

# Historic District Commission

City Hall, Cranston, Rhode Island 02910

## APPLICATION FOR REVIEW OF PROPOSED WORK

### ATTACH TO COMPLETED BUILDING APPLICATION

1. Local District Name Oaklawn Village
2. Property Address (Street & #) 272 Wilbur Avenue
3. Plat # 18 Lot # 1757
4. Owner/Applicant Name: Kimberly Owens  
Address: 272 Wilbur Ave, Cranston, RI 02921  
  
Phone: Day 401-222-0881 Night \_\_\_\_\_
5. A. Designer's Name (if any): \_\_\_\_\_  
Address: \_\_\_\_\_  
  
Phone: Day \_\_\_\_\_ Night \_\_\_\_\_  
B. Contractor's Name (if any): Hyrum Bond / Rooftop Power  
Address: 275 W Natick RD, Ste 800, Warwick, RI 02886  
  
Phone: Day 833-787-7697 Night \_\_\_\_\_
6. Work Category:  
 New Structure(s)       Partial Demolition of Structure(s)  
 Addition to Structure       Total Demolition of Structure(s)  
 Remodeling of Structure       Sign(s)/Landscaping Features
7. Description of Proposed Work: INSTALL SOLAR  
19 MODULES-ROOF MOUNTED - 7.60 KWDC, 5.51 KWAC ON THE SOUTHERN  
SIDE OF THE ROOF

-OVER-

7. Continued \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ Check here if continued on additional sheet(s).

8. Included with the Application (check those submitted):  
PHOTOGRAPHS:

- Overall view of property from street(s)
- Overall views of building
- Existing details to be altered by work

\_\_\_\_\_ Other (Identify)  
DRAWINGS:

- Site Plan (drawn to scale) \_\_\_\_\_ Floor plan(s) (to scale)
- \_\_\_\_\_ Exterior Elevations  Details

OTHER:

- \_\_\_\_\_ Rendering(s) \_\_\_\_\_ Catalog Cuts
- Specifications \_\_\_\_\_ Other (Identify)

\_\_\_\_\_ Kimberly Owens

\_\_\_\_\_ Applicant's Name (printed)

\_\_\_\_\_ Applicant's Signature

DATE: 01/23/2023

Contact Person if other than Applicant:

Name (printed) Edgar Gonzalez

Phone: Day 401-345-0870 Night \_\_\_\_\_

FOR USE BY BUILDING OFFICIAL'S OFFICE ONLY

Date Received \_\_\_\_\_ Signature \_\_\_\_\_

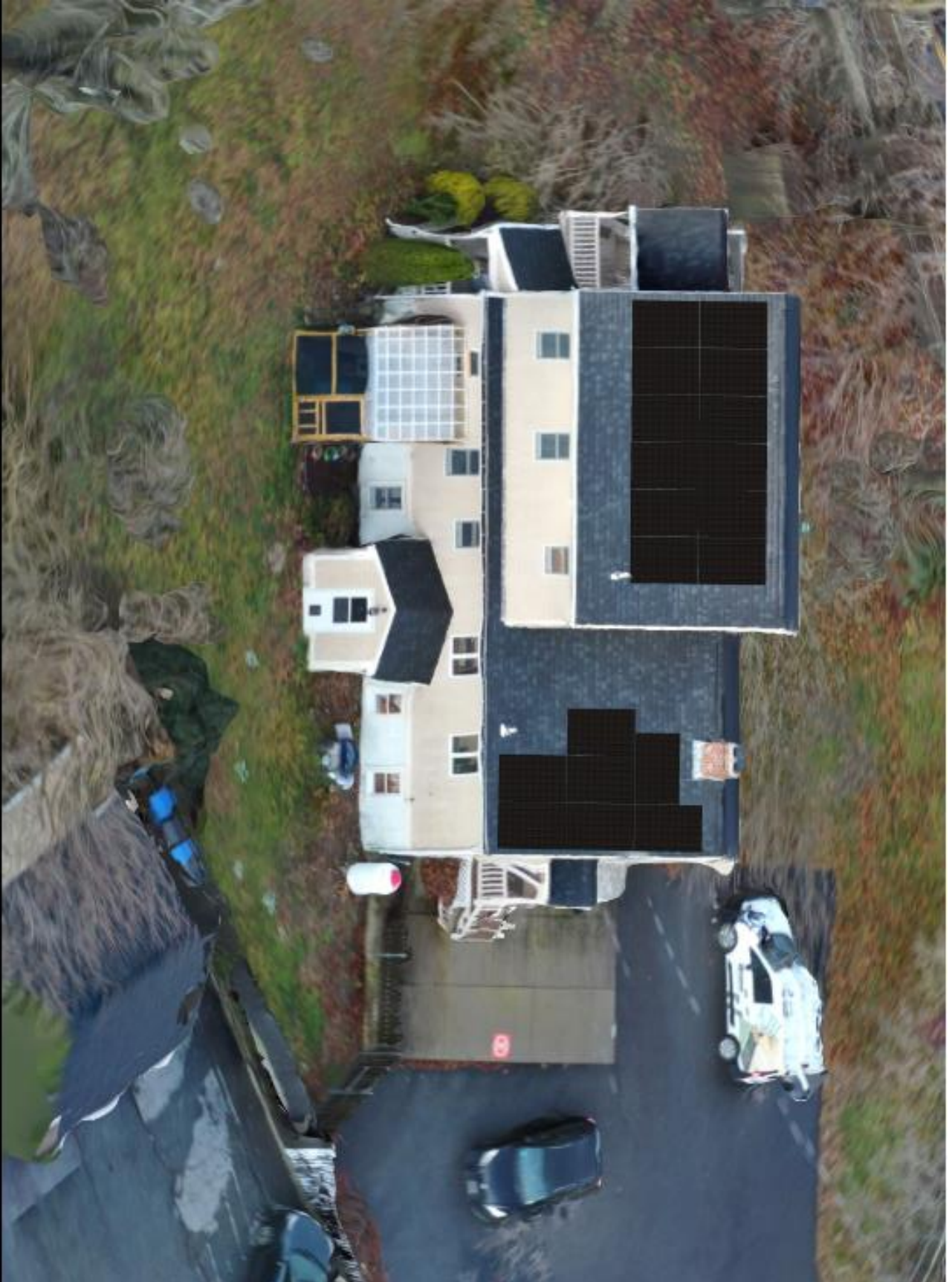
FOR HISTORIC DISTRICT COMMISSION USE ONLY

Completed Application Received:

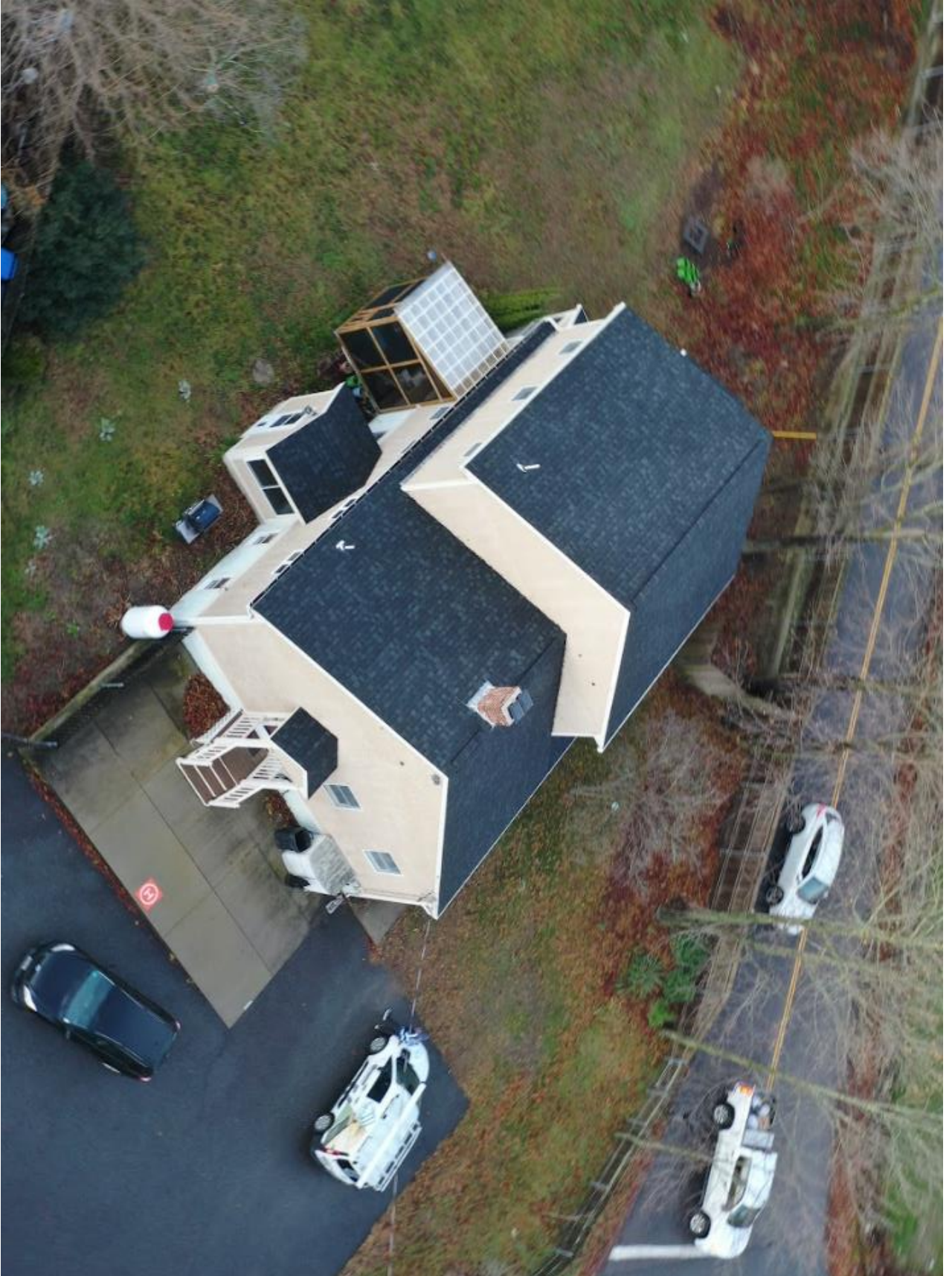
Date: \_\_\_\_\_ Signature \_\_\_\_\_



























# PHOTOVOLTAIC ROOF MOUNT SYSTEM

19 MODULES-ROOF MOUNTED - 7.60 kWDC, 5.51 kWAC

272 WILBUR AVE, CRANSTON, RI 02921 USA



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com

## SYSTEM SUMMARY:

- (N) 19 - PHONO SOLAR 400 M6-10B-R (400W) MODULES
- (N) 19 - ENPHASE ENERGY IQ7PLUS-72-2-US MICRO-INVERTERS
- (N) JUNCTION BOX
- (E) 150A MAIN SERVICE PANEL WITH (E) 150A MAIN BREAKER
- (N) 60A FUSED AC DISCONNECT
- (N) ENPHASE IQ COMBINER BOX 3

## DESIGN CRITERIA:

ROOF TYPE: - COMP SHINGLE  
NUMBER OF LAYERS: - 01  
ROOF FRAME: - 2"X4" TRUSSES @25" O.C.  
STORY: - TWO STORY  
SNOW LOAD : - 30 PSF  
WIND SPEED :- 125 MPH  
WIND EXPOSURE:- B  
EXPOSURE CATEGORY:- II  
COORDINATE: 41.757835, -71.487068

## GOVERNING CODES:

2020 NATIONAL ELECTRICAL CODE (NEC)  
2018 INTERNATIONAL BUILDING CODE (IBC)  
2018 INTERNATIONAL MECHANICAL CODE (IMC)  
2018 INTERNATIONAL RESIDENTIAL CODE (IRC)  
2018 INTERNATIONAL PLUMBING CODE (IPC)

## SHEET INDEX

PV-0	COVER SHEET
PV-1	SITE PLAN WITH ROOF PLAN
PV-2	ROOF PLAN WITH MODULES
PV-3	ATTACHMENT DETAILS
PV-4	ELECTRICAL LINE DIAGRAM
PV-5	PLACARDS & WARNING LABELS
PV-6+	EQUIPMENT SPEC SHEETS

## CONSTRUCTION NOTE:

- A LADDER SHALL BE IN PLACE FOR INSPECTION THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY GRID INTERACTIVE SYSTEM
- A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 690-47 AND 250-50 THROUGH 60 250-166 SHALL BE PROVIDED PER NEC, GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO AT THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, OR IS ONLY METALLIC WATER PIPING, A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO GREATER THAN #8 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE OR A COMPLETE GROUND.
- EACH MODULE WILL BE GROUNDED USING THE SUPPLIED GROUNDING POINTS IDENTIFIED BY THE MANUFACTURER.
- EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENT, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED, REGARDLESS OF VOLTAGE.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED
- ALL SIGNAGE WILL BE INSTALLED AS REQUIRED BY AND 2020 NEC.
- HEIGHT OF INTEGRATED AC/DC DISCONNECT SHALL NOT EXCEED 6' 7" THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE BETWEEN THE GROUNDING ELECTRODE AND THE PANEL (OR INVERTER) IF SMALLER THAN #6 AWG COPPER WIRE. THE GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AT BUSBARS WITHIN LISTED EQUIPMENT.
- ALL EXTERIOR CONDUIT SHALL BE PAINTED TO MATCH ADJACENT SURFACES.
- THE PV CONNECTION IN THE PANEL BOARD SHALL BE POSITIONED AT THE OPPOSITE (LOAD) END FROM THE INPUT FEEDER LOCATION OR MAIN CIRCUIT LOCATION.
- SITE CONDITIONS SHALL PREVAIL IF NO SCALE IS GIVEN. DRAWINGS ARE NOT NECESSARILY TO SCALE. ALL DIMENSIONS SHALL BE VERIFIED BY SUBCONTRACTOR UPON COMMENCEMENT OF CONSTRUCTION.

## ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH CEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE



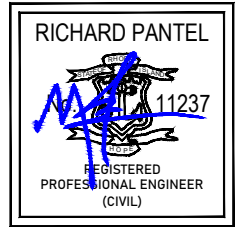
**1 AERIAL PHOTO**  
PV-0 SCALE: NTS



**2 VICINITY MAP**  
PV-0 SCALE: NTS



41.757835, -71.487068



Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

COVER SHEET

SHEET SIZE

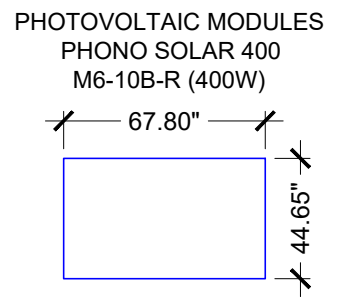
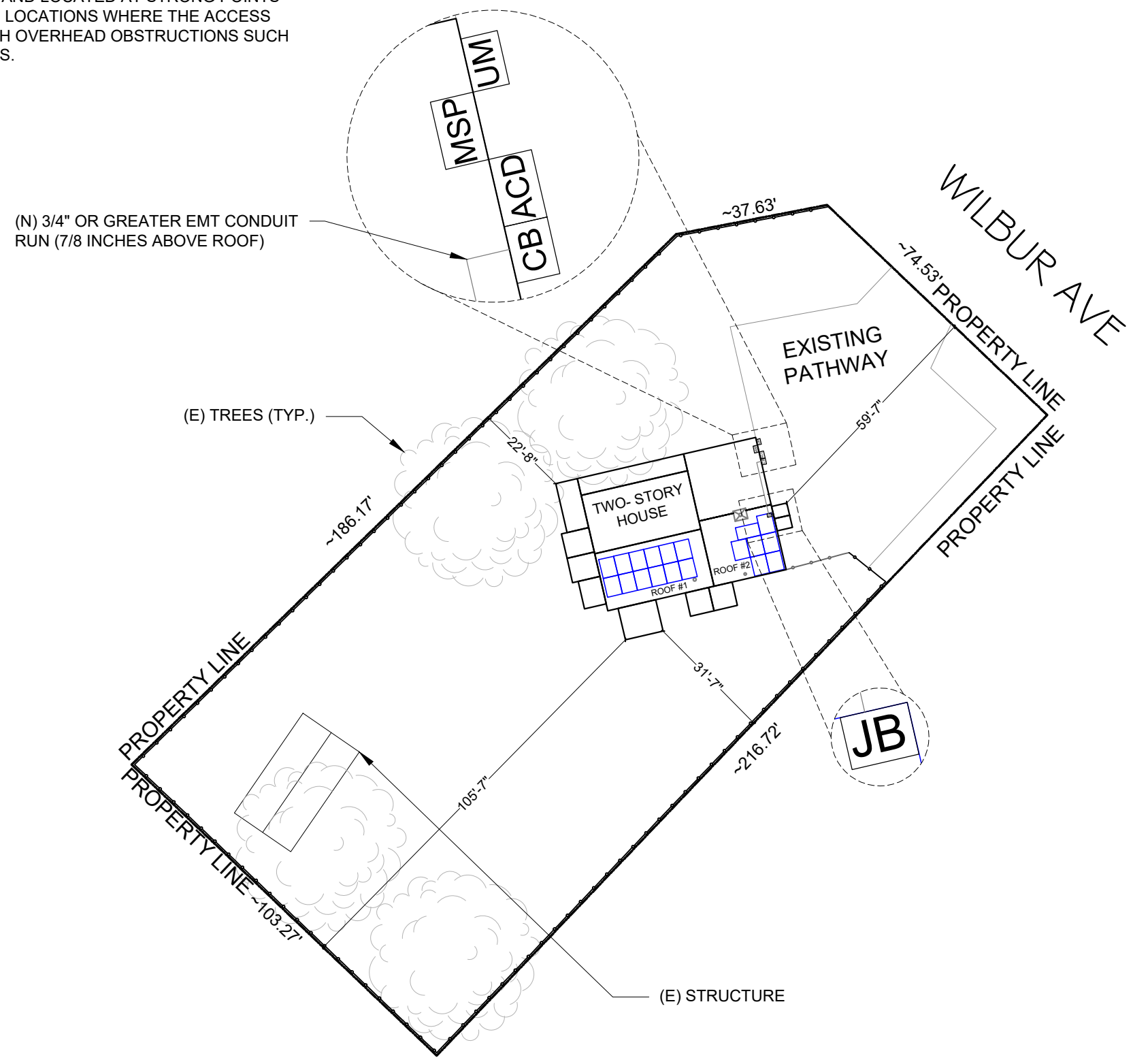
ANSI B  
11" X 17"

SHEET NUMBER

PV-0

● **ROOF ACCESS POINT** SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

**NOTE:**  
 A. ALL ELECTRICAL EQUIPMENT, COMBINER, DISCONNECTS, MAIN SERVICE PANELS, ETC. SHALL NOT BE INSTALLED WITHIN 3' OF THE GAS METERS' SUPPLY OR DEMAND PIPING.



**RTTP**  
 Rooftop Power  
 ROOF TOP POWER  
 275 W NATICK RD  
 WARWICK, RI, 02886  
 TEL: (833) 787-7697  
 LIC#: A-004027  
 EMAIL: design@rooftoppowerco.com

RICHARD PANTEL  
 11237  
 REGISTERED PROFESSIONAL ENGINEER (CIVIL)

Reviewed and approved  
 Richard Pantel, P.E.  
 RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
 272 WILBUR AVE,  
 CRANSTON, RI 02921 USA  
 APN# CRANM182L1757U  
 UTILITY: RHODE ISLAND ENERGY  
 AHJ: CITY OF CRANSTON

LEGEND	
UM	UTILITY METER
MSP	MAIN SERVICE PANEL
ACD	AC DISCONNECT
CB	ENPHASE COMBINER BOX
JB	JUNCTION BOX
-----	CONDUIT
-----	PROPERTY LINE
—+—+—+—	FENCE
○ □	VENT, ATTIC FAN (ROOFOBSTRUCTION)
⊞	CHIMNEY

**1** SITE PLAN WITH ROOF PLAN  
 SCALE: 1/32" = 1'-0"

41.757835, -71.487068

SHEET NAME  
 SITE PLAN WITH ROOF PLAN

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 PV-1



# MODULE TYPE, DIMENSIONS & WEIGHT

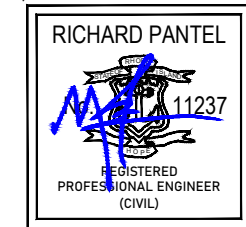
NUMBER OF MODULES = 19 MODULES  
 MODULE TYPE = PHONO SOLAR 400 M6-10B-R (400W) MODULES  
 MODULE WEIGHT = 45.8 LBS / 20.8 KG.  
 MODULE DIMENSIONS = 67.80" X 44.65" = 21.02 SF  
 UNIT WEIGHT OF ARRAY = 2.18 PSF  
 DISTRIBUTED DEAD LOAD = 2.50 PSF  
 AVERAGE ROOF POINT DEAD LOAD = 18.88 LBS  
 TOTAL SYSTEM WEIGHT: 585.32 LBS  
 "AVERAGE ROOF HEIGHT" (GROUND TO EAVE) = ~25 FT.

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
RAIL	10	UNIRAC SM LIGHT RAIL 168" DARK (315168D)
SPLICE	04	BND SPLICE BAR PRO SERIES MILL
MID CLAMP	26	UNIVERSAL AF SERIES MID CLAMPS DRK (302045D)
END CLAMP	24	PRO SERIES END CLAMPS (302035M)
FLASHING	48	UNIRAC FLASHKIT PRO .DRK 10PK
GROUNDING LUG	06	ILSCO LAY IN LUG (GBL4DBT)

ROOF DESCRIPTION					
ROOF TYPE				COMP SHINGLE ROOF	
ROOF	# OF MODULES	ROOF TILT	AZIMUTH	TRUSSES SIZE	TRUSSES SPACING
#1	12	34°	167°	2"X4"	25" O.C.
#2	07	34°	167°	2"X4"	25" O.C.

ARRAY AREA & ROOF AREA CALC'S		
AREA OF NEW ARRAY (Sq. Ft.)	AREA OF ROOF (PLAN VIEW) (Sq. Ft.)	TOTAL ROOF AREA COVERED BY ARRAY %
399.43	1821.77	21.93%
21.93%	ROOF AREA (ARRAY < 33% OF ROOF AREA)	

- PLUMBING VENTS, SKYLIGHTS AND MECHANICAL VENTS SHALL NOT BE COVERED, MOVED, RE-ROUTED OR RE-LOCATED.



Reviewed and approved  
 Richard Pantel, P.E.

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
 272 WILBUR AVE,  
 CRANSTON, RI 02921 USA  
 APN# CRANM182L1757U  
 UTILITY: RHODE ISLAND ENERGY  
 AHJ: CITY OF CRANSTON

SHEET NAME  
 ROOF PLAN WITH  
 MODULES

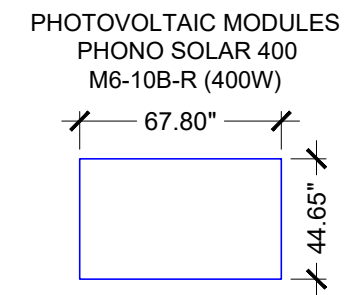
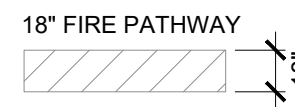
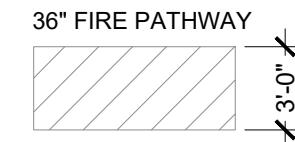
SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
 PV-2



(N) 3/4" OR GREATER EMT CONDUIT RUN (7/8 INCHES ABOVE ROOF)

FRONT YARD  
 WILBUR AVE



LEGEND	
UM	UTILITY METER
MSP	MAIN SERVICE PANEL
ACD	AC DISCONNECT
CB	ENPHASE COMBINER BOX
JB	JUNCTION BOX
-----	2"X4" TRUSSES @ 25" O.C.
-----	CONDUIT
■	IQ7PLUS-72-2-US MICRO INVERTER
●	ATTACHMENTS
○ □	VENT, ATTIC FAN (ROOF OBSTRUCTION)
⊗	CHIMNEY

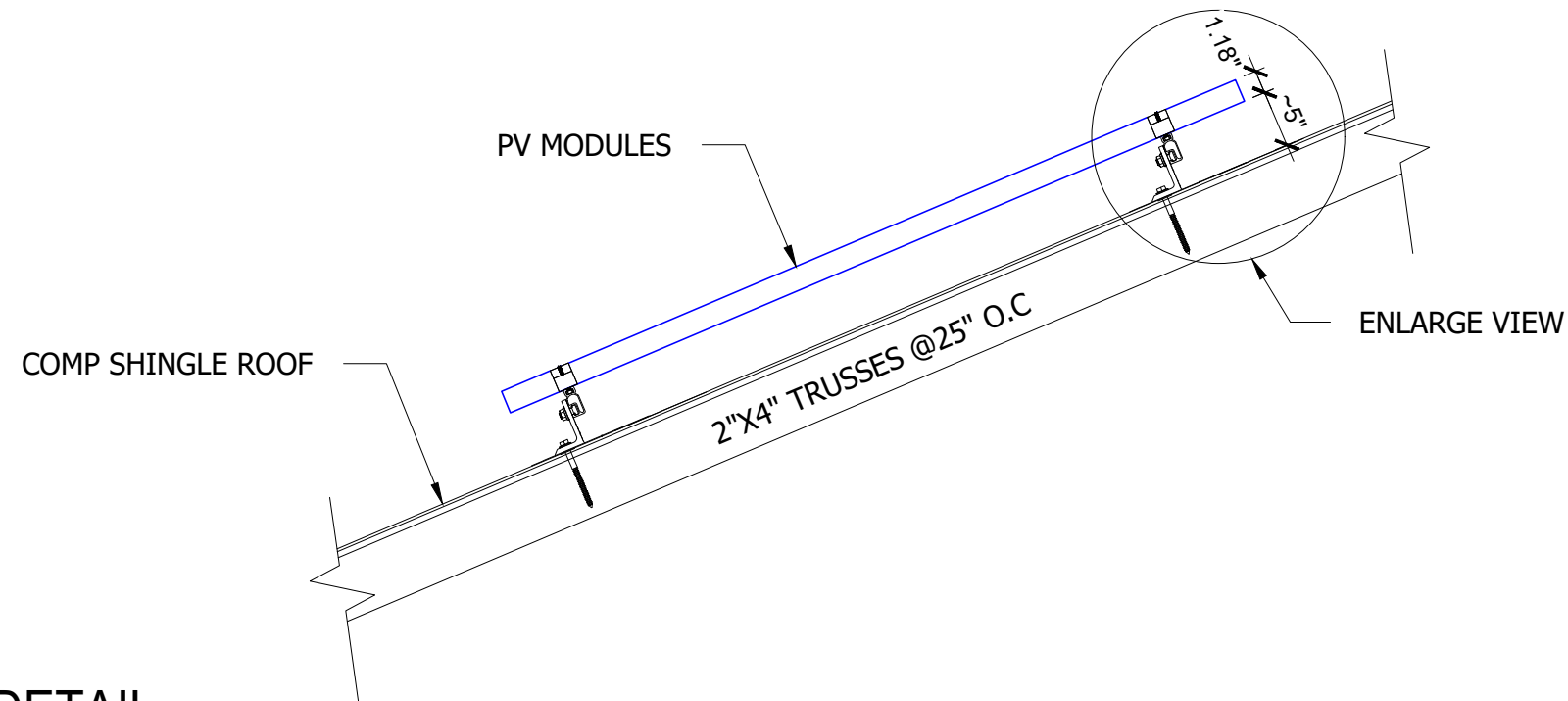
**NOTE:** ACTUAL ROOF CONDITIONS AND RAFTERS (OR SEAM) LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS



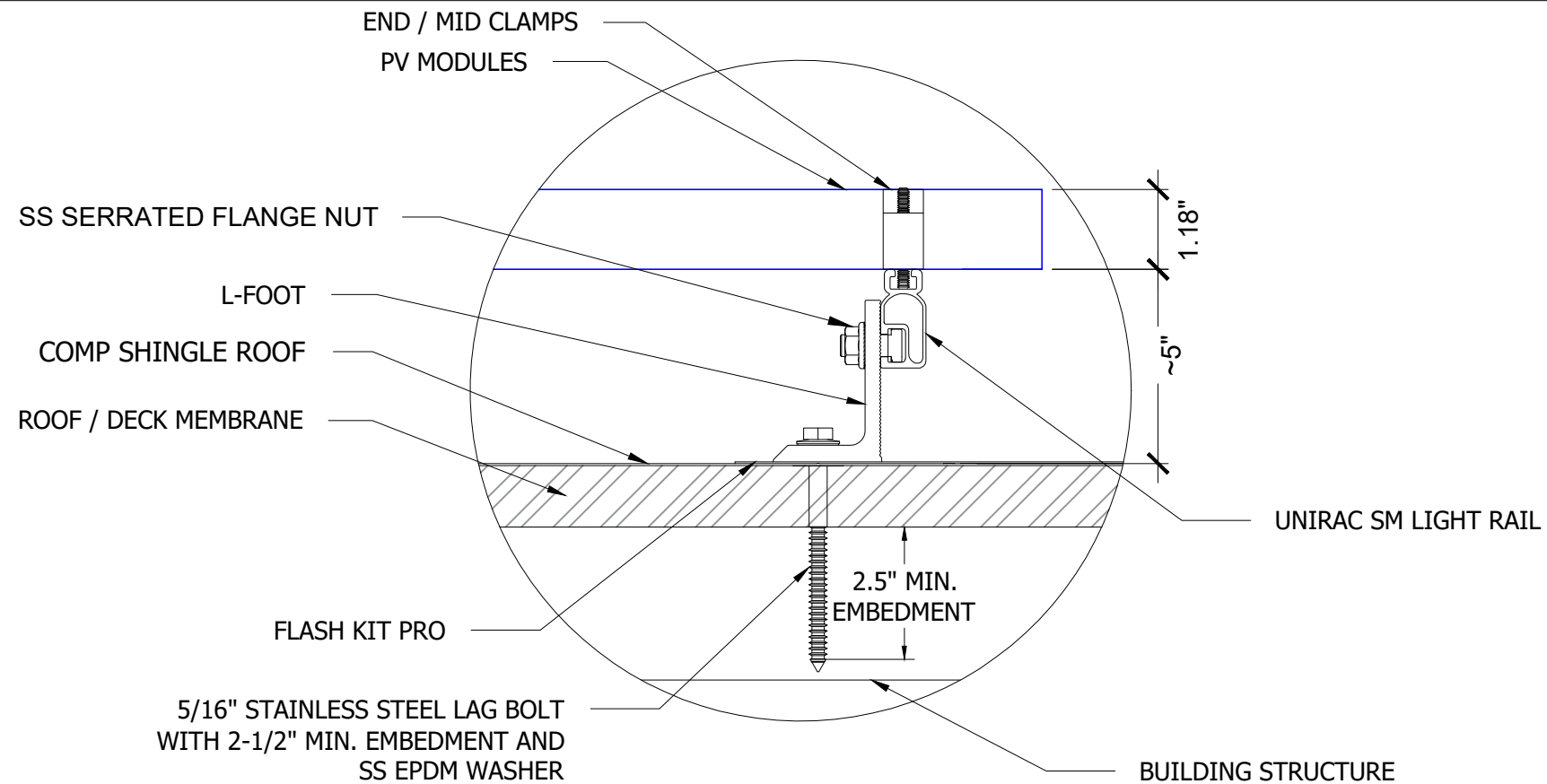
41.757835, -71.487068

**1** ROOF PLAN WITH MODULES  
 SCALE: 1/8" = 1'-0"

**NOTE: ACTUAL ROOF CONDITIONS AND RAFTERS (OR SEAM) LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS**



**1** ATTACHMENT DETAIL  
SCALE: NTS



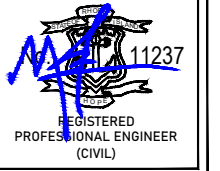
**2** ATTACHMENT DETAIL (ENLARGED VIEW)  
SCALE: NTS



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com

RICHARD PANTEL



Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

ATTACHMENT  
DETAIL

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-3

SOLAR MODULE SPECIFICATIONS					
MANUFACTURER / MODEL #	VMP	IMP	VOC	ISC	TEMPERATURE COEFFICIENT OF Voc
PHONO SOLAR 400 M6-10B-R (400W)	30.85	12.97	36.87	13.52	-0.28%/°C
MODULE DIMENSION	67.80" L x 44.65" W x 1.18" D				

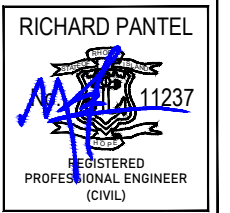
INVERTER SPECIFICATIONS			
MANUFACTURER / MODEL #	QUANTITY	NOMINAL OUTPUT VOLTAGE	NOMINAL OUTPUT CURRENT
ENPHASE ENERGY IQ7PLUS-72-2-US	19	240 VAC	1.21A

AMBIENT TEMPERATURE SPECIFICATIONS			
RECORD LOW TEMP	AMBIENT TEMP (HIGH TEMP 2%)	CONDUIT HEIGHT	CONDUCTOR TEMPERATURE RATE
-17°	32°	7/8"	ON/OFF ROOF 90°



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com



Reviewed and approved

Richard Pantel, P.E.

PL Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

ELECTRICAL LINE DIAGRAM

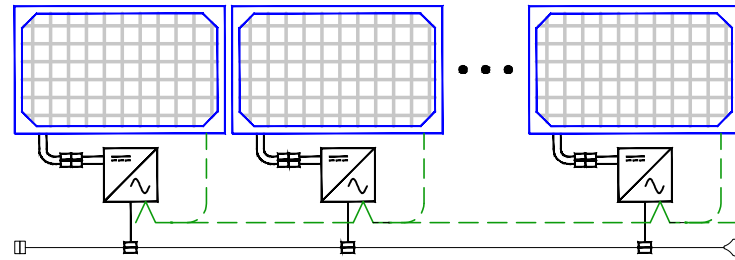
SHEET SIZE

ANSI B  
11" X 17"

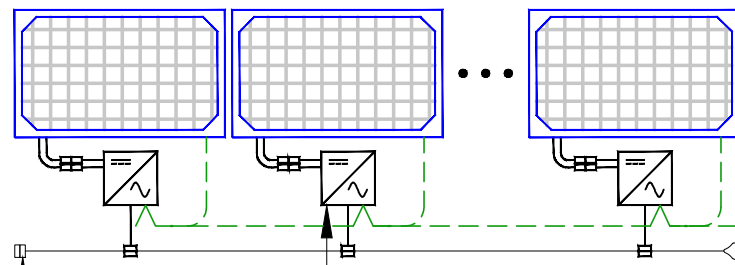
SHEET NUMBER

PV-4

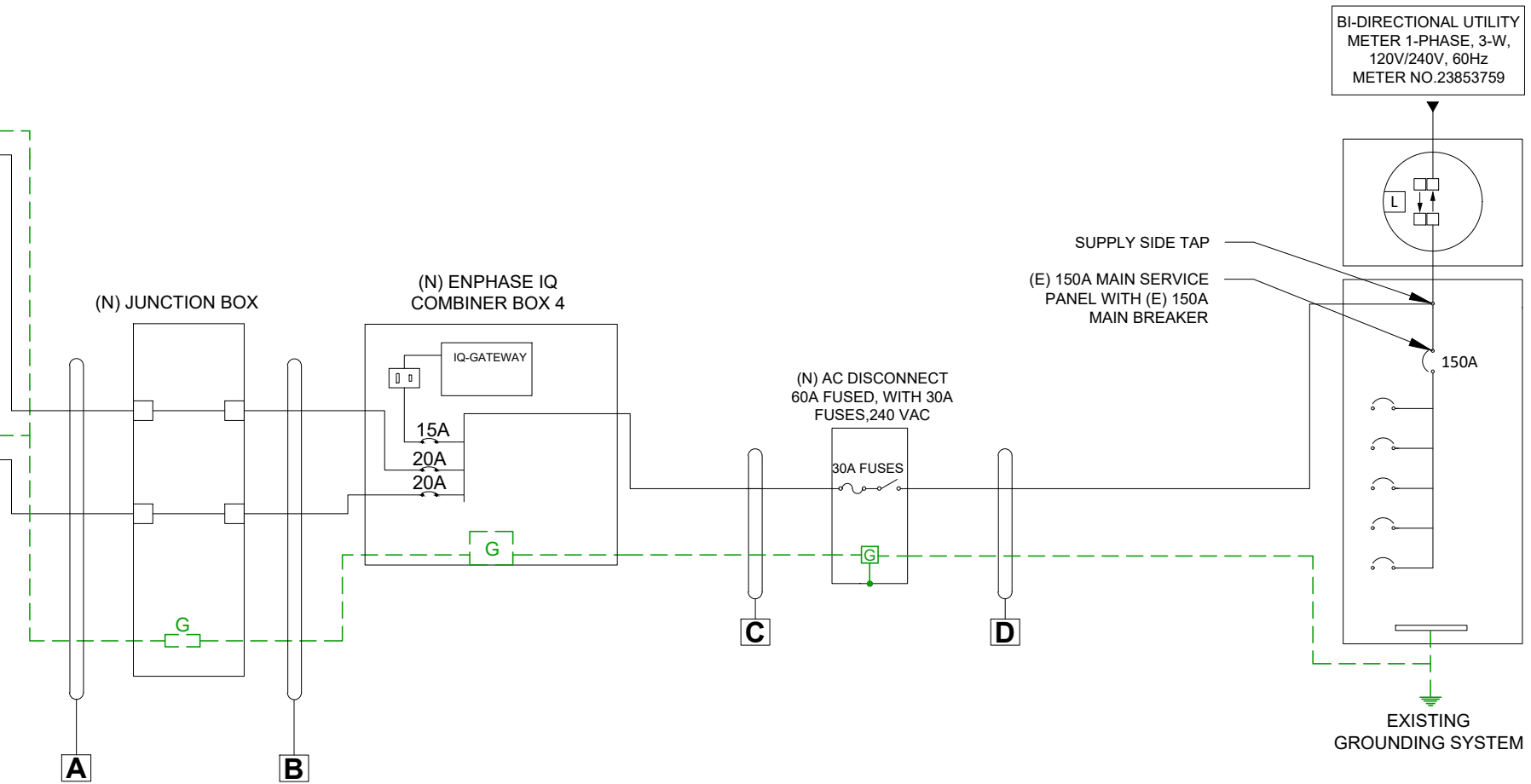
10 MICRO-INVERTERS IN BRANCH CIRCUIT #1



09 MICRO-INVERTERS IN BRANCH CIRCUIT #2



(N) ENPHASE ENERGY IQ7PLUS-72-2-US MICRO-INVERTER  
TERMINATOR CAP ON LAST CABLE CONNECTOR AC TRUNK CABLE (TYP)



CONDUCTOR SCHEDULE AND CALCULATIONS

TAG	LOCATION DESCRIPTION	# OF BRANCH	CURRENT (A)				#C. CARRYING CONDUCTOR	WIRE SIZE	WIRE TYPE	COND. RATING (A)	AMBIENT TEMP	COND. FILL FACTOR	DERATED (A)	GROUND SIZE	CONDUIT TYPE	CONDUIT SIZE
			MAX. MOD. IN BRANCH LENGTH	INVERTER OUTPUT CURRENT	NEC Correction	690.8(A)(1)										
A	BRANCH TO J-BOX	2	10	1.21	1.25	15.13	2	12 AWG	Q-CABLE	30	0.96	1	28.80	6 AWG	FREE AIR	N/A
B	J-BOX TO COMBINER BOX	2	10	1.21	1.25	15.13	4	10 AWG	THWN-2	40	0.96	0.80	30.72	8 AWG	EMT	3/4"
C	COMBINER BOX TO AC DISCONNECT	1	19	1.21	1.25	28.74	3	10 AWG	THWN-2	40	0.96	1	38.40	8 AWG	EMT	3/4"
D	AC DISCONNECT TO INTERCONNECTION	1	19	1.21	1.25	28.74	3	6 AWG	THWN-2	75	0.96	1	72.00	8 AWG	EMT	3/4"

**1** ELECTRICAL LINE DIAGRAM  
SCALE: NTS

**⚠ WARNING**  
**ELECTRICAL SHOCK HAZARD**

TERMINALS ON LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:  
 INVERTER(S), AC DISCONNECT(S), AC COMBINER PANEL (IF APPLICABLE).  
 PER CODE(S): NEC 2020: NEC 706.15 (C)(4) & NEC 690.13(B)

**PHOTOVOLTAIC**

---

**AC DISCONNECT**

LABEL LOCATION:  
 AC DISCONNECT  
 NEC 690.13(B)

**⚠ WARNING DUAL POWER SOURCE**  
**SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

LABEL LOCATION:  
 POINT OF INTERCONNECTION  
 PRODUCTION METER  
 NEC 705.12(B)(3)(3) & NEC 690.59)

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

LABEL LOCATION:  
 SERVICE PANEL IF SUM OF BREAKERS EXCEEDS PANEL RATING  
 NEC 705.12 (B)(3)(2)

**PHOTOVOLTAIC AC DISCONNECT**

MAXIMUM AC OPERATING CURRENT: 22.99 AMPS  
 NOMINAL OPERATING AC VOLTAGE: 240 VAC

LABEL LOCATION:  
 AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.  
 PER CODE(S): NEC 2020: 690.54

**PHOTOVOLTAIC POWER SOURCE**

LABEL LOCATION:  
 EMT/CONDUIT RACEWAYS  
 (PER CODE: NEC690.31(D)(2))

**MAIN PHOTOVOLTAIC SYSTEM DISCONNECT**

LABEL LOCATION:  
 MAIN SERVICE DISCONNECT / UTILITY METER  
 (PER CODE: NEC 690.13(B))

**⚠ WARNING**

THIS EQUIPMENT FED BY MULTIPLE SOURCES TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN POWER SUPPLY SHALL NOT EXCEED AMPACITY OF BUSBAR

LABEL LOCATION:  
 POINTS OF CONNECTION/BREAKER  
 CODE: NEC 705.12(B)(3)(3)

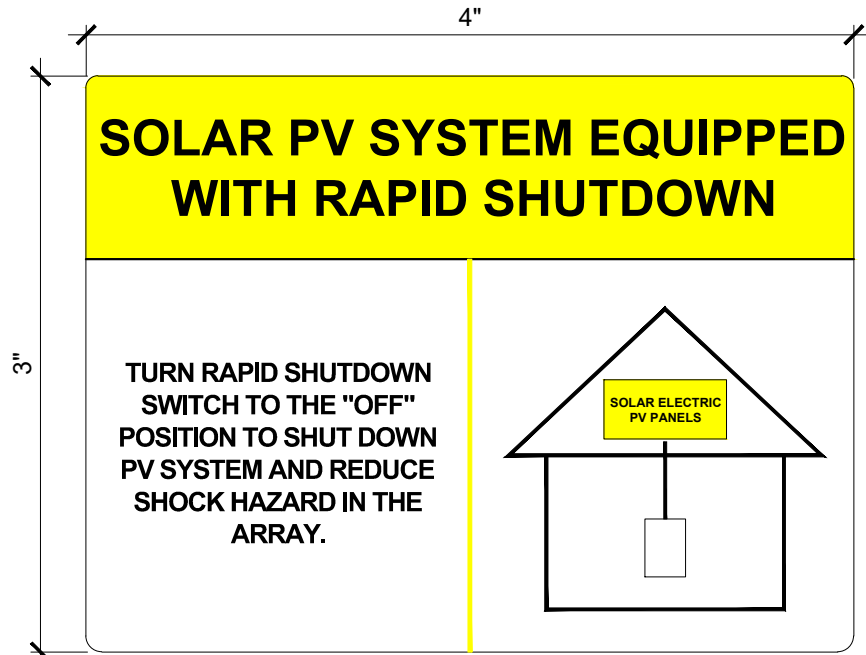
**RAPID SHUTDOWN FOR SOLAR PV SYSTEM**

LABEL LOCATION:  
 UTILITY SERVICE ENTRANCE/METER, INVERTER/DC DISCONNECT IF REQUIRED BY LOCAL AHJ, OR OTHER LOCATIONS AS REQUIRED BY LOCAL AHJ.  
 PER CODE(S): NEC 2020: 690.56(C)(2)

**⚠ WARNING**

THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT

LABEL LOCATION:  
 INVERTER  
 PER CODE: NEC 690.31(E)



LABEL LOCATION:  
 ON OR NO MORE THAN 1 M (3 FT) FROM THE SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED.  
 PER CODE(S): NEC 2020: IFC 690.56(C)

- NOTES AND SPECIFICATIONS:
- SIGNS AND LABELS SHALL MEET THE REQUIREMENTS OF THE 2020 ARTICLE 110.21(B), UNLESS SPECIFIC INSTRUCTIONS ARE REQUIRED BY SECTION 690, OR IF REQUESTED BY THE LOCAL AHJ.
  - SIGNS AND LABELS SHALL ADEQUATELY WARN OF HAZARDS USING EFFECTIVE WORDS, COLORS AND SYMBOLS.
  - LABELS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN.
  - LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
  - SIGNS AND LABELS SHALL COMPLY WITH ANSI Z535.4-2011, PRODUCT SAFETY SIGNS AND LABELS, UNLESS OTHERWISE SPECIFIED.
  - DO NOT COVER EXISTING MANUFACTURER LABELS.

ROOF TOP POWER  
 275 W NATICK RD  
 WARWICK, RI, 02886  
 TEL: (833) 787-7697  
 LIC#: A-004027  
 EMAIL: design@rooftoppowerco.com

RICHARD PANTEL  
 11237  
 REGISTERED PROFESSIONAL ENGINEER (CIVIL)

Reviewed and approved  
 Richard Pantel, P.E.  
 RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
 272 WILBUR AVE,  
 CRANSTON, RI 02921 USA  
 APN# CRANM182L1757U  
 UTILITY: RHODE ISLAND ENERGY  
 AHJ: CITY OF CRANSTON

SHEET NAME	WARNING LABELS
SHEET SIZE	ANSI B 11" X 17"
SHEET NUMBER	PV-5

Phono<sup>®</sup> Solar

# TWINPLUS MODULE SERIES

HIGH EFFICIENCY MONO-PERC M6-10B-R

# 395-415W



### OUTSTANDING PRODUCT PERFORMANCE

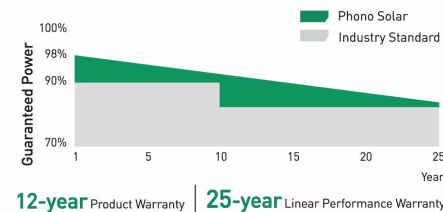
- Competitive high-temperature performance with ameliorated temperature coefficient
- Minimized power loss in cell connection
- Better performance under shading effect
- Decreased nominal operating cell temperature to 45 ± 2°C
- Higher power generation with multi-busbar and half-cut technology

### TRUSTWORTHY QUALITY AND RELIABILITY

- Guaranteed 0--+5W positive tolerance secures reliable power output
- 5400Pa maximum snow load, 2400Pa maximum wind load
- Optimized electrical design lowers hot spot risk and operating current

### PID RESISTANT

- Industry-leading cell processing technology and electrical design ensure solid PID resistance



### MANAGEMENT SYSTEM CERTIFICATES

IEC 61215, IEC 61730  
 ISO 9001:2015 / Quality management system  
 ISO 14001:2015 / Standards for environmental management system  
 ISO 45001:2018 / International standards for occupational health & safety



GL-EN-Version 2022.03.31 © Phono Solar Co., Ltd All Rights Reserved

www.phonosolar.com info@phonosolar.com

### ELECTRICAL TYPICAL VALUES

Model	PS395M6-18/VH		PS400M6-18/VH		PS405M6-18/VH		PS410M6-18/VH		PS415M6-18/VH	
	1000V	1500V	PS395M6H-18/VH	PS400M6H-18/VH	PS405M6H-18/VH	PS410M6H-18/VH	PS415M6H-18/VH			
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Rated Power (Pmpp)	395	294	400	298	405	301	410	305	415	309
Rated Current (Impp)	12.88	10.41	12.97	10.48	13.06	10.55	13.15	10.63	13.24	10.70
Rated Voltage (Vmpp)	30.67	28.24	30.85	28.40	31.02	28.55	31.18	28.71	31.35	28.86
Short Circuit Current (Isc)	13.42	10.84	13.52	10.92	13.62	11.00	13.72	11.09	13.82	11.17
Open Circuit Voltage (Voc)	36.67	34.62	36.87	34.81	37.05	34.98	37.23	35.15	37.42	35.32
Module Efficiency (%)	20.23		20.48		20.74		21.00		21.25	

STC(Standard Testing Conditions):Irradiance 1000W/m<sup>2</sup>, AM 1.5, Cell Temperature 25°C  
 NOCT (Nominal Operation Cell Temperature): Irradiance 800W/m<sup>2</sup>, Ambient Temperature 20°C, Spectra at AM1.5, Wind at 1m/S

### MECHANICAL CHARACTERISTICS

Cell Type	Monocrystalline 182mm x 91mm
Dimension (L x W x H)	Length: 1722mm (67.80 inch)
	Width: 1134mm (44.65 inch)
	Height: 30mm (1.18 inch)
Weight	22.0kg (48.80 lbs)
Front Glass	3.2mm Toughened Glass
Frame	Anodized Aluminium Alloy
Cable (Including Connector)	4mm <sup>2</sup> (IEC), [+]:450mm,[-]:250mm or Customized Length
Junction Box	IP 68 Rated

### TEMPERATURE RATINGS

Voltage Temperature Coefficient	-0.28%/°C
Current Temperature Coefficient	+0.05%/°C
Power Temperature Coefficient	-0.35%/°C
Tolerance	0--+5w
NOCT	45±2°C

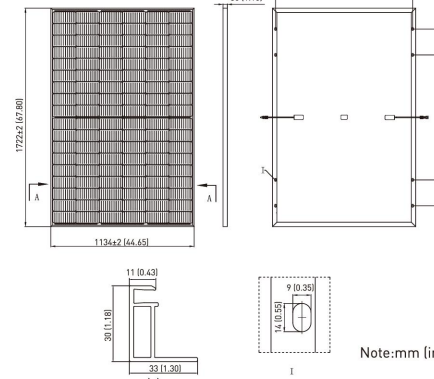
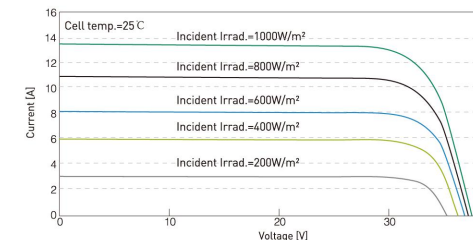
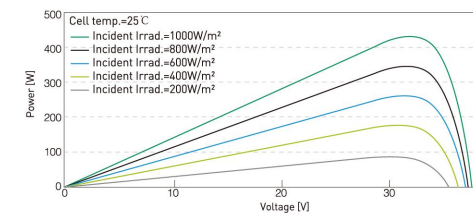
### ABSOLUTE MAXIMUM RATING

Operating Temperature	From -40 to +85°C
Hail Diameter @ 80km/h	Up to 25mm
Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Maximum Series Fuse Rating	25A
PV Module Classification	II
Fire Rating (IEC 61730)	C
Maximum System Voltage	DC 1000V/1500V

### PACKING CONFIGURATION

Container	20' GP	40' HQ
Pieces/Container	216	936

### ELECTRICAL CHARACTERISTICS



Phono<sup>®</sup> Solar

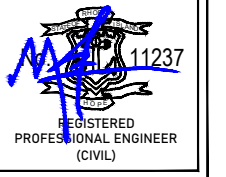
PHONO SOLAR TECHNOLOGY CO.,LTD reserves the right to make necessary adjustments to the information described herein at any time without further notice. The specifications and certificates contained in this datasheet may deviate slightly from our actual products due to the on-going innovation and product enhancement. Please be sure to use the most recent version of data.



ROOF TOP POWER  
 275 W NATICK RD  
 WARWICK, RI, 02886  
 TEL: (833) 787-7697  
 LIC#: A-004027

EMAIL:design@rooftoppowerco.com

RICHARD PANTEL



Reviewed and approved

Richard Pantel, P.E.

PL Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
 272 WILBUR AVE,  
 CRANSTON, RI 02921 USA  
 APN# CRANM182L1757U  
 UTILITY: RHODE ISLAND ENERGY  
 AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
 11" X 17"

SHEET NUMBER

PV-6

# Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.



### Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

### Productive and Reliable

- Optimized for high powered 60-cell and 72-cell\* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

### Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

\*The IQ 7+ Micro is required to support 72-cell modules.

## Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings <sup>1</sup>	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	IQ 7 Microinverter		IQ 7+ Microinverter	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range <sup>2</sup>	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit <sup>3</sup>	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	18 mA		18 mA	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	@240 V	@208 V	@240 V	@208 V
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.  
 2. Nominal voltage range can be extended beyond nominal if required by the utility.  
 3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

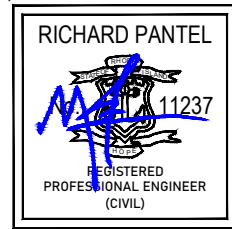
To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

© 2020 Enphase Energy. All rights reserved. Enphase, the Enphase logo, Enphase IQ 7, Enphase IQ 7+, Enphase IQ Battery, Enphase Enlighten, Enphase IQ Envoy, and other trademarks or service names are the trademarks of Enphase Energy, Inc. Data subject to change. 2020-01-06



ROOF TOP POWER  
 275 W NATICK RD  
 WARWICK, RI, 02886  
 TEL: (833) 787-7697  
 LIC#: A-004027

EMAIL: [design@rooftoppowerco.com](mailto:design@rooftoppowerco.com)



Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
 272 WILBUR AVE,  
 CRANSTON, RI 02921 USA  
 APN# CRANM182L1757U  
 UTILITY: RHODE ISLAND ENERGY  
 AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
 11" X 17"

SHEET NUMBER

PV-7

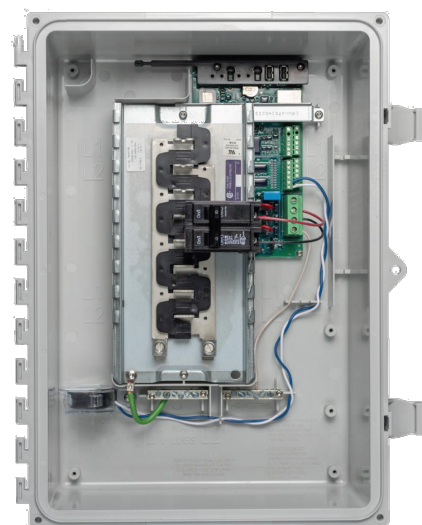


To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



## Enphase IQ Combiner 3 (X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



### Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

### Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

### Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- UL listed



To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



## Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
ACCESSORIES and REPLACEMENT PARTS (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan)	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)
Consumption Monitoring* CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
* Consumption monitoring is required for Enphase Storage Systems	
Wireless USB adapter COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows redundant wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" x 6.63"). Height is 21.06" (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	<ul style="list-style-type: none"> <li>• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors</li> <li>• 60 A breaker branch input: 4 to 1/0 AWG copper conductors</li> <li>• Main lug combined output: 10 to 2/0 AWG copper conductors</li> <li>• Neutral and ground: 14 to 1/0 copper conductors</li> </ul> Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included)
COMPLIANCE	
Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

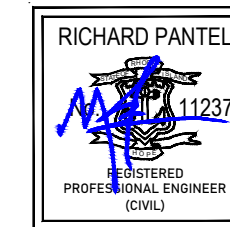
To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

© 2018 Enphase Energy. All rights reserved. Enphase, the Enphase logo, IQ Combiner 3, and other trademarks or service names are the trademarks of Enphase Energy, Inc.  
2019-11-04



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: [design@rooftoppowerco.com](mailto:design@rooftoppowerco.com)



Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-8

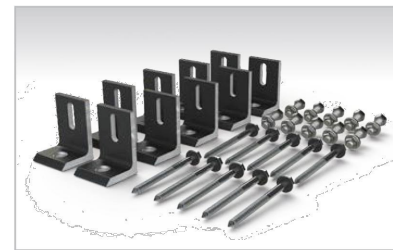
# FLASHKIT PRO



**FLASHKIT PRO** is the complete attachment solution for composition shingle roofs. Featuring Unirac's patented **SHED & SEAL** technology, a weather proof system which provides the ultimate protection against roof leaks. Kitted in 10 packs for maximum convenience, flashings and hardware are available in Mill or Dark finishes. With **FLASHKIT pro**, you have everything you need for a quick, professional installation.



**TRUSTED WATER SEAL FLASHINGS**  
FEATURING SHED & SEAL TECHNOLOGY



**YOUR COMPLETE SOLUTION**  
Flashings, lags, continuous slot L-Feet and hardware



**CONVENIENT 10 PACKS**  
Packaged for speed and ease of handling

# FLASHKIT PRO

## INSTALLATION GUIDE



**FLASHKIT PRO** IS THE COMPLETE FLASHING AND ATTACHMENT SOLUTION FOR COMPOSITION ROOFS.



INSTALL **FLASHKIT PRO** FLASHING



INSTALL L-FOOT



ATTACH L-FOOT TO RAIL

### PRE-INSTALL

- Locate roof rafters and snap chalk lines to mark the installation point for each roof attachment.
- Drill a 7/32" pilot hole at each roof attachment. Fill each pilot hole with sealant.

### STEP 1 INSTALL FLASHKIT PRO FLASHING

- Add a U-shaped bead of roof sealant to the underside of the flashing with the open side of the U pointing down the roof slope. Slide the aluminum flashing underneath the row of shingles directly up slope from the pilot hole as shown. Align the indicator marks on the lower end of the flashing with the chalk lines on the roof to center the raised hole in the flashing over the pilot hole in the roof. When installed correctly, the flashing will extend under the two courses of shingles above the pilot hole.

### STEP 2 INSTALL L-FOOT

- Fasten L-foot and Flashing into place by passing the included lag bolt and pre-installed stainless steel-backed EPDM washer through the L-foot EPDM grommet, and the raised hole in the flashing, into the pilot hole in the roof rafter.

- Drive the lag bolt down until the L-foot is held firmly in place. It is normal for the EPDM on the underside of the stainless steel backed EPDM washer to compress and expand beyond the outside edge of the steel washer when the proper torque is applied.

#### TIP:

- Use caution to avoid over-torquing the lag bolt if using an impact driver.
- Repeat Steps 1 and 2 at each roof attachment point.

### STEP 3 ATTACH L-FOOT TO RAIL

- Insert the included 3/8"-16 T-bolts into the lower slot on the Rail (sold separately), spacing the bolts to match the spacing between the roof attachments.
- Position the Rail against the L-Foot and insert the threaded end of the T-Bolt through the continuous slot in the L-Foot. Apply anti-seize to bolt threads to prevent galling of the T-bolt and included 3/8" serrated flange nut. Place the 3/8" flange nut on the T-bolt and finger tighten. Repeat STEP 3 until all L-Feet are secured to the Rail with a T-bolt. Adjust the level and height of the Rail and torque each bolt to 30ft-lbs.

## THE COMPLETE ROOF ATTACHMENT SOLUTION

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

## FASTER INSTALLATION. 25-YEAR WARRANTY.

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



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com

RICHARD PANTEL



Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-9



# UNIVERSAL AF

## EXPECT MORE

FROM A UNIVERSAL FASTENER.

### Ditch the Spacers

The Universal Aesthetic Fastener (Universal AF) accommodates every module between 30 and 46 mm without extra spacers, while providing the fast intuitive install experience that installers require, and a refined aesthetic home owners will love.

### More than just Universal

- Self standing, twist-and-lock install
- Guaranteed T-bolt engagement
- 1-tool installation
- Integrated bonding mid and end clamps

### Sleek Aesthetics

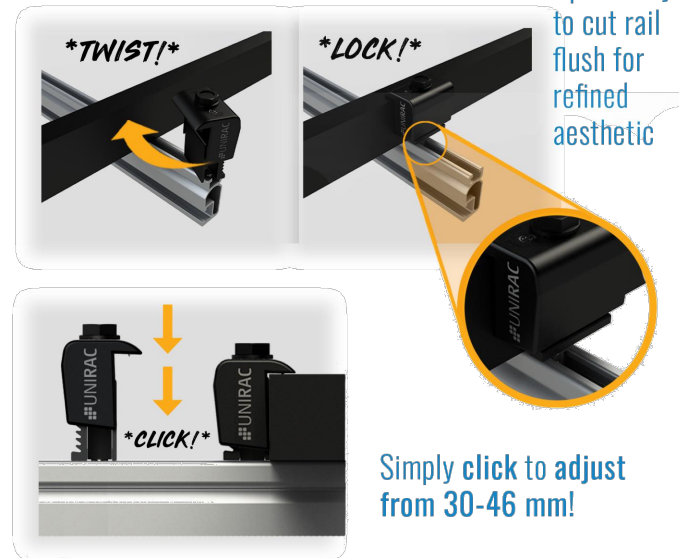
- Low profile hardware
- 1/2" module gap, end caps
- Optionality to cut rail flush
- Rail endcaps available for refined finish.

### Product Specifications

PART #	PRODUCT DESCRIPTION	LIST PRICE	PACK SIZE
#302045M	UNIVERSAL AF SERIES MID CLAMP MILL	\$2.33	20
#302045D	UNIVERSAL AF SERIES MID CLAMP DRK	\$2.52	20
#302050M	UNIVERSAL AF SERIES END CLAMP MILL	\$2.69	20
#302050D	UNIVERSAL AF SERIES END CLAMP DRK	\$2.90	20

## END-CLAMP

Twist and Lock engagement feature

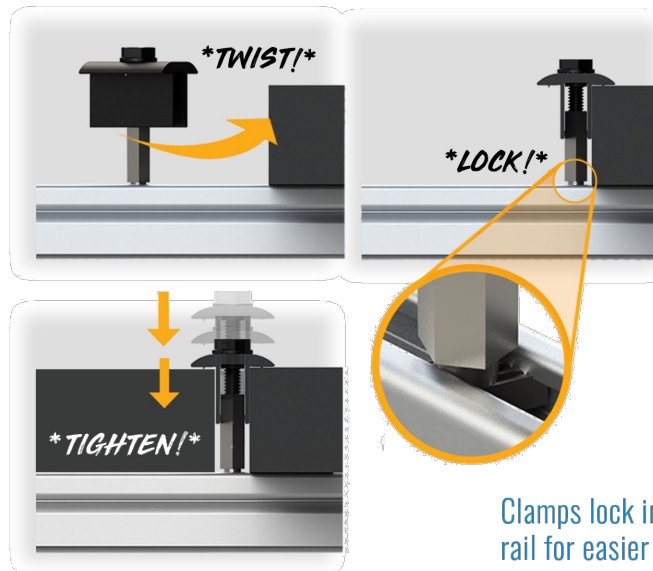


Optionality to cut rail flush for refined aesthetic

Simply click to adjust from 30-46 mm!

## MID-CLAMP

Twist and Lock engagement feature



Clamps lock into rail for easier panel placement

Tighten to adjust from 30-46 mm!

CONTACT: 505-242-6411 | SALES@UNIRAC.COM | WWW.UNIRAC.COM



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com



Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION DATE REV

INITIAL RELEASE 12/10/2022 UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

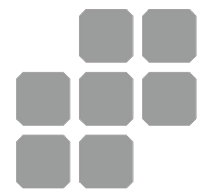
SPEC SHEETS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-10



# SM SOLAR MOUNT

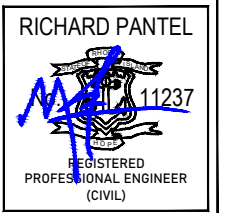
# BONDING CONNECTION GROUND PATHS

## N PAGE

## INSTALLATION GUIDE

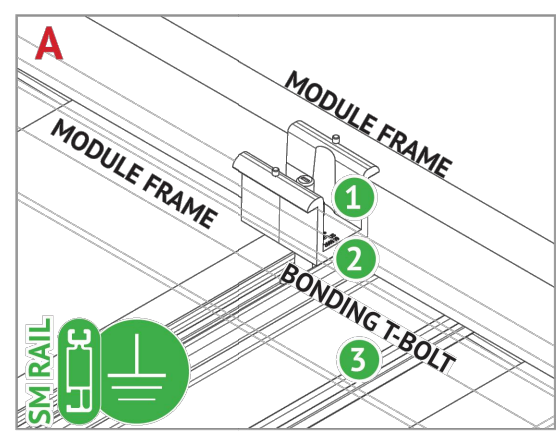


ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027  
EMAIL: design@rooftoppowerco.com



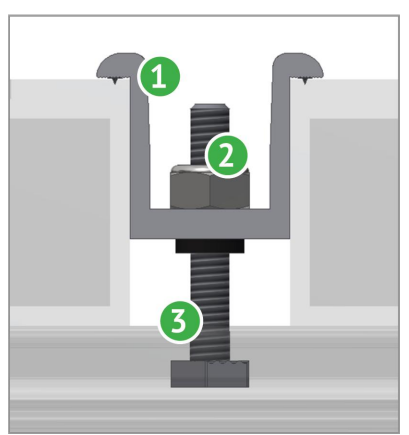
Reviewed and approved  
Richard Pantel, P.E.  
RPLic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

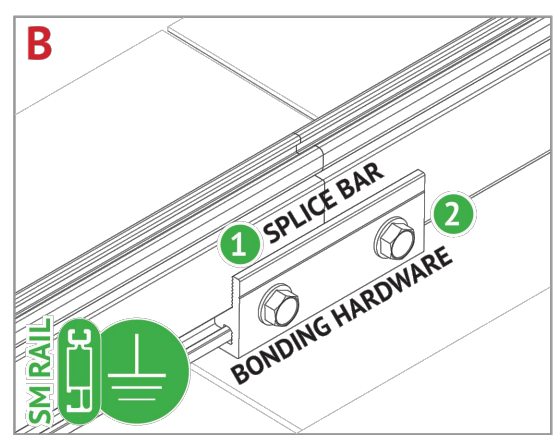


### BONDING MIDCLAMP ASSEMBLY

- 1 Aluminum mid clamp with stainless steel bonding pins that pierce module frame anodization to bond module to module through clamp
- 2 Stainless steel nut bonds aluminum clamp to stainless steel T-bolt
- 3 Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, clamp, and modules to SM rail

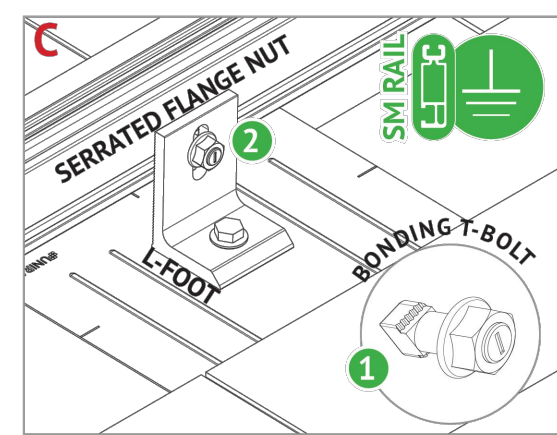


### BONDING MIDCLAMP ASSEMBLY



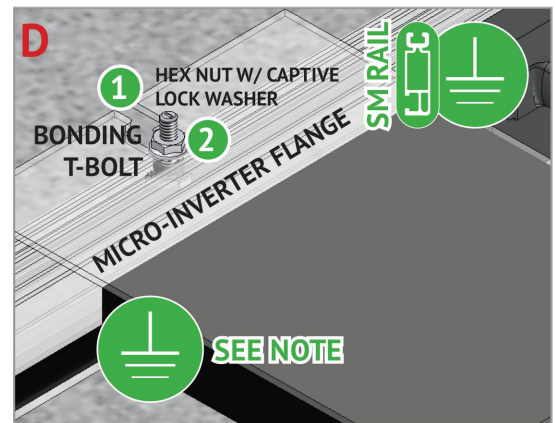
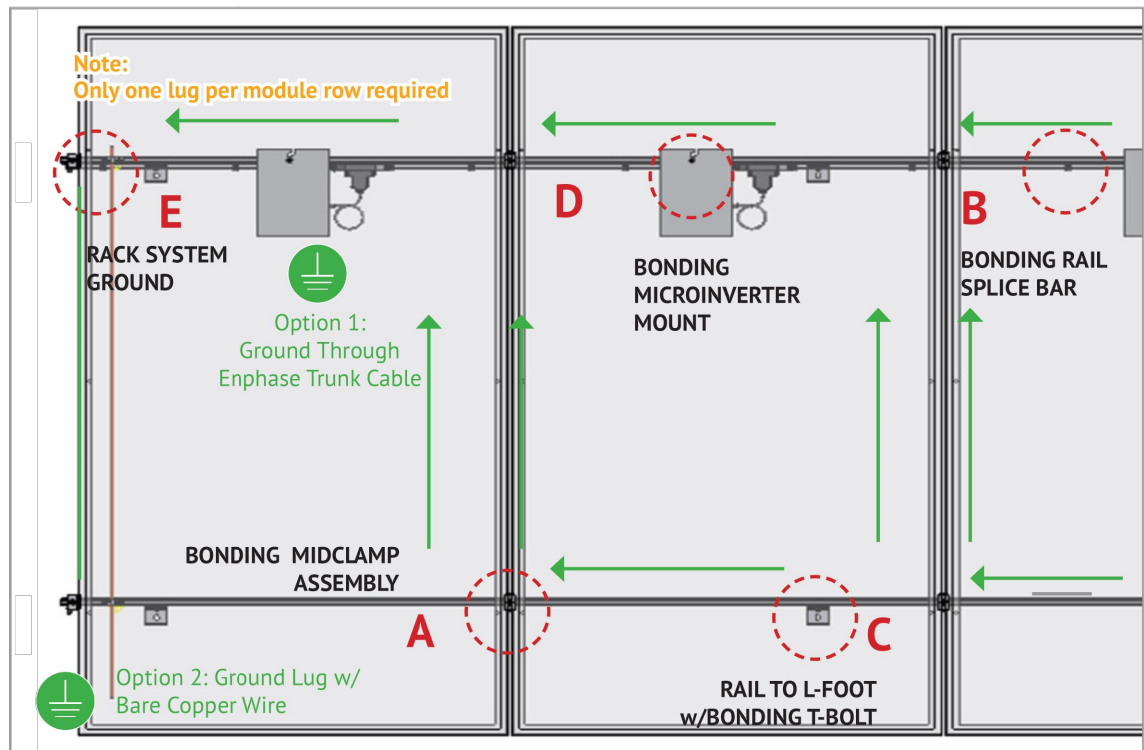
### BONDING RAIL SPLICE BAR

- 1 Bonding Hardware creates bond between splice bar and each rail section
  - 2 Aluminum splice bar spans across rail gap to create rail to rail bond. Rail on at least one side of splice will be grounded.
- Note:** Splice bar and bolted connection are non-structural. The splice bar function is rail alignment and bonding.



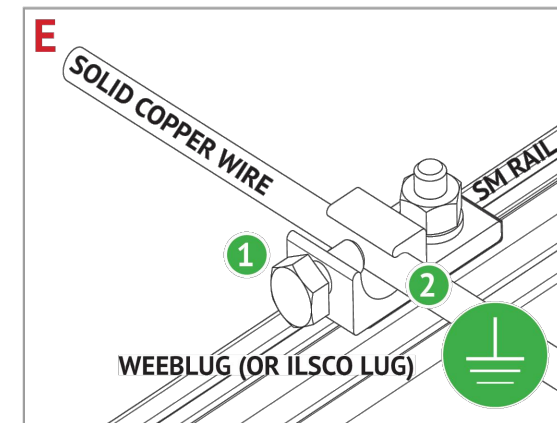
### RAIL TO L-FOOT w/BONDING T-BOLT

- 1 Serrated flange nut removes L-foot anodization to bond L-Foot to stainless steel T-bolt
- 2 Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, and L-foot to grounded SM rail



### BONDING MICROINVERTER MOUNT

- 1 Hex nut with captive lock washer bonds metal microinverter flange to stainless steel T-bolt
- 2 Serrated T-bolt head penetrates rail anodization to bond T-bolt, nut, and L-foot to grounded SM rail **System ground including racking and modules may be achieved through the trunk cable of approved microinverter systems. See page I for details**



### RACK SYSTEM GROUND

- 1 WEEB washer dimples pierce anodized rail to create bond between rail and lug
- 2 Solid copper wire connected to lug is routed to provide final system ground connection. **NOTE: IlSCO lug can also be used when secured to the side of the rail. See page J for details**

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-11



# CODE COMPLIANCE NOTES

## INSTALLATION GUIDE

### C PAGE

#### SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the SOLARMOUNT Installation Guide. SOLARMOUNT has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into our UL 2703 product certification. SOLARMOUNT has achieved system level performance for steep sloped roofs. System level fire performance is inherent in the SOLARMOUNT design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes  $\geq$  2 inches per foot, or 9.5 degrees). The system is to be mounted over fire resistant roof covering rated for the application. There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for SOLARMOUNT. Module Types & System Level Fire Ratings are listed below:

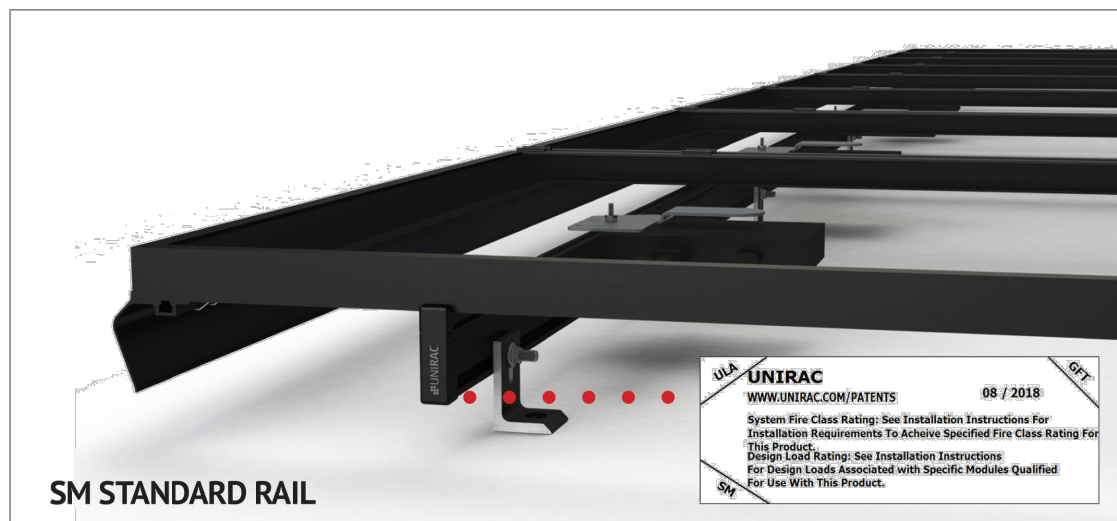
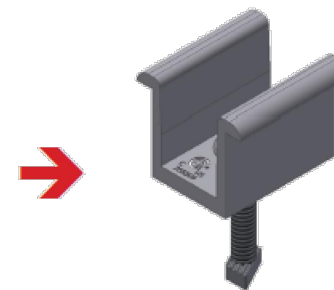
Rail Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required
Standard Rail	Type 1, Type 2, Type 3 & Type 10	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required
Light Rail	Type 1 & Type 2	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required

**This racking system may be used to ground and/or mount a PV module complying with UL1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.**

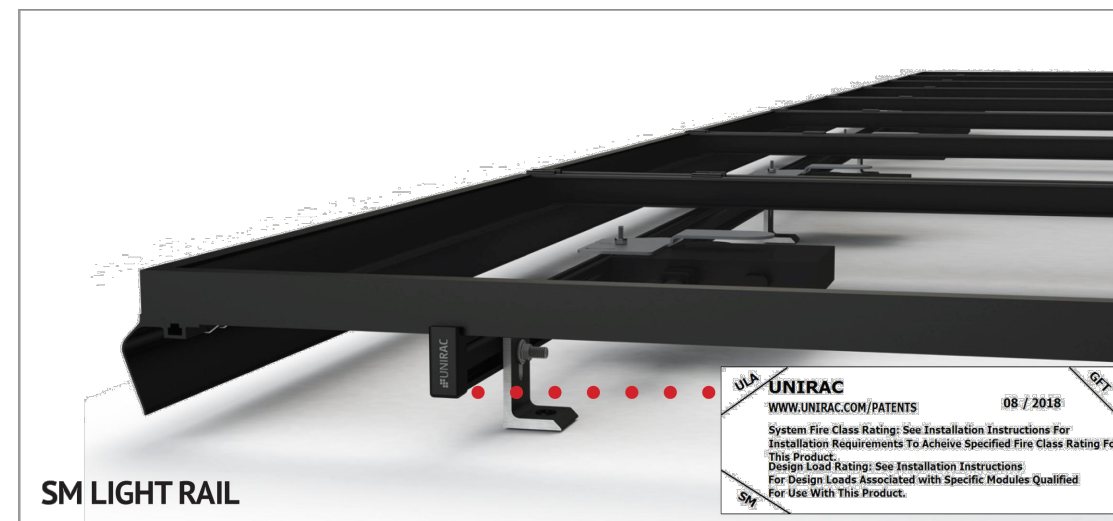
#### UL2703 CERTIFICATION MARKING LABEL

Unirac SOLARMOUNT is listed to UL 2703. Certification marking is embossed on all mid clamps as shown. Labels with additional information will be provided. After the racking system is fully assembled, a single label should be applied to the SOLARMOUNT rail at the edge of the array. **Before applying the label, the corners of the label that do not pertain to the system being installed must be removed so that only the installed system type is showing.**

**Note:** The sticker label should be placed such that it is visible, but not outward facing.



SM STANDARD RAIL

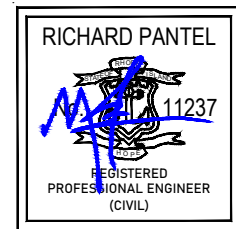


SM LIGHT RAIL



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com



Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-12



# Descriptive Report and Test Results

MASTER CONTRACT: 266909  
REPORT: 70131735  
PROJECT: 80096297



# APPENDIX A : C System Certification : PAGE

**Edition 1:** September 20, 2017; Project 70131735– Albuquerque  
Issued by Michael Hoffnagle

**Edition 14:** October 9, 2021; Project 80089428 - Irvine  
Prepared By: Michael Hoffnagle  
Authorized By: Michael Hoffnagle

**Edition 15:** October 22, 2021; Project 80096297 - Irvine  
Prepared By: Michael Hoffnagle  
Authorized By: Michael Hoffnagle

Report pages reissued

Contents: Certificate of Compliance - Pages 1 to 6  
Supplement to Certificate of Compliance - Pages 1 to 2  
Description and Tests - Pages 1 to 25  
Att1 Installation Manual SM– Pages 1 to 36  
Att2 Schematics SM/ULA– Pages 1 to 64  
Att3 Installation Manual ULA– Pages 1 to 21  
Att4 RM5\_Installation Guide - 1 to 16  
Att5 RMDT\_Installation Guide - 1 to 17  
Att6 RM series schematics – 1 to 26  
Att7 Installation Manual, GFT Shared Rail – Pages 1 to 39  
Att8 Installation Manual, GFT 4-Rail – Pages 1 to 38  
Att9 GFT Schematics – Pages 1 to 42  
Att10 NXT Horizon Installation Manual – Pages 1 to 21  
Att11 Schematics NXT Horizon – Pages 1 to 13

### PRODUCTS

CLASS - C531302 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems  
CLASS - C531382 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems - Certified to US Standards

### Electrical Bonding and Grounding Test Modules

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the SOLARMOUNT system.

Manufacture	Module Model / Series	Manufacture	Module Model / Series	Manufacture	Module Model / Series
LONGi	LR4-60(HPB/HPH) LR4-72(HPH) LR6-60 LR6-60(BK/HPB/HPH/HV/PB/PE/PH) LR6-72 LR6-72(BK/HV/PB/PE/PH) RealBlack LR4-60HPB RealBlack LR6-60HPB	Q.Cells	Plus, Pro, Peak, G3, G4, Peak G5(SC), G6(+)(SC)(AC), G7, G8(+), Plus, Pro, Peak L-G2, L-G4, L-G5 Peak L-G5, L-G6, L-G7, L-G8(BFF)	Sharp	NU-SA & NU-SC Series
Mission Solar Energy	MSE Mono, MSE Perc	Q.Cells (cont.)	Q.PEAK DUO( BLK)-G6+ Q.PEAK DUO BLK-G6+/TS Q.PEAK DUO (BLK) G8(+) Q.PEAK DUO L-(G8.1/G8.2/G8.3) Q.PEAK DUO L-G8.3 BFF Q.PEAK DUO (BLK) ML-G9(+) Q.PEAK DUO XL-(G9/G9.2/G9.3) Q.PEAK DUO (BLK) ML-G10(+)	Solaria	PowerXT-xxxR-(AC/PD/BD) PowerXT-xxxC-PD PowerXT-xxxR-PM (AC)
Mitsubishi	MIE & MLE Series	Panasonic	VBHNxxxSA06/SA06B/SA11/SA11B VBHNxxxSA15/SA15B/SA16/SA16B, VBHNxxxKA,VBHNxxxKA03/04, VBHNxxxSA17/SA17G/SA17E/SA18/SA18E, VBHNxxxZA01/ZA02/ZA03/VBHNxxxZA04 EVPV	Solartech	STU HJT, STU PERC & Quantum PERC
Neo Solar Power Co.	D6M Series	Peimar	SGxxxM (FB/BF) SMxxxM	SolarWorld	Sunmodule Protect, Sunmodule Plus/Pro
Phono Solar	PSxxxM1-20/U PSxxxM1H-20/U PSxxxM1-20UH PSxxxM1H-20UH PSxxxM1-20/UH PSxxxM1H-20/UH PSxxxM-24/T PSxxxMH-24/T PSxxxM-24/TH PSxxxMH-24/TH	REC	RECxxxAA (BLK/Pure) RECxxxNP (N-PEAK) RECxxxNP2 (Black) RECxxxPE, RECxxxPE72 RECxxxTP, RECxxxTP72 RECxxxTP2 (M/BLK2) RECxxxTP25 (M)72 RECxxxTP3M (Black) RECxxxTP4 (Black)	Suntech	STP
Prism Solar	P72 Series	Renesola	All 60-cell modules	Suniva	MV Series & Optimus Series (35mm)
		Risen	RSM Series	Sun Edison	F-Series, R-Series
		S-Energy	SN72 & SN60 Series	SunPower	AC, X-Series, E-Series & P-Series
		Seraphim	SEG-(6PA/6PB/6MA/6MA-HV/6MB/E01/E11) SRP-(6QA/6QB) SRP-xxx-6MB-HV, SRP-320-375-BMB-HV, SRP-xxx-BMC-HV, SRP-390-450-BMA-HV, SRP-xxx-BMZ-HV, SRP-390-405-BMD-HV	Talesun	TP572, TP596, TP654, TP660 TP672, Hipor M, Smart
				Testa	SC, SC B, SC B1, SC B2, TxxxS
				Trina	PA05, PD05, DD05, DD06, DE06 PD14, PE14, DD14, DE14, DE15
				TSMC	TS-150C2 CIGSw
				Upsolar	UP-MxxxP, UP-MxxxM(-B)
				URECO	D7Kxxx(H7A/H8A), D7Mxxx(H7A/H8A) FAKxxx(C8G/E8G), FAMxxxE7G-BB FAMxxxE8G(-BB)
				Vikram	Eldora, Somera, Ultima
				VSUN	VSUNxxx-60M-BB, VSUNxxx-72MH VSUN4xx-144BMB

- Unless otherwise noted, all modules listed above include all wattages and specific models within that series. Variable wattages are represented as "xxx"
- Items in parenthesis are those that may or may not be present in a compatible module's model ID
- Slashes "/" between one or more items indicates that either of those items may be the one that is present in a module's model ID
- The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system
- Use with a maximum over current protection device OCPD of 30A
- Please see the SM UL2703 Construction Data Report at Unirac.com to ensure the exact solar module selected is approved for use with SM
- **Listed models can be used to achieve a Class A fire system rating for steep slope applications. See Appendix A, page A**

The reader is responsible for any liability arising from actions taken in interpreting or applying the results presented in this report. This report shall not be reproduced except in full, without written approval from CSA Group Testing & Certification Inc. The results of this report only relate to those items tested.

34 Bunsen, Irvine, CA, U.S.A. 92618  
Telephone: 949.733.4300 1.800.463.6727 Fax: 949.733.4320 www.csagroup.org

DQD 507.10 Rev 2021-09-27

© 2021 CSA Group. All rights reserved.



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com

RICHARD PANTEL

11237

REGISTERED  
PROFESSIONAL ENGINEER  
(CIVIL)

Reviewed and approved

Richard Pantel, P.E.

RI Lic. No. 11237

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-13



# Certificate of Compliance

**Certificate:** 70131735      **Master Contract:** 266909  
**Project:** 80111014      **Date Issued:** 2022-02-28  
**Issued To:** Unirac  
1411 Broadway NE  
Albuquerque, New Mexico, 87102  
United States

**Attention:** Klaus Nicolaedis

*The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.*

**Issued by:** Michael Hoffnagle  
Michael Hoffnagle



### PRODUCTS

CLASS - C531302 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems  
CLASS - C531382 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems -  
Certified to US Standards

Models:	SM	-	SOLARMOUNT Flush-to-Roof is an extruded aluminum rail PV racking system that is installed parallel to the roof in landscape or portrait orientations.
---------	----	---	---



**Certificate:** 70131735  
**Project:** 80111014

**Master Contract:** 266909  
**Date Issued:** 2022-02-28

	ULA	-	Unirac Large Array is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules.
--	-----	---	---

### Solarmount

The system listed is designed to provide bonding/grounding, and mechanical stability for photovoltaic modules. The system is secured to the roof with the L-Foot components through the roofing material to building structure. Modules are secured to the racking system with stainless steel or aluminum mid clamps and Aluminum end clamps. The modules are bonded to the racking system with the stainless-steel bonding mid clamps with piercing points. The system is grounded with 10 AWG copper wire to bonding/grounding lugs. Fire ratings of Class A with Type 1, 2, 3 (with metallic frame), 10(with metallic frame), 19, 22, 25, 29, or 30 for steep slope. Tested at 5" interstitial gap which allows installation at any stand-off height.

The grounding of the system is intended to comply with the latest edition of the National Electrical Code, to include NEC 250 & 690. Local codes compliance is required, in addition to national codes. All grounding/bonding connections are to be torqued in accordance with the Installation Manual and the settings used during the certification testing for the current edition of the project report.

The system may employ optimizers/micro-inverters and used for grounding when installed per installation instructions.

UL 2703 Mechanical Load ratings:

Downward Design Load (lb/ft <sup>2</sup> )	113.5
Upward Design Load (lb/ft <sup>2</sup> )	50.7
Down-Slope Load (lb/ft <sup>2</sup> )	16.13

Test Loads:

Downward Load (lb/ft <sup>2</sup> )	170.20
Upward Load (lb/ft <sup>2</sup> )	76.07
Down-Slope Load (lb/ft <sup>2</sup> )	24.2

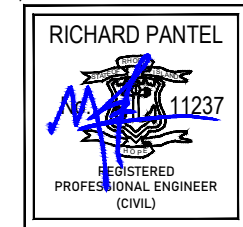
### Unirac Large Array

ULA is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules. ULA aluminum components merge with SM rails and installer-supplied steel pipe. The SM rail system is secured to the horizontal Pipe using the Rail Bracket components. The Rear and Front cap secures the horizontal Pipe to the vertical Pipe. The Front cap is also used to secure the Cross brace. A Slider is attached to the vertical Pipe to secure the Cross brace. The SM rails, caps, slider, rail brackets, and cross braces materials are



ROOF TOP POWER  
275 W NATICK RD  
WARWICK, RI, 02886  
TEL: (833) 787-7697  
LIC#: A-004027

EMAIL: design@rooftoppowerco.com



Reviewed and approved

Richard Pantel, P.E.

DESCRIPTION	DATE	REV
INITIAL RELEASE	12/10/2022	UR

PROJECT NAME

KIM OWENS  
272 WILBUR AVE,  
CRANSTON, RI 02921 USA  
APN# CRANM182L1757U  
UTILITY: RHODE ISLAND ENERGY  
AHJ: CITY OF CRANSTON

SHEET NAME

SPEC SHEETS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-14