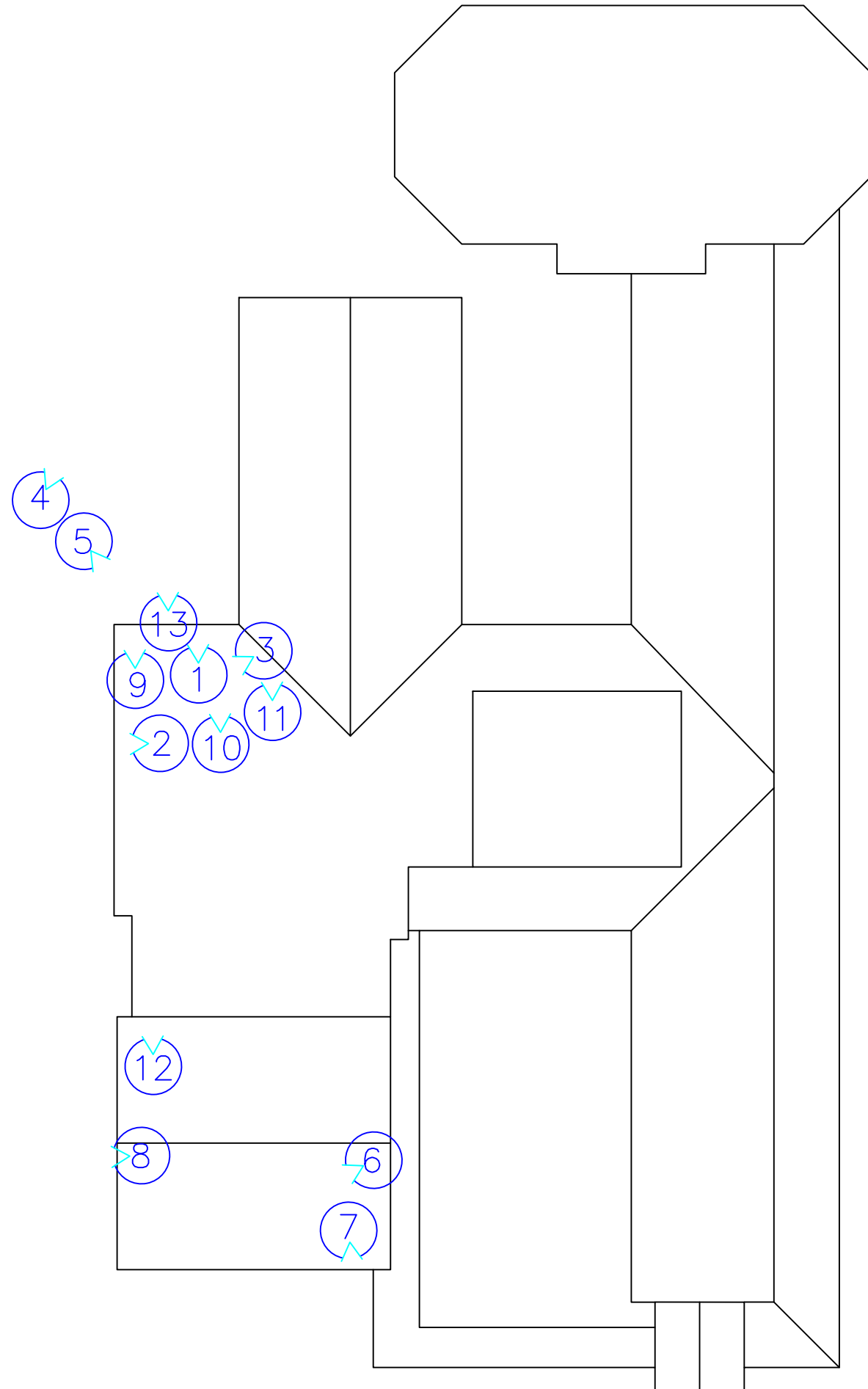
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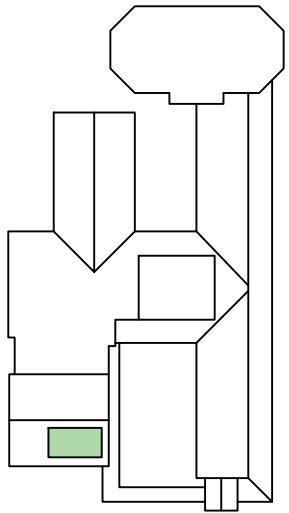
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DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS

1. Bidding 3/3/2022

PV 1.5





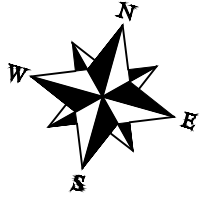
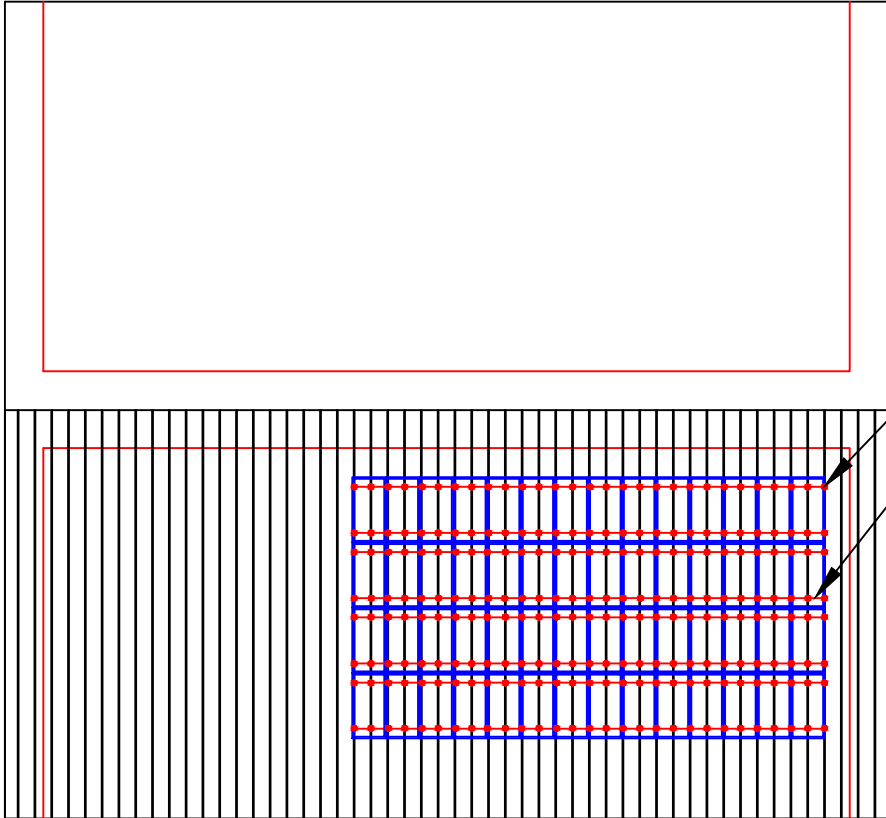
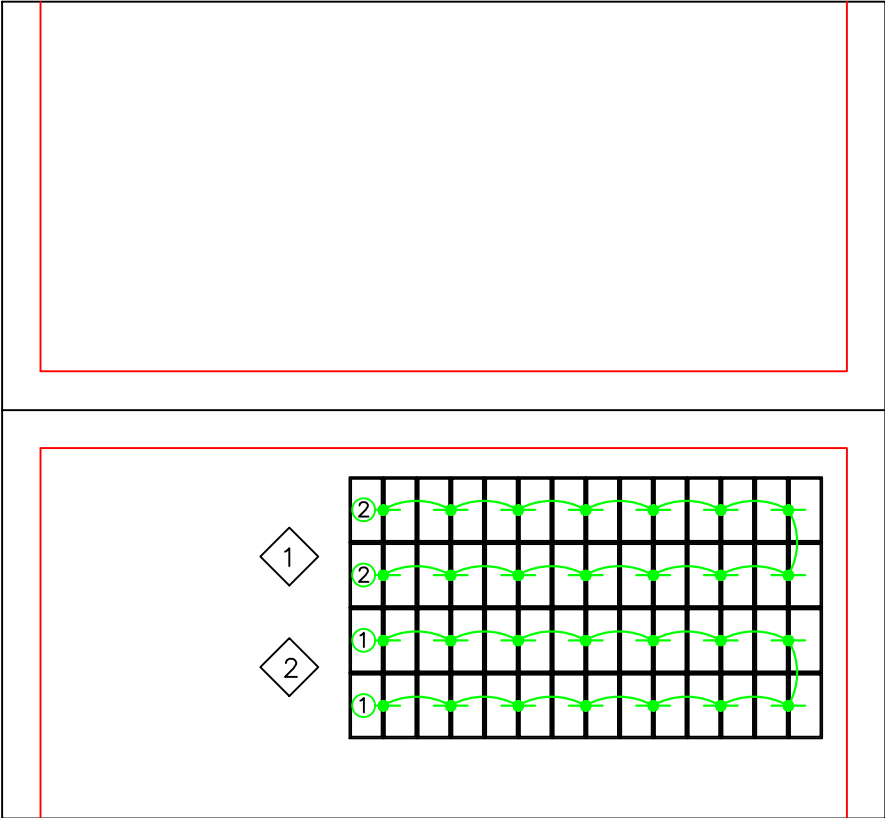
String	Modules	Optimizers
1	28	14
2	28	14

- TAG NOTES/KEY:**
- 1 Wire management shall be neat and professional. No wires shall be laying on roof surfaces.
 - 2 Should strings change or run differently be sure to create as built drawings and give to BID manager.
 - 3 S5! Standing Seam Attachment Point
 - 4 Unirac Rail System
 - 5 Contractor shall not damage or scrape metal roof when attaching S5! clamps

Part List	
Item	Quantity
SM Rail 168" Mill	32
Splice	24
End Clamp	32
Mid Clamp	96
Metal Roof Attachment S-5!	232
Grounding Lug	8

Torque Specification Unirac Rail System	
Item	Foot Pounds
Mid Clamp	11
MLPE Mount	10
End Clamp	3
L-Foot to Rail	30
Rail Splice	10

Torque Specification for S5! Clamp	
Specified Torque	Foot Pounds
22ga steel	13-15
All other metals and gauges	11-12.5



BID
DOCUMENTS

Bend Gate Elementary School
Henderson County Schools
920 Bend Gate Rd
Henderson, KY 42420

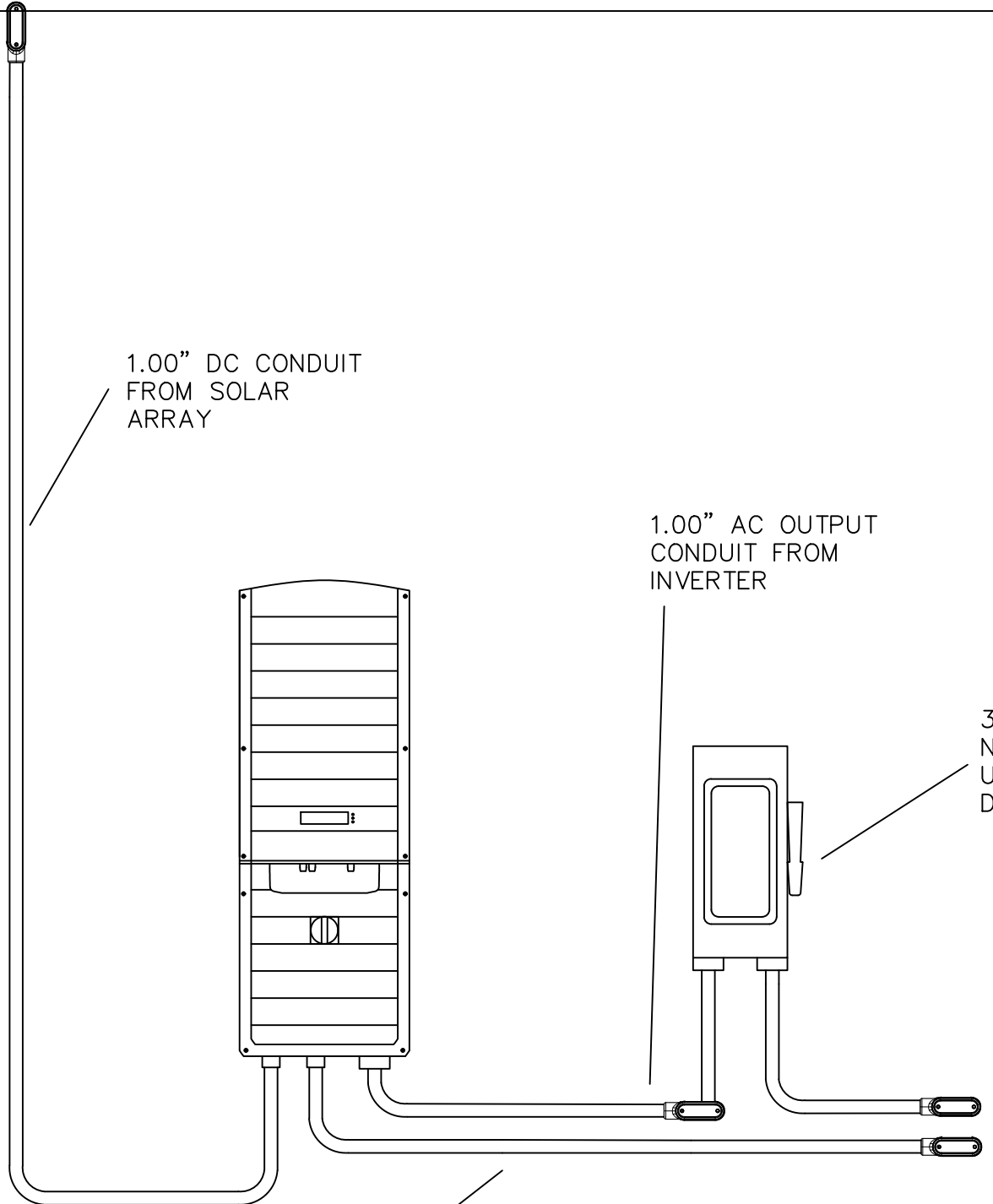
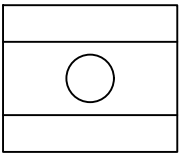
BALLAST AND STRINGS

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
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REVISIONS	
1.	Bidding 3/3/2022

Building Height is ~24'

PV 1.6



BID
DOCUMENTS

Bend Gate Elementary School
Henderson County Schools
920 Bend Gate Rd
Henderson, KY 42420

UAD AND INVERTER RISER

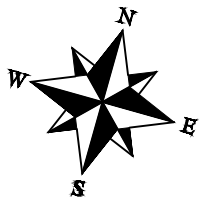
CLIENT/CMTA JOB #:	2HIC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS	
1.	Bidding 3/3/2022

E 1.0

TAG NOTES/KEY:

- 1 AC HOMERUN TO MDP PENETRATES WALL AND CONTINUES INSIDE OF ELECTRICAL ROOM
- 2 SUBCONTRACTOR TO SECURE EMT WITH S51 CLAMPS EVERY 6 FEET



BID
DOCUMENTS

Bend Gate Elementary School
Henderson County Schools
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Henderson, KY 42420

EXTERIOR CONDUIT PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

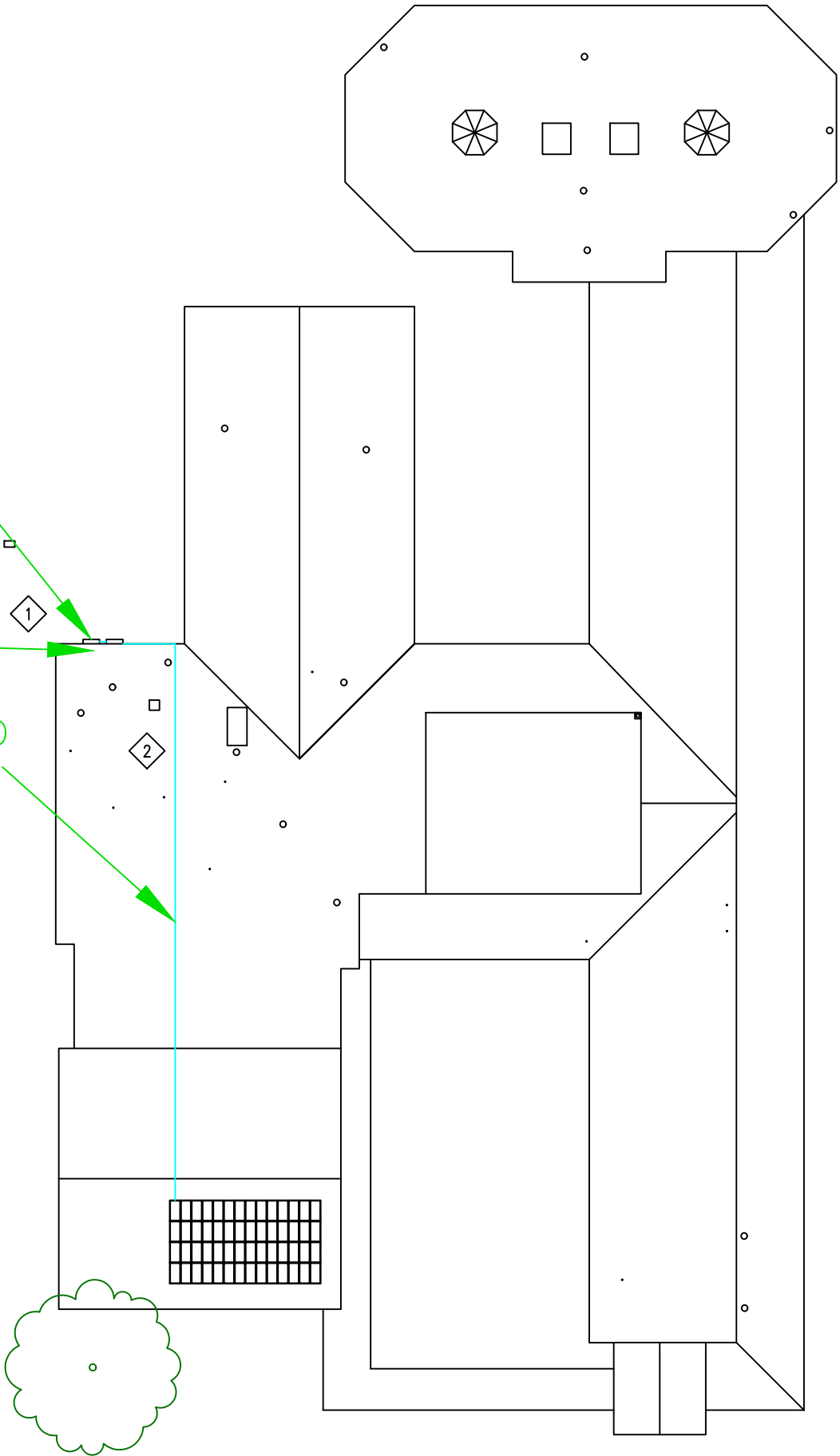
REVISIONS
1. Bidding 3/3/2022

E 1.1

UTILITY
ACCESSIBLE
DISCONNECT

AC HOMERUN TO
SUBPANEL: 15'

DC HOMERUN TO
INVERTER: 210'

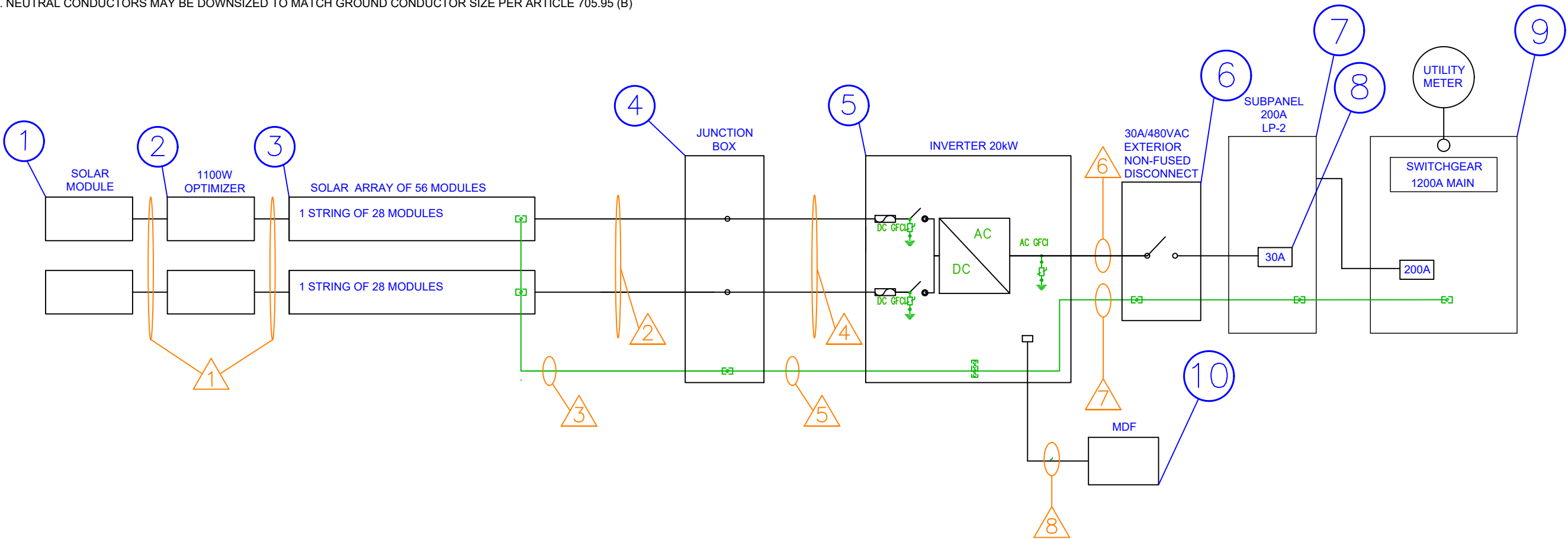


ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



BID
DOCUMENTS



Equipment Schedule				
Tag	Description	Quantity	Part Number	Notes
1	Solar PV Module	56	SPR-E20-435-COM	SunPower 435W Commercial Solar Module
2	Solar PV Optimizer	28	P1101	SolarEdge Power Optimizer
3	Solar Array	1		56 Solar Modules in 2 strings
4	Junction Box	1		Soltection Transition Box 1000 Nema 3R
5	Inverter	1	SE20KUS	SolarEdge 20kW Three Phase 480V Commercial Inverter
6	Utility Accessible Disconnect Switch	1	SquareD	Unfused 30A/600V SquareD NEMA 3R Disconnect 3PH
7	Sub Panel	1	ITE Switchboard	200A/480V ITE Sub Panel w/200A Main
8	30A ITE Breaker	1	ITE	30A Three Phase Breaker
9	Main Distribution Panel	1	ITE Switchboard	1200A/480V ITE Switchboard w/1200A Main
10	Main Distribution Frame	1		Main Server Rack for Building

Conductor and Raceway Schedule					
Tag	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size
1	USE-2 (MFG Cables & Connectors)	12 CU	4	FREE AIR	N/A
2	PV Wire	10 CU	4	FREE AIR	N/A
3	Bare Copper Equipment Ground (EGC)	6 CU	1	FREE AIR	N/A
4	XHHW 1,000V	10 CU	4	EMT	1.00"
5	XHHW-Ground	6 CU	1	EMT	1.00"
6	THWN-2 600V	10 CU	4	EMT	1.00"
7	THWN-Ground	6 CU	1	EMT	1.00"
8	CAT6 Plenum	24 CU	1	EMT	0.50"

CLIENT/CMTA JOB #:	ZHC22
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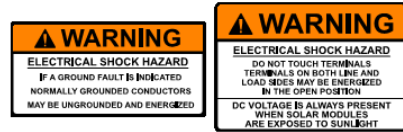
REVISIONS	
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E 1.2

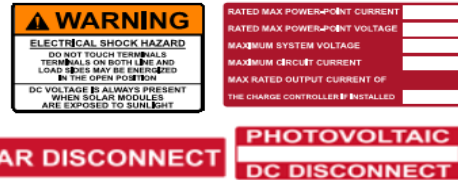
Bend Gate Elementary School
Henderson County Schools
920 Bend Gate Rd
Henderson, KY 42420
SINGLE LINE DIAGRAM

A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.



C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.



D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

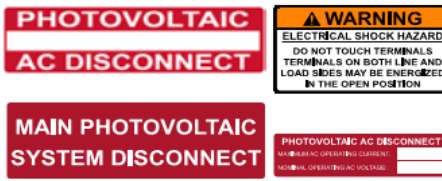
E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.



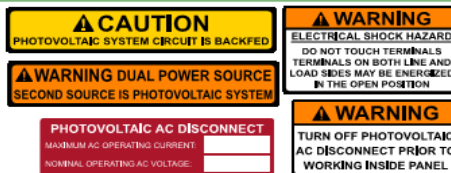
F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

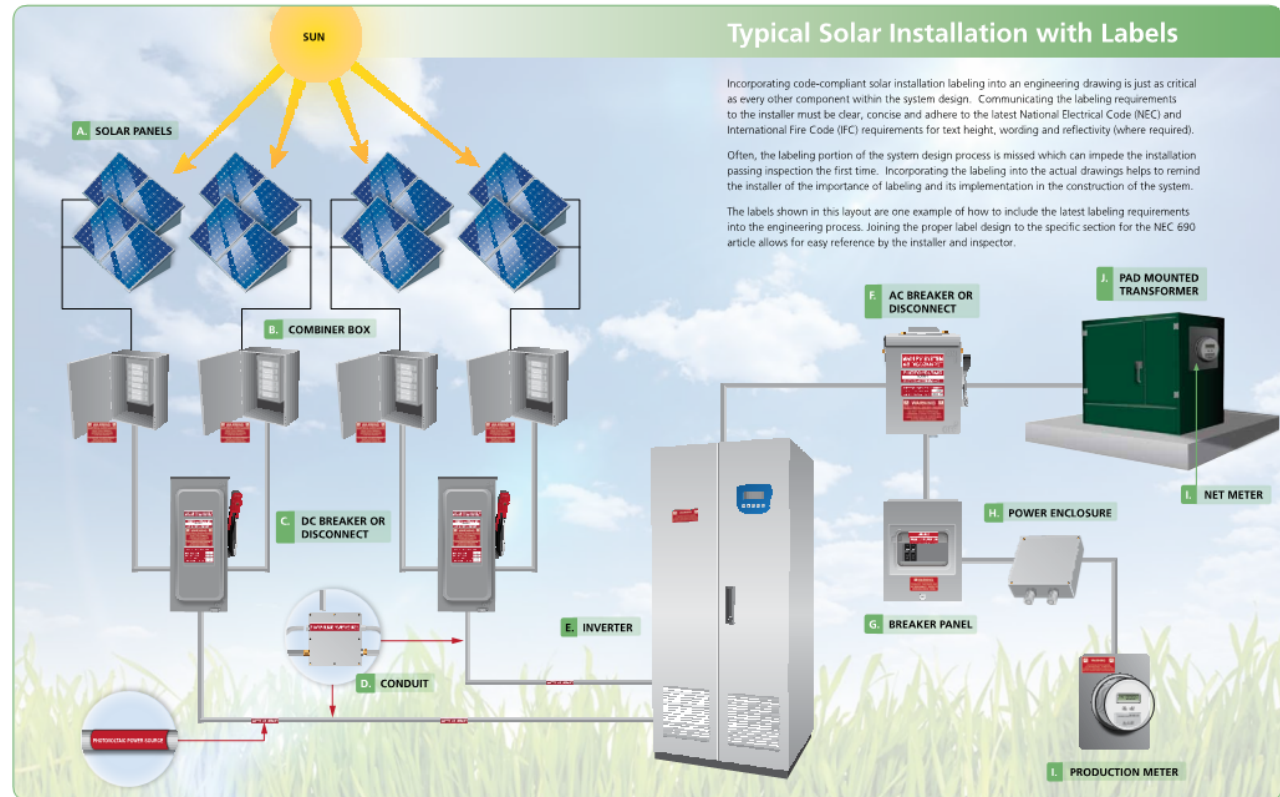


H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.



J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.



CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022



SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

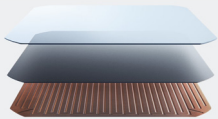
Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



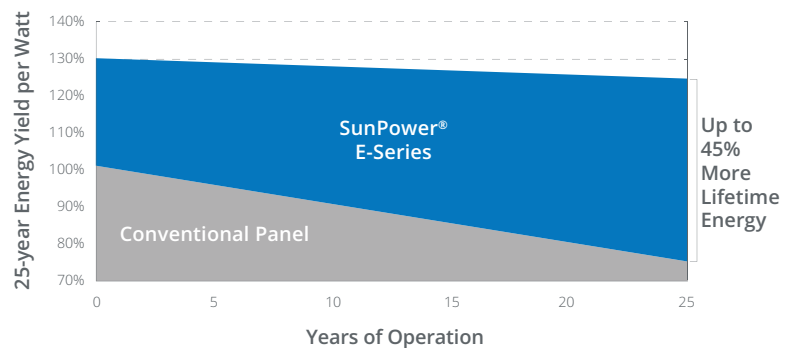
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



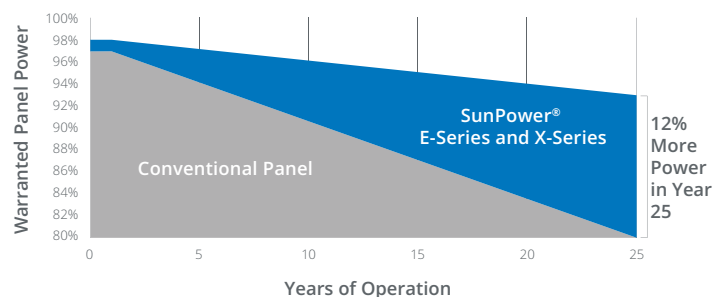
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.

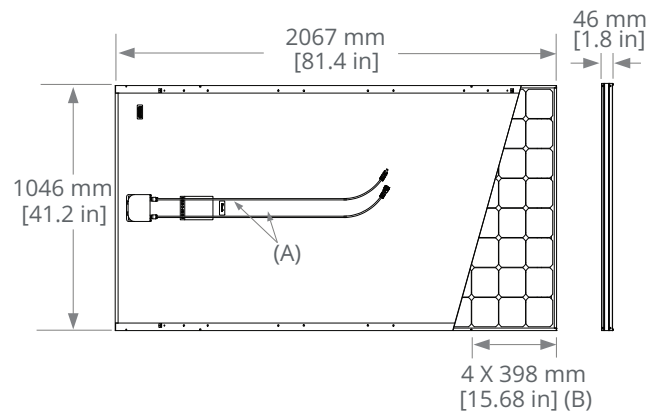


E-Series: E20-435-COM SunPower® Commercial DC Panel

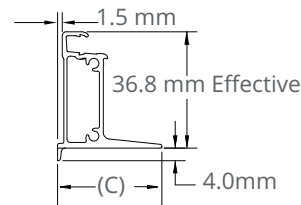
Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 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	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins

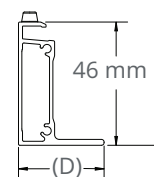
Tests And Certifications	
Standard Tests ⁸	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/- 10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

1 SunPower 327 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), 0.75%/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.

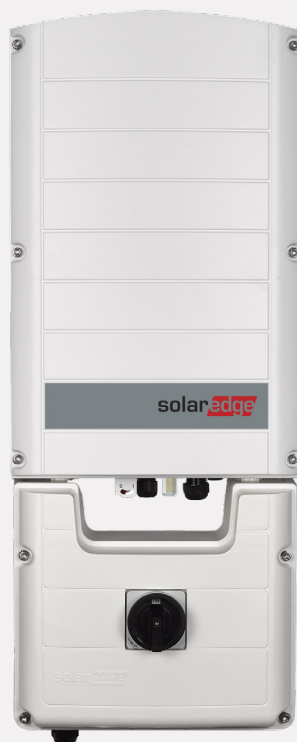
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Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 277/480V Grid for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS)



The best choice for SolarEdge enabled systems

- / Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- / Specifically designed to work with power optimizers
- / Superior efficiency (98%)
- / Fixed voltage inverter for longer strings
- / Integrated Safety Switch
- / UL1741 SA certified, for CPUC Rule 21 grid compliance
- / Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- / Built-in module-level monitoring
- / Internet connection through Ethernet or Wireless
- / Small, lightweight, and easy to install outdoors or indoors on provided bracket
- / Supplied with RS485 Surge Protection Device, to better withstand lightning events

/ Three Phase Inverters for the 277/480V Grid⁽¹⁾ for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS

SE10KUS		SE20KUS		SE30KUS		SE33.3KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER		SEXXX-XXXXXBXX4					
OUTPUT							
Rated AC Power Output	10000	20000	30000	33300	VA		
Maximum AC Power Output	10000	20000	30000	33300	VA		
Output Line Connections	3 phase, 3-wire / PE (L1-L2-L3), TN, TT			3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT			
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)	244-277-305			Vac			
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)	422.5-480-529			Vac			
AC Frequency Min-Nom-Max ⁽²⁾	59.3 - 60 - 60.5			Hz			
x. Continuous Output Current (per Phase)	12	24	36.5	40	A		
GFDI Threshold	1			A			
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes						
THD	≤ 3			%			
INPUT							
Maximum DC Power (Module STC)	13500	27000	40500	40500	W		
Transformer-less, Ungrounded	Yes						
Maximum Input Voltage DC to Gnd	490			Vdc			
Maximum Input Voltage DC+ to DC-	1000			Vdc			
Nominal Input Voltage DC to Gnd	420			Vdc			
Nominal Input Voltage DC+ to DC-	840			Vdc			
Maximum Input Current	13.5	26.5	39	40	Adc		
Maximum Input Short Circuit Current	45			Adc			
Reverse-Polarity Protection	Yes						
Ground-Fault Isolation Detection	1MΩ Sensitivity		350kΩ Sensitivity ⁽³⁾				
CEC Weighted Efficiency	98		98.5		%		
Night-time Power Consumption	< 3		< 4		W		
ADDITIONAL FEATURES							
Supported Communication Interfaces	2 x RS485, Ethernet, Built-in GSM (optional)						
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi station for local connection						
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect ⁽⁴⁾						
RS485 Surge Protection	Supplied with the inverter						
Smart Energy Management	Export Limitation						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)						
Emissions	FCC part15 class B						
INSTALLATION SPECIFICATIONS							
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG		3/4" minimum / 8-4 AWG				
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG						
Number of DC inputs	2 pairs		3 pairs ⁽⁵⁾				
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260			in / mm			
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260			in / mm			
Weight	73.2 / 33.2		99.5 / 45		lb / kg		
Weight with Safety Switch	79.7 / 36.2		106 / 48		lb / kg		
Cooling	Fans (user replaceable)						
Noise	< 50		< 55		dBA		
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁶⁾			°F / °C			
Protection Rating	NEMA 3R						

(1) For 120/208V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-208V-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) P/Ns SE10K/SE20K-US0xxxxx have Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)

(5) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(6) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

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Power Optimizer

For North America

P860 / P960 / P1101



POWER OPTIMIZER

PV power optimization at the module-level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses and combiner boxes, over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

/ Power Optimizer For North America

P860 / P960 / P1101

Power OptimizerModel (Typical Module Compatibility)	P860 (for 2 x 72 cell modules)		P960 (for 2 x 72 cell modules)		P1101 (for up to 2 x high power or bi-facial modules)	
INPUT						
Rated Input DC Power ⁽¹⁾	860		960		1100	W
Connection Method	Dual input for independently connected modules ⁽²⁾				Single input for series connected modules	
Absolute Maximum Input Voltage (Voc at lowest temperature)	60				125	Vdc
MPPT Operating Range	12.5 - 60				12.5 - 105	Vdc
Maximum Short Circuit Current (Isc)	22		23.2		14.1	Adc
Maximum Short Circuit Current per Input (Isc)	11		11.6		-	Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.6					%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)						
Maximum Output Current	18					Adc
Maximum Output Voltage	80					Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
Photovoltaic Rapid Shutdown System	Compliant with NEC 2014, 2017, 2020					
EMC	FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741				IEC62109-1 (class II safety), UL1741, UL3741	
Material	UL94 V-0, UV resistant					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Compatible SolarEdge Inverters	Three phase inverters				SE30K & larger	
Maximum Allowed System Voltage	1000					Vdc
Dimensions (W x L x H)	129 x 168 x 59 / 5.1 x 6.61 x 2.32				129 x 162 x 59 / 5.1 x 6.4 x 2.32	mm / in
Weight	1064 / 2.34					gr / lb
Input Connector	MC4 ⁽³⁾					
Input Wire Length Options	Input #1	Input #2	Input #1	Input #2	-	
1	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2	1.6 / 5.2	m / ft
2	(-) 1.6 / 5.2, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 1.6 / 5.2				
3	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2				
Output Wire Type / Connector	Double insulated; MC4					
Output Wire Length	2.3 / 7.5		2.3 / 7.5		2.4 / 7.8	m / ft
Operating Temperature Range ⁽⁴⁾	-40 to +85 / -40 to +185					°C / °F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.

(2) In the event of an odd number of PV modules in one string, installation of one P860 /P960 Power Optimizer connected to one PV module is allowed. When connecting a single module to the P860/P960, seal the unused input connectors with the supplied pair of seals.

(3) For other connector types please refer to: <https://www.solaredge.com/sites/default/files/optimizer-input-connector-compatibility.pdf>

(4) For ambient temperature above +70°C / +158°F, power de-rating is applied. Refer to the Power Optimizers Temperature De-Rating Application Note for more details.

PV System Design Using a SolarEdge Inverter ⁽⁵⁾⁽⁶⁾		208V Grid SE14.4K*	208V Grid SE17.3K*	277/480V Grid SE20K, 30K	277/480V Grid SE33.3K*, SE40K*	
Compatible Power Optimizers		P860, P960, P1101	P860, P960, P1101	P860, P960, P1101	P860, P960, P1101	
Minimum String Length	Power Optimizers	8	9	14	14	
	PV Modules	15	17	27	27	
Maximum String Length	Power Optimizers	30	30	30	30	
	PV Modules	60	60	60	60	
Maximum Continuous Power per String		7200	8730	15300	15300	W
Maximum Allowed Connected Power per String ⁽⁷⁾ (Permitted only when the difference in connected power between strings is up to 2,000W for the 277/480V grid, or 1,000W for the 208V grid)		1 string - 8400 2 strings or more - 9000	1 string - 9930 2 strings or more - 10530	1 string - 17550 2 strings or more - 20300	2 strings or less - 17550 3 strings or more - 20300	W
Parallel Strings of Different Lengths or Orientations		Yes				

* The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter.

(5) P860/P960 can be mixed in one string only with P860/P960.

(7) P860/P960 design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification.

(8) To connect more STC power per string, design your project using [SolarEdge Designer](#).

S-5![®]

The Right Way![®]

S-5-T Clamp

The S-5-T clamp is specially developed to fit profiles having a "T" shaped seam configuration. It will also work on architectural "single-fold," or "horizontal seam" profiles having a horizontal projection of 5/8" or less. Its two-piece design allows it to be easily installed anywhere along the length of the panel seam.

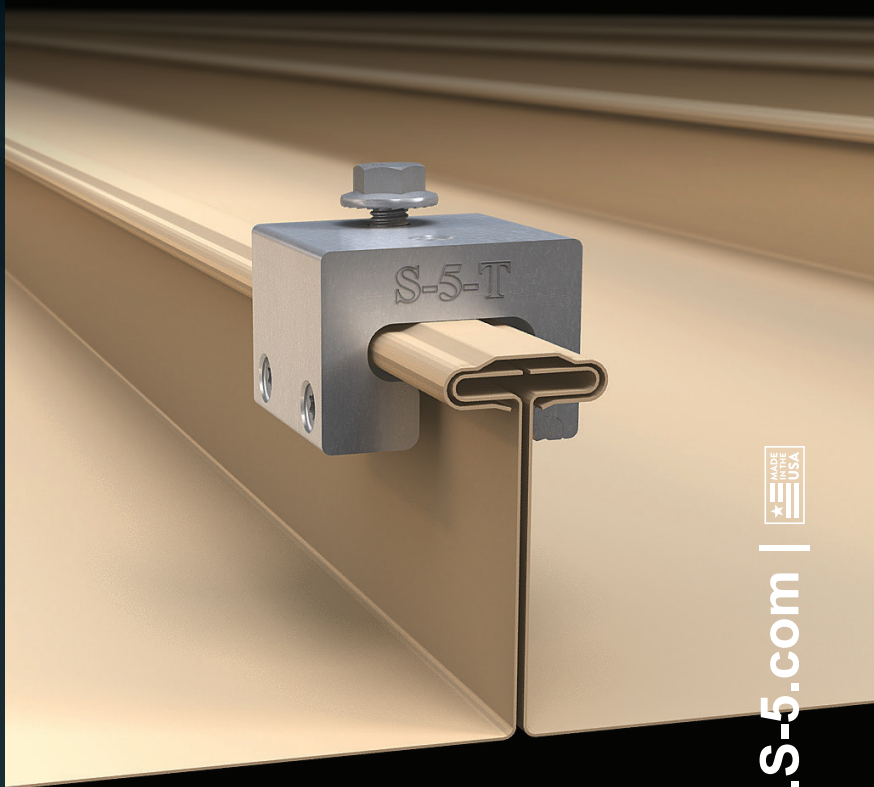
The S-5-T (illustrated in Steps 1–4) is perfect for use with S-5![®] ColorGard[®] snow retention system and other heavy-duty applications.

Installation is as simple as placing the clamp on the seam, positioning the insert piece, and tightening the patented round-point setscrews to the specified tension. Then, affix ancillary items using the bolt provided. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-T Mini Clamp

The S-5-T Mini is a bit shorter than the S-5-T and has one setscrew rather than two. The mini (illustrated in the rendering to the right) is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*

*S-5! mini clamps are not compatible with, and should not be used with, S-5! SnoRail™/SnoFence™ or ColorGard[®] snow retention systems.



The S-5-T clamp is specifically developed to fit profiles having a "T" shaped seam configuration.

The right way to attach almost anything to metal roofs!

S-5-T and S-5-T Mini



888-825-3432 | www.S-5.com |

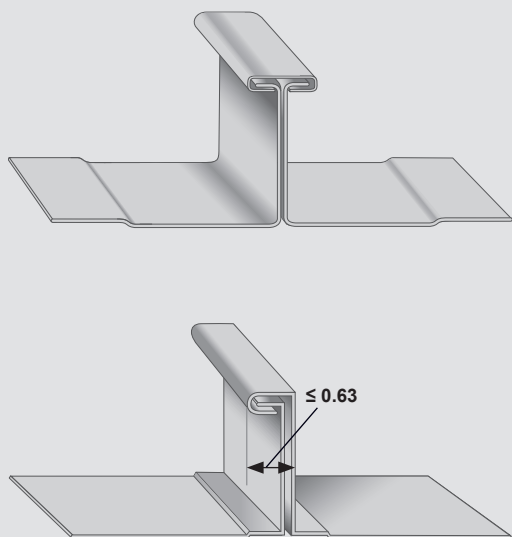


The strength of the S-5-T clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but will not puncture it—leaving roof warranties intact.

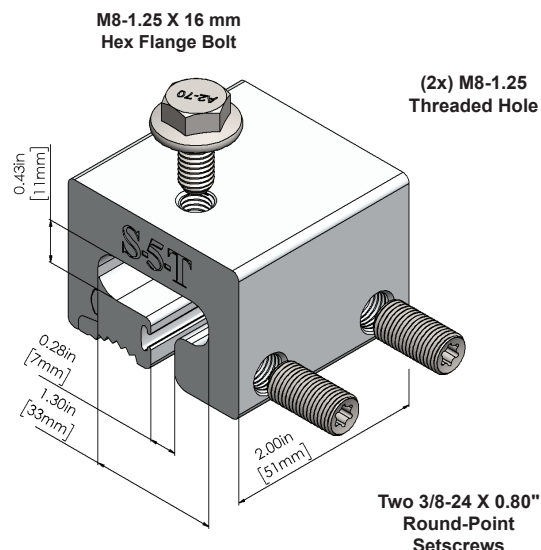
The **S-5-T** and **S-5-T Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-T is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit www.S-5.com for more information including CAD details, metallurgical compatibilities and specifications.

The S-5-T clamp has been tested for load-to-failure results on a variety of "T" shaped standing seam roof profiles from leading manufacturers of panels. The independent lab test reports found on our website at www.S-5.com prove that S-5!® holding strength is unmatched in the industry.

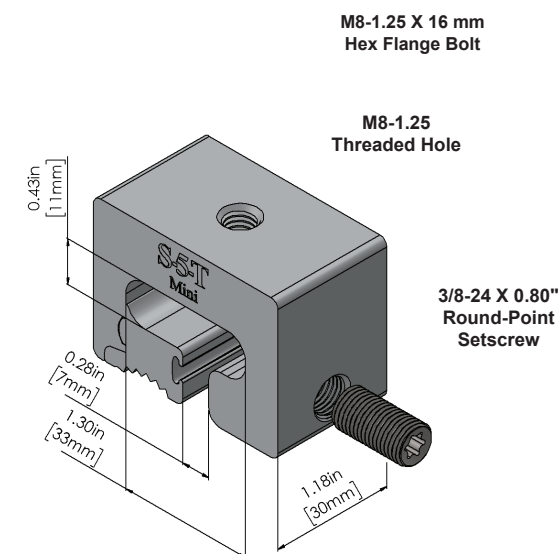
Example Profiles



S-5-T Clamp



S-5-T Mini Clamp



Please note: All measurements are rounded to the second decimal place.

S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. For maximum holding strength, setscrews should be tensioned and re-tensioned as the seam material compresses. Clamp setscrew tension should be verified using a calibrated torque wrench between 160 and 180 inch pounds when used on 22ga steel, and between 130 and 150 inch pounds for all other metals and thinner gauges of steel. Consult the S-5! website at www.S-5.com for published data regarding holding strength.

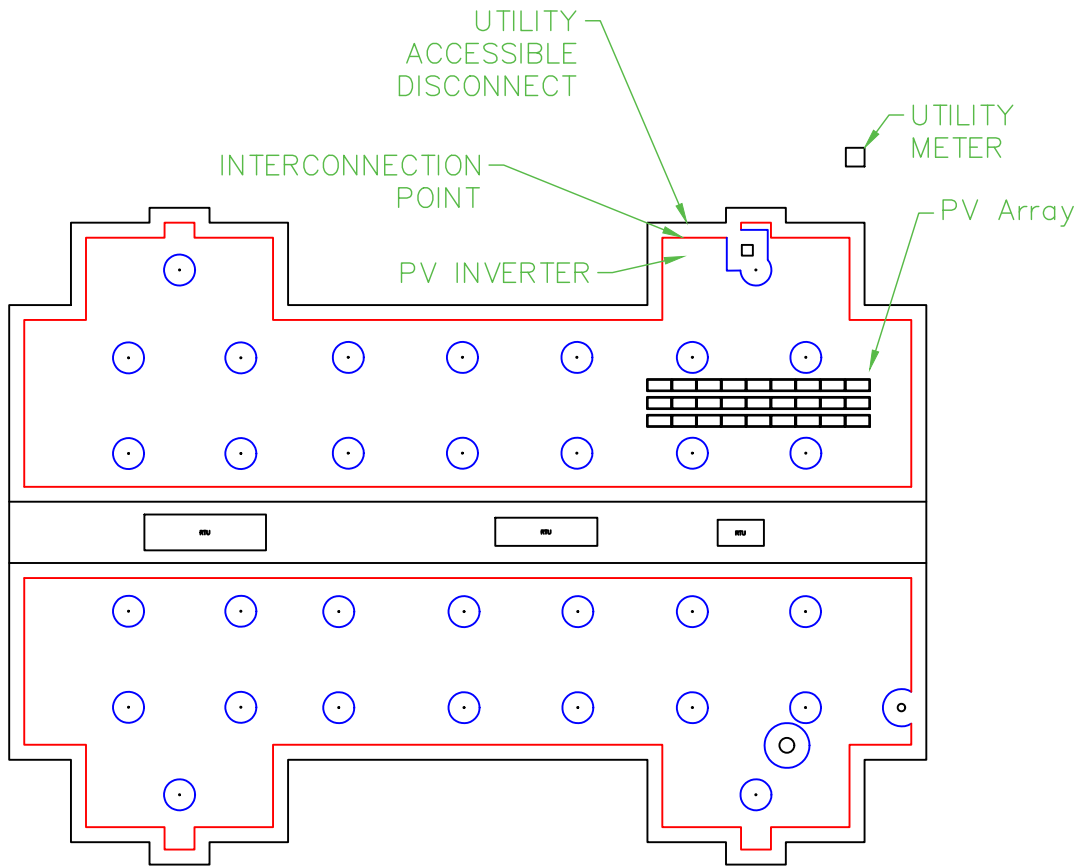
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Distributed by

11.745kW DC PHOTOVOLTAIC BALLASTED ROOF SYSTEM

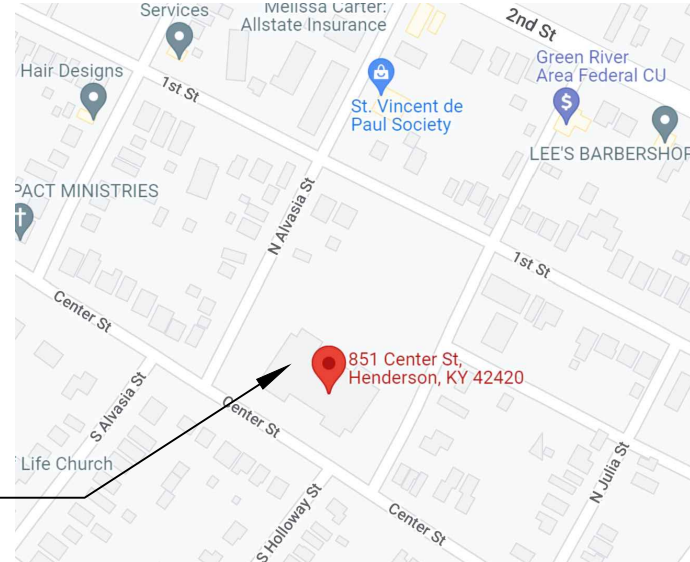
FOR

HENDERSON COUNTY SCHOOLS GUARANTEED ENERGY SAVINGS CONTRACT



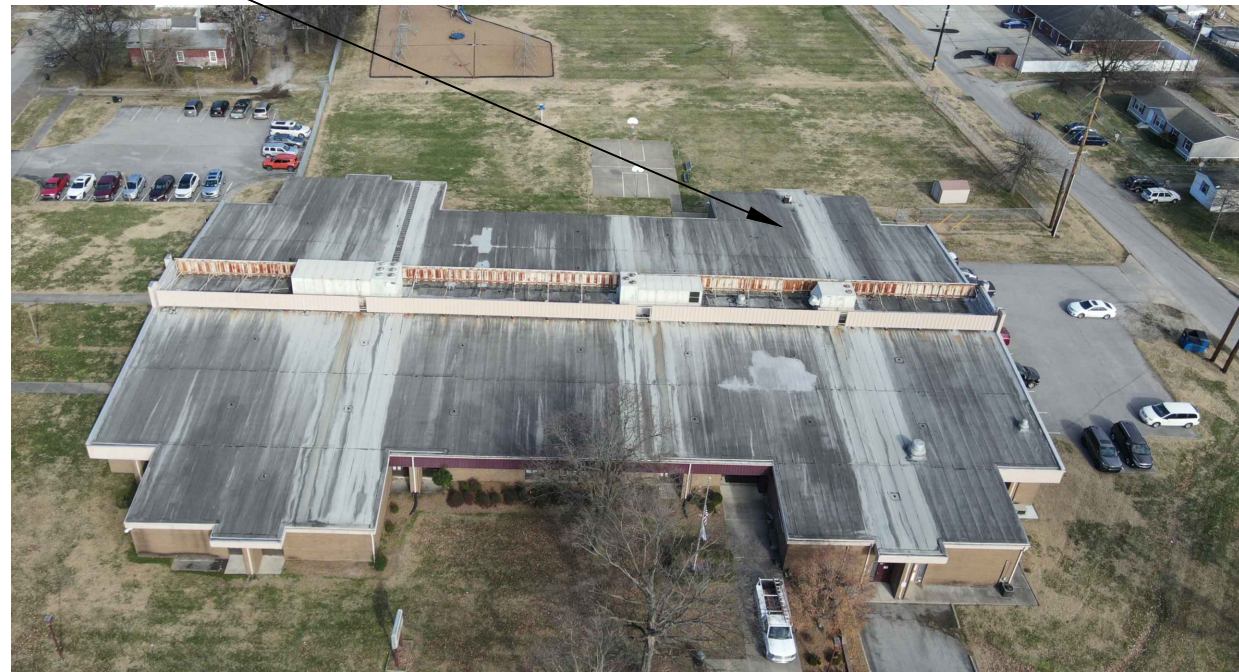
1 SITE OVERVIEW

PROJECT LOCATION



3 VICINTY MAP

ARRAY LOCATION



2 ROOFTOP VIEW OF SITE

INDEX

SHEET #	SHEET TITLE
PV 1.0	COVER SHEET
PV 1.1	GENERAL NOTES
PV 1.2	SITE PLAN
PV 1.3	STAGING & SAFETY PLAN
PV1.5	PHOTO MAP
PV1.6	BALLAST & STRINGS
E1.0	UAD & INVERTER RISER
E1.1	EXTERIOR CONDUIT PLAN
E1.2	SINGLE LINE DIAGRAM
E1.3	SAFETY PLACARDS & SIGNAGE
NONE	EQUIPMENT CUTSHEETS



BID
DRAWINGS

CENTRAL ACADEMY
Henderson County Public Schools
851 Center Street
Henderson, KY 42420

Cover Sheet

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/03/2022
DRAWN:	MA
CHECKED:	KK

REVISIONS
Bid set 03/04/2022

PV 1.0



BID
DRAWINGS

CENTRAL ACADEMY
Henderson County Public Schools
851 Center Street
Henderson, KY 42420

General Notes

GENERAL NOTES:

1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INsofar AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND.OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/03/2022
DRAWN:	HA
CHECKED:	KK

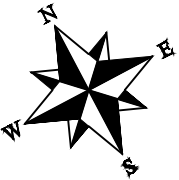
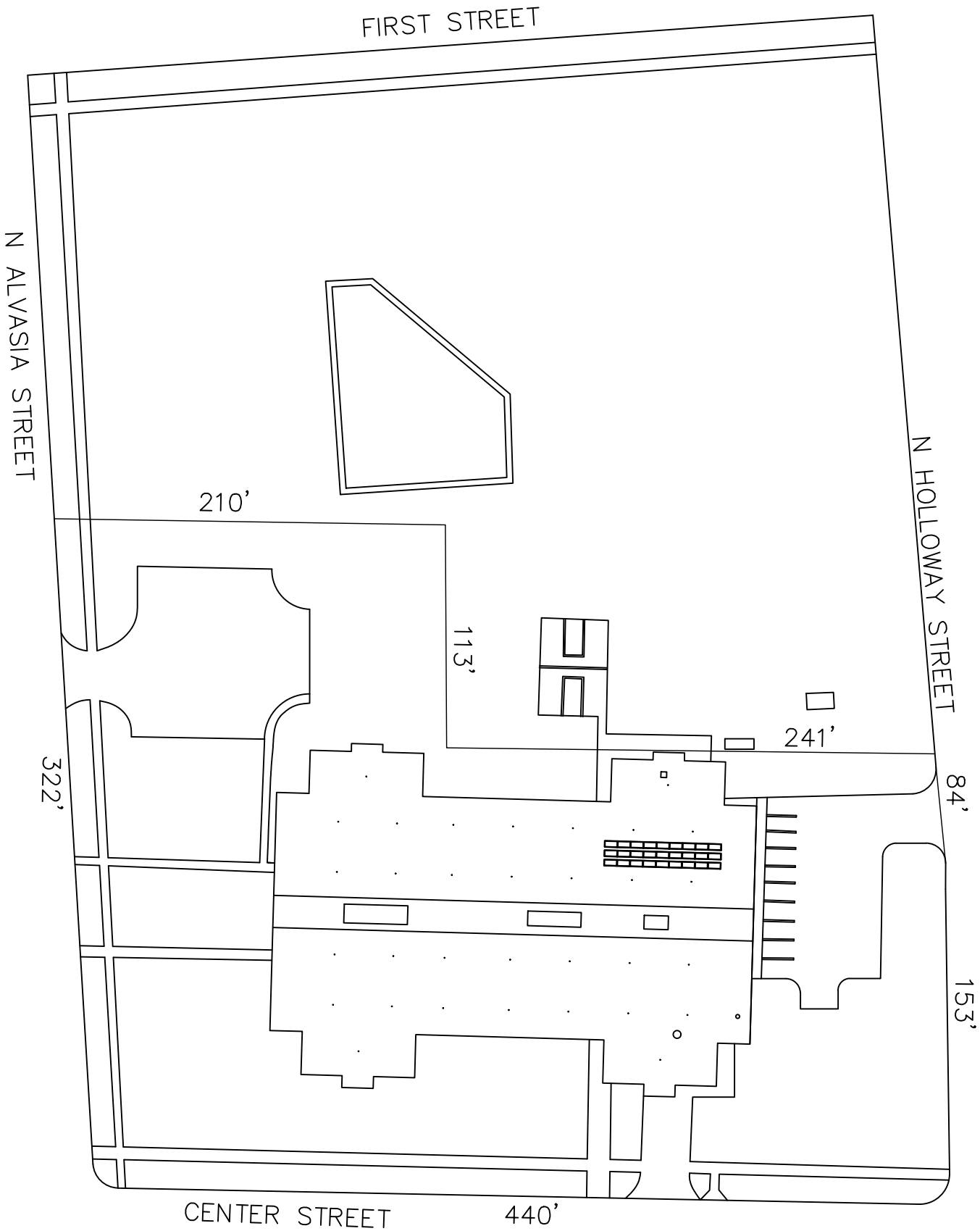
REVISIONS
Bid set 03/04/2022

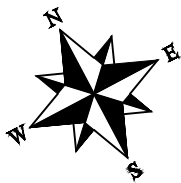
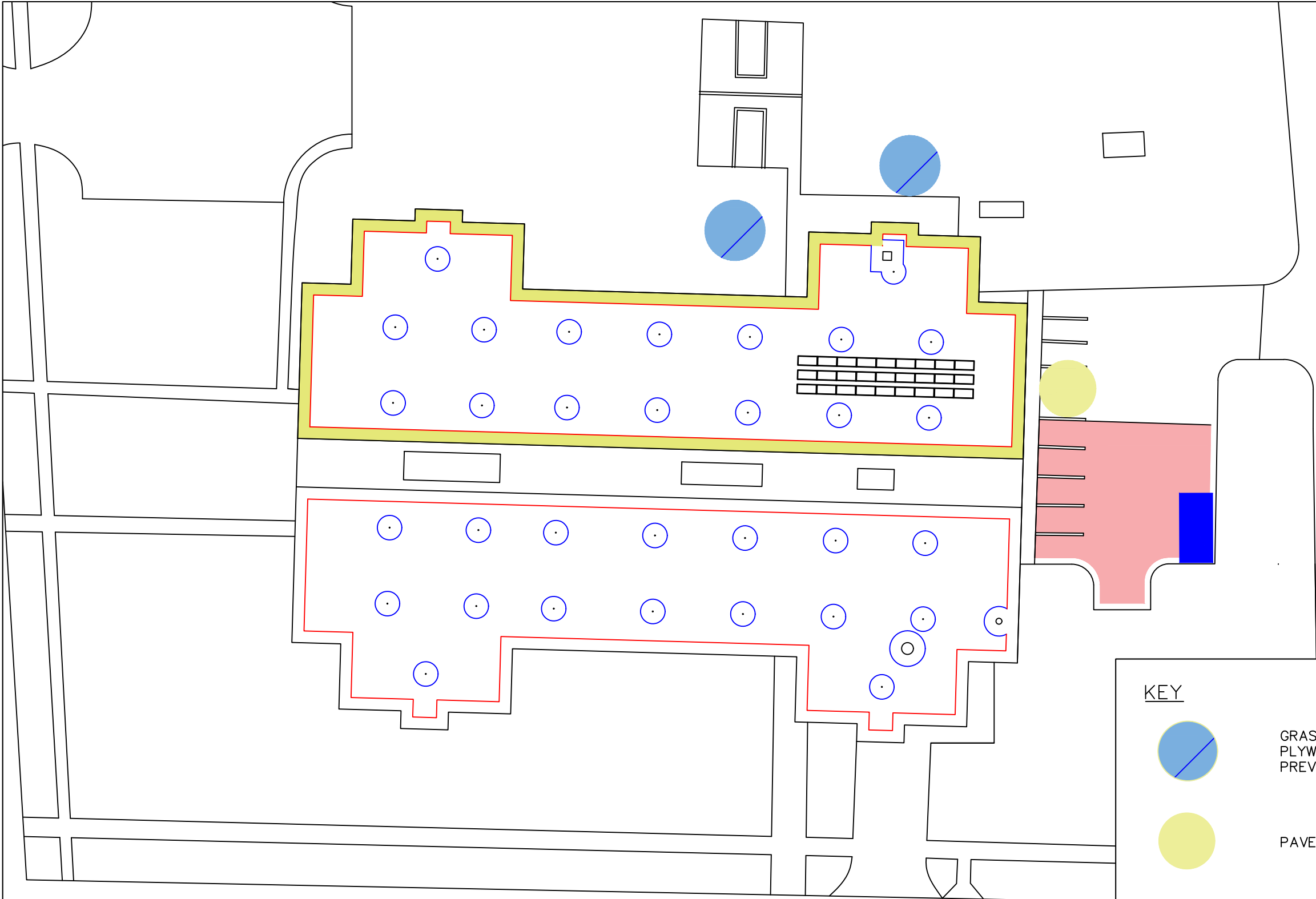
PV 1.1

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PV 1.3



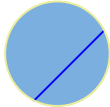


BID
DRAWINGS

CENTRAL ACADEMY
Henderson County Public Schools
851 Center Street
Henderson, KY 42420

Staging and Safety Plan

KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 6' FROM
ROOF EDGE DURING PV INSTALL

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/03/2022
DRAWN:	HA
CHECKED:	KK

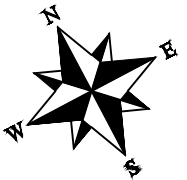
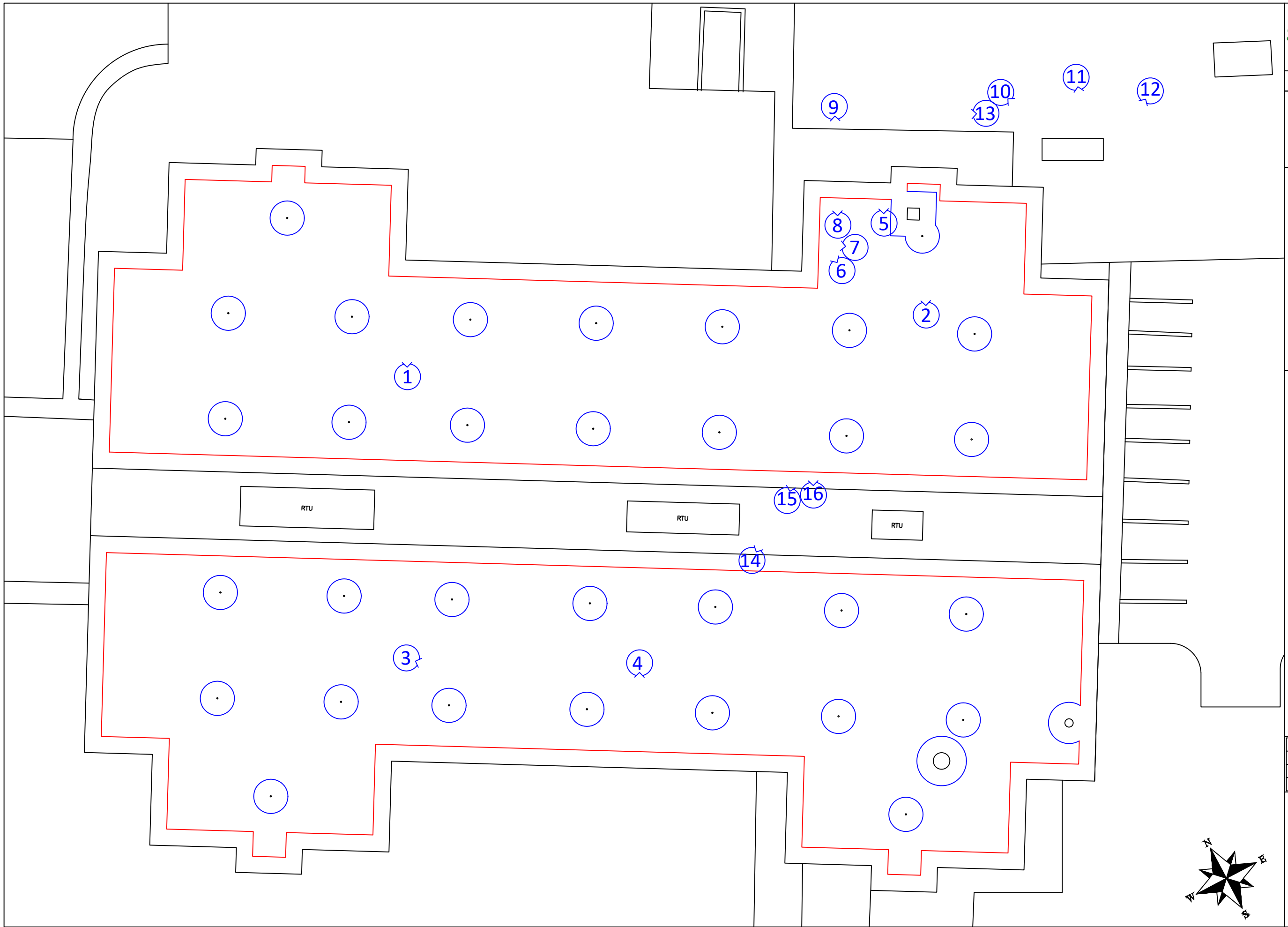
REVISIONS
Bid set 03/04/2022

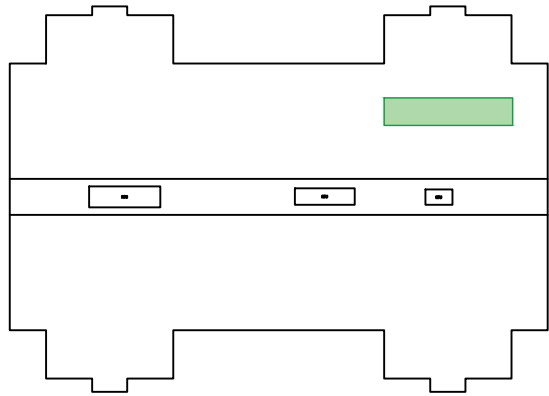
PV 1.4

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DATE:	03/03/2022
DRAWN:	HA
CHECKED:	KK

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Bid set 03/04/2022

PV 1.5





TAG NOTES/KEY:

- 1 Wire management shall be neat and professional. No wires shall be laying on roof surfaces.
- 2 Should strings change or run differently be sure to create as built drawings and give to BID manager.
- 3 Ballast block shall be laid according to Unirac ballast plan. Contractor shall not deviate from ballast plan.
- # # Denotes the number of ballast block in the RM5 ballast pan.

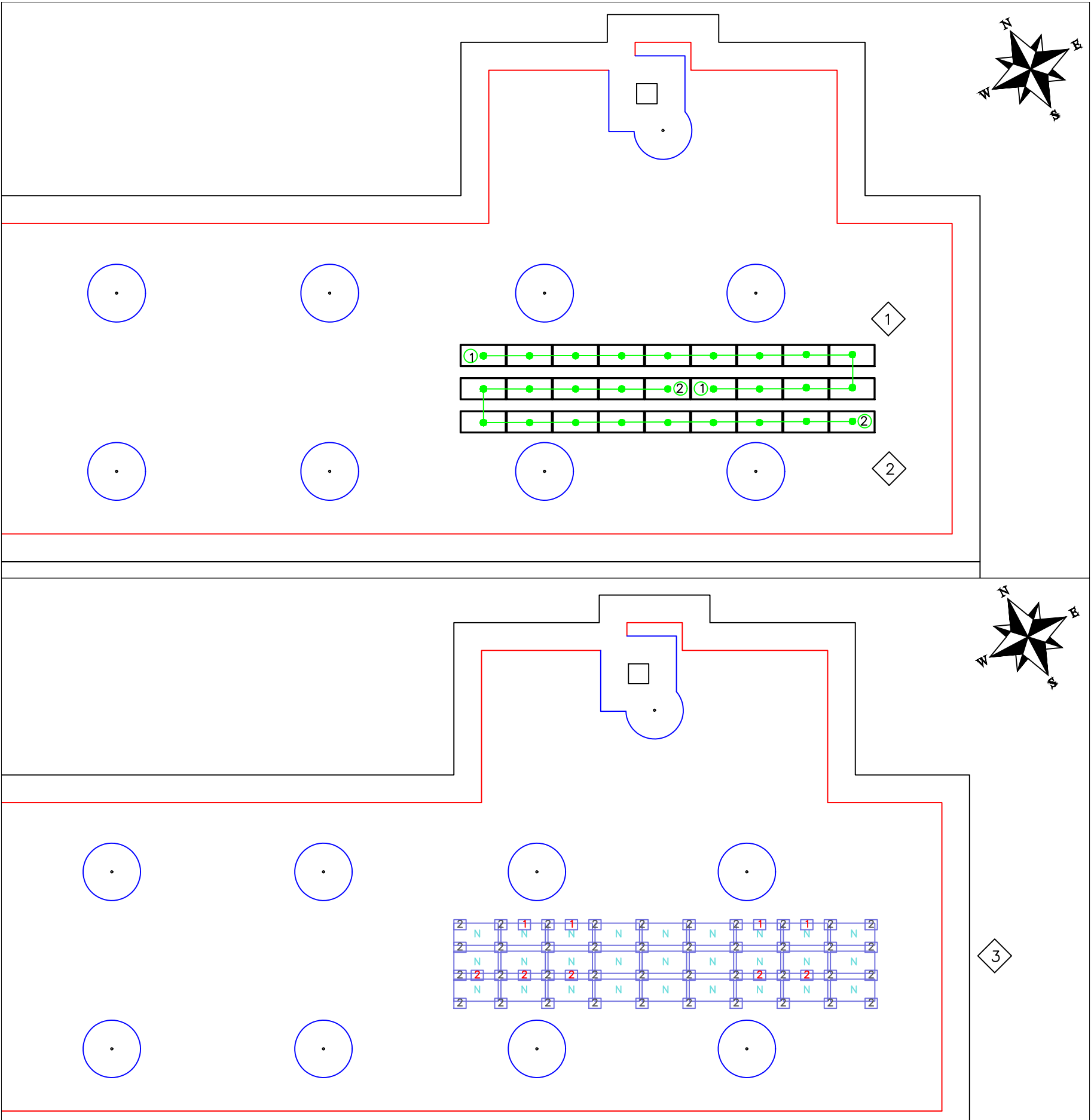
N signifies that a wind deflector must be installed on the North side of panel.

ARRAY: 27 Modules		
STIRNG	# MODS	# POWER OPTIMIZERS
1	13	13
2	14	14

STAGING QUANTITIES	
Item	QTY
Modules	27
Block	94
RM5 Bays	49
End Clamp*	148
U-Nuts*	226
Wind Deflectors	27

TORQUE SPECS FOR RM5	
Item	Torque
End Clamps	7ft-lbs
Wind Deflector Attachment Kit	10ft-lbs

*Estimated QTY. Actual QTY not to exceed.



BID
DRAWINGS

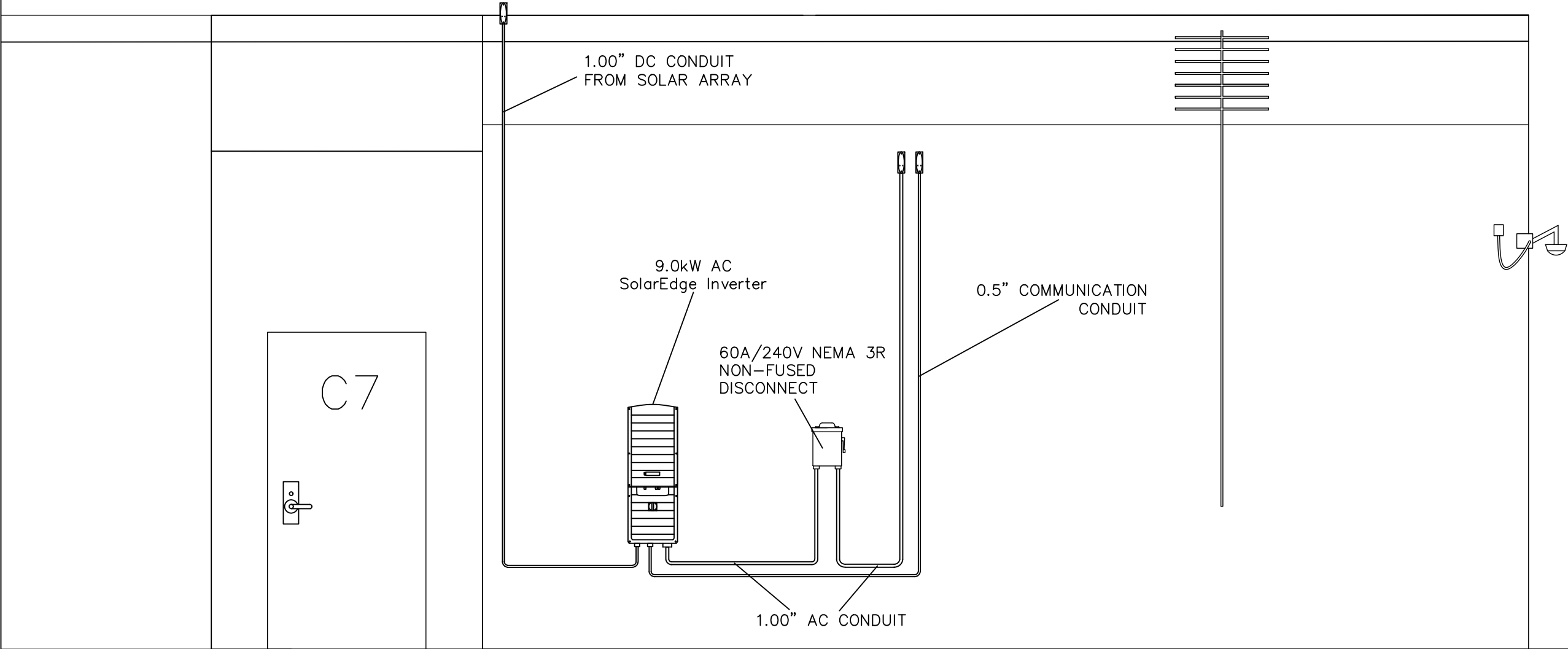
CENTRAL ACADEMY
Henderson County Public Schools
851 Center Street
Henderson, KY 42420

Ballast and Strings

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PV 1.6



CENTRAL ACADEMY
Henderson County Public Schools
851 Center Street
Henderson, KY 42420

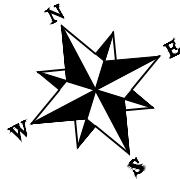
UAD and Inverter Riser

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DATE:	03/03/2022
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REVISIONS
Bid set 03/04/2022

TAG NOTES/KEY:

1 AC HOMERUN TO SUBPANEL PENETRATES WALL AND CONTINUES INSIDE OF MECHANICAL ROOM



BID
DRAWINGS

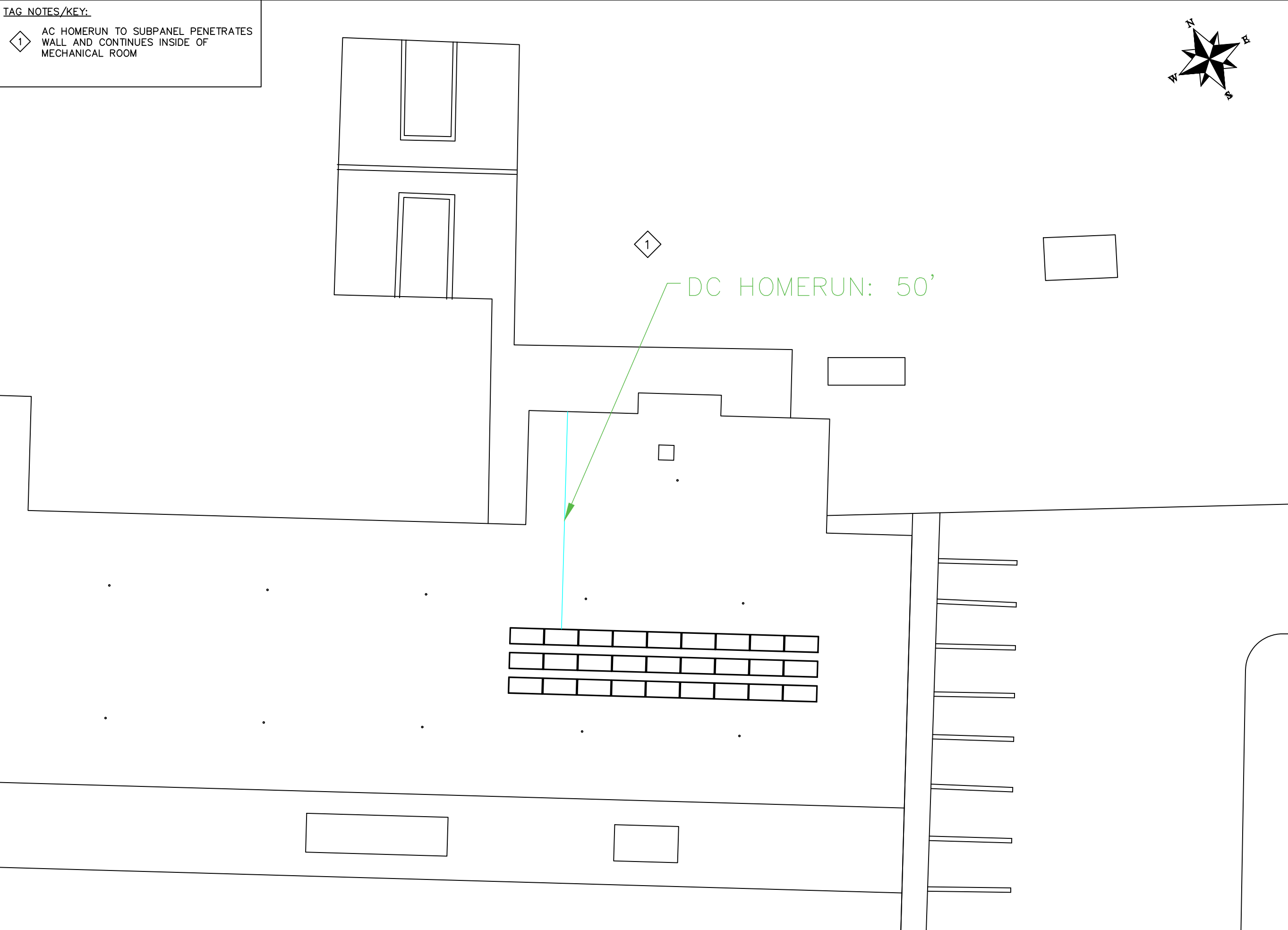
CENTRAL ACADEMY
Henderson County Public Schools
851 Center Street
Henderson, KY 42420

Exterior Conduit Plan

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DATE:	03/03/2022
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REVISIONS
Bid set 03/04/2022

E 1.1

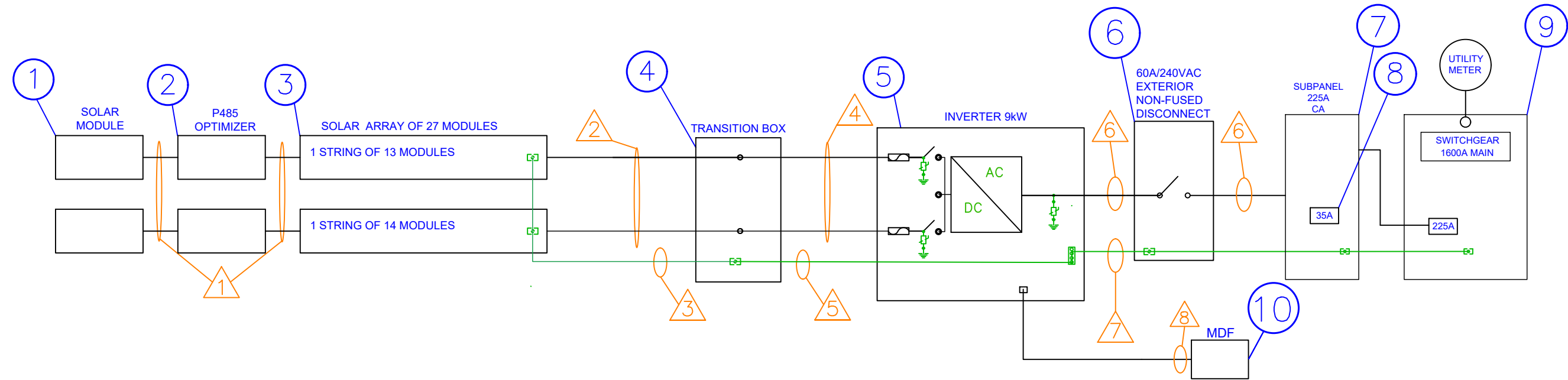


ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



BID
DRAWINGS



Equipment Schedule				
Tag	Description	Quantity	Part Number	Notes
1	Solar PV Module	27	SPR-E20-435-COM	SunPower 435W Commercial Solar Module
2	Solar PV Optimizer	27	P485	SolarEdge Power Optimizer
3	Solar Array	1		27 Solar Modules in 2 strings
4	Transition Box	1		Soltection Transition Box 1000 Nema 3R
5	Inverter	1	SE9KUS	SolarEdge 9kW Three Phase 208V Commercial Inverter
6	Utility Accessible Disconnect Switch	1	SquareD	Unfused 60A/240V SquareD NEMA 3R Disconnect
7	Subpanel	1		225A/208V SquareD Subpanel w/225A Main
8	35A SquareD Breaker	1	SquareD	35A Three Phase Breaker
9	Main Distribution Panel	1	SquareD Switchboard	1600A/208V SquareD Switchgear w/1600A Main
10	Main Distribution Frame	1		Main Server Rack for Building

Conductor and Raceway Schedule					
Tag	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size
1	USE-2 (MFG Cables & Connectors)	12 CU	4	FREE AIR	N/A
2	PV Wire	10 CU	4	RAYTRAY	N/A
3	Bare Copper Equipment Ground (EGC)	6 CU	1	RAYTRAY	N/A
4	THWN-2 600V	10 CU	4	EMT	1.00"
5	THWN-2 600V Ground	6 CU	1	EMT	1.00"
6	THWN-2 600V	8 CU	4	EMT	1.00"
7	THWN-Ground	6 CU	1	EMT	1.00"
8	CAT6 Plenum	24 CU	1	EMT	0.50"

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/03/2022
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E 1.2

CENTRAL ACADEMY
Henderson County Public Schools
851 Center Street
Henderson, KY 42420
Single Line Diagram

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/03/2022
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E 1.3

A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.



C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.



SOLAR DISCONNECT

PHOTOVOLTAIC
DC DISCONNECT

D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2

WARNING: PHOTOVOLTAIC
POWER SOURCE

E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.



F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

PHOTOVOLTAIC
AC DISCONNECT



MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT



F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

PHOTOVOLTAIC
AC DISCONNECT



MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT



G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFEED

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

PHOTOVOLTAIC AC DISCONNECT
TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS OR BOTH LINE AND LOAD WIRING MAY BE ENERGIZED BY THE OPEN POSITION

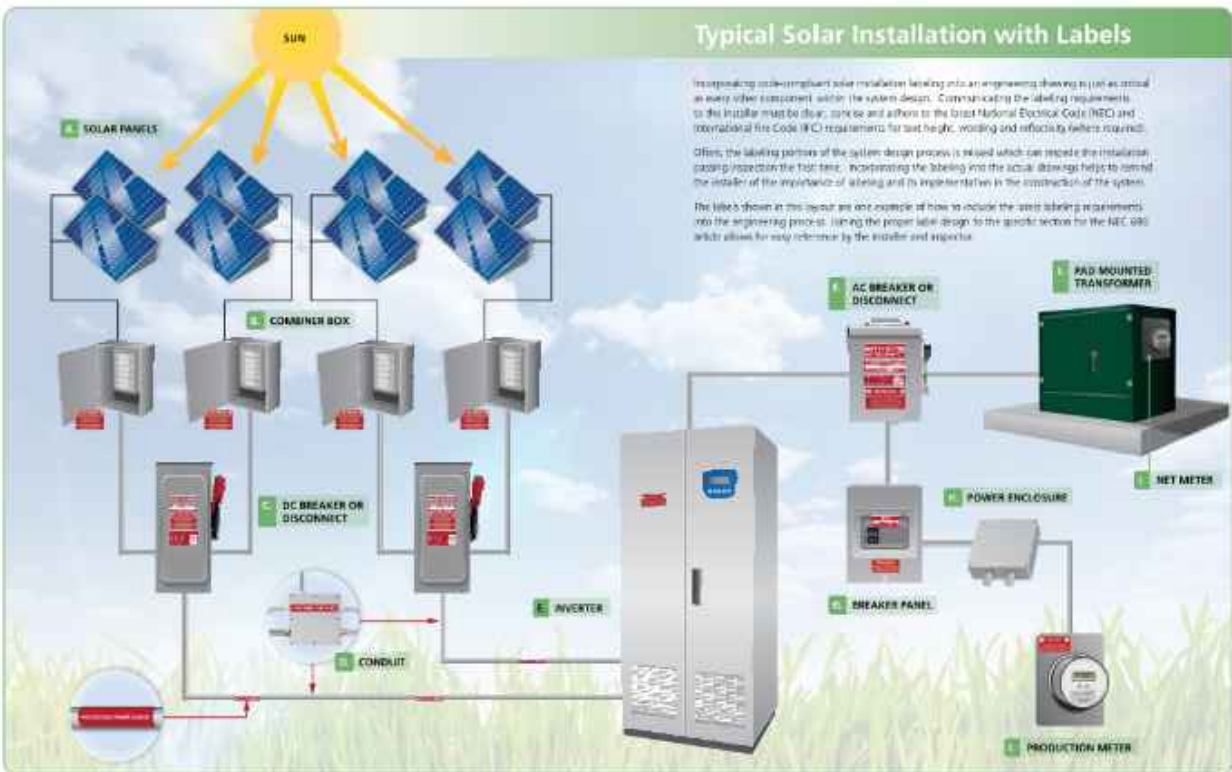
WARNING
TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.



J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.





SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

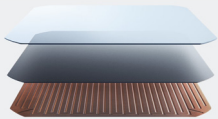
Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



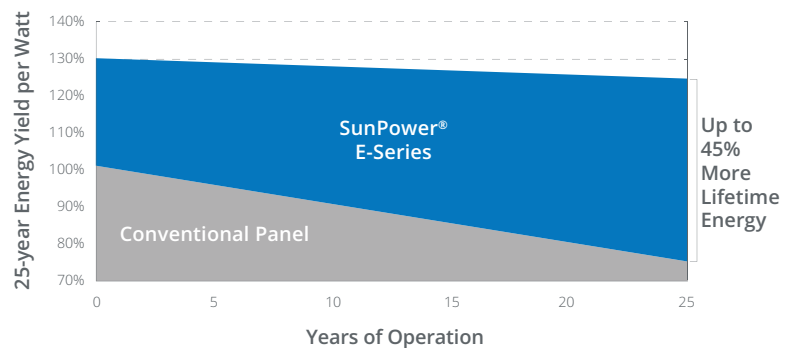
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



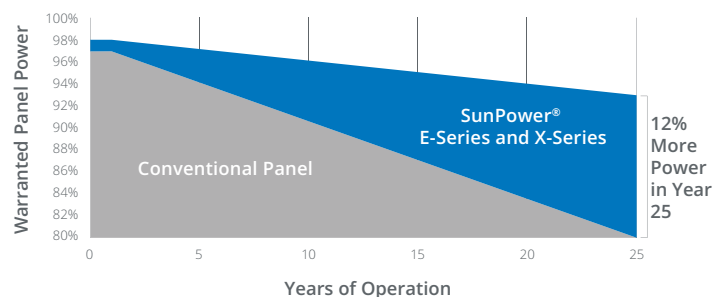
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.

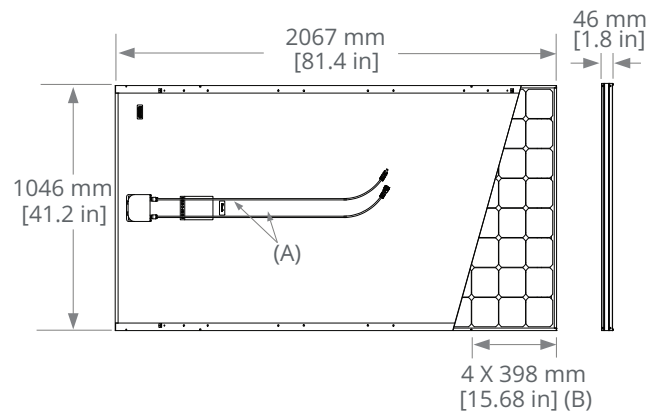


E-Series: E20-435-COM SunPower® Commercial DC Panel

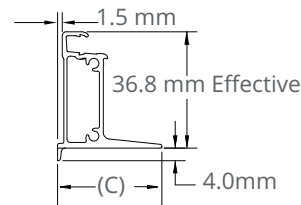
Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 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	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins

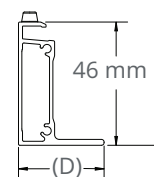
Tests And Certifications	
Standard Tests ⁸	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/-10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

1 SunPower 327 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), 0.75%/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.

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Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 120/208V Grid for North America

SE9KUS / SE14.4KUS



INVERTERS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Built-in module-level monitoring
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- Internet connection through Ethernet or Wireless
- Integrated Safety Switch
- Fixed voltage inverter for longer strings
- Supplied with RS485 Surge Protection, to better withstand lightning events
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install outdoors or indoors on provided bracket

/ Three Phase Inverters for the 120/208V Grid⁽¹⁾ for North America

SE9KUS / SE14.4KUS

MODEL NUMBER	SE9KUS	SE14.4KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXKX-XXXXXBXX4		
OUTPUT			
Rated AC Power Output	9000	14400	VA
Maximum AC Power Output	9000	14400	VA
Output Line Connections	3 phase, 3-wire / PE (L1-L2-L3), TN, TT 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT		
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)	105-120-132.5		Vac
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)	183-208-229		Vac
AC Frequency Min-Nom-Max ⁽²⁾	59.3 - 60 - 60.5		Hz
x. Continuous Output Current (per Phase)	25	40	A
GFDI Threshold	1		A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes		
THD	≤ 3		%
INPUT			
Maximum DC Power (Module STC)	12150	19400	W
Transformer-less, Ungrounded	Yes		
Maximum Input Voltage DC to Gnd	250	300	Vdc
Maximum Input Voltage DC+ to DC-	500	600	Vdc
Nominal Input Voltage DC to Gnd	200		Vdc
Nominal Input Voltage DC+ to DC-	400		Vdc
Maximum Input Current	26.5	38	Adc
Maximum Input Short Circuit Current	45		Adc
Reverse-Polarity Protection	Yes		
Ground-Fault Isolation Detection	1MΩ Sensitivity	350kΩ Sensitivity ⁽³⁾	
CEC Weighted Efficiency	96.5	97	%
Night-time Power Consumption	< 3	< 4	W
ADDITIONAL FEATURES			
Supported Communication Interfaces	RS485, Ethernet, Built-in Cellular (Optional)		
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi access point for local connection		
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect		
RS485 Surge Protection Plug-in	Supplied with the inverter		
Smart Energy Management	Export Limitation		
STANDARD COMPLIANCE			
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07		
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)		
Emissions	FCC part15 class B		
INSTALLATION SPECIFICATIONS			
AC output conduit size / AWG range	3/4" minimum / 8-4 AWG		
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG		
Number of DC inputs	2 pairs	3 pairs ⁽⁴⁾	
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260		in / mm
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260		in / mm
Weight	99.5 / 45		lb / kg
Weight with Safety Switch	106 / 48		lb / kg
Cooling	Fans (user replaceable)		
Noise	< 55		dBA
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁵⁾		°F / °C
Protection Rating	NEMA 3R		

(1) For 277/480V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-277-480v-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(5) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

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Power Optimizer

For North America

P370 / P400 / P401 / P485 / P505

POWER OPTIMIZER



PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

/ Power Optimizer

For North America

P370 / P400 / P401 / P485 / P505

Optimizer model (typical module compatibility)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96- cell modules)	P401 (for high power 60 and 72 cell modules)	P485 (for high-voltage modules)	P505 (for higher current modules)	
INPUT						
Rated Input DC Power ⁽¹⁾	370	400	430	485	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	60	80	60	125 ⁽²⁾	83 ⁽²⁾	Vdc
MPPT Operating Range	8 - 60	8 - 80	8-60	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11	10.1	12.5	11	14	Adc
Maximum DC Input Current	13.75	12.5	14.65	12.5	17.5	
Maximum Efficiency	99.5					%
Weighted Efficiency	98.8					%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)						
Maximum Output Current	15					Adc
Maximum Output Voltage	60			80		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
EMC	FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741, NEC/PVRSS					
Material	UL94 V-0 , UV Resistant					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Maximum Allowed System Voltage	1000					Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters					
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 153 x 29.5 / 5.1 x 6 x 1.16	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	630 / 1.4	750 / 1.7	655 / 1.5	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4 ⁽³⁾			MC4 ⁽³⁾	MC4 ⁽³⁾	
Input Wire Length	0.16 / 0.5					m / ft
Output Wire Type / Connector	Double Insulated / MC4					
Output Wire Length	1.2 / 3.9					m / ft
Operating Temperature Range ⁽⁴⁾	-40 to +85 / -40 to +185					°C / °F
Protection Rating	IP68 / Type6B					
Relative Humidity	0 - 100					%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed

(2) NEC 2017 requires max input voltage be not more than 80V

(3) For other connector types please contact SolarEdge

(4) Longer inputs wire lengths are available for use. For 0.9m input wire length order P401-xxxLxxx

(5) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

PV System Design Using a SolarEdge Inverter ⁽⁶⁾⁽⁷⁾	Single Phase HD-Wave	Single phase	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	P370, P400, P401 P485, P505	8 6	10 8	18 14	
Maximum String Length (Power Optimizers)	25		25	50	
Maximum Power per String	5700 ⁽⁸⁾ (6000 with SE7600-US - SE11400-US)	5250 ⁽⁸⁾	6000 ⁽⁹⁾	12750 ⁽¹⁰⁾	W
Parallel Strings of Different Lengths or Orientations	Yes				

(6) For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf

(7) It is not allowed to mix P485/P505 with P370/P400/P401 in one string

(8) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement

(9) For 208V grid: it is allowed to install up to 6,500W per string when the maximum power difference between each string is 1,000W

(10) For 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

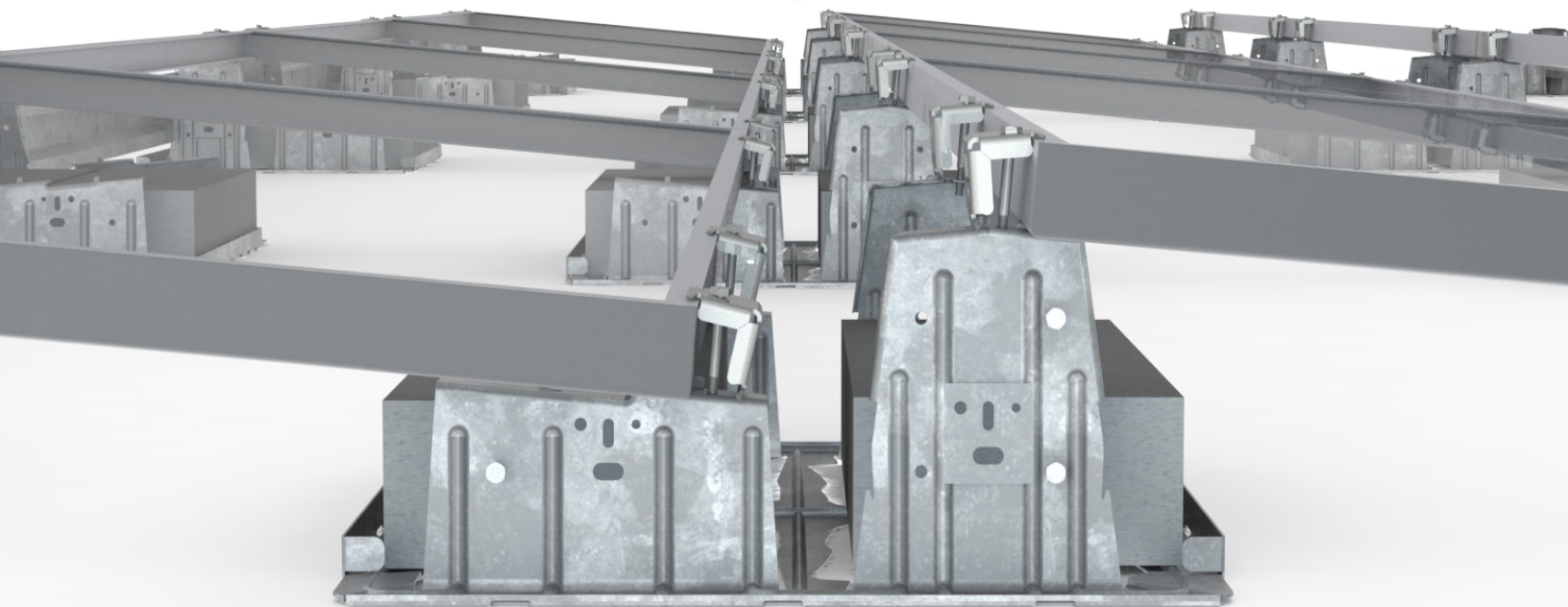
ROOFMOUNT | RM5

SOUTH FACING 5 DEGREE TILT



BETTER SOLAR STARTS HERE

RM5 is a ballasted south-facing five-degree tilt mounting system for flat roofs. Fewer components, single tool installation, snap-in hardware, and integrated bonding ensure high speed installation, while features such as 7.5" or 11" row spacing and optional wind deflector, roof attachments, MLPE mount, and wire management provide a complete solution. UNIRAC's unmatched commercial project support makes construction easy, from permitting through installation, and **RM5** is supported by North America's largest distribution network. Plus, enjoy peace of mind with UNIRAC's industry-leading 25-year warranty.



MAXIMIZE PROFITABILITY AT EVERY STEP

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

ROOFMOUNT | RM5

SOUTH FACING 5 DEGREE TILT



BETTER SOLAR STARTS HERE

OPTIMIZE ARRAY LAYOUT

MAXIMUM LAYOUT FLEXIBILITY WITH TWO ROW SPACING OPTIONS

5 Degree Tilt with 7" / 11" Row Spacing Options

Set, Then Clamp Feature, Provides Better Construction Sequencing for Rapid Installation

Simplified Wire Management, with Two (2) Optional Unirac Clips

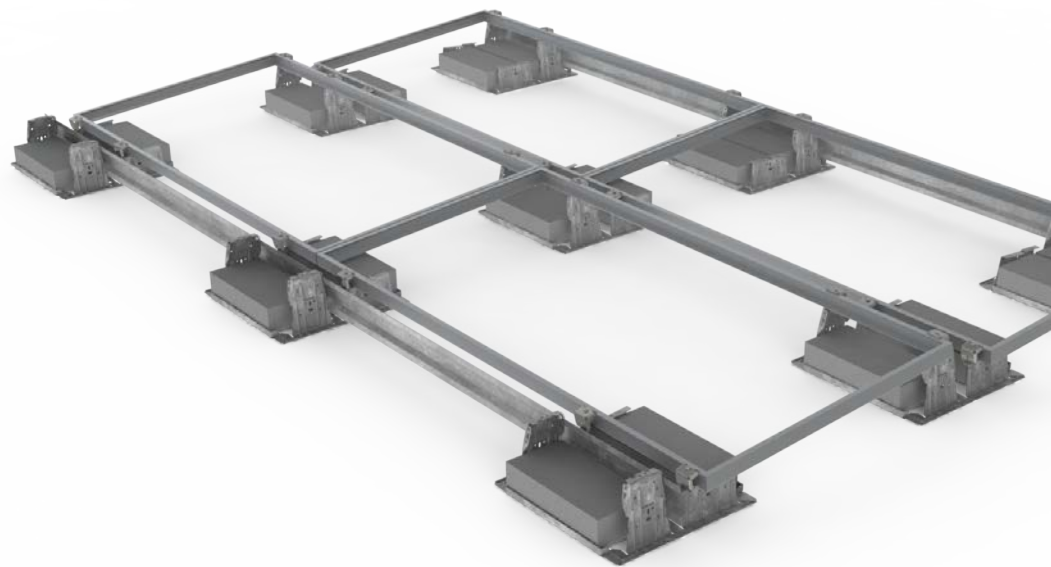
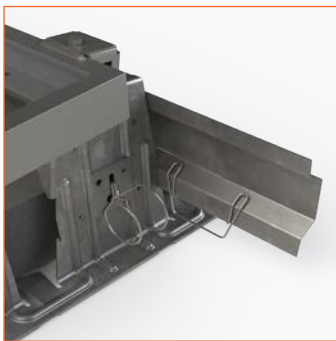
Wind Deflector for Ballast Reduction & Fire Mitigation

Optional Roof Attachment Meets a Variety of Project Requirements

MPL Mount with Engage Trunk Cable Wire Management Clip

G235 Steel - Double the Corrosion Protection of other Industry Products

Compact Packaging - Up to 1 MW / Truck



GENERATE LAYOUTS IN MINUTES WITH U-BUILDER ON-LINE DESIGN TOOL

HelioScope Integration • Google & Bing Maps • Ballast Distribution Maps • Site Specific Engineering Reports • Layout Multiple Arrays per Project • CAD Downloads

INDUSTRY LEADING PROJECT SUPPORT

UNIRAC's Team of Technical Experts & Professional Engineers is Your Partner Through Design, Engineering, Permitting and Installation.

GUARANTEED PERMIT APPROVAL

UL2703 Certification Documents • Stamped 3rd Party PE Letters • Construction Drawings • AHJ Outreach Program

FASTEST DELIVERY IN THE INDUSTRY

In Stock & Ready to Ship From North America's Largest Flat Roof Distribution Network.

WORLD CLASS INSTALLATION TRAINING & SUPPORT

Library of QuickTips Installation Videos • Installation Guides • Live Demos • Train the Trainer Program

MAXIMIZE PROFITABILITY AT EVERY STEP

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HIT A
HOME RUN
WITH

RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

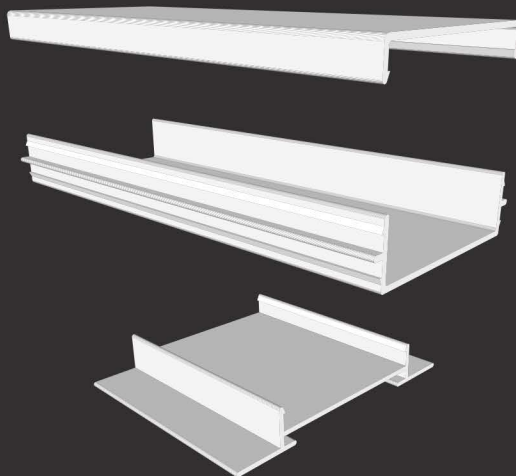
CAP

+

TRAY

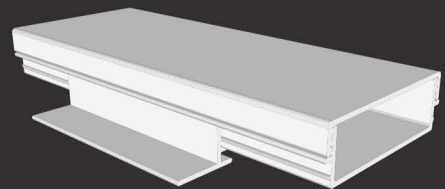
+

BASE



=

RAYTRAYTM
SOLAR WIRE MANAGEMENT SYSTEM



RayTrayTM
info@raytraysolar.com
www.raytraysolar.com



Conforms to UL Std 870
Control No. 4009754

RAYTRAY™ v2

SOLAR WIRE MANAGEMENT SYSTEM

RayTray™ is a protective enclosure manufactured with a durable RPVC polymer to ensure a neat and comprehensive routing method for jumper, home run, and equipment-grounding conductor cables.

RayTray™ is the product of a collaborative effort between solar installers and electrical, structural, and polymer engineers. The result is a wire management system that is simple, durable, cost effective, and ETL listed for use in PV arrays.

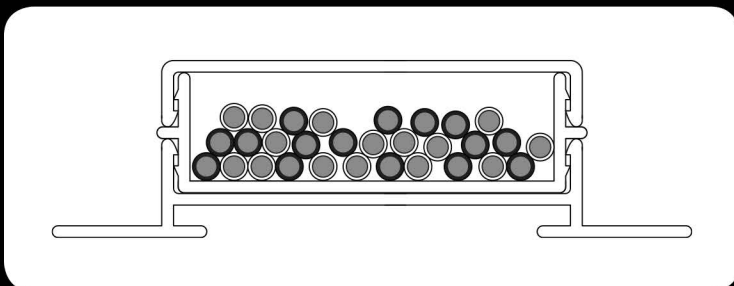
RayTray™ is

- Simple and easy to install
- Durable and UV resistant
- Low Cost
- Versatile
- ETL listed to UL 870 Standard
- Made in the USA

RAYTRAY™ SPECIFICATIONS

Product	Solar Wire Management System
Material	Non-metallic RPVC polymer. UV rating: F1
Listing	ETL Intertek conforms to UL Std 870. Voltage rating: 1000 VDC
Installation	Flat roofs with pitch < 8 degrees. Standing seam metal roofs
Internal Wiring	Maximum of thirty #10 AWG wires/tray. RHW, USE, or PV wire. Maximum wire size: #6 AWG
Grounding	Non-metallic RPVC polymer requires no grounding
Material Dimensions	Overall height: 2", width: 8", length of tray and cap: 8', length of base: 6"
Maximum Support Interval	4'3"
Warranty	25-year warranty against defects in materials and workmanship

RayTray™ is rated to hold thirty #10 AWG PV wires.
Maximum wire size is #6 AWG.



CONNECTING THE COMPONENTS

SNAP AND CONNECT



Assembling RayTray™ is easier than connecting modules in a string. Snap a RayTray™ base onto one end of a tray; add a base in the middle of the tray, and another at the opposite end. Be sure to leave a one-inch gap between sections of tray to allow for expansion and contraction. Keep the base between tray sections fixed in place by inserting a rivet into one side of the tray.

CAP AND PROTECT

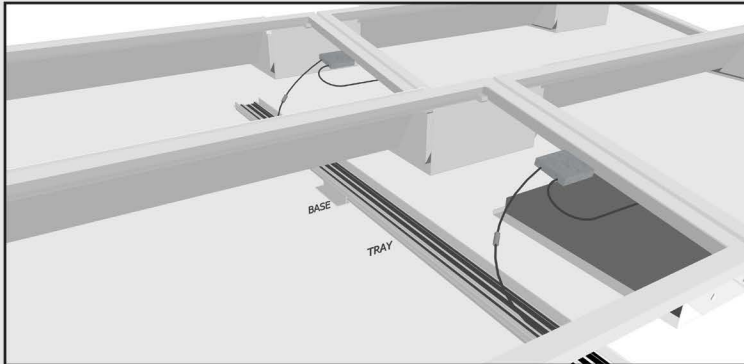


Once your home runs are in place, snap on the cap. The cap should span the gap left for expansion by at least six inches.

AN EASY CHANGE IN DIRECTION

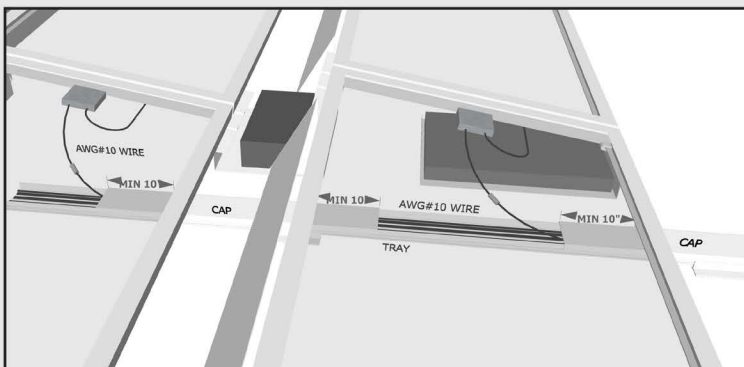


Most runs will go in one direction. But when you need to change direction, RayTray™ can accommodate. RayTray™ is cut easily with a hacksaw or a reciprocating saw. Make some simple cuts, insert a plastic rivet, and you will have a secure and stable T-fitting or elbow. A file or deburring tool quickly gets rid of sharp edges.



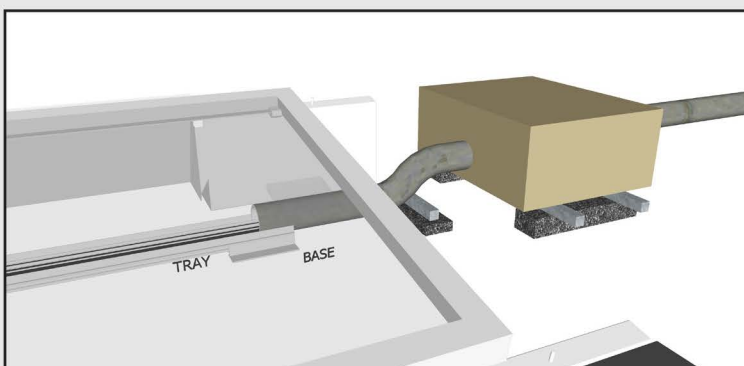
KEEP THOSE HOME RUNS IN LINE

RayTray™ keeps your home runs organized, secure, and protected. No more worries about home runs getting stepped on or rubbing and abrading on racking. Simply pick your route, snap together your RayTray™ trays and base supports, slide under the array, and drop in your home runs. Alternatively, lay the RayTray™ out and drop in your home runs before the modules are installed. Array cabling is neat and organized. Your crew will thank you. Your inspector will be pleased. And your client will be thrilled at how professional everything looks.



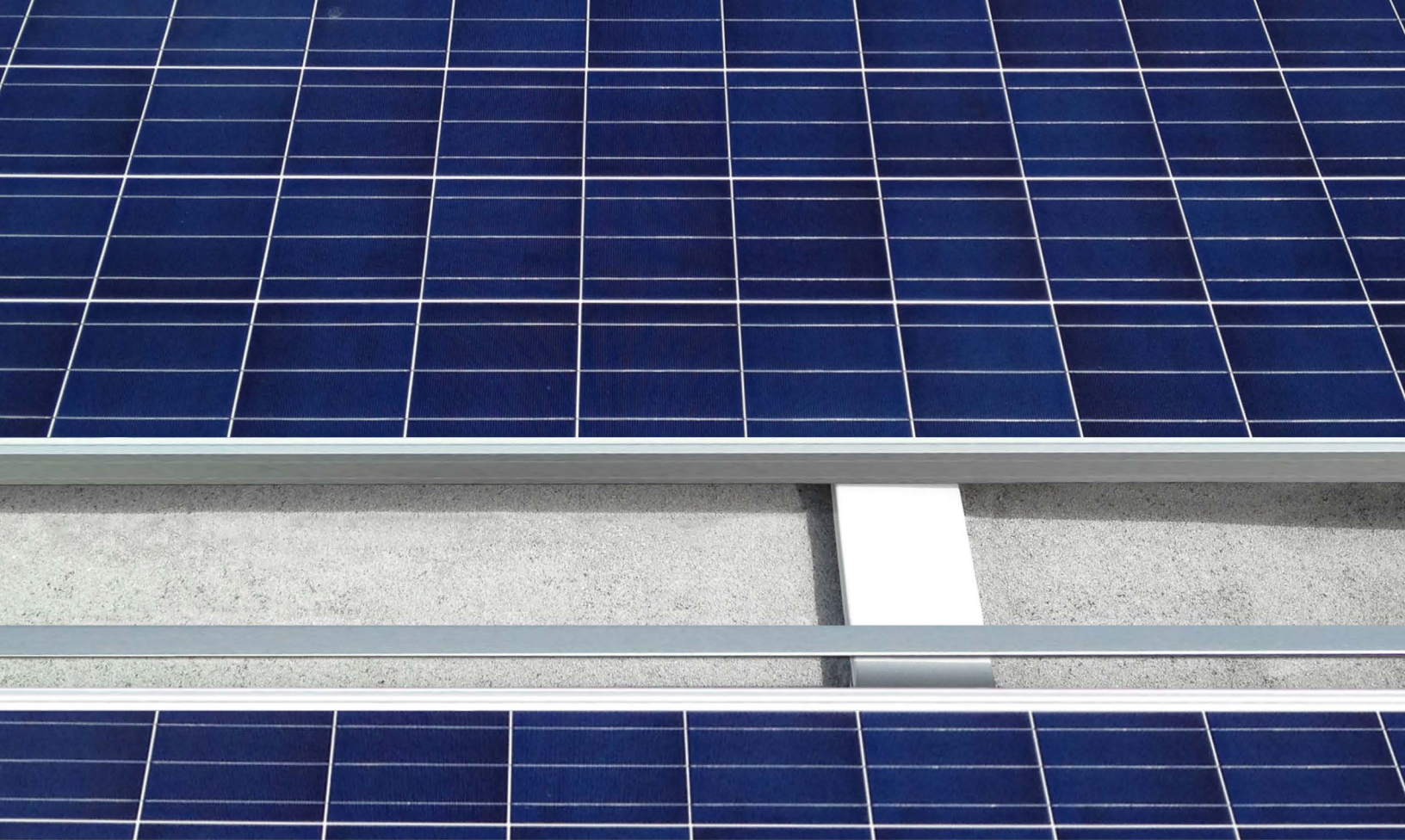
PROTECTION ENHANCED

Your home runs are in, your connections are made, and now you want to protect the wires and tidy things up. If you begin with RayTray™, you're already there. No unsightly bundles. No haphazard wires. Organize as you build. When the build is done and tested, finish up by snapping on the protective caps, which will not only protect and enhance your work but also prolong the life of your client's investment.



A STELLAR TRANSITION

You have been there before and you're not excited about being there again. Use RayTray™ to organize the chaos. Aggregate your home runs into RayTray™ and they're ready to transition into pipe when you are. Home runs will be organized and accessible.



RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

info@raytraysolar.com

RayTrayTM

Sunlight resistant wire management system

Cables permitted: RHW, USE, PV

Max wire size: AWG #6

Max support interval: 4'-3"

Consult manufacturer for proper installation



Intertek

Conforms to UL Std 870
Control No. 4009754



Made in the U.S.A.

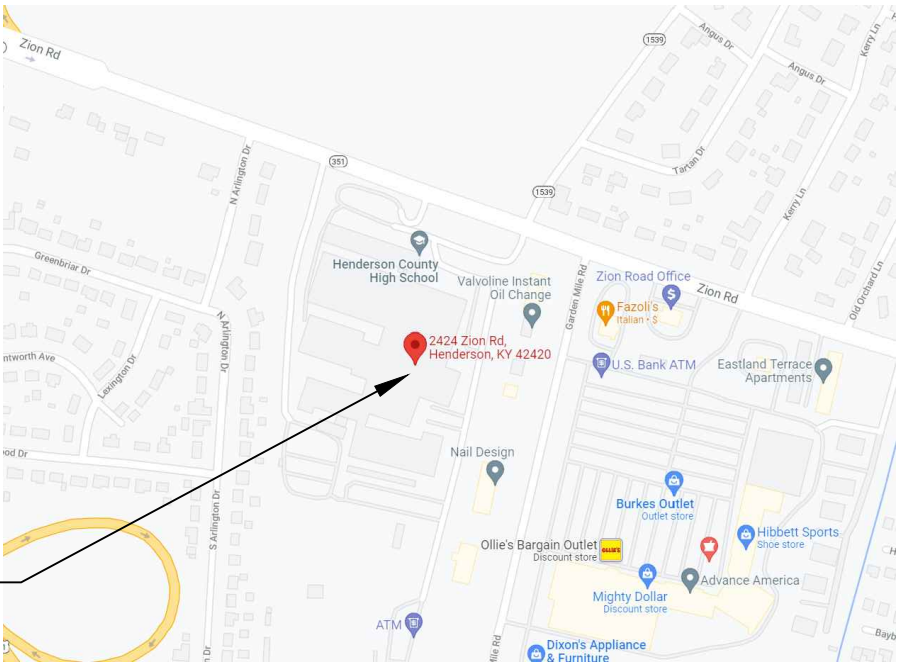
WWW.RAYTRAYSOLAR.COM

24.36kW DC PHOTOVOLTAIC
PITCHED ROOF SYSTEM
FOR
HENDERSON COUNTY SCHOOLS
GUARANTEED ENERGY SAVINGS CONTRACT



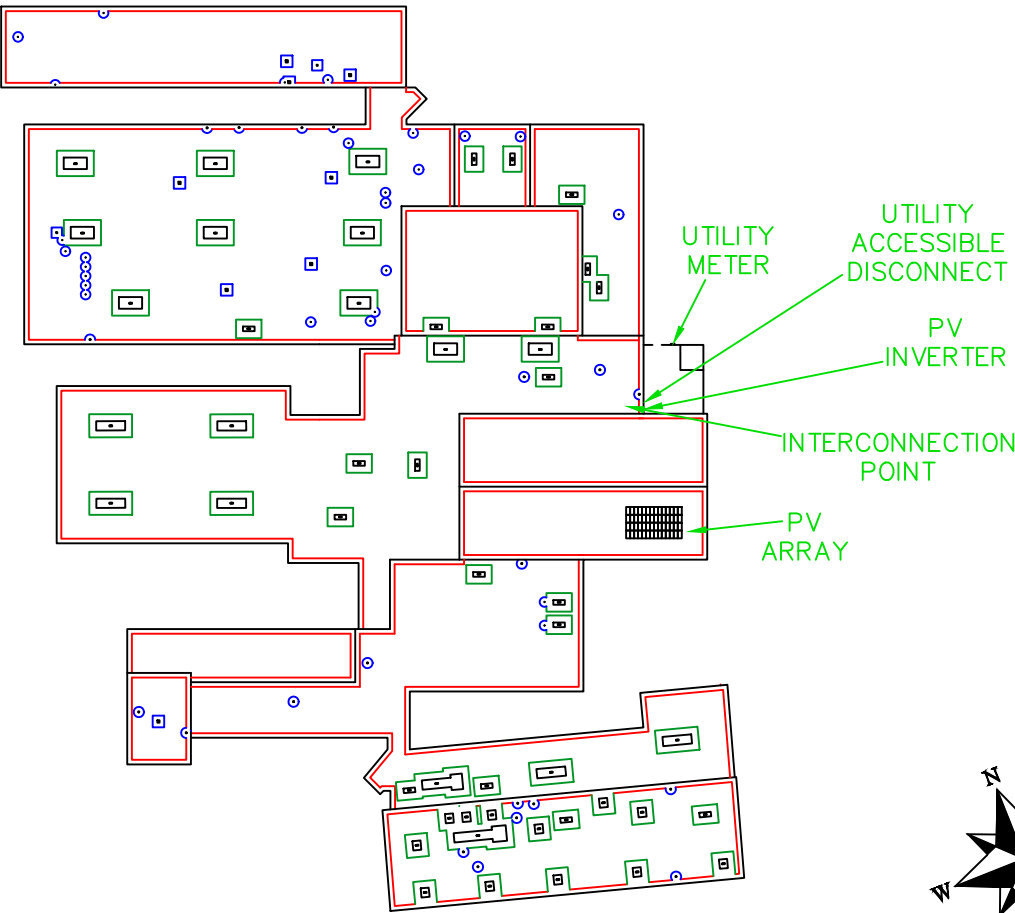
BID
DOCUMENTS

PROJECT LOCATION



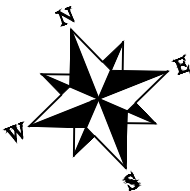
3 VICINTY MAP

SCALE: NTS



1 SITE OVERVIEW

SCALE: 1" = 100'



2 ROOFTOP VIEW OF SITE

SCALE: NTS



ARRAY LOCATION

INDEX

SHEET #	SHEET TITLE
PV1.0	COVER SHEET
PV1.1	GENERAL NOTES
PV1.2	SITE PLAN
PV1.3	PLOT PLAN
PV1.4	STAGING AREA
PV1.5	PHOTO MAP
PV1.6	BALLAST & STRINGS
E1.0	UAD & INVERTER RISER
E1.1	EXTERIOR CONDUIT PLAN
E1.4	SINGLE LINE DIAGRAM
E1.5	SAFETY PLACARDS & SIGNAGE
NONE	EQUIPMENT CUTSHEETS

Henderson High School
Henderson County Public Schools
2424 Zion Road
Henderson, KY 42420

COVER SHEET

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

PV1.0

GENERAL NOTES:

1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.



BID
DOCUMENTS

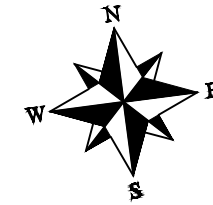
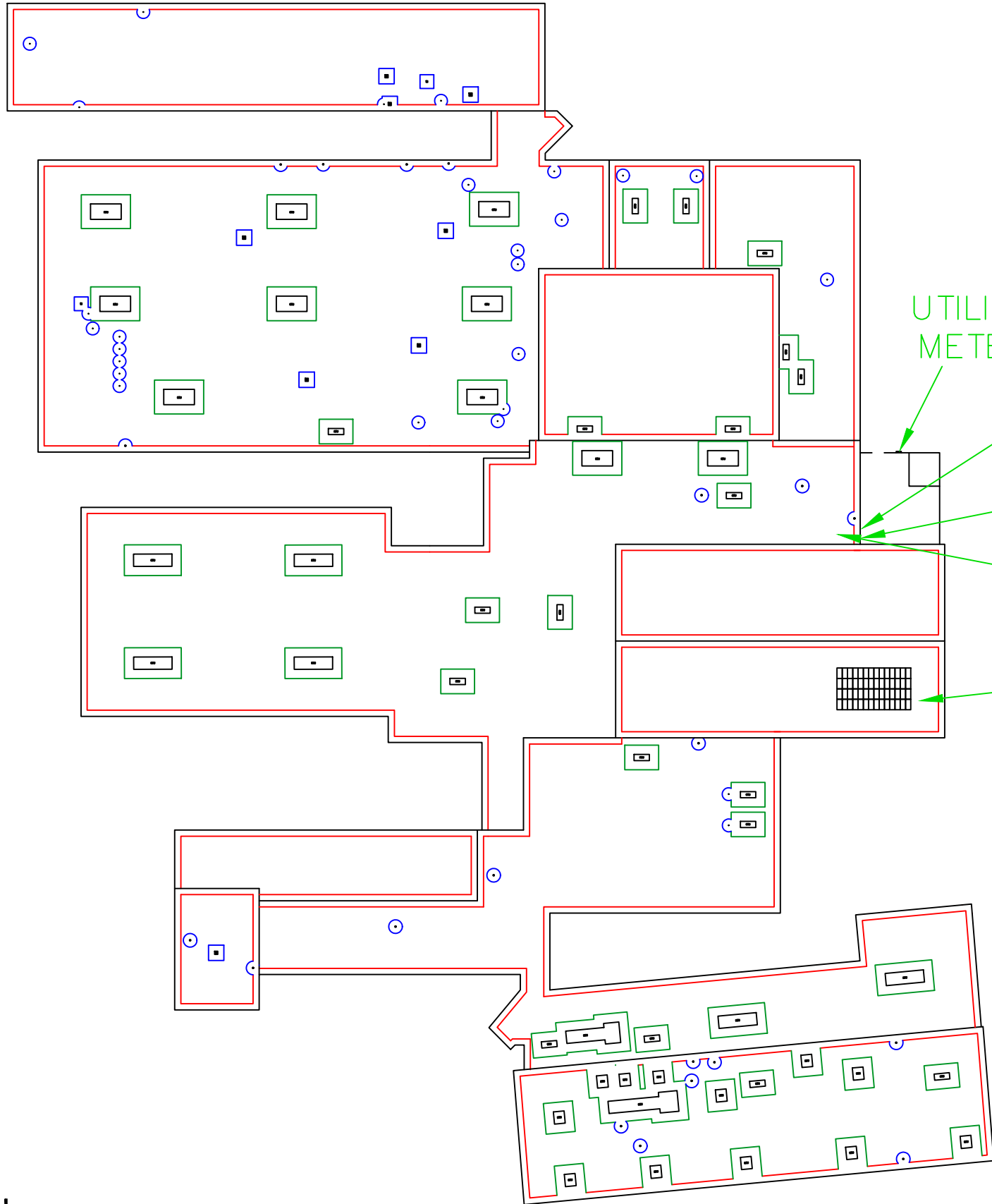
Henderson High School
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Henderson, KY 42420

GENERAL NOTES

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

PV1.1



System Summary

Electrical Equipment:

- 56 – SunPower 435W Commercial Solar Module
- 28 – SolarEdge P1101 Power Optimizer
- 1 – SolarEdge 20kW Three Phase Inverter

24.36kW DC System Size
20kW AC System Size

Roof Details:

Roof Type: Standing Seam
Racking Type: Unirac Standard Rail with S5! attachments
Module Tilt: 2.3 Degrees
Azimuth: 198 Degrees

Key:

- Solar Module
- 4ft Roof Edge Setback
- 4ft Obstruction Setback
- 6ft Equipment Setback
- Roof Drain
- Roof Vent
- Roof Top Unit



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SITE PLAN

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PV1.2



BID
DOCUMENTS

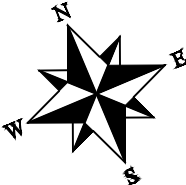
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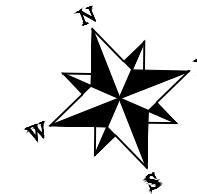
PLOT PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS	
1.	Bidding 3/3/2022

PV1.3





1 SAFETY & STAGING AREA

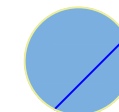
SCALE: NTS

TAG NOTES/KEY:



SUBCONTRACTOR TO USE
TIE-OFF POINTS ON ROOF RIDGE
FOR FALL PROTECTION

KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 6' FROM
ROOF EDGE DURING PV INSTALL

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SAFETY AND STAGING AREA

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DRAWN:	LW
CHECKED:	KK

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PV1.4

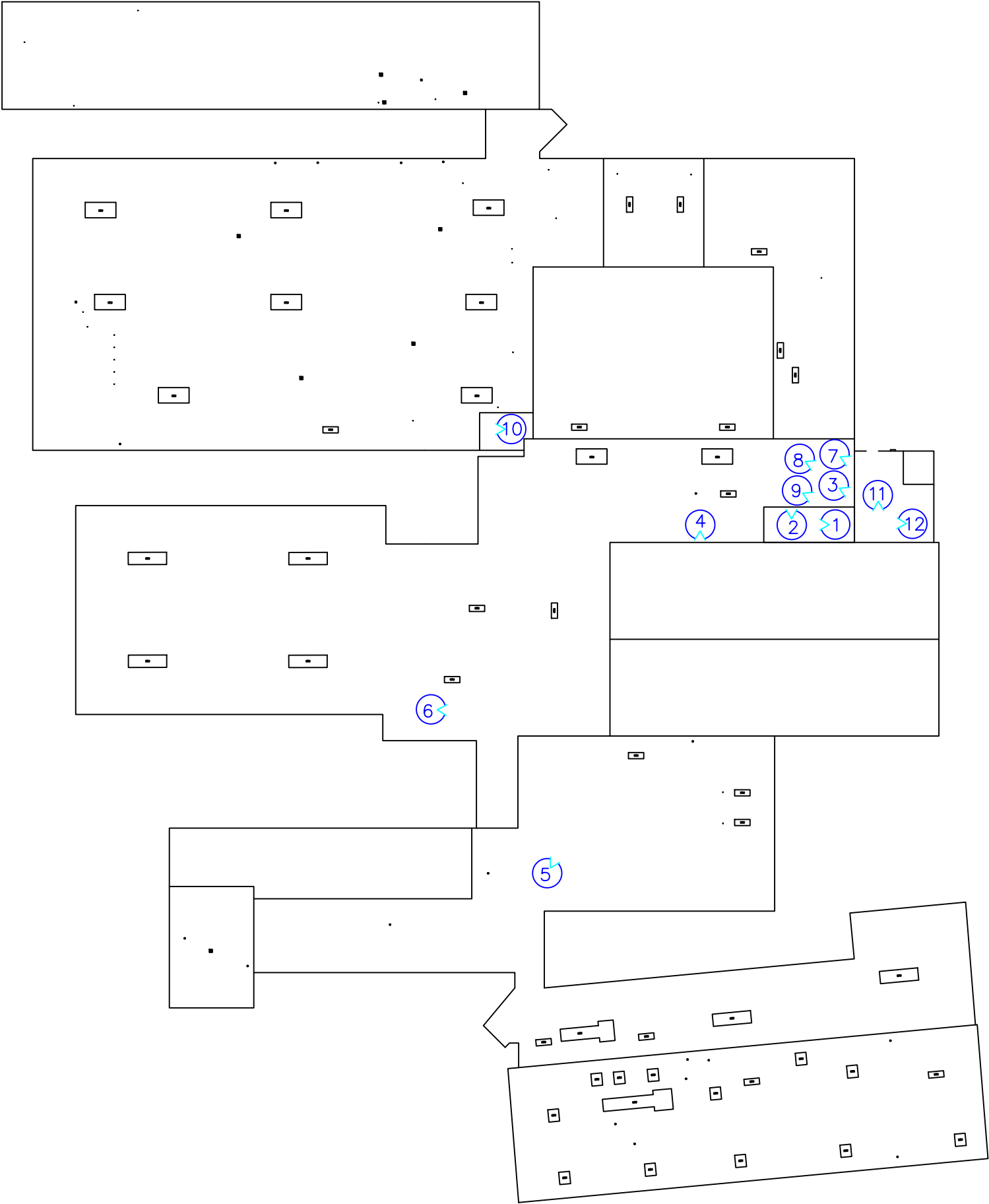
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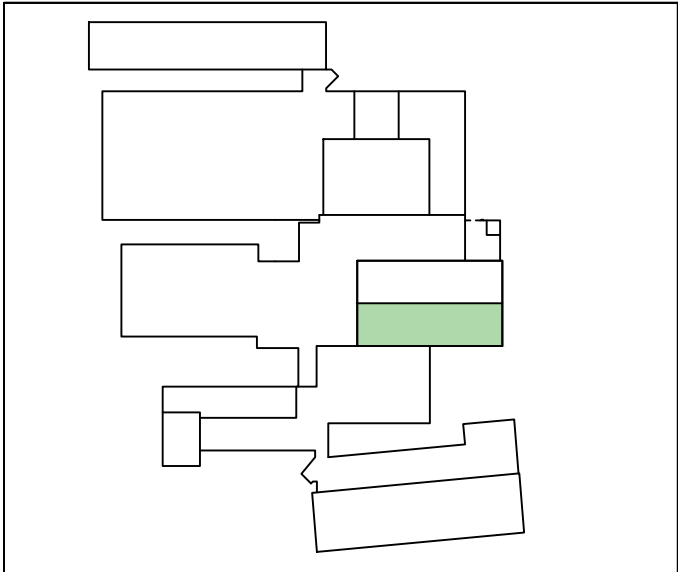
PHOTO MAP

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
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CHECKED:	KK

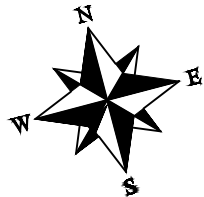
REVISIONS
1. Bidding 3/3/2022

PV1.5





String	Modules	Optimizers
1	28	14
2	28	14



TAG NOTES/KEY:

- 1

Wire management shall be neat and professional. No wires shall be laying on roof surfaces.
- 2

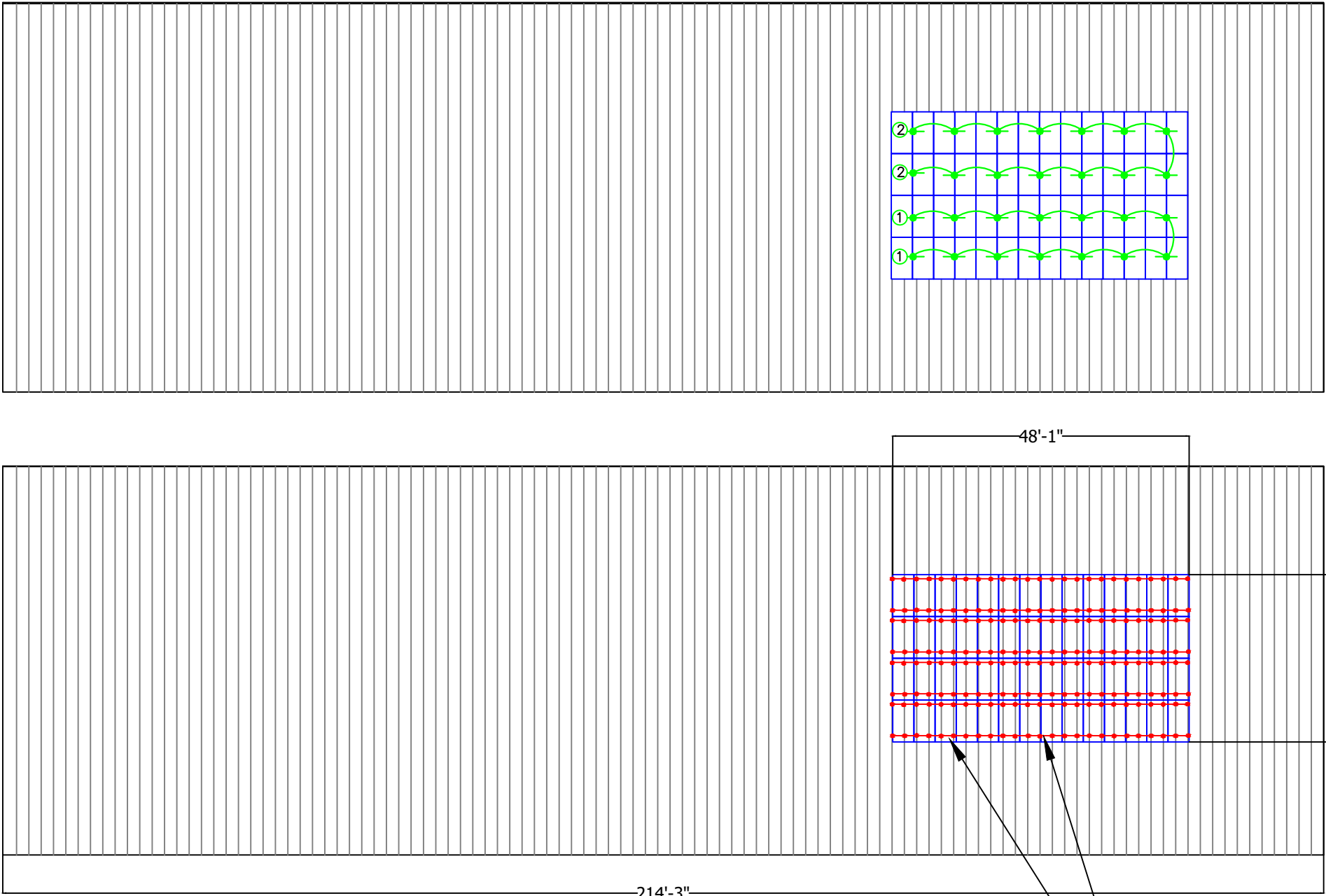
Should strings change or run differently be sure to create as built drawings and give to construction manager.
- 3

S5! Standing Seam Attachment Point
- 4

Unirac Rail System
- 5

Contractor shall not damage or scrape metal roof when attaching S5! clamps

Part List		Torque Specification Unirac Rail System		Torque Specification for S5! Clamp	
Item	Quantity	Item	Foot Pounds		
SM Rail 168" Mill	112	Mid Clamp	11	Specified Torque	Foot Pounds
End Clamp	224	MLPE Mount	10		
Metal Roof Attachment S-5!	205	End Clamp	3	22ga steel	13-15
Roof Attachment	205	L-Foot to Rail	30		
Grounding Lug	56	Rail Splice	10	All other metals and gauges	11-12.5



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BALLAST AND STRINGS

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DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

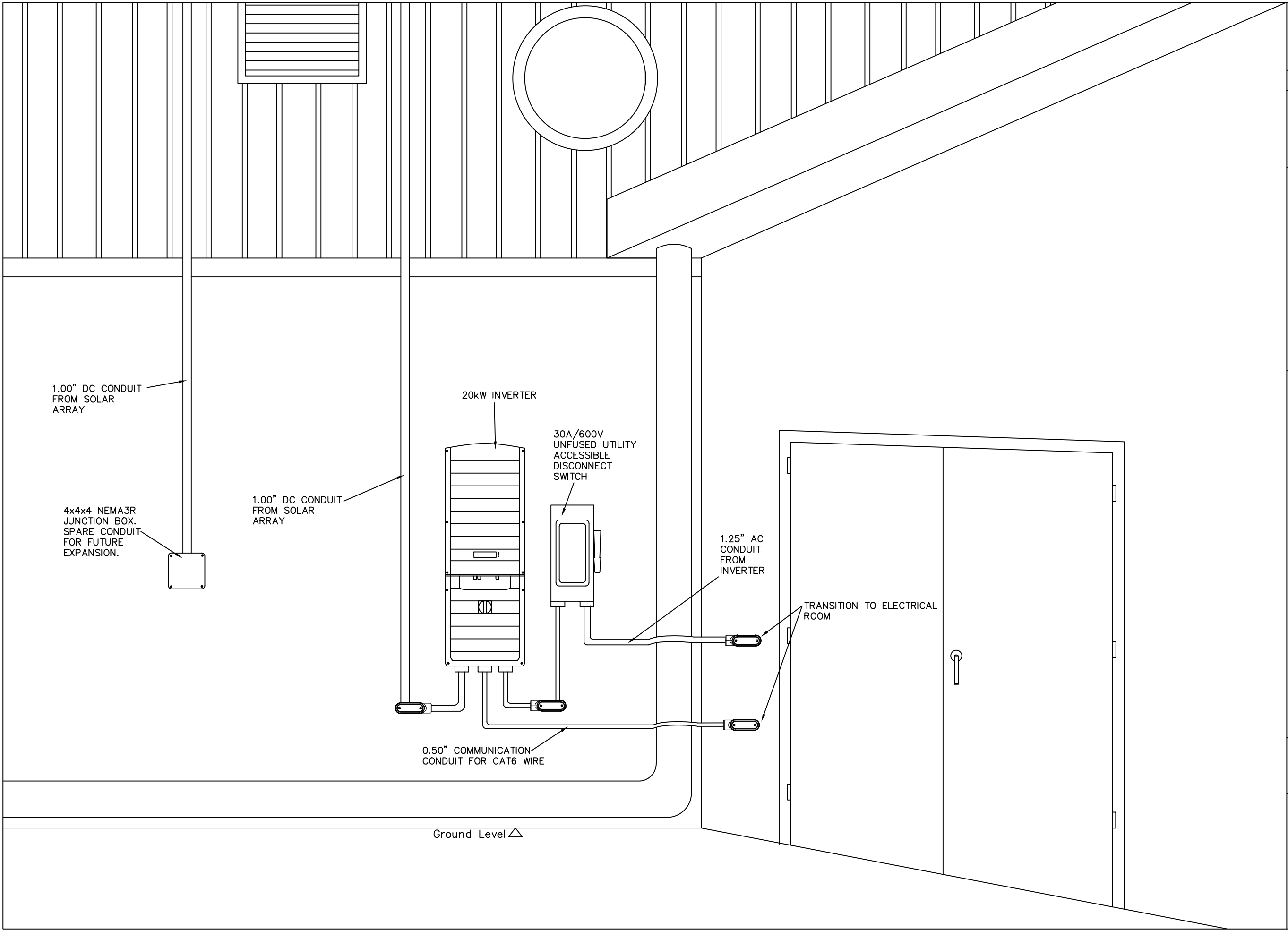
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PV1.6

Building Height is ~27'

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DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

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UTILITY METER

UTILITY ACCESSIBLE DISCONNECT

AC HOME RUN TO
— MDP: 20'

-DC HOME RUN TO
INVERTER: 110'

1

2

1 | EXTERIOR CONDUIT PLAN

SCALE: 1" = 60'

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EXTERIOR CONDUIT PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

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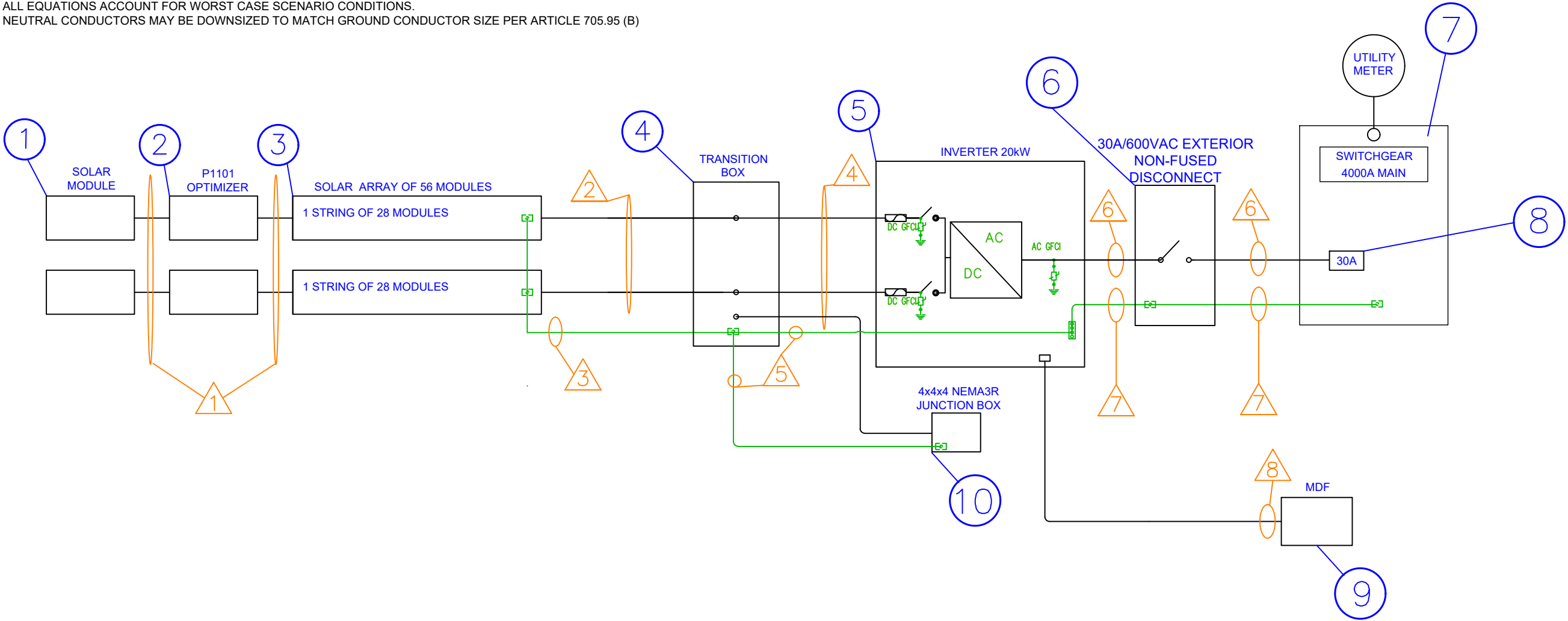
E1.1

ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



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SINGLE LINE DIAGRAM

⊙	Equipment Schedule											
TAG	Description	Quantity	Part Number	Notes	△	Conductor and Raceway Schedule						
1	Solar PV Module	56	SPR-E20-435-COM	Sunpower 435W Commercial Solar Module	TAG	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size	CLIENT/CMTA JOB #:	ZHC22
2	Solar PV Optimizer	28	P1101	SolarEdge P1101 Optimizer							DATE:	2/17/2022
3	Solar Array	1		56 Solar Modules in 2 strings							DRAWN:	LW
4	Transition Box	1		Soltection Transition Box 1000V Nema 3R							CHECKED:	KK
5	Inverter	1	SE20KUS	SolarEdge 20kW Three Phase 480V Commercial Inverter							REVISIONS	
6	Utility Accessible Disconnect Switch	1	SquareD	Unfused 30A/600V SquareD Nema 3R Disconnect 3PH							1. Bidding 3/3/2022	
7	Main Distribution Panel	1	SquareD	4000A/480V SquareD Switchboard w/4000 Main								
8	30A Main SquareD Breaker	1	SquareD	30A/600V Three Phase Breaker								
9	Main Distribution Frame	1		Main Server Rack for Building								
10	4x4x4 NEMA3R Junction Box	1		Spare conduit to be terminated in junction box.								
<div>E1.2</div>												

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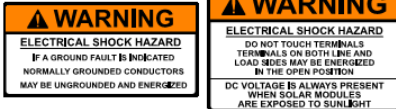
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DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

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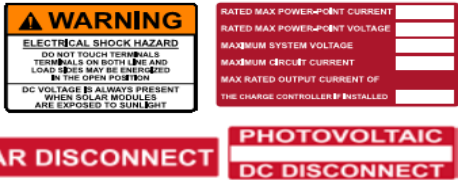
E1.3

A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.



C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.



D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2



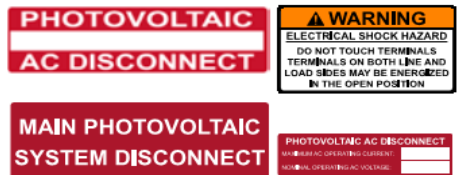
E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.



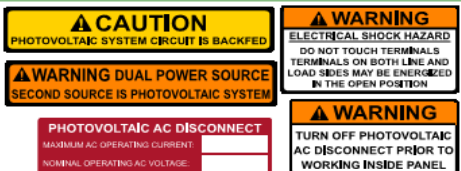
F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

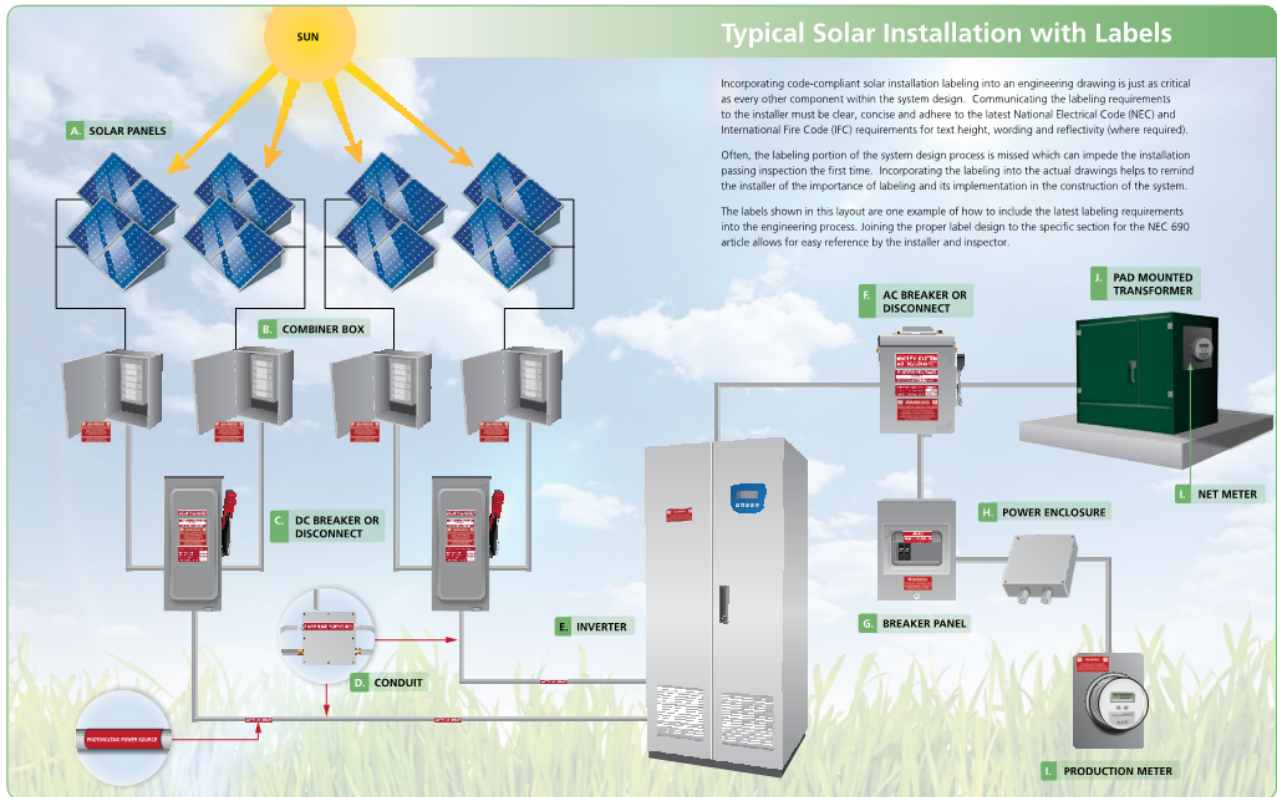


H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.



J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.





SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

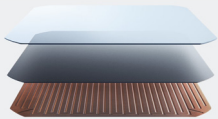
Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



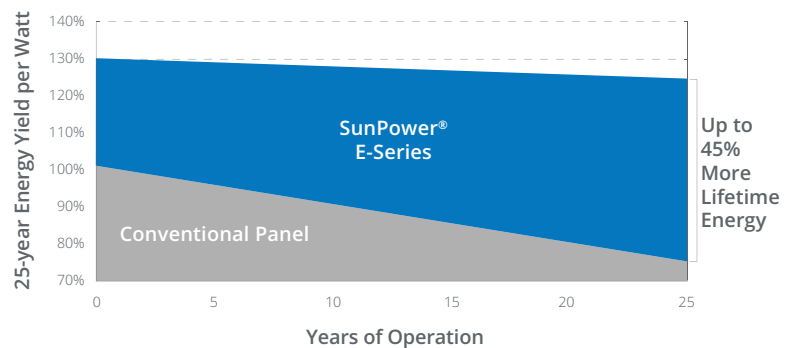
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



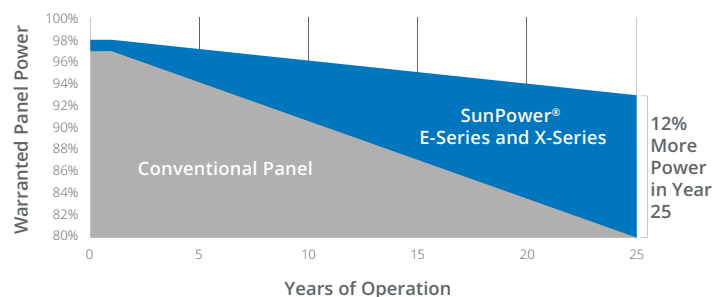
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.

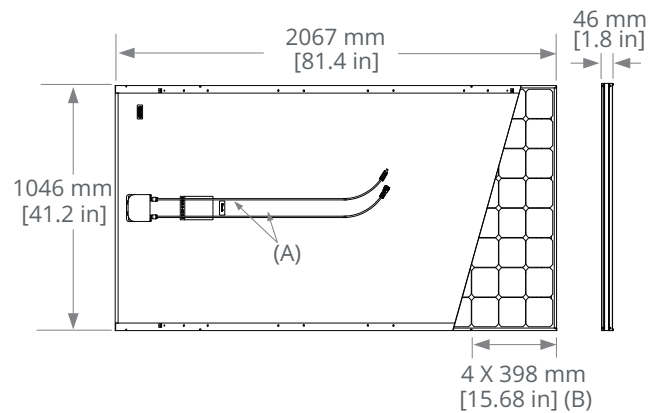


E-Series: E20-435-COM SunPower® Commercial DC Panel

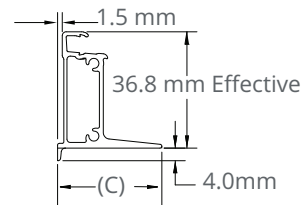
Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 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	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front
	G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins

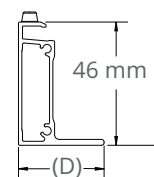
Tests And Certifications	
Standard Tests ⁸	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/-10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

1 SunPower 327 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), 0.75%/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.

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Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 277/480V Grid for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS)



INVERTERS

The best choice for SolarEdge enabled systems

- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Specifically designed to work with power optimizers
- Superior efficiency (98%)
- Fixed voltage inverter for longer strings
- Integrated Safety Switch
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Small, lightweight, and easy to install outdoors or indoors on provided bracket
- Supplied with RS485 Surge Protection Device, to better withstand lightning events

/ Three Phase Inverters for the 277/480V Grid⁽¹⁾ for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS

SE10KUS		SE20KUS	SE30KUS	SE33.3KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER		SEXXX	XXXXXBXX4		
OUTPUT					
Rated AC Power Output	10000	20000	30000	33300	VA
Maximum AC Power Output	10000	20000	30000	33300	VA
Output Line Connections	3 phase, 3-wire / PE (L1-L2-L3), TN, TT 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT				
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)	244-277-305				
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)	422.5-480-529				
AC Frequency Min-Nom-Max ⁽²⁾	59.3 - 60 - 60.5				
x. Continuous Output Current (per Phase)	12	24	36.5	40	A
GFDI Threshold	1				
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes				
THD	≤ 3				
INPUT					
Maximum DC Power (Module STC)	13500	27000	40500	40500	W
Transformer-less, Ungrounded	Yes				
Maximum Input Voltage DC to Gnd	490				
Maximum Input Voltage DC+ to DC-	1000				
Nominal Input Voltage DC to Gnd	420				
Nominal Input Voltage DC+ to DC-	840				
Maximum Input Current	13.5	26.5	39	40	Adc
Maximum Input Short Circuit Current	45				
Reverse-Polarity Protection	Yes				
Ground-Fault Isolation Detection	1MΩ Sensitivity		350kΩ Sensitivity ⁽³⁾		
CEC Weighted Efficiency	98		98.5		
Night-time Power Consumption	< 3		< 4		
ADDITIONAL FEATURES					
Supported Communication Interfaces	2 x RS485, Ethernet, Built-in GSM (optional)				
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi station for local connection				
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect ⁽⁴⁾				
RS485 Surge Protection	Supplied with the inverter				
Smart Energy Management	Export Limitation				
STANDARD COMPLIANCE					
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07				
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)				
Emissions	FCC part15 class B				
INSTALLATION SPECIFICATIONS					
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG		3/4" minimum / 8-4 AWG		
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG				
Number of DC inputs	2 pairs		3 pairs ⁽⁵⁾		
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260				
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260				
Weight	73.2 / 33.2		99.5 / 45		
Weight with Safety Switch	79.7 / 36.2		106 / 48		
Cooling	Fans (user replaceable)				
Noise	< 50		< 55		
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁶⁾				
Protection Rating	NEMA 3R				

(1) For 120/208V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-208V-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) P/Ns SE10K/SE20K-US0xxxxx have Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)

(5) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(6) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-de-rating-note-na.pdf>

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Power Optimizer

For North America

P860 / P960 / P1101



POWER OPTIMIZER

PV power optimization at the module-level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses and combiner boxes, over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

/ Power Optimizer For North America

P860 / P960 / P1101

Power OptimizerModel (Typical Module Compatibility)	P860 (for 2 x 72 cell modules)		P960 (for 2 x 72 cell modules)		P1101 (for up to 2 x high power or bi-facial modules)	
INPUT						
Rated Input DC Power ⁽¹⁾	860		960		1100	W
Connection Method	Dual input for independently connected modules ⁽²⁾				Single input for series connected modules	
Absolute Maximum Input Voltage (Voc at lowest temperature)	60				125	Vdc
MPPT Operating Range	12.5 - 60				12.5 - 105	Vdc
Maximum Short Circuit Current (Isc)	22		23.2		14.1	Adc
Maximum Short Circuit Current per Input (Isc)	11		11.6		-	Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.6					%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)						
Maximum Output Current	18					Adc
Maximum Output Voltage	80					Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
Photovoltaic Rapid Shutdown System	Compliant with NEC 2014, 2017, 2020					
EMC	FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741			IEC62109-1 (class II safety), UL1741, UL3741		
Material	UL94 V-0, UV resistant					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Compatible SolarEdge Inverters	Three phase inverters			SE30K & larger		
Maximum Allowed System Voltage	1000					Vdc
Dimensions (W x L x H)	129 x 168 x 59 / 5.1 x 6.61 x 2.32			129 x 162 x 59 / 5.1 x 6.4 x 2.32		mm / in
Weight	1064 / 2.34					gr / lb
Input Connector	MC4 ⁽³⁾					
Input Wire Length Options	Input #1	Input #2	Input #1	Input #2	-	m / ft
1	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2	1.6 / 5.2	
2	(-) 1.6 / 5.2, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 1.6 / 5.2				
3	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2				
Output Wire Type / Connector	Double insulated; MC4					
Output Wire Length	2.3 / 7.5		2.3 / 7.5		2.4 / 7.8	m / ft
Operating Temperature Range ⁽⁴⁾	-40 to +85 / -40 to +185					°C / °F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed

(2) In the event of an odd number of PV modules in one string, installation of one P860 /P960 Power Optimizer connected to one PV module is allowed. When connecting a single module to the P860/ P960, seal the unused input connectors with the supplied pair of seals

(3) For other connector types please refer to: <https://www.solaredge.com/sites/default/files/optimizer-input-connector-compatibility.pdf>

(4) For ambient temperature above +70°C / +158°F, power derating is applied. Refer to the Power Optimizers Temperature De-Rating Application Note for more details

PV System Design Using a SolarEdge Inverter ⁽⁵⁾⁽⁶⁾		208V Grid SE14.4K*	208V Grid SE17.3K*	277/480V Grid SE20K, 30K	277/480V Grid SE33.3K*, SE40K*
Compatible Power Optimizers		P860, P960, P1101	P860, P960, P1101	P860, P960, P1101	P860, P960, P1101
Minimum String Length	Power Optimizers	8	9	14	14
	PV Modules	15	17	27	27
Maximum String Length	Power Optimizers	30	30	30	30
	PV Modules	60	60	60	60
Maximum Continuous Power per String		7200	8730	15300	15300
Maximum Allowed Connected Power per String ⁽⁷⁾ (Permitted only when the difference in connected power between strings is up to 2,000W for the 277/480V grid, or 1,000W for the 208V grid)		1 string - 8400 2 strings or more - 9000	1 string - 9930 2 strings or more - 10530	1 string - 17550 2 strings or more - 20300	2 strings or less - 17550 3 strings or more - 20300
Parallel Strings of Different Lengths or Orientations		Yes			

* The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter

(5) P860/P960 can be mixed in one string only with P860/P960

(7) P860/P960 design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification

(8) To connect more STC power per string, design your project using [SolarEdge Designer](#)

The right way to attach almost anything to metal roofs!

S-5![®]

The Right Way![®]

S-5-V Clamp

The S-5-V clamp is a versatile clamp that fits vertical-folded seam profiles manufactured in North America—including most structural and architectural profiles.

Its simple design and generous dimensioning are what make the S-5-V clamp so versatile for use with the S-5![®] snow retention products, such as ColorGard[®], as well as with other heavy-duty applications.

Installation is as simple as setting the patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the stainless steel bolt provided with the product. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-V Mini Clamp

The S-5-V Mini is a bit shorter than the S-5-V and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*

*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard[®] snow retention systems.



The S-5-V clamp is a versatile clamp, fitting most of the vertical standing seam profiles in North America.

S-5-V and S-5-V Mini

888-825-3432 | www.S-5.com |



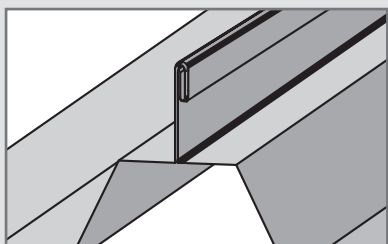
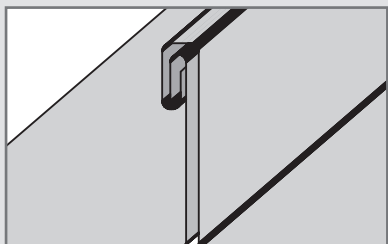


The strength of the S-5-V clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving the roof manufacturer's warranty intact.

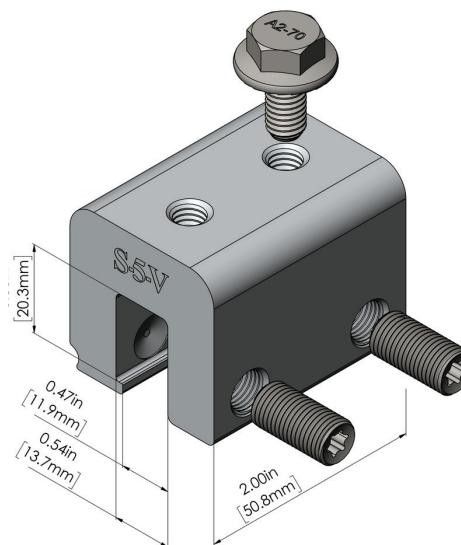
The **S-5-V and S-5-V Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-V is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit www.S-5.com for more information including CAD details, metallurgical compatibilities, and specifications.

The S-5-V clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

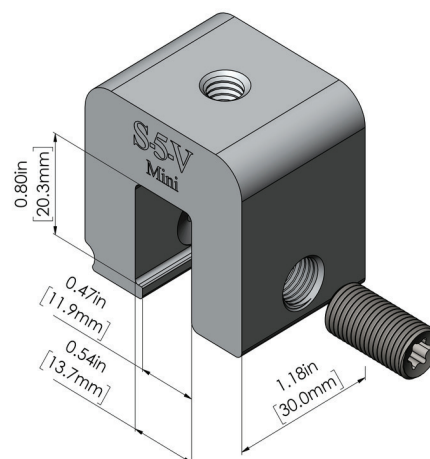
Example Profiles



S-5-V Clamp



S-5-V Mini Clamp



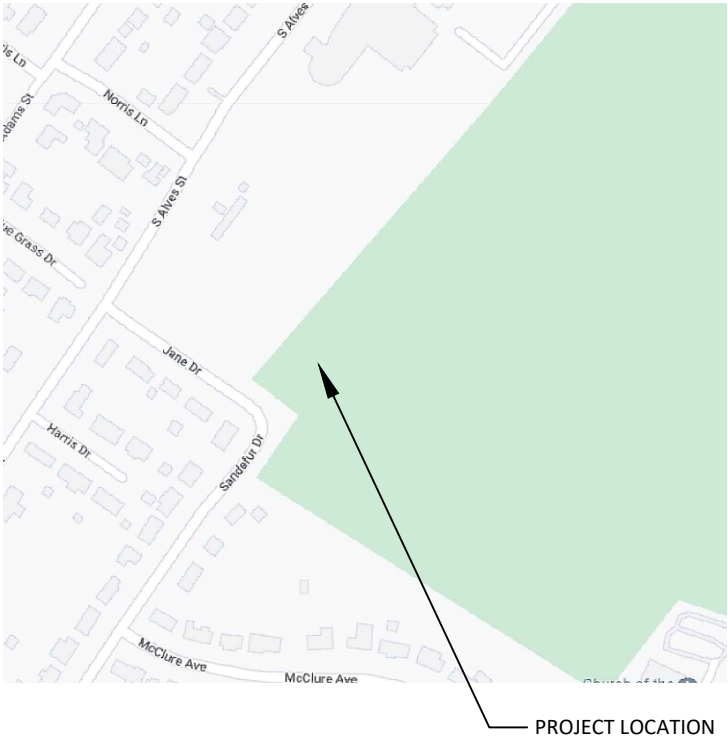
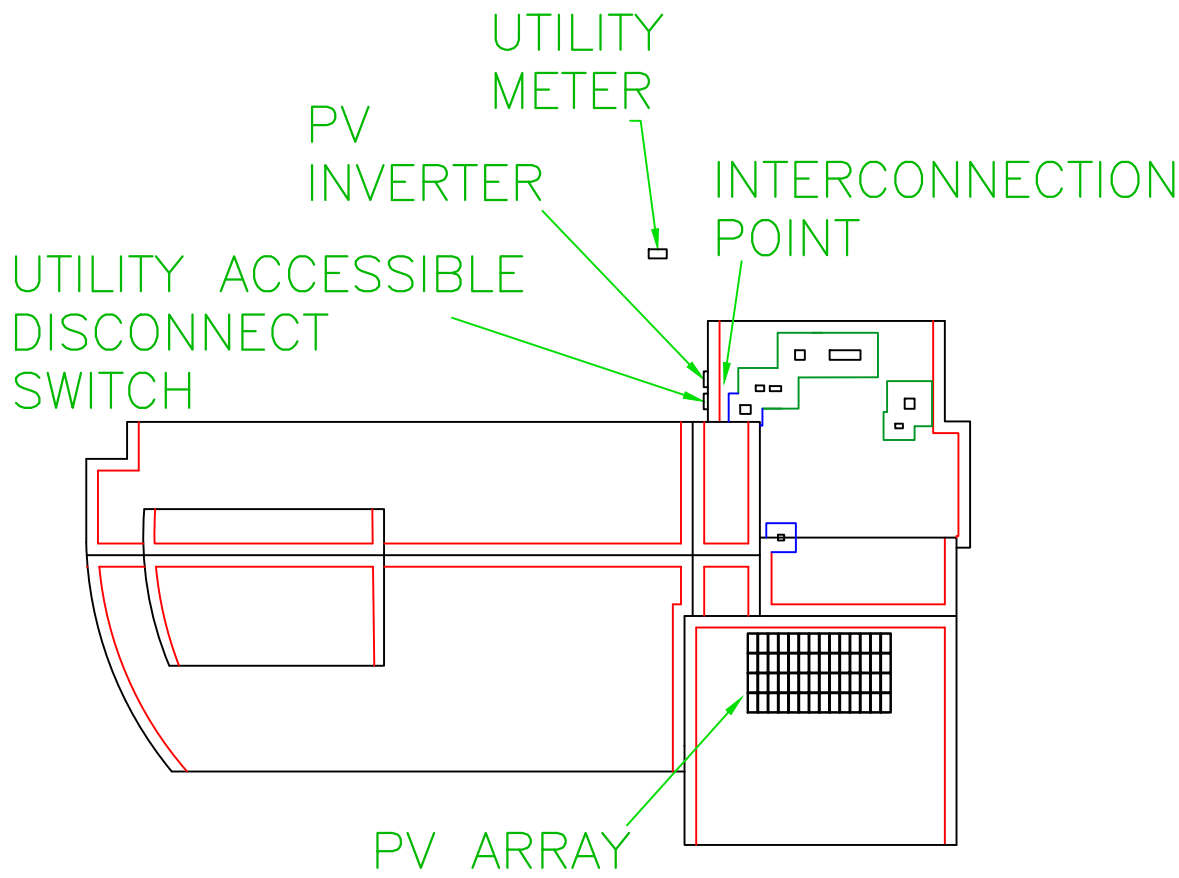
S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. Consult the S-5! website at www.S-5.com for published data regarding installation instructions and holding strength.

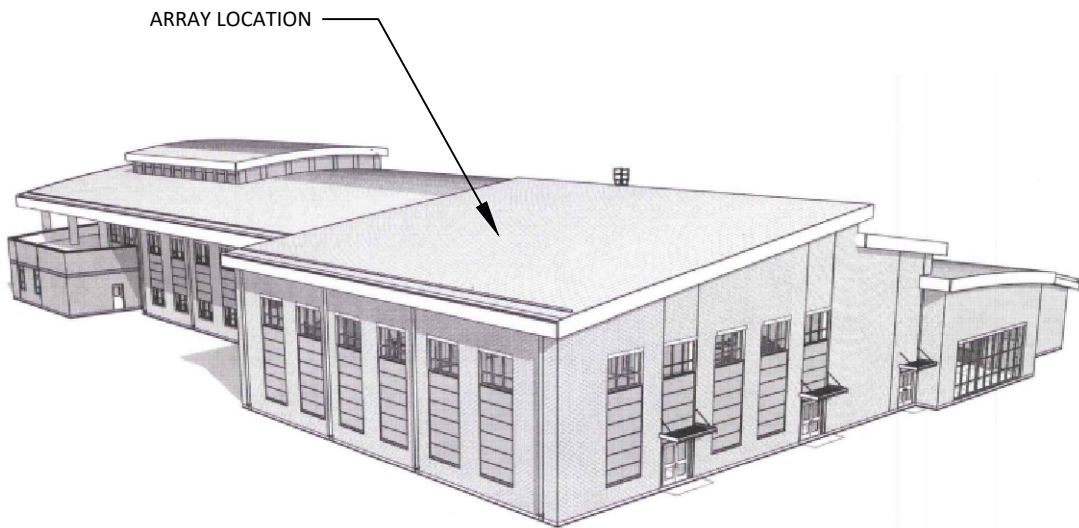
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24.36kW DC PHOTOVOLTAIC
PITCHED ROOF SYSTEM
FOR
HENDERSON COUNTY SCHOOLS
GUARANTEED ENERGY SAVINGS CONTRACT



3 VICINTY MAP



2 ROOFTOP VIEW OF SITE

INDEX

SHEET #	SHEET TITLE
PV1.0	COVER SHEET
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PV1.2	SITE PLAN
PV1.3	PLOT PLAN
PV1.4	STAGING AREA
PV1.5	PHOTO MAP
PV1.6	ROOF A BALLAST & STRINGS
E1.0	UAD & INVERTER RISER
E1.1	EXTERIOR CONDUIT PLAN
E1.2	SINGLE LINE DIAGRAM
E1.3	SAFETY PLACARDS & SIGNAGE



BID
DOCUMENTS

Jefferson Elementary School
Henderson County Schools
800 S Alves St
Henderson, KY 42420

COVER SHEET

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

PV 1.0

1 SITE OVERVIEW



GENERAL NOTES:

1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.

BID
DOCUMENTS

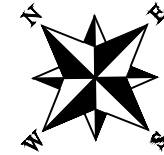
Jefferson Elementary School
Henderson County Schools
800 S Alves St
Henderson, KY 42420

GENERAL NOTES

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

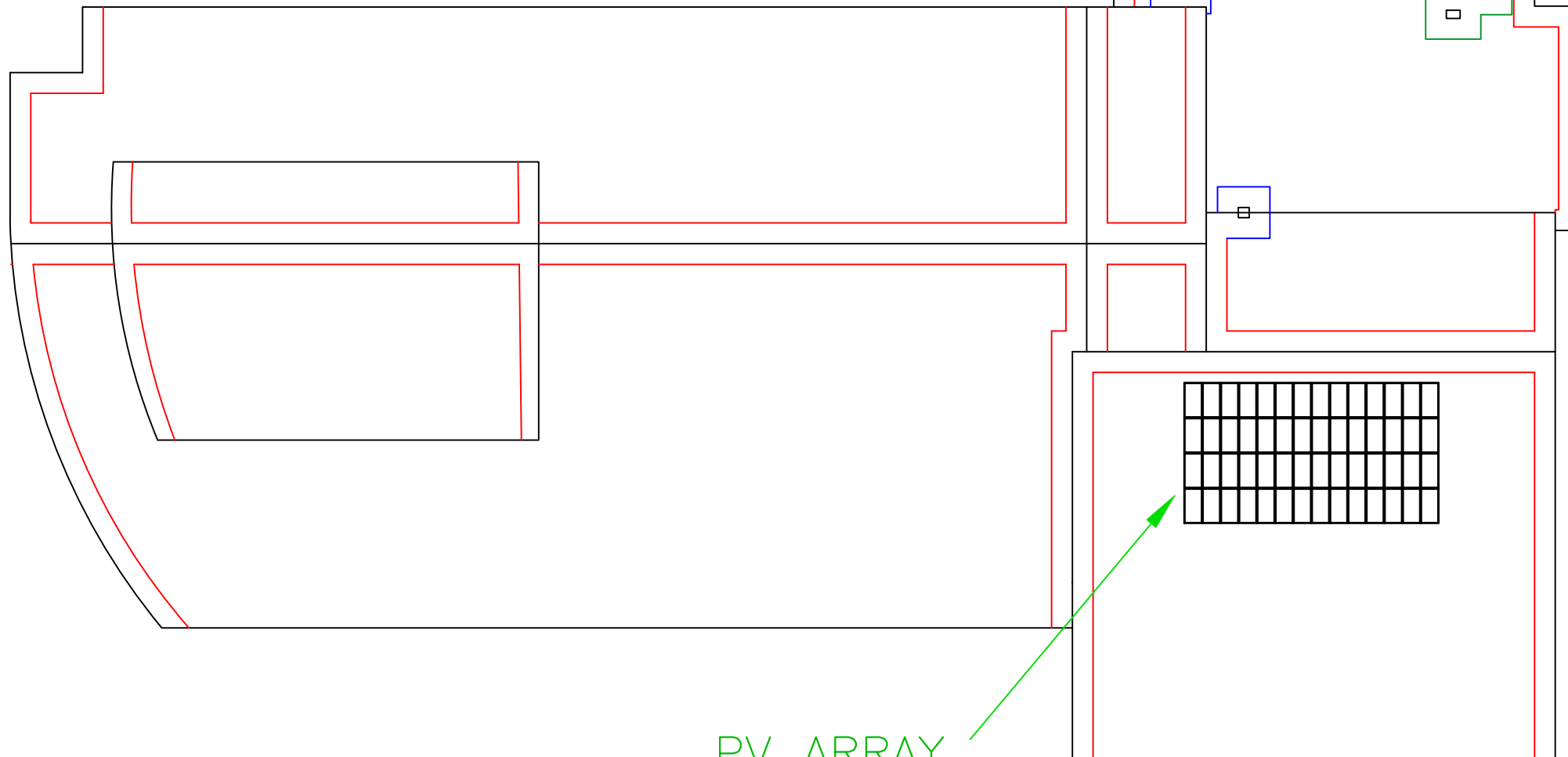
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1. Bidding 3/3/2022

PV 1.1



UTILITY METER
PV INVERTER
INTERCONNECTION POINT

UTILITY
ACCESSIBLE
DISCONNECT
SWITCH



PV ARRAY

System Summary



Electrical Equipment:

- 56 – SunPower 435W Commercial Solar Module
- 28 – SolarEdge P1101 Power Optimizer
- 1 – SolarEdge 20kW Three Phase Inverter

24.36kW DC System Size
20kW AC System Size

Roof Details:

Roof Type: Standing Seam

Racking Type: Standard Railing System
with S5! Attachments

Module Tilt: 3 Degrees

Azimuth: 215 Degrees

Key:

- Solar Module
- 4ft Roof Edge Setback
- 4ft Obstruction Setback
- 6ft Equipment Setback
- Roof Drain
- Roof Vent
- Roof Top Unit

BID
DOCUMENTS

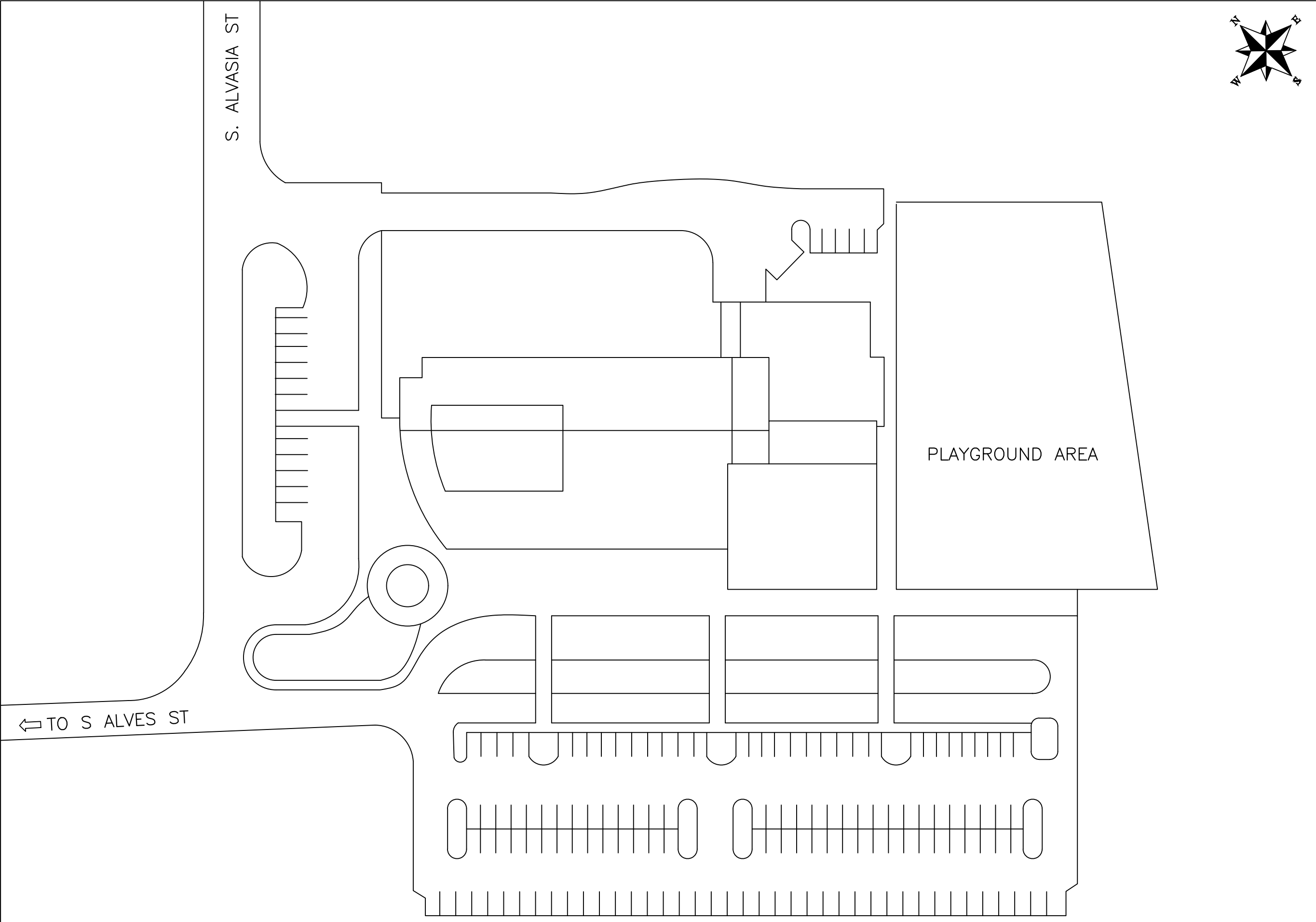
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Henderson County Schools
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Henderson, KY 42420

SITE PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
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PV 1.2



BID
DOCUMENTS

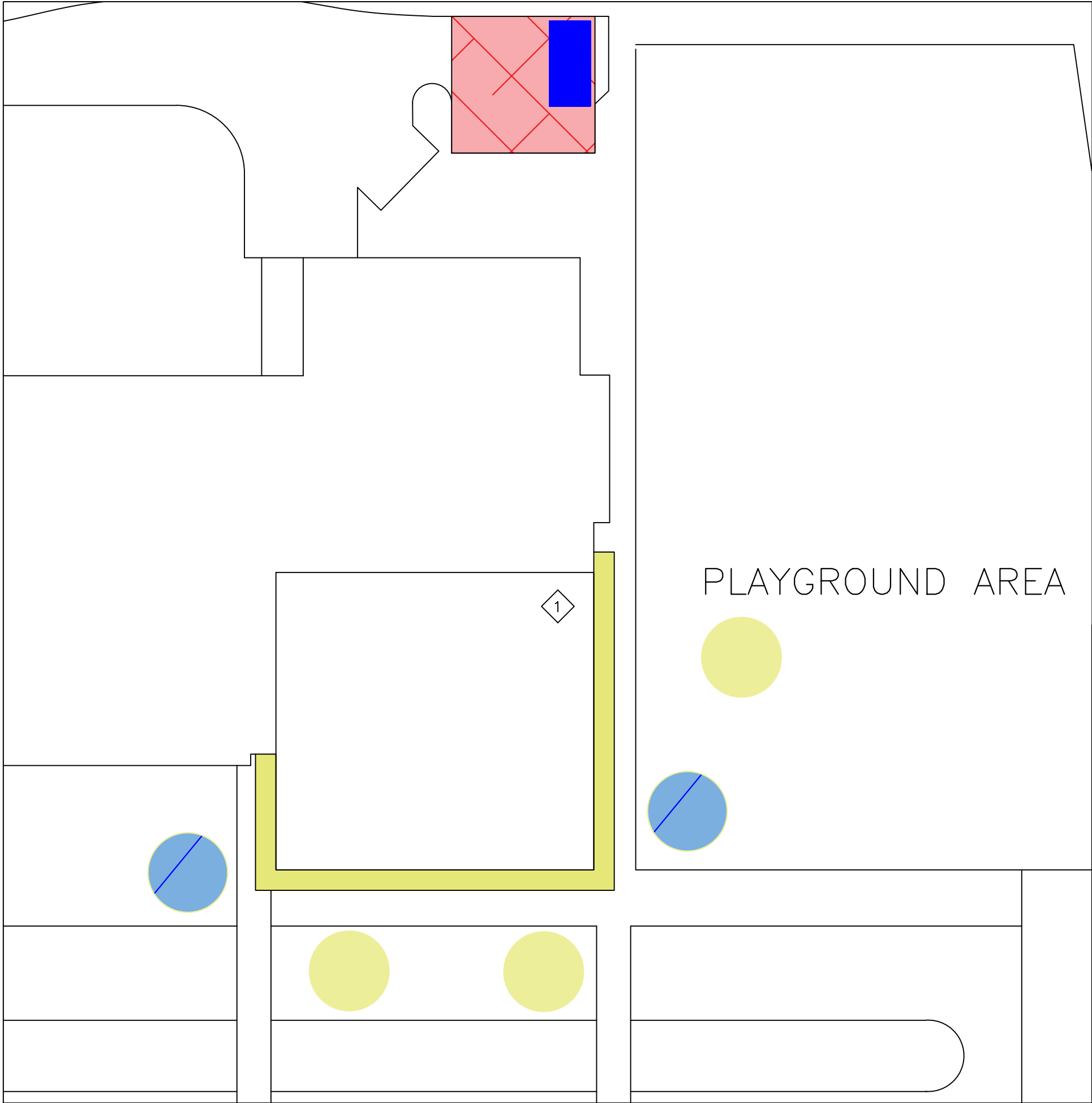
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Henderson County Schools
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Henderson, KY 42420

PLOT PLAN

CLIENT/CMTA JOB #:	ZHC22
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PV 1.3



BID
DOCUMENTS

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800 S Alves St
Henderson, KY 42420

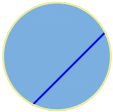
SAFETY AND STAGING AREA

TAG NOTES/KEY:



SUBCONTRACTOR TO USE
TIE-OFF POINTS ON ROOF RIDGE
FOR FALL PROTECTION

KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 6' FROM
ROOF EDGE DURING PV INSTALL

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DATE:	03/02/2022
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PV 1.4

BID
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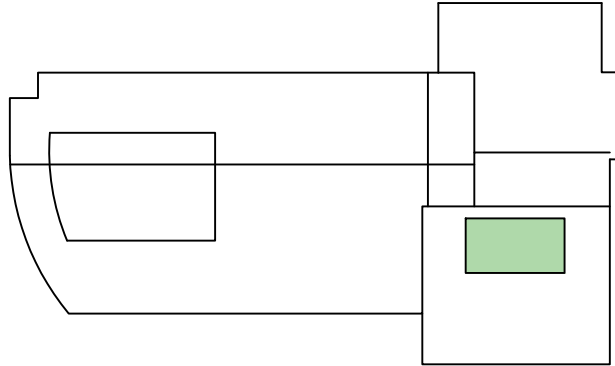
PHOTO MAP

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS

1. Bidding 3/3/2022

PV 1.5 ||



String	Modules	Optimizers
1	28	14
2	28	14

TAG NOTES/KEY:

- 1

Wire management shall be neat and professional. No wires shall be laying on roof surfaces.
- 2

Should strings change or run differently be sure to create as built drawings and give to BID manager.
- 3

S5! Standing Seam Attachment Point
- 4

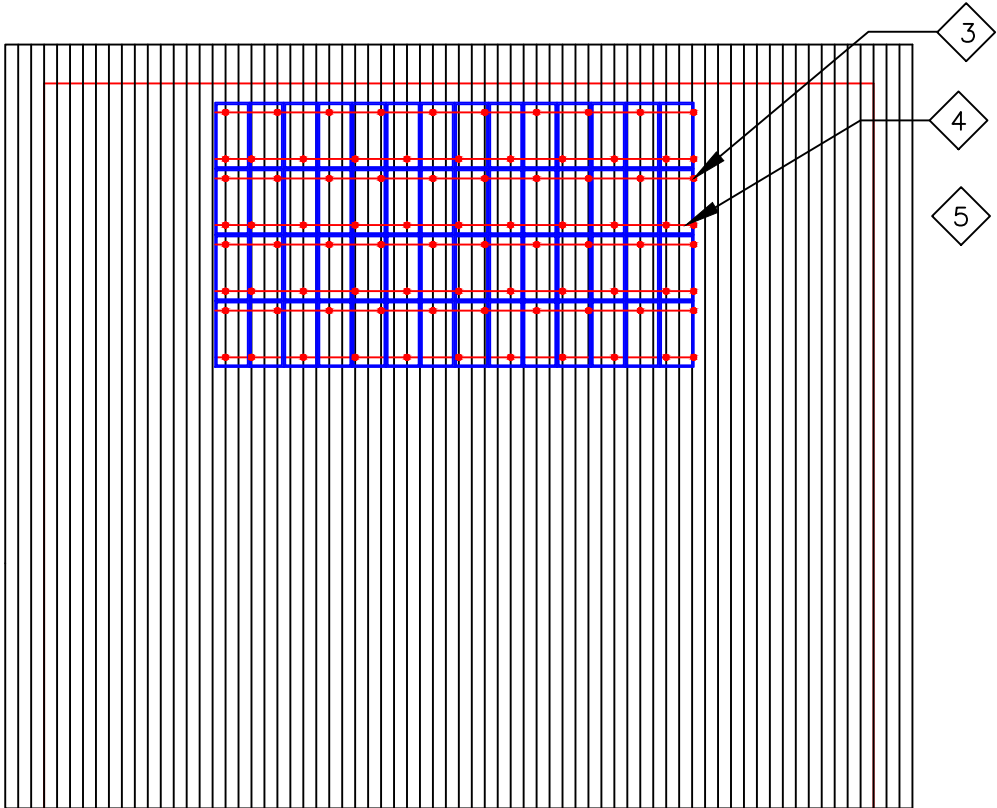
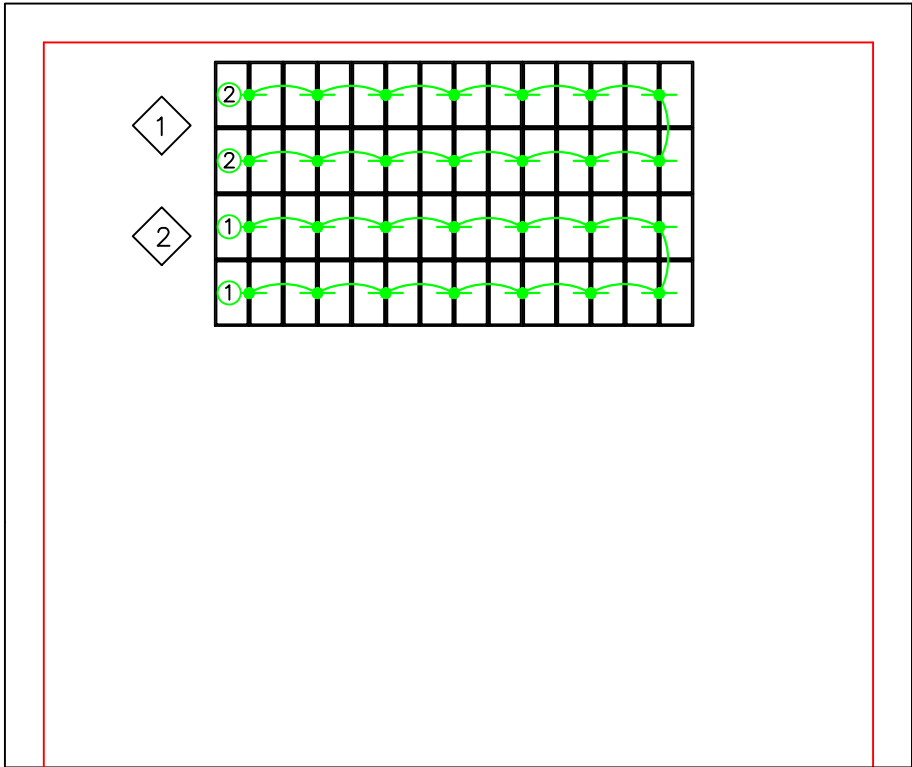
Unirac Rail System
- 5

Contractor shall not damage or scrape metal roof when attaching S5! clamps

Part List	
Item	Quantity
SM Rail 168" Mill	32
Splice	24
End Clamp	32
Mid Clamp	96
Metal Roof Attachment S-5!	168
Roof Attachment	168
Grounding Lug	8

Torque Specification Unirac Rail System	
Item	Foot Pounds
Mid Clamp	11
MLPE Mount	10
End Clamp	3
L-Foot to Rail	30
Rail Splice	10

Torque Specification for S5! Clamp	
Specified Torque	Foot Pounds
22ga steel	13-15
All other metals and gauges	11-12.5



BID
DOCUMENTS

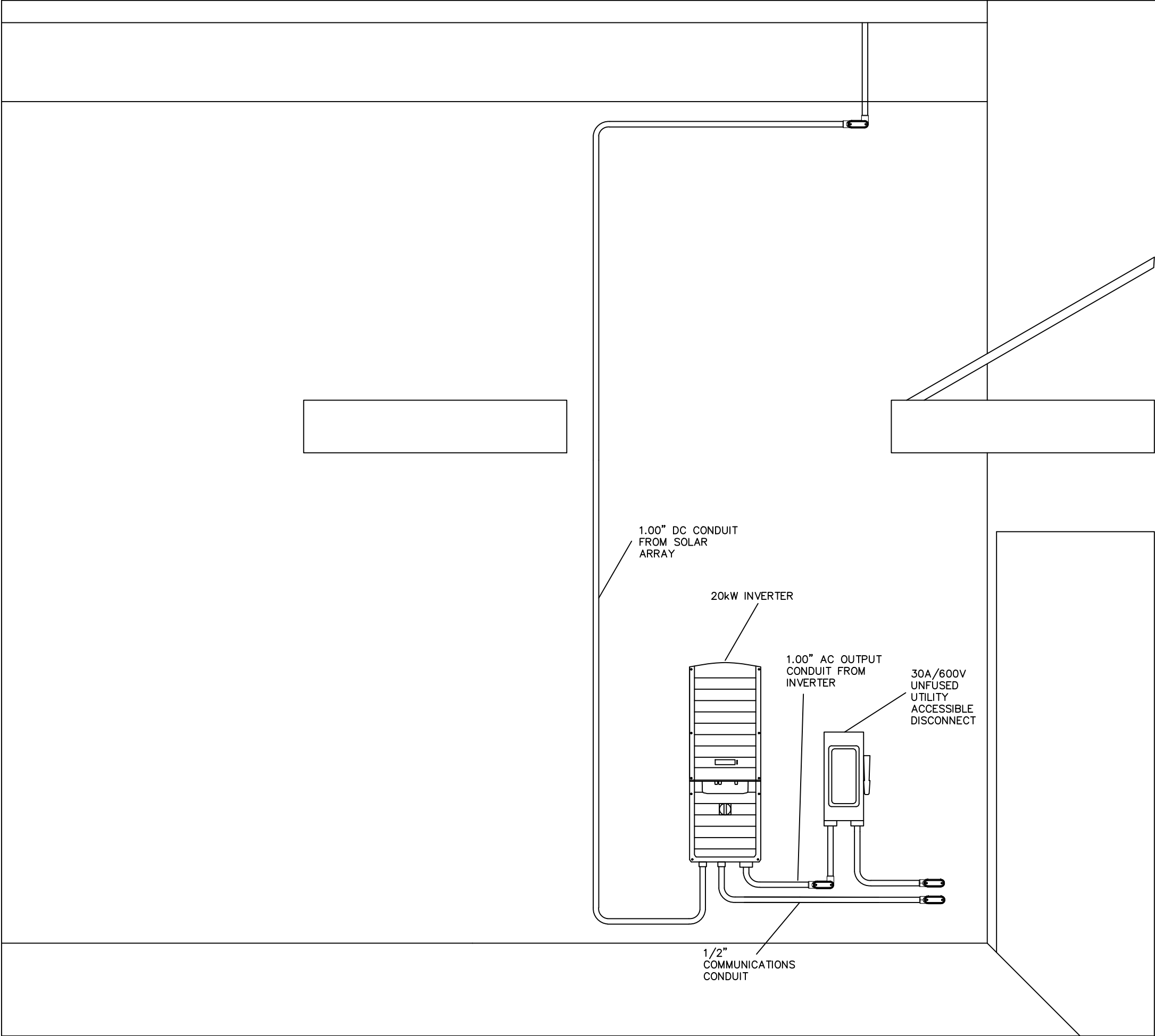
Jefferson Elementary School
Henderson County Schools
800 S Alves St
Henderson, KY 42420

BALLAST AND STRINGS

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

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PV 1.6



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DOCUMENTS

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Henderson County Schools
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Henderson, KY 42420

UAD AND INVERTER RISER

CLIENT/CMTA JOB #:	2H22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

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1. Bidding 3/3/2022

E 1.0

TAG NOTES/KEY:

1

AC HOMERUN TO SUBPANEL PENETRATES WALL AND CONTINUES INSIDE OF ELECTRICAL ROOM

2

SUBCONTRACTOR TO SECURE EMT WITH S51 CLAMPS EVERY 6 FEET



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DOCUMENTS

Jefferson Elementary School
Henderson County Schools
800 S Alves St
Henderson, KY 42420

EXTERIOR CONDUIT PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

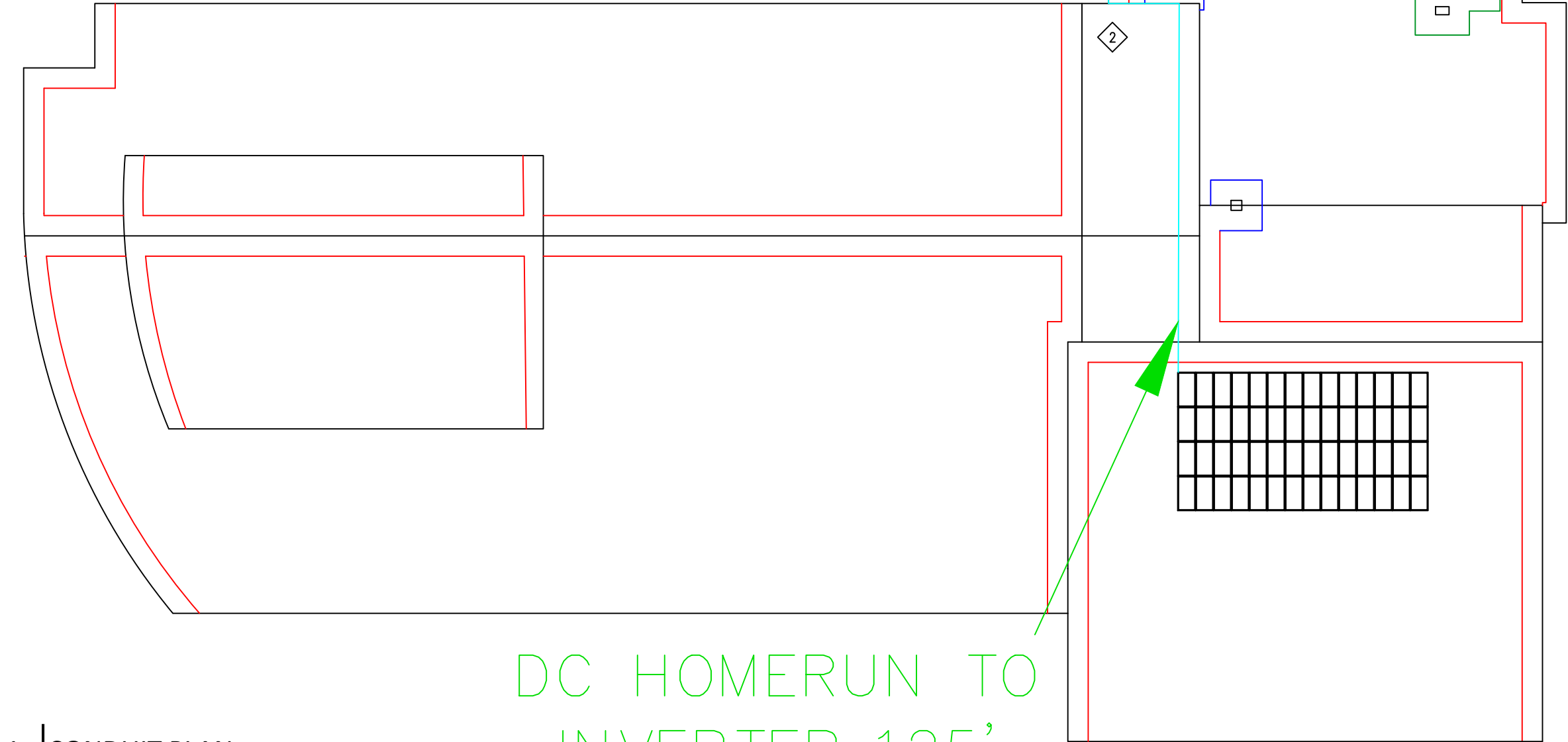
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E 1.1

UTILITY
ACCESSIBLE
DISCONNECT

AC HOMERUN TO
SUBPANEL: 30'

DC HOMERUN TO
INVERTER: 125'

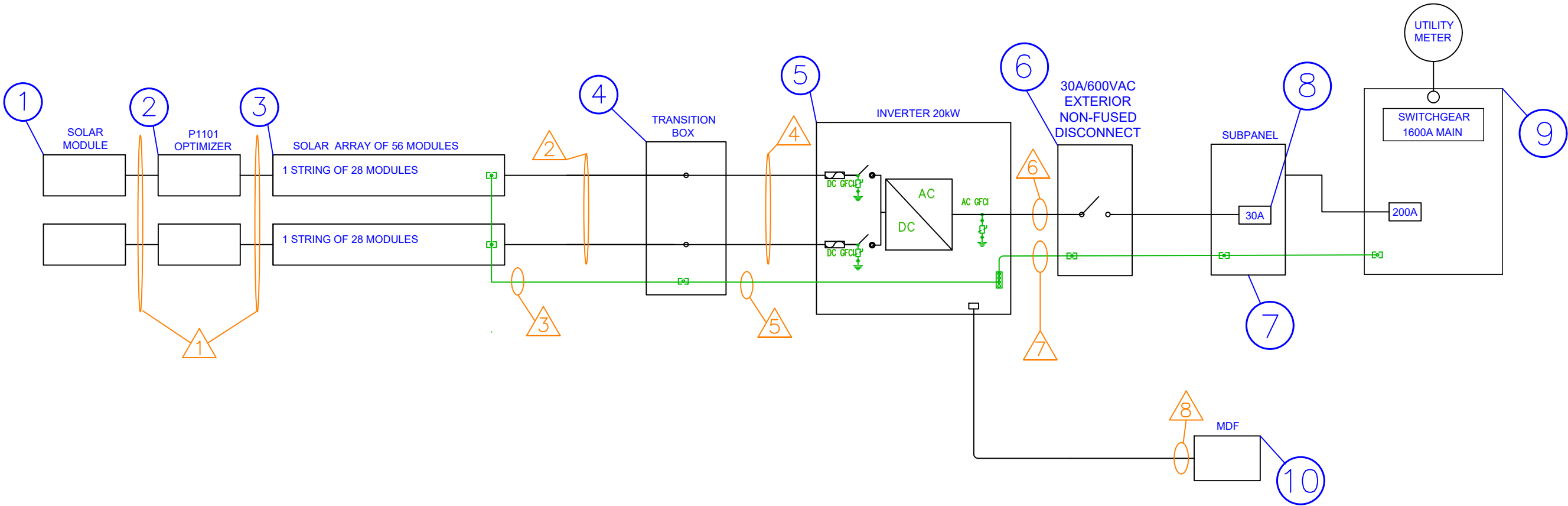


ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



BID
DOCUMENTS



○	Equipment Schedule			
TAG	Description	Quantity	Part Number	Notes
1	Solar PV Module	56	SPR-E20-435-COM	Sunpower 435W Commercial Solar Module
2	Solar PV Optimizer	28	P1101	SolarEdge P1101 Optimizer
3	Solar Array	1		56 Solar Modules in 2 strings
4	Transition Box	1		Soltection Transition Box 1000V Nema 3R
5	Inverter	1	SE20KUS	SolarEdge 20kW Three Phase 480V Commercial Inverter
6	Utility Accessible Disconnect Switch	1	SquareD	Unfused 30A/600V SquareD Nema 3R Disconnect 3PH
7	Subpanel	1	SquareD	200A/480V SquareD Subpanel
8	30A SquareD Breaker	1	SquareD	30A/600V Three Phase Breaker
9	Main Distribution Panel	1	SquareD	1600A/480V SquareD Switchboard w/1600 Main
10	Main Distribution Frame	1		Main Server Rack for Building

△	Conductor and Raceway Schedule				
TAG	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size
1	USE-2 (MFG Cables & Connectors)	12 CU	4	FREE AIR	N/A
2	PV Wire	10 CU	4	FREE AIR	N/A
3	Bare Copper Equipment Ground (EGC)	6 CU	1	FREE AIR	N/A
4	XHHW 1,000V	10 CU	4	EMT	1.00"
5	XHHW-Ground	6 CU	1	EMT	1.00"
6	THWN-2 600V	10 CU	4	EMT	1.00"
7	THWN-2 Ground	6 CU	1	EMT	1.00"
8	CAT6 Plenum	24 CU	1	EMT	0.50"

CLIENT/CMTA JOB #:	ZHC22
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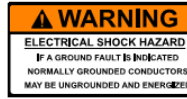
E 1.2

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Henderson County Schools
800 S Alves St
Henderson, KY 42420

SINGLE LINE DIAGRAM

A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.



C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.



RATED MAX POWERPOINT CURRENT	
RATED MAX POWERPOINT VOLTAGE	
MAXIMUM SYSTEM VOLTAGE	
MAXIMUM CIRCUIT CURRENT	
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER IF INSTALLED	

SOLAR DISCONNECT

**PHOTOVOLTAIC
DC DISCONNECT**

D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.



F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

**PHOTOVOLTAIC
AC DISCONNECT**



**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

PHOTOVOLTAIC AC DISCONNECT	
MAXIMUM AC OPERATING CURRENT	
NOMINAL OPERATING AC VOLTAGE	

F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

**PHOTOVOLTAIC
AC DISCONNECT**



**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

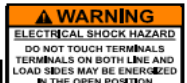
PHOTOVOLTAIC AC DISCONNECT	
MAXIMUM AC OPERATING CURRENT	
NOMINAL OPERATING AC VOLTAGE	

G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

PHOTOVOLTAIC AC DISCONNECT	
MAXIMUM AC OPERATING CURRENT	
NOMINAL OPERATING AC VOLTAGE	



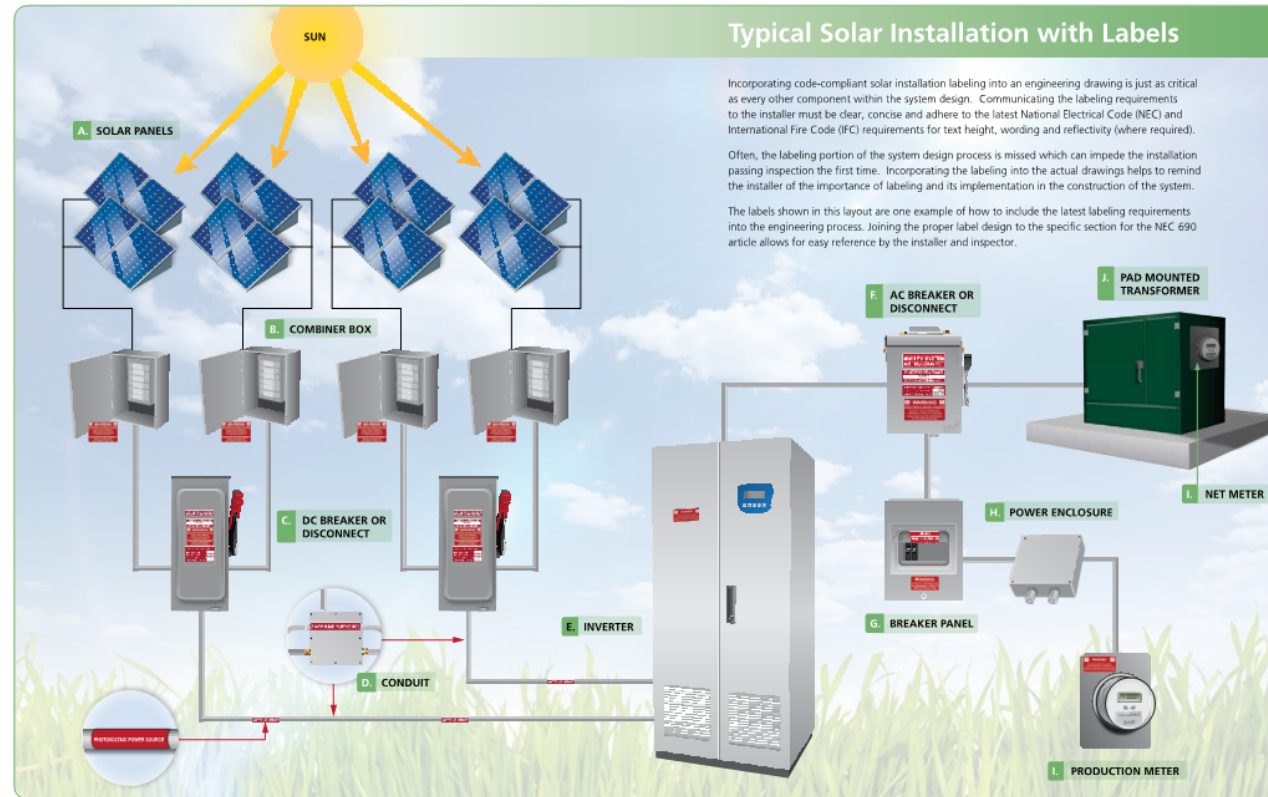
WARNING
TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.



J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.



CLIENT/CMTA JOB #:	ZHC22
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SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

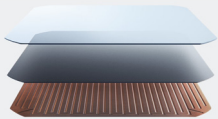
Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



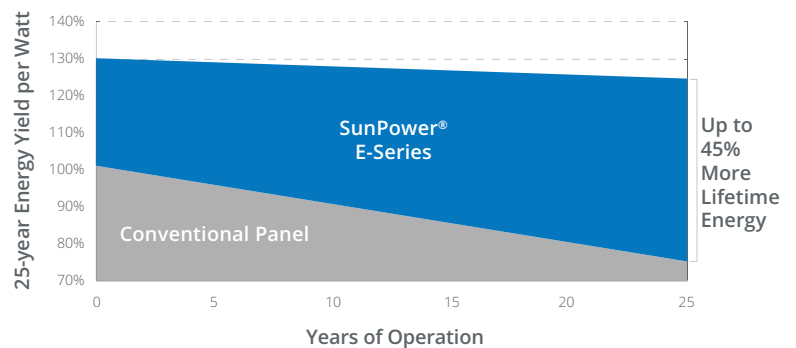
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



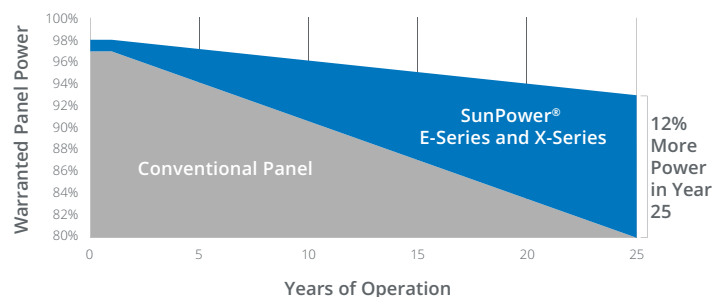
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.

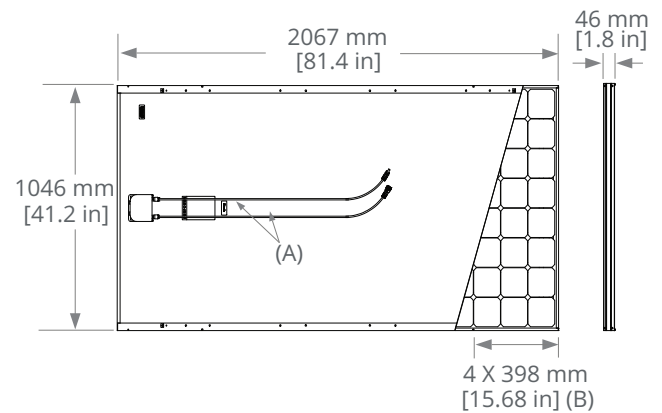


E-Series: E20-435-COM SunPower® Commercial DC Panel

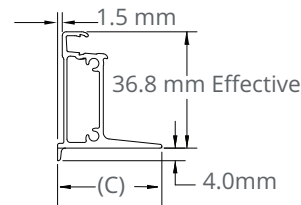
Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 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	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front
	G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins

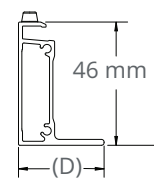
Tests And Certifications	
Standard Tests ⁸	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/-10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

1 SunPower 327 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), 0.75%/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.

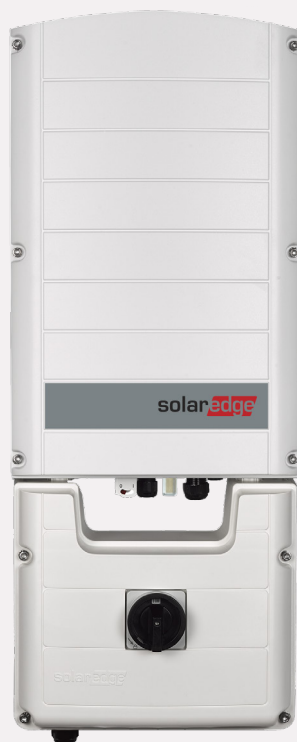
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Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 277/480V Grid for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS)



The best choice for SolarEdge enabled systems

- / Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- / Specifically designed to work with power optimizers
- / Superior efficiency (98%)
- / Fixed voltage inverter for longer strings
- / Integrated Safety Switch
- / UL1741 SA certified, for CPUC Rule 21 grid compliance
- / Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- / Built-in module-level monitoring
- / Internet connection through Ethernet or Wireless
- / Small, lightweight, and easy to install outdoors or indoors on provided bracket
- / Supplied with RS485 Surge Protection Device, to better withstand lightning events

/ Three Phase Inverters for the 277/480V Grid⁽¹⁾ for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS

SE10KUS		SE20KUS		SE30KUS		SE33.3KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER		SEXXX-XXX		XXBXX4			
OUTPUT							
Rated AC Power Output	10000	20000	30000	33300	VA		
Maximum AC Power Output	10000	20000	30000	33300	VA		
Output Line Connections	3 phase, 3-wire / PE (L1-L2-L3), TN, TT			3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT			
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)	244-277-305						Vac
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)	422.5-480-529						Vac
AC Frequency Min-Nom-Max ⁽²⁾	59.3 - 60 - 60.5						Hz
x. Continuous Output Current (per Phase)	12	24	36.5	40	A		
GFDI Threshold	1						A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes						
THD	≤ 3						%
INPUT							
Maximum DC Power (Module STC)	13500	27000	40500	40500	W		
Transformer-less, Ungrounded	Yes						
Maximum Input Voltage DC to Gnd	490						Vdc
Maximum Input Voltage DC+ to DC-	1000						Vdc
Nominal Input Voltage DC to Gnd	420						Vdc
Nominal Input Voltage DC+ to DC-	840						Vdc
Maximum Input Current	13.5	26.5	39	40	Adc		
Maximum Input Short Circuit Current	45						Adc
Reverse-Polarity Protection	Yes						
Ground-Fault Isolation Detection	1MΩ Sensitivity		350kΩ Sensitivity ⁽³⁾				
CEC Weighted Efficiency	98		98.5			%	
Night-time Power Consumption	< 3		< 4			W	
ADDITIONAL FEATURES							
Supported Communication Interfaces	2 x RS485, Ethernet, Built-in GSM (optional)						
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi station for local connection						
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect ⁽⁴⁾						
RS485 Surge Protection	Supplied with the inverter						
Smart Energy Management	Export Limitation						
STANDARD COMPLIANCE							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)						
Emissions	FCC part15 class B						
INSTALLATION SPECIFICATIONS							
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG		3/4" minimum / 8-4 AWG				
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG						
Number of DC inputs	2 pairs		3 pairs ⁽⁵⁾				
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260						in / mm
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260						in / mm
Weight	73.2 / 33.2		99.5 / 45			lb / kg	
Weight with Safety Switch	79.7 / 36.2		106 / 48			lb / kg	
Cooling	Fans (user replaceable)						
Noise	< 50		< 55			dBA	
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁶⁾						°F / °C
Protection Rating	NEMA 3R						

(1) For 120/208V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-208V-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) P/Ns SE10K/SE20K-US0xxxxx have Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)

(5) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(6) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

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Power Optimizer

For North America

P860 / P960 / P1101



POWER OPTIMIZER

PV power optimization at the module-level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses and combiner boxes, over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

/ Power Optimizer For North America

P860 / P960 / P1101

Power OptimizerModel (Typical Module Compatibility)	P860 (for 2 x 72 cell modules)		P960 (for 2 x 72 cell modules)		P1101 (for up to 2 x high power or bi- facial modules)	
INPUT						
Rated Input DC Power ⁽¹⁾	860		960		1100	W
Connection Method	Dual input for independently connected modules ⁽²⁾				Single input for series connected modules	
Absolute Maximum Input Voltage (Voc at lowest temperature)	60				125	Vdc
MPPT Operating Range	12.5 - 60				12.5 - 105	Vdc
Maximum Short Circuit Current (Isc)	22	23.2		14.1	Adc	
Maximum Short Circuit Current per Input (Isc)	11	11.6		-	Adc	
Maximum Efficiency	99.5				%	
Weighted Efficiency	98.6				%	
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)						
Maximum Output Current	18					Adc
Maximum Output Voltage	80					Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
Photovoltaic Rapid Shutdown System	Compliant with NEC 2014, 2017, 2020					
EMC	FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741				IEC62109-1 (class II safety), UL1741, UL3741	
Material	UL94 V-0, UV resistant					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Compatible SolarEdge Inverters	Three phase inverters				SE30K & larger	
Maximum Allowed System Voltage	1000					Vdc
Dimensions (W x L x H)	129 x 168 x 59 / 5.1 x 6.61 x 2.32				129 x 162 x 59 / 5.1 x 6.4 x 2.32	mm / in
Weight	1064 / 2.34					gr / lb
Input Connector	MC4 ⁽³⁾					
Input Wire Length Options	Input #1	Input #2	Input #1	Input #2	-	m / ft
1	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2	1.6 / 5.2	
2	(-) 1.6 / 5.2, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 1.6 / 5.2				
3	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2				
Output Wire Type / Connector	Double insulated; MC4					
Output Wire Length	2.3 / 7.5		2.3 / 7.5		2.4 / 7.8	m / ft
Operating Temperature Range ⁽⁴⁾	-40 to +85 / -40 to +185					°C / °F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.

(2) In the event of an odd number of PV modules in one string, installation of one P860 /P960 Power Optimizer connected to one PV module is allowed. When connecting a single module to the P860/P960, seal the unused input connectors with the supplied pair of seals.

(3) For other connector types please refer to: <https://www.solaredge.com/sites/default/files/optimizer-input-connector-compatibility.pdf>

(4) For ambient temperature above +70°C / +158°F, power de-rating is applied. Refer to the Power Optimizers Temperature De-Rating Application Note for more details.

PV System Design Using a SolarEdge Inverter ⁽⁵⁾⁽⁶⁾		208V Grid SE14.4K*	208V Grid SE17.3K*	277/480V Grid SE20K, 30K	277/480V Grid SE33.3K*, SE40K*
Compatible Power Optimizers		P860, P960, P1101	P860, P960, P1101	P860, P960, P1101	P860, P960, P1101
Minimum String Length	Power Optimizers	8	9	14	14
	PV Modules	15	17	27	27
Maximum String Length	Power Optimizers	30	30	30	30
	PV Modules	60	60	60	60
Maximum Continuous Power per String		7200	8730	15300	15300
Maximum Allowed Connected Power per String ⁽⁷⁾ (Permitted only when the difference in connected power between strings is up to 2,000W for the 277/480V grid, or 1,000W for the 208V grid)		1 string - 8400 2 strings or more - 9000	1 string - 9930 2 strings or more - 10530	1 string - 17550 2 strings or more - 20300	2 strings or less - 17550 3 strings or more - 20300
Parallel Strings of Different Lengths or Orientations		Yes			

* The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter.

(5) P860/P960 can be mixed in one string only with P860/P960.

(7) P860/P960 design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification.

(8) To connect more STC power per string, design your project using [SolarEdge Designer](#).

The right way to attach almost anything to metal roofs!

S-5![®]

The Right Way![®]

S-5-V Clamp

The S-5-V clamp is a versatile clamp that fits vertical-folded seam profiles manufactured in North America—including most structural and architectural profiles.

Its simple design and generous dimensioning are what make the S-5-V clamp so versatile for use with the S-5![®] snow retention products, such as ColorGard[®], as well as with other heavy-duty applications.

Installation is as simple as setting the patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the stainless steel bolt provided with the product. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-V Mini Clamp

The S-5-V Mini is a bit shorter than the S-5-V and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*

*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard[®] snow retention systems.



The S-5-V clamp is a versatile clamp, fitting most of the vertical standing seam profiles in North America.

S-5-V and S-5-V Mini

888-825-3432 | www.S-5.com |

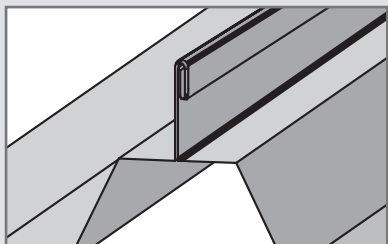
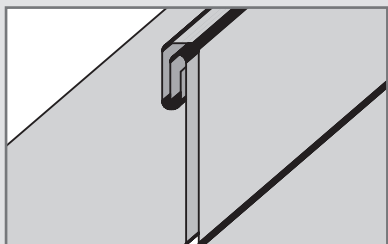


The strength of the S-5-V clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving the roof manufacturer's warranty intact.

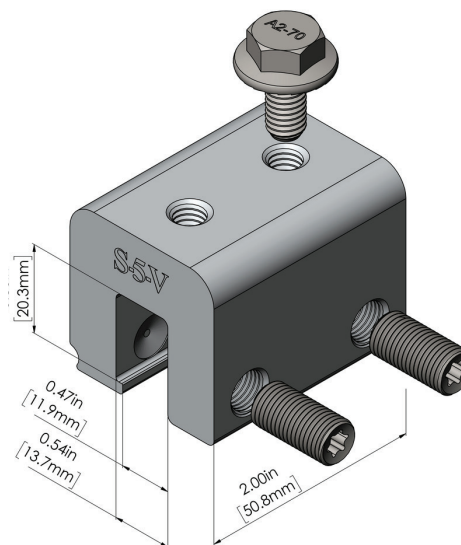
The **S-5-V and S-5-V Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-V is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit www.S-5.com for more information including CAD details, metallurgical compatibilities, and specifications.

The S-5-V clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

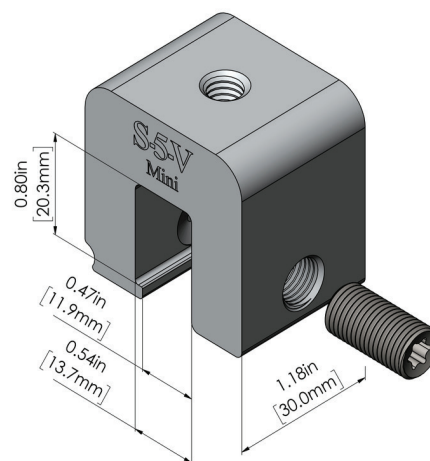
Example Profiles



S-5-V Clamp



S-5-V Mini Clamp



S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. Consult the S-5! website at www.S-5.com for published data regarding installation instructions and holding strength.

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23.49kW DC PHOTOVOLTAIC BALLASTED ROOF SYSTEM

FOR

HENDERSON COUNTY SCHOOLS

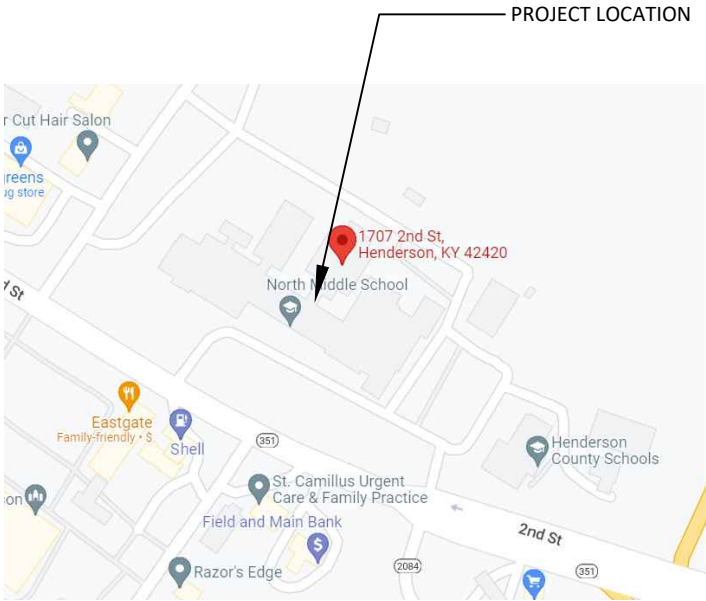
GUARANTEED ENERGY SAVINGS CONTRACT



INDEX

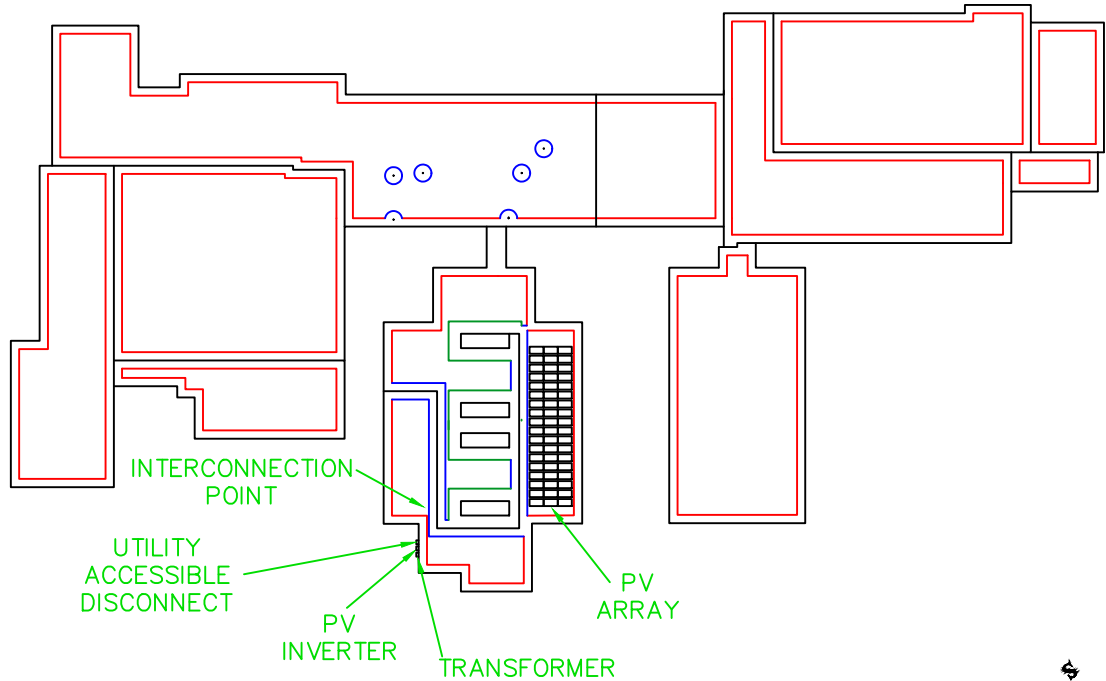
SHEET # SHEET TITLE	
PV1.0	COVER SHEET
PV1.1	GENERAL NOTES
PV1.2	SITE PLAN
PV1.3	PLOT PLAN
PV1.4	STAGING AREA
PV1.5	PHOTO MAP
PV1.6	BALLAST & STRINGS
E1.0	UAD & INVERTER RISER
E1.1	EXTERIOR CONDUIT PLAN
E1.2	SINGLE LINE DIAGRAM
E1.3	SAFETY PLACARDS & SIGNAGE
NONE	EQUIPMENT CUTSHEETS

BID
DOCUMENTS



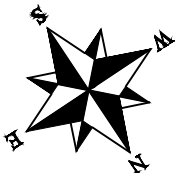
3 VICINITY MAP

SCALE: NTS



1 SITE OVERVIEW

SCALE: NTS



2 ROOFTOP VIEW OF SITE

SCALE: NTS

North Middle School
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COVER SHEET

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DATE:	2/17/2022
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CHECKED:	KK

REVISIONS	
1.	Bidding 3/3/2022

PV1.0

GENERAL NOTES:

1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.



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DOCUMENTS

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GENERAL NOTES

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PV1.1

System Summary



Electrical Equipment:

- 54 – SunPower 435W Commercial Solar Module
- 28 – SolarEdge P1101 Power Optimizer
- 1 – SolarEdge 20kW Three Phase Inverter
- 1 – 20kVA Wall Mounted Transformer

23.49kW DC System Size
20kW AC System Size

Roof Details:

Roof Type: Firestone TPO
Racking Type: Unirac RM5
Module Tilt: 5 Degrees
Azimuth: 212 Degrees

Key:

- Solar Module
- 4ft Roof Edge Setback
- 4ft Obstruction Setback
- 6ft Equipment Setback
- Roof Drain
- Roof Vent
- Roof Top Unit

BID
DOCUMENTS

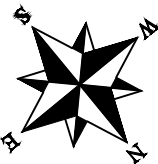
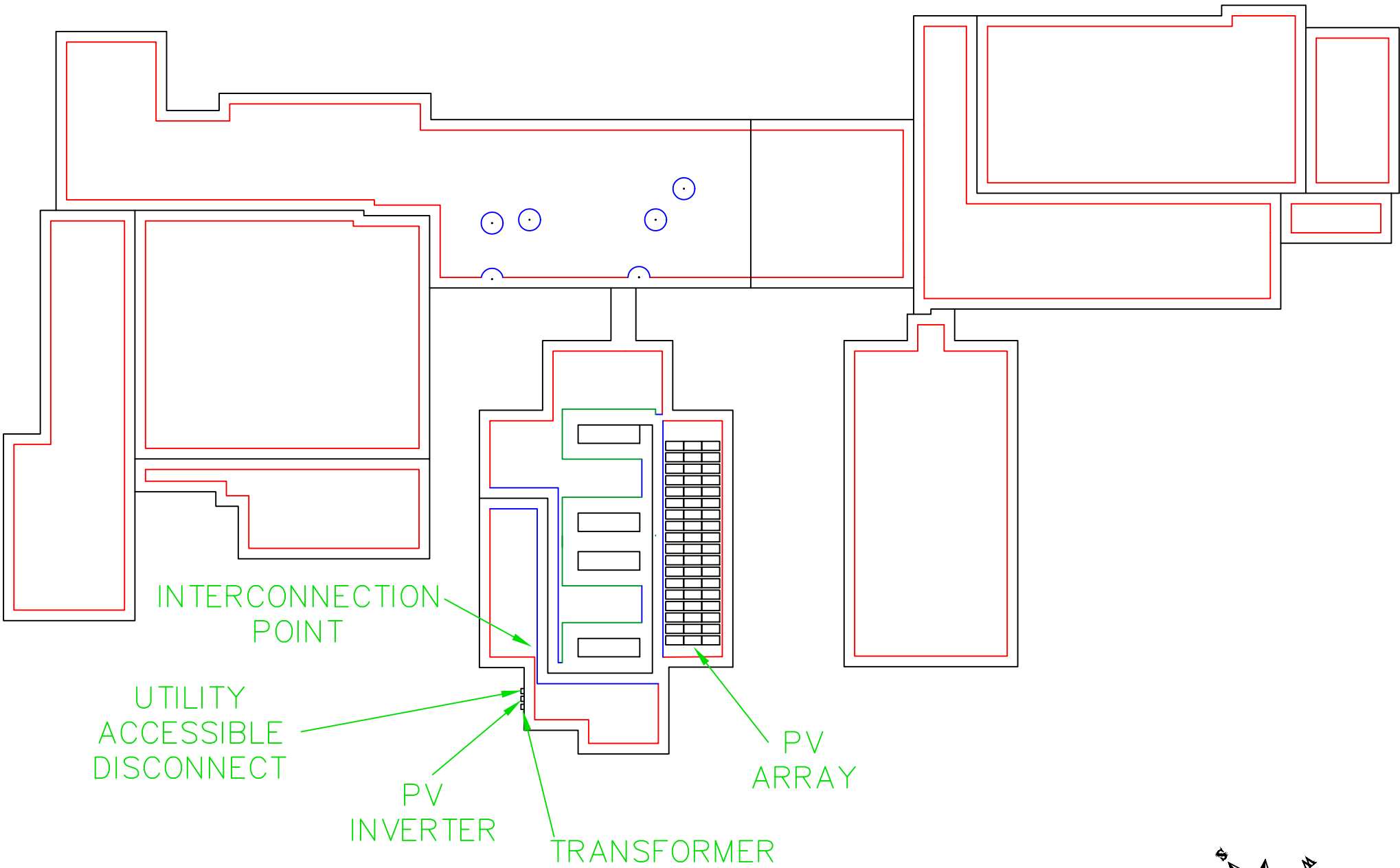
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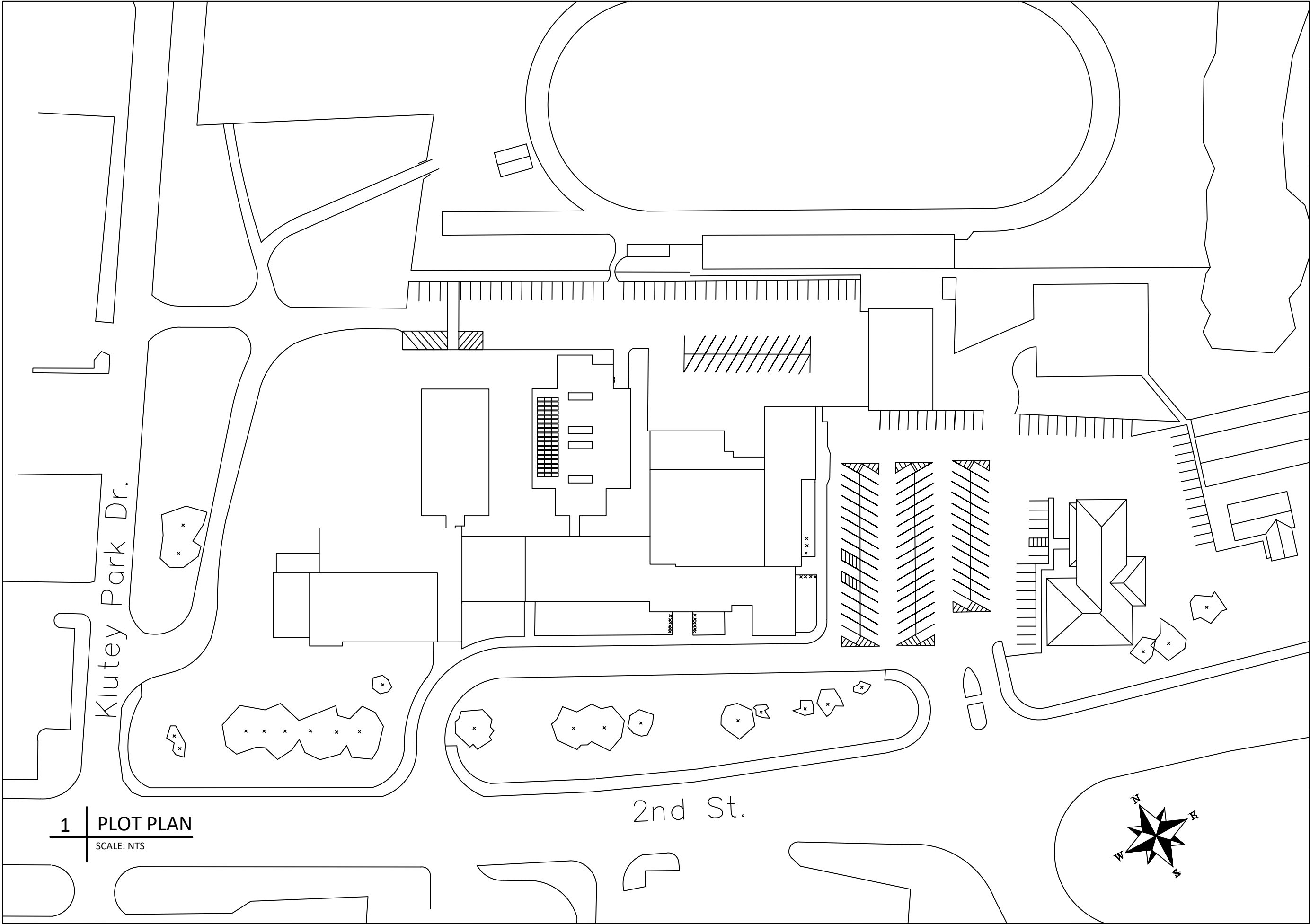
SITE PLAN

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PV1.2



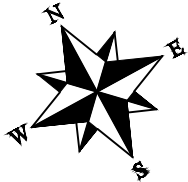


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PLOT PLAN

1 | PLOT PLAN
SCALE: NTS



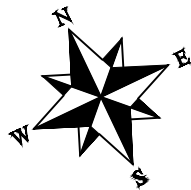
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PV1.3

1 SAFETY AND STAGING AREA

SCALE: NTS

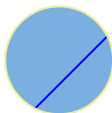


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SAFETY AND STAGING AREA

KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 4' FROM
ROOF EDGE DURING PV INSTALL

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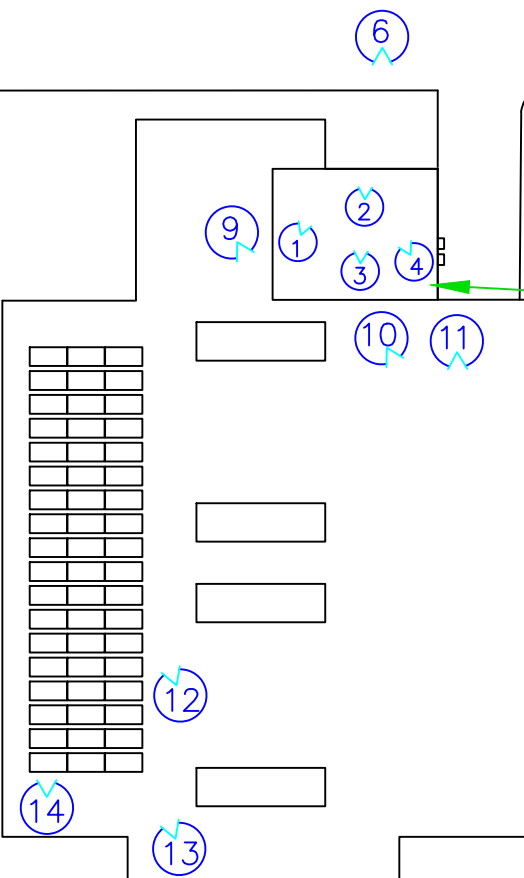
PV1.4

7



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ELECTRICAL
ROOM



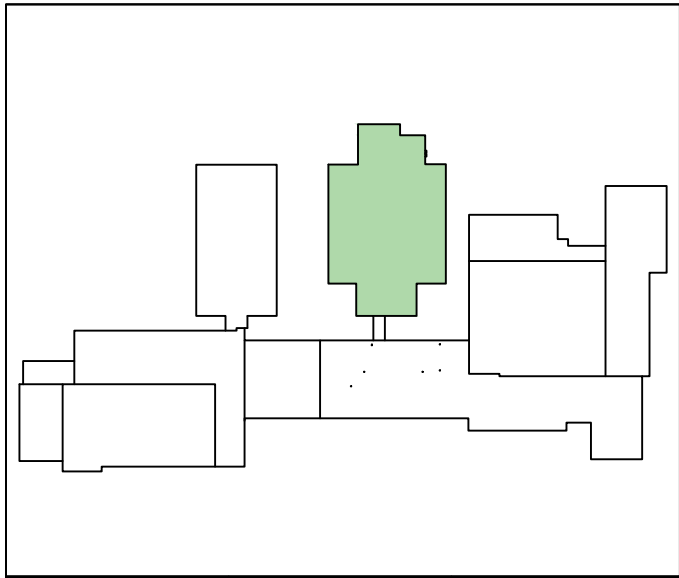
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PHOTO MAP

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PV1.5



String	Modules	Optimizers
1	27	14
2	27	14

Part List	
Item	Quantity
Ballast Block	225
RM5 Bay	113
RM5 Wind Deflector	54
Kit, Wind Deflector Attachment	218
EM End Clamp 32-40mm	434
Kit 1/2 20 Clip on Nut SS 18-8	652
Sunrunner Wire Clip S6445	216
Sunrunner Wire Clip S6476	108

TAG NOTES/KEY:

① Wire management shall be neat and professional. No wires shall be laying on roof surfaces.

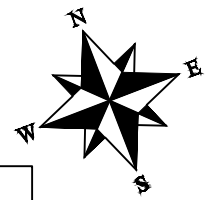
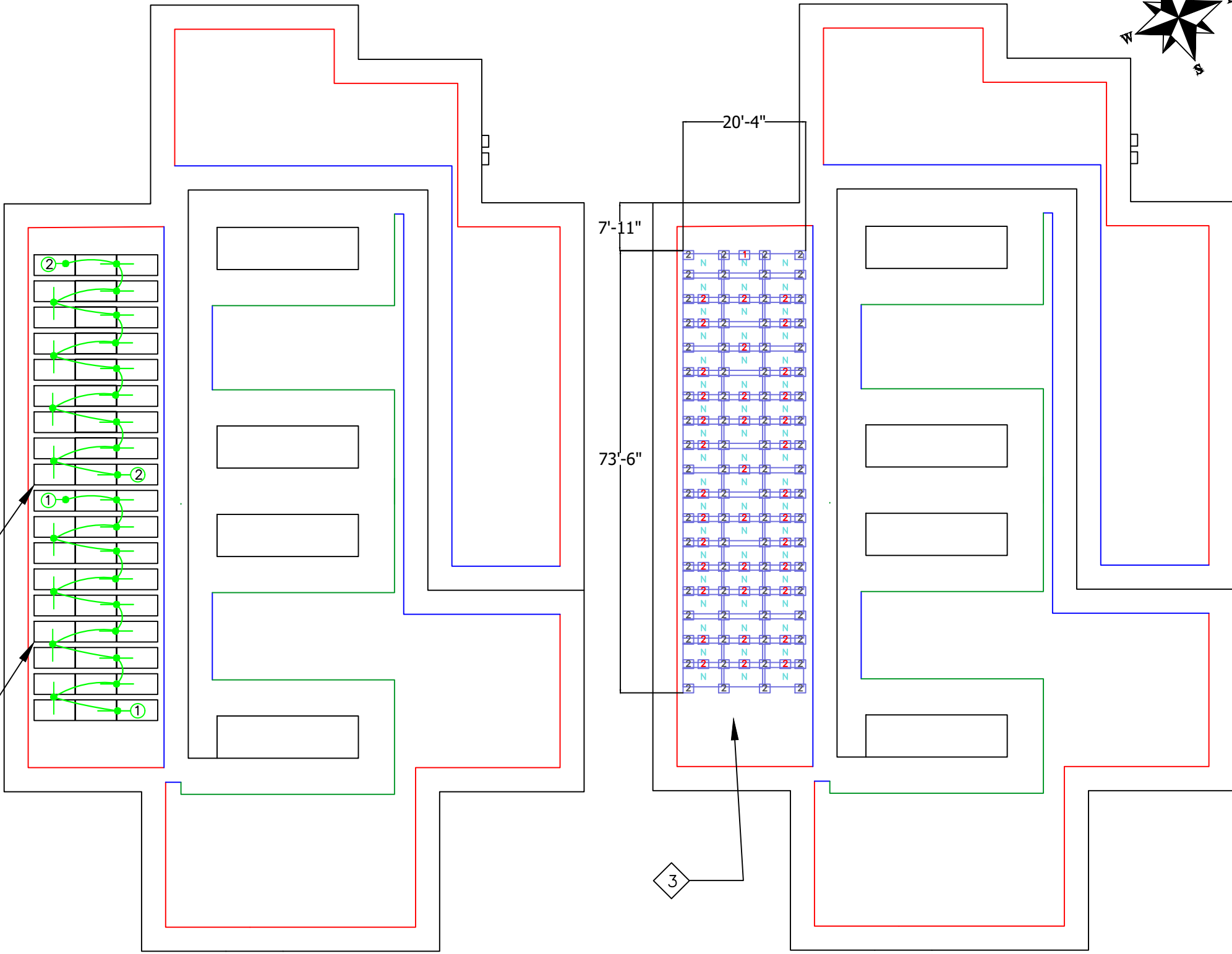
② Should strings change or run differently be sure to create as built drawings and give to BID manager.

③ Ballast block shall be laid according to Unirac ballast plan. Contractor shall not deviate from ballast plan.

Denotes the number of ballast block in the RM5 ballast pan.

N N signifies that a wind deflector must be installed on the North side of panel.

Torque Specifications - Ground Lug			Torque Specifications - RM5	
Ground Lug	Bolt Size	Torque Value	Item	Torque Value
Ilco Lug SGB-4	1/4"-20	6.5 ft-lbs	End Clamp	7 ft-lbs
Ilco Lug GBL-4	#10-32	2.9 ft-lbs	Wind Deflector Attachment Kit	10 ft-lbs
Wiley 6.7	1/4"-20	10 ft-lbs		



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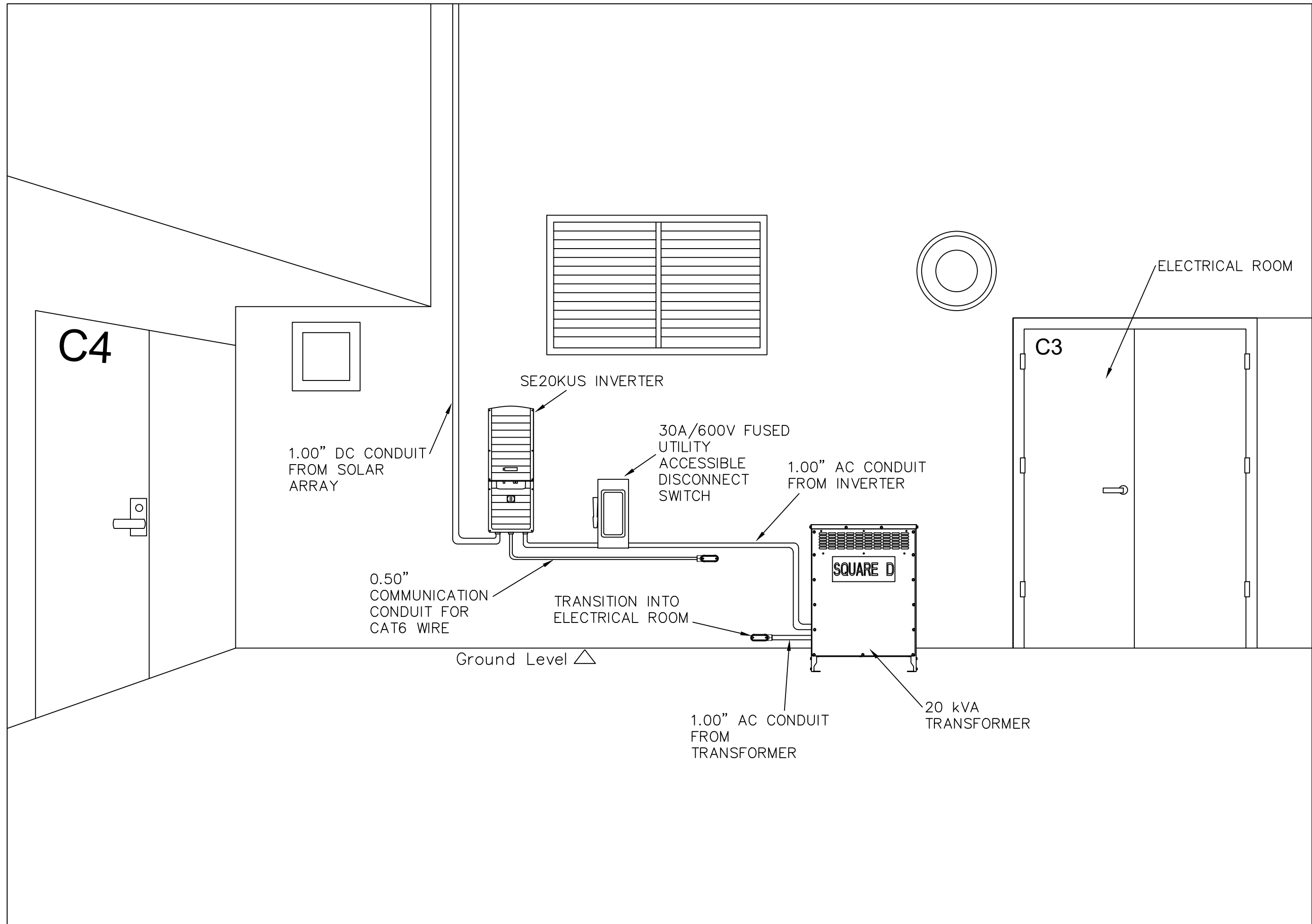
BALLAST AND STRINGING

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Building Height is ~25'

PV1.6



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UAD AND INVERTER RISER

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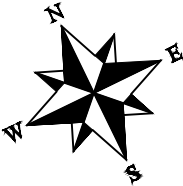
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E1.0

DC HOME RUN TO INVERTER: 100' AC HOME RUN TO MDP: 10'



BID
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UADS

PV INVERTER

1

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EXTERIOR CONDUIT PLAN

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TAG NOTES/KEY:

1

AC HOMERUN TO MDP PENETRATES
WALL AND CONTINUES INSIDE OF
ELECTRICAL ROOM

1 EXTERIOR CONDUIT PLAN

SCALE: 1"= 40'

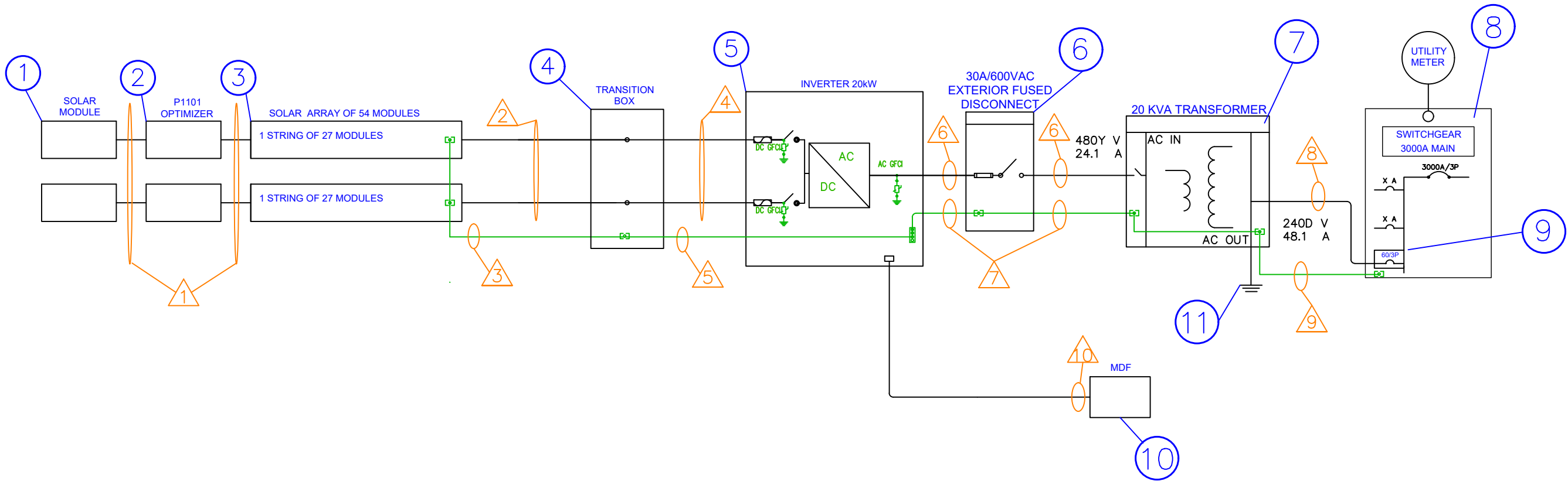
E1.1

ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



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DOCUMENTS



Equipment Schedule

Tag	Description	Quantity	Part Number	Notes
1	Solar PV Module	54	SPR-E20-435-COM	SunPower 435W Commercial Solar Module
2	Solar PV Optimizer	28	P1101	SolarEdge Power Optimizer
3	Solar Array	1		54 Solar Modules in 2 strings
4	Transition Box	1		Soltection Transition Box 1000V Nema 3r
5	Inverter	1	SE20KUS	SolarEdge 20kW Three Phase 480V Commercial Inverter
6	Utility Accessible Disconnect Switch	1	SquareD	Fused SquareD 30A/600V w/ (3) 30A fuses NEMA 3R Disconnect
7	20kVA Transformer	1	SquareD	20kVA transformer to step voltage down from 480v to 240v 3 phase.
8	Main Distribution Panel	1	Westinghouse Switchboard	3000A/240V Westinghouse Switchboard w/3000A Main
9	60A Westinghouse Breaker	1	Westinghouse	Subcontracter to replace spare breaker with 60A/3P backfed solar breaker.
10	Main Distribution Frame	1		Main Server Rack for Building
11	Grounding Electrode	1		To be installed according to NEC 250.68(C)

Conductor and Raceway Schedule

Tag	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size
1	USE-2 (MFG Cables & Connectors)	12 CU	4	FREE AIR	N/A
2	PV Wire	10 CU	4	RAY TRAY	N/A
3	Bare Copper Equipment Ground (EGC)	6 CU	1	RAY TRAY	N/A
4	XHHW 1,000V	10 CU	4	EMT	1.00"
5	XHHW-Ground	6 CU	1	EMT	1.00"
6	THWN-2 600V	10 CU	4	EMT	1.00"
7	THWN-Ground	6 CU	1	EMT	1.00"
8	THWN-2 600V	8 CU	4	EMT	1.00"
9	THWN-Ground	6 CU	1	EMT	1.00"
10	CAT6 Plenum	24 CU	1	EMT	0.50"

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

E1.2

North Middle School
Henderson County Public Schools
1707 2nd Street
Henderson, KY 42420

SINGLE LINE DIAGRAM

A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.



C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.



D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2



E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.



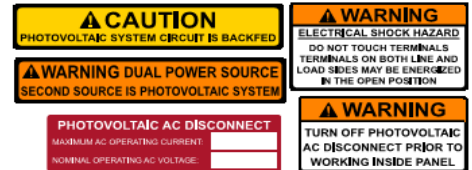
F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

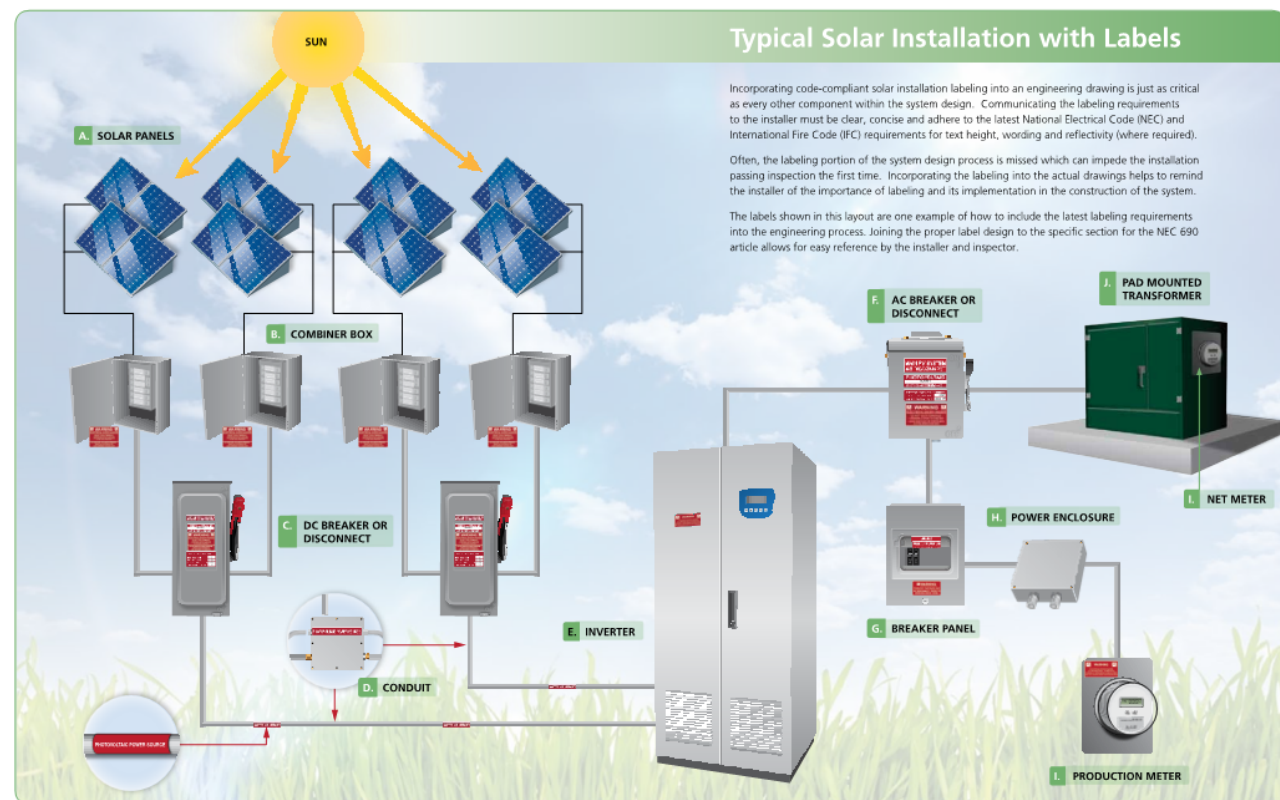


H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.



J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.



CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
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REVISIONS
1. Bidding 3/3/2022



SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

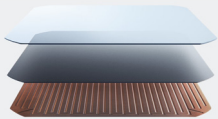
Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



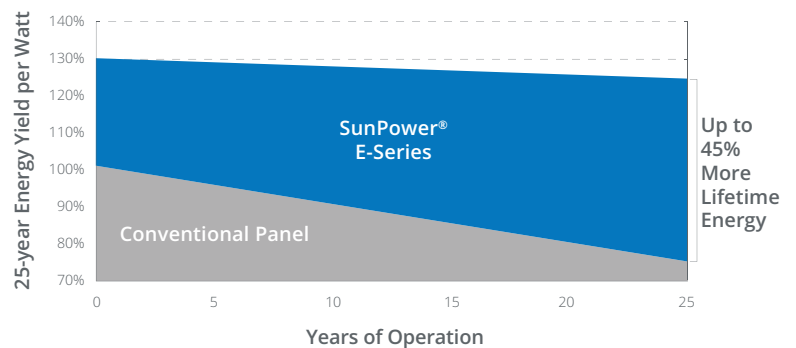
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



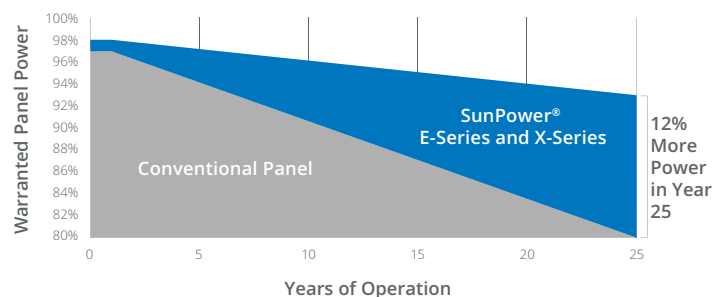
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.

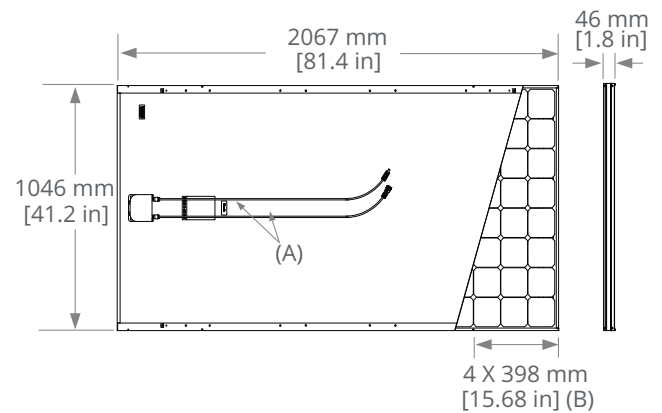


E-Series: E20-435-COM SunPower® Commercial DC Panel

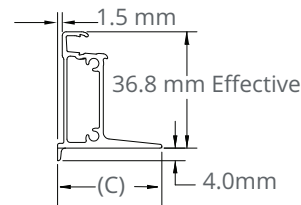
Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 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	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front
	G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins

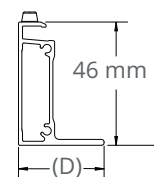
Tests And Certifications	
Standard Tests ⁸	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/-10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

1 SunPower 327 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), 0.75%/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.

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Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 277/480V Grid for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS)



INVERTERS

The best choice for SolarEdge enabled systems

- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Specifically designed to work with power optimizers
- Superior efficiency (98%)
- Fixed voltage inverter for longer strings
- Integrated Safety Switch
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Small, lightweight, and easy to install outdoors or indoors on provided bracket
- Supplied with RS485 Surge Protection Device, to better withstand lightning events

/ Three Phase Inverters for the 277/480V Grid⁽¹⁾ for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS

SE10KUS		SE20KUS	SE30KUS	SE33.3KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER		SEXXX-XXXXXBXX4			
OUTPUT					
Rated AC Power Output	10000	20000	30000	33300	VA
Maximum AC Power Output	10000	20000	30000	33300	VA
Output Line Connections	3 phase, 3-wire / PE (L1-L2-L3), TN, TT 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT				
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)	244-277-305				
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)	422.5-480-529				
AC Frequency Min-Nom-Max ⁽²⁾	59.3 - 60 - 60.5				
x. Continuous Output Current (per Phase)	12	24	36.5	40	A
GFDI Threshold	1				
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes				
THD	≤ 3				
INPUT					
Maximum DC Power (Module STC)	13500	27000	40500	40500	W
Transformer-less, Ungrounded	Yes				
Maximum Input Voltage DC to Gnd	490				
Maximum Input Voltage DC+ to DC-	1000				
Nominal Input Voltage DC to Gnd	420				
Nominal Input Voltage DC+ to DC-	840				
Maximum Input Current	13.5	26.5	39	40	Adc
Maximum Input Short Circuit Current	45				
Reverse-Polarity Protection	Yes				
Ground-Fault Isolation Detection	1MΩ Sensitivity		350kΩ Sensitivity ⁽³⁾		
CEC Weighted Efficiency	98		98.5		
Night-time Power Consumption	< 3		< 4		
ADDITIONAL FEATURES					
Supported Communication Interfaces	2 x RS485, Ethernet, Built-in GSM (optional)				
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi station for local connection				
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect ⁽⁴⁾				
RS485 Surge Protection	Supplied with the inverter				
Smart Energy Management	Export Limitation				
STANDARD COMPLIANCE					
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07				
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)				
Emissions	FCC part15 class B				
INSTALLATION SPECIFICATIONS					
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG		3/4" minimum / 8-4 AWG		
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG				
Number of DC inputs	2 pairs		3 pairs ⁽⁵⁾		
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260				
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260				
Weight	73.2 / 33.2		99.5 / 45		
Weight with Safety Switch	79.7 / 36.2		106 / 48		
Cooling	Fans (user replaceable)				
Noise	< 50		< 55		
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁶⁾				
Protection Rating	NEMA 3R				

(1) For 120/208V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-208V-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) P/Ns SE10K/SE20K-US0xxxxx have Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)

(5) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(6) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-de-rating-note-na.pdf>

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Power Optimizer

For North America

P860 / P960 / P1101



POWER OPTIMIZER

PV power optimization at the module-level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses and combiner boxes, over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

/ Power Optimizer For North America

P860 / P960 / P1101

Power OptimizerModel (Typical Module Compatibility)	P860 (for 2 x 72 cell modules)		P960 (for 2 x 72 cell modules)		P1101 (for up to 2 x high power or bi-facial modules)		
INPUT							
Rated Input DC Power ⁽¹⁾	860		960		1100		W
Connection Method	Dual input for independently connected modules ⁽²⁾				Single input for series connected modules		
Absolute Maximum Input Voltage (Voc at lowest temperature)	60				125		Vdc
MPPT Operating Range	12.5 - 60				12.5 - 105		Vdc
Maximum Short Circuit Current (Isc)	22		23.2		14.1		Adc
Maximum Short Circuit Current per Input (Isc)	11		11.6		-		Adc
Maximum Efficiency	99.5						%
Weighted Efficiency	98.6						%
Overvoltage Category	II						
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)							
Maximum Output Current	18						Adc
Maximum Output Voltage	80						Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)							
Safety Output Voltage per Power Optimizer	1 ± 0.1						Vdc
STANDARD COMPLIANCE							
Photovoltaic Rapid Shutdown System	Compliant with NEC 2014, 2017, 2020						
EMC	FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3						
Safety	IEC62109-1 (class II safety), UL1741				IEC62109-1 (class II safety), UL1741, UL3741		
Material	UL94 V-0, UV resistant						
RoHS	Yes						
INSTALLATION SPECIFICATIONS							
Compatible SolarEdge Inverters	Three phase inverters				SE30K & larger		
Maximum Allowed System Voltage	1000						Vdc
Dimensions (W x L x H)	129 x 168 x 59 / 5.1 x 6.61 x 2.32				129 x 162 x 59 / 5.1 x 6.4 x 2.32		mm / in
Weight	1064 / 2.34						gr / lb
Input Connector	MC4 ⁽³⁾						
Input Wire Length Options	Input #1	Input #2	Input #1	Input #2	-		m / ft
1	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2	1.6 / 5.2		
2	(-) 1.6 / 5.2, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 1.6 / 5.2					
3	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2					
Output Wire Type / Connector	Double insulated; MC4						
Output Wire Length	2.3 / 7.5		2.3 / 7.5		2.4 / 7.8		m / ft
Operating Temperature Range ⁽⁴⁾	-40 to +85 / -40 to +185						°C / °F
Protection Rating	IP68 / NEMA6P						
Relative Humidity	0 - 100						%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed

(2) In the event of an odd number of PV modules in one string, installation of one P860 /P960 Power Optimizer connected to one PV module is allowed. When connecting a single module to the P860/ P960, seal the unused input connectors with the supplied pair of seals

(3) For other connector types please refer to: <https://www.solaredge.com/sites/default/files/optimizer-input-connector-compatibility.pdf>

(4) For ambient temperature above +70°C / +158°F, power derating is applied. Refer to the Power Optimizers Temperature De-Rating Application Note for more details

PV System Design Using a SolarEdge Inverter ⁽⁵⁾⁽⁶⁾		208V Grid SE14.4K*	208V Grid SE17.3K*	277/480V Grid SE20K, 30K	277/480V Grid SE33.3K*, SE40K*
Compatible Power Optimizers		P860, P960, P1101	P860, P960, P1101	P860, P960, P1101	P860, P960, P1101
Minimum String Length	Power Optimizers	8	9	14	14
	PV Modules	15	17	27	27
Maximum String Length	Power Optimizers	30	30	30	30
	PV Modules	60	60	60	60
Maximum Continuous Power per String		7200	8730	15300	15300
Maximum Allowed Connected Power per String ⁽⁷⁾ (Permitted only when the difference in connected power between strings is up to 2,000W for the 277/480V grid, or 1,000W for the 208V grid)		1 string - 8400 2 strings or more - 9000	1 string - 9930 2 strings or more - 10530	1 string - 17550 2 strings or more - 20300	2 strings or less - 17550 3 strings or more - 20300
Parallel Strings of Different Lengths or Orientations		Yes			

* The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter

(5) P860/P960 can be mixed in one string only with P860/P960

(7) P860/P960 design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification

(8) To connect more STC power per string, design your project using [SolarEdge Designer](#)

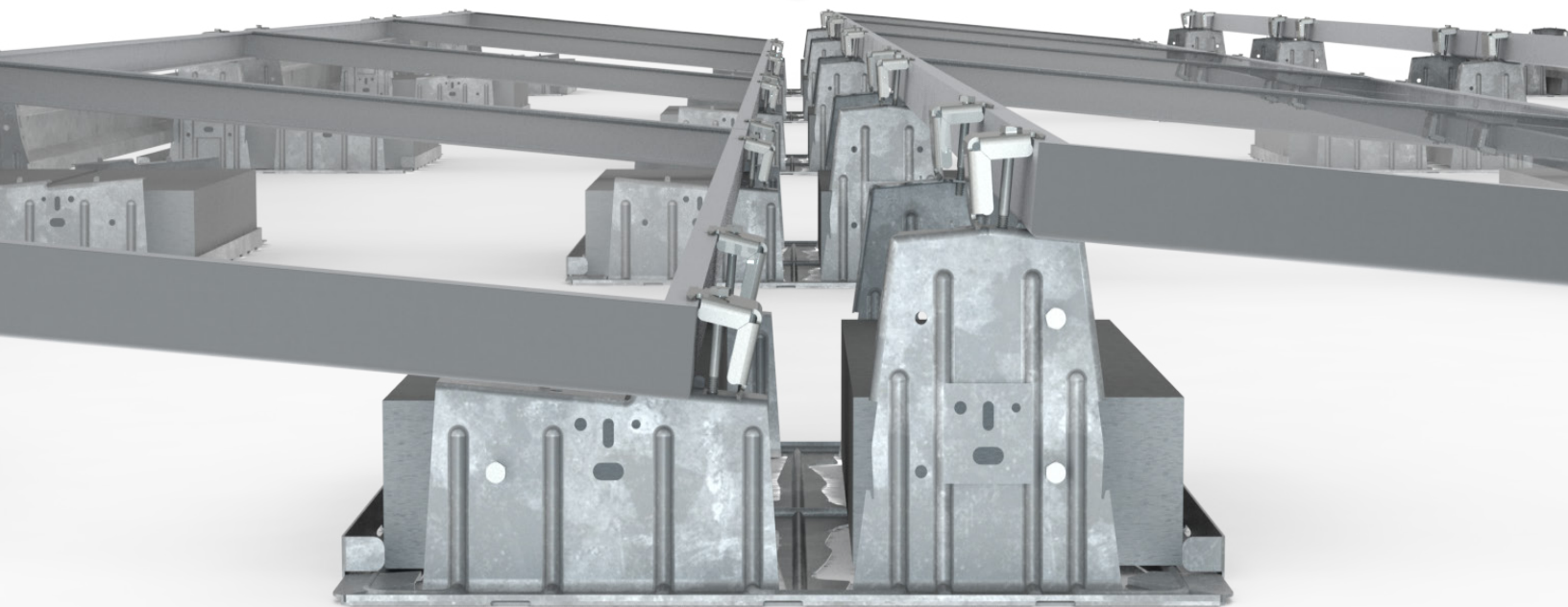
ROOFMOUNT | RM5

SOUTH FACING 5 DEGREE TILT



BETTER SOLAR STARTS HERE

RM5 is a ballasted south-facing five-degree tilt mounting system for flat roofs. Fewer components, single tool installation, snap-in hardware, and integrated bonding ensure high speed installation, while features such as 7.5" or 11" row spacing and optional wind deflector, roof attachments, MLPE mount, and wire management provide a complete solution. UNIRAC's unmatched commercial project support makes construction easy, from permitting through installation, and **RM5** is supported by North America's largest distribution network. Plus, enjoy peace of mind with UNIRAC's industry-leading 25-year warranty.



MAXIMIZE PROFITABILITY AT EVERY STEP

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

ROOFMOUNT | RM5

SOUTH FACING 5 DEGREE TILT



BETTER SOLAR STARTS HERE

OPTIMIZE ARRAY LAYOUT

MAXIMUM LAYOUT FLEXIBILITY WITH TWO ROW SPACING OPTIONS

5 Degree Tilt with 7" / 11" Row Spacing Options

Set, Then Clamp Feature, Provides Better Construction Sequencing for Rapid Installation

Simplified Wire Management, with Two (2) Optional Unirac Clips

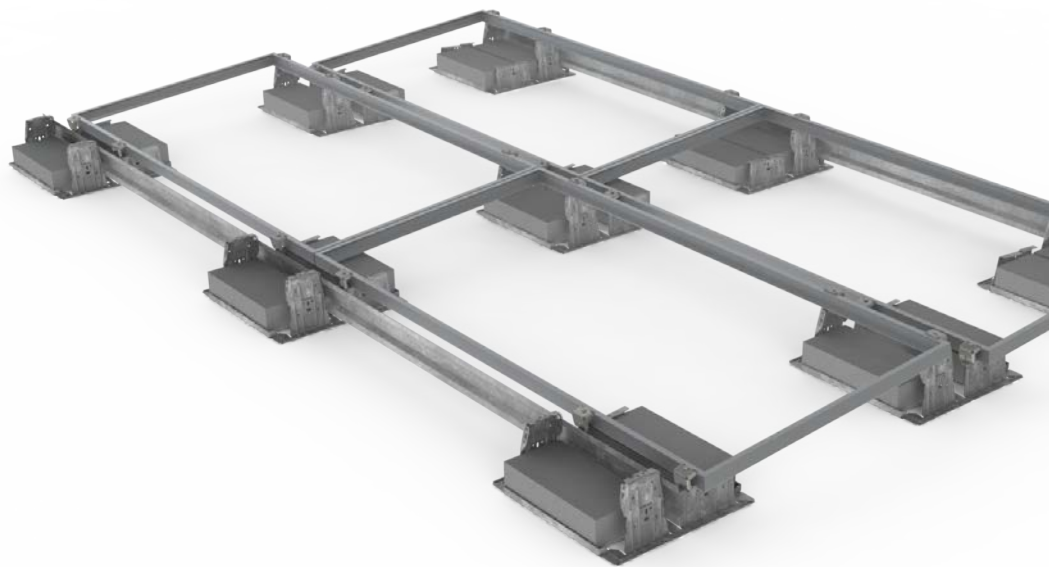
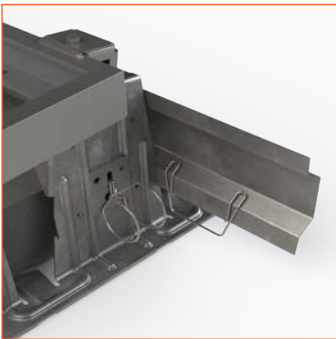
Wind Deflector for Ballast Reduction & Fire Mitigation

Optional Roof Attachment Meets a Variety of Project Requirements

MPL Mount with Engage Trunk Cable Wire Management Clip

G235 Steel - Double the Corrosion Protection of other Industry Products

Compact Packaging - Up to 1 MW / Truck



GENERATE LAYOUTS IN MINUTES WITH U-BUILDER ON-LINE DESIGN TOOL

HelioScope Integration • Google & Bing Maps • Ballast Distribution Maps • Site Specific Engineering Reports • Layout Multiple Arrays per Project • CAD Downloads

INDUSTRY LEADING PROJECT SUPPORT

UNIRAC's Team of Technical Experts & Professional Engineers is Your Partner Through Design, Engineering, Permitting and Installation.

GUARANTEED PERMIT APPROVAL

UL2703 Certification Documents • Stamped 3rd Party PE Letters • Construction Drawings • AHJ Outreach Program

FASTEST DELIVERY IN THE INDUSTRY

In Stock & Ready to Ship From North America's Largest Flat Roof Distribution Network.

WORLD CLASS INSTALLATION TRAINING & SUPPORT

Library of QuickTips Installation Videos • Installation Guides • Live Demos • Train the Trainer Program

MAXIMIZE PROFITABILITY AT EVERY STEP

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HIT A
HOME RUN
WITH

RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

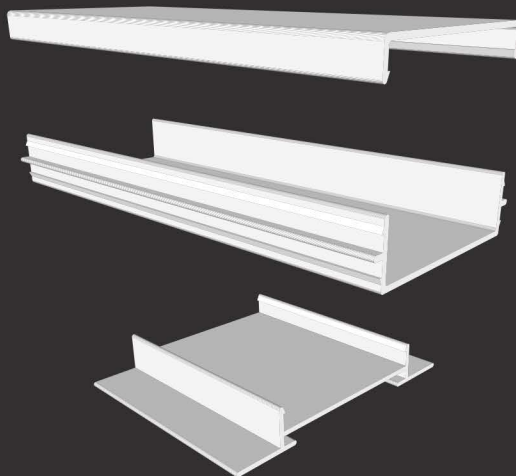
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TRAY

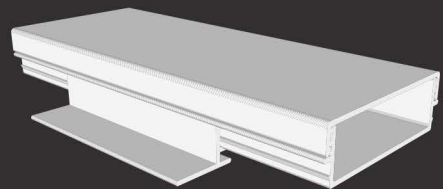
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BASE



=

RAYTRAYTM
SOLAR WIRE MANAGEMENT SYSTEM



RayTrayTM
info@raytraysolar.com
www.raytraysolar.com



Intertek

Conforms to UL Std 870
Control No. 4009754

RAYTRAY™ v2

SOLAR WIRE MANAGEMENT SYSTEM

RayTray™ is a protective enclosure manufactured with a durable RPVC polymer to ensure a neat and comprehensive routing method for jumper, home run, and equipment-grounding conductor cables.

RayTray™ is the product of a collaborative effort between solar installers and electrical, structural, and polymer engineers. The result is a wire management system that is simple, durable, cost effective, and ETL listed for use in PV arrays.

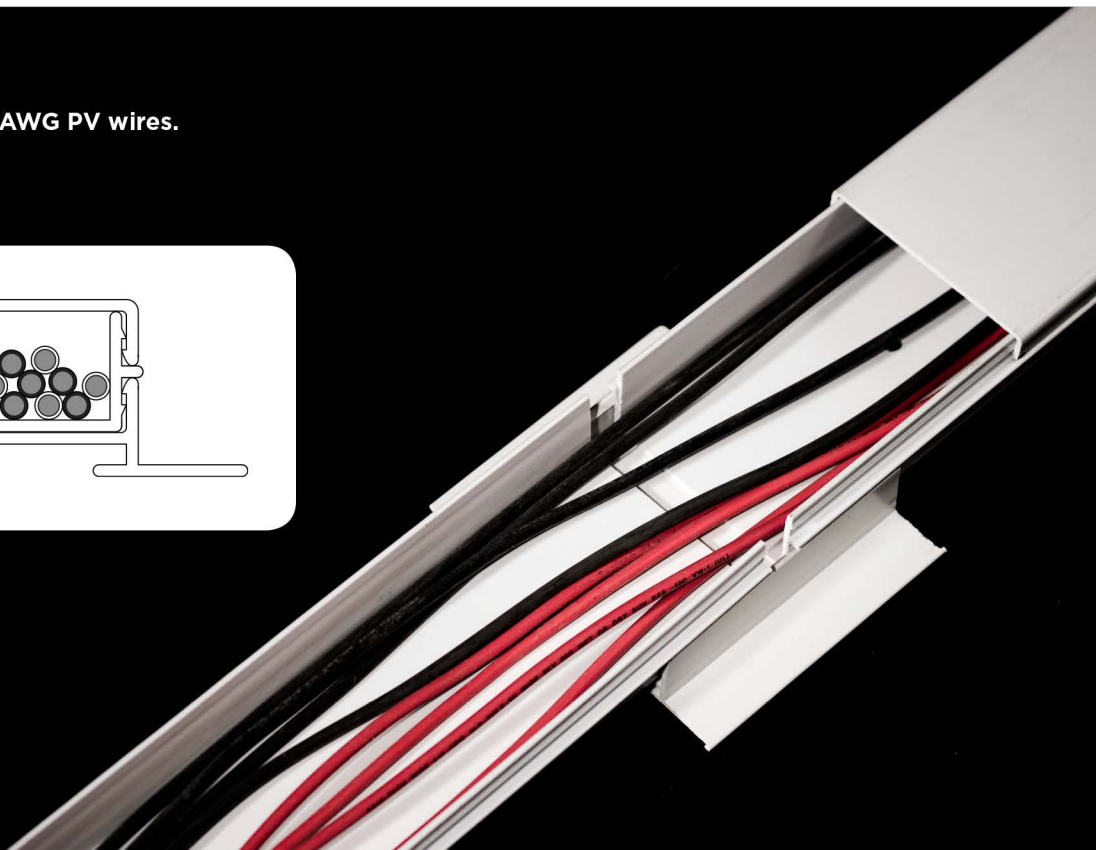
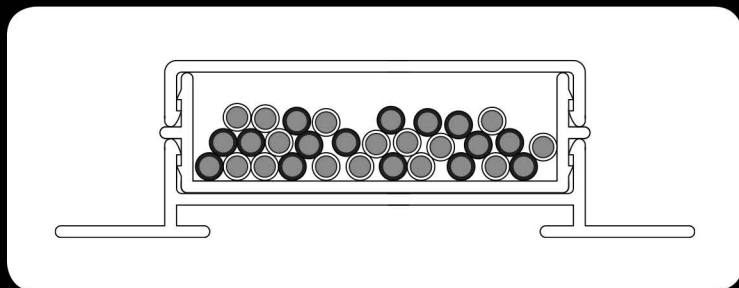
RayTray™ is

- Simple and easy to install
- Durable and UV resistant
- Low Cost
- Versatile
- ETL listed to UL 870 Standard
- Made in the USA

RAYTRAY™ SPECIFICATIONS

Product	Solar Wire Management System
Material	Non-metallic RPVC polymer. UV rating: F1
Listing	ETL Intertek conforms to UL Std 870. Voltage rating: 1000 VDC
Installation	Flat roofs with pitch < 8 degrees. Standing seam metal roofs
Internal Wiring	Maximum of thirty #10 AWG wires/tray. RHW, USE, or PV wire. Maximum wire size: #6 AWG
Grounding	Non-metallic RPVC polymer requires no grounding
Material Dimensions	Overall height: 2", width: 8", length of tray and cap: 8', length of base: 6"
Maximum Support Interval	4'3"
Warranty	25-year warranty against defects in materials and workmanship

RayTray™ is rated to hold thirty #10 AWG PV wires.
Maximum wire size is #6 AWG.



CONNECTING THE COMPONENTS

SNAP AND CONNECT



Assembling RayTray™ is easier than connecting modules in a string. Snap a RayTray™ base onto one end of a tray; add a base in the middle of the tray, and another at the opposite end. Be sure to leave a one-inch gap between sections of tray to allow for expansion and contraction. Keep the base between tray sections fixed in place by inserting a rivet into one side of the tray.

CAP AND PROTECT

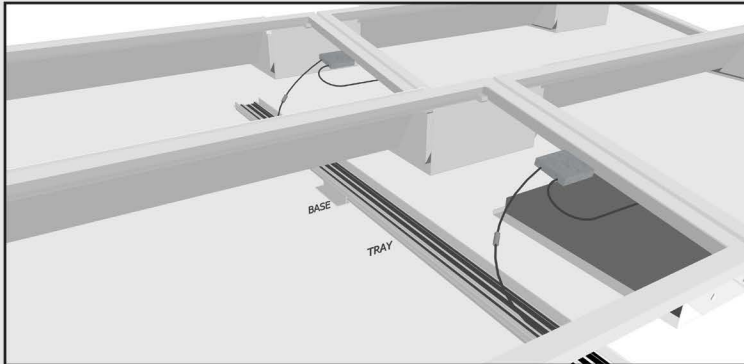


Once your home runs are in place, snap on the cap. The cap should span the gap left for expansion by at least six inches.

AN EASY CHANGE IN DIRECTION

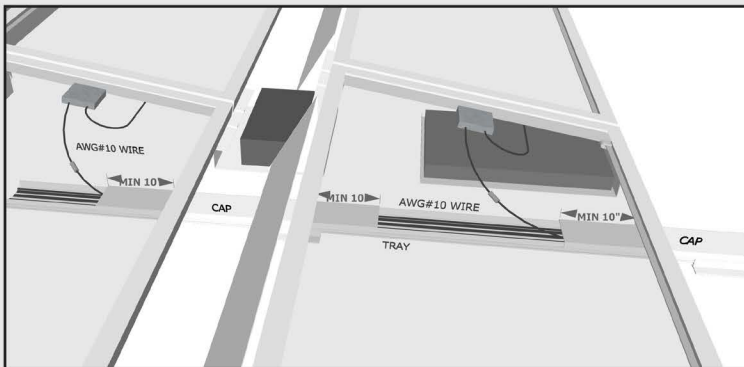


Most runs will go in one direction. But when you need to change direction, RayTray™ can accommodate. RayTray™ is cut easily with a hacksaw or a reciprocating saw. Make some simple cuts, insert a plastic rivet, and you will have a secure and stable T-fitting or elbow. A file or deburring tool quickly gets rid of sharp edges.



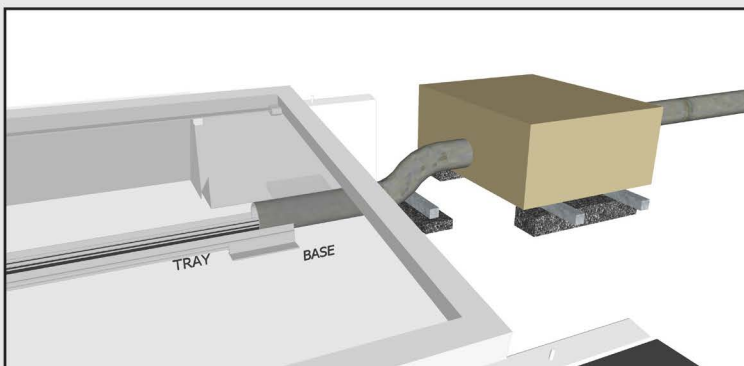
KEEP THOSE HOME RUNS IN LINE

RayTray™ keeps your home runs organized, secure, and protected. No more worries about home runs getting stepped on or rubbing and abrading on racking. Simply pick your route, snap together your RayTray™ trays and base supports, slide under the array, and drop in your home runs. Alternatively, lay the RayTray™ out and drop in your home runs before the modules are installed. Array cabling is neat and organized. Your crew will thank you. Your inspector will be pleased. And your client will be thrilled at how professional everything looks.



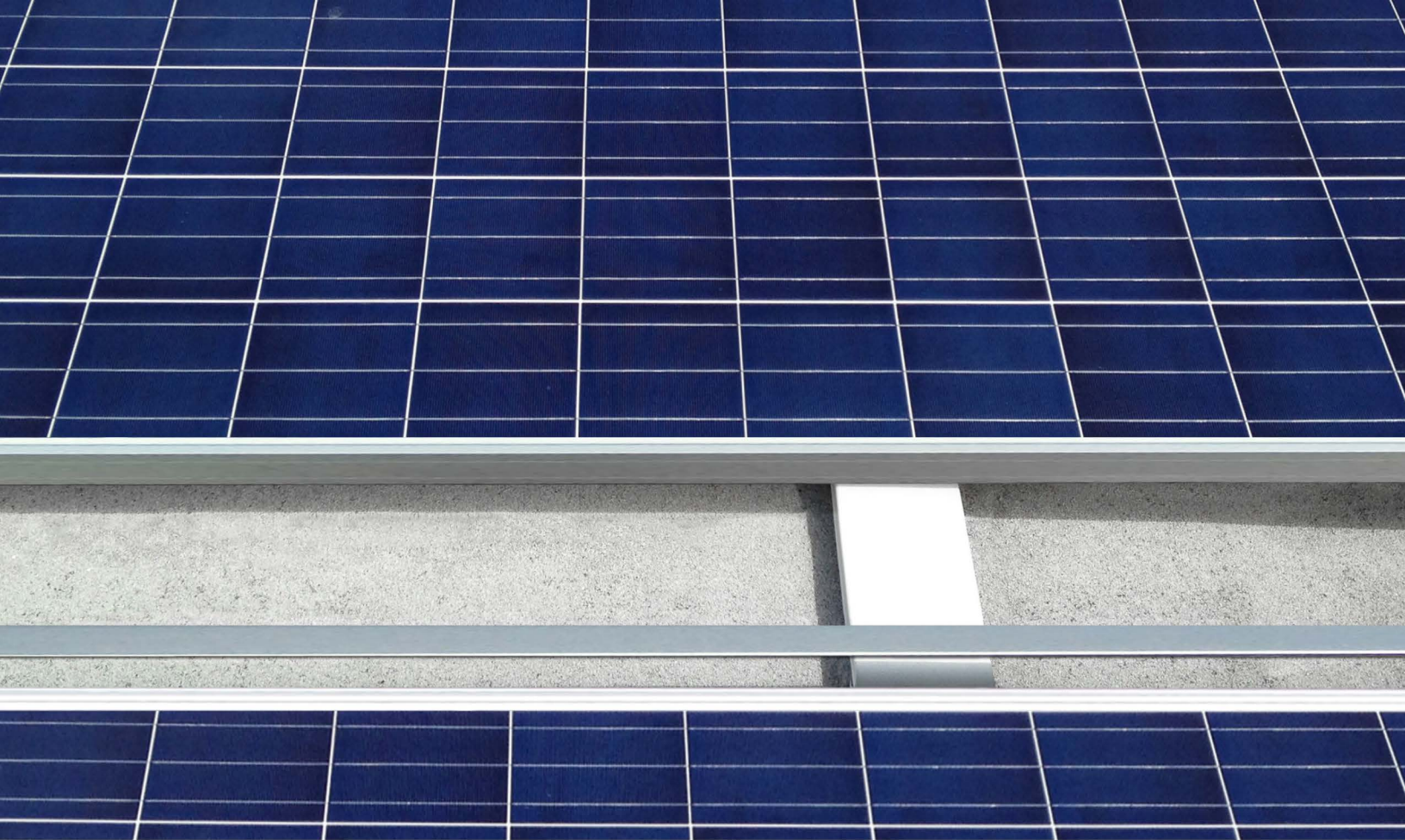
PROTECTION ENHANCED

Your home runs are in, your connections are made, and now you want to protect the wires and tidy things up. If you begin with RayTray™, you're already there. No unsightly bundles. No haphazard wires. Organize as you build. When the build is done and tested, finish up by snapping on the protective caps, which will not only protect and enhance your work but also prolong the life of your client's investment.



A STELLAR TRANSITION

You have been there before and you're not excited about being there again. Use RayTray™ to organize the chaos. Aggregate your home runs into RayTray™ and they're ready to transition into pipe when you are. Home runs will be organized and accessible.



RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

info@raytraysolar.com

RayTrayTM

Sunlight resistant wire management system

Cables permitted: RHW, USE, PV

Max wire size: AWG #6

Max support interval: 4'-3"

Consult manufacturer for proper installation



Intertek

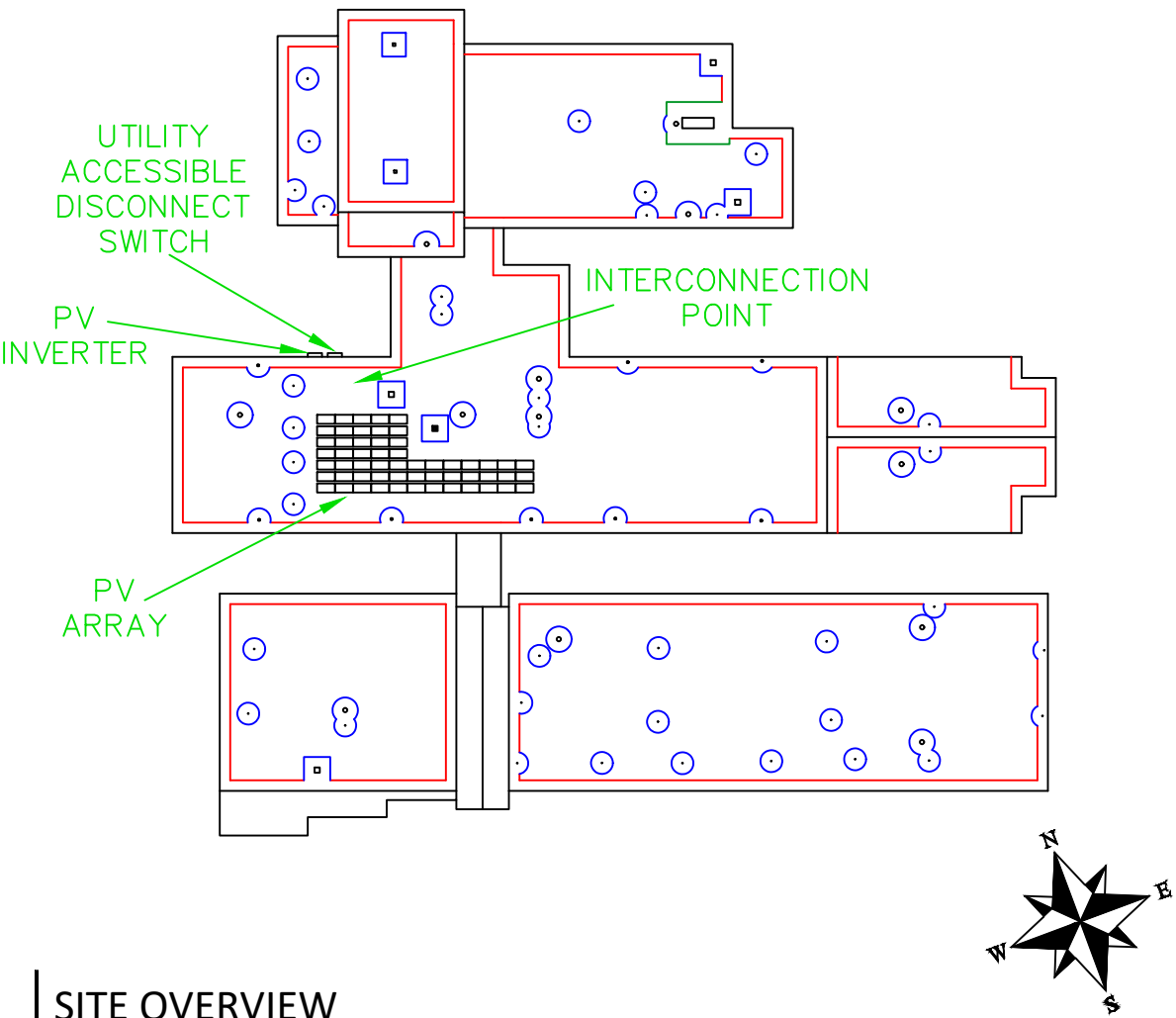
Conforms to UL Std 870
Control No. 4009754



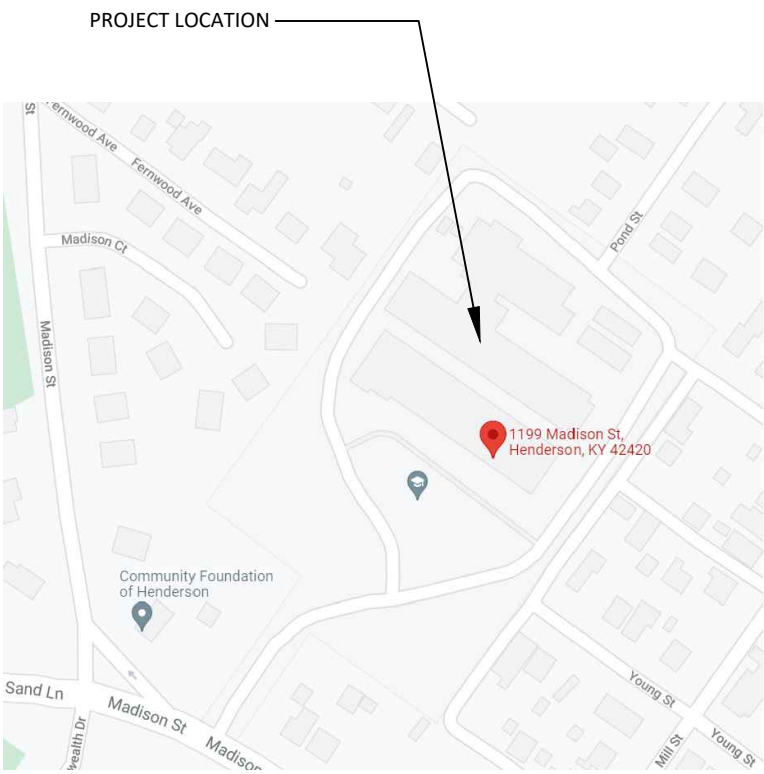
Made in the U.S.A.

WWW.RAYTRAYSOLAR.COM

24.36kW DC PHOTOVOLTAIC
BALLASTED ROOF SYSTEM
FOR
HENDERSON COUNTY SCHOOLS
GUARANTEED ENERGY SAVINGS CONTRACT



1 SITE OVERVIEW
SCALE: NTS



3 VICINITY MAP
SCALE: NTS



2 ROOFTOP VIEW OF SITE
SCALE: NTS

INDEX		
SHEET #	SHEET TITLE	
PV1.0	COVER SHEET	BID DOCUMENTS
PV1.1	GENERAL NOTES	
PV1.2	SITE PLAN	
PV1.3	PLOT PLAN	
PV1.4	SAFETY & STAGING AREA	
PV1.5	PHOTO MAP	
PV1.6	BALLAST & STRINGS	
E1.0	UAD & INVERTER RISER	
E1.1	EXTERIOR CONDUIT PLAN	
E1.2	SINGLE LINE DIAGRAM	
E1.3	SAFETY PLACARDS & SIGNAGE	
NONE	EQUIPMENT CUTSHEETS	

South Heights Elementary School
Henderson County Public Schools
1199 Madison St
Henderson, KY 42420
COVER SHEET

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PV1.0

GENERAL NOTES:

1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.



BID
DOCUMENTS

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GENERAL NOTES

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PLOT PLAN

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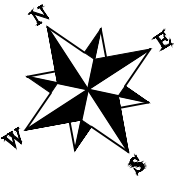
PV1.3

Wright Street

Mill Street

Young Street

Madison Street

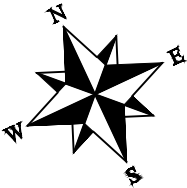


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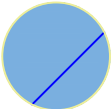
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PV1.4



KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 4' FROM
ROOF EDGE DURING PV INSTALL

1

SAFETY AND STAGING AREA

SCALE: NTS



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PHOTO MAP

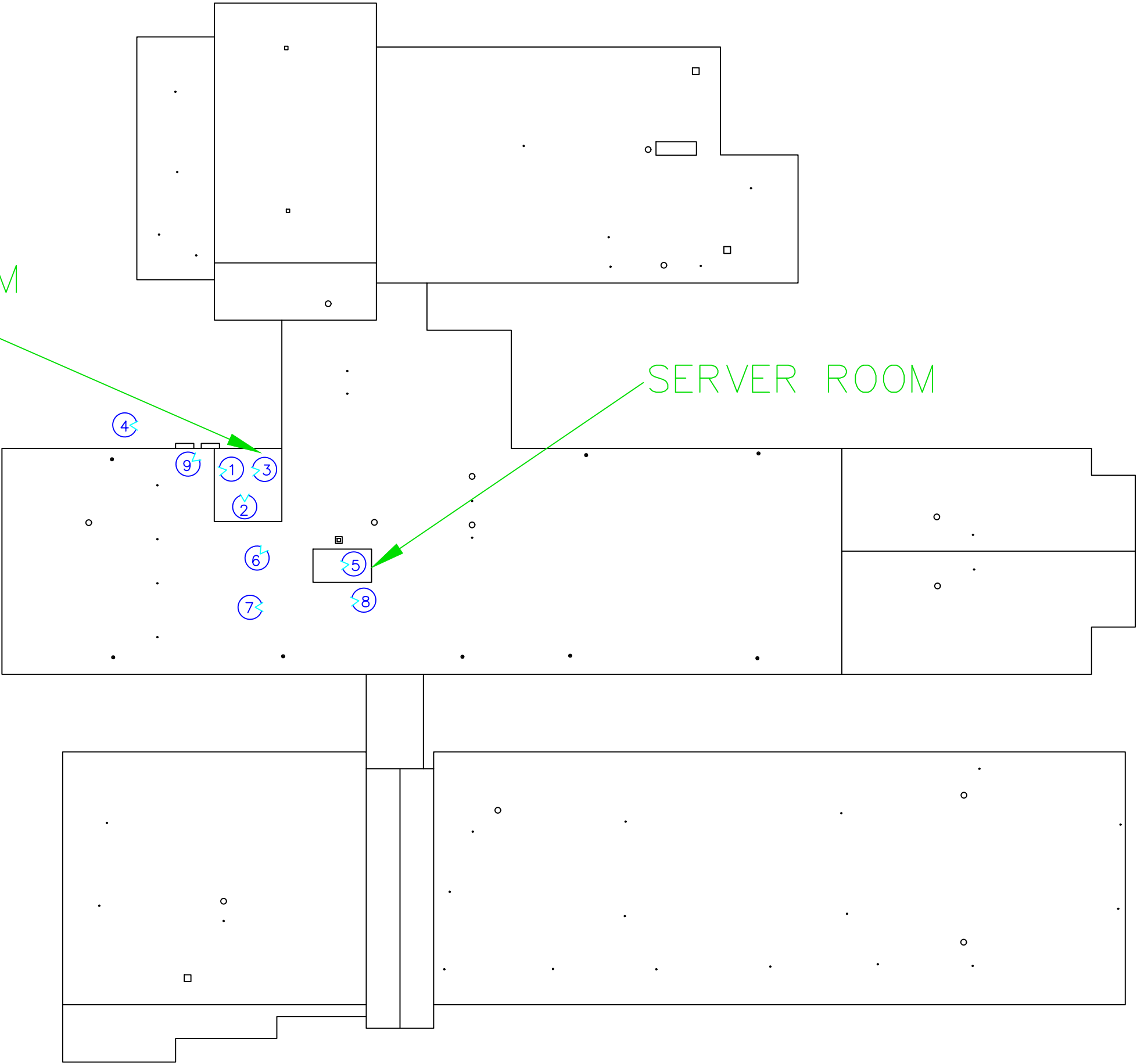
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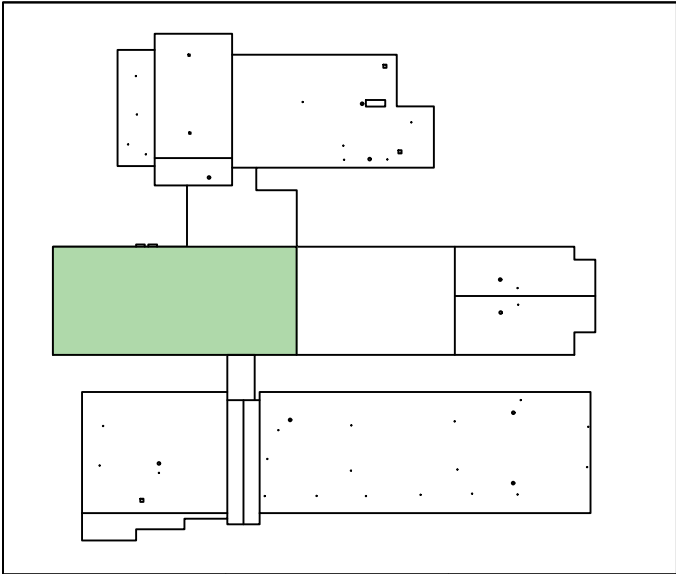
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PV1.5

ELECTRICAL ROOM

SERVER ROOM





String	Modules	Optimizers
1	28	14
2	28	14

Part List	
Item	Quantity
Ballast Block	187
RM5 Bay	96
RM5 Wind Deflector	56
Kit, Wind Deflector Attachment	166
EM End Clamp 32-40mm	321
Kit 1/4 20 Clip on Nut SS 18-8	487
Sunrunner Wire Clip S6445	224
Sunrunner Wire Clip S6476	112

TAG NOTES/KEY:

① Wire management shall be neat and professional. No wires shall be laying on roof surfaces.

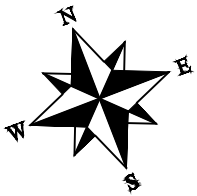
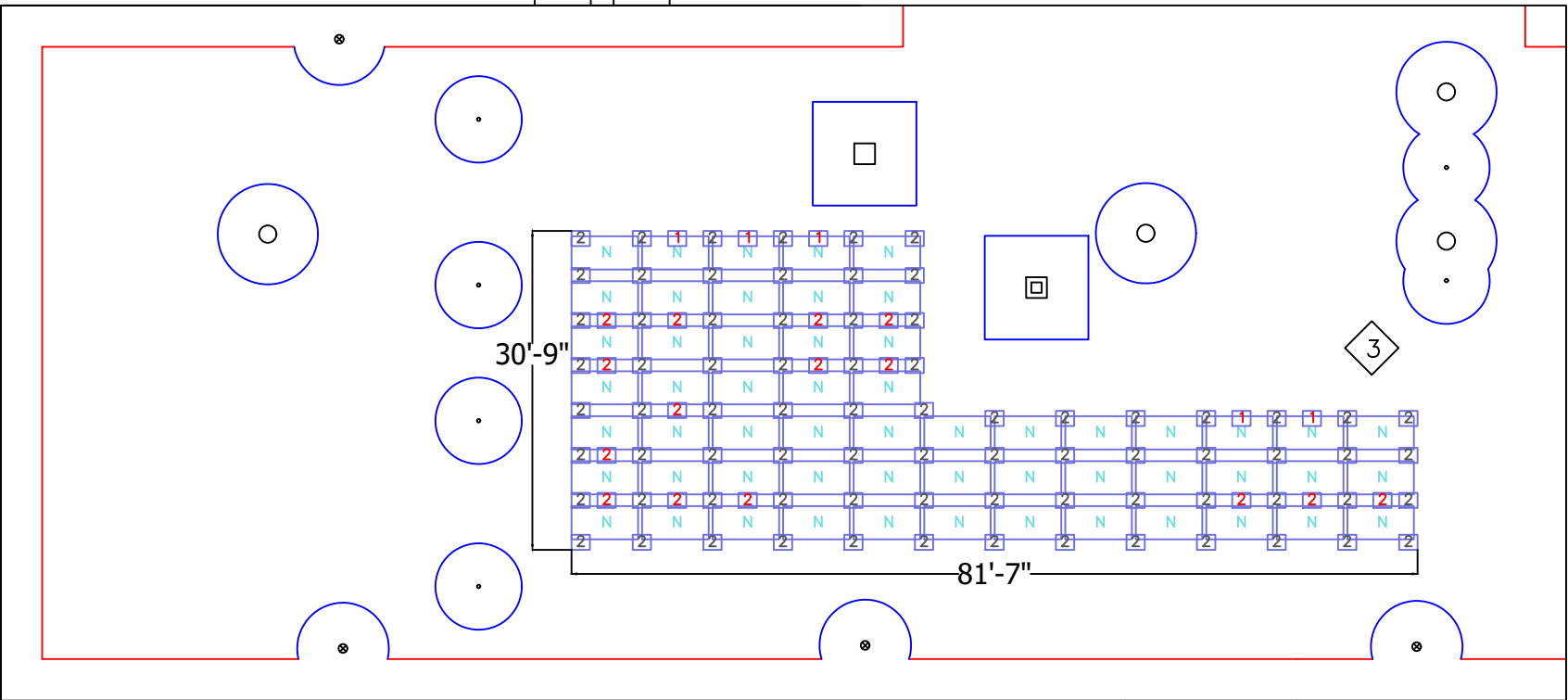
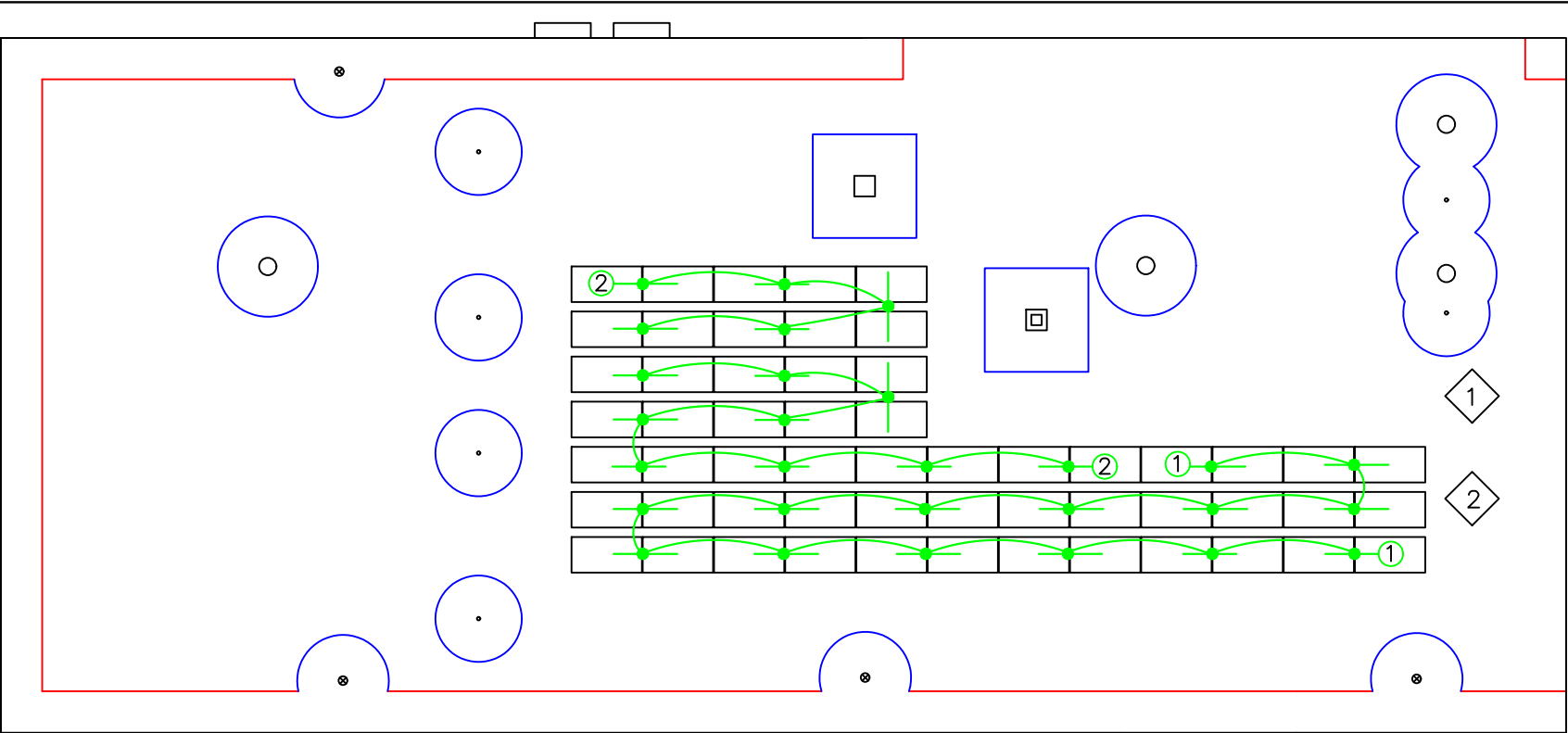
② Should strings change or run differently be sure to create as built drawings and give to BID manager.

③ Ballast block shall be laid according to Unirac ballast plan. Contractor shall not deviate from ballast plan.

Denotes the number of ballast block in the RM5 ballast pan.

N N signifies that a wind deflector must be installed on the North side of panel.

Torque Specifications – Ground Lug			Torque Specifications – RM5	
Ground Lug	Bolt Size	Torque Value	Item	Torque Value
Ilco Lug SGB-4	1/4"-20	6.5 ft-lbs	End Clamp	7 ft-lbs
Ilco Lug GBL-4	#10-32	2.9 ft-lbs	Wind Deflector Attachment Kit	10 ft-lbs
Wiley 6.7	1/4"-20	10 ft-lbs		



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BALLAST AND STRINGING

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Building Height is ~11'

PV1.6

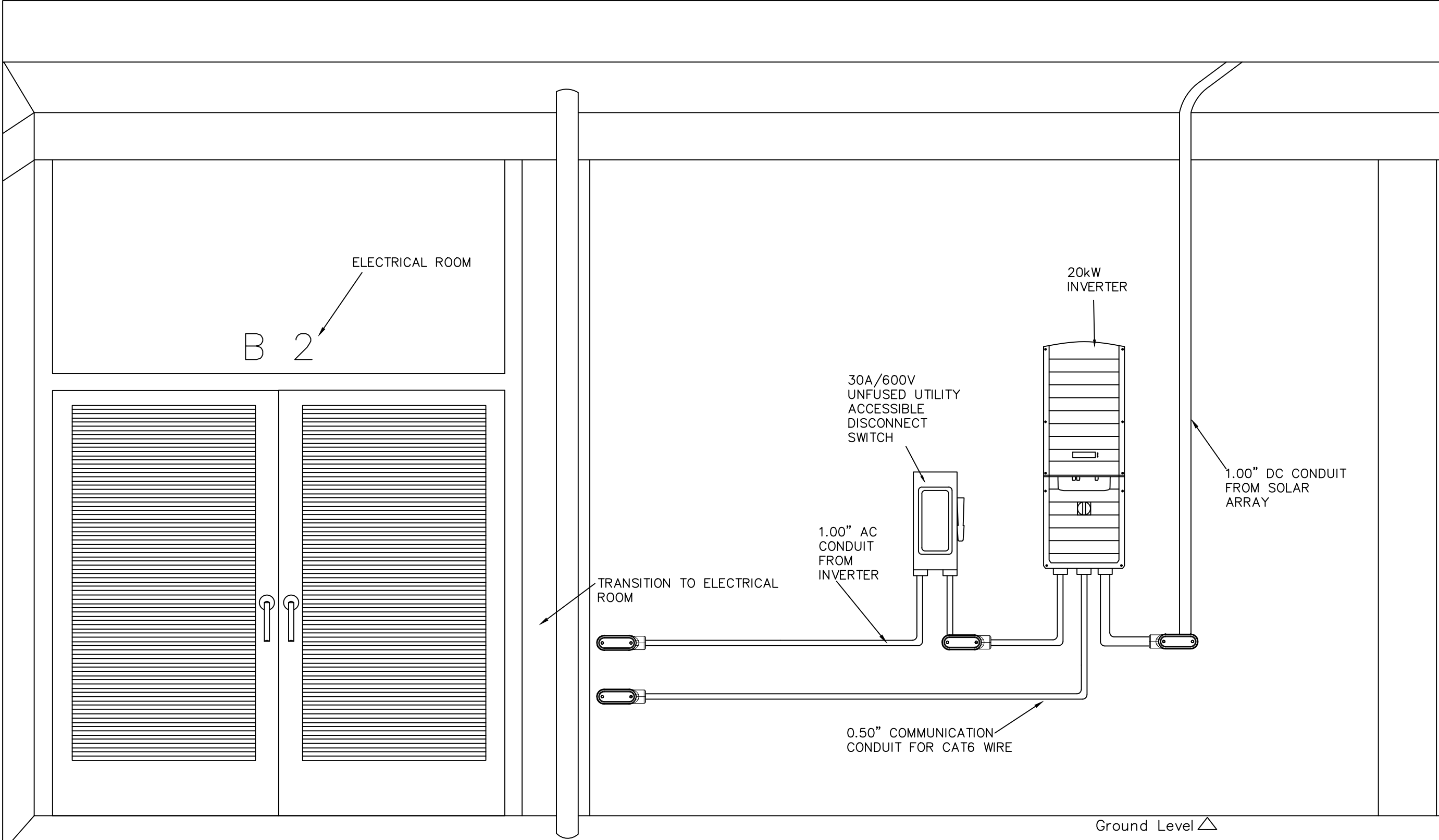
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UAD AND INVERTER RISER

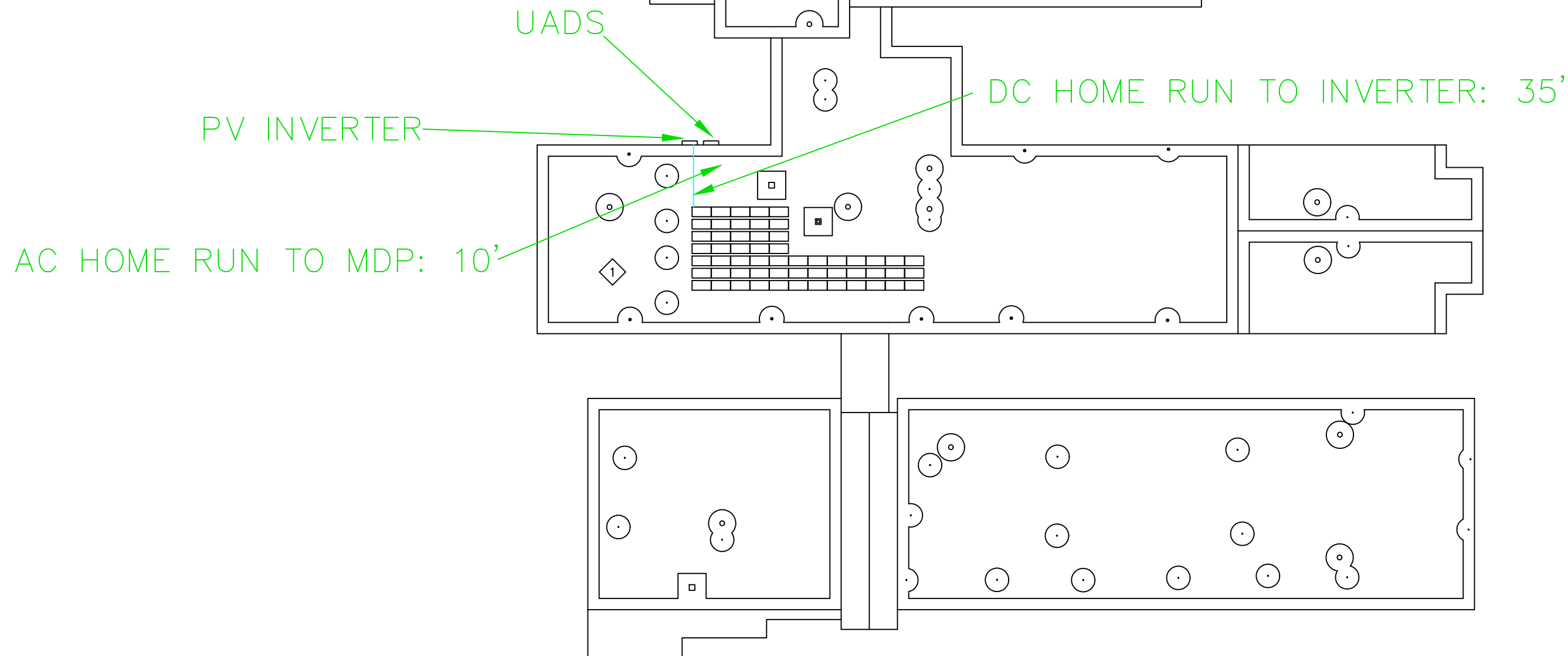
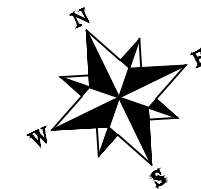
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E1.0



Ground Level \triangle



TAG NOTES/KEY:

- 1 AC HOMERUN TO MDP PENETRATES WALL AND CONTINUES INSIDE OF ELECTRICAL ROOM

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EXTERIOR CONDUIT PLAN

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1 EXTERIOR CONDUIT PLAN

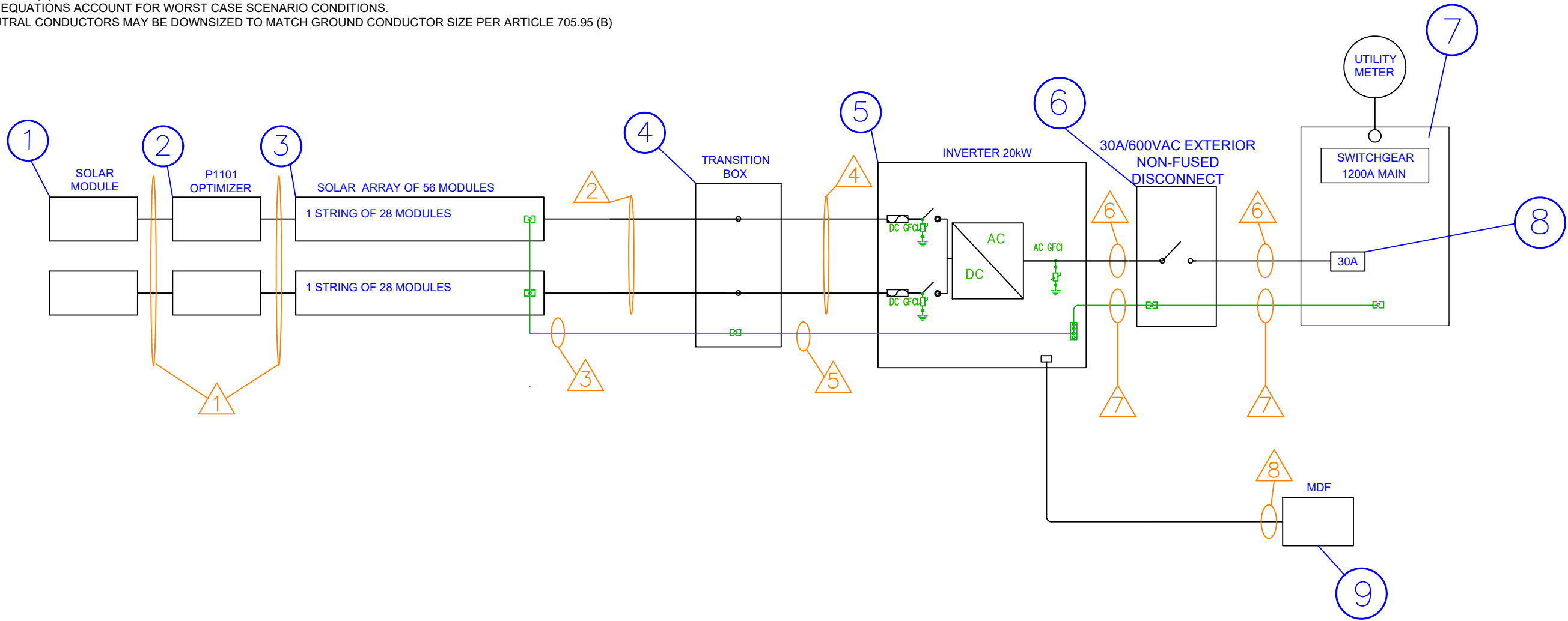
SCALE: 1"= 40'

ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



BID
DOCUMENTS



○	Equipment Schedule			
Tag	Description	Quantity	Part Number	Notes
1	Solar PV Module	56	SPR-E20-435-COM	SunPower 435W Commercial Solar Module
2	Solar PV Optimizer	28	P485	SolarEdge Power Optimizer
3	Solar Array	1		56 Solar Modules in 2 strings
4	Transition Box	1		Soltection Transition Box 1000V Nema 3r
5	Inverter	1	SE20KUS	SolarEdge 20kW Three Phase 480V Commercial Inverter
6	Utility Accessible Disconnect Switch	1	SquareD	Unfused 30A/600V SquareD NEMA 3R Disconnect 3PH
7	Main Distribution Panel	1	ITE Switchboard	1200A/480V I-T-E Switchboard w/1200A Main
8	30A I-T-E Breaker	1	ITE	30A Three Phase Breaker
9	Main Distribution Frame	1		Main Server Rack for Building

△	Conductor and Raceway Schedule				
Tag	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size
1	USE-2 (MFG Cables & Connectors)	12 CU	4	FREE AIR	N/A
2	PV Wire	10 CU	4	RAY TRAY	N/A
3	Bare Copper Equipment Ground (EGC)	6 CU	1	RAY TRAY	N/A
4	XHHW 1,000V	10 CU	4	EMT	1.00"
5	XHHW-Ground	6 CU	1	EMT	1.00"
6	THWN-2 600V	10 CU	4	EMT	1.00"
7	THWN-Ground	6 CU	1	EMT	1.00"
8	CAT6 Plenum	24 CU	1	EMT	0.50"

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SINGLE LINE DIAGRAM

A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED CONDUCTORS
MAY BE UNGROUNDED AND ENERGIZED

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT
WHEN SOLAR MODULES
ARE EXPOSED TO SUNLIGHT

C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT
WHEN SOLAR MODULES
ARE EXPOSED TO SUNLIGHT

RATED MAX POWERPOINT CURRENT
RATED MAX POWERPOINT VOLTAGE
MAXIMUM SYSTEM VOLTAGE
MAXIMUM CIRCUIT CURRENT
MAX RATED OUTPUT CURRENT OF
THE CHARGE CONTROLLER IS INSTALLED

SOLAR DISCONNECT

**PHOTOVOLTAIC
DC DISCONNECT**

D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED CONDUCTORS
MAY BE UNGROUNDED AND ENERGIZED

F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

**PHOTOVOLTAIC
AC DISCONNECT**

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

**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT
NOMINAL OPERATING AC VOLTAGE

F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

**PHOTOVOLTAIC
AC DISCONNECT**

WARNING
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IN THE OPEN POSITION

**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT
NOMINAL OPERATING AC VOLTAGE

G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT
NOMINAL OPERATING AC VOLTAGE

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

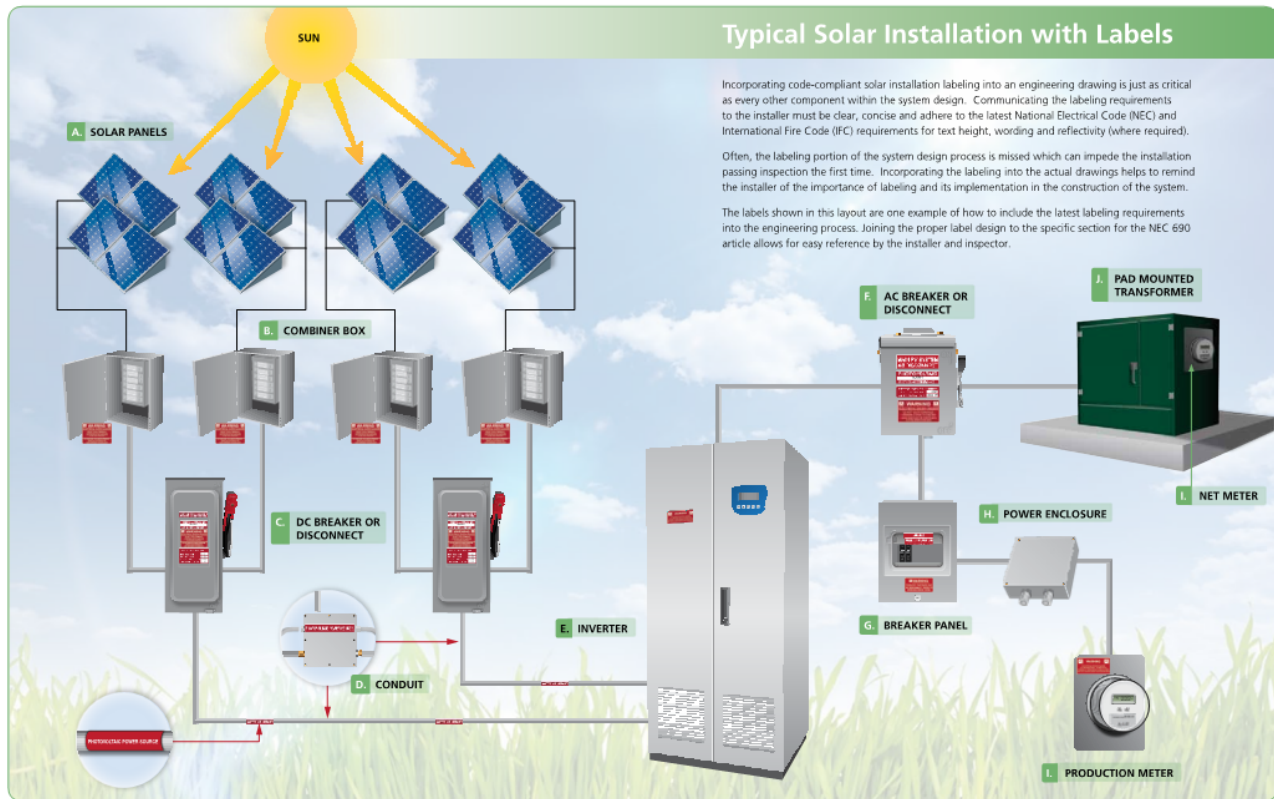
WARNING
TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED CONDUCTORS
MAY BE UNGROUNDED AND ENERGIZED

J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.



South Heights Elementary School
Henderson County Public Schools
1199 Madison St
Henderson, KY 42420

SAFETY PLACARD & SIGNAGE

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/18/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

E1.3



SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

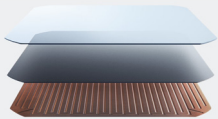
Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



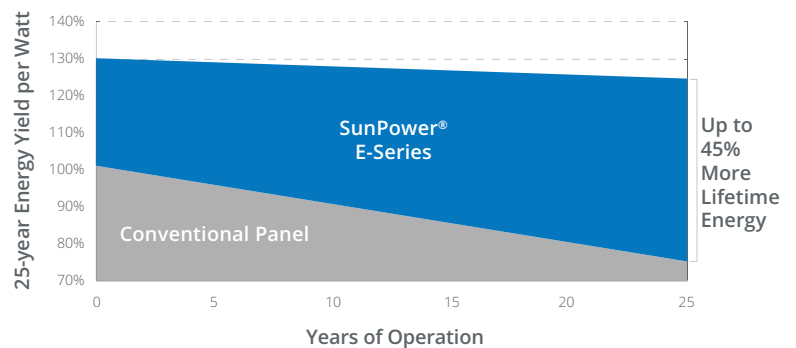
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



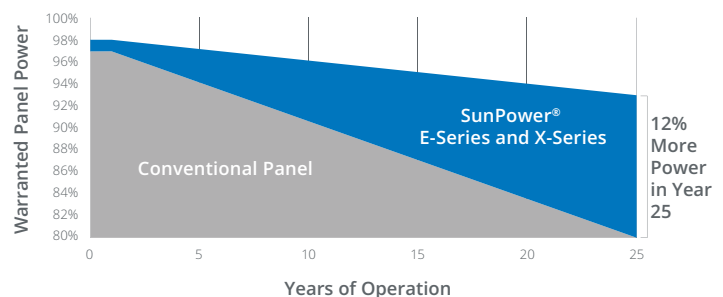
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.

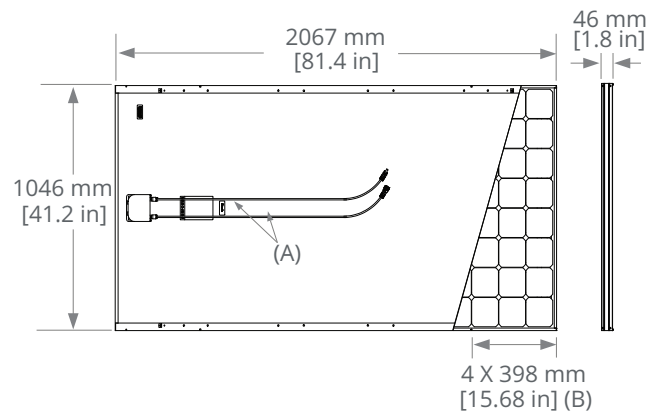


E-Series: E20-435-COM SunPower® Commercial DC Panel

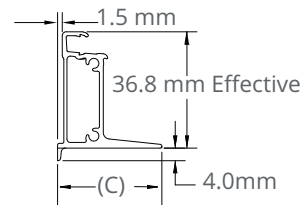
Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 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	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins

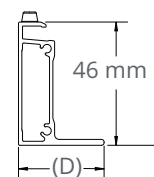
Tests And Certifications	
Standard Tests ⁸	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/-10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

1 SunPower 327 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), 0.75%/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.

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Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 277/480V Grid for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS)



INVERTERS

The best choice for SolarEdge enabled systems

- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Specifically designed to work with power optimizers
- Superior efficiency (98%)
- Fixed voltage inverter for longer strings
- Integrated Safety Switch
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Small, lightweight, and easy to install outdoors or indoors on provided bracket
- Supplied with RS485 Surge Protection Device, to better withstand lightning events

/ Three Phase Inverters for the 277/480V Grid⁽¹⁾ for North America

SE10KUS / SE20KUS / SE30KUS / SE33.3KUS

SE10KUS		SE20KUS	SE30KUS	SE33.3KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER		SEXXX	XXXXXBXX4		
OUTPUT					
Rated AC Power Output	10000	20000	30000	33300	VA
Maximum AC Power Output	10000	20000	30000	33300	VA
Output Line Connections	3 phase, 3-wire / PE (L1-L2-L3), TN, TT 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT				
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)	244-277-305				
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)	422.5-480-529				
AC Frequency Min-Nom-Max ⁽²⁾	59.3 - 60 - 60.5				
x. Continuous Output Current (per Phase)	12	24	36.5	40	A
GFDI Threshold	1				
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes				
THD	≤ 3				
INPUT					
Maximum DC Power (Module STC)	13500	27000	40500	40500	W
Transformer-less, Ungrounded	Yes				
Maximum Input Voltage DC to Gnd	490				
Maximum Input Voltage DC+ to DC-	1000				
Nominal Input Voltage DC to Gnd	420				
Nominal Input Voltage DC+ to DC-	840				
Maximum Input Current	13.5	26.5	39	40	Adc
Maximum Input Short Circuit Current	45				
Reverse-Polarity Protection	Yes				
Ground-Fault Isolation Detection	1MΩ Sensitivity		350kΩ Sensitivity ⁽³⁾		
CEC Weighted Efficiency	98		98.5		
Night-time Power Consumption	< 3		< 4		
ADDITIONAL FEATURES					
Supported Communication Interfaces	2 x RS485, Ethernet, Built-in GSM (optional)				
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi station for local connection				
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect ⁽⁴⁾				
RS485 Surge Protection	Supplied with the inverter				
Smart Energy Management	Export Limitation				
STANDARD COMPLIANCE					
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07				
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)				
Emissions	FCC part15 class B				
INSTALLATION SPECIFICATIONS					
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG		3/4" minimum / 8-4 AWG		
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG				
Number of DC inputs	2 pairs		3 pairs ⁽⁵⁾		
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260				
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260				
Weight	73.2 / 33.2		99.5 / 45		
Weight with Safety Switch	79.7 / 36.2		106 / 48		
Cooling	Fans (user replaceable)				
Noise	< 50		< 55		
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁶⁾				
Protection Rating	NEMA 3R				

(1) For 120/208V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-208V-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) P/Ns SE10K/SE20K-US0xxxxx have Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)

(5) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(6) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

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Power Optimizer

For North America

P860 / P960 / P1101



POWER OPTIMIZER

PV power optimization at the module-level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses and combiner boxes, over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

/ Power Optimizer For North America

P860 / P960 / P1101

Power OptimizerModel (Typical Module Compatibility)	P860 (for 2 x 72 cell modules)		P960 (for 2 x 72 cell modules)		P1101 (for up to 2 x high power or bi-facial modules)	
INPUT						
Rated Input DC Power ⁽¹⁾	860		960		1100	W
Connection Method	Dual input for independently connected modules ⁽²⁾				Single input for series connected modules	
Absolute Maximum Input Voltage (Voc at lowest temperature)	60				125	Vdc
MPPT Operating Range	12.5 - 60				12.5 - 105	Vdc
Maximum Short Circuit Current (Isc)	22		23.2		14.1	Adc
Maximum Short Circuit Current per Input (Isc)	11		11.6		-	Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.6					%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)						
Maximum Output Current	18					Adc
Maximum Output Voltage	80					Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
Photovoltaic Rapid Shutdown System	Compliant with NEC 2014, 2017, 2020					
EMC	FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741			IEC62109-1 (class II safety), UL1741, UL3741		
Material	UL94 V-0, UV resistant					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Compatible SolarEdge Inverters	Three phase inverters			SE30K & larger		
Maximum Allowed System Voltage	1000					Vdc
Dimensions (W x L x H)	129 x 168 x 59 / 5.1 x 6.61 x 2.32			129 x 162 x 59 / 5.1 x 6.4 x 2.32		mm / in
Weight	1064 / 2.34					gr / lb
Input Connector	MC4 ⁽³⁾					
Input Wire Length Options	Input #1	Input #2	Input #1	Input #2	-	m / ft
1	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 0.16 / 0.52	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2	1.6 / 5.2	
2	(-) 1.6 / 5.2, (+) 0.16 / 0.52	(-) 0.16 / 0.52, (+) 1.6 / 5.2				
3	(-) 1.6 / 5.2, (+) 1.6 / 5.2	(-) 1.6 / 5.2, (+) 1.6 / 5.2				
Output Wire Type / Connector	Double insulated; MC4					
Output Wire Length	2.3 / 7.5		2.3 / 7.5		2.4 / 7.8	m / ft
Operating Temperature Range ⁽⁴⁾	-40 to +85 / -40 to +185					°C / °F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed

(2) In the event of an odd number of PV modules in one string, installation of one P860 /P960 Power Optimizer connected to one PV module is allowed. When connecting a single module to the P860/ P960, seal the unused input connectors with the supplied pair of seals

(3) For other connector types please refer to: <https://www.solaredge.com/sites/default/files/optimizer-input-connector-compatibility.pdf>

(4) For ambient temperature above +70°C / +158°F, power derating is applied. Refer to the Power Optimizers Temperature De-Rating Application Note for more details

PV System Design Using a SolarEdge Inverter ⁽⁵⁾⁽⁶⁾		208V Grid SE14.4K*	208V Grid SE17.3K*	277/480V Grid SE20K, 30K	277/480V Grid SE33.3K*, SE40K*
Compatible Power Optimizers		P860, P960, P1101	P860, P960, P1101	P860, P960, P1101	P860, P960, P1101
Minimum String Length	Power Optimizers	8	9	14	14
	PV Modules	15	17	27	27
Maximum String Length	Power Optimizers	30	30	30	30
	PV Modules	60	60	60	60
Maximum Continuous Power per String		7200	8730	15300	15300
Maximum Allowed Connected Power per String ⁽⁷⁾ (Permitted only when the difference in connected power between strings is up to 2,000W for the 277/480V grid, or 1,000W for the 208V grid)		1 string - 8400 2 strings or more - 9000	1 string - 9930 2 strings or more - 10530	1 string - 17550 2 strings or more - 20300	2 strings or less - 17550 3 strings or more - 20300
Parallel Strings of Different Lengths or Orientations		Yes			

* The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter

(5) P860/P960 can be mixed in one string only with P860/P960

(7) P860/P960 design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification

(8) To connect more STC power per string, design your project using [SolarEdge Designer](#)

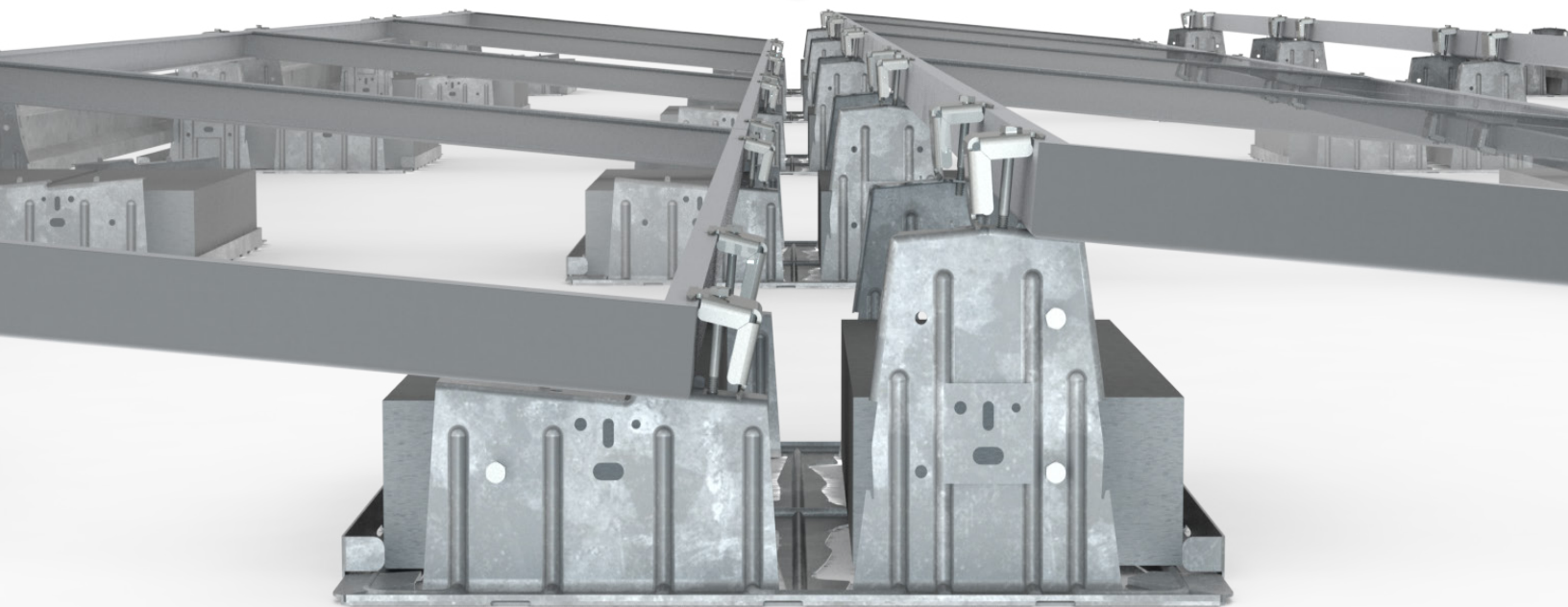
ROOFMOUNT | RM5

SOUTH FACING 5 DEGREE TILT



BETTER SOLAR STARTS HERE

RM5 is a ballasted south-facing five-degree tilt mounting system for flat roofs. Fewer components, single tool installation, snap-in hardware, and integrated bonding ensure high speed installation, while features such as 7.5" or 11" row spacing and optional wind deflector, roof attachments, MLPE mount, and wire management provide a complete solution. UNIRAC's unmatched commercial project support makes construction easy, from permitting through installation, and **RM5** is supported by North America's largest distribution network. Plus, enjoy peace of mind with UNIRAC's industry-leading 25-year warranty.



MAXIMIZE PROFITABILITY AT EVERY STEP

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

ROOFMOUNT | RM5

SOUTH FACING 5 DEGREE TILT



BETTER SOLAR STARTS HERE

OPTIMIZE ARRAY LAYOUT

MAXIMUM LAYOUT FLEXIBILITY WITH TWO ROW SPACING OPTIONS

5 Degree Tilt with 7" / 11" Row Spacing Options

Set, Then Clamp Feature, Provides Better Construction Sequencing for Rapid Installation

Simplified Wire Management, with Two (2) Optional Unirac Clips

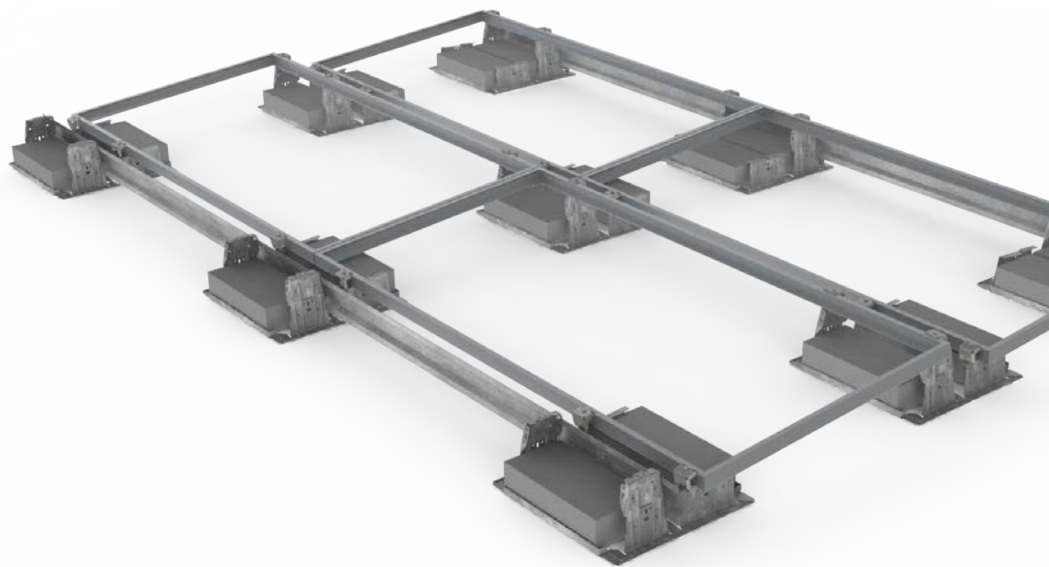
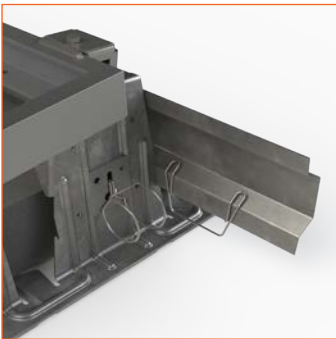
Wind Deflector for Ballast Reduction & Fire Mitigation

Optional Roof Attachment Meets a Variety of Project Requirements

MPL Mount with Engage Trunk Cable Wire Management Clip

G235 Steel - Double the Corrosion Protection of other Industry Products

Compact Packaging - Up to 1 MW / Truck



GENERATE LAYOUTS IN MINUTES WITH U-BUILDER ON-LINE DESIGN TOOL

HelioScope Integration • Google & Bing Maps • Ballast Distribution Maps • Site Specific Engineering Reports • Layout Multiple Arrays per Project • CAD Downloads

INDUSTRY LEADING PROJECT SUPPORT

UNIRAC's Team of Technical Experts & Professional Engineers is Your Partner Through Design, Engineering, Permitting and Installation.

GUARANTEED PERMIT APPROVAL

UL2703 Certification Documents • Stamped 3rd Party PE Letters • Construction Drawings • AHJ Outreach Program

FASTEST DELIVERY IN THE INDUSTRY

In Stock & Ready to Ship From North America's Largest Flat Roof Distribution Network.

WORLD CLASS INSTALLATION TRAINING & SUPPORT

Library of QuickTips Installation Videos • Installation Guides • Live Demos • Train the Trainer Program

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HIT A
HOME RUN
WITH

RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

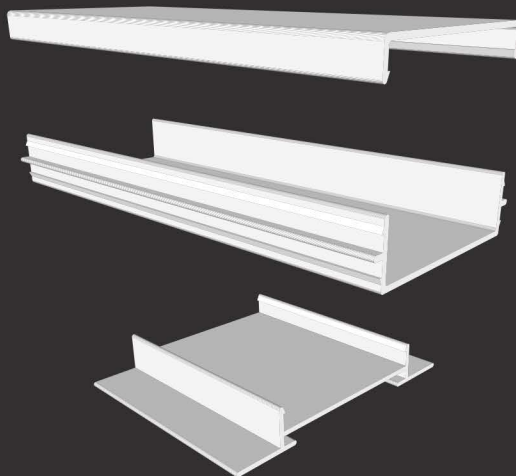
CAP

+

TRAY

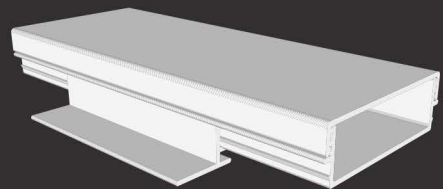
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BASE



=

RAYTRAYTM
SOLAR WIRE MANAGEMENT SYSTEM



RayTrayTM
info@raytraysolar.com
www.raytraysolar.com



Conforms to UL Std 870
Control No. 4009754

RAYTRAY™ v2

SOLAR WIRE MANAGEMENT SYSTEM

RayTray™ is a protective enclosure manufactured with a durable RPVC polymer to ensure a neat and comprehensive routing method for jumper, home run, and equipment-grounding conductor cables.

RayTray™ is the product of a collaborative effort between solar installers and electrical, structural, and polymer engineers. The result is a wire management system that is simple, durable, cost effective, and ETL listed for use in PV arrays.

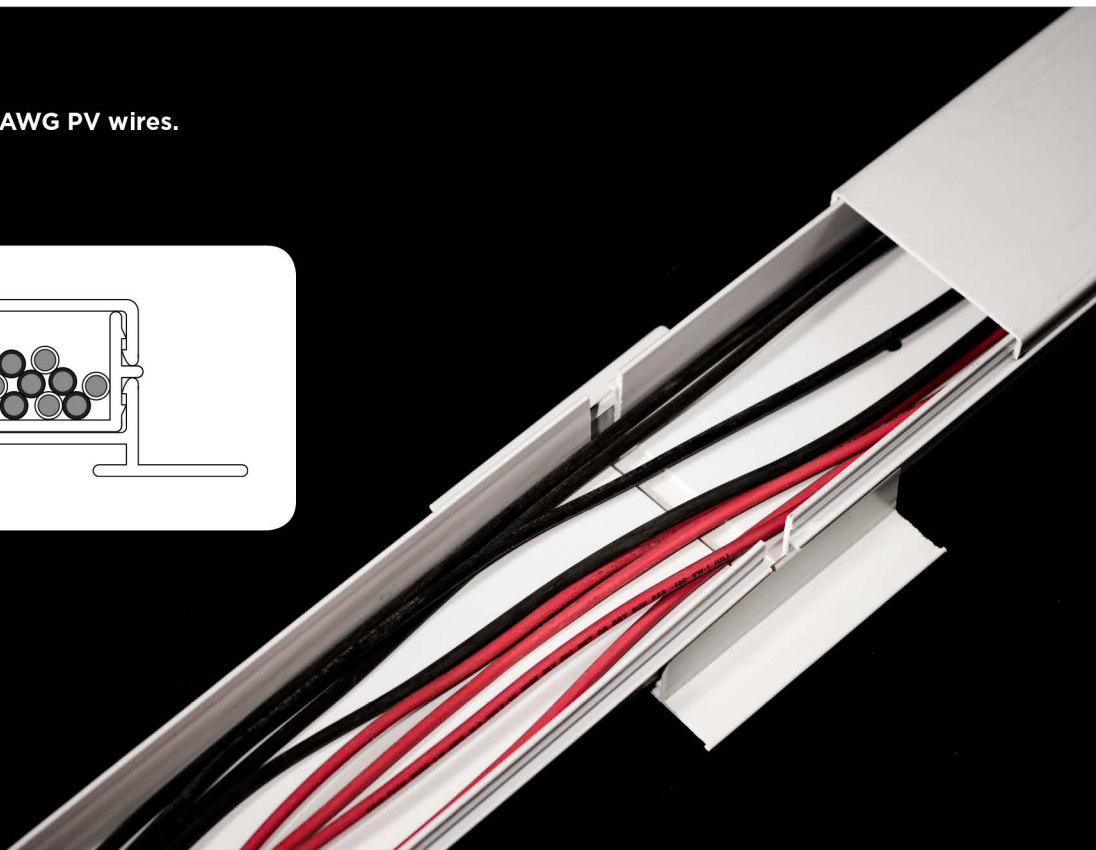
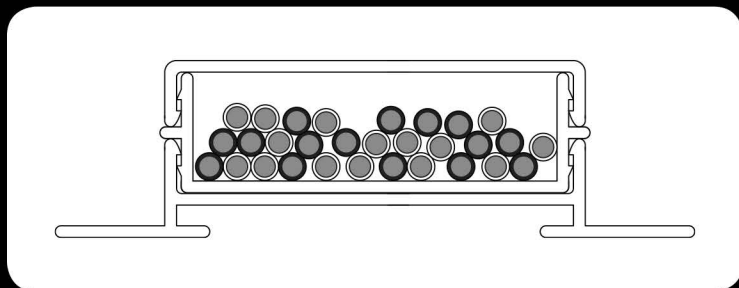
RayTray™ is

- Simple and easy to install
- Durable and UV resistant
- Low Cost
- Versatile
- ETL listed to UL 870 Standard
- Made in the USA

RAYTRAY™ SPECIFICATIONS

Product	Solar Wire Management System
Material	Non-metallic RPVC polymer. UV rating: F1
Listing	ETL Intertek conforms to UL Std 870. Voltage rating: 1000 VDC
Installation	Flat roofs with pitch < 8 degrees. Standing seam metal roofs
Internal Wiring	Maximum of thirty #10 AWG wires/tray. RHW, USE, or PV wire. Maximum wire size: #6 AWG
Grounding	Non-metallic RPVC polymer requires no grounding
Material Dimensions	Overall height: 2", width: 8", length of tray and cap: 8', length of base: 6"
Maximum Support Interval	4'3"
Warranty	25-year warranty against defects in materials and workmanship

RayTray™ is rated to hold thirty #10 AWG PV wires.
Maximum wire size is #6 AWG.



CONNECTING THE COMPONENTS

SNAP AND CONNECT



Assembling RayTray™ is easier than connecting modules in a string. Snap a RayTray™ base onto one end of a tray; add a base in the middle of the tray, and another at the opposite end. Be sure to leave a one-inch gap between sections of tray to allow for expansion and contraction. Keep the base between tray sections fixed in place by inserting a rivet into one side of the tray.

CAP AND PROTECT

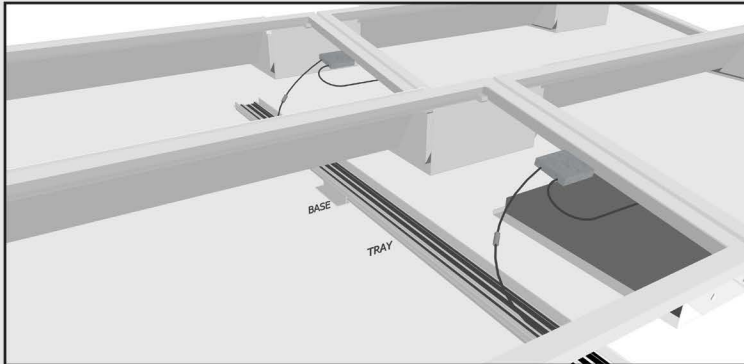


Once your home runs are in place, snap on the cap. The cap should span the gap left for expansion by at least six inches.

AN EASY CHANGE IN DIRECTION

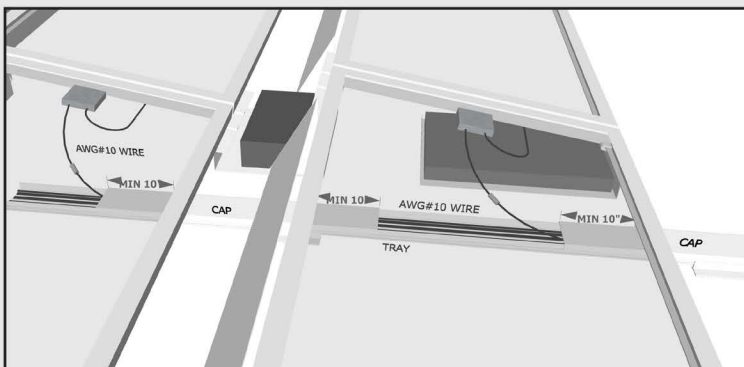


Most runs will go in one direction. But when you need to change direction, RayTray™ can accommodate. RayTray™ is cut easily with a hacksaw or a reciprocating saw. Make some simple cuts, insert a plastic rivet, and you will have a secure and stable T-fitting or elbow. A file or deburring tool quickly gets rid of sharp edges.



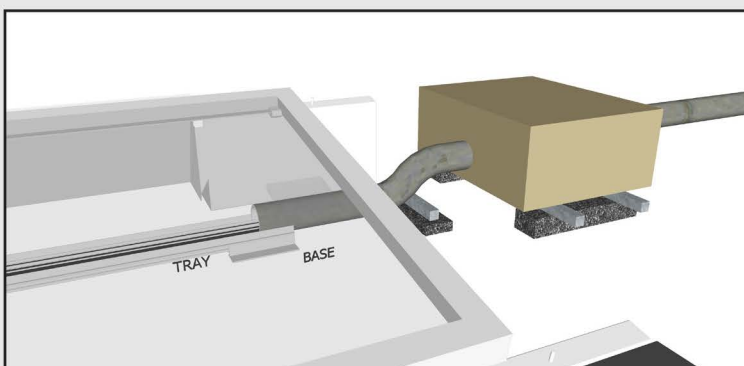
KEEP THOSE HOME RUNS IN LINE

RayTray™ keeps your home runs organized, secure, and protected. No more worries about home runs getting stepped on or rubbing and abrading on racking. Simply pick your route, snap together your RayTray™ trays and base supports, slide under the array, and drop in your home runs. Alternatively, lay the RayTray™ out and drop in your home runs before the modules are installed. Array cabling is neat and organized. Your crew will thank you. Your inspector will be pleased. And your client will be thrilled at how professional everything looks.



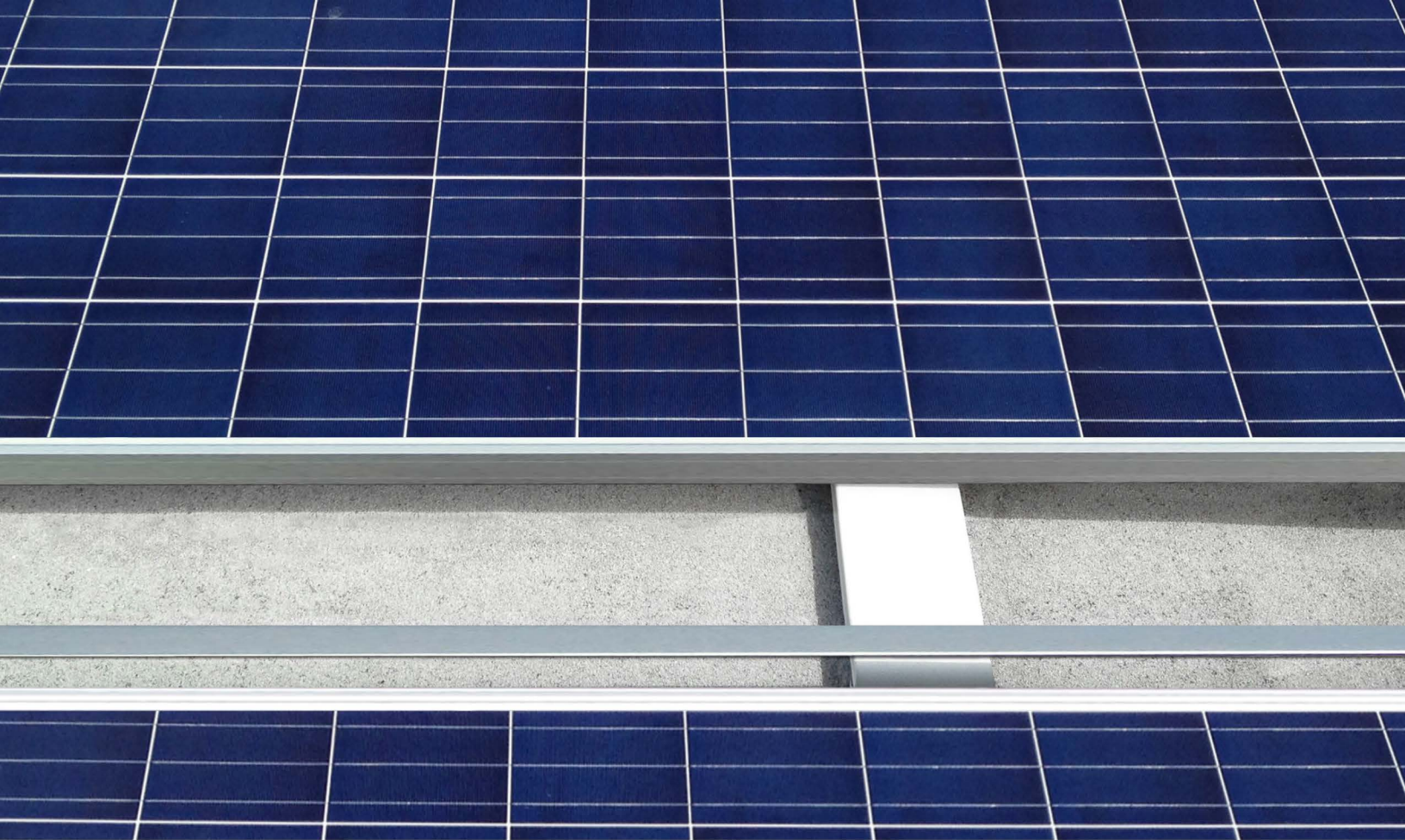
PROTECTION ENHANCED

Your home runs are in, your connections are made, and now you want to protect the wires and tidy things up. If you begin with RayTray™, you're already there. No unsightly bundles. No haphazard wires. Organize as you build. When the build is done and tested, finish up by snapping on the protective caps, which will not only protect and enhance your work but also prolong the life of your client's investment.



A STELLAR TRANSITION

You have been there before and you're not excited about being there again. Use RayTray™ to organize the chaos. Aggregate your home runs into RayTray™ and they're ready to transition into pipe when you are. Home runs will be organized and accessible.



RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

info@raytraysolar.com

RayTrayTM

Sunlight resistant wire management system

Cables permitted: RHW, USE, PV

Max wire size: AWG #6

Max support interval: 4'-3"

Consult manufacturer for proper installation



Intertek

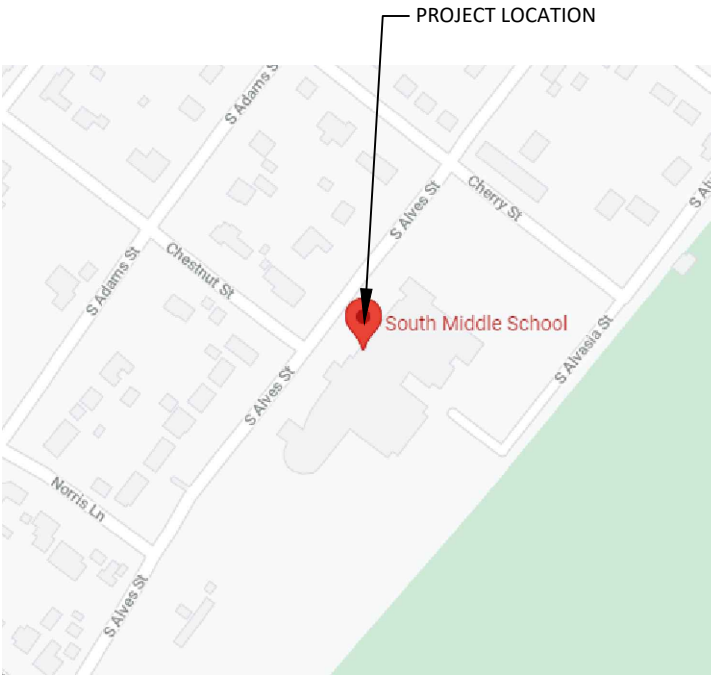
Conforms to UL Std 870
Control No. 4009754



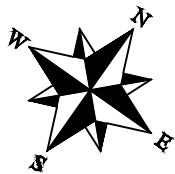
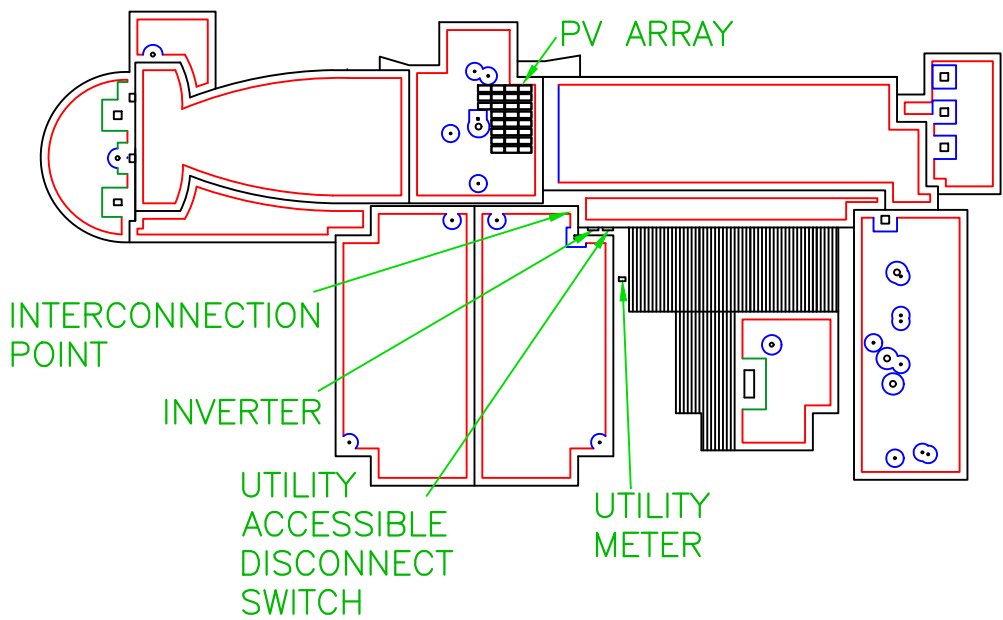
Made in the U.S.A.

WWW.RAYTRAYSOLAR.COM

11.745kW DC PHOTOVOLTAIC
BALLASTED ROOF SYSTEM
FOR
HENDERSON COUNTY SCHOOLS
GUARANTEED ENERGY SAVINGS CONTRACT



3 VICINTY MAP



2 ROOFTOP VIEW OF SITE

INDEX

SHEET #	SHEET TITLE
PV1.0	COVER SHEET
PV1.1	GENERAL NOTES
PV1.2	SITE PLAN
PV1.3	PLOT PLAN
PV1.4	STAGING AREA
PV1.5	PHOTO MAP
PV1.6	ROOF A BALLAST & STRINGS
E1.0	UAD & INVERTER RISER
E1.1	EXTERIOR CONDUIT PLAN
E1.2	SINGLE LINE DIAGRAM
E1.3	SAFETY PLACARDS & SIGNAGE



BID
DOCUMENTS

South Middle School
Henderson County Schools
800 S Alvea St
Henderson, KY 42420

COVER SHEET

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

PV 1.0



GENERAL NOTES:

- 1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
- 2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
- 3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
- 4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
- 5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
- 6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
- 7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
- 8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
- 9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
- 10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
- 11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
- 12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
- 13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
- 14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
- 15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
- 16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
- 17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
- 18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
- 19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
- 20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
- 21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND.OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
- 22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
- 23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
- 24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
- 25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
- 26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
- 27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
- 28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
- 29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
- 30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.

BID
DOCUMENTS

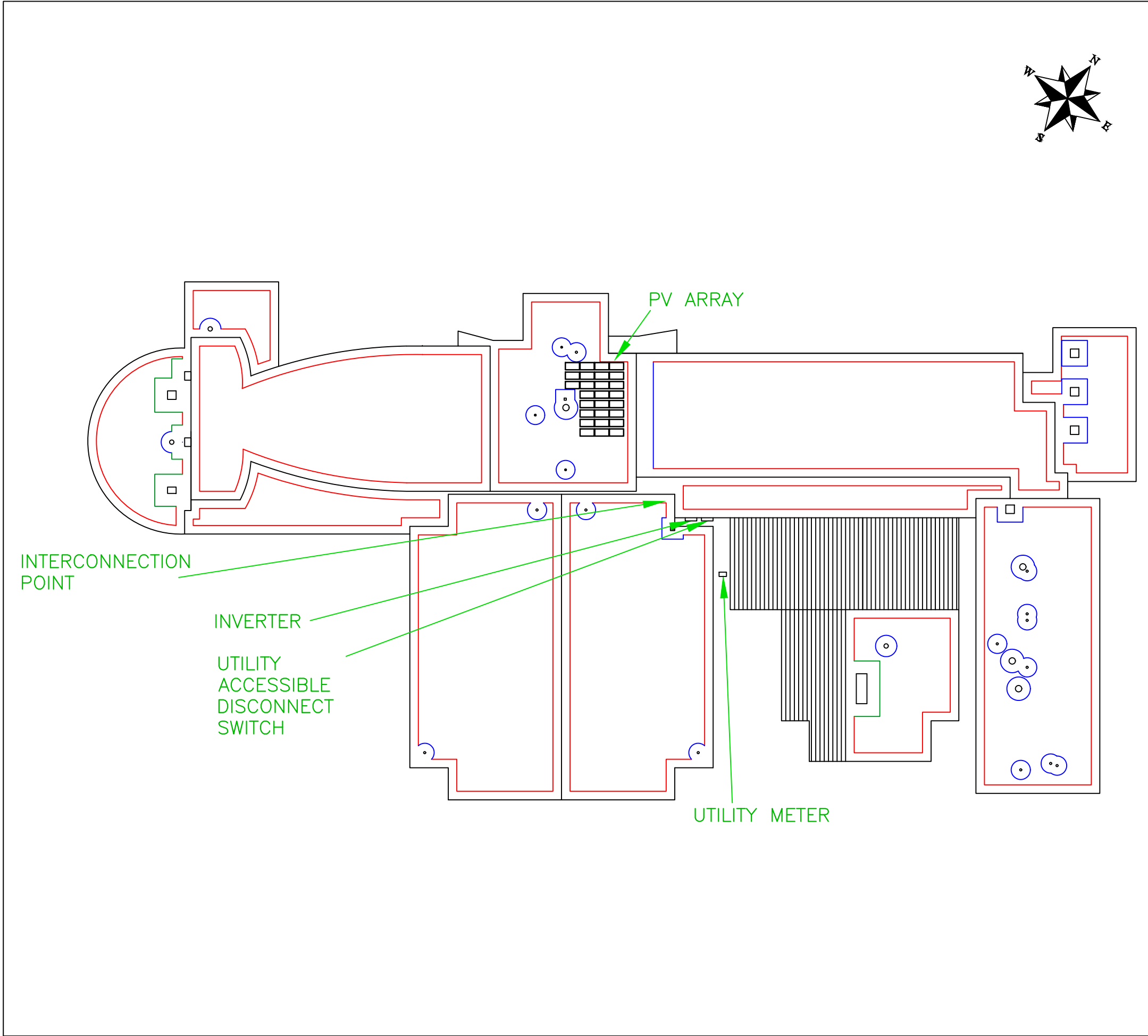
South Middle School
Henderson County Schools
800 S Alves St
Henderson, KY 42420

GENERAL NOTES

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022

PV 1.1



System Summary

- Electrical Equipment:
- 27 – Sunpower 435W Commercial Solar Module
 - 27 – SolarEdge P485 Power Optimizer
 - 1 – SolarEdge 9kW Three Phase Inverter

11.745kW DC System Size
9kW AC System Size

Roof Details:

Roof Type: White TPO

Racking Type: Unirac RM5

Module Tilt: 5 Degrees

Azimuth: 127 Degrees

- Key:
- Solar Module
 - 4ft Roof Edge Setback
 - 4ft Obstruction Setback
 - 6ft Equipment Setback
 - Roof Drain
 - Roof Vent
 - Roof Top Unit



BID
DOCUMENTS

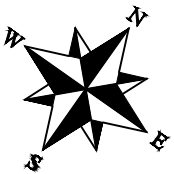
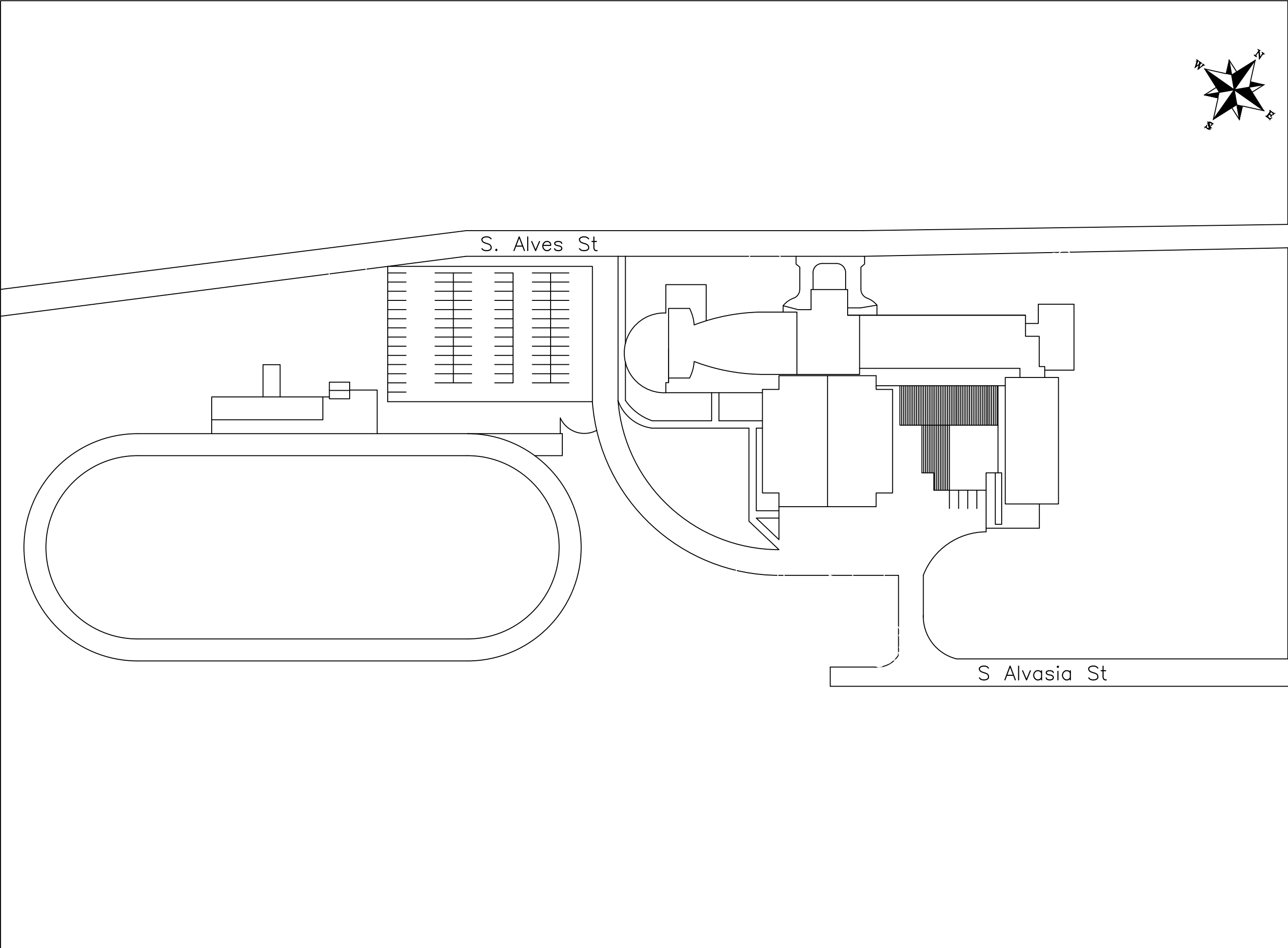
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SITE PLAN

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PV 1.2



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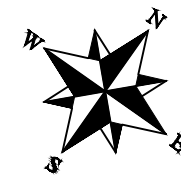
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PLOT PLAN

CLIENT/CMTA JOB #:	ZHC22
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PV 1.3



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SAFETY AND STAGING AREA

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DATE:	03/02/2022
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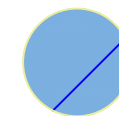
REVISIONS	
1.	Bidding 3/3/2022

PV 1.4

S. Alves St

MATERIAL STORAGE

KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



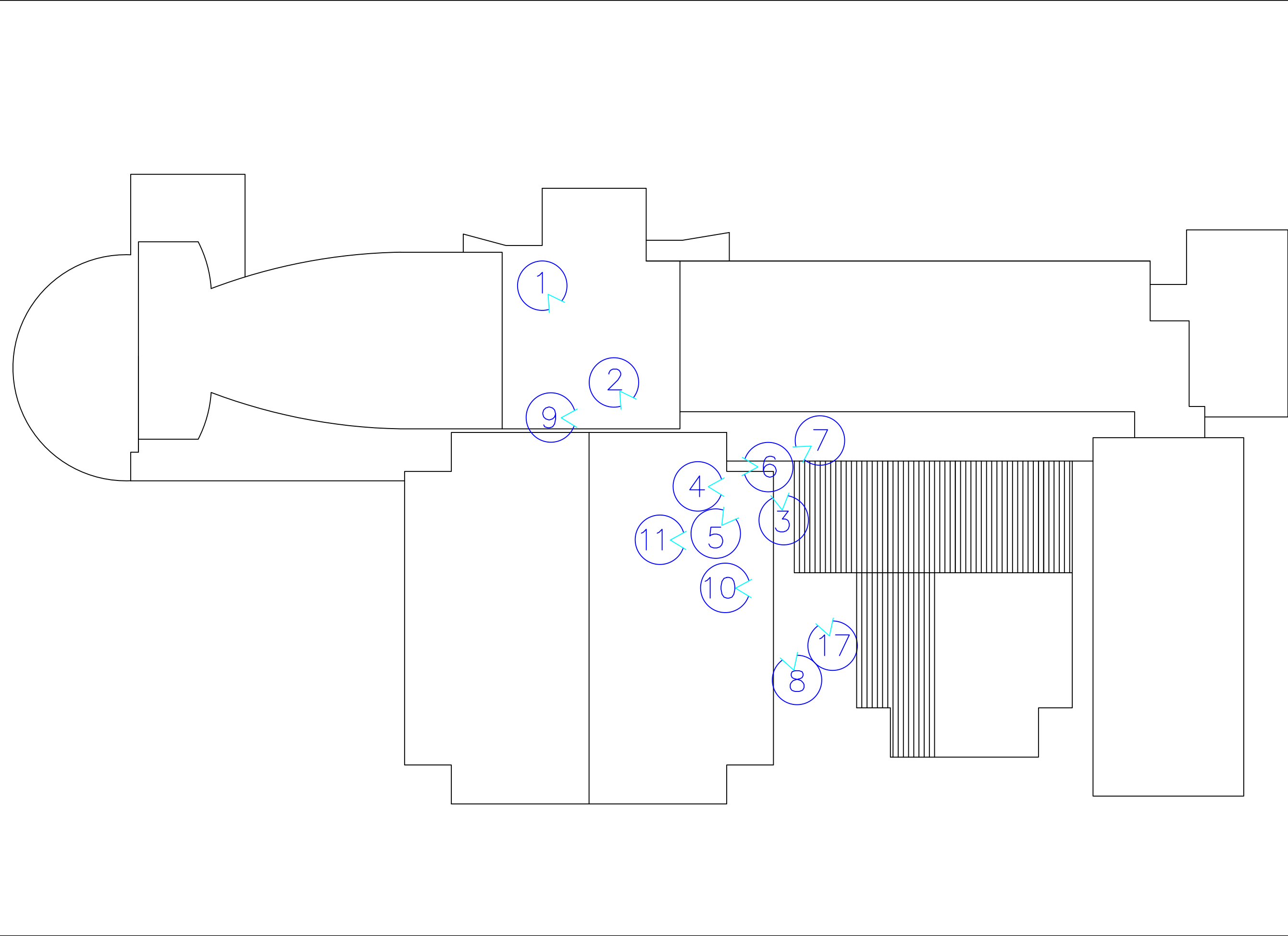
MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 6' FROM
ROOF EDGE DURING PV INSTALL



BID
DOCUMENTS

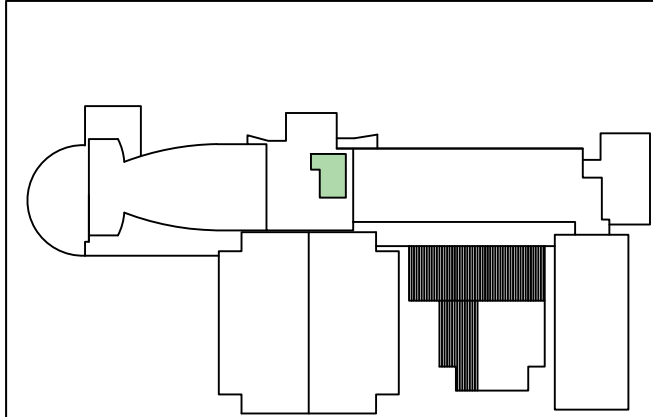
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PHOTO MAP

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DATE:	03/02/2022
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PV 1.5



String	Modules	Optimizers
1	13	13
2	14	14

Part List	
Item	Quantity
Ballast Block	107
RM5 Bay	52
RM5 Wind Deflector	27
Kit, Wind Deflector Attachment	94
EM End Clamp 32–40mm	183
Kit 1/2 20 Clip on Nut SS 18–8	277
Sunrunner Wire Clip S6445	108
Sunrunner Wire Clip S6476	54

TAG NOTES/KEY:

1 Wire management shall be neat and professional. No wires shall be laying on roof surfaces.

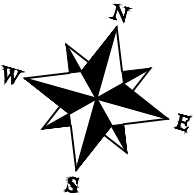
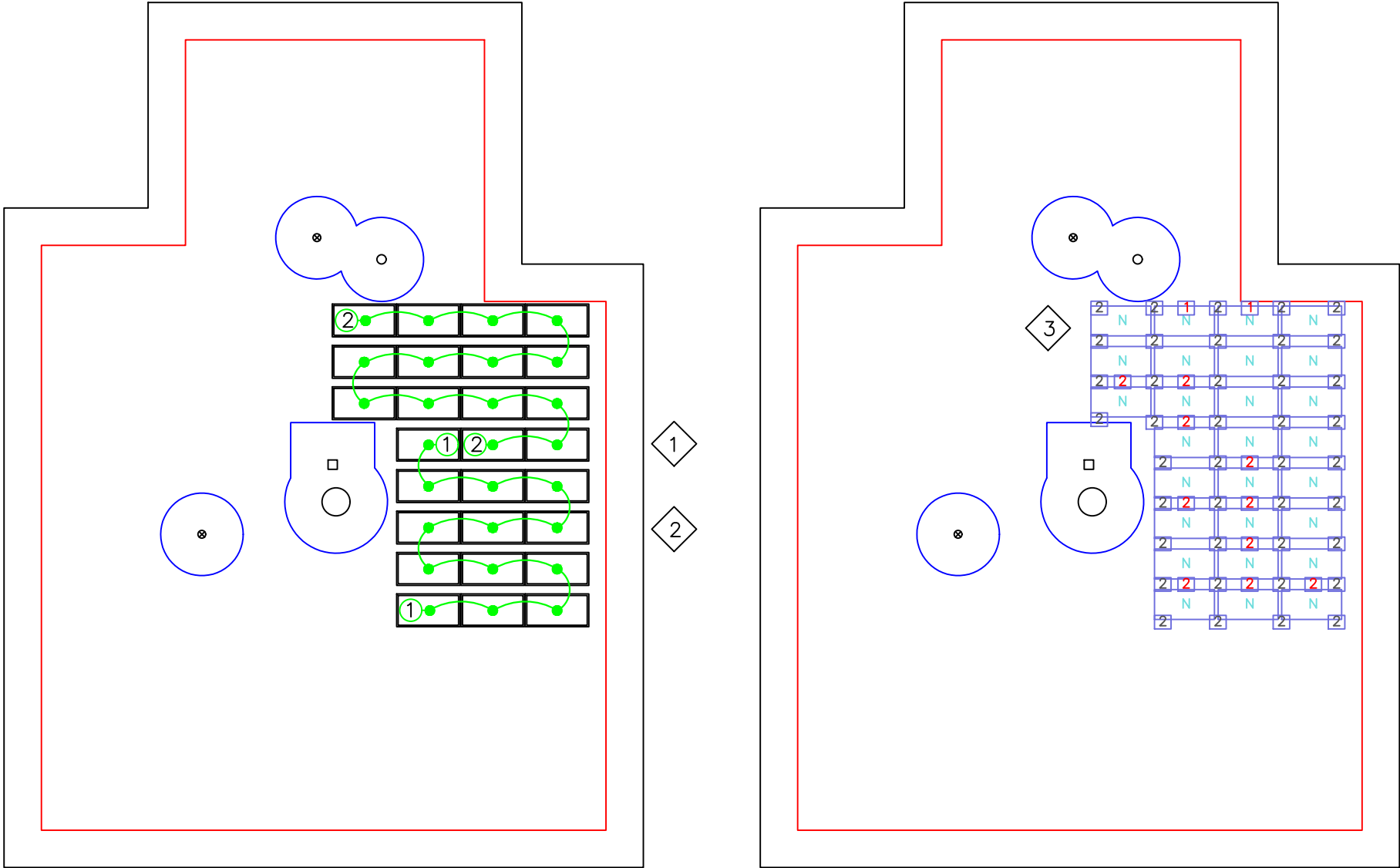
2 Should strings change or run differently be sure to create as built drawings and give to BID manager.

3 Ballast block shall be laid according to Unirac ballast plan. Contractor shall not deviate from ballast plan.

Denotes the number of ballast block in the RM5 ballast pan.

N N signifies that a wind deflector must be installed on the North side of panel.

Torque Specifications – Ground Lug			Torque Specifications – RM5	
Ground Lug	Bolt Size	Torque Value	Item	Torque Value
Ilisco Lug SGB-4	1/4"–20	6.5 ft–lbs	End Clamp	7 ft–lbs
Ilisco Lug GBL-4	#10–32	2.9 ft–lbs		
Wiley 6.7	1/4"–20	10 ft–lbs	Wind Deflector Attachment Kit	10 ft–lbs



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Henderson, KY 42420

BALLAST AND STRINGS

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
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Building Height is ~16'

PV 1.6

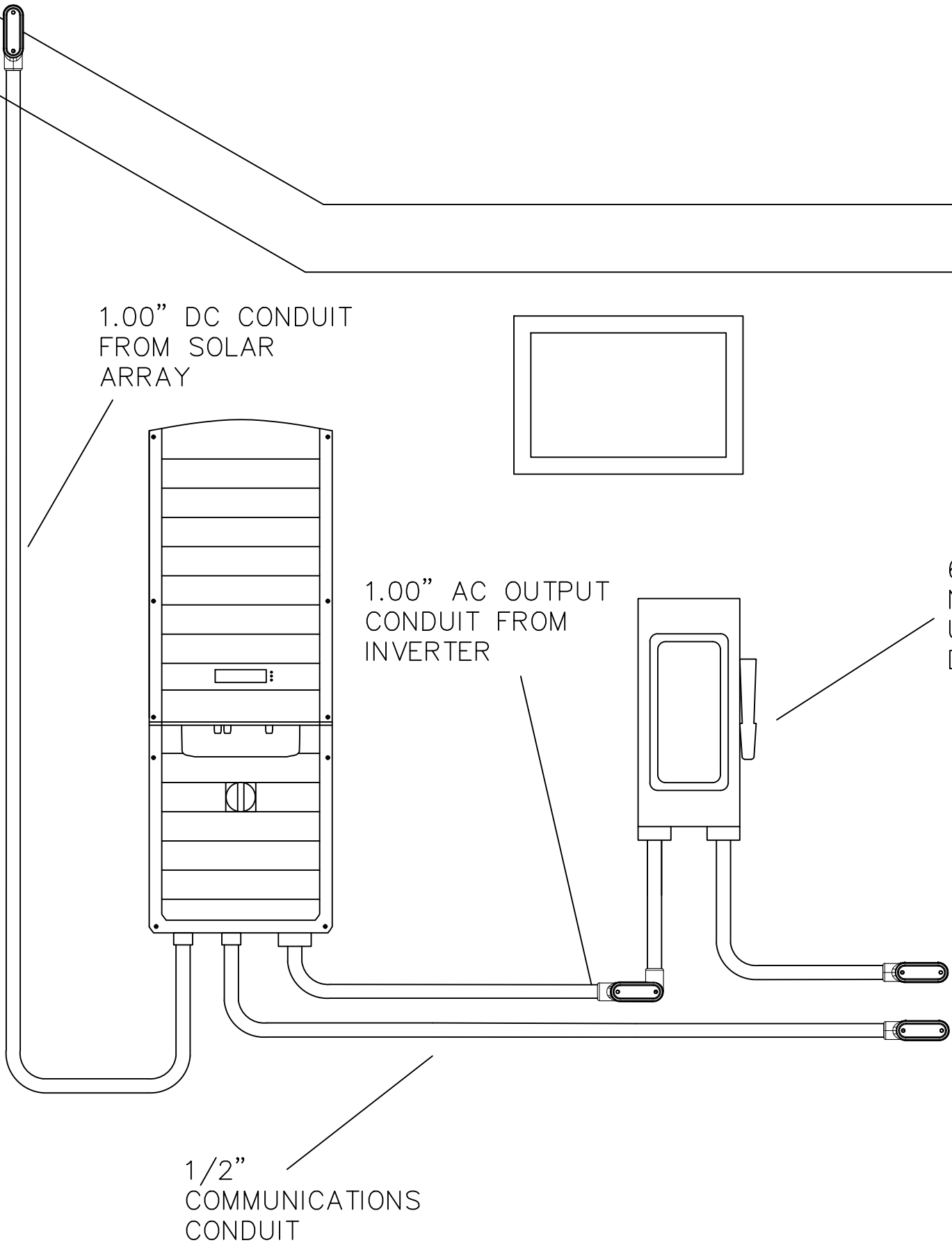
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UAD AND INVERTER RISER

CLIENT/CMTA JOB #:	2H22
DATE:	03/02/2022
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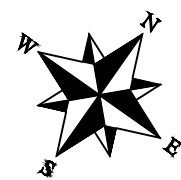
E 1.0



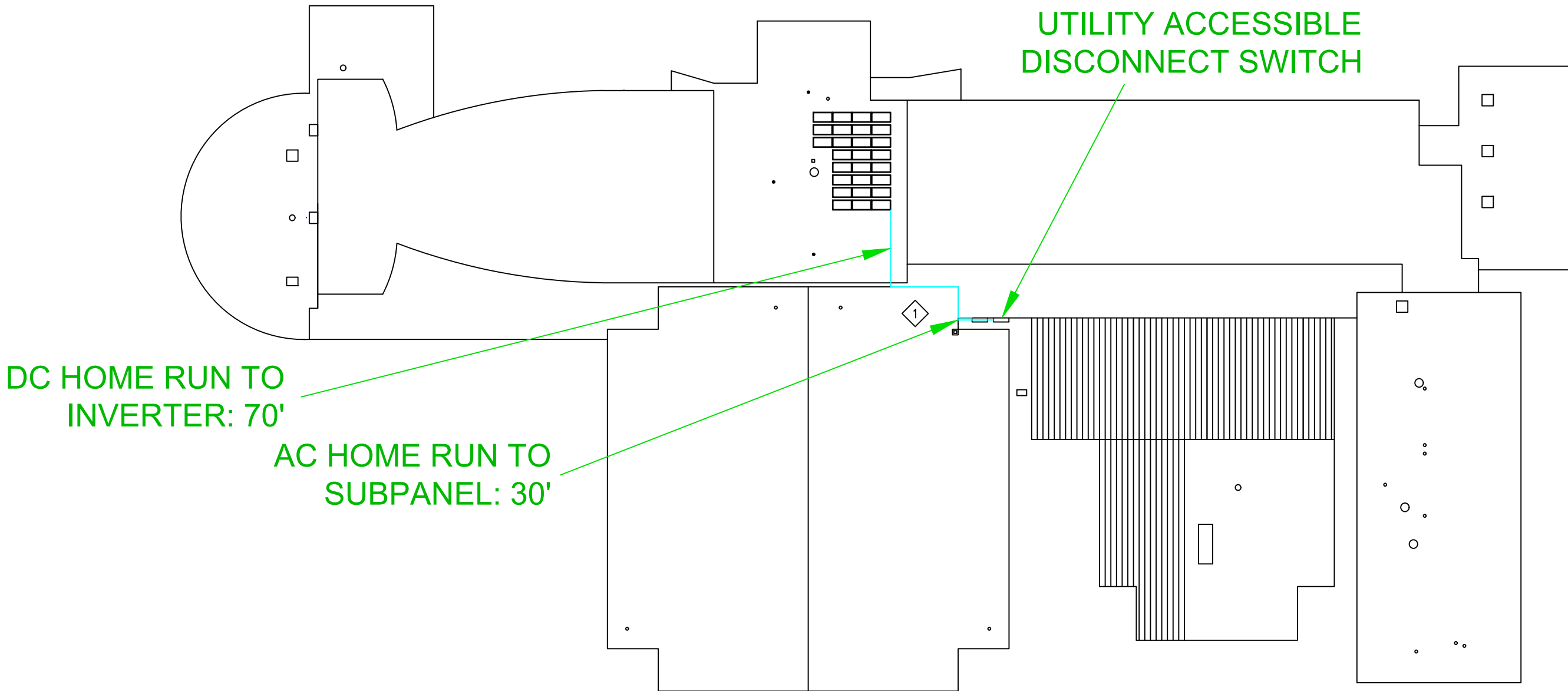
TAG NOTES/KEY:

1

AC HOMERUN TO MDP PENETRATES WALL AND CONTINUES INSIDE OF ELECTRICAL ROOM



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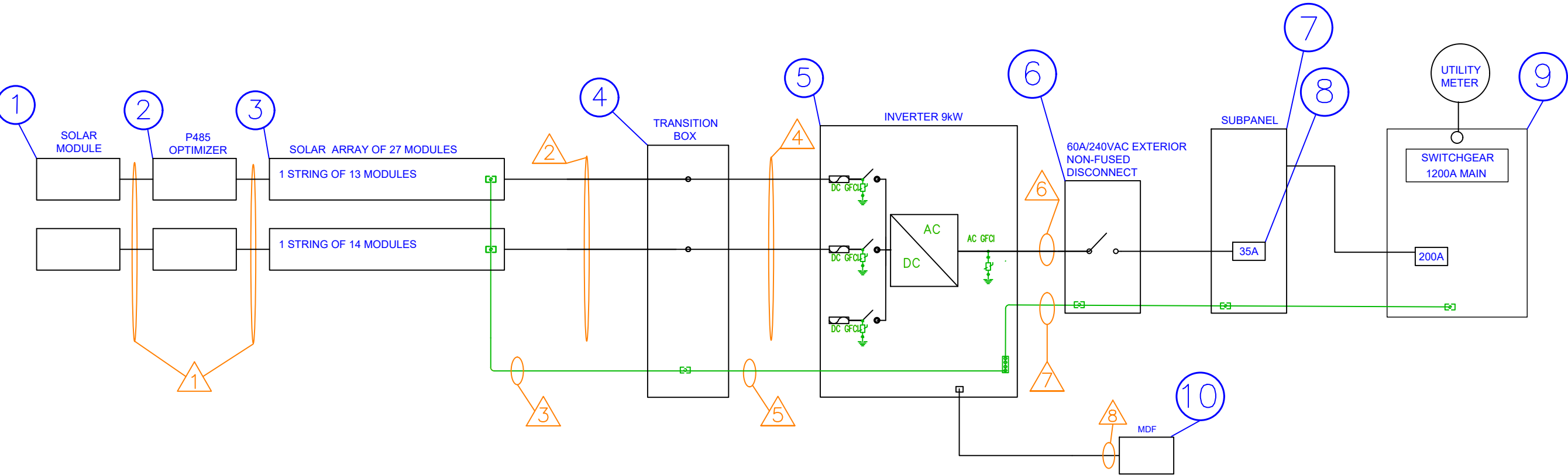
EXTERIOR CONDUIT PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
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ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



Equipment Schedule				
Tag	Description	Quantity	Part Number	Notes
1	Solar PV Module	27	SPR-E20-435-COM	SunPower 435W Commercial Solar Module
2	Solar PV Optimizer	27	P485	SolarEdge Power Optimizer
3	Solar Array	1		27 Solar Modules in 2 strings
4	Junction Box	1		Soltection Transition Box 1000 Nema 3R
5	Inverter	1	SE9KUS	SolarEdge 9kW Three Phase 208V Commercial Inverter
6	Utility Accessible Disconnect Switch	1	SquareD	Unfused 60A/240V SquareD NEMA 3R Disconnect 3PH
7	Subpanel	1	SquareD	200A/208V SquareD Sub Panel w/200A Main
8	35A SquareD Breaker	1	SquareD	35A Three Phase Breaker
9	Main Distribution Panel	1	SquareD	1200A/208V SquareD Switchboard w/1200A Main
10	Main Distribution Frame	1		Main Server Rack for Building

Conductor and Raceway Schedule					
Tag	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size
1	USE-2 (MFG Cables & Connectors)	12 CU	4	FREE AIR	N/A
2	PV Wire	10 CU	4	RAY TRAY	N/A
3	Bare Copper Equipment Ground (EGC)	6 CU	1	RAY TRAY	N/A
4	THHN 600V	10 CU	4	EMT	1.00"
5	THHN-Ground	6 CU	1	EMT	1.00"
6	THWN-2 600V	8 CU	4	EMT	1.00"
7	THWN-Ground	6 CU	1	EMT	1.00"
8	CAT6 Plenum	24 CU	1	EMT	0.50"

CLIENT/OMTA JOB #:	ZHC22
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A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.

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

⚠ WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT
WHEN SOLAR MODULES
ARE EXPOSED TO SUNLIGHT

C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.

⚠ WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION
DC VOLTAGE IS ALWAYS PRESENT
WHEN SOLAR MODULES
ARE EXPOSED TO SUNLIGHT

RATED MAX POWERPOINT CURRENT
RATED MAX POWERPOINT VOLTAGE
MAXIMUM SYSTEM VOLTAGE
MAXIMUM CIRCUIT CURRENT
MAX RATED OUTPUT CURRENT OF
THE CHARGE CONTROLLER IF INSTALLED

SOLAR DISCONNECT

**PHOTOVOLTAIC
DC DISCONNECT**

D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2

**WARNING: PHOTOVOLTAIC
POWER SOURCE**

E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.

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

F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

**PHOTOVOLTAIC
AC DISCONNECT**

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

**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT
NOMINAL OPERATING AC VOLTAGE

F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.

**PHOTOVOLTAIC
AC DISCONNECT**

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

**MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT**

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT
NOMINAL OPERATING AC VOLTAGE

G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

⚠ CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT
NOMINAL OPERATING AC VOLTAGE

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

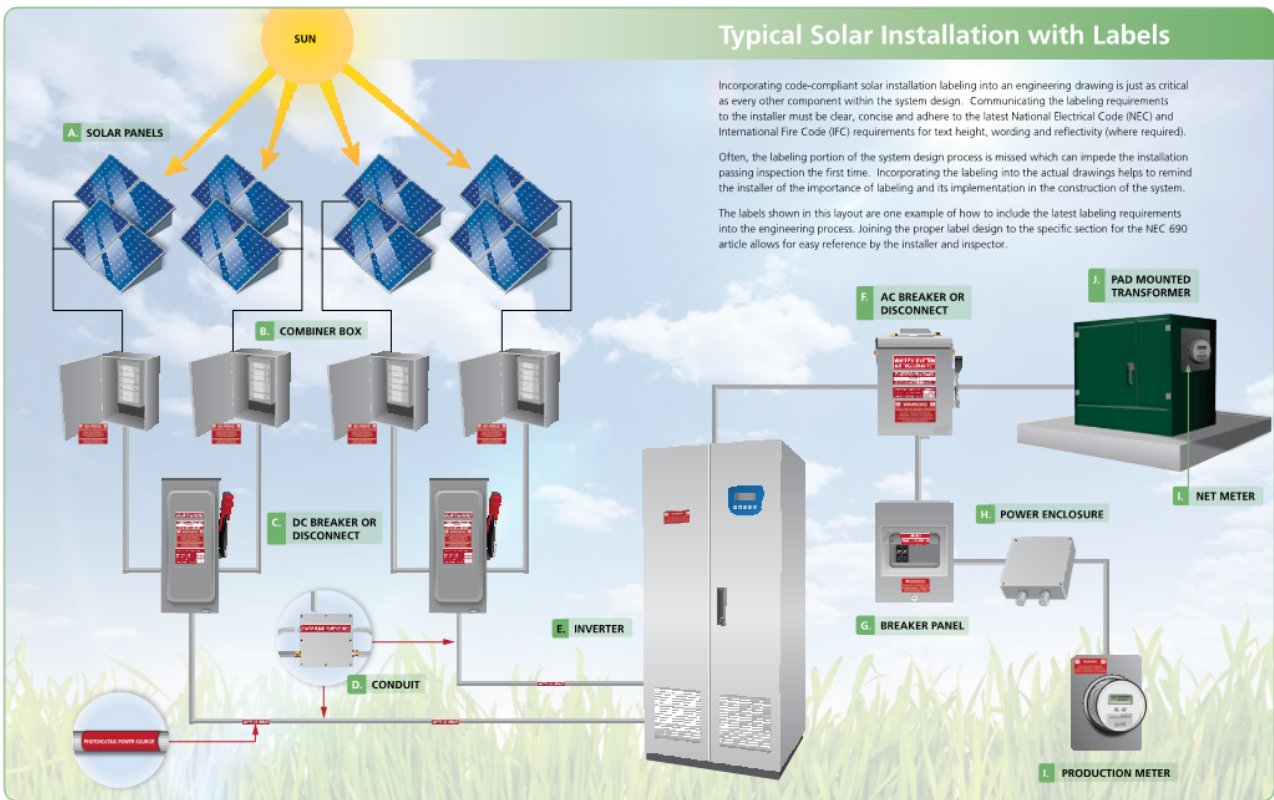
⚠ WARNING
TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.

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

J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.



South Middle School
Henderson County Schools
800 S Alves St
Henderson, KY 42420

CLIENT/CMTA JOB #:	ZHC22
DATE:	03/02/2022
DRAWN:	KC
CHECKED:	KK

REVISIONS
1. Bidding 3/3/2022



SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

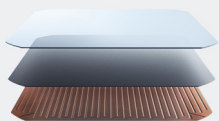
Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



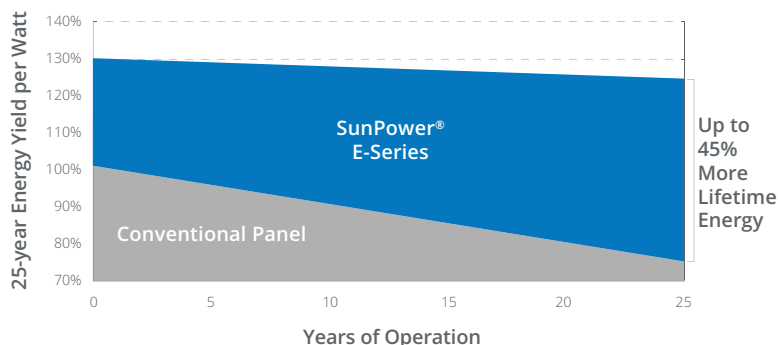
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



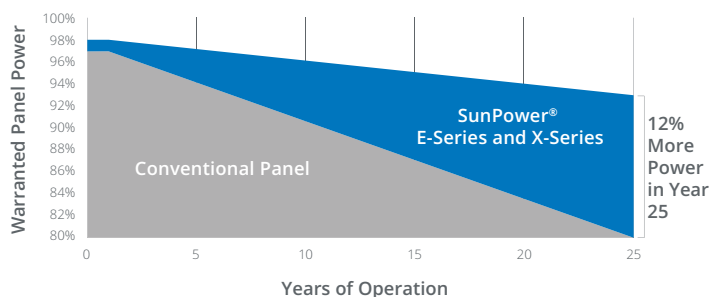
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.



E-Series: E20-435-COM SunPower® Commercial DC Panel

Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 mA / °C

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	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC

1 SunPower 327 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), 0.75%/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.

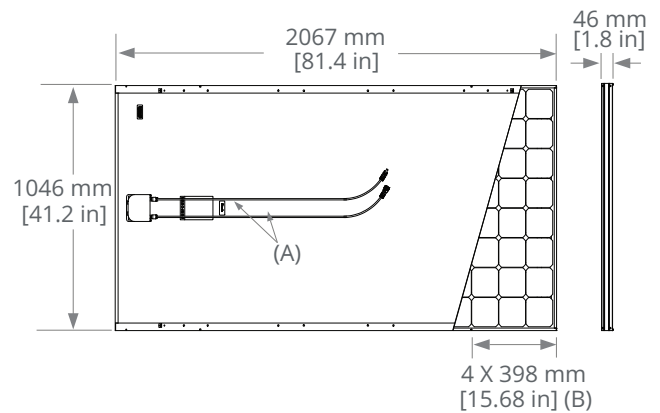
8 Type 2 fire rating per UL1703:2013, Class C fire rating per UL1703:2002.

See www.sunpower.com/company for more reference information.

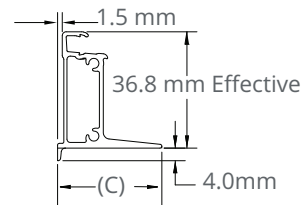
For more details, see extended datasheet: www.sunpower.com/solar-resources. Specifications included in this datasheet are subject to change without notice.

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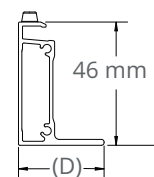
Operating Condition And Mechanical Data	
Temperature	-40° F to +185° F (-40° C to +85° C)
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)
Appearance	Class A
Solar Cells	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/-10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 120/208V Grid for North America

SE9KUS / SE14.4KUS



12-20
YEAR
WARRANTY

INVERTERS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Built-in module-level monitoring
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- Internet connection through Ethernet or Wireless
- Integrated Safety Switch
- Fixed voltage inverter for longer strings
- Supplied with RS485 Surge Protection, to better withstand lightning events
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install outdoors or indoors on provided bracket

/ Three Phase Inverters for the 120/208V Grid⁽¹⁾ for North America

SE9KUS / SE14.4KUS

	SE9KUS		SE14.4KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXK-XXX(XBXX4			
OUTPUT				
Rated AC Power Output	9000		14400	VA
Maximum AC Power Output	9000		14400	VA
Output Line Connections	3 phase, 3-wire / PE (L1-L2-L3), TN, TT 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT			
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)	105-120-132.5			Vac
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)	183-208-229			Vac
AC Frequency Min-Nom-Max ⁽²⁾	59.3 - 60 - 60.5			Hz
x. Continuous Output Current (per Phase)	25		40	A
GFDI Threshold	1			A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes			
THD	≤ 3			%
INPUT				
Maximum DC Power (Module STC)	12150		19400	W
Transformer-less, Ungrounded	Yes			
Maximum Input Voltage DC to Gnd	250		300	Vdc
Maximum Input Voltage DC+ to DC-	500		600	Vdc
Nominal Input Voltage DC to Gnd	200			Vdc
Nominal Input Voltage DC+ to DC-	400			Vdc
Maximum Input Current	26.5		38	Adc
Maximum Input Short Circuit Current	45			Adc
Reverse-Polarity Protection	Yes			
Ground-Fault Isolation Detection	1MΩ Sensitivity		350kΩ Sensitivity ⁽³⁾	
CEC Weighted Efficiency	96.5		97	%
Night-time Power Consumption	< 3		< 4	W
ADDITIONAL FEATURES				
Supported Communication Interfaces	RS485, Ethernet, Built-in GSM (Optional)			
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi access point for local connection			
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect			
RS485 Surge Protection	Supplied with the inverter			
Smart Energy Management	Export Limitation			
STANDARD COMPLIANCE				
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07			
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)			
Emissions	FCC part15 class B			
INSTALLATION SPECIFICATIONS				
AC output conduit size / AWG range	3/4" minimum / 8-4 AWG			
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG			
Number of DC inputs	3 pairs ⁽⁴⁾			
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260			in / mm
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260			in / mm
Weight	99.5 / 45			lb / kg
Weight with Safety Switch	106 / 48			lb / kg
Cooling	Fans (user replaceable)			
Noise	< 55			dBA
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁵⁾			°F / °C
Protection Rating	NEMA 3R			

(1) For 277/480V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-277-480v-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(5) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

Power Optimizer

P370 / P401 / P404 / P405 / P485 / P500 / P505

POWER OPTIMIZER



PV power optimization at the module level

- Specifically designed to work with SolarEdge inverters
- Superior efficiency (99.5%)
- Up to 25% more energy
- Flexible system design for maximum space utilization
- Next generation maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Mitigates all types of modules mismatch-loss, from manufacturing tolerance to partial shading
- Fast installation with a single bolt

/ Power Optimizer

P370 / P401 / P404 / P405 / P485 / P500 / P505

OPTIMIZER MODEL (typical module compatibility)	P370 (60/72 Cell modules)	P401 (For high power 60/72-cell modules)	P404 (for 60/72- cell short strings)	P405 (for high-voltage modules)	P485 (for high-voltage modules)	P500 (for 96-cell modules)	P505 (for higher current modules)	UNIT
INPUT								
Rated Input DC Power ⁽¹⁾	370	400	405	405	485	500	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	60		80	125		80	83	Vdc
MPPT Operating Range	8 - 60		12.5 - 80	12.5 - 105		8 - 80	12.5-83	Vdc
Maximum Short Circuit Current (Isc)	11	11.75	11			10.1	14	Adc
Maximum Efficiency	99.5							%
Weighted Efficiency	98.8							%
Overvoltage Category	II							
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)								
Maximum Output Current	15							Adc
Maximum Output Voltage	60		85			60	85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)								
Safety Output Voltage per Power Optimizer	1 ± 0.1							Vdc
STANDARD COMPLIANCE								
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3							
Safety	IEC62109-1 (class II safety), UL1741							
RoHS	Yes							
Fire Safety	VDE-AR-E 2100-712:2013-05							
INSTALLATION SPECIFICATIONS								
Maximum Allowed System Voltage	1000							Vdc
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x29.5 / 5.08 x6.02 x 1.16	129 x 89 x 42.5 / 5.1 x 3.5 x 1.7	129 x 90 x 49.5 / 5.1 x 3.5 x 1.9		129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	655 / 1.5		775 / 1.7	845 / 1.9		750 / 1.7	1064 / 2.3	gr / lb
Input Connector	MC4 ⁽²⁾				Single or Dual MC4 ⁽²⁾⁽³⁾	MC4 ⁽²⁾		
Input Wire Length	0.16 / 0.52							m / ft
Output Connector	MC4							
Output Wire Length	1.2 / 3.9							m / ft
Operating Temperature Range	-40 - +85 / -40 - +185							°C / °F
Protection Rating	IP68							
Relative Humidity	0 - 100							%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.

(2) For other connector types please contact SolarEdge.

(3) For dual version for parallel connection of two modules use the P485. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module is supported. When connecting a single module, seal the unused input connectors using the supplied pair of seals.

PV SYSTEM DESIGN USING A SOLAREGE INVERTER ⁽⁴⁾⁽⁵⁾		SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE	THREE PHASE FOR 277/480V GRID	
Minimum String Length (Power Optimizers)	P370, P401, P500 ⁽⁶⁾	8		16	18	
	P404, P405, P485, P505	6		14 (13 with SE3K ⁽⁷⁾)	14	
Maximum String Length (Power Optimizers)		25		50	50	
Maximum Power per String		5700	5250	11250 ⁽⁸⁾	12750 ⁽⁹⁾	W
Parallel Strings of Different Lengths or Orientations		Yes				

(4) It is not allowed to mix P404/P405/P485/P505 with P370/P401/P500/P600/P650/P730/P801/P800p/P850/P950 in one string.

(5) For SE15k and above, the minimum DC power should be 11KW.

(6) The P370/P401/P500 cannot be used with the SE3K three phase inverter (available in some countries; refer to the three phase inverter SE3K-SE10K datasheet).

(7) Exactly 10 when using SE3K-RW010BNN4

(8) For the 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W.

(9) For the 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

ROOFMOUNT | RM5

SOUTH FACING 5 DEGREE TILT



BETTER SOLAR STARTS HERE

OPTIMIZE ARRAY LAYOUT

MAXIMUM LAYOUT FLEXIBILITY WITH TWO ROW SPACING OPTIONS

5 Degree Tilt with 7" / 11" Row Spacing Options

Set, Then Clamp Feature, Provides Better Construction Sequencing for Rapid Installation

Simplified Wire Management, with Two (2) Optional Unirac Clips

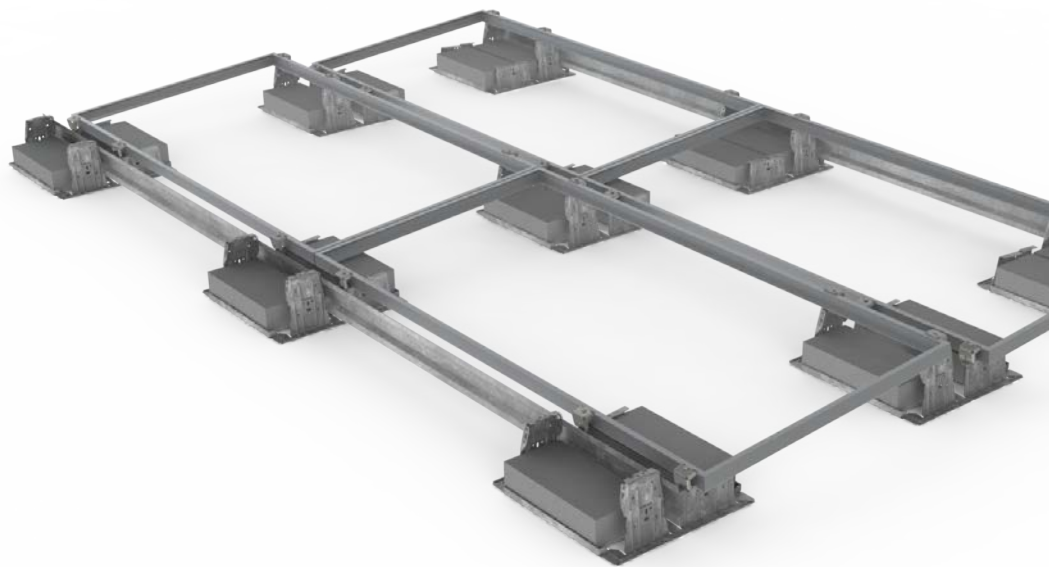
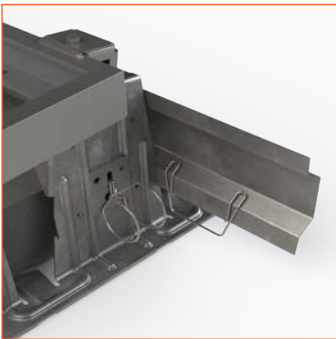
Wind Deflector for Ballast Reduction & Fire Mitigation

Optional Roof Attachment Meets a Variety of Project Requirements

MPL Mount with Engage Trunk Cable Wire Management Clip

G235 Steel - Double the Corrosion Protection of other Industry Products

Compact Packaging - Up to 1 MW / Truck



GENERATE LAYOUTS IN MINUTES WITH U-BUILDER ON-LINE DESIGN TOOL

HelioScope Integration • Google & Bing Maps • Ballast Distribution Maps • Site Specific Engineering Reports • Layout Multiple Arrays per Project • CAD Downloads

INDUSTRY LEADING PROJECT SUPPORT

UNIRAC's Team of Technical Experts & Professional Engineers is Your Partner Through Design, Engineering, Permitting and Installation.

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FASTEST DELIVERY IN THE INDUSTRY

In Stock & Ready to Ship From North America's Largest Flat Roof Distribution Network.

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MAXIMIZE PROFITABILITY AT EVERY STEP

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

HIT A
HOME RUN
WITH

RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

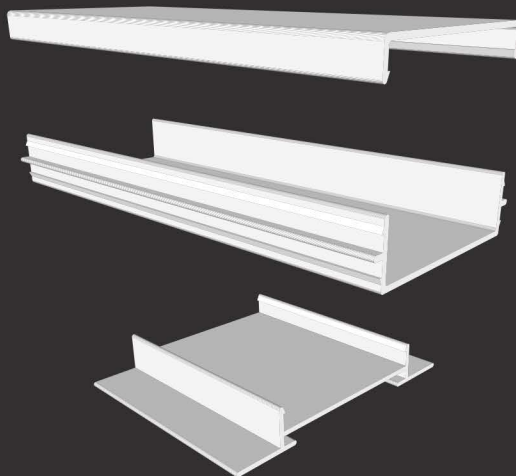
CAP

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TRAY

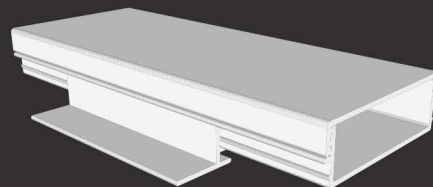
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BASE



=

RAYTRAYTM
SOLAR WIRE MANAGEMENT SYSTEM



RayTrayTM
info@raytraysolar.com
www.raytraysolar.com



Conforms to UL Std 870
Control No. 4009754

RAYTRAY™ v2

SOLAR WIRE MANAGEMENT SYSTEM

RayTray™ is a protective enclosure manufactured with a durable RPVC polymer to ensure a neat and comprehensive routing method for jumper, home run, and equipment-grounding conductor cables.

RayTray™ is the product of a collaborative effort between solar installers and electrical, structural, and polymer engineers. The result is a wire management system that is simple, durable, cost effective, and ETL listed for use in PV arrays.

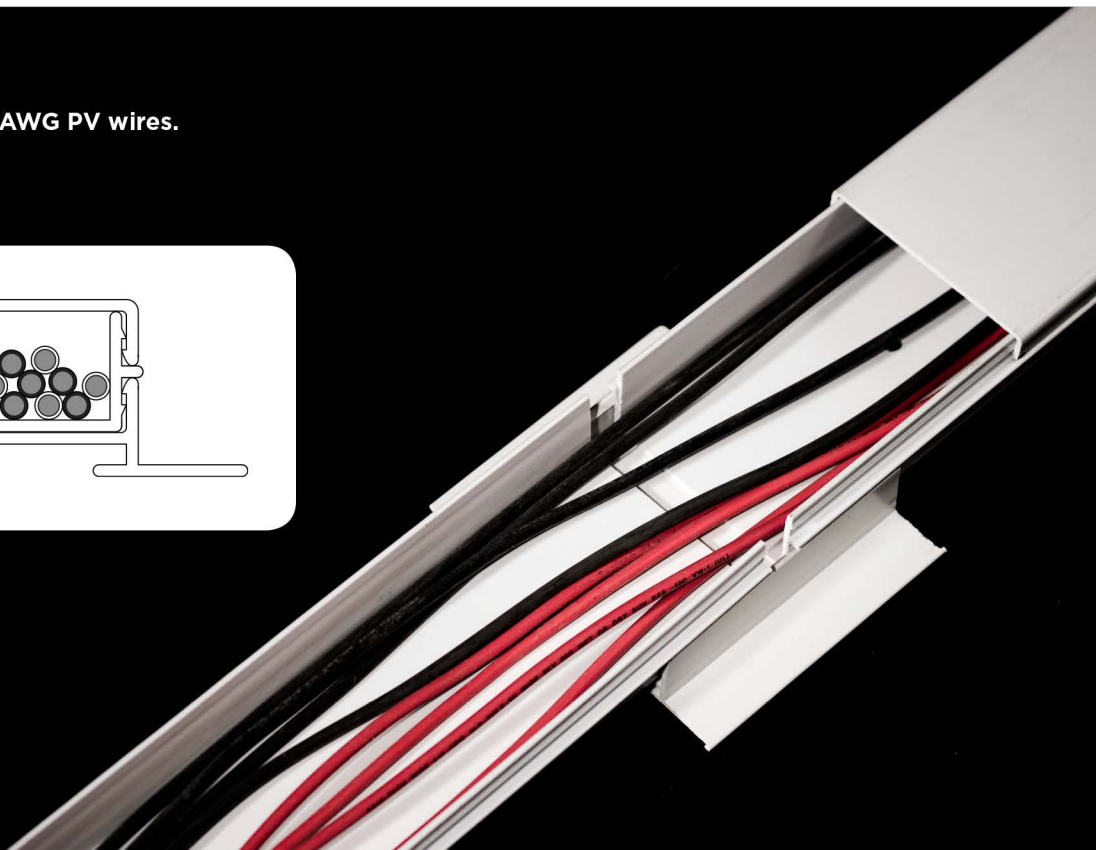
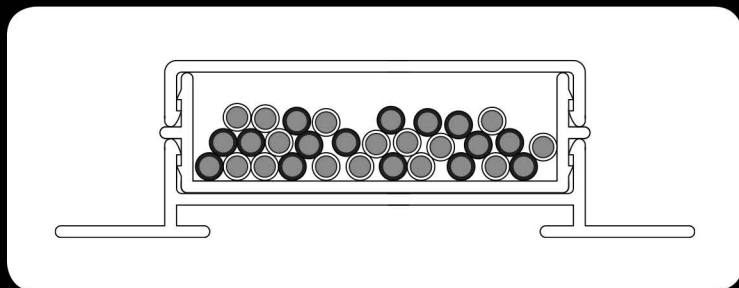
RayTray™ is

- Simple and easy to install
- Durable and UV resistant
- Low Cost
- Versatile
- ETL listed to UL 870 Standard
- Made in the USA

RAYTRAY™ SPECIFICATIONS

Product	Solar Wire Management System
Material	Non-metallic RPVC polymer. UV rating: F1
Listing	ETL Intertek conforms to UL Std 870. Voltage rating: 1000 VDC
Installation	Flat roofs with pitch < 8 degrees. Standing seam metal roofs
Internal Wiring	Maximum of thirty #10 AWG wires/tray. RHW, USE, or PV wire. Maximum wire size: #6 AWG
Grounding	Non-metallic RPVC polymer requires no grounding
Material Dimensions	Overall height: 2", width: 8", length of tray and cap: 8', length of base: 6"
Maximum Support Interval	4'3"
Warranty	25-year warranty against defects in materials and workmanship

RayTray™ is rated to hold thirty #10 AWG PV wires.
Maximum wire size is #6 AWG.



CONNECTING THE COMPONENTS

SNAP AND CONNECT



Assembling RayTray™ is easier than connecting modules in a string. Snap a RayTray™ base onto one end of a tray; add a base in the middle of the tray, and another at the opposite end. Be sure to leave a one-inch gap between sections of tray to allow for expansion and contraction. Keep the base between tray sections fixed in place by inserting a rivet into one side of the tray.

CAP AND PROTECT

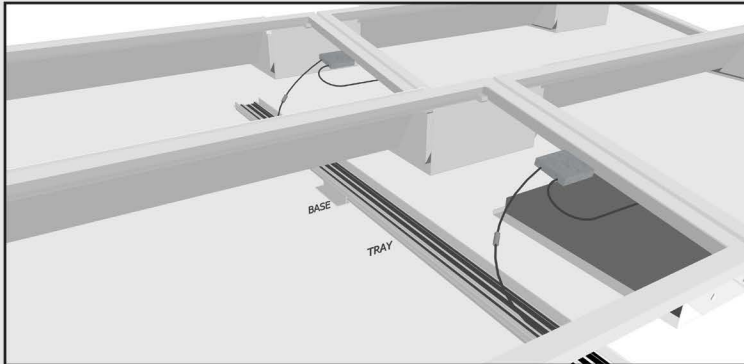


Once your home runs are in place, snap on the cap. The cap should span the gap left for expansion by at least six inches.

AN EASY CHANGE IN DIRECTION

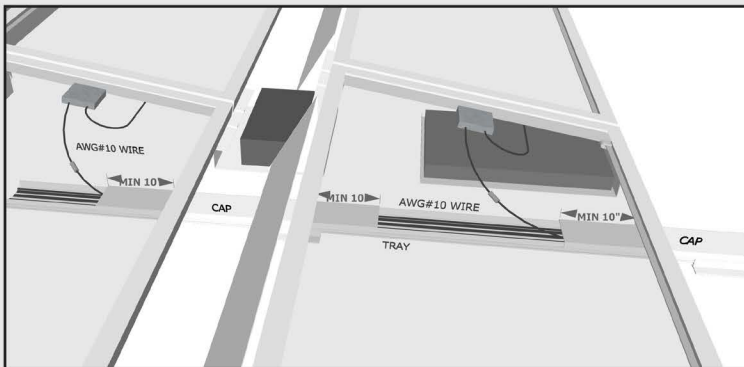


Most runs will go in one direction. But when you need to change direction, RayTray™ can accommodate. RayTray™ is cut easily with a hacksaw or a reciprocating saw. Make some simple cuts, insert a plastic rivet, and you will have a secure and stable T-fitting or elbow. A file or deburring tool quickly gets rid of sharp edges.



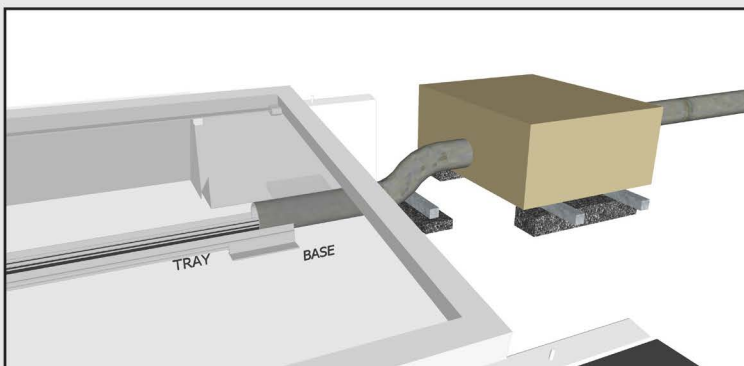
KEEP THOSE HOME RUNS IN LINE

RayTray™ keeps your home runs organized, secure, and protected. No more worries about home runs getting stepped on or rubbing and abrading on racking. Simply pick your route, snap together your RayTray™ trays and base supports, slide under the array, and drop in your home runs. Alternatively, lay the RayTray™ out and drop in your home runs before the modules are installed. Array cabling is neat and organized. Your crew will thank you. Your inspector will be pleased. And your client will be thrilled at how professional everything looks.



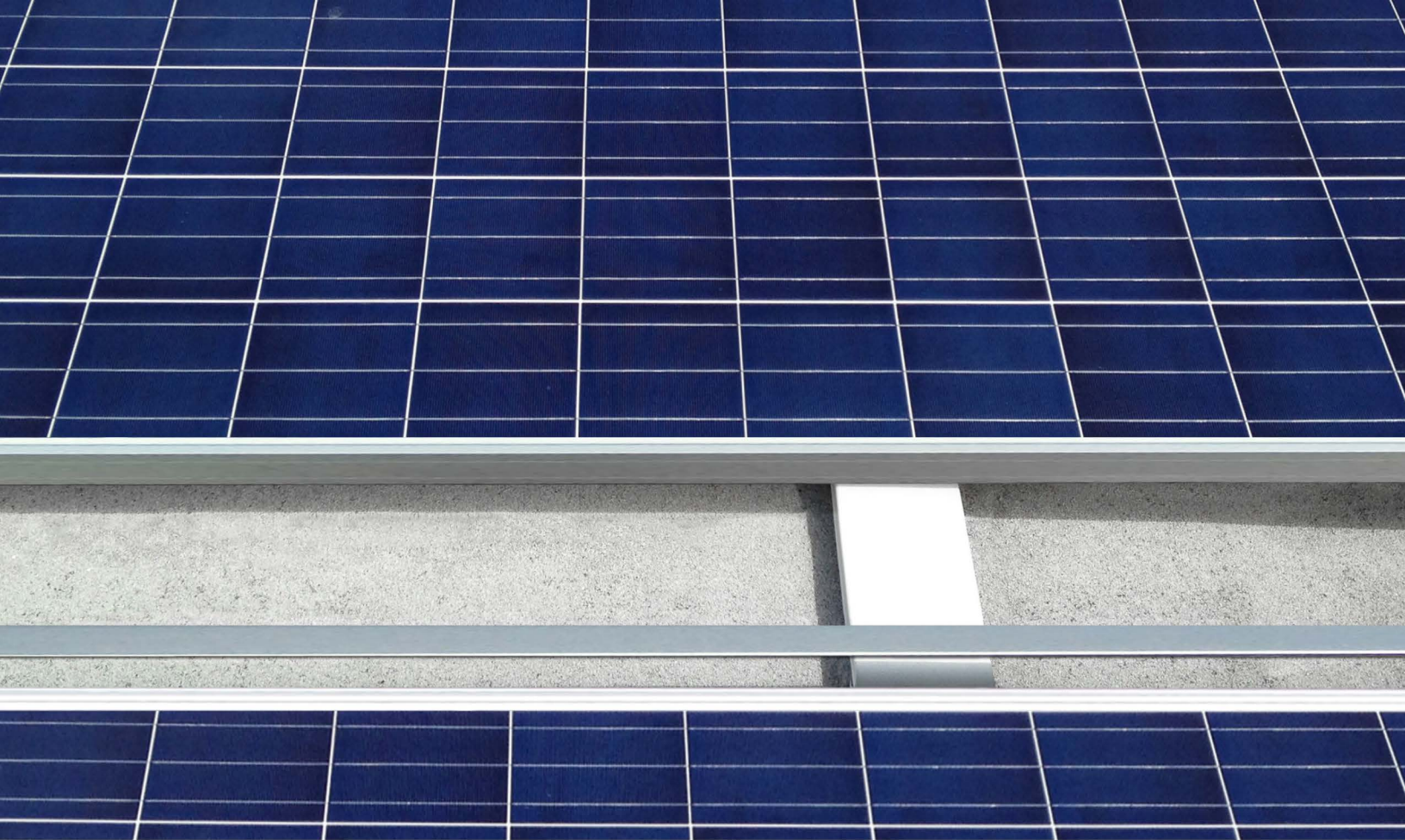
PROTECTION ENHANCED

Your home runs are in, your connections are made, and now you want to protect the wires and tidy things up. If you begin with RayTray™, you're already there. No unsightly bundles. No haphazard wires. Organize as you build. When the build is done and tested, finish up by snapping on the protective caps, which will not only protect and enhance your work but also prolong the life of your client's investment.



A STELLAR TRANSITION

You have been there before and you're not excited about being there again. Use RayTray™ to organize the chaos. Aggregate your home runs into RayTray™ and they're ready to transition into pipe when you are. Home runs will be organized and accessible.



RAYTRAYTM v2

SOLAR WIRE MANAGEMENT SYSTEM

info@raytraysolar.com

RayTrayTM

Sunlight resistant wire management system

Cables permitted: RHW, USE, PV

Max wire size: AWG #6

Max support interval: 4'-3"

Consult manufacturer for proper installation



Intertek

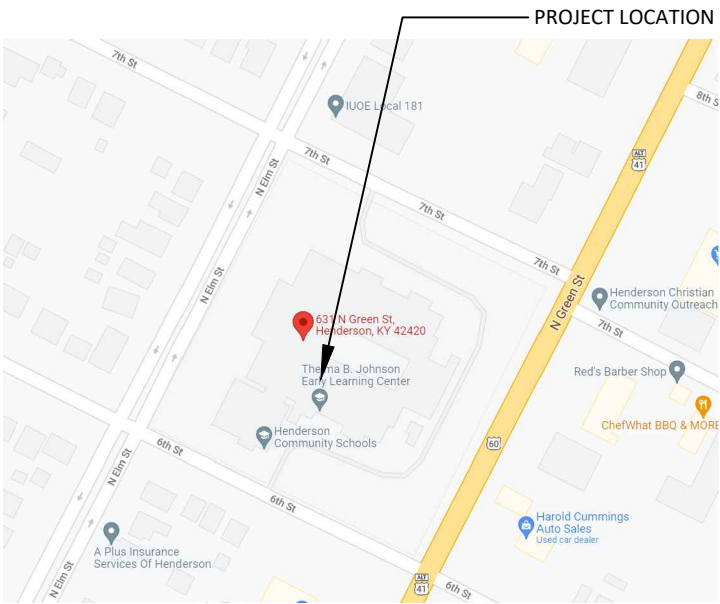
Conforms to UL Std 870
Control No. 4009754



Made in the U.S.A.

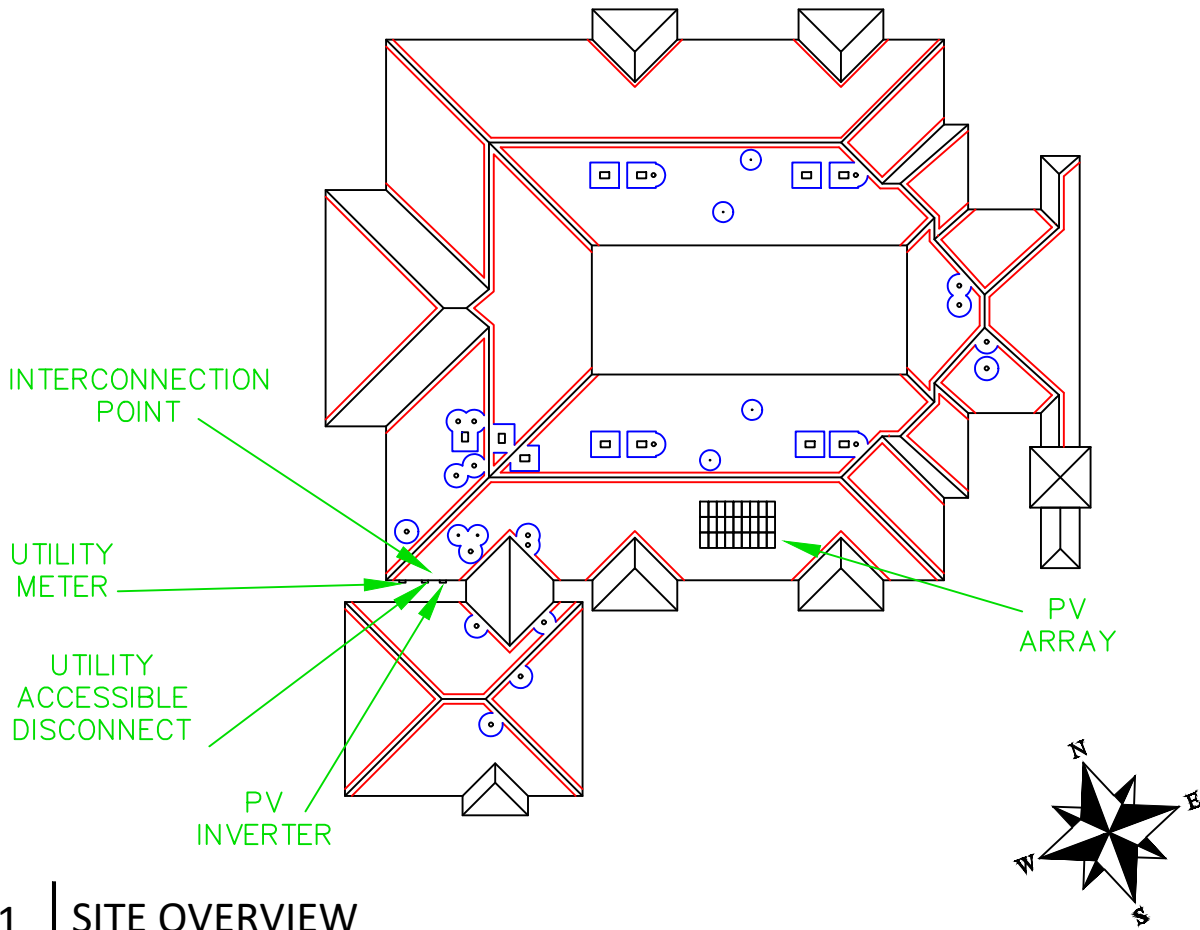
WWW.RAYTRAYSOLAR.COM

11.745kW DC PHOTOVOLTAIC
PITCHED ROOF SYSTEM
FOR
HENDERSON COUNTY SCHOOLS
GUARANTEED ENERGY SAVINGS CONTRACT



3 VICINTY MAP

SCALE: NTS



1 SITE OVERVIEW



2 ROOFTOP VIEW OF SITE

INDEX



SHEET # SHEET TITLE	
PV1.0	COVER SHEET
PV1.1	GENERAL NOTES
PV1.2	SITE PLAN
PV1.3	PLOT PLAN
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PV1.6	BALLAST & STRINGS
E1.0	UAD & INVERTER RISER
E1.1	EXTERIOR CONDUIT PLAN
E1.2	SINGLE LINE DIAGRAM
E1.3	SAFETY PLACARDS & SIGNAGE
NONE	EQUIPMENT CUTSHEETS

BID
DOCUMENTS

Theima B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

COVER SHEET

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS	
1.	BIDDING 3/3/2022

PV1.0

GENERAL NOTES:

1. EACH CONTRACTOR, PROPOSER, SUPPLIER AND/ OR MANUFACTURER SHALL REFER TO ALL DOCUMENTS PERTAINING TO THIS PROJECT AND COORDINATE ACCORDINGLY SO AS TO ENSURE ADEQUACY OF FIT, COMPLIANCE WITH SPECIFICATIONS, PROPER VOLTAGE AND CURRENT CHARACTERISTICS TO AVOID CONFLICT WITH ANY OTHER BUILDINGS SYSTEMS. VERIFY SAME WITH SHOP DRAWINGS.
2. ALL OFFSETS, TURNS, FITTINGS, TRIM , DETAIL ECT. MAY NOT BE INDICATED, BUT SHALL BE PROVIDED AS REQUIRED. ADDITIONAL ALLOWANCES SHALL BE INCLUDED FOR SAME AT EACH PROPOSERS DISCRETION.
3. INSTALL NO CONDUIT, ECT. IN A LOCATION OR IN A MANNER WHICH WILL ALLOW FREEZING AND THE COLLECTION OF CONDENSATION THEREON. IF IN DOUBT, CONTACT THE ENGINEERS.
4. ADVISE THE ENGINEERS OF ANY CONFLICTS, ERRORS, OR EMISSIONS, ECT. AT LEAST 10 DAYS PRIOR TO BID DATE, TO ALLOW CLARIFICATION BY WRITTEN ADDENDUM.
5. DEVIATION FROM SPECIFICATIONS OR PLANS REQUIRES PRIOR WRITTEN APPROVAL FROM THE ENGINEERS AND MUST BE SUBMITTED IN WRITING NO LATER THAN TEN DAYS PRIOR TO THE BID DATE.
6. OBSERVE ALL APPLICABLE CODES, RULES AND REGULATIONS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT. (CITY, COUNTY, LOCAL, STATE, FEDERAL, MUNICIPALITY, UTILITY COMPANY, OSHA ECT.).
7. INSTALL EQUIPMENT, MATERIALS, ET. IN STRICT ACCORD WITH MANUFACTURERS RECOMMENDATIONS AND DIRECTIONS. IF IN CONFLICT WITH THE DESIGN INDICATED IN CONTRACT DOCUMENTS, ADVISE THE ENGINEER PRIOR TO INSTALLATION FOR CLARIFICATION.
8. DO NOT RECESS PANEL BOARD TUBS OR OTHER FLUSH-MOUNTED EQUIPMENT IN WALLS THAT HAVE A FIRE RATING, AS REQUIRED BY CODES. NO INSTALLATION SHALL DIMINISH OR VOID FIRE RESISTIVE RATINGS IN ANYWAY.
9. THE PURPOSE AND INTENT OF ALL OF THE DOCUMENTS PERTAINING TO THIS PROJECT IS TO PROVIDE A COMPLETE, FUNCTIONAL, SAFE, LIKE-NEW FACILITY. ANYTHING LESS SHALL BE UNACCEPTABLE.
10. ALL SYSTEMS, EQUIPMENT AND MATERIALS ARE TO BE INSTALLED IN A NEAT AND WORKMANLIKE MANNER. WORK NOT MEETING THIS CRITERION SHALL BE REMOVED AND REINSTALLED SATISFACTORILY. FINAL DETERMINATION OF THE ACCEPTABILITY OF THE QUALITY OF WORK RESIDES WITH THE ENGINEER.
11. ALL WORK, MATERIALS, EQUIPMENT, ECT. SHALL BE FULLY GUARANTEED FOR ONE FULL CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AS DOCUMENTED BY THE ENGINEER, UNLESS LONGER WARRANTY PERIODS FOR EQUIPMENT ARE SPECIFIED.
12. UNLESS OTHERWISE SPECIFIED OR INDICATED, ALL EQUIPMENT AND/OR MATERIALS WITHIN OCCUPIED SPACES OR EXPOSED TO VIEW ON THE BUILDING EXTERIOR SHALL BE PRIMED AND FINISHED SO AS TO COMPLEMENT ADJACENT SURFACE, UNLESS OTHERWISE NOTED. COORDINATE WORK AND COLORS WITH OWNER REPRESENTATIVE.
13. WHERE PENETRATING EXISTING ROOFING MEMBRANE OR OTHER MATERIALS USED FOR WEATHER PROOFING THE BUILDING, MAKE SUCH PENETRATION IN A WAY THAT WILL NOT DIMINISH THE ROOFING WARRANTY OR INTEGRITY IN ANYWAY. COORDINATE ALL SUCH PENETRATIONS WITH THE ROOFING MANUFACTURER OR OWNER REPRESENTATIVE.
14. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY COMPANY FEES, CASH CONTRIBUTIONS OR OTHER COSTS THAT THE UTILITY COMPANY MAY REQUIRE TO COMPLETE THEIR WORK. (ELECTRIC, ECT.)
15. PROVIDE DETAILED SHOP DRAWINGS TO ENGINEERS PRIOR TO PURCHASING OR INSTALLING ANY EQUIPMENT.
16. DEVIATIONS IN SIZES, CAPACITIES, FIT, FINISH, ECT. FOR EQUIPMENT FROM THAT PRIME SPECIFIED SHALL BE THE RESPONSIBILITY OF THE PURCHASER OF THAT EQUIPMENT. ANY PROVISIONS REQUIRED TO ACCOMMODATE A DEVIATION, WHETHER APPROVED BY THE ENGINEER OR NOT, SHALL BE THE RESPONSIBILITY OF THE PURCHASER.
17. THE BID MANAGER, GENERAL CONTRACTOR OR WHOMEVER HOLDS THE PRIME CONTRACT(S) FOR THIS BID IS RESPONSIBLE FOR THE COORDINATION, APPEARANCE, SCHEDULING AND TIMELINESS OF THE WORK OF ALL TRADES, CONTRACTORS, SUPPLIERS, INSTALLERS, ECT. POOR OR UNTIMELY WORK ON THE PART OF ANY SUBCONTRACTORS SHALL BE RESOLVED BY THE PARTY WHO ENGAGED THEM ON THIS PROJECT.
18. WHERE MOUNTING HEIGHTS ARE NOT INDICATED OR ARE IN CONFLICT WITH OTHER BUILDING SYSTEM, CONTACT THE ENGINEER BEFORE AFFECTING INSTALLATION. REFER ALSO TO ARCHITECTURAL, INTERIOR AND EXTERIOR ELEVATIONS, CEILING HEIGHTS, AND OTHER DETAILS OF THESE DOCUMENTS, AS APPLICABLE.
19. ALL ELECTRICAL COMPONENTS OR EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES OR OTHER APPROVED LISTING AGENCY, APPROVAL AND LABELING OF INDIVIDUAL COMPONENTS ON AN ASSEMBLY IS NOT ACCEPTABLE AS MEETING THIS REQUIREMENT, UNLESS WAIVED BY THE ENGINEER IN WRITING.
20. ALL WIRING SYSTEMS SHALL BE INSTALLED WITH A MINIMUM OF SPLICES, CONDUCTORS, WHETHER SINGLE OR MULTI-PAIR, SHALL BE INSTALLED, CONTINUOUS INSOFAR AS POSSIBLE FROM TERMINAL POINT TO TERMINAL POINT.
21. ALL CONTRACTORS SHALL EXERCISE EXTREME CARE IN THE COURSE OF THEIR WORK SO AS TO INSURE THAT THEY DO NOT INTERRUPT ANY EXISTING SERVICE, OR SUB-SERVICE FOR SAFETY PURPOSES. PAY PARTICULAR ATTENTION TO THIS PRECAUTION RELATIVE TO NATURAL GAS AND ELECTRICAL LINES. VERIFY THE LOCATION, SIZE, AND TYPE, ECT. OF EACH UNDERGROUND OR OVERHEAD UTILITY. ALL WORK SHALL BE PERFORMED IN ACCORD WITH ALL FEDERAL, STATE AND/OR LOCAL RULES, REGULATIONS, STANDARD AND SAFETY REQUIREMENTS, UTILITIES SHALL BE INSTALLED IN ACCORD WITH THE APPLICABLE MUNICIPALITY OR UTILITY COMPANY STANDARDS. IN ALL CASES, THE MOST STRINGENT REQUIREMENTS SHALL APPLY.
22. ALL SUPPORTS FOR EQUIPMENT, DEVICES OR FIXTURES SHALL BE UNIQUE, DIRECTLY, FROM THE BUILDING STRUCTURE. DO NOT SUPPORT WORK FROM OTHER TRADES EQUIPMENT OR SUPPORTS WITHOUT WRITTEN PERMISSION FROM THE ENGINEER AND CONSENT FORM THE OTHER TRADE, IN WRITING.
23. WHERE INTERRUPTING AN EXISTING UTILITY OR SERVICE DELIBERATELY OR ACCIDENTALLY, THE RESPONSIBLE CONTRACTOR SHALL WORK CONTINUOUSLY AS NEEDED TO RESTORE SAME, PROVIDING PREMIUM TIME AS NEEDED.
24. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED FOR HIS WORK. ALL CUTTING AND PATCHING SHALL BE IN ACCORD WITH THE ARCHITECTS STANDARDS FOR SUCH WORK.
25. ALL WORK SHALL BE CONCEALED UNLESS SPECIFICALLY INDICATED TO BE EXPOSED, OR REQUIRED TO BE EXPOSED. IF IN DOUBT, CONTACT THE ENGINEER FOR CLARIFICATION PRIOR TO INSTALLING ANY SUCH WORK.
26. INTERRUPTION OF ANY EXISTING SERVICES SHALL BE COORDINATED WITH THE OWNER, GENERAL CONTRACTOR, UTILITY COMPANY AS NECESSARY, AND THE OWNER REPRESENTATIVE, AT LEAST TWO WEEKS IN ADVANCE OF ANTICIPATED INTERRUPTION. A SCHEDULE FOR THESE OUTAGES SHALL BE DEVELOPED AND AGREED UPON BETWEEN THE PARTIES MENTIONED, TO AVOID UNNECESSARY INCONVENIENCE TO THE OWNER OR ANY AFFECTED PARTY. NOTIFY THE UTILITY COMPANY OF ANY ANTICIPATED SERVICES REQUIRED TWO WEEKS IN ADVANCE, IN WRITING. IF UTILITY COMPANY REQUIRES A LONGER NOTIFICATION PERIOD, SO PROVIDE.
27. ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE CURRENT EDITION OF THE NATIONAL ELECTRIC CODES, NATIONAL FIRE CODES OF THE NATIONAL FIRE PROTECTION ASSOCIATION, THE REQUIREMENTS OF LOCAL UTILITY COMPANIES AND WITH THE REQUIREMENT OF ALL GOVERNMENTAL AGENCIES OR DEPARTMENTS HAVING JURISDICTION. IF ANY CONFLICT OR DISCREPANCIES OCCUR THE MOST STRINGENT WILL APPLY.
28. DO NOT SCALE FROM DRAWINGS, AS PRINTING DISTORTS SCALE. WORK SHALL BE LAID OUT FROM DIMENSIONED DRAWINGS, OR DIMENSIONS SUPPLIED TO CONTRACTOR.
29. NOISY WORK, WORK OUTSIDE BID BARRIERS, WORKS IN OCCUPIED AREAS, ECT. SHALL BE PERFORMED AFTER HOURS OR ON WEEKENDS OR DURING SUMMER BREAK, COORDINATE EXACT SCHEDULING WITH FACILITY PRIOR TO BID.
30. PROVIDE NEMA RATINGS THAT ARE APPROPRIATE FOR THE ENVIRONMENT, WHERE NO NEMA RATING IS LISTED, THE ENGINEER SHALL MAKE THE FINAL DETERMINATION.



BID
DOCUMENTS

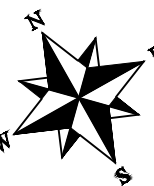
Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

GENERAL NOTES

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS
1. BIDDING 3/3/2022

PV1.1



PV
ARRAY

7th Street

N Elm Street

North Green Street

6th Street

1 | PLOT PLAN
SCALE: NTS



BID
DOCUMENTS

Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

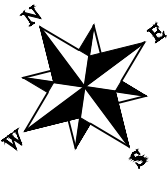
PLOT PLAN

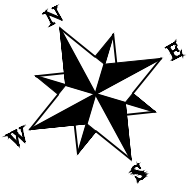
CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS

1. BIDDING 3/3/2022

PV1.3





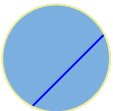
North Green Street

TAG NOTES/KEY:



SUBCONTRACTORS TO USE
TIE-OFF POINTS ON ROOF RIDGE
FOR FALL PROTECTION

KEY



GRASS ROOF LOADING ZONE:
PLYWOOD BASE NEEDED TO
PREVENT DAMAGE TO GRASS



PAVEMENT ROOF LOADING ZONE



MATERIAL STORAGE AREA



15YD DUMPSTER



CONES & FLAGS SHALL BE
PERMANENTLY SET UP 4' DURING
PV INSTALL

1

SAFETY & STAGING AREA

SCALE: NTS

6th Street

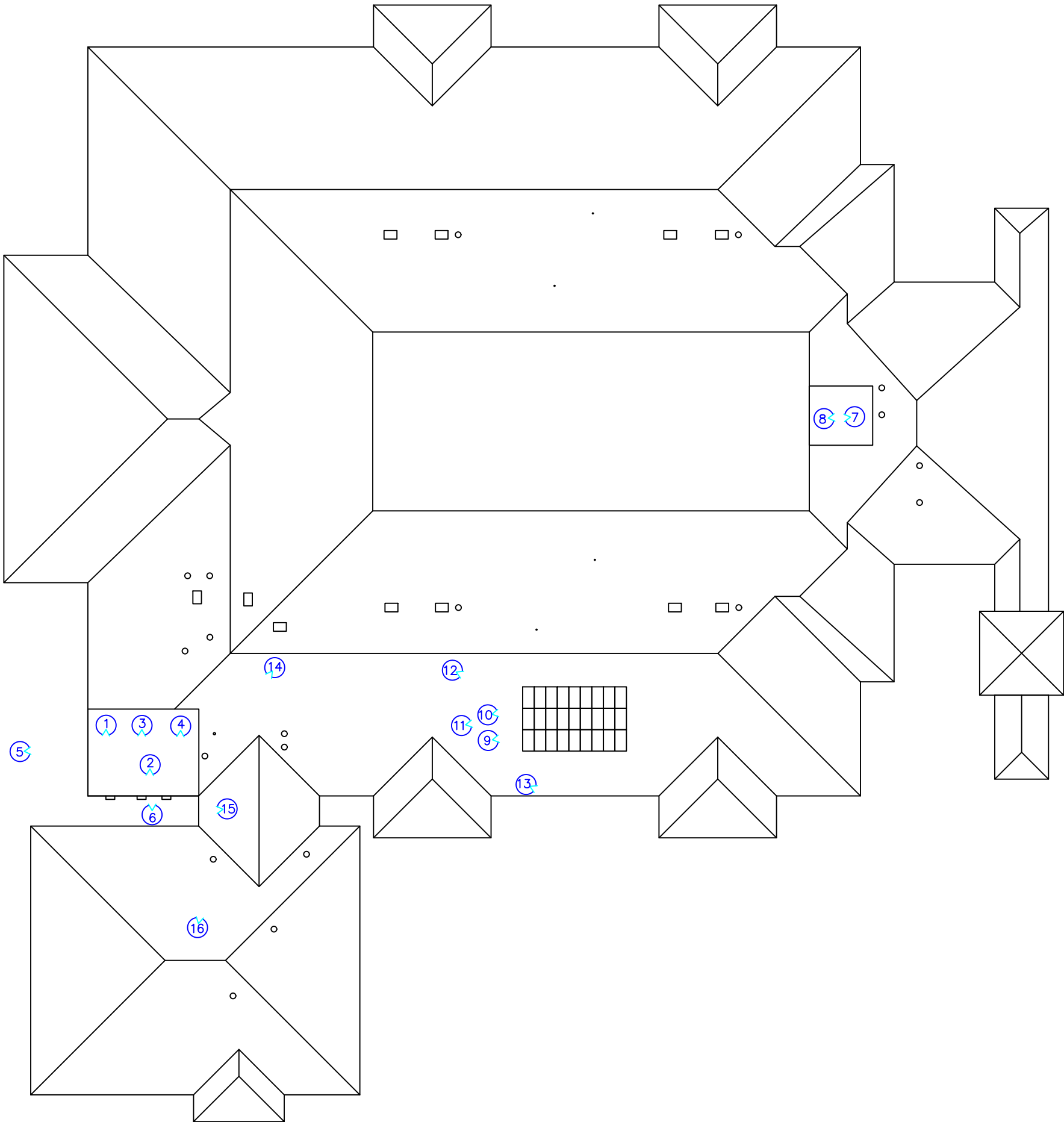
Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

SAFETY AND STAGING AREA

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS	
1.	BIDDING 3/3/2022

PV1.4



BID
DOCUMENTS

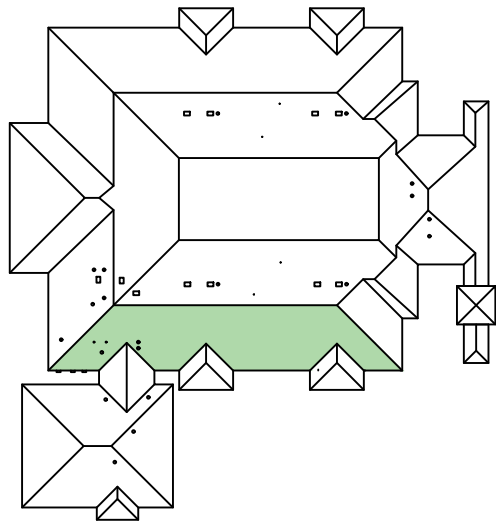
Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

PHOTO MAP

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS
1. BIDDING 3/3/2022

PV1.5

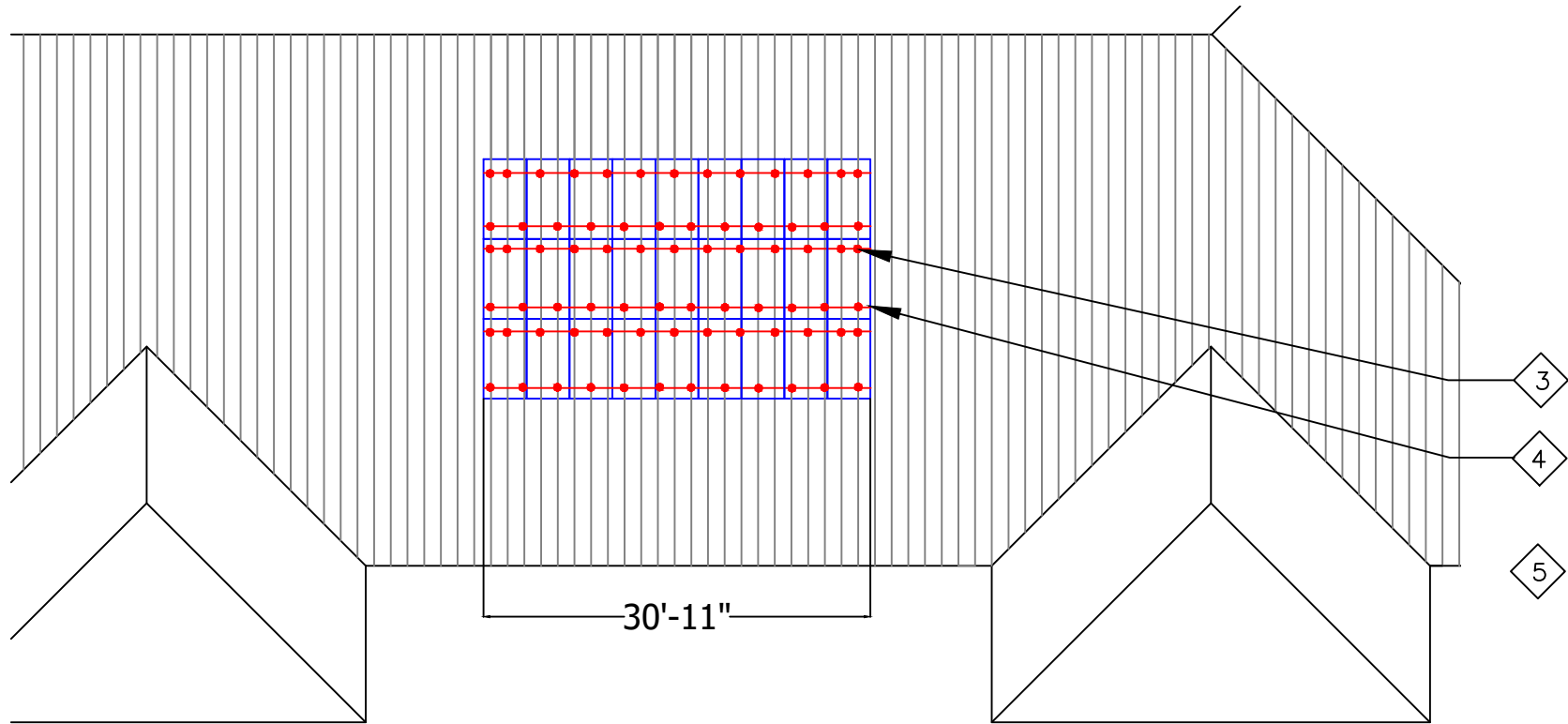
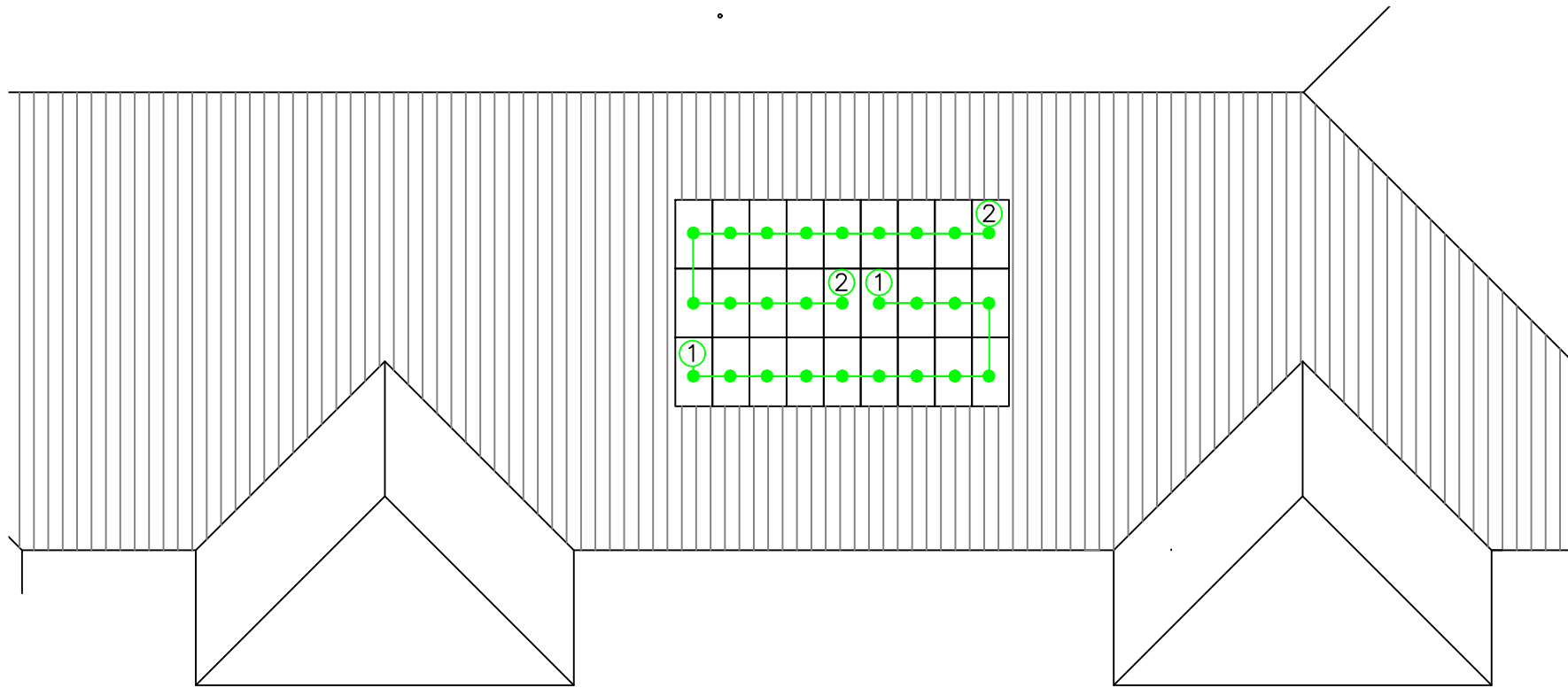


String	Modules	Optimizers
1	13	13
2	14	14

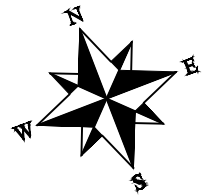
Torque Specification Unirac Rail System			
Item	Foot Pounds		
Mid Clamp	11		
MLPE Mount	10	Torque Specification for S5! Clamp	
End Clamp	3	Specified Torque	Foot Pounds
L-Foot to Rail	30	22ga steel	13-15
Rail Splice	10	All other metals and gauges	11-12.5

TAG NOTES/KEY:

- 1 Wire management shall be neat and professional. No wires shall be laying on roof surfaces.
- 2 Should strings change or run differently be sure to create as built drawings and give to construction manager.
- 3 S5! Standing Seam Attachment Point
- 4 Unirac Rail System
- 5 Contractor shall not damage or scrape metal roof when attaching S5! clamps



Building Height is ~11'



1

2



BID
DOCUMENTS

Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

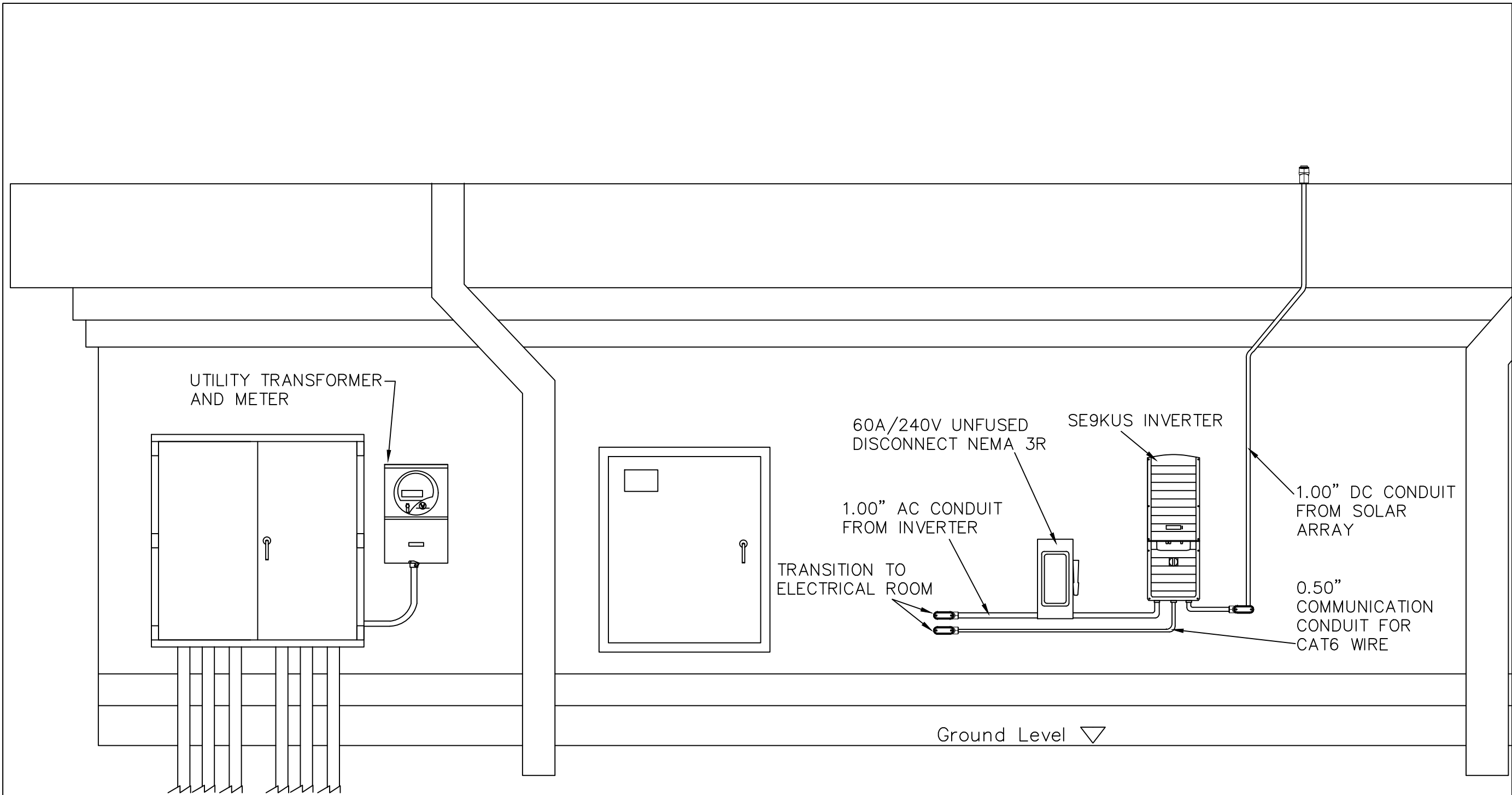
BALLAST AND STRINGING

Part List	
Item	Quantity
SM Rail 168" Mill	18
Splice Bar	12
Mid Clamp	48
End Clamp	12
Metal Roof Attachment S-5!	100
Roof Attachment	78
Grounding Lug	3

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS	
1.	BIDDING 3/3/2022

PV1.6

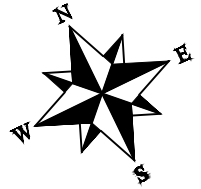


Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

UAD AND INVERTER RISER

CLIENT/OMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

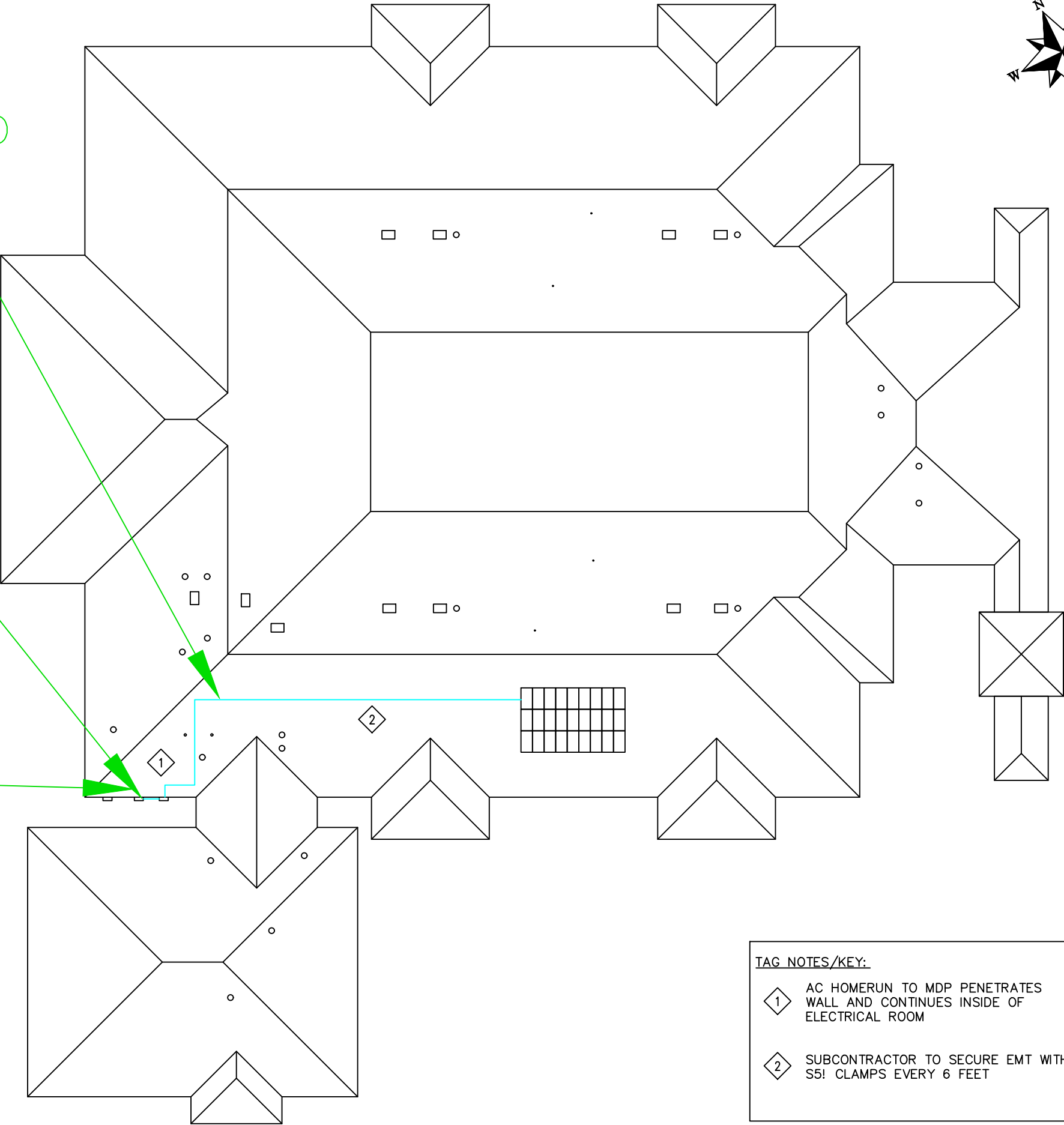
REVISIONS	
1.	BIDDING 3/3/2022



DC HOMERUN TO
INVERTER: 145'

UTILITY
ACCESSIBLE
DISCONNECT

AC HOMERUN TO
MDP: 10'



TAG NOTES/KEY:

- 1 AC HOMERUN TO MDP PENETRATES WALL AND CONTINUES INSIDE OF ELECTRICAL ROOM
- 2 SUBCONTRACTOR TO SECURE EMT WITH S5! CLAMPS EVERY 6 FEET

1 EXTERIOR CONDUIT PLAN

Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

EXTERIOR CONDUIT PLAN

CLIENT/CMTA JOB #:	ZHC22
DATE:	2/17/2022
DRAWN:	LW
CHECKED:	KK

REVISIONS
1. BIDDING 3/3/2022

E1.1

1. ALL EQUIPMENT IS LISTED FOR USE.
2. NEC AND LOCAL JURISDICTION GUIDELINES TO BE FOLLOWED.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV.)
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATIONS.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LOAD SIDE AND AC UTILITY WIRE ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 1000 VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED USING EITHER APPROVED STAINLESS STEEL WEEBS OR TIN PLATED DIRECT BURIAL RATED LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL.
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE SCENARIO CONDITIONS.
13. NEUTRAL CONDUCTORS MAY BE DOWNSIZED TO MATCH GROUND CONDUCTOR SIZE PER ARTICLE 705.95 (B)



BID
DOCUMENTS

Thelma B Johnson Pre-School
Henderson County Public Schools
631 N Green St
Henderson, KY 42420

SINGLE LINE DIAGRAM

<div><div></div><div></div></div>	Equipment Schedule				<div><div></div><div></div></div>	Conductor and Raceway Schedule					CLIENT/CHTA JOB #:	ZHC22		
	TAG	Description	Quantity	Part Number		Notes	TAG	Description or Conductor Type	Conductor Gauge	Number of Conductors	Conduit or Raceway Type	Size	DATE:	2/17/2022
													DRAWN:	LW
													CHECKED:	KK
													REVISIONS	
1	Solar PV Module	27	SPR-E20-435-COM	SunPower 435W Commercial Solar Module	1	USE-2 (MFG Cables & Connectors)	12 CU	4	FREE AIR	N/A	1. BIDDING 3/3/2022			
2	Solar PV Optimizer	27	P485	SolarEdge Power P485 Optimizer	2	PV Wire	10 CU	4	FREE AIR	N/A				
3	Solar Array	1		27 Solar Modules in 2 Strings	3	Bare Copper Equipment Ground (EGC)	6 CU	1	FREE AIR	N/A				
4	Transition Box	1		Soltection Transition Box 1000V Nema 3R	4	THHN-2 600V	10 CU	4	EMT	1.00"				
5	Inverter	1	SE9KUS	SolarEdge 9kW Three Phase 208V Commercial Inverter	5	THHN-Ground	6 CU	1	EMT	1.00"				
6	Utility Accessible Disconnect Switch	1	SquareD	Unfused 60A/240V SquareD NEMA 3R Disconnect 3PH	6	THWN-2 600V	8 CU	4	EMT	1.00"				
7	Main Distribution Panel	1	SquareD	2000A/208V SquareD Switchboard W/2000 Main	7	THWN-Ground	6 CU	1	EMT	1.00"				
8	35A SquareD Breaker	1	SquareD	35A Three Phase Breaker	8	CAT6 Plenum	24 CU	1	EMT	0.50"				
9	Main Distribution Frame	1		Main Server Rack for Building										

E1.2

A. **SOLAR PANEL** — Solar photovoltaic panels convert energy from the sun into DC power.

B. **COMBINER BOX** — Power cables run DC power from multiple solar panels into the combiner box which unites all the power cables into one. Typically, a combiner box consolidates multiple power sources into one single power source that is fed to a DC breaker or recombiner box.



C. **DC BREAKER or DC DISCONNECT** — The DC breaker is designed to shut off the DC power coming from the solar array. Shutting off the DC breaker does not stop power from feeding into the DC breaker, but keeps the power from going past the DC breaker. This is why EMT or conduit must be marked with the words PHOTOVOLTAIC POWER SOURCE to alert emergency personnel to the presence of a live solar circuit.



D. **CONDUIT** — The conduit routes and protects the solar power cables.

Must be reflective per
NEC 630.31 &
IFC 605.11.1.2



E. **INVERTER** — The transformer converts the DC voltage into AC voltage that can be sold back to the utility or consumed onsite.



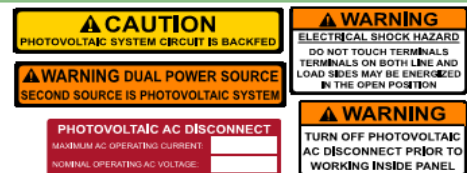
F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



F. **AC BREAKER or AC DISCONNECT** — The AC breaker cuts power coming from the inverter. The AC breaker does not stop power from feeding into the transformer or from the solar array, it simply isolates and prevents AC voltage from continuing into a breaker panel. This is why a label is posted showing the location of all disconnects servicing a facility so that emergency personnel can shut down everything related to power transportation.



G. **BREAKER PANEL** — A breaker panel allocates the power into multiple circuits with circuit breakers and fuses servicing various areas of the facility. In our homes, we might call this a fuse box or breaker box. Each breaker might service different aspects of the building such as lighting, heating and ventilation, air conditioning, offices, warehouse, etc.

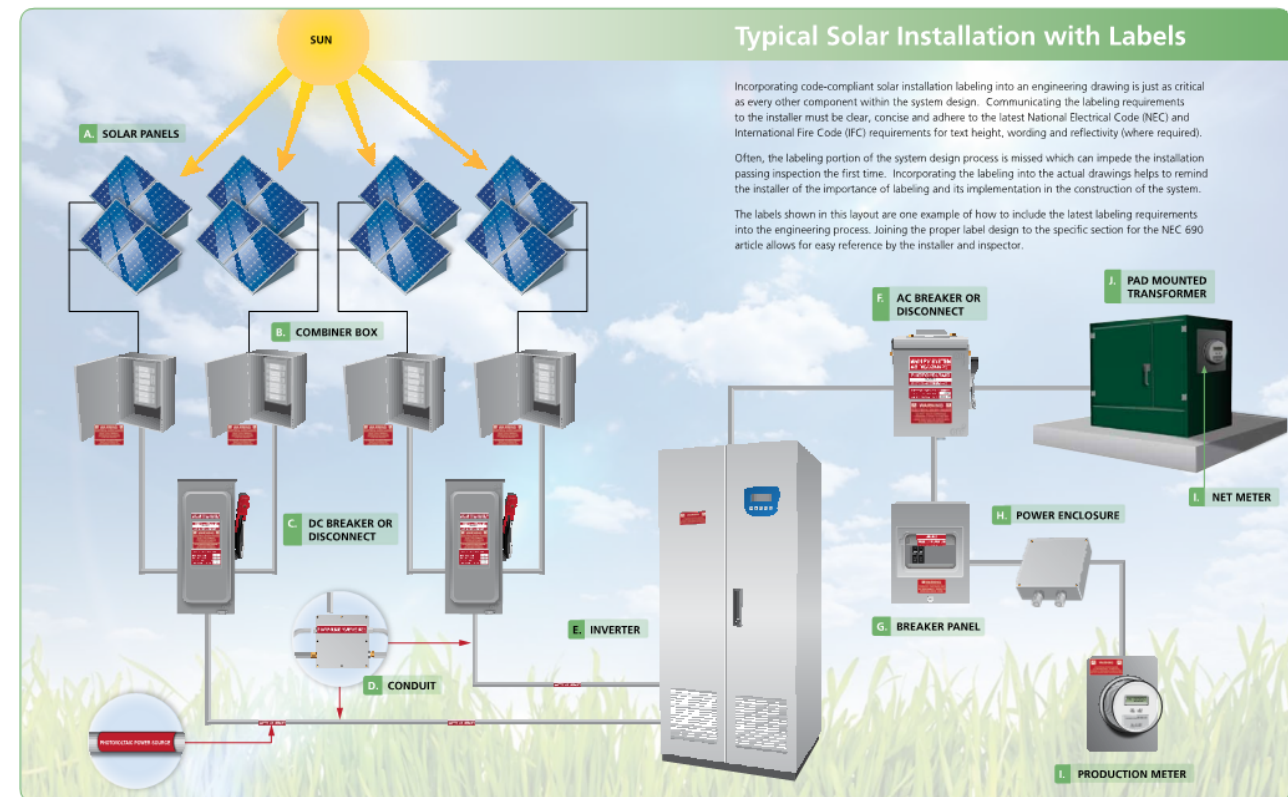


H. **POWER ENCLOSURE** — A power enclosure is simply a point where multiple power cables are spliced together.

I. **PRODUCTION / NET METER** — A mechanism for monitoring the utilization of electricity. Meters are typically used by the utility to calculate and bill for electricity consumption. Meters also can determine power coming from the PV installation which then offsets the utility's electrical usage, saving both energy use and money.



J. **PAD MOUNTED TRANSFORMER** — A device that transfers electrical energy from one circuit to another through inductively coupled conductors, transforming utility scale voltages to voltages used by a dwelling or commercial building. This is typically the point at which the utility combines and distributes power to the local area.



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REVISIONS
1. BIDDING 3/3/2022



SunPower E-Series: E20-435-COM

SunPower® Commercial DC Panel

SunPower E-Series panels combine high efficiency with the strongest durability and warranty available in the market today, resulting in more long-term energy and savings.^{1,2}



High Efficiency

Generates more power and savings per available space, making it easier to meet your organization's goals.



More Lifetime Energy and Savings

Designed to deliver 45% more energy in the same space over 25 years in real-world conditions like partial shade and high temperatures.²

Fundamentally Different. And Better.



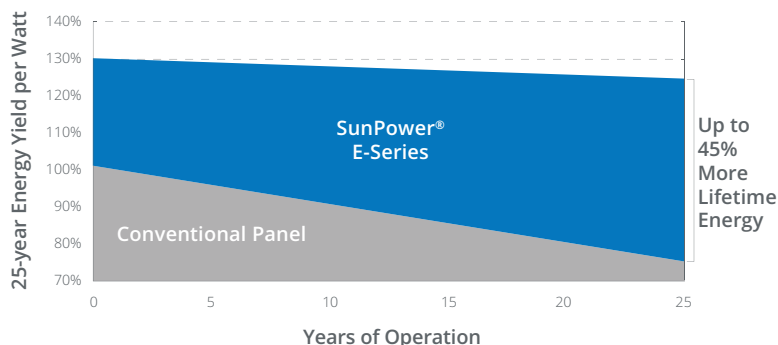
The SunPower Maxeon® Solar Cell

- Enables high efficiency panels²
- Unmatched reliability³
- Patented solid metal foundation prevents breakage and corrosion



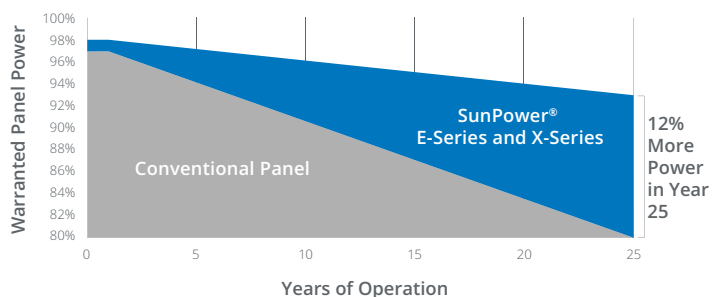
As Sustainable As Its Energy

- Ranked #1 in Silicon Valley Toxics Coalition 2015 Solar Scorecard⁴
- First solar panels to achieve Cradle to Cradle Certified™ Silver recognition⁵
- Contributes to more LEED categories than conventional panels⁶



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.

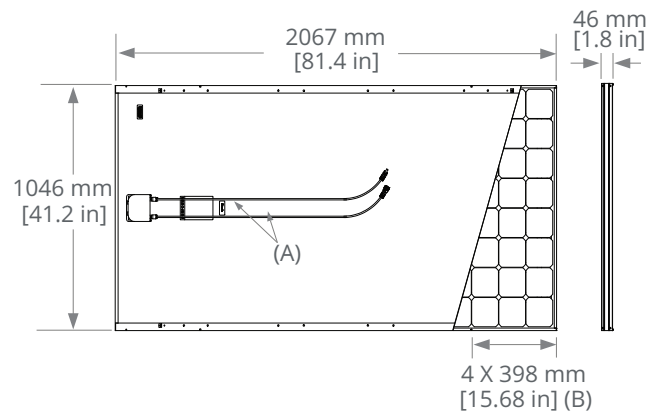


E-Series: E20-435-COM SunPower® Commercial DC Panel

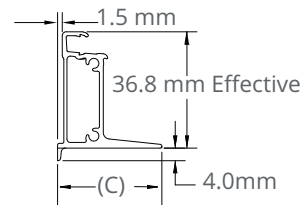
Electrical Data	
SPR-E20-435-COM	
Nominal Power (P _{nom}) ⁷	435 W
Power Tolerance	+5/-3%
Panel Efficiency	20.1%
Rated Voltage (V _{mpp})	72.9 V
Rated Current (I _{mpp})	5.97 A
Open-Circuit Voltage (V _{oc})	85.6 V
Short-Circuit Current (I _{sc})	6.43 A
Max. System Voltage	1500 V UL & 1500 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	-0.35% / °C
Voltage Temp Coef.	-235.5 mV / °C
Current Temp Coef.	2.6 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	128 Monocrystalline Moxeon Gen II
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, 1230 mm cables / MC4 Compatible
Weight	56 lbs (25.4 kg)
Max. Load	G6 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 50 psf, 2400 Pa front G4 Frame: Wind: 50 psf, 2400 Pa front & back Snow: 112 psf, 5400 Pa front
Frame	Class 2 silver anodized; stacking pins

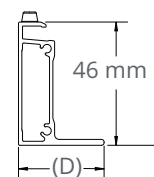
Tests And Certifications	
Standard Tests ⁸	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Management Certs	ISO 9001:2015, ISO 14001:2015
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, Recycle Scheme, REACH SVHC-163
Sustainability	Cradle to Cradle Certified™ Silver. "Declare." listed.
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	1500 V: IEC 62804, PVEL 600 hr duration
Available Listings	UL, TUV, MCS, FSEC, CEC



G6 FRAME PROFILE
Optimized for Oasis 3



G4 FRAME PROFILE



(A) Cable Length: 1230 mm +/-10 mm

(B) Stacking Pins

(C) Long Side: 33 mm [1.3 in]

Short Side 18.3 mm [0.7 in]

(D) Long Side: 32 mm [1.3 in]

Short Side 22 mm [0.9 in]

1 SunPower 327 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), 0.75%/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.

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Please read the safety and installation guide.

SUNPOWER®

Three Phase Inverters for the 120/208V Grid for North America

SE9KUS / SE14.4KUS



12-20
YEAR
WARRANTY

INVERTERS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Built-in module-level monitoring
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- Internet connection through Ethernet or Wireless
- Integrated Safety Switch
- Fixed voltage inverter for longer strings
- Supplied with RS485 Surge Protection, to better withstand lightning events
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install outdoors or indoors on provided bracket

/ Three Phase Inverters for the 120/208V Grid⁽¹⁾ for North America

SE9KUS / SE14.4KUS

	SE9KUS		SE14.4KUS	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXK-XXX.XXBXX4			
OUTPUT				
Rated AC Power Output		9000	14400	VA
Maximum AC Power Output		9000	14400	VA
Output Line Connections		3 phase, 3-wire / PE (L1-L2-L3), TN, TT 3 phase, 4-wire / PE (L1-L2-L3-N), TN, TT		
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-N)		105-120-132.5		Vac
AC Output Voltage Minimum-Nominal-Maximum ⁽²⁾ (L-L)		183-208-229		Vac
AC Frequency Min-Nom-Max ⁽²⁾		59.3 - 60 - 60.5		Hz
x. Continuous Output Current (per Phase)		25	40	A
GFDI Threshold		1		A
Utility Monitoring, Islanding Protection, Country Configurable Set Points		Yes		
THD		≤ 3		%
INPUT				
Maximum DC Power (Module STC)		12150	19400	W
Transformer-less, Ungrounded		Yes		
Maximum Input Voltage DC to Gnd		250	300	Vdc
Maximum Input Voltage DC+ to DC-		500	600	Vdc
Nominal Input Voltage DC to Gnd		200		Vdc
Nominal Input Voltage DC+ to DC-		400		Vdc
Maximum Input Current		26.5	38	Adc
Maximum Input Short Circuit Current		45		Adc
Reverse-Polarity Protection		Yes		
Ground-Fault Isolation Detection		1MΩ Sensitivity	350kΩ Sensitivity ⁽³⁾	
CEC Weighted Efficiency		96.5	97	%
Night-time Power Consumption		< 3	< 4	W
ADDITIONAL FEATURES				
Supported Communication Interfaces	RS485, Ethernet, Built-in GSM (Optional)			
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi access point for local connection			
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect			
RS485 Surge Protection	Supplied with the inverter			
Smart Energy Management	Export Limitation			
STANDARD COMPLIANCE				
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07			
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)			
Emissions	FCC part15 class B			
INSTALLATION SPECIFICATIONS				
AC output conduit size / AWG range	3/4" minimum / 8-4 AWG			
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG			
Number of DC inputs	3 pairs ⁽⁴⁾			
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260			in / mm
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260			in / mm
Weight	99.5 / 45			lb / kg
Weight with Safety Switch	106 / 48			lb / kg
Cooling	Fans (user replaceable)			
Noise	< 55			dBA
Operating Temperature Range	-40 to +140 / -40 to +60 ⁽⁵⁾			°F / °C
Protection Rating	NEMA 3R			

(1) For 277/480V inverters refer to: <https://www.solaredge.com/sites/default/files/se-three-phase-us-inverter-277-480v-setapp-datasheet.pdf>

(2) For other regional settings please contact SolarEdge support

(3) Where permitted by local regulations

(4) Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1

(5) For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

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Power Optimizer

P370 / P401 / P404 / P405 / **P485** / P500 / P505

POWER OPTIMIZER



PV power optimization at the module level

- Specifically designed to work with SolarEdge inverters
- Superior efficiency (99.5%)
- Up to 25% more energy
- Flexible system design for maximum space utilization
- Next generation maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Mitigates all types of modules mismatch-loss, from manufacturing tolerance to partial shading
- Fast installation with a single bolt

/ Power Optimizer

P370 / P401 / P404 / P405 / **P485** / P500 / P505

OPTIMIZER MODEL (typical module compatibility)	P370 (60/72 Cell modules)	P401 (For high power 60/72-cell modules)	P404 (for 60/72- cell short strings)	P405 (for high-voltage modules)	P485 (for high-voltage modules)	P500 (for 96-cell modules)	P505 (for higher current modules)	UNIT
INPUT								
Rated Input DC Power ⁽¹⁾	370	400	405	405	485	500	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	60		80	125		80	83	Vdc
MPPT Operating Range	8 - 60		12.5 - 80	12.5 - 105		8 - 80	12.5-83	Vdc
Maximum Short Circuit Current (Isc)	11	11.75	11			10.1	14	Adc
Maximum Efficiency	99.5							%
Weighted Efficiency	98.8							%
Overvoltage Category	II							
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREEDGE INVERTER)								
Maximum Output Current	15							Adc
Maximum Output Voltage	60		85			60	85	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREEDGE INVERTER OR SOLAREEDGE INVERTER OFF)								
Safety Output Voltage per Power Optimizer	1 ± 0.1							Vdc
STANDARD COMPLIANCE								
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3							
Safety	IEC62109-1 (class II safety), UL1741							
RoHS	Yes							
Fire Safety	VDE-AR-E 2100-712:2013-05							
INSTALLATION SPECIFICATIONS								
Maximum Allowed System Voltage	1000							Vdc
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1	129 x 153 x29.5 / 5.08 x6.02 x 1.16	129 x 89 x 42.5 / 5.1 x 3.5 x 1.7	129 x 90 x 49.5 / 5.1 x 3.5 x 1.9		129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	655 / 1.5		775 / 1.7	845 / 1.9		750 / 1.7	1064 / 2.3	gr / lb
Input Connector	MC4 ⁽²⁾				Single or Dual MC4 ⁽²⁾⁽³⁾	MC4 ⁽²⁾		
Input Wire Length	0.16 / 0.52							m / ft
Output Connector	MC4							
Output Wire Length	1.2 / 3.9							m / ft
Operating Temperature Range	-40 - +85 / -40 - +185							°C / °F
Protection Rating	IP68							
Relative Humidity	0 - 100							%

(1) Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.

(2) For other connector types please contact SolarEdge.

(3) For dual version for parallel connection of two modules use the P485. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module is supported. When connecting a single module, seal the unused input connectors using the supplied pair of seals.

PV SYSTEM DESIGN USING A SOLAREdge INVERTER ⁽⁴⁾⁽⁵⁾		SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE	THREE PHASE FOR 277/480V GRID	
Minimum String Length (Power Optimizers)	P370, P401, P500 ⁽⁶⁾	8		16	18	
	P404, P405, P485, P505	6		14 (13 with SE3K ⁽⁷⁾)	14	
Maximum String Length (Power Optimizers)		25		50	50	
Maximum Power per String		5700	5250	11250 ⁽⁸⁾	12750 ⁽⁹⁾	W
Parallel Strings of Different Lengths or Orientations		Yes				

(4) It is not allowed to mix P404/P405/P485/P505 with P370/P401/P500/P600/P650/P730/P801/P800p/P850/P950 in one string.

(5) For SE15k and above, the minimum DC power should be 11kW.

(6) The P370/P401/P500 cannot be used with the SE3K three phase inverter (available in some countries; refer to the three phase inverter SE3K-SE10K datasheet).

(7) Exactly 10 when using SE3K-RW010BNN4

(8) For the 230/400V grid: it is allowed to install up to 13,500W per string when the maximum power difference between each string is 2,000W.

(9) For the 277/480V grid: it is allowed to install up to 15,000W per string when the maximum power difference between each string is 2,000W

S-5!®

The Right Way!®

S-5-S Clamp

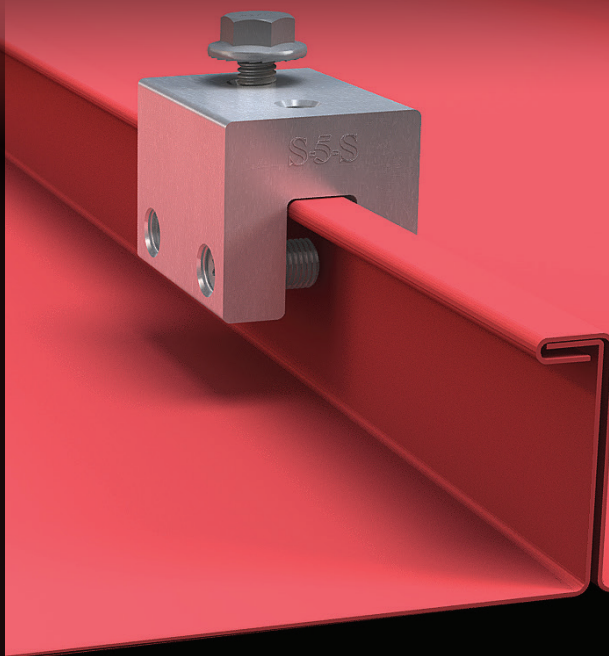
The S-5-S clamp was created specifically for popular snap-together profiles—including residential profiles by Taylor Metals and Easy Lock Standing Seam. For horizontal seams under .540 inches (like the Firestone UC4) the S-5-S or S-5-S Mini can be used to avoid the necessity of crimping the seam.

Its simple design and size make it perfect for use with S-5!® snow retention products and other heavy-duty applications. Installation is as simple as setting the patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the bolt provided with the product. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-S Mini Clamp

The S-5-S Mini is a bit shorter than the S-5-S and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*

*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard® snow retention systems.



The S-5-S clamp was created specifically for popular snap-together profiles.

S-5-S and S-5-S Mini

888-825-3432 | www.S-5.com

The right way to attach almost anything to metal roofs!

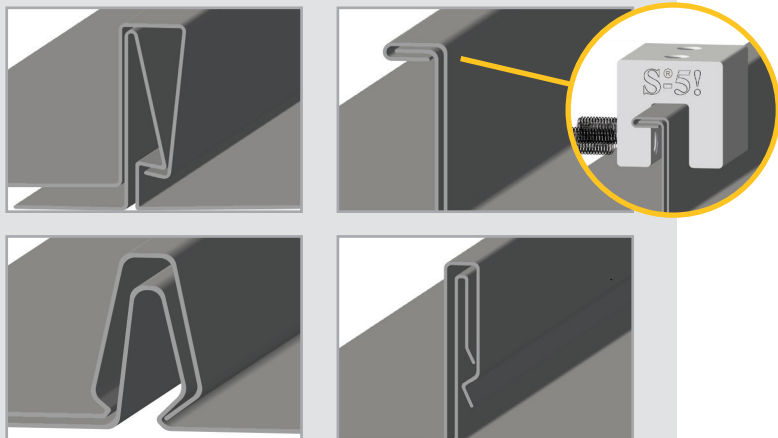
The strength of the S-5-S clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving roof warranties intact.

The **S-5-S** and **S-5-S Mini** clamps are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-S is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit www.S-5.com for more information including CAD details, metallurgical compatibilities and specifications.

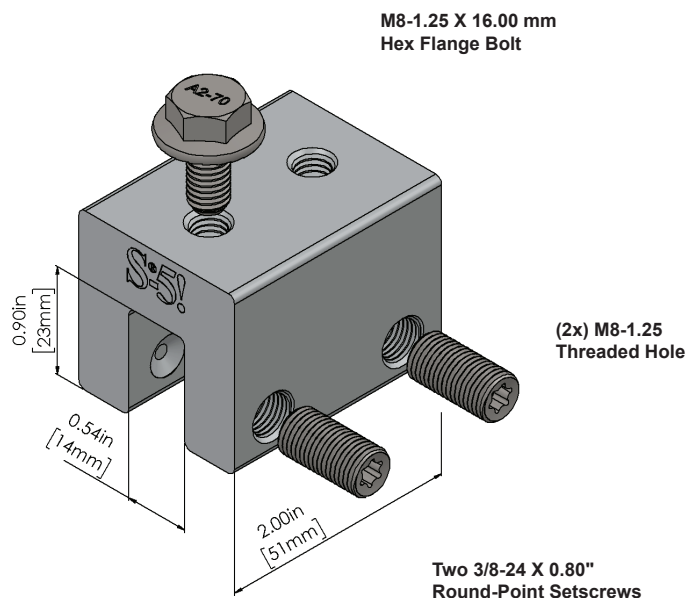
The S-5-S clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry. Profiles that are shaped as illustrated below will work with the S-5-S and S-5-S Mini. In order for the S-5-S or S-5-S Mini to fit these types of seams, the finished seam must:

- Be at least 1.00" high.
- Have a height distance less than or equal to 0.25" between the male portion of the panel and female portion of the panel.

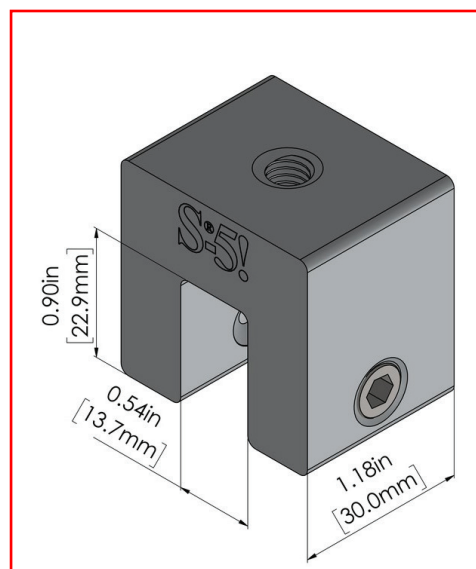
Example Profiles



S-5-S Clamp



S-5-S Mini Clamp



Please note: All measurements are rounded to the second decimal place.

S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. For maximum holding strength, setscrews should be tensioned and re-tensioned as the seam material compresses. Clamp setscrew tension should be verified using a calibrated torque wrench between 160 and 180 inch pounds when used on 22ga steel, and between 130 and 150 inch pounds for all other metals and thinner gauges of steel. Consult the S-5! website at www.S-5.com for published data regarding holding strength.

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