



01/13/2012

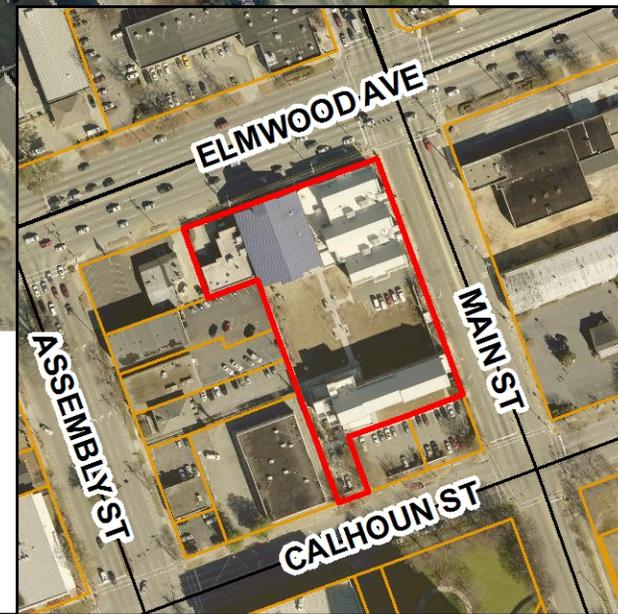


D/DRC Case

2025 Main Street

City Center Design/Development District

TMS: 09015-02-03



**DESIGN/DEVELOPMENT REVIEW COMMISSION
DESIGN REVIEW DISTRICT**

Case # 1

ADDRESS: 2025 Main Street

APPLICANT: Tripp Hathaway, agent

TAX MAP REFERENCE: TMS# 09015-02-03

USE OF PROPERTY: Midlands Housing Alliance center

REVIEW DISTRICT: City Center Design/Development District (-DD)

NATURE OF REQUEST: Request for Certificate of Design Approval to install solar panels

PROJECT SUMMARY:

The applicant received a grant to install solar panels on the roof of this building. The grant application process was completed and awarded prior to permitting. When the applicant went to obtain a permit for installation, they were informed that this property is in an urban design overlay district and requires design review.

The City Center Design/Development Guidelines do not have specific guidelines for solar panels; however they do require that any changes to the exterior of the building that are visible from the public right-of-way receive a Certificate of Design Approval prior to permitting. The guideline used to evaluate the proposal addresses roof-mounted utility equipment; the current proposal does not meet the applicable guideline. Staff worked with the applicant to provide alternative solutions, such as solar film that can be applied to the roof between the seams, however the grant process is evidently too far along to reconsider different technologies for this application. Therefore the application was denied and the unmodified proposal is before the Commission as an appeal to the staff decision.

The following evaluation is based on the guideline that we do have, best applied to this particular situation. It should be noted that this application will set a precedent for future projects as it is the first application of its type to come to the Commission in the City Center Design District.

STAFF COMMENTS:

5.3.6 Roofs and Upper Stories

- *Roof mounted mechanical or utility equipment should be screened. The method of screening should be architecturally integrated with the structure in terms of materials, color, shape and size. Equipment should be screened by solid building elements (e.g., parapet wall) instead of after-the-fact add-on screening (e.g., wood or metal slats).*

The proposed solar panels are raised, black panels that are situated on the western roof slope, side by side. The existing roof is a blue, standing seam metal, making these highly contrasting and visible.

The guideline is primarily referring to equipment sitting on flat roofs, which can easily be screened with a vertical parapet; screening solar panels on a sloped roof is not practical. However, the color, profile, and location of the panels on the roof make them highly visible. The proposed equipment could

be modified to have a much reduced visual impact from the right-of-way, particularly as this will be mostly visible from Elmwood Avenue heading east into the City. The recommendation is an interpretation of the guidelines based on the intent of reducing the appearance of utility equipment and/or integrating it into the structure in terms of materials, color, shape, and size.

STAFF RECOMMENDATION:

To this end, staff recommends approving the Certificate of Design Approval with the condition that the panels be mounted on the flat roofed portion of the building to the west of the standing seam roof, OR, to mount the panels at the far southern end of the standing seam roof, stacked vertically- rather than horizontally- in order to minimize their visibility from Elmwood Avenue.

MIDLANDS HOUSING ALLIANCE

2025 Main Street
Columbia, SC 29201

18.9 kW DC (14.0 kW AC) Solar Photovoltaic Array



GENERAL DESIGN

- ALL AMPACITIES OF CONDUCTORS ENCLOSED IN CONDUIT SHALL BE CALCULATED AT A MAXIMUM OF 90°C INSULATION RATING OR THE TEMPERATURE RATING OF THE TERMINATION, WHICHEVER IS LOWER AS PER NEC TABLE 310.15(B)(16).
- THE MAX AND MIN AMBIENT TEMPERATURES USED IN THIS DESIGN ARE 38°C AND -10°C RESPECTIVELY AND ARE BASED ON DATA PROVIDED BY ASHRAE FOR COLUMBIA, SOUTH CAROLINA.
- ALLOWABLE AMPACITIES OF ABOVEGROUND CONDUCTORS SHALL BE DERATED BY A CORRECTION FACTOR OF 0.76, TO ALLOW FOR THE HEAT PRODUCED BY THE ARRAY AND OTHER SURROUNDING SOURCES. THIS IS DERIVED FROM THE SITE MAX DESIGN TEMPERATURE FROM NOTE 2 PLUS AN ADDITIONAL 17°C (PER NEC TABLE 310.15(B)(3)(C) TO GET TO 53°C. REFER TO NEC TABLE 310.15(B)(2)(A) FOR THESE SPECIFIC CORRECTION FACTORS.
- ALLOWABLE AMPACITIES OF UNDERGROUND CONDUCTORS SHALL BE BASED ON AN AMBIENT TEMPERATURE OF 30°C, (REFER TO NEC TABLE 310.15(B)(16)).
- DERATING OF THE ALLOWABLE CONDUCTOR AMPACITIES MAY NEED TO BE RECALCULATED IF THE NUMBER OF CURRENT CARRYING CONDUCTORS EXCEEDS THREE IN A SINGLE CONDUIT OR RACEWAY (REFER TO NEC TABLE 310.15(B)(3)(A)).

NEW PHOTOVOLTAIC SYSTEM

- THE PROPOSED PHOTOVOLTAIC SYSTEM IS INTENDED TO OPERATE IN PARALLEL WITH THE UTILITY DISTRIBUTION SYSTEM.
- THE PHOTOVOLTAIC SYSTEM IS INTENDED TO CONNECT TO THE EXISTING SOUTH CAROLINA ELECTRIC & GAS POWER SYSTEM SERVICING CUSTOMER LOCATED AT 2025 MAIN STREET COLUMBIA, SOUTH CAROLINA 29201. THIS CONNECTION SHALL BE IN COMPLIANCE WITH THE NEC AND SCE&G STANDARDS.
- BUILDING VOLTAGE AT POINT OF INTERCONNECTION IS 120/208V 3Ø4W "WYE".
- PRIOR TO INSTALLATION, THE CONTRACTOR SHALL SUBMIT AN INTERCONNECTION APPLICATION TO SOUTH CAROLINA ELECTRIC & GAS AND OBTAIN AN INTERCONNECTION AGREEMENT IN COORDINATION WITH THESE STANDARDS.
- THE CONTRACTOR SHALL SUBMIT ALL EQUIPMENT SHOP DRAWINGS OR EXACT PART NUMBER WITH SPECS TO THE OWNER, AND SHALL RECEIVE OWNER APPROVAL PRIOR TO ANY PURCHASE BY CONTRACTOR. DELAYED APPROVAL BY OWNER COULD CAUSE LONGER LEAD TIME FOR MATERIAL AND DELAYED CONSTRUCTION START.
- THE INVERTER(S) FOR THE PROPOSED PHOTOVOLTAIC SYSTEM SHALL BE IDENTIFIED FOR USE IN SOLAR PHOTOVOLTAIC SYSTEMS.
- ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION FOR TESTING AND ISOLATION. ALL COMBINER BOXES SHALL HAVE DISCONNECTION MEANS IN OR NEAR THE COMBINER BOX FOR ISOLATION AND TESTING.
- ALL DISCONNECTS, COMBINERS, PULL/SPLICE BOXES, AND ENCLOSURES SHALL BE UL LISTED FOR ITS PURPOSE.

CONDUITS

- DIRECT BURY UNDERGROUND CONDUIT SHALL BE SCH 40 PVC, BURIED MINIMUM DEPTH OF 36" BELOW GRADE.
- NO GREATER THAN 360° OF TURNS IN UNDERGROUND CONDUITS MAY TAKE PLACE. THE CONTRACTOR SHALL INSTALL UNDERGROUND VAULTS, PULL BOXES, OR HAND HOLES IN ORDER TO COMPLETE THE RUNS.
- ALL UNDERGROUND UTILITY SHALL BE MARKED 12" BELOW GRADE WITH THE APPROPRIATE EARLY WARNING MARKING TAPE. MARKING TAPE WITH A METALLIC STRIP SHALL BE USED FOR ALL NONMETALLIC UNDERGROUND UTILITY.
- TOPS OF CONDUIT SHALL BE A MINIMUM OF 6" ABOVE FINISHED SURFACE TO PREVENT INGRESS OF WATER (UNO). ALL CONDUITS OPEN TO THE ENVIRONMENT SHALL BE SEALED TO PREVENT TRANSMISSION OF HUMID AIR BETWEEN INTERIOR AND EXTERIOR OF EQUIPMENT.
- INSTALL A 1/2" DIAMETER NYLON PULL ROPE IN ALL SPARE CONDUITS.
- CONDUIT TRANSITIONING FROM BELOW GRADE TO ELECTRICAL ENCLOSURE SHALL BE SCH 80 PVC IF THE POTENTIAL FOR DAMAGE IS PRESENT.
- ABOVEGROUND CONDUIT SHALL BE 'ELECTRICAL METALLIC TUBING' (EMT) OR SCH 40 PVC CONDUIT.
- FLEXIBLE METAL CONDUIT IS GENERALLY SUITABLE FOR INSTALLATION IN DRY LOCATIONS. SHOULD IT BE EMPLOYED, SUPPORTS WILL BE NO MORE THAN 12 INCHES FROM BOXES (JUNCTION BOX, CABINETS OR CONDUIT FITTING) AND NO MORE THAN 54 INCHES APART.
- LONG STRAIGHT CONDUIT RUNS SHALL BE REVIEWED FOR THE REQUIREMENT OF EXPANSION FITTINGS.
- ADEQUATELY STRAP AND SUPPORT ALL CONDUIT WORK PER NEC. IN GENERAL SUPPORT ALL CONDUIT WITHIN THREE FEET (3') OF OUTLET BOX, CABINET OR PANEL AND MAXIMUM OF TEN FEET (10') ON CENTER THEREAFTER.

EQUIPMENT

- EQUIPMENT AND COMPONENTS SHALL BE FREE OF FUNCTIONAL DEFECTS AND UL LISTED AND LABELED FOR THE INTENDED APPLICATION.
- PROVIDE DANGER, WARNING, AND CAUTION LABELS AS REQUIRED BY NEC, NESC, NFPA, OR OSHA STANDARDS ON EQUIPMENT ENCLOSURES, DOORS, ACCESS PLATES, AND BARRIERS AND LABEL ALL MEDIUM VOLTAGE EQUIPMENT WITH THE OPERATING VOLTAGE.
- EQUIPMENT AND MATERIAL SHALL MEET THE REQUIREMENTS OF THE FOLLOWING STANDARDS:
 - AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
 - INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
 - NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)
 - NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
 - OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
 - UNDERWRITER'S LABORATORIES, INC. (UL)
 - ELECTRONIC INDUSTRY ASSOCIATION (EIA)
 - TELECOMMUNICATION INDUSTRY ASSOCIATION (TIA)
 - NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)
- EQUIPMENT SHALL BE ANCHORED TO CONCRETE PADS, FOUNDATIONS, WALLS, OR RACKS PER MANUFACTURER'S INSTRUCTIONS.

WIRING AND WIRING METHODS

- ALL WIRING METHODS AND INSTALLATION PRACTICES SHALL CONFORM TO THE NATIONAL ELECTRIC CODE.
- EXPOSED PV SOLAR PANEL WIRING WILL BE '1000VDC RH/RHW-2' RATED AT 90°C FOR WET LOCATION AND SUNLIGHT EXPOSURE. ALL EXPOSED CABLES, SUCH AS MODULE LEADS AND DC HOMERUNS, SHALL BE SECURED BENEATH THE MODULES WITH MECHANICAL OR OTHER SUN-LIGHT RESISTANT MEANS USING BEST WIRE MANAGEMENT PRACTICES.
- ALL PHOTOVOLTAIC OUTPUT CIRCUITS SHALL BE BUILDING WIRE COPPER OR ALUMINUM AND HAVE INSULATION RATING 600 V, 90°C, UNLESS OTHERWISE NOTED.
- USE THE FOLLOWING COLOR CONVENTION FOR DC CONDUCTORS:
 - RED - POSITIVE
 - BLACK - NEGATIVE
 - GREEN - GROUND
- ALL FIELD WIRING THAT IS NOT COLOR CODED SHALL BE TAGGED AT BOTH ENDS WITH PERMANENT WIRE MARKERS TO IDENTIFY POLARITY AND GROUND.
- IF USED, ALL WIRENUTS ARE TO BE SILICONE FILLED, EQUIVALENT TO IDEAL BLUE, AND INSTALLED PER MANUFACTURER'S SPECIFICATIONS BY A QUALIFIED/CERTIFIED PERSON. WIRENUTS SHALL NOT BE INSTALLED ALONG THE PATH OF PV POWER GENERATION, OR FOR ANY EQUIPMENT NECESSARY FOR THE GENERATION OF PV POWER. WIRENUTS ARE ONLY ALLOWED FOR AUXILIARY EQUIPMENT.
- FUSES AND WIRES SUBJECT TO TRANSFORMER INRUSH CURRENT SHALL BE SIZED ACCORDINGLY.
- ALL DC MATERIALS SHALL BE UL LISTED FOR 1000VDC MINIMUM.
- WIRING SHALL BE INSTALLED IN APPROVED METAL OR PVC CONDUITS OR RACEWAYS WITH LISTED FITTINGS, AS APPLICABLE.
- PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OF THIS PROPOSED SOLAR SYSTEM SHALL NOT BE CONTAINED IN THE SAME RACEWAY CABLE TRAY, CABLE, OUTLET BOX, JUNCTION BOX, OR SIMILAR FITTING AS FEEDERS OR BRANCH CIRCUITS OF OTHER SYSTEMS UNLESS THE CONDUCTORS OF THE DIFFERENT SYSTEMS ARE SEPARATED BY A PARTITION OR ARE CONNECTED TOGETHER.
- CONNECTORS TO BE TORQUED PER DEVICE LISTING, OR MANUFACTURER'S RECOMMENDATIONS.
- SPLIT BOLTS / SPLICES / CONNECTORS SHALL BE INSULATED WITH APPROVED MEANS. UL LISTED ELECTRICAL TAPE ALONE IS NOT SUITABLE AS THE ONLY INSULATION MEANS. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR APPLICATION OF INSULATING PRODUCT.

DISCONNECTING MEANS

- MEANS SHALL BE PROVIDED TO DISCONNECT ALL CURRENT CARRYING CONDUCTORS OF THE PHOTOVOLTAIC POWER SOURCE FROM ALL OTHER CONDUCTORS.
- WHERE A CIRCUIT GROUNDING CONNECTION IS NOT DESIGNED TO BE AUTOMATICALLY INTERRUPTED AS PART OF THE GROUND-FAULT PROTECTION SYSTEM REQUIRED BY NEC ARTICLE 690-5, A SWITCH OR CIRCUIT BREAKER USED AS A DISCONNECTING MEANS SHALL NOT HAVE A POLE IN THE GROUNDED CONDUCTOR.
- THE GROUNDED CONDUCTOR MAY HAVE A BOLTED OR TERMINAL DISCONNECTING MEANS TO ALLOW MAINTENANCE OR TROUBLESHOOTING BY QUALIFIED PERSONNEL.
- THE DISCONNECTING MEANS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH NEC ARTICLE 690-17.
- EQUIPMENT SUCH AS PHOTOVOLTAIC SOURCE CIRCUITS, OVER CURRENT DEVICES, AND BLOCKING DIODES SHALL BE PERMITTED ON THE PHOTOVOLTAIC SIDE OF THE PHOTOVOLTAIC DISCONNECTING MEANS.
- MEANS SHALL BE PROVIDED TO DISCONNECT EQUIPMENT SUCH AS INVERTERS, BATTERIES, AND CHARGE CONTROLLERS FROM ALL UNGROUNDED CONDUCTORS OF ALL SOURCES. IF THE EQUIPMENT IS ENERGIZED FROM MORE THAN ONE SOURCE, THE DISCONNECTING MEANS SHALL BE IDENTIFIED.
- A SINGLE DISCONNECTING MEANS SHALL BE PERMITTED FOR THE COMBINED AC OUTPUT OF ONE OR MORE INVERTERS IN AN INTERACTIVE SYSTEM.
- NEC 690-16. FUSES. DISCONNECTING MEANS SHALL BE PROVIDED TO DISCONNECT A FUSE FROM ALL SOURCES OF SUPPLY IF THE FUSE IS ENERGIZED FROM BOTH DIRECTIONS AND IS ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS. SUCH A FUSE IN A PHOTOVOLTAIC SOURCE CIRCUIT SHALL BE CAPABLE OF BEING DISCONNECTED INDEPENDENTLY OF FUSES IN OTHER PHOTOVOLTAIC SOURCE CIRCUITS.

GROUNDING

- SEE ELECTRICAL DIAGRAM AND ELECTRICAL DETAILS FOR MORE GROUNDING INFORMATION.
- ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS SHALL BE USED FOR SYSTEM GROUNDING (REFERENCED TO THE SAME POINT).
- EQUIPMENT GROUNDING CONDUCTORS AND SYSTEM GROUNDING CONDUCTORS SHALL HAVE AS SHORT A DISTANCE TO GROUND AS POSSIBLE AND A MINIMUM NUMBER OF TURNS.
- NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER GROUNDING; NOTING THAT TERMINAL LUGS BOLTED ON AN ENCLOSURE'S FINISHED SURFACE MAY BE INSULATED BECAUSE OF PAINT/FINISH. IF NO CONNECTIVITY IS DETECTED AFTER TESTING, PAINT/FINISH AT POINT OF CONTACT SHALL BE PROPERLY REMOVED AND TREATED FOR RUST PREVENTION.
- PV MODULE FRAMES SHALL BE BONDED WITH WEEB'S BONDING WASHERS TO RACKING STRUCTURE USING A METHOD APPROVED BY THE MODULE MANUFACTURER AND WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE.
- THE CONNECTION TO THE MODULE OR PANEL OF THIS PROPOSED SOLAR ELECTRIC SYSTEM SHALL BE SO ARRANGED THAT REMOVAL OF A MODULE OR A PANEL FROM THE PHOTOVOLTAIC SOURCE CIRCUIT DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER PHOTOVOLTAIC SOURCE CIRCUIT.
- GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC. GROUNDING DEVICES EXPOSED TO THE ENVIRONMENT SHALL BE RATED FOR DIRECT BURIAL. GROUNDING LUGS SHALL BE LISTED FOR DIRECT-BURIAL.
- ALL GROUNDING SYSTEMS FOR THE SOLAR PV INSTALLATION SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE.

GROUND FAULT PROTECTION

- PHOTOVOLTAIC INVERTERS SHALL BE EQUIPPED WITH DC GROUND FAULT PROTECTION TO REDUCE FIRE HAZARDS.
- DC SYSTEM SHALL BE ISOLATING WITH NEITHER THE POSITIVE NOR NEGATIVE POLES TIED TO GROUND.

MARKINGS

- ALL INTERACTIVE SYSTEM POINTS OF INTERCONNECTION WITH OTHER SOURCES SHALL BE MARKED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS.
- A PERMANENT PLAQUE OR DIRECTORY SHALL BE PROVIDED IDENTIFYING THE LOCATION OF THE SERVICE DISCONNECT MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECT MEANS, IF NOT LOCATED AT THE SAME LOCATION.
- PHOTOVOLTAIC MODULES SHALL BE MARKED TO IDENTIFY LEAD POLARITY, DEVICE RATINGS, AND SPECIFICATIONS FOR VOLTAGES, CURRENTS, AND POWER.

REQUIRED SAFETY SIGNS AND LABELS

REQUIRED SAFETY SIGNS AND LABELS SHALL BE PERMANENTLY ATTACHED BY ADHESIVE, OR OTHER MECHANICAL MEANS. LABELS SHALL COMPLY WITH ARTICLE 690 OF THE NEC OR OTHER APPLICABLE STATE, AND UTILITY CODES. SEE LABELS AND MARKING PAGE FOR MORE INFORMATION.

- ANY SWITCH, FUSES, OR CIRCUIT BREAKERS THAT CAN BE ENERGIZED IN EITHER DIRECTION SHALL BE LABELED AS FOLLOWS:

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

- THIS PHOTOVOLTAIC SYSTEM WILL BE EQUIPPED WITH A DC DISCONNECT WHICH WILL BE LABELED AS FOLLOWS:

PHOTOVOLTAIC MAINTENANCE
DC DISCONNECT SWITCH

- THIS PHOTOVOLTAIC SYSTEM WILL BE EQUIPPED WITH AN AC DISCONNECT WHICH WILL BE LABELED AS FOLLOWS:

PHOTOVOLTAIC AC DISCONNECT

- A MARKING SPECIFYING THE PHOTOVOLTAIC POWER SOURCE RATED AS FOLLOWS SHALL BE PROVIDED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS FOR THE POWER SOURCE:

OPERATING CURRENT (##) AMPS
OPERATING VOLTAGE (##) VOLTS
MAXIMUM SYSTEM VOLTAGE (##) VOLTS
SHORT CIRCUIT CURRENT (##) AMPS

NOTE : ## VALUES TO BE PROVIDED BY CONTRACTOR PER ACTUAL INSTALLATION.

- ALL MAJOR EQUIPMENT SHALL BE PROPERLY LABELED WITH ARC-FLASH HAZARD SIGNS AS REQUIRED BY NFPA 70E.

CONDUCTORS

- COMPLETELY INSTALL ALL CONDUIT RUNS AND BACKFILL BEFORE PULLING CABLE. PULL A FLEXIBLE MANDREL AND BRUSH THROUGH EACH CONDUIT AFTER INSTALLATION.
- USE CABLE MANUFACTURER APPROVED PULLING LUBRICANT. CABLE PULLING LUBRICANT MUST BE RATED FOR THE CABLE BEING PULLED.
- CABLE PULLS PERFORMED USING MACHINERY SHALL BE EQUIPPED WITH TENSION INDICATORS SUCH THAT THE CONTRACTOR CAN ENSURE THAT THE TENSION DOES NOT EXCEED WIRE AND CABLE MANUFACTURER'S MAXIMUM TENSION REQUIREMENTS.
- TERMINATE ALL CONTROL WIRING BETWEEN PIECES OF EQUIPMENT ON FIELD WIRING TERMINAL BOARDS. LABEL ALL CONTROL WIRES WITH TERMINAL BOARD AND TERMINAL NUMBER IDENTIFICATION AT BOTH ENDS.
- ALL BURIED OR INACCESSIBLE GROUND CONNECTIONS SHALL BE BY EXOTHERMIC (CADWELD) PROCESS.
- VERIFY PROPER TORQUE OF ALL BOLTED CONNECTIONS USING A CALIBRATED TORQUE WRENCH AND MARK EACH BOLT HEAD TO INDICATE VERIFICATION IS COMPLETE.

TRENCHING

- CONTACT SOUTH CAROLINA 811 PRIOR TO ANY DIGGING.

PHONE# 811 OR 1-888-721-7877
810 DUTCH SQUARE BLVD, SUITE 320
COLUMBIA SC 29210



MONDAY-FRIDAY 7:30-10:30

NOTIFY 3-10 WORKING DAYS PRIOR TO SCHEDULED DIG
MARKINGS ARE VALID FOR 15 WORKING DAYS

- BACKFILL THAT CONTAINS LARGE ROCKS, PAVING MATERIALS, CINDERS, LARGE OR SHARPLY ANGULAR SUBSTANCES, OR CORROSIVE MATERIAL SHALL NOT BE PLACED IN AN EXCAVATION WHERE MATERIALS MAY DAMAGE RACEWAYS, CABLES, OR OTHER SUBSTRUCTURES OR PREVENT ADEQUATE COMPACTION OF FILL OR CONTRIBUTE TO CORROSION OF RACEWAYS, CABLES, OR OTHER SUBSTRUCTURES. WHERE NECESSARY TO PREVENT PHYSICAL DAMAGE TO THE RACEWAY OR CABLE, PROTECTION SHALL BE PROVIDED IN THE FORM OF GRANULAR OR SELECTED MATERIAL, SUITABLE RUNNING BOARDS, SUITABLE SLEEVES, OR OTHER APPROVED MEANS.
- FOR PERPENDICULAR CROSSINGS OF EXISTING UNDERGROUND UTILITIES, THE RUNS SHALL GO OVER OR UNDER THE UTILITY AND BE BURIED AT A DEPTH NOT CLOSER THAN 18 INCHES FROM THE UTILITY. THE CONTRACTOR SHALL PLY PARTICULAR ATTENTION TO COMPACTION DURING BACKFILL TO INSURE THAT THE UNDERGROUND UTILITY LINES ARE SUPPORTED PROPERLY AND NO DAMAGE IS DONE TO THE SUBSURFACE UTILITY. THE CONTRACTOR IS INSTRUCTED TO HAND-DIG WITHIN 12 INCHES OF ANY UNDERGROUND UTILITY IN ORDER TO SPECIFICALLY LOCATE IT.

INVERTER

- INVERTER SHALL BE HANDLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND DOCUMENTATION. ALL INSTRUCTIONS AND REFERENCE DOCUMENTS SHALL BE REVIEWED AND UNDERSTOOD BY THE CONTRACTOR PRIOR TO HANDLING AND UNPACKING THE EQUIPMENT.
- INVERTER SHALL BE STORED IN A SECURE AND CLEAN LOCATION PER THE MANUFACTURER'S RECOMMENDATIONS AND DOCUMENTATION. INVERTERS SHALL BE PROTECTED FROM THE ENVIRONMENT SUCH AS HEAT, COLD, MOISTURE, DUST, SNOW, ETC.
- REFERENCE THE MANUFACTURER'S INSTRUCTIONS FOR UNPACKING THE EQUIPMENT. INVERTERS SHALL BE TRANSPORTED BY MEANS OUTLINED IN THE MANUFACTURER'S DOCUMENTATION ONLY.
- THE CONTRACTOR IS TO ENSURE THAT WORKING CLEARANCES MEET THE REQUIREMENTS OF ALL APPLICABLE CODES AND THE MANUFACTURER'S REQUIREMENTS. ANY DISCREPANCIES SHALL BE REPORTED TO THE OWNER IMMEDIATELY.
- ALL DISCONNECT SWITCHES SHALL BE IN THE OPEN POSITION DURING INSTALLATION AND SHALL REMAIN IN THE OPEN POSITION UNTIL PROPER TESTING, INSPECTION, AND COMMISSIONING HAS BEEN COMPLETED.
- DO NOT OPEN THE INVERTER OR ELECTRICAL CABINETS WHEN IT IS RAINING OR HUMIDITY EXCEEDS 95%.
- ALL FASTENERS SHALL BE TORQUED PER THE MANUFACTURER'S DOCUMENTATION.
- IT IS PROHIBITED TO MODIFY THE INVERTER OR INSTALL EQUIPMENT NOT EXPLICITLY RECOMMENDED BY THE MANUFACTURER.
- ALL CONDUCTORS SHALL BE CONNECTED TO THE INVERTER PER THE MANUFACTURER'S DOCUMENTATION, MAKING NOTE OF RECOMMENDED TERMINATIONS, TORQUE VALUES, AND BOLT STACK UP DETAILS IF PROVIDED. ALL BUSS BARS, CONDUCTORS, AND TERMINATIONS SHALL BE CLEAN PRIOR TO MAKING THE CONNECTION.
- PHOTOVOLTAIC SYSTEM DC GROUNDING CONFIGURATIONS MAY VARY BY MANUFACTURER AND TECHNOLOGY. THE GROUNDING CONFIGURATION SHALL BE NOTED BY THE CONTRACTOR FOR SAFETY AND PROPER INSTALLATION.

TESTING AND COMMISSIONING

- CONTRACTOR IS TO OBTAIN ALL ELECTRICAL APPROVALS BY THE AUTHORITIES HAVING JURISDICTION, APPROVAL FROM THE ELECTRIC UTILITY SERVICE PROVIDER, AND APPROVAL FROM THE OWNER PRIOR TO ENERGIZING ANY INVERTERS.
- COMMISSIONING, INSPECTION, AND TESTING OF THE SYSTEM SHALL BE CONDUCTED AND DOCUMENTED INTERNALLY BY CONTRACTOR.
- OWNER AND/OR OWNER REPRESENTATIVE MAY BE PRESENT DURING TESTING AND COMMISSIONING. OWNER WILL BE NOTIFIED OF TESTING AND COMMISSIONING SCHEDULE.
- ALL COMMISSIONING, INSPECTION, AND TESTING DOCUMENTS WILL BE TURNED OVER TO OWNER UPON COMPLETION OF PROJECT.

INDEX OF DRAWINGS

DRAWING #	TITLE	DESCRIPTION
PV-001	GENERAL	SOLAR 'PV' COVER SHEET, NOTES, LEGENDS, AND INDEX OF DRAWINGS
PV-101	PLAN / ARRANGEMENT	SITE LOCATION, EXISTING CONDITIONS, ARRAY LAYOUT, EQUIPMENT & ICP
PV-201	PLAN / ARRANGEMENT	STRING LAYOUT, EQUIPMENT LOCATION & CONDUIT ROUTING
PV-301	ELEVATIONS / SECTIONS	MODULE AND EQUIPMENT MOUNTING SECTIONS AND ELEVATIONS
PV-401	MODULE MOUNTING	ARRAY 1.1 & 1.2 ATTACHMENT AND RAIL LAYOUT PLAN
PV-601	ONE LINE DIAGRAM	SOLAR 'PV' ELECTRICAL ONE-LINE DIAGRAM
PV-602	TABLES & SCHEDULES	EQUIPMENT /OC/PD/CONDUIT/CONDUCTOR SCHEDULES
PV-701	SAFETY	NEC AND NFPA LABELS

COLUMBIA METRO AIRPORT

ELEV	HIGH TEMP		DISTANCE ABOVE ROOF			EXTREME MIN	COLD ΔT	HOT ΔT
	0.4%	2% AVG	0.5"	3.5"	12"			
69M	38° C	36° C	58° C	53° C	50° C	(-)10° C	(-)35° C	28° C

PERMIT INFO

AHJ: _____
LICENSED ELECTRICIAN: _____
ELECTRICAL LICENSE #: _____
PERMIT #: _____

ABBREVIATIONS

A	AMPERES
AC	ALTERNATING CURRENT
AF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BC	BARE COPPER
C	CONDUIT
CB	COMBINER BOX
COM	COMMUNICATION
CONT	CONTINUED
CP	CURRENT PANEL
CT	CURRENT TRANSFORMER
CU	COPPER
DC	DIRECT CURRENT
DAS	DATA ACQUISITION SYSTEM
DIAL	DISCONNECT
DP	DIP POLE
DS	DISCONNECT SWITCH
DWG	DRAWING
EG	EQUIPMENT GROUND
EGC	EQUIPMENT GROUND CONDUCTOR
ELEV	ELEVATION
ELEC	ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
FMC	FLEXIBLE METAL CONDUIT
G	GROUND
GALV	GALVANIZED
GEN	GENERATOR
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GND	GROUND
GRC	GALVANIZED RIGID CONDUIT
ISC	SHORT CIRCUIT CURRENT
IMP	CURRENT AT MAX POWER
INV	INVERTER
J	JUNCTION
KAIC	(THOUSAND) AMPERES INTERRUPTING CAPACITY
KVA	KILOVOLT AMPERES
KW	KILOWATT
LA	LIGHTNING ARRESTOR
MAX	MAXIMUM
MCM	THOUSANDS OF CIRCULAR MILS
MH	MAN HOLE
MIN	MINIMUM
MNT	MOUNT
MOD	MODULE
MTR	METER
MTS	MANUAL TRANSFER SWITCH
N	NEUTRAL
NEMA	NATIONAL ELECTRICAL CODE
NEC	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NF	NON-FUSED
NIC	NOT IN CONTACT
NTS	NOT TO SCALE
OC	ON CENTER
OH	OVERHEAD
PH	POLE
PLCS	PHASE
PLACES	PLACES
PTB	PASS THROUGH BOX
PV	PHOTOVOLTAIC
PWR	POWER
PVC	POLYVINYL CHLORIDE
REF	REFERENCE
RMC	RIGID METAL CONDUIT
SCH	SCHEDULE
SPEC	SPECIFICATION
SSMR	STANDING SEAM METAL ROOF
SS	STAINLESS STEEL
STC	STANDARD TEST CONDITION
SQ	SQUARE
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TX	TRANSFORMER
TYP	TYPICAL
UG	UNDERGROUND
UN	UNLESS OTHERWISE NOTED
UP	UTILITY POLE
V	VOLTS
VDC	DIRECT CURRENT VOLTAGE
VMP	VOLTAGE AT MAX POWER
VOC	OPEN CIRCUIT VOLTAGE
W	WIRE OR WATT
WP	WEATHER PROOF

SOLAR PV SYSTEM OVERVIEW

Module Name:	Canadian Solar Max Power CS6X-315P
(#) of Modules:	60
Inverter Name:	Solectria Renewables PVI 14TL
(#) of Inverters:	1
(#) Modules in Series:	10
(#) of Strings:	6
System Size (DC):	18.9 kW
System Size (AC):	14.0 kW
Array Tilt Angle:	Fixed = 18° (4:12 Pitch)
Array Azimuth (N=0°):	≈ 249.5°

CONSTRUCTION

CODES & SPECIFICATIONS

- NATIONAL ELECTRIC CODE (NEC)
- NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
- INTERNATIONAL BUILDING CODE (IBC)
- OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)
- LOCAL CODES, REGULATIONS, AND ORDINANCES
- SITE SPECIFIC CODES AND/OR SPECIFICATIONS
- THE AUTHORITY HAVING JURISDICTION (AHJ)

- NOTE: DESIGN AND CONSTRUCTION SHALL ADHERE TO THE LATEST VERSION OF EACH CODE AND/OR SPECIFICATION ADOPTED BY THE AUTHORITY HAVING JURISDICTION (AHJ).

- * IN THE EVENT OF CODES AND/OR SPECIFICATIONS CONTRADICTING EACH OTHER, CHECK WITH THE AHJ FOR ORDER OF PRECEDENCE.

GENERAL ARRANGEMENT

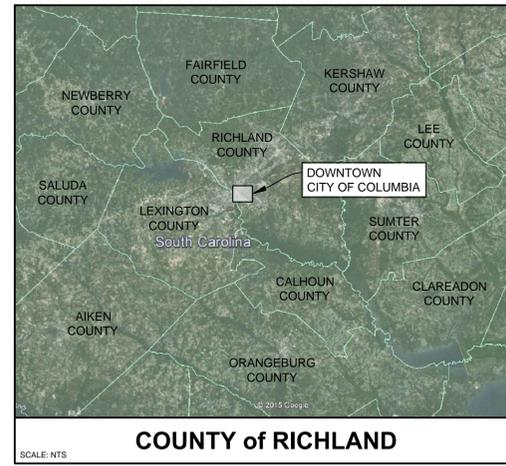
SYMBOL LEGEND

	EQUIPMENT IDENTIFIER
	CIRCUIT IDENTIFIER
	SOLAR 'PV' MODULES
	SPARE MODULE (DUMMY MODULE)
	MODULE STRING
	GROUND ROD OR LPS AIR TERMINAL
	EXISTING UTILITY POLE
	INSTALL UTILITY POLE
	UTILITY POLE GUYING
	FUSE
	STEP-UP TRANSFORMER

ONE-LINE DIAGRAM

SYMBOL LEGEND

	EQUIPMENT IDENTIFIER
	LINE IDENTIFIER
	FUSE
	FUSE
	CIRCUIT BREAKER
	DISCONNECTION SWITCH
	TRANSFORMER
	GROUND
	LIGHTNING ARRESTOR
	SOLAR PHOTOVOLTAIC MODULE
	INVERTER
	REVENUE METER
	CELL MODEM
	PYRANOMETER
	ANEMOMETER
	AMBIENT AIR TEMP SENSOR
	MODULE CELL TEMP SENSOR



1 PV-201 PV DETAIL
SCALE: 1"=20'

LEGEND

- POTENTIAL SHADING CALCULATED FOR WINTER SOLSTICE DECEMBER 21ST BETWEEN THE HOURS OF 9AM AND 3PM
- (E)=EXISTING
- (N)=NEW

GENERAL NOTES

- DRAWING DOES NOT REPRESENT ALL EXISTING CONDITIONS SUCH AS EQUIPMENT, VENTS, AND OBJECTS.
- LOCATIONS AND DIMENSIONS OF EXISTING CONDITIONS ARE BASED OFF BEST AVAILABLE INFORMATION AND SHOULD BE FIELD VERIFIED.
- OWNER SHALL BE RESPONSIBLE FOR MAINTAINING VEGETATION TO PREVENT SHADING ON SOLAR MODULES.

COL (RET) Dave McNeil
3297 Pacific St
N. Charleston, SC 29418
NABCEP Certified
PV Installer - 100414-003117

PROJECT ENGINEER:
Jack Brandon
NABCEP Certified
PV Installer - 102415-012142

DESIGNER DRAFTER:
Andrew Slaw
Solar PV Designer

PERMIT SET

REV	DATE	BY	REVISION DESCRIPTION	APRVD
0	05/01/2016	ASL/AM	PERMIT SET	ZEM/AM
B	03/16/2016	ASL/AM	PROJECT AWARD AND GENERAL REVISIONS	
A	11/24/2015	ASL/AM	INITIAL DRAWING CREATION AND RELEASE	

MIDLANDS HOUSING ALLIANCE
2025 Main Street
Columbia, SC 29201
18.9 kW DC (14 kW AC) Solar System
Standing Seam Metal Roof Mount
PROJECT AND ARRAY LOCATION
EXISTING SITE CONDITIONS

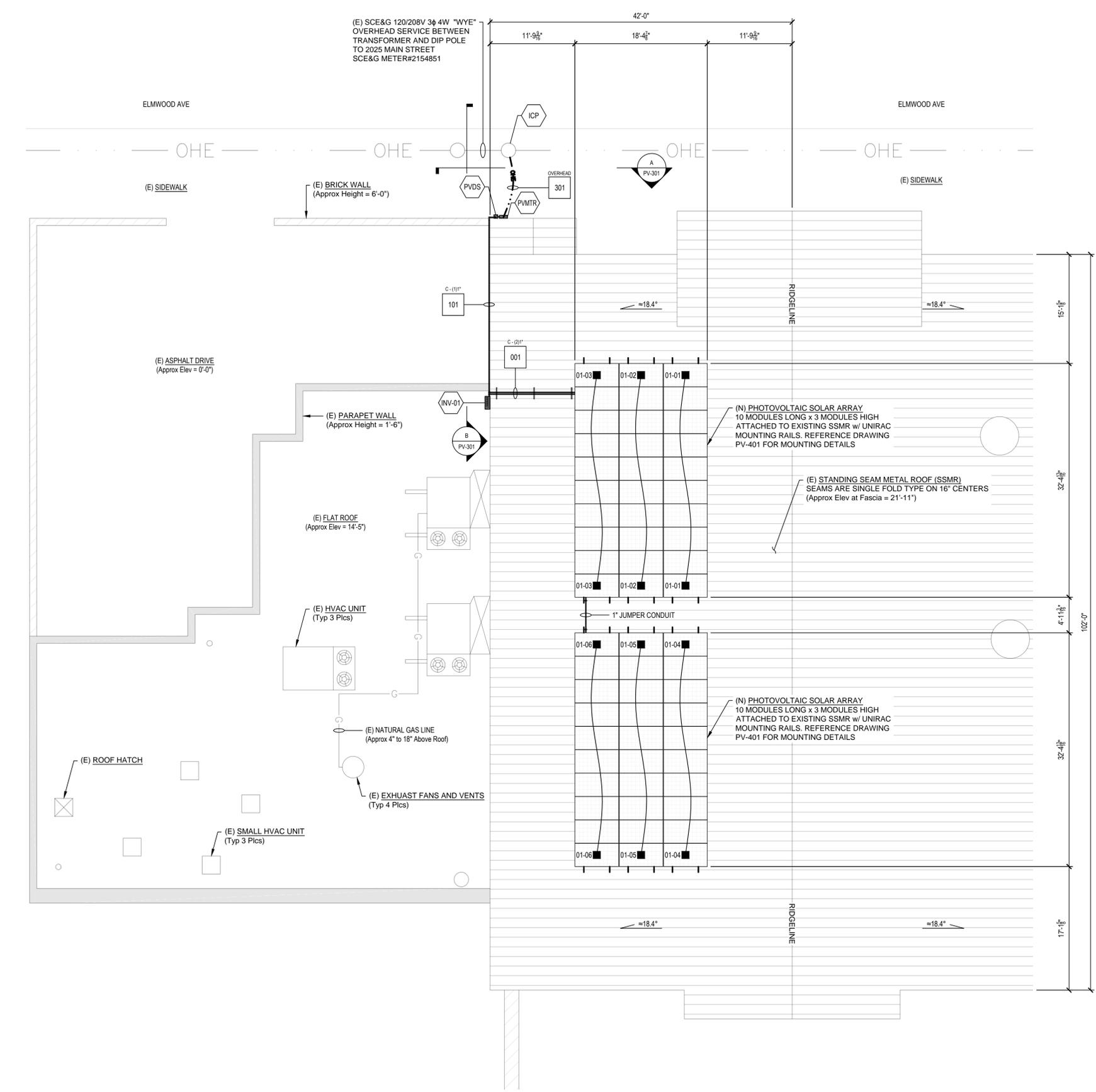
PROJECT NO:	1605
DRAWING NO:	PV-101
SHEET NO:	N/A
SHEET SIZE:	ANSI-D / 22x34
FILE NAME:	1605-Midlands-Housing-Alliance-PV-101-Site-Plan.dwg
SCALE:	AS NOTED
REVISION DATE:	05/01/2016
REVISION:	0

THIS DOCUMENT CONTAINS INTELLECTUAL DESIGN OR COPY WRITE PROPERTY OF HANNAH SOLAR GOVERNMENT SERVICES, LLC WHICH IS PRIVILEGED OR CONFIDENTIAL AND IS NOT TO BE REPRODUCED, DISCLOSED, USED IN ANY MANNER OR DISTRIBUTED WITHOUT WRITTEN PERMISSION OF HANNAH SOLAR GOVERNMENT SERVICES, LLC

REV	DATE	BY	REVISION DESCRIPTION	APRVD
0	05/01/2016	ASLAW	PERMIT SET	JEREMAHY
A	03/29/2016	ASLAW	INITIAL DRAWING CREATION AND RELEASE	

MIDLANDS HOUSING ALLIANCE
 2025 Main Street
 Columbia, SC 29201
 18.9 kW DC (14 kW AC) Solar System
 Standing Seam Metal Roof Mount
GENERAL ARRANGEMENT
DC STRINGS AND CONDUIT ROUTING

PROJECT NO:	1605
DRAWING NO:	PV-201
SHEET NO:	N/A
SHEET SIZE:	ANSI-D / 22x34
FILE NAME:	1605-Midlands-20W-PVDC-PV-201-PV-Permit.dwg
SCALE:	AS NOTED
REVISION DATE:	05/01/2016
REVISION:	0



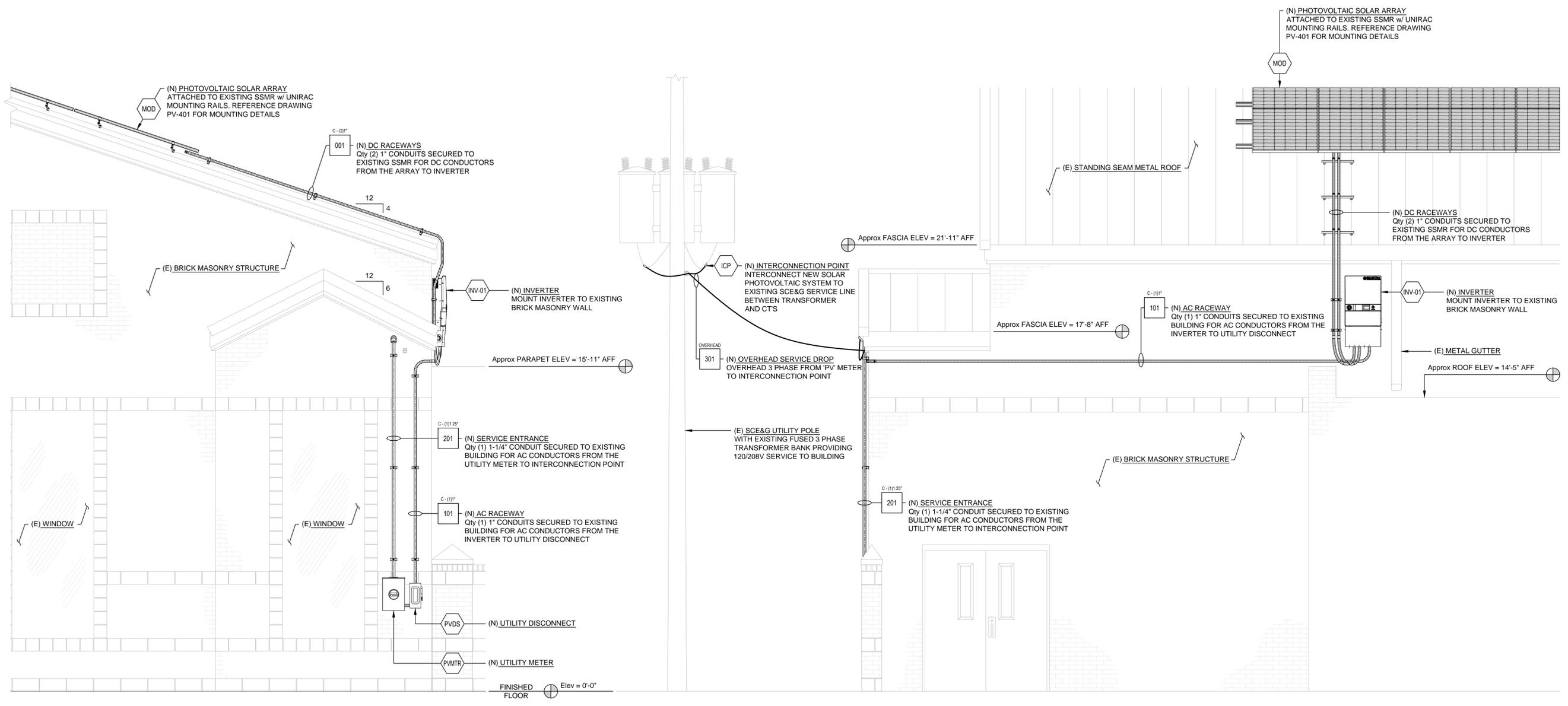
1 STRING LAYOUT
 PV-201
 SCALE: 1/8" = 1'-0"

PERMIT SET

REV	DATE	BY	REVISION DESCRIPTION	APRVD
0	05/01/2016	ASL/AM	PERMIT SET	J. BRAN/AM

MIDLANDS HOUSING ALLIANCE
 2025 Main Street
 Columbia, SC 29201
 18.9 kW DC (14 kW AC) Solar System
 Standing Seam Metal Roof Mount
SECTIONS AND ELEVATIONS
MODULE AND EQUIPMENT MOUNTING

PROJECT NO:	1605
DRAWING NO:	PV-301
SHEET NO:	N/A
SHEET SIZE:	ANSI-D / 22x34
FILE NAME:	1605-Midlands-20W PVDC-PV-301-Sections & Elevations.dwg
SCALE:	AS NOTED
REVISION DATE:	05/01/2016
REVISION:	0



A INTERCONNECTION POINT ELEVATION
 PV-301 SCALE: 3/8" = 1'-0"
 LOOKING SOUTH EAST

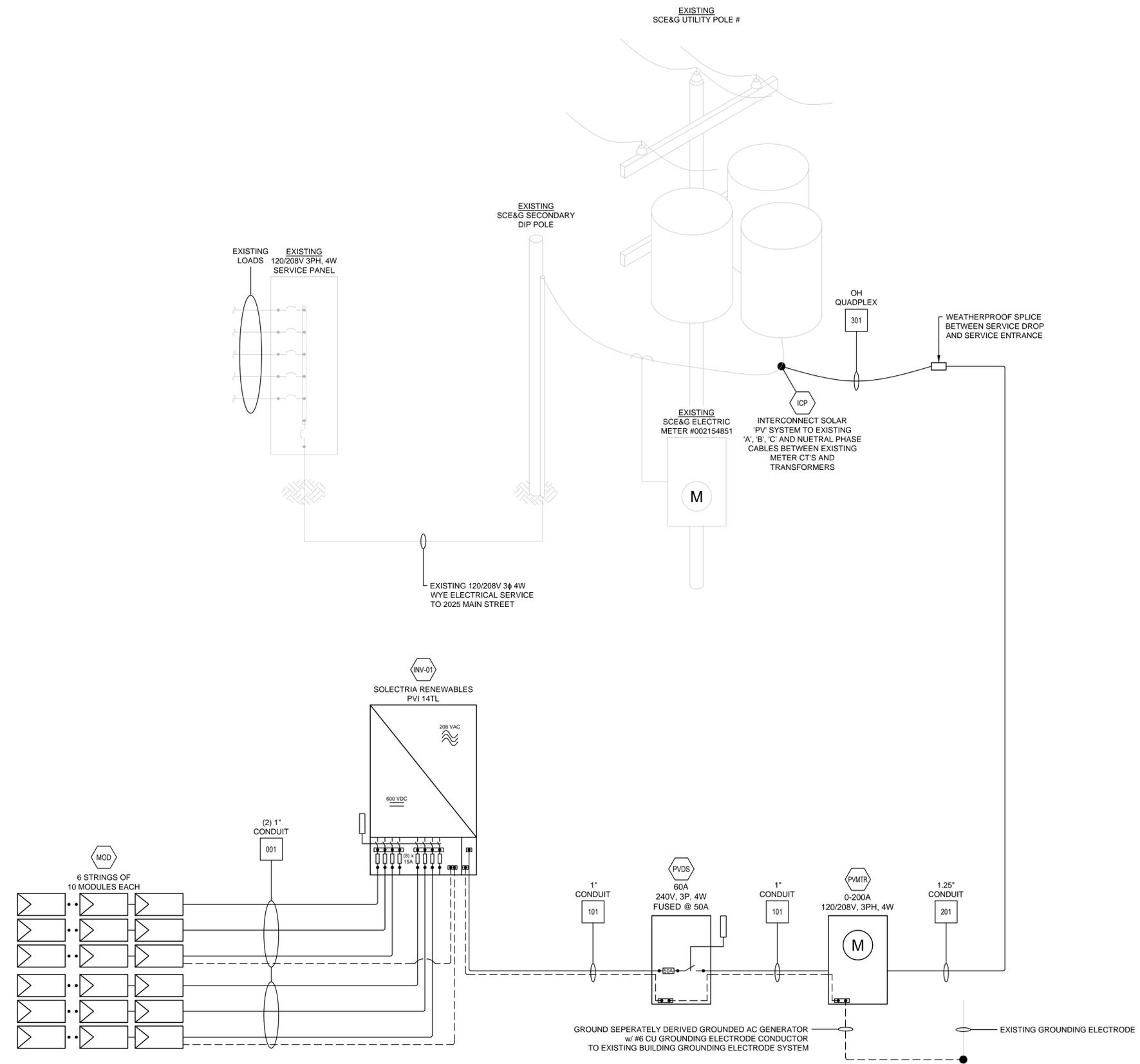
B PV EQUIPMENT ELEVATION
 PV-301 SCALE: 3/8" = 1'-0"
 LOOKING NORTH EAST

SOLAR PV SYSTEM OVERVIEW	
Module Name:	Canadian Solar Max Power CS6X-315P
(#) of Modules:	60
Inverter Name:	Solectria Renewables PVI 14TL
(#) of Inverters:	1
(#) Modules in Series:	10
(#) of Strings:	6
System Size (DC):	18.9 kW
System Size (AC):	14.0 kW
Array Tilt Angle:	Fixed = 18° (4:12 Pitch)
Array Azimuth (N=0°):	≈ 249.5°

PERMIT SET

THIS DOCUMENT CONTAINS INTELLECTUAL DESIGN OR COPY WRITE PROPERTY OF HANNAH SOLAR GOVERNMENT SERVICES, LLC WHICH IS PRIVILEGED OR CONFIDENTIAL AND IS NOT TO BE REPRODUCED, DISCLOSED, USED IN ANY MANNER OR DISTRIBUTED WITHOUT WRITTEN PERMISSION OF HANNAH SOLAR GOVERNMENT SERVICES, LLC

REV	DATE	BY	REVISION DESCRIPTION	APRVD
0	05/01/2016	ASLAW	PERMIT SET	ZEREMOV
B	04/08/2016	ASLAW	ISSUED WITH INTERCONNECTION APPLICATION	ZEREMOV
A	03/25/2016	ASLAW	INITIAL DRAWING CREATION AND RELEASE	



MIDLANDS HOUSING ALLIANCE
2025 Main Street
Columbia, SC 29201
18.9 kW DC (14 kW AC) Solar System
Standing Seam Metal Roof Mount
ONE LINE DIAGRAM

PROJECT NO:	1605
DRAWING NO:	PV-601
SHEET NO:	N/A
SHEET SIZE:	ANSI-D / 22x34
FILE NAME:	1605-Midlands-Housing-Alliance-PV-601-One-Line-01.dwg
SCALE:	AS NOTED
REVISION DATE:	05/01/2016

PERMIT SET

EQUIPMENT SCHEDULE				
EQUIPMENT DESIGNATION	MANUFACTURER	MODEL #	QTY	DESCRIPTION
MOD	CANADIAN SOLAR	CS6X-315P	60	POLY CRYSTALLINE (72) CELL SOLAR MODULE RATED FOR 1000 VDC. TEMPERED GLASS w/ CLEAR ANODIZED ALUMINUM ALLOY FRAME. IP 67 RATED JUNCTION BOX w/ (3) BYPASS DIODES. FACTORY STANDARD 12 AWG 'PV' WIRE LEADS AND FRIENDS PV2 CONNECTORS.
INV	SOLECTRIA RENEWABLES	PVI 14TL	1	TRANSFORMERLESS 3-PH STRING INVERTER w/ DUAL MAX POWER POINT TRACKERS. INVERTER DC INPUT RATED FOR 600 VDC AND 25 AMP PER MPPT. INVERTER AC OUTPUT IS 3-PH 4 WIRE 208 VAC w/ 39 Max AMPS AT A 60 HZ FREQUENCY. FULLY INTEGRATED DC CONNECTION BOX WITH DISCONNECT SWITCH. USER-INTERACTIVE LCD SCREEN AND OPTIONAL WEB BASED MONITORING VIA RS-485 PORTS. NEMA 4 POLYESTER POWDER COATED ALUMINUM ENCLOSURE.
PVDS	SQUARE D	D322NRB	1	FUSIBLE (3) POLE GENERAL DUTY SINGLE THROW 'AC' DISCONNECT SWITCH RATED FOR 240 VAC AND 60 AMP w/ 100KA SCCR. FACTORY INSTALLED NEUTRAL ASSEMBLY. GRAY BAKED ENAMEL NEMA 3R ENCLOSURE.
	MERSEN	A2K50R	2	FAST ACTING 250 VAC 50 AMP CLASS RK1 REJECTION STYLE FUSES w/ 200KAIC RATING
PVMTR		TBD	1	7 JAW SOCKET NEMA 3R RATED METER ENCLOSURE FOR SCE&G 3-PH 4 WIRE 120/208V FORM 16S METER RATED FOR 0-200 AMPS.
ICP	N/A			INTERCONNECTION POINT BETWEEN EXISTING SCE&G METER #002154851 AND UTILITY TRANSFORMER ON SCE&G POLE #

SOURCE CIRCUIT	
Modules in Series:	10
Vmax (V):	495.74
Vmp (V):	366.00
Vmin (V):	326.98
Lifetime Vmin (V):	277.94
Imp (A):	8.61
Isc (A):	9.18
Imax (A):	11.63
Imax x 125%:	14.54
String Fuse (A):	15

PV MODULE SPECIFICATIONS	
Module Name:	Canadian Solar CS6X-315P
STC Power Rating (W):	315
Voc (V):	45.1
Vmp (V):	36.6
Isc (A):	9.18
Imp (A):	8.61
NOCT (°C):	45.0
TC Isc (%/C):	0.053
TC Voc (%/C):	-0.310
TC Pmax (%/C):	-0.410
Module Efficiency:	16.42%

OCPD, VOLTAGE DROP, CONDUCTOR & RACEWAY TABLE												
DC POWER												
GENERAL			OCPD		VOLTAGE DROP				CONDUCTOR AND CONDUIT			
Circuit Description	Circuit ID	Max One-Way Distance	Operating Current	Fuse/Breaker	Distance(ft) x 2	Imp (A) x # of parallel strings	Conductor (Ohm/Kft) x 100	(Sys Nom. Voltage x # of modules in string) x 1000	Voltage Drop (%)	Service Conductor Size & Type	EGC Size & Type	Raceway Size & Qty
PV STRING TO INV-## (Max)	001	100 Ft	9.18A	15A	100 x 2 x	8.61 x 1 x	1.21 x 100	/(*27.79V x 10 x 1000)	0.75%	2#10 CU USE-2	1#10 CU THWN-2	(2) x 1"
					*27.79V COMES FROM LIFETIME MIN VOLTAGE OF MODULES AT HIGHEST RECORD TEMP.				MAX TOTAL DC VOLT DROP: 0.75%			
AC POWER												
GENERAL			OCPD		VOLTAGE DROP				CONDUCTOR AND CONDUIT			
Circuit Description	Circuit ID	Max One-Way Distance	Operating Current	Fuse/Breaker	Distance(ft) x 2	Imp (A) x # of parallel strings	Conductor (Ohm/Kft) x 100	(Sys Nom. Voltage x # of modules in string) x 1000	Voltage Drop (%)	Service Conductor Size & Type	EGC Size & Type	Conduit Size & Qty
INV TO PVMTR	101	50 Ft	**39A	50A	50 x 2 x	39 x 1 x	0.49 x 100	/(208 x 1 x 1000)	0.92%	4#6 CU THWN-2	1#10 CU THWN-2	(1) x 1"
PVMTR TO WEATHERHEAD	201	20 Ft	**39A	50A	20 x 2 x	39 x 1 x	0.20 x 100	/(208 x 1 x 1000)	0.15%	4#2 CU THWN-2	N/A	(1) x 1.25"
WEATHERHEAD TO ICP	301	20 Ft	**39A	50A	20 x 2 x	39 x 1 x	0.32 x 100	/(208 x 1 x 1000)	0.24%	#2 AL AAC XLP QUADPLEX	N/A	N/A
					**INVERTER CONTINUOUS OUTPUT CURRENT IS 39A AT 208 VAC. INVERTER OUTPUT IS 208V WYE 3φ 4W w/ A NEUTRAL.				MAX TOTAL AC VOLT DROP: 1.31%			

INVERTER ELECTRICAL SPECIFICATIONS	
Inverter Name:	Solectria Renewables PVI 14TL
Input (DC)	
Max DC Voltage (V):	600
Rated MPPT Voltage (V):	300 - 540
MPPT Operating Voltage (V):	180 - 580
Strike Voltage (V):	300
Max Input Current (A):	25 / MPPT
(#) of MPPTs:	2
(#) of String Inputs:	4 / MPPT
Output (AC)	
Rated Power (W):	14,000
Nominal AC Voltage (V):	208V 3φ 4W
AC Frequency (Hz):	60
Max Output Current (A):	39 @ 208V
CEC Efficiency:	96.0%

REV	DATE	BY	DESCRIPTION	APRD
0	05/01/2016	ASL	PERMIT SET	ASL
1	04/08/2016	ASL	ISSUED WITH INTERCONNECTION APPLICATION	ASL
2	03/17/2016	ASL	INITIAL DRAWING CREATION AND RELEASE	ASL

MIDLANDS HOUSING ALLIANCE
 2025 Main Street
 Columbia, SC 29201
 18.9 kW DC (14 kW AC) Solar System
 Standing Seam Metal Roof Mount
SCHEDULES AND TABLES

PROJECT NO:	1605
DRAWING NO:	PV-602
SHEET NO:	N/A
SHEET SIZE:	ANSI-D / 22x34
FILE NAME:	1605-Midlands-20W-PVDC-PV-602-Schedules.dwg
SCALE:	AS NOTED
REVISION DATE:	05/01/2016
REVISION:	0

PVI 3800TL
PVI 5200TL
PVI 6600TL
PVI 7600TL

FEATURES

- 600 VDC
- Highest industry peak and CEC efficiencies
- Lightweight, compact design - smallest in the industry
- Quick and easy installation
- Wide operating voltage range
- DC disconnect
- Passive cooling
- DC arc-fault detection and interrupt

OPTIONS

- Web-based monitoring
- Revenue grade monitoring



TRANSFORMERLESS STRING INVERTERS

Solectria's PVI 3800TL, 5200TL, 6600TL, and 7600TL are compact, transformerless, single-phase inverters with the highest peak and CEC efficiencies in the industry. These inverters come standard with an integrated DC disconnect, DC arc-fault detection and interrupt, 1 or 2 MPP tracker(s), and a user-interactive LCD and keypad. Their small and lightweight design make for quick and easy installation and maintenance. They have an innovative passive cooling design which eliminates the need for fans in the inverter. These inverters include an enhanced DSP control, comprehensive protection functions, and advanced thermal design enabling highest reliability and uptime. Any PVI 3800-7600TL may be purchased with Solectria's Rapid Shutdown Combiner to comply with NEC 2014.



SPECIFICATIONS		PVI 3800TL	PVI 5200TL	PVI 6600TL	PVI 7600TL
DC Input					
Absolute Maximum Open Circuit Voltage		600 VDC			
Operating Voltage Range		120-550 VDC			
MPPT Input Voltage Range		200-500 VDC			
MPP Trackers		1	2		
Maximum Operating Input Current		20 A	15 A per MPP tracker	18 A per MPP tracker	20 A per MPP tracker
Start Voltage		150 V			
AC Output					
Nominal Output Voltage		208 or 240 VAC, 1-Ph			
AC Voltage Range		-12%/+10%			
Continuous Output Power	208 VAC	3300 W	5200 W	6600 W	6600 W
	240 VAC	3800 W	5200 W	6600 W	7600 W
Continuous Output Current	208 VAC	15.8 A	25 A	31.7 A	31.7 A
	240 VAC	15.8 A	21.6 A	27.5 A	31.7 A
Maximum Backfeed Current		0 A			
Nominal Output Frequency		60 Hz			
Output Frequency Range		59.3-60.5 Hz			
Power Factor		Unity, > 0.99			
Total Harmonic Distortion (THD) @ Rated Load		< 3%			
Efficiency					
Peak Efficiency		98.3%			
CEC Efficiency		97.5%			
Tare Loss		< 1 W			
Temperature					
Ambient Temperature Range (full power)		-13°F to +122°F (-25°C to +50°C)			
Storage Temperature Range		-40°F to +185°F (-40°C to +85°C)			
Relative Humidity (non-condensing)		0-100%			
Operating Altitude		6562 ft/2000 m			
Data Monitoring					
Optional SolrenView Web-based Monitoring		External			
Optional Revenue Grade Monitoring		External			
External Communication Interface		RS-485			
Testing & Certifications					
Safety Listings & Certifications		UL 1741/IEEE 1547, UL 1699B, CSA C22.2#107.1, FCC part 15 A&B			
Testing Agency		ETL	CSA		
Warranty					
Standard		10 year			
Optional		-			
Enclosure					
dBA (Decibel) Rating		< 45 dBA @ 3 m			
DC Disconnect		Standard, fully-integrated			
Dimensions (H x W x D)		17.5 x 15.8 x 8.5 in. (445 x 402 x 216 mm)	26.8 x 15.8 x 8.5 in. (681 x 402 x 216 mm)		
Weight		43 lbs (19.5 kg)	65 lbs (29.5 kg)		
Enclosure Rating		Type 4 + Salt Mist Corrosion Protection			
Enclosure Finish		Aluminum			



MAX POWER CS6X-310 | 315 | 320P

High quality and reliability in all Canadian Solar modules is ensured by 15 years' experience in module manufacturing, well-engineered module design, stringent BOM quality testing, an automated manufacturing process and 100% EL testing.

KEY FEATURES



Excellent module efficiency of up to 16.68 %



Outstanding low irradiance performance: 96.0 %



Positive power tolerance of up to 5 W



High PTC rating of up to 91.97%



IP67 junction box for long-term weather endurance



Heavy snow load up to 5400 Pa, wind load up to 2400 Pa



Salt mist, ammonia and blowing sand resistance, apply to seaside, farm and desert environments*



insurance-backed warranty
non-cancelable, immediate warranty insurance
linear power output warranty



product warranty on materials
and workmanship

MANAGEMENT SYSTEM CERTIFICATES*

ISO 9001:2008 / Quality management system

ISO/TS 16949:2009 / The automotive industry quality management system

ISO 14001:2004 / Standards for environmental management system

OHSAS 18001:2007 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: VDE / MCS / CE / SII / CEC AU / INMETRO

UL 1703 / IEC 61215 performance: CEC listed (US)

UL 1703: CSA / IEC 61701 ED2: VDE / IEC 62716: VDE / IEC 60068-2-68: SGS

Take-e-way / UNI 9177 Reaction to Fire: Class 1



* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. As a leading manufacturer of solar modules and PV project developer with over 14 GW of premium quality modules deployed around the world since 2001, Canadian Solar Inc. (NASDAQ: CSIQ) is one of the most bankable solar companies worldwide.

CANADIAN SOLAR INC.

545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

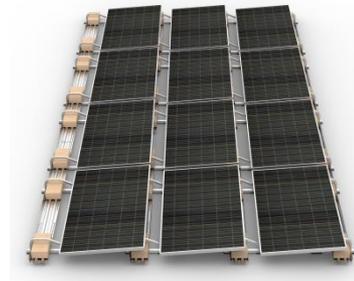


Polar Bear® III

DESIGN GUIDELINES v3.0



10 Degree



5 Degree

© 2015 PanelClaw, Inc. All Rights Reserved.

Design Guidelines for Polar Bear® III



Roof Loading	2.5 – 9 psf (12.2 – 44 kg/m ²) including racking, modules and ballast
Roof Slope	5° max slope (1/12 pitch) in all directions
Wind Speed	150 mph (193 km/h) – 3 second gust per ASCE7-05 Higher wind speeds require PanelClaw Technical Services review
Exposures	B and C D upon request
Seismic	A, B, C, D Category D may require mechanical attachments, or as required by the permitting authority
Maximum Building Height	60 ft (18.3 m), measured from grade. Heights above 60 ft generally require mechanical attachments; check with PanelClaw Technical Services
Standard Setback	6 ft (1.8 m) Set backs as low as 3 ft (0.9 m) are possible, but require PanelClaw Technical Services review
Roof Material	EPDM, TPO, PVC, Mod Bitumen, Asphalt, Coal Tar, Foam, and Gravel
Fire Certification Requirements	System Fire Rating Class A with Type 1 and Type 2 modules Polar Bear III 5 Degree may require additional fire shields to maintain rating
Ballast Block Size	Nominal 2"x8"x16", 3"x8"x16", or 4"x8"x16" blocks Actual dimensions: 1 5/8" or 2 5/8" or 3 5/8"x7 5/8"x15 5/8" with +/- 1/8" tolerance

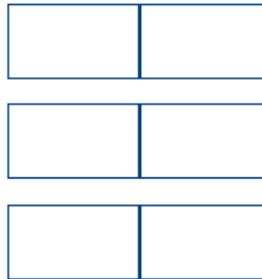
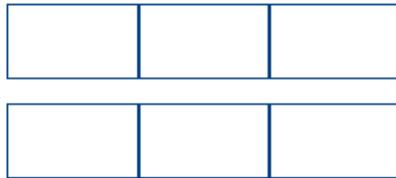
Layout Design Guidelines



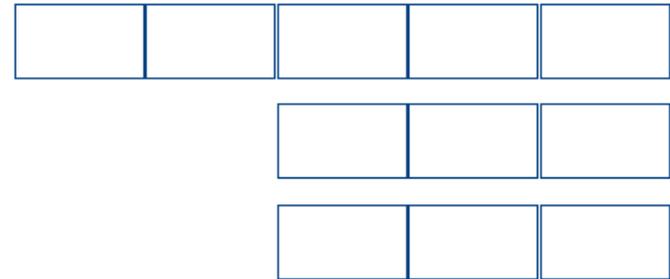
Maximum array size east west of 150'

Do limit north south but check with local authorities for specific code limitations

Minimum Array Size 2x3 or 3x2



Max Single Module Peninsula of 1x2



Max Single Module Wide Bridge of 1x5

