

## SCOPE OF WORK

**SYSTEM SIZE:** 43.35kW DC, 33.15kW AC  
**MODULES:** (102) HANWHA QCELLS Q.TRON BLK M-G2+ 425W  
**INVERTERS:** (102) ENPHASE: IQ8M-72-2-US MICROINVERTERS  
**RACKING:** IRONRIDGE AIRE RAIL A1  
**ATTACHMENT:** IRONRIDGE AIRE DOCK, WITH L-FOOT

ARRAY TILT: #1 - 27° #2 - 27°  
 ARRAY AZIMUTH: #1 - 59° #2 - 239°

ELECTRICAL INFORMATION  
 UTILITY COMPANY: EVERSOURCE  
 MAIN SERVICE AMPERAGE: 400A

BUILDING INFORMATION: TWO STORY HOUSE  
 APN #: PRSM106553  
 ROOF TYPE: COMP. SHINGLE  
 NUMBER OF LAYERS: 01  
 ROOF TRUSSES: 2"X8" @ 24" O.C.

## CODE SUMMARY

THIS PROJECT SHALL COMPLY WITH THE FOLLOWING CODE  
 2018 FIRE CODE AS AMENDED BY SAF-FMO 300  
 2018 INTERNATIONAL BUILDING CODE (IBC)  
 2018 INTERNATIONAL RESIDENTIAL CODE (IRC)  
 2018 INTERNATIONAL ENERGY CONSERVATION CODE (IEC)  
 2018 INTERNATIONAL EXISTING BUILDING CODE (IEBC)  
 2018 INTERNATIONAL MECHANICAL CODE (IMC)  
 2018 INTERNATIONAL PLUMBING CODE (IPC)  
 2020 NATIONAL ELECTRICAL CODE (NEC)  
 STATE FIRE CODE SAF-C 6000

## SHEET INDEX

PV-0 COVER SHEET  
 PV-1 SITE PLAN  
 PV-2 ARRAY DETAIL  
 PV-2A STRING LAYOUT  
 PV-3 ATTACHMENT DETAILS  
 PV-4 ELECTRICAL LINE DIAGRAM  
 PV-5 ELECTRICAL CALCULATION  
 PV-6 PLACARDS  
 PV-7+ MANUFACTURER SPEC SHEET


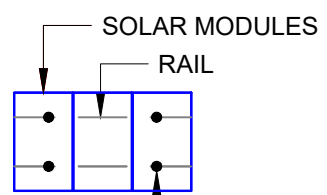





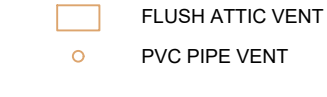

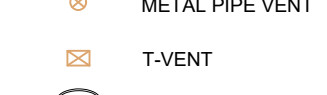

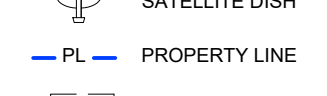

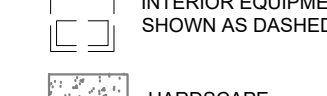











## ADDITIONAL NOTE:

- 400AMP SINGLE PHASE SERVICE.
- LOWER EDGE OF EACH ROOF HAS A STANDING SEAM METAL SECTION.
- THERE IS AN ATTIC SPACE ON THE NORTHERN SIDE OF THE BUILDING (ABOVE A STAGE).

## GENERAL NOTES:

- PV INSTALLATION COMPLIES WITH THE NEC 2020 ARTICLE 690.12(B)(2).
- PHOTOVOLTAIC SYSTEM IS UNGROUNDED. NO CONDUCTORS ARE SOLIDLY GROUNDED IN THE INVERTER. SYSTEM COMPLIES WITH 690.35.
- MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
- INVERTER CONFORMS TO AND IS LISTED UNDER UL 1741.
- RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
- RAPID SHUTDOWN REQUIREMENTS MET WHEN INVERTERS AND ALL CONDUCTORS ARE WITHIN ARRAY BOUNDARIES PER NEC 690.12(1).
- CONSTRUCTION FOREMAN TO PLACE CONDUIT RUN PER 690.31(G).
- ARRAY DC CONDUCTORS ARE SIZED FOR DERATED CURRENT.
- 13.49 AMPS MODULE SHORT CIRCUIT CURRENT.
- 21.04 AMPS DERATED SHORT CIRCUIT CURRENT [690.8 (a) & 690.8 (b)].

## LEGEND AND ABBREVIATIONS

 UTILITY METER		A AMPERE	AMPERE
 MAIN PANEL		AC ALTERNATING CURRENT	ALTERNATING CURRENT
 SUB-PANEL		AFCI ARC FAULT CIRCUIT INTERRUPTER	ARC FAULT CIRCUIT INTERRUPTER
 PV LOAD CENTER		AZIM AZIMUTH	AZIMUTH
 DEDICATED PV METER		COMP COMPOSITION	COMPOSITION
 INVERTER(S) WITH INTEGRATED DC DISCONNECT AND AFCI		DC DIRECT CURRENT	DIRECT CURRENT
 AC DISCONNECT(S)		(E) EXISTING	EXISTING
 DC DISCONNECT(S)		EXT EXTERIOR	EXTERIOR
 FUSED AC DISCONNECT		FRM FRAMING	FRAMING
 COMBINER BOX		INT INTERIOR	INTERIOR
 AUTOMATIC TRANSFER SWITCH		LBW LOAD BEARING WALL	LOAD BEARING WALL
 ENPHASE MICROINVERTER		MAG MAGNETIC	MAGNETIC
		MSP MAIN SERVICE PANEL	MAIN SERVICE PANEL
		(N) NEW	NEW
		NTS NOT TO SCALE	NOT TO SCALE
		OC ON CENTER	ON CENTER
		PRE-FAB PRE-FABRICATED	PRE-FABRICATED
		PSF POUNDS PER SQUARE FOOT	POUNDS PER SQUARE FOOT
		PV PHOTOVOLTAIC	PHOTOVOLTAIC
		TL TRANSFORMERLESS	TRANSFORMERLESS
		TYP TYPICAL	TYPICAL
		V VOLTS	VOLTS
		W WATTS	WATTS

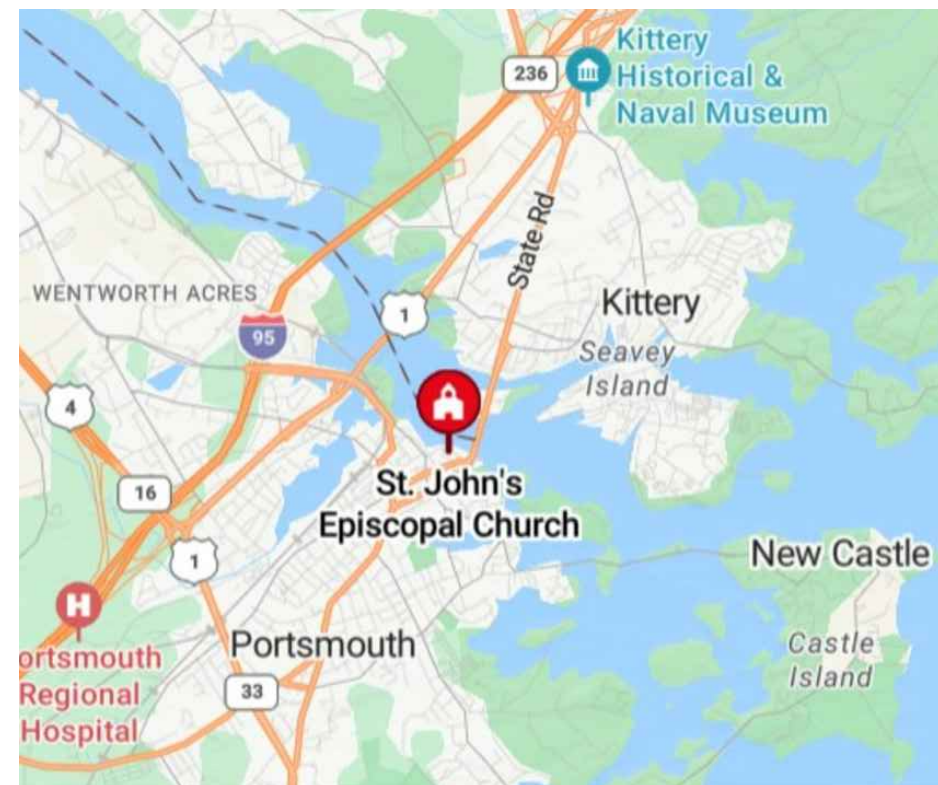
SCALE: NTS



1 AERIAL VIEW

PV-0

SCALE: NTS



2 VICINITY MAP

PV-0

SCALE: NTS



603 SOLAR

24 CHARTER ST.  
 EXETER, NH 03833  
 (603) 570-2607

### REVISIONS

DESCRIPTION	DATE	REV

### PROJECT NAME & ADDRESS

ST. JOHN'S EPISCOPAL CHURCH

100 CHAPEL ST,  
 PORTSMOUTH, NH 03801  
 PHONE #: (603) 988-8347  
 EMAIL: reginnhny@outlook.com  
 43.35kW DC PHOTOVOLTAIC SYSTEM

SALES PERSON

STEVE

SHEET NAME

COVER SHEET

SHEET SIZE

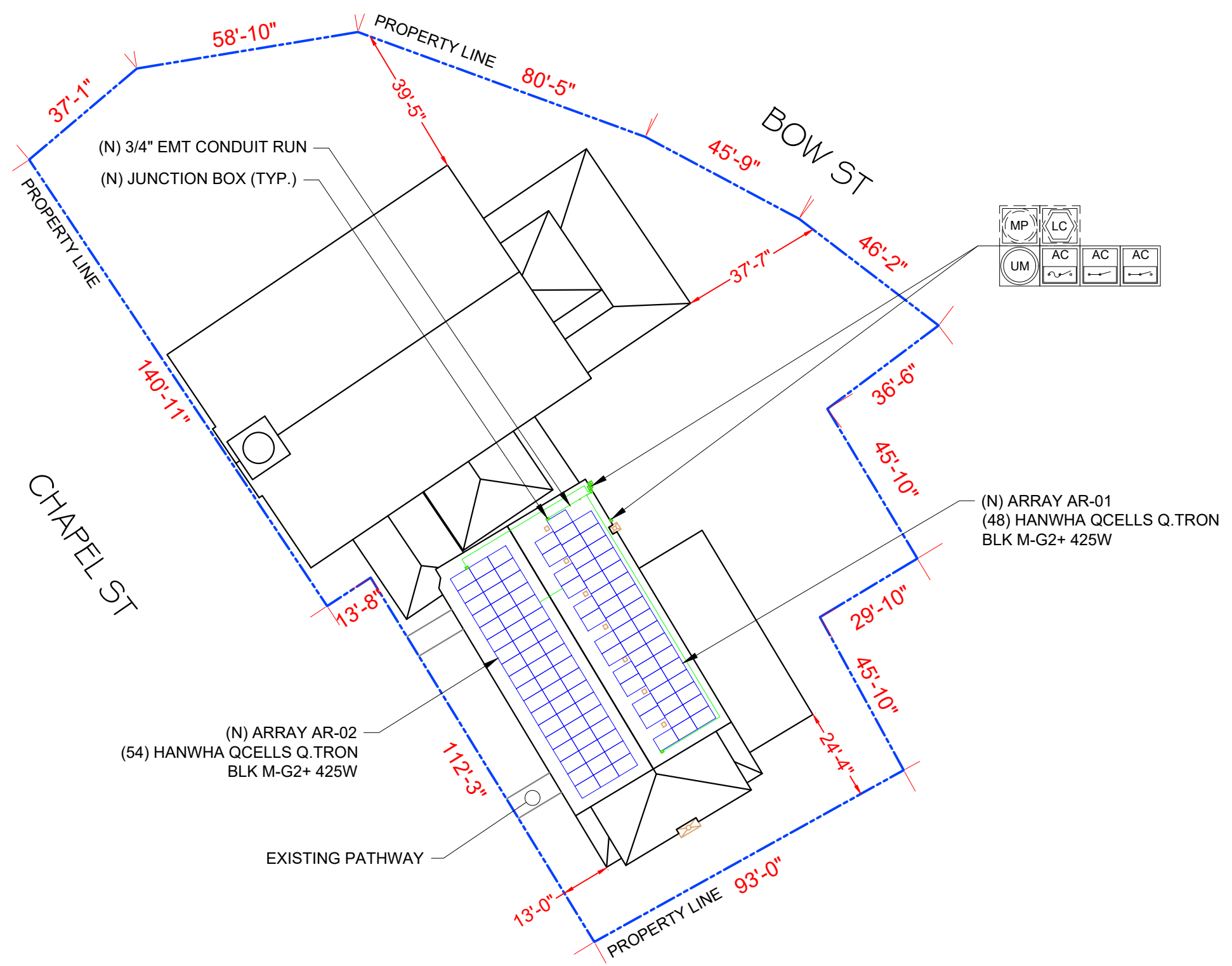
ANSI B  
 11" X 17"

SHEET NUMBER

PV-0



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 43.35kW DC PHOTOVOLTAIC SYSTEM

SALES PERSON  
 STEVE

SHEET NAME  
**SITE PLAN**

SHEET SIZE  
 ANSI B  
 11" X 17"

SHEET NUMBER  
**PV-1**

**MODULE TYPE, DIMENSIONS & WEIGHT**

NUMBER OF MODULES = 102 MODULES  
 MODULE TYPE = HANWHA QCELLS Q.TRON BLK M-G2+ 425W  
 MODULE WEIGHT = 47.2 LBS / 21.4 KG.  
 MODULE DIMENSIONS = 67.8" x 44.6" = 20.99 SF  
 UNIT WEIGHT OF ARRAY = 2.25 PSF



ROOF DESCRIPTION				
ROOF TYPE			COMP. SHINGLE	
ROOF	ARRAY TILT	AZIMUTH	TRUSSES SIZE	TRUSSES SPACING
#1	27°	59°	2"X8"	24" O.C.
#2	27°	239°	2"X8"	24" O.C.

ARRAY AREA				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	48	2140.98	6677.88	32.06
#2	54			

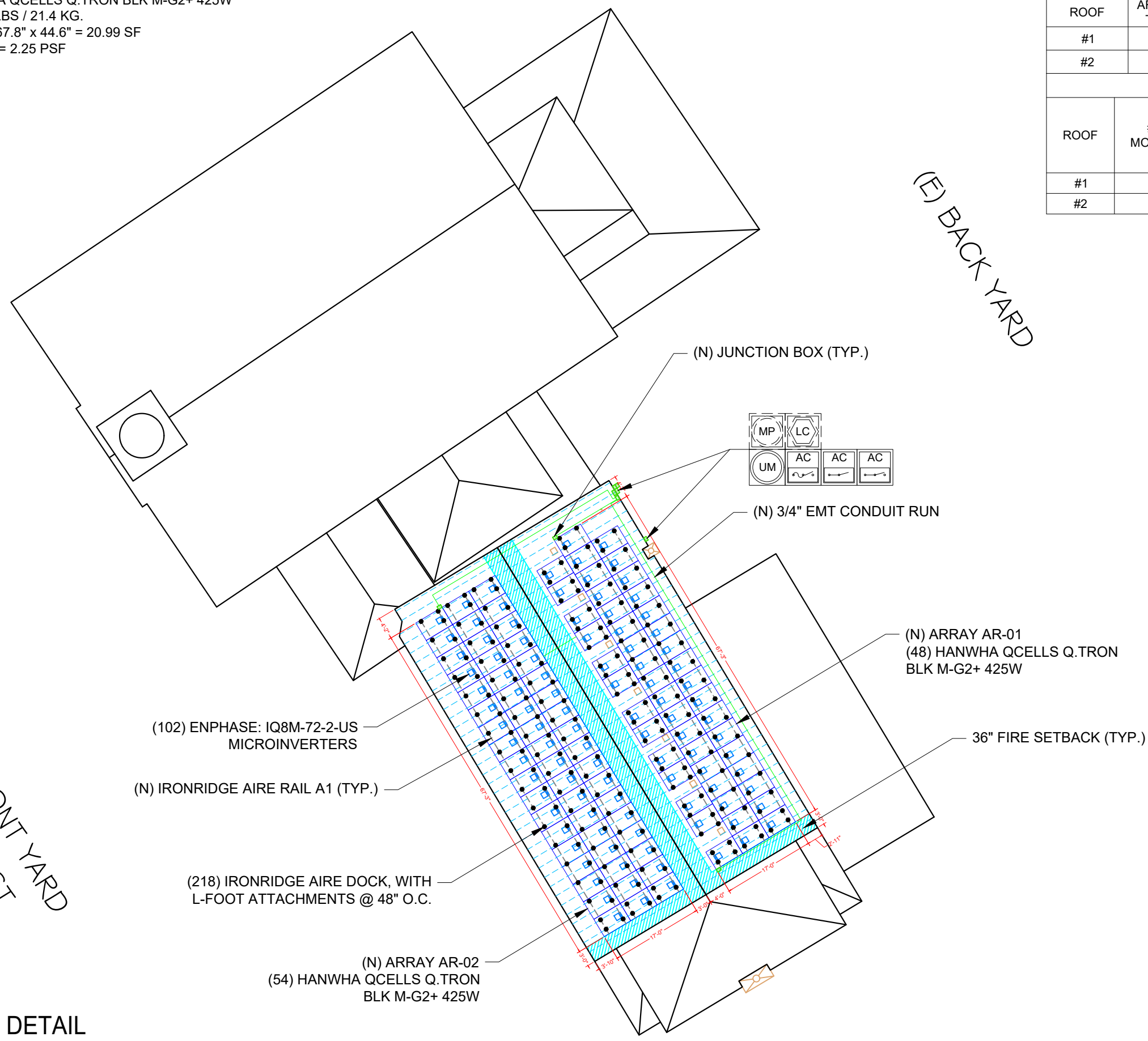
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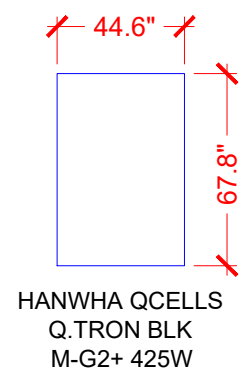
**ST. JOHN'S EPISCOPAL CHURCH**  
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 EMAIL: reginnhny@outlook.com  
 43.35kW DC PHOTOVOLTAIC SYSTEM

SALES PERSON	STEVE
SHEET NAME	<b>ARRAY DETAIL</b>
SHEET SIZE	<b>ANSI B 11" X 17"</b>
SHEET NUMBER	<b>PV-2</b>



(E) BACK YARD

(E) FRONT YARD  
 CHAPEL ST



(102) HANWHA QCELLS Q.TRON BLK M-G2+ 425W MODULE

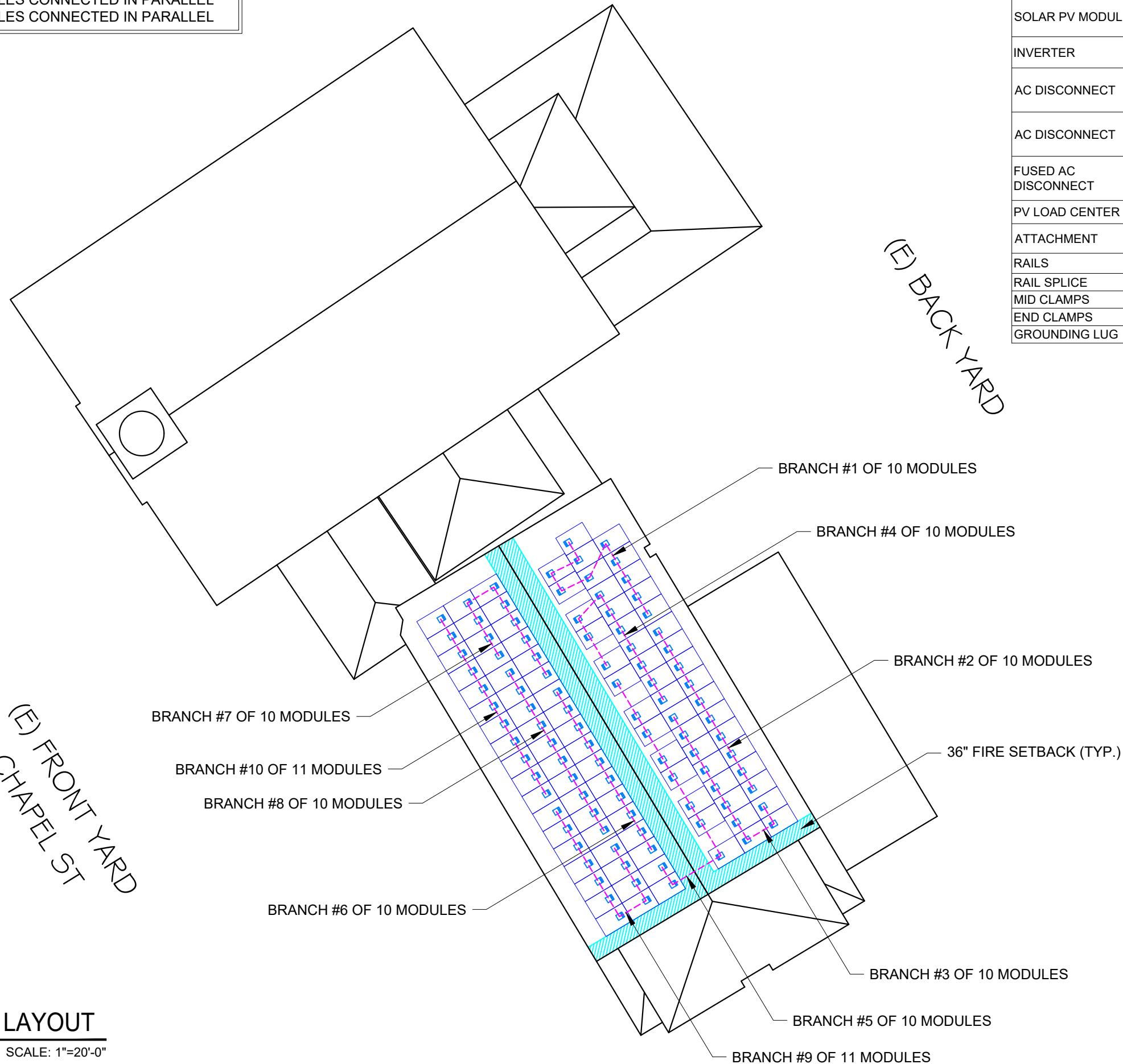
(8) BRANCH OF 10 MODULES CONNECTED IN PARALLEL

(2) BRANCH OF 11 MODULES CONNECTED IN PARALLEL



(E) FRONT YARD  
CHAPEL ST

(E) BACK YARD



BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	102	HANWHA QCELLS Q.TRON BLK M-G2+ 425W MODULES
INVERTER	102	ENPHASE: IQ8M-72-2-US MICROINVERTERS
AC DISCONNECT	1	AC DISCONNECT: 240V, 200AMP, NEMA 3R, UL LISTED LOCKABLE AND NON-FUSIBLE
AC DISCONNECT	1	AC DISCONNECT: 240V, 200AMP, LOCKABLE KNIFE HANDLE DISCONNECT
FUSED AC DISCONNECT	1	AC DISCONNECT: 240V, 200AMP, FUSED NEMA 3R, UL LISTED WITH 175A FUSES
PV LOAD CENTER	1	200A PV LOAD CENTER, 240V
ATTACHMENT	218	IRONRIDGE AIRE DOCK, WITH L-FOOT ATTACHMENTS
RAILS	51	IRONRIDGE AIRE RAIL A1 170"
RAIL SPLICE	40	SPLICE KIT
MID CLAMPS	180	MID CLAMP
END CLAMPS	48	END CLAMP
GROUNDING LUG	12	IRONRIDGE LUG



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EMAIL: reginnhny@outlook.com  
43.35kW DC PHOTOVOLTAIC SYSTEM

SALES PERSON

STEVE

SHEET NAME

**STRING LAYOUT**

SHEET SIZE

**ANSI B  
11" X 17"**

SHEET NUMBER

**PV-2A**

**1 STRING LAYOUT**

PV-2A

SCALE: 1"=20'-0"

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SALES PERSON

STEVE

SHEET NAME

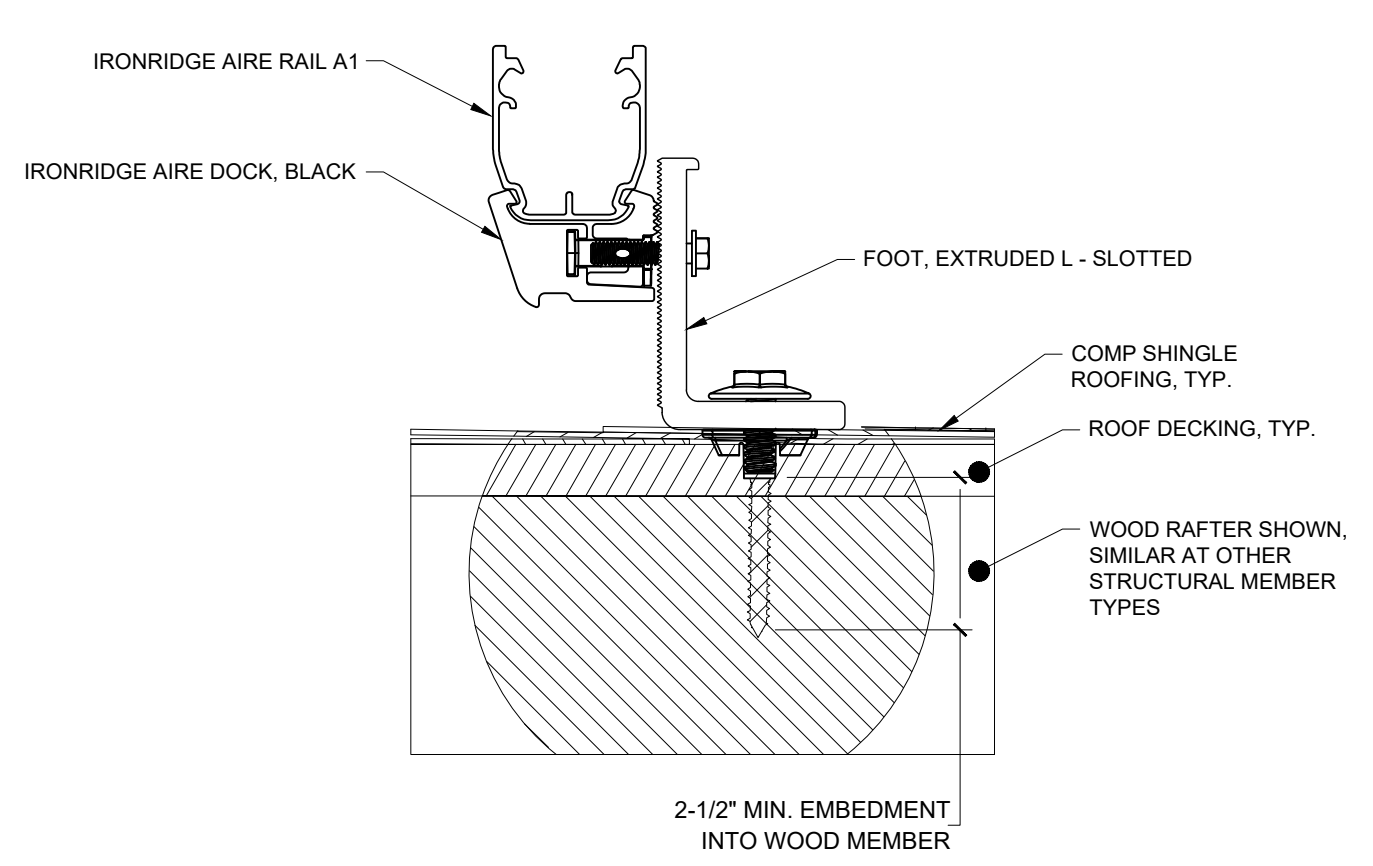
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DETAILS**

SHEET SIZE

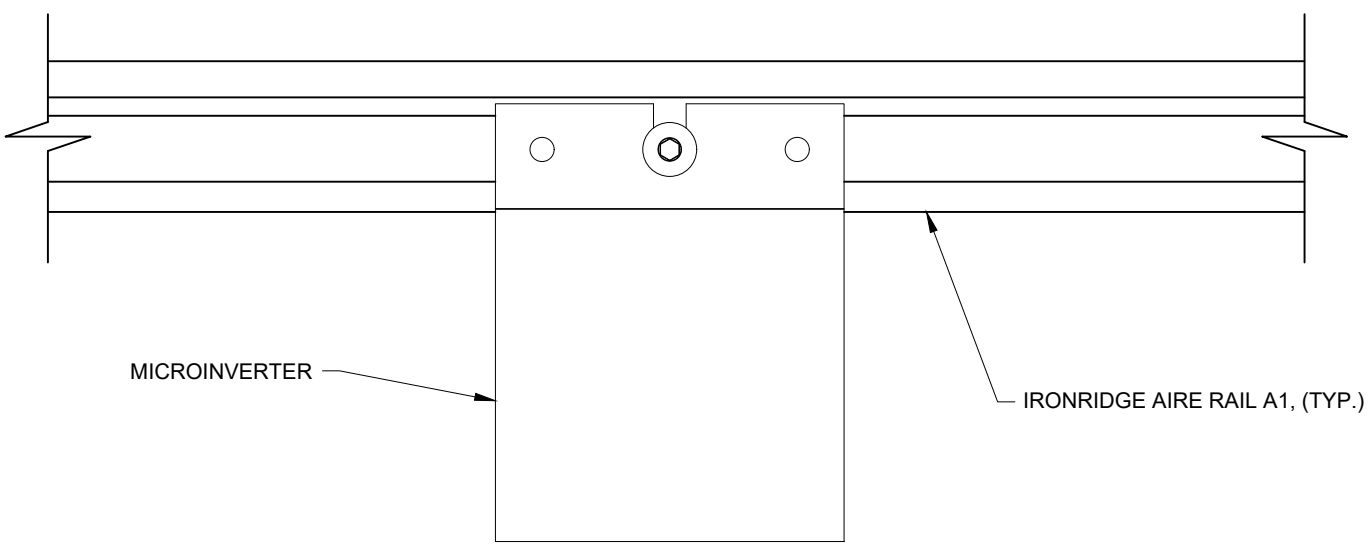
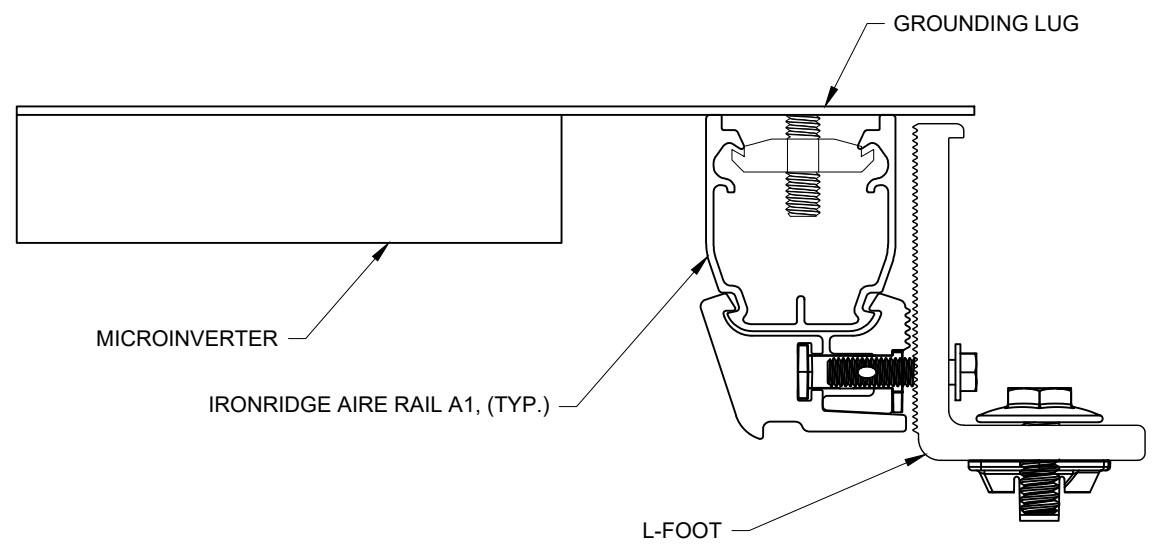
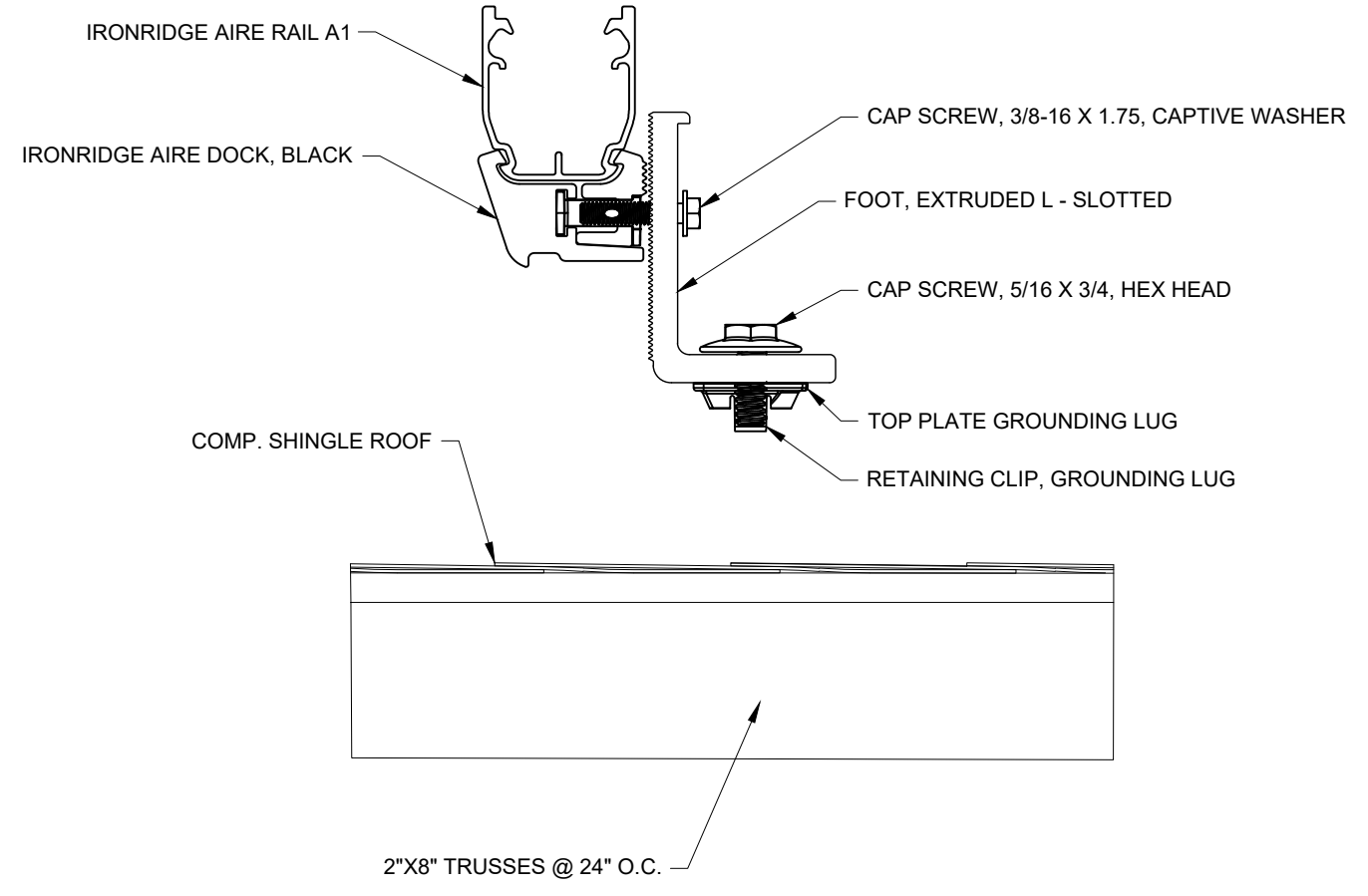
**ANSI B  
11" X 17"**

SHEET NUMBER

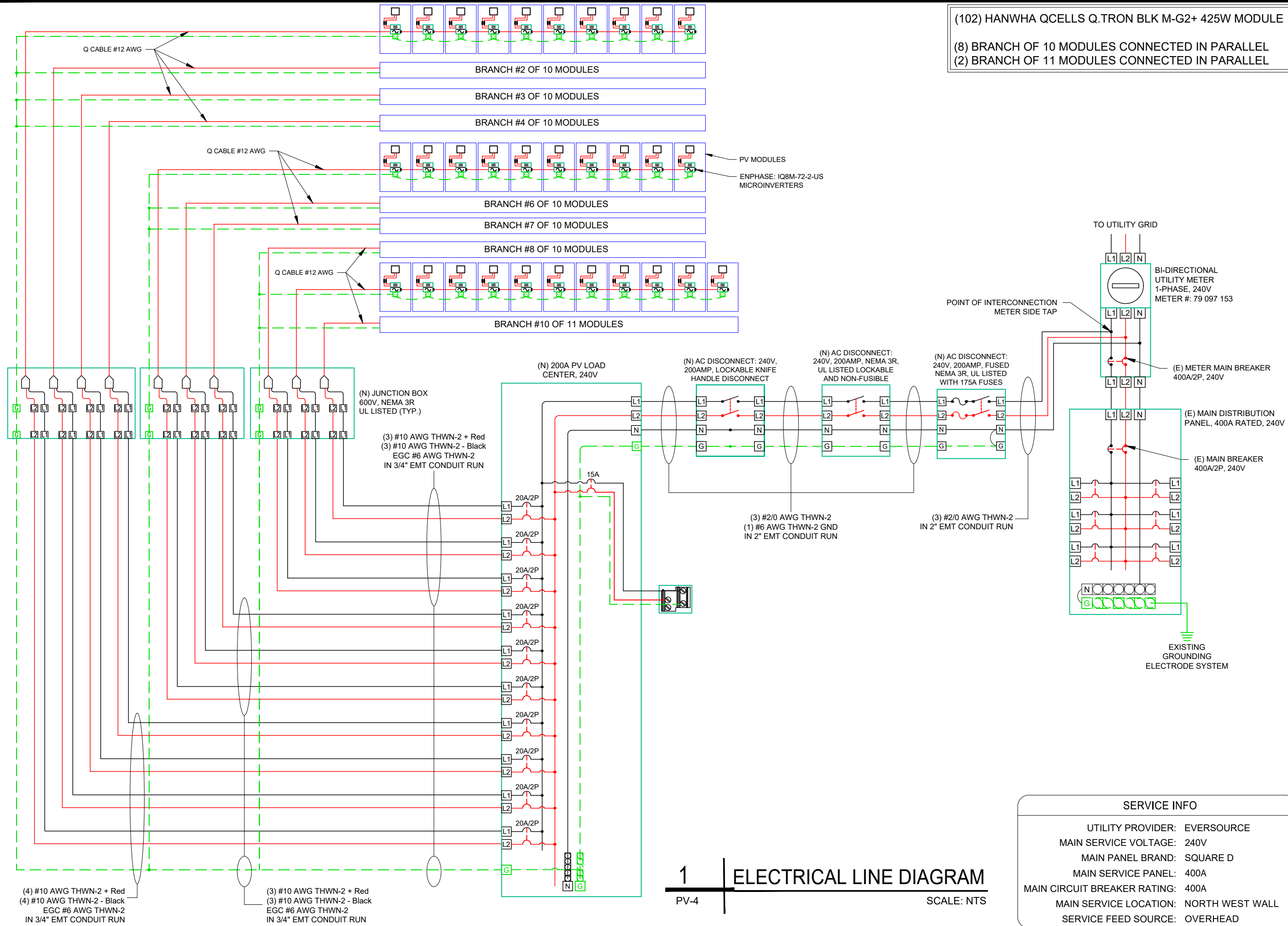
**PV-3**



**1 ATTACHMENT DETAIL**  
PV-3 SCALE: NTS



**2 MICROINVERTER DETAIL**  
PV-3 SCALE: NTS



(102) HANWHA QCELLS Q.TRON BLK M-G2+ 425W MODULE  
 (8) BRANCH OF 10 MODULES CONNECTED IN PARALLEL  
 (2) BRANCH OF 11 MODULES CONNECTED IN PARALLEL



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 43.35kW DC PHOTOVOLTAIC SYSTEM

SALES PERSON  
 STEVE

SHEET NAME  
**ELECTRICAL  
 LINE DIAGRAM**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-4**

SERVICE INFO	
UTILITY PROVIDER:	EVERSOURCE
MAIN SERVICE VOLTAGE:	240V
MAIN PANEL BRAND:	SQUARE D
MAIN SERVICE PANEL:	400A
MAIN CIRCUIT BREAKER RATING:	400A
MAIN SERVICE LOCATION:	NORTH WEST WALL
SERVICE FEED SOURCE:	OVERHEAD

**1** | **ELECTRICAL LINE DIAGRAM**  
 PV-4 | SCALE: NTS

## AC CONDUCTOR AMPACITY CALCULATIONS: FROM ROOF TOP JUNCTION BOX TO PV LOAD CENTER

AMBIENT TEMPERATURE ADJUSTMENT FOR EXPOSED CONDUIT  
PER NEC 310.15(B)(2)(c): + 22°  
EXPECTED WIRE TEMP (°C): 33° + 22°  
TEMP CORRECTION PER TABLE 310.15: 0.76  
#OF CURRENT CARRYING CONDUCTORS: 8  
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a): 0.70  
CIRCUIT CONDUCTOR SIZE: 10 AWG  
CIRCUIT CONDUCTOR AMPACITY: 40A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B):  
1.25 X MAX AC OUTPUT CURRENT X # OF INVERTERS PER STRING  
BRANCH #1 TO #8 : 1.25 X 1.35 X 10 = 16.88A  
BRANCH #9 & #10 : 1.25 X 1.35 X 11 = 18.57A

DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.15  
TEMP CORR. PER NEC TABLE 310.15 X  
CONDUIT FILL CORR. PER NEC 310.15(B)(2)(a) X  
CIRCUIT CONDUCTOR AMPACITY = 0.76 X 0.70 X 40 = 21.28A

## AC CONDUCTOR AMPACITY CALCULATIONS: FROM PV LOAD CENTER TO FUSED AC DISCONNECT

EXPECTED WIRE TEMP (°C): 33°  
TEMP CORRECTION PER NEC TABLE 310.15: 0.96  
CIRCUIT CONDUCTOR SIZE: 2/0 AWG  
CIRCUIT CONDUCTOR AMPACITY: 195A  
#OF CURRENT CARRYING CONDUCTORS: 3  
CONDUIT FILL PER NEC 310.15(B)(2)(a): 1  
REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(B):  
1.25 X OUTPUT CURRENT OF LOAD CENTER  
1.25 X 1.35 X 102 = 172.13A

DERATED AMPACITY OF CIRCUIT CONDUCTORS PER NEC TABLE 310.15:  
TEMP CORR. PER NEC 310.15 X  
CONDUIT FILL CORR. PER NEC 310.15(B)(2)(a) X  
CIRCUIT CONDUCTOR AMPACITY =  
0.96 X 1.00 X 195 = 187.2A

### ELECTRICAL NOTES

- NO DC CONDUCTORS PRESENT.
- 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.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 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 AND WHERE REQUIRED.
- MODULE SUPPORT RAIL TO BE BONDED TO COPPER G.E.C. VIA WEEB LUG OR ILSKO GBL-4DBT LAY-IN LUG.
- THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE.

ENPHASE: IQ8M-72-2-US MICROINVERTERS		
Input Data (DC)		
Recommended Input Power (STC)		260-460W +
Maximum Input DC Voltage		60V
Peak Power Tracking Voltage		16V-58V
Operating Range		22V-58V
Min. / Max. Start Voltage		60V
Max DC Short Circuit Current		25A
Output Data (AC)		
Maximum Output Power		325W
Nominal Output Current		1.35A
Nominal Voltage / Range		240V/211-264V
Nominal Frequency / Range		60 Hz
Extended Frequency / Range		47-68 Hz
Power Factor at rated power		1.0
Maximum unit per 20A Branch Circuit		11 (240 VAC)

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-21°
AMBIENT TEMP (HIGH TEMP 2%)	33°
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	55°
CONDUCTOR TEMPERATURE RATE	90°



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#### SALES PERSON

STEVE

#### SHEET NAME

**ELECTRICAL  
CALCULATION**

#### SHEET SIZE

**ANSI B  
11" X 17"**

#### SHEET NUMBER

**PV-5**

**! 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).

**! WARNING**  
DUAL POWER SUPPLY

SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL LOCATION:  
UTILITY SERVICE METER AND MAIN SERVICE PANEL.

**! WARNING**  
INVERTER OUTPUT CONNECTION

DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:  
ADJACENT TO PV BREAKER (IF APPLICABLE).

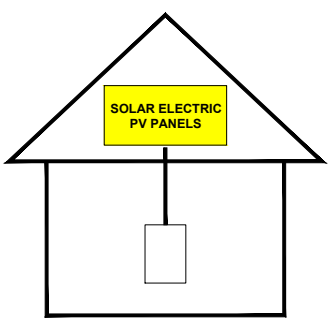
**! WARNING**  
PHOTOVOLTAIC SYSTEM COMBINER PANEL

DO NOT ADD LOADS

LABEL LOCATION:  
PHOTOVOLTAIC AC COMBINER (IF APPLICABLE).

**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

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



LABEL LOCATION:  
ON OR NO MORE THAN 1 M (3 FT) FROM THE SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED.

**PHOTOVOLTAIC AC DISCONNECT**

MAXIMUM AC OPERATING CURRENT: 172.13 AMPS  
NOMINAL OPERATING AC VOLTAGE: 240 VAC

LABEL LOCATION:  
AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.

DATA PER PANEL

NOMINAL OPERATING AC VOLTAGE -	240	V
NOMINAL OPERATING AC FREQUENCY-	60	Hz
MAXIMUM AC POWER-	325	VA
MAXIMUM AC CURRENT-	1.35	A
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT-	20	A

LABEL LOCATION:  
COMBINER BOX

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.



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SALES PERSON

STEVE

SHEET NAME

PLACARDS

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-6



# Q.TRON BLK M-G2+ SERIES

410-430Wp | 108 Cells  
22.4% Maximum Module Efficiency

MODEL Q.TRON BLK M-G2+

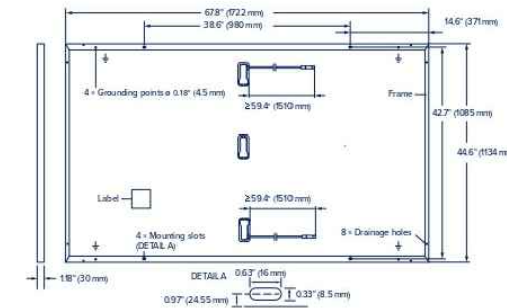


PRELIMINARY

## Q.TRON BLK M-G2+ SERIES

### Mechanical Specification

Format	67.8 in × 44.6 in × 1.18 in (including frame) (1722 mm × 1134 mm × 30 mm)
Weight	47.2 lbs (21.4 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 18 monocrystalline Q.ANTUM NEO solar half cells
Junction box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), Protection class IP67, with bypass diodes
Cable	4 mm <sup>2</sup> Solar cable; (+) ≥ 59.4 in (1510 mm), (-) ≥ 59.4 in (1510 mm)
Connector	Stäubli MC4; IP68



### Electrical Characteristics

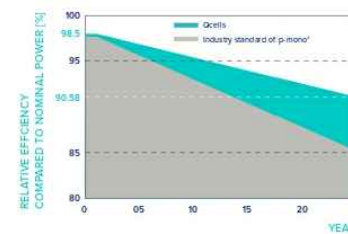
POWER CLASS		410	415	420	425	430
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC <sup>1</sup> (POWER TOLERANCE +5W/-0W)						
Power at MPP <sup>1</sup>	P <sub>MPP</sub> [W]	410	415	420	425	430
Short Circuit Current <sup>1</sup>	I <sub>SC</sub> [A]	13.39	13.42	13.46	13.49	13.53
Open Circuit Voltage <sup>1</sup>	V <sub>OC</sub> [V]	38.58	38.61	38.64	38.67	38.70
Current at MPP	I <sub>MPP</sub> [A]	12.68	12.75	12.82	12.88	12.95
Voltage at MPP	V <sub>MPP</sub> [V]	32.32	32.55	32.77	32.98	33.20
Efficiency <sup>1</sup>	η [%]	≥ 21.4	≥ 21.6	≥ 21.9	≥ 22.2	≥ 22.4

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT<sup>2</sup>

Power at MPP	P <sub>MPP</sub> [W]	310.0	313.8	317.6	321.4	325.2
Short Circuit Current	I <sub>SC</sub> [A]	10.79	10.82	10.84	10.87	10.90
Open Circuit Voltage	V <sub>OC</sub> [V]	36.61	36.63	36.66	36.69	36.71
Current at MPP	I <sub>MPP</sub> [A]	9.97	10.03	10.09	10.15	10.21
Voltage at MPP	V <sub>MPP</sub> [V]	31.09	31.29	31.48	31.66	31.85

<sup>1</sup>Measurement tolerances P<sub>MPP</sub> ± 3%; I<sub>SC</sub>; V<sub>OC</sub> ± 5% at STC: 1000 W/m<sup>2</sup>, 25 ± 2°C, AM 1.5 according to IEC 60904-3 • 2800 W/m<sup>2</sup>, NMOT, spectrum AM 1.5

### Qcells PERFORMANCE WARRANTY

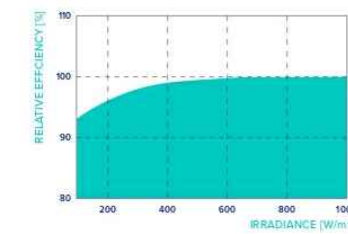


At least 98.5% of nominal power during first year. Thereafter max. 0.33% degradation per year. At least 95.53% of nominal power up to 10 years. At least 90.58% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Qcells sales organisation of your respective country.

<sup>1</sup>Standard terms of guarantee for the 5 PV companies with the highest production capacity in 2021 (February 2021)

### PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25°C, 1000 W/m<sup>2</sup>).

### TEMPERATURE COEFFICIENTS

Temperature Coefficient of I <sub>SC</sub>	α [%/K]	+0.04	Temperature Coefficient of V <sub>OC</sub>	β [%/K]	-0.24
Temperature Coefficient of P <sub>MPP</sub>	γ [%/K]	-0.30	Nominal Module Operating Temperature	NMOT [°F]	109 ± 5.4 (43 ± 3 °C)

### Properties for System Design

Maximum System Voltage	V <sub>sys</sub> [V]	1000 (IEC)/1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI/UL 61730	C / TYPE 2
Max. Design Load, Push/Pull <sup>2</sup>	[lbs / ft <sup>2</sup> ]	75 (3600 Pa) / 50 (2400 Pa)	Permitted Module Temperature on Continuous Duty	-40°F up to +185°F (-40°C up to +85°C)
Max. Test Load, Push/Pull <sup>3</sup>	[lbs / ft <sup>2</sup> ]	113 (5400 Pa) / 75 (3600 Pa)		

<sup>3</sup> See Installation Manual

### Qualifications and Certificates

Quality Controlled PV - TÜV Rheinland; IEC 61215:2016; IEC 61730:2016. This data sheet complies with DIN EN 50380.



Qcells pursues minimizing paper output in consideration of the global environment.

Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product.  
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL: +1 949 748 99 96 | EMAIL: hcq-inquiry@qcells.com | WEB: www.qcells.com



### High performance Qcells N-type solar cells

Q.ANTUM NEO Technology with optimized module layout boosts module efficiency up to 22.4%.



### A reliable investment

Inclusive 25-year product warranty and 25-year linear performance warranty<sup>1</sup>.



### Enduring high performance

Long-term yield security with Anti LeTID Technology, Anti PID Technology<sup>2</sup>, Hot-Spot Protect.



### Extreme weather rating

High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (3600 Pa).



### Innovative all-weather technology

Optimal yields, whatever the weather with excellent low-light and temperature behaviour.



### The most thorough testing programme in the industry

Qcells is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

<sup>1</sup> See data sheet on rear for further information.

<sup>2</sup> APT test conditions according to IEC/TS 62804-1:2015, method A (-1500V, 96 h)

The ideal solution for:



603 SOLAR  
24 CHARTER ST.  
EXETER, NH 03833  
(603) 570-2607

### REVISIONS

DESCRIPTION	DATE	REV

### PROJECT NAME & ADDRESS

ST. JOHN'S EPISCOPAL CHURCH  
100 CHAPEL ST.,  
PORTSMOUTH, NH 03801  
PHONE #: (603) 988-8347  
EMAIL: reginnhny@outlook.com  
43.35kW DC PHOTOVOLTAIC SYSTEM

### SALES PERSON

STEVE

### SHEET NAME

DATA SHEET

### SHEET SIZE

ANSI B  
11" X 17"

### SHEET NUMBER

PV-7

Specifications subject to technical changes © Qcells Q.TRON\_BLK\_M-G2+\_series\_410-430\_2022-09\_Rev01.NA



## IQ8M and IQ8A Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included O-DCC-2 adapter cable with plug-n-play MC4 connectors.



IQ8 Series Microinverters are UL listed as PV Rapid Shutdown Equipment and conform with various regulations, when installed according to manufacturer's instructions.

\*Only when installed with IQ System Controller 2, meets UL 1741.  
\*\*IQ8M and IQ8A support split-phase, 240V installations only.

### Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

### High productivity and reliability

- Produce power even when the grid is down\*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

### Microgrid-forming

- Complies with the latest advanced grid support\*\*
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB 3<sup>rd</sup> Ed.)

### Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc.) in the same system.

## IQ8M and IQ8A Microinverters

INPUT DATA (DC)		IQ8M-72-2-US	IQ8A-72-2-US
Commonly used module pairings <sup>1</sup>	W	260 – 460	295 – 500
Module compatibility		54-cell / 108 half-cell, 60-cell / 120 half-cell, 66-cell / 132 half-cell and 72-cell / 144 half-cell	
MPPT voltage range	V	30 – 45	32 – 45
Operating range	V		16 – 58
Min. / Max. start voltage	V		22 / 58
Max. input DC voltage	V		60
Max. continuous input DC current	A		12
Max. input DC short-circuit current	A		25
Max. module I <sub>sc</sub>	A		20
Overvoltage class DC port			II
DC port backfeed current	mA		0
PV array configuration		1x 1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		IQ8M-72-2-US	IQ8A-72-2-US
Peak output power	VA	330	366
Max. continuous output power	VA	325	349
Nominal (L-L) voltage / range <sup>2</sup>	V		240 / 211 – 264
Max. continuous output current	A	1.35	1.45
Nominal frequency	Hz		60
Extended frequency range	Hz		47 – 68
AC short circuit fault current over 3 cycles	Arms		2
Max. units per 20 A (L-L) branch circuit <sup>3</sup>			11
Total harmonic distortion			<5%
Overvoltage class AC port			III
AC port backfeed current	mA		30
Power factor setting			1.0
Grid-tied power factor (adjustable)			0.85 leading – 0.85 lagging
Peak efficiency	%	97.8	97.7
CEC weighted efficiency	%	97.5	97
Night-time power consumption	mW		60
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (H x W x D)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
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	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3 <sup>rd</sup> Ed.), 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 Shutdown Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at <https://link.enphase.com/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.

### REVISIONS

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PORTSMOUTH, NH 03801  
PHONE #: (603) 988-8347  
EMAIL: reginnhny@outlook.com  
43.35kW DC PHOTOVOLTAIC SYSTEM

### SALES PERSON

STEVE

### SHEET NAME

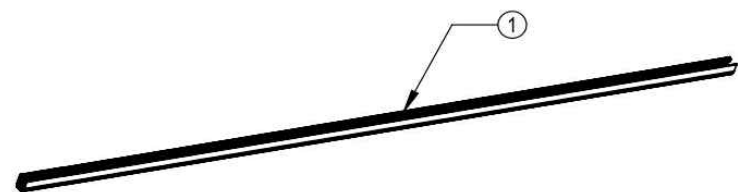
DATA SHEET

### SHEET SIZE

ANSI B  
11" X 17"

### SHEET NUMBER

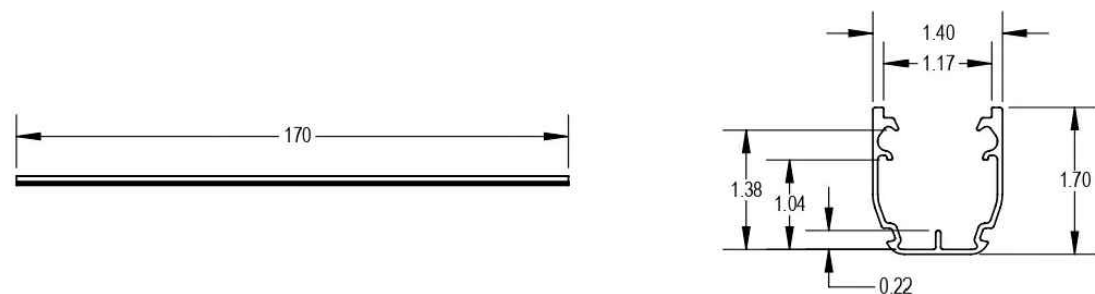
PV-8



ITEM NO	DESCRIPTION	QTY IN KIT
1	Aire Rail, A1, Black(or Clear), 170	1

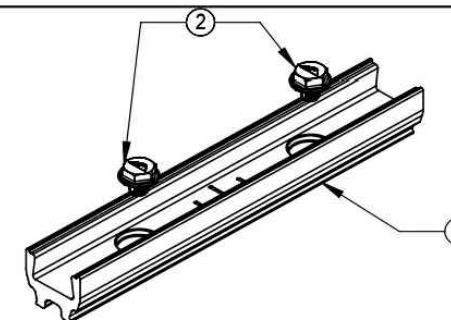
Part Number	Description
AE-A1-170B	AIRE RAIL, A1, BLACK, 170
AE-A1-170M	AIRE RAIL, A1, MILL, 170

1) Aire A1



Part Number	Material	Value
AE-A1-170B	6000-Series Aluminum	Black
AE-A1-170M	6000-Series Aluminum	Clear

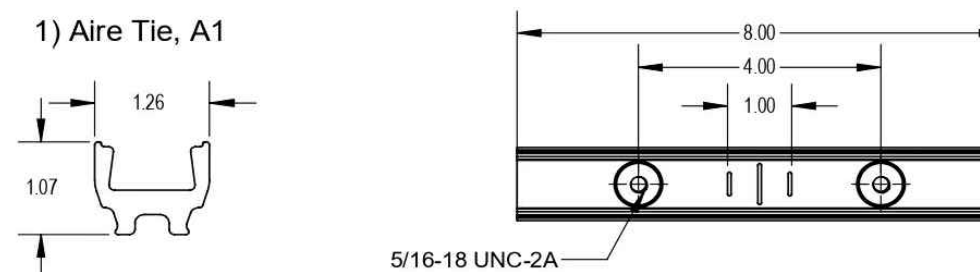
v1.0



ITEM NO	DESCRIPTION	QTY IN KIT
1	Aire Tie, A1	1
2	Aire Splc Bolt, Hex	2

Part Number	Description
AE-A1TIE-01-M1	AIRE TIE, A1 (BONDED SPLICE)

1) Aire Tie, A1



Property	Value
Material	6000 Series Aluminum
Finish	Mill

2) Aire Splc Bolt, Hex



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.0

REVISIONS

DESCRIPTION	DATE	REV

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SALES PERSON

STEVE

SHEET NAME

DATA SHEET

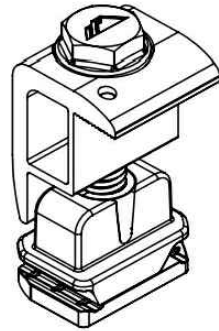
SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-9

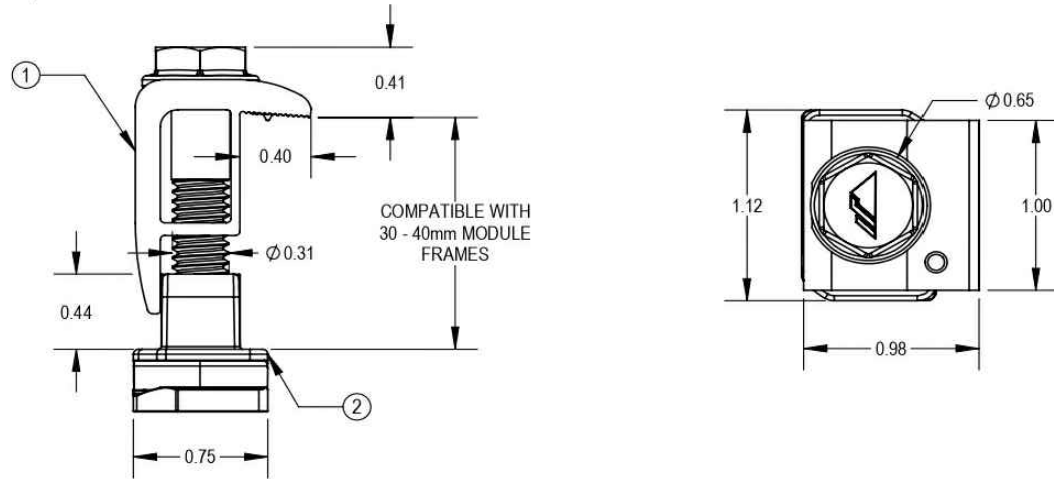
## AIRE LOCK END



ITEM NO	DESCRIPTION	QTY IN KIT
1	Aire Lock End, Black	1

Part Number	Description
AE-END-01-B1	AIRE LOCK END, BLACK

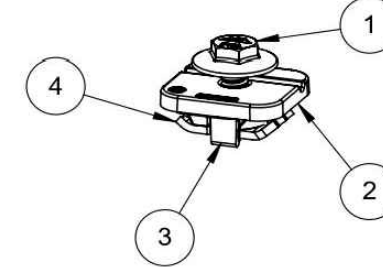
1) Aire Lock End



Item No	Material	Value
1	300 Series Stainless Steel	Clear and Black
2	Polypropelene	Black

v1.0

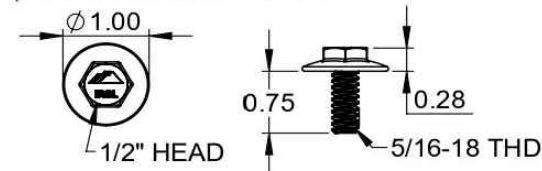
## AIRE LUG



ITEM NO.	DESCRIPTION	QTY IN KIT
1	CAP SCREW, 5/16 X 3/4, HEX HEAD	1
2	TOP PLATE GROUNDING LUG	1
3	RETAINING CLIP, GROUNDING LUG	1
4	T-NUT, SHEET METAL	1

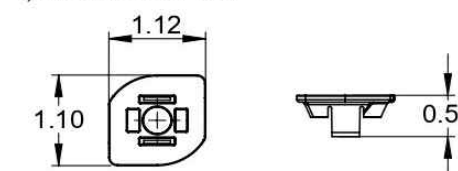
PART NUMBER	DESCRIPTION	WIRE SIZE RANGE (AWG)
AE-LUG-01-M1	AIRE LUG	6-10

1) CAP SCREW, 5/16 X 3/4



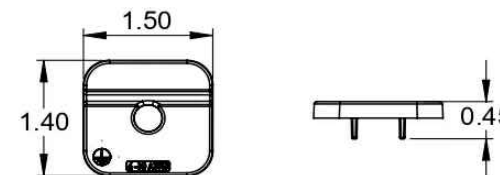
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

3) RETAINING CLIP



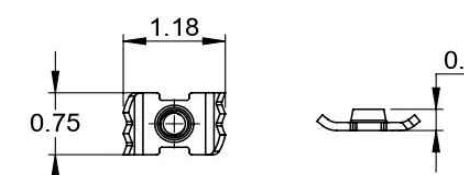
Property	Value
Material	Polypropylene
Finish	Black

2) TOP PLATE



Property	Value
Material	Tin Plated Aluminum
Finish	Clear Matte

4) T-NUT, SHEET METAL



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.0

REVISIONS

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SALES PERSON

STEVE

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PV-10

ITEM NO	DESCRIPTION	QTY IN KIT
1	FOOT, EXTRUDED L - SLOTTED	4

PART NUMBER	DESCRIPTION
FM-LFT-003	Kit, 4Pcs, Slotted L-Foot, Mill
FM-LFT-003-B	Kit, 4Pcs, Slotted L-Foot, Black

1) Foot, Extruded L - Slotted

v1.11

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME & ADDRESS

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SALES PERSON  
 STEVE

SHEET NAME  
**DATA SHEET**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-11**