

PHOTOVOLTAIC ROOF MOUNT SYSTEM

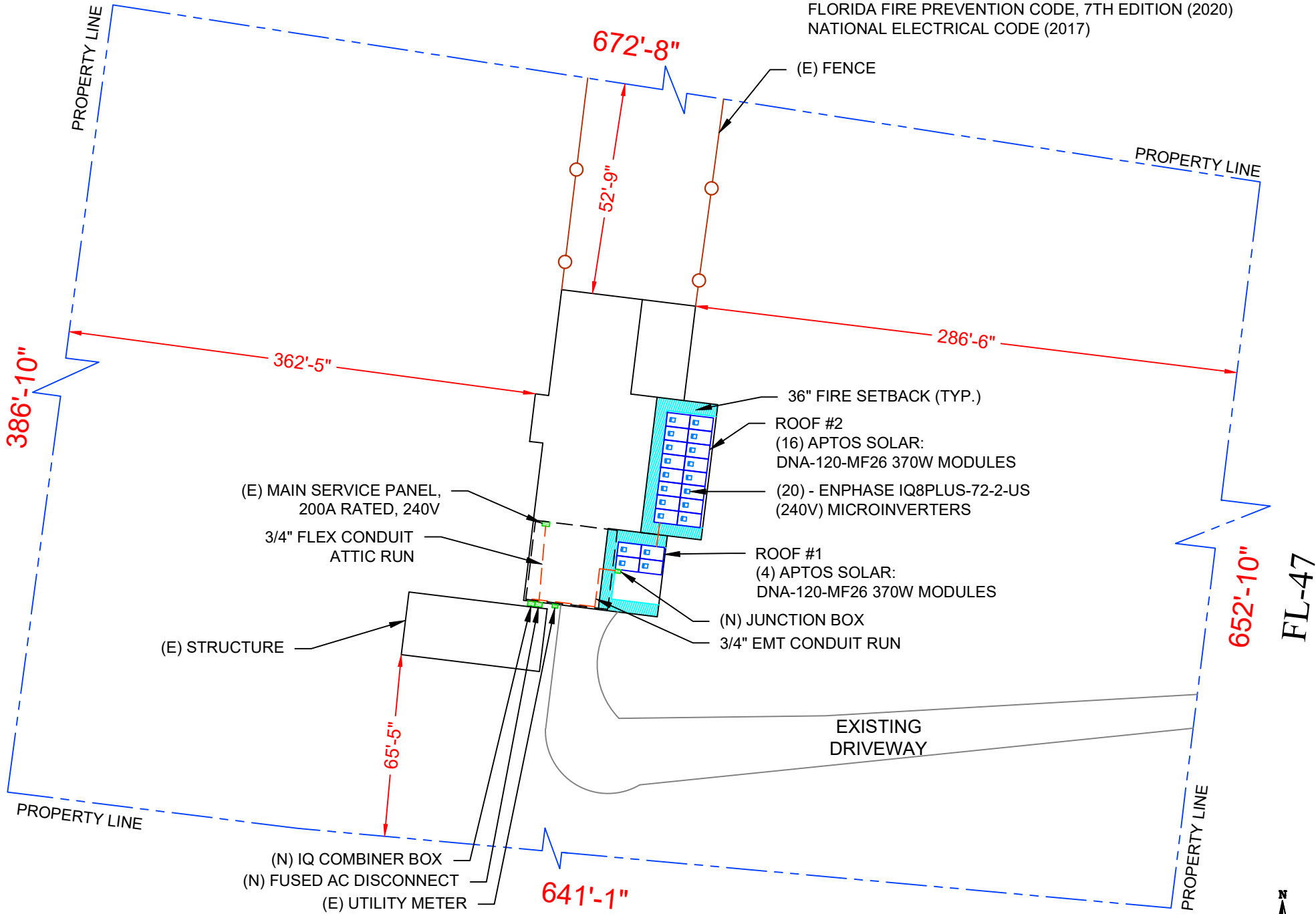
20 MODULES-ROOF MOUNTED - 7.400 kW DC, 5.80 kW AC
15990 FL-47, FORT WHITE, FL 32038,USA (29.957453, -82.713431)

PROJECT DESCRIPTION:

EQUIPMENT SUMMARY
20 - APTOS SOLAR: DNA-120-MF26 370W MODULES
20 - ENPHASE IQ8PLUS-72-2-US (240V) MICROINVERTERS

GOVERNING CODE:

FLORIDA BUILDING CODE – RESIDENTIAL, 7TH EDITION (2020)
FLORIDA BUILDING CODE – BUILDING, 7TH EDITION (2020)
FLORIDA BUILDING CODE – ENERGY CONSERVATION, 7TH EDITION (2020)
FLORIDA BUILDING CODE – PLUMBING, 7TH EDITION (2020)
FLORIDA BUILDING CODE – MECHANICAL, 7TH EDITION (2020)
FLORIDA BUILDING CODE – FUEL GAS, 7TH EDITION (2020)
FLORIDA BUILDING CODE – EXISTING BUILDING, 7TH EDITION (2020)
FLORIDA BUILDING CODE – ACCESSIBILITY, 7TH EDITION (2020)
FLORIDA FIRE PREVENTION CODE, 7TH EDITION (2020)
NATIONAL ELECTRICAL CODE (2017)



1 | SITE PLAN
PV-1 | SCALE: 1/32" = 1'-0"

SHEET INDEX

PV1-SITE-PLAN
PV2-LEGEND-SYSTEM-DESCRIPTION
PV3-ARRAY-DETAIL
PV4-STRING-LAYOUT
PV5-ATTACHMENT-DETAIL
PV6-ELEC-LINE-DIAGRAM
PV7-WIRING-CALCS
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PD2-INVERTER
PD3-COMBINER
PD4-IRONRIDGE
PD5-IRONRIDGE-UFO
PD6-VERSA-BRACKET-47
PD-ENGINEER-CALCS

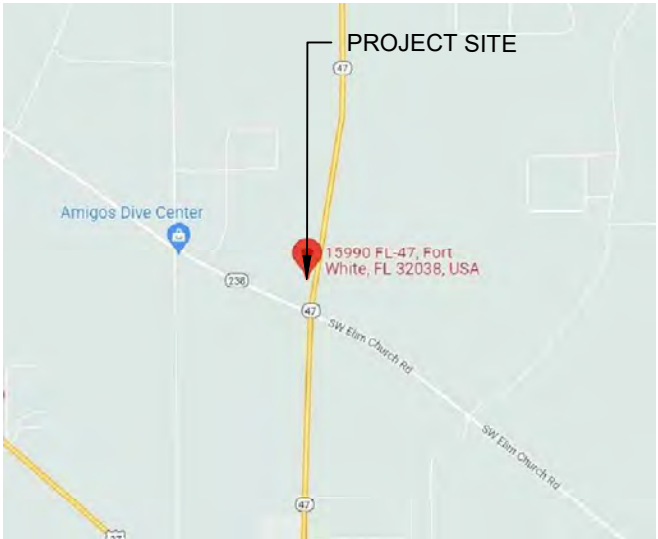


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AERIAL VIEW



VICINITY MAP

CONTRACTOR NAME



SUN SERVICES
FLORIDA
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LAKE LAND, FL 33803,USA
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REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038,USA

SHEET NAME


PV-1
SITE PLAN

SHEET SIZE

ANSI B
11" X 17"


Symbols:

Section.....




Sheet where section is located

Elevation




Detail ID Letter
Sheet where section is located

Detail



Detail ID Letter
Sheet where section is located

Detail
(Enlarged Plan)




Detail ID Letter
Area to be enlarged
Sheet where section is located

Keyed Notes


1

Keyed note designation on applicable sheet


Ground Terminal



Grounding Point/rod....



Solar Panel



or 00

Module with Source Circuit number

Combiner Box

CB


DC Disconnect

DCD


Main Distribution Panel

MDP


Fuse




Overcurrent Breaker ..



Inverter



Transformer



Automatic
Transfer Switch

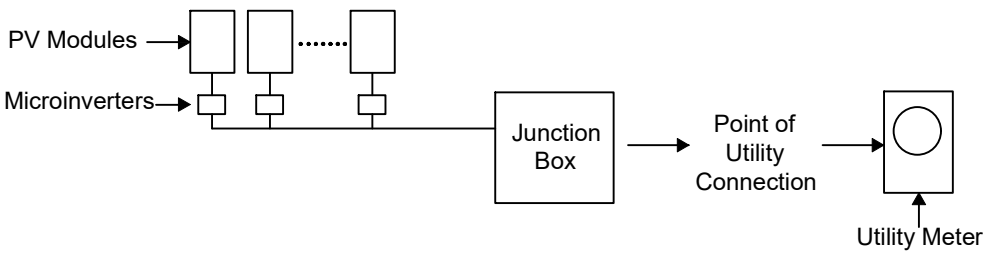
ATS

Abbreviations:

AC	Alternating Current
APPROX	Approximate
AWG	American Wire Gauge
CB	Combiner Box
DC	Direct Current
DCD	Direct Current Disconnect
DISC	Disconnect
(E)	Existing
EL	Elevation
EQ	Equal
JB	Junction Box
MCB	Main Combiner Box
MFR	Manufacturer
MIN	Minimum
MISC	Miscellaneous
(N)	New
OCPD	OverCurrent Protection Device
POCC	Point Of Common Coupling
PV	Photovoltaic
SF	Squarefoot/feet
STC	Standard Test Conditions
TBD	To Be Determined
TYP	Typical
VIF	Verify In Field
WP	Weather Proof

System Description

This system is a grid-tied, PV system, with PV generation consisting of 20 APTOS SOLAR: DNA-120-MF26 370W MODULES with a combined STC rated dc output power of 7400W. The modules are connected into 20 ENPHASE IQ8PLUS-72-2-US MICROINVERTERS. The inverter has electronic maximum power point tracking to maximize energy captured by the PV modules. The inverter also has an internal ground fault detection and interruption device that is set to disconnect the array in the event that a ground fault that exceeds one ampere should occur. The inverter has DC and AC disconnect integrated system and labels are provided as required by the *National Electric Code*



When the sun is shining, power from the PV array is fed into the inverter, where it is converted from DC to AC. The inverter output is then used to contribute to the power requirements of the occupancy. If PV power meets the requirements of the loads of the occupancy, any remaining PV power is sold back to the utility. When utility power is available, but PV power is not available, building loads are supplied by the utility.

The inverter meets the requirements of IEEE 1547 and UL 1741. This means that if it detects a loss of utility power, it will automatically disconnect from the utility. When utility voltage is restored, the inverter automatically reconnects to the utility grid after verifying utility voltage and frequency stability.

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DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PV-2
LEGEND SYSTEM DESCRIPTION

SHEET SIZE

ANSI B
11" X 17"

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 20 MODULES
MODULE TYPE = APTOS SOLAR: DNA-120-MF26 370W
MODULE WEIGHT = 45.19 LBS / 20.5 KG.
MODULE DIMENSIONS = 69.13" x 40.91" = 19.64 SF
UNIT WEIGHT OF ARRAY = 2.30 PSF

DESIGN CRITERIA

- EXPOSURE CATEGORY = B
- WIND SPEED = 121 MPH
- RISK CATEGORY = II
- ROOF HEIGHT = 15 FT.

ROOF DESCRIPTION				
ROOF TYPE			CORRUGATED METAL	
ROOF	ARRAY PITCH	AZIMUTH	RAFTERS SIZE	RAFTERS SPACING
#1	20°	97°	2"x4"	24" o.c.
#2	20°	97°	2"x4"	24" o.c.

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	4	78.56	303.04	25.92
#2	16	314.24	517.82	60.69

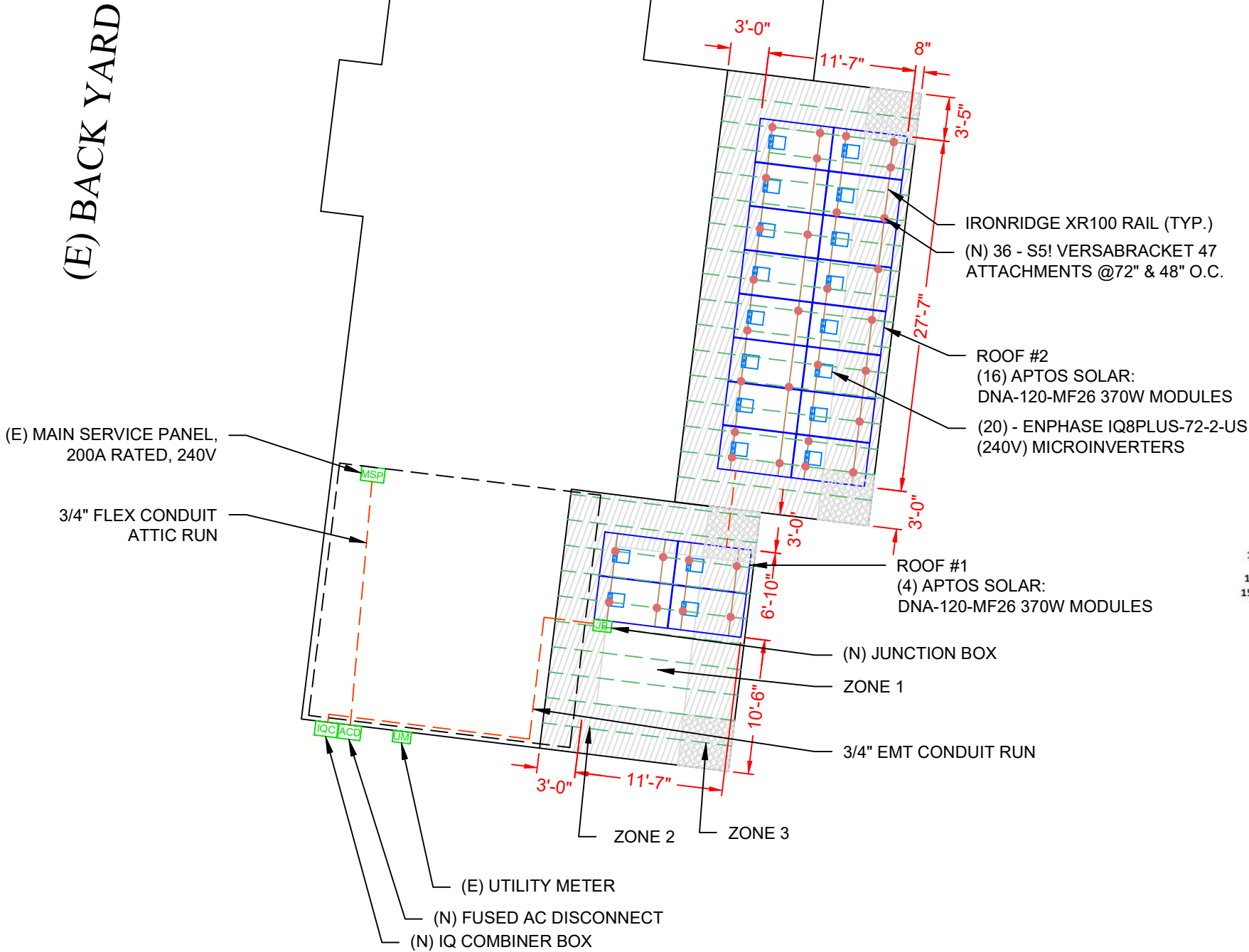
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(E) FRONT YARD
FL-47

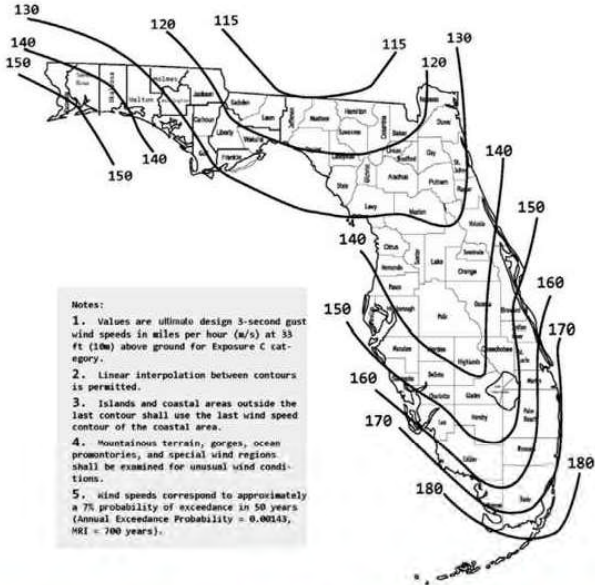
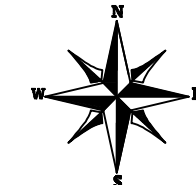



FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT} , FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES



1 | ARRAY DETAIL
PV-3 | SCALE: 3/32" = 1'-0"

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SHEET NAME

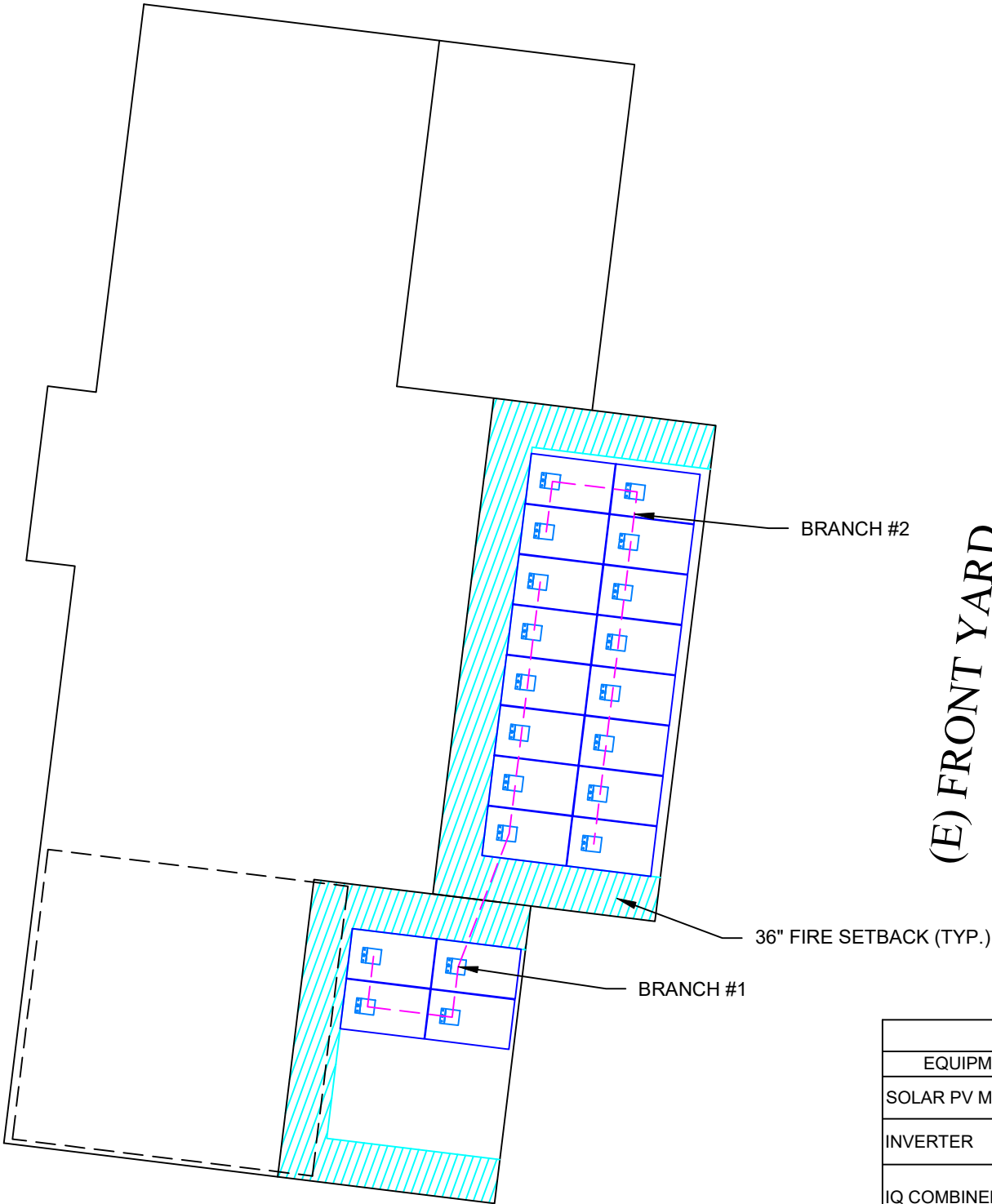
PV-3
ARRAY DETAIL

SHEET SIZE

ANSI B
11" X 17"

(20) APTOS SOLAR: DNA-120-MF26 370W MODULES
7.400 KW DC
5.80 KW AC
(2) BRANCH OF 10 MODULES CONNECTED IN SERIES.

(E) BACK YARD



(E) FRONT YARD
FL-47

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	20	APTOS SOLAR: DNA-120-MF26 370W MODULES
INVERTER	20	ENPHASE IQ8PLUS-72-2-US (240V) MICROINVERTERS
IQ COMBINER BOX	1	125A ENPHASE IQ COMBINER BOX 3 (X-IQ-AM1-240-3) WITH ENVOY COMMUNICATION GATEWAY]
FUSED AC DISCONNECT	1	FUSED AC DISCONNECT SW (VISIBLE OPEN, 40A RK1 FUSES) 60A, 2P, 240V NEMA 3R, 22 KAIC MIN. SERVICE ENTRANCE RATED
ATTACHMENT	36	S5! VERSABRACKET 47
RAILS	10	IRONRIDGE XR100 RAILS 168"
RAILS SPLICE	4	SPLICE KIT
MID CLAMPS	48	IRONRIDGE UFO
END CLAMPS	16	END SPACERS
GROUNDING LUG	4	WEEBLUG

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DESCRIPTION	DATE	REV

PROJECT NAME

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15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

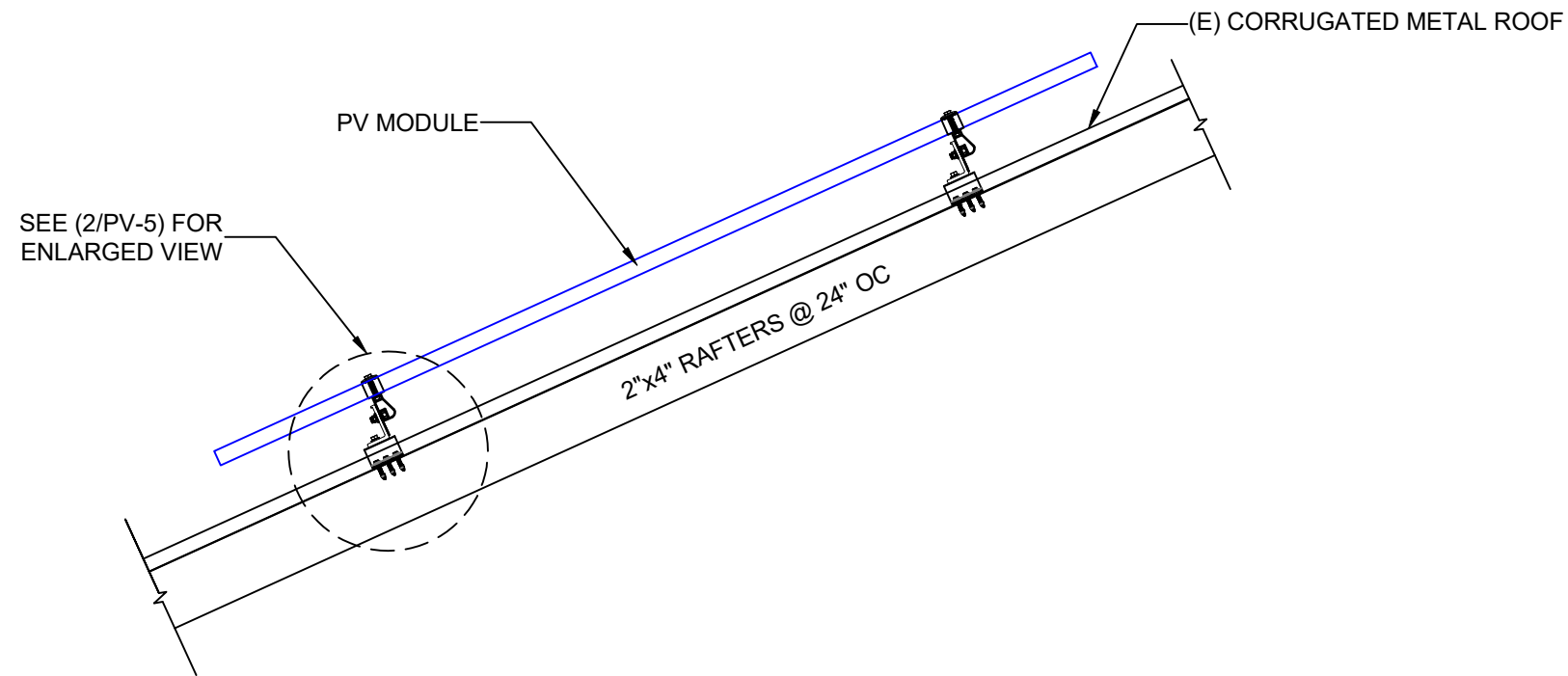
PV-4

STRING LAYOUT

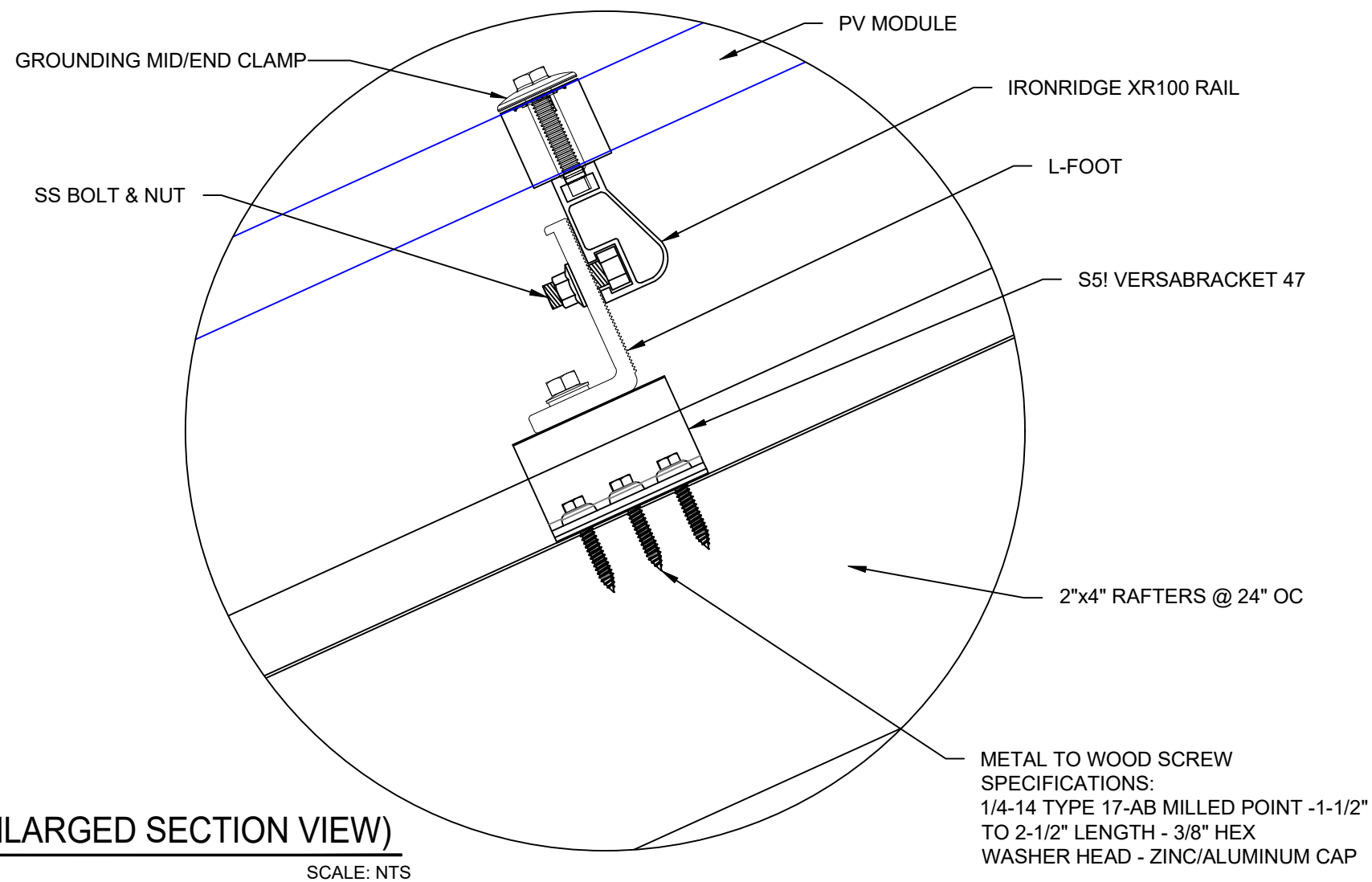
SHEET SIZE

ANSI B

11" X 17"



1 | **ATTACHMENT DETAIL**
PV-5 | SCALE: NTS



2 | **ATTACHMENT DETAIL (ENLARGED SECTION VIEW)**
PV-5 | SCALE: NTS

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PROJECT NAME

BRANDI GRISWOLD
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FORT WHITE, FL 32038, USA

SHEET NAME

PV-5
ATTACHMENT
DETAIL

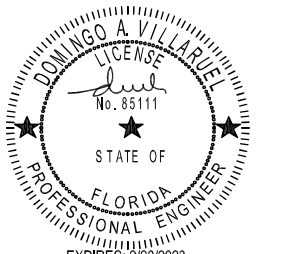
SHEET SIZE

ANSI B
11" X 17"

(20) APTOS SOLAR: DNA-120-MF26 370W MODULES
7.400 KW DC
5.80 KW AC
(2) BRANCH OF 10 MODULES CONNECTED IN SERIES.

- NOTE:**
- PROVIDE GROUNDING ELECTRODE CONDUCTOR FROM THE INVERTER TO AN EXISTING SERVICE GROUNDING ELECTRODE PER 690.47(B).
 - SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION, INCLUDING MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER, AS APPLICABLE.

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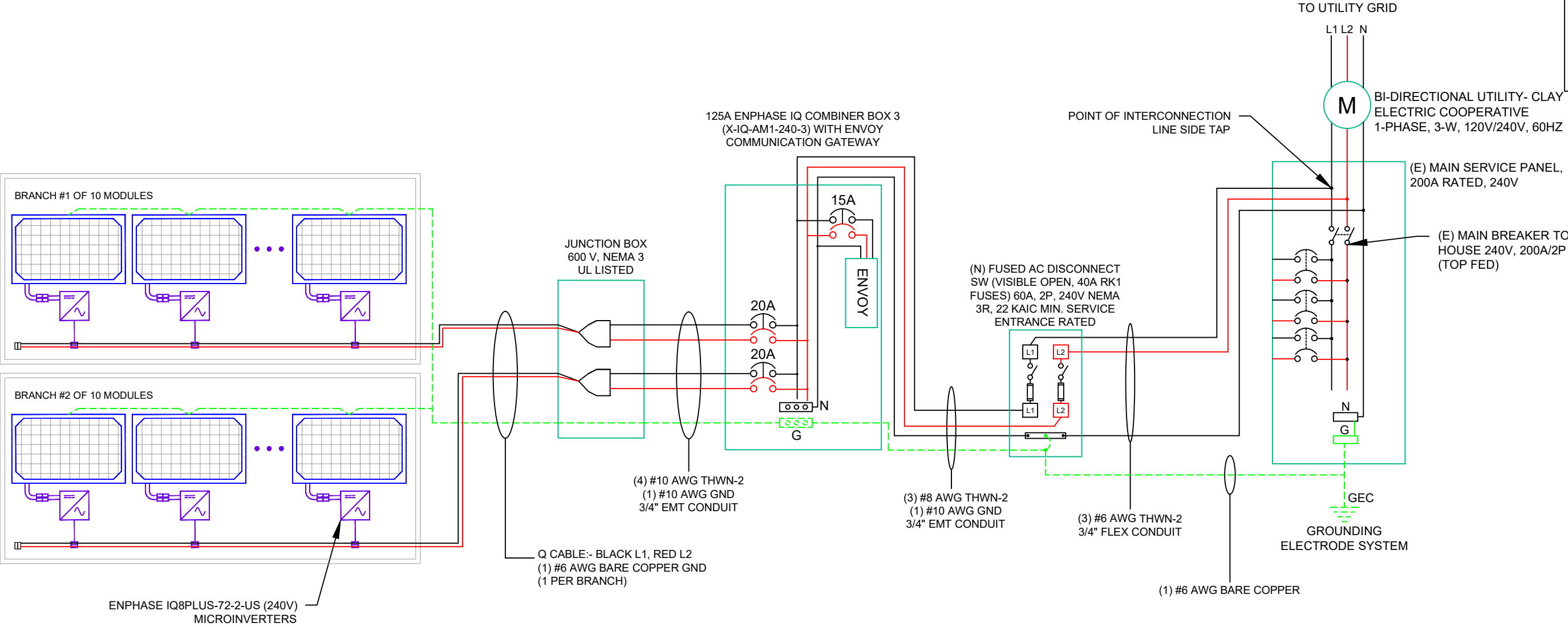
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REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD

APN #: 21-6S-16-03900-002

15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PV-6

ELECTRICAL LINE
DIAGRAM

SHEET SIZE

ANSI B

11" X 17"

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM ROOF TOP JUNCTION BOX TO IQ COMBINER BOX

AMBIENT TEMPERATURE ADJUSTMENT FOR EXPOSED CONDUIT
PER NEC 310.15(B)(2)(c): + 22°
EXPECTED WIRE TEMP (°C): 34° + 22°
TEMP CORRECTION PER TABLE 310.15: 0.71
#OF CURRENT CARRYING CONDUCTORS: 4
CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a): 0.80
CIRCUIT CONDUCTOR SIZE: 10 AWG
CIRCUIT CONDUCTOR AMPACITY: 40 A

REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B):
1.25 X MAX AC OUTPUT CURRENT X # OF INVERTERS PER STRING
BRANCH #1 & #2 : 1.25 X 1.21 X 10 = 15.13A

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 = 0.71 X 0.80 X 40 = 22.72A

AC CONDUCTOR AMPACITY CALCULATIONS:
FROM IQ COMBINER BOX TO FUSED AC DISCONNECT

EXPECTED WIRE TEMP (°C): 34°
TEMP CORRECTION PER NEC TABLE 310.15: 0.96
CIRCUIT CONDUCTOR SIZE: 8 AWG
CIRCUIT CONDUCTOR AMPACITY: 55A
#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 1.21 X 20 =30.25A

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 55 = 52.8A

ELECTRICAL NOTES

- 1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- 2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- 3.) 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.
- 4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- 5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- 6.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- 7.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- 8.) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- 9.) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- 10.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE

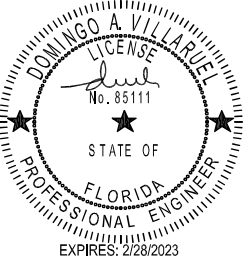
SOLAR MODULE SPECIFICATIONS		
MANUFACTURER /	MODEL #	APTOS SOLAR: DNA-120-MF26 370W
VMP		34.06
IMP		10.87
VOC		40.80
ISC		11.51
MODULE DIMENSION		69.13"L x 40.91"W x 1.38"D (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8PLUS-72-2-US (240V)
NOMINAL OUTPUT VOLTAGE	240 VAC
NOMINAL OUTPUT CURRENT	1.21A

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-5°
AMBIENT TEMP (HIGH TEMP 2%)	34°
CONDUIT HEIGHT	1.0"
ROOF TOP TEMP	56°
CONDUCTOR TEMPERATURE RATE	90°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.29%/°C

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

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038,USA

SHEET NAME

PV-7
WIRING
CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

WARNING

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

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.13(B))

WARNING

DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

RAPID SHUTDOWN
SWITCH FOR
SOLAR PV SYSTEM

LABEL LOCATION:
AC DISCONNECT
(PER CODE: NEC690.56(C)(3))

- ADHESIVE FASTENED SIGNS:
- THE LABEL SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED.
 - WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNINGS, AND MARKINGS SHOULD COMPLY WITH ANSI Z535.4 [NEC 110.21(B) FIELD MARKING].
 - ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OPERATING CURRENT 30.25 AMPS
AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.54)

WARNING

INVERTER OUTPUT CONNECTION DO NOT
RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

DATA PER PANEL	
NOMINAL OPERATING AC VOLTAGE -	240 V
NOMINAL OPERATING AC FREQUENCY-	60 Hz
MAXIMUM AC POWER-	290 VA
MAXIMUM AC CURRENT-	1.21 A
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT-	20 A

LABEL LOCATION:
COMBINER BOX
(PER CODE: NEC690.52)

DEDICATED PHOTOVOLTAIC SYSTEM
COMBINER PANEL
NO LOAD SHALL BE ADDED TO THIS PANEL

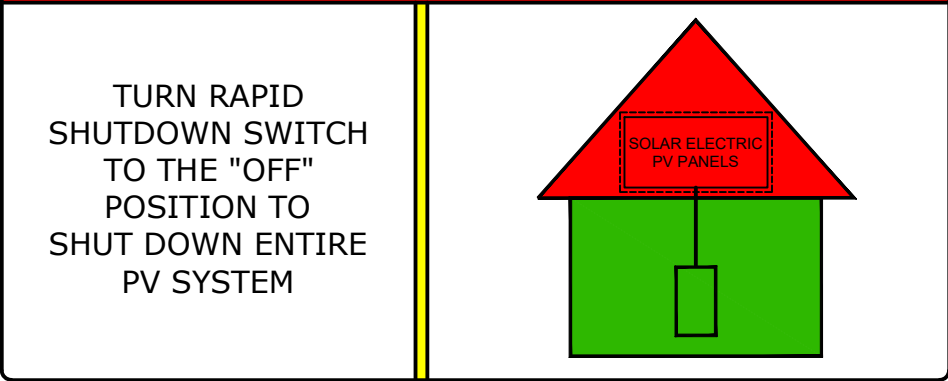
LABEL LOCATION:
AC PHOTOVOLTAIC COMBINER PANEL (if required)
CODE REF: NEC 690.64(B)(2)

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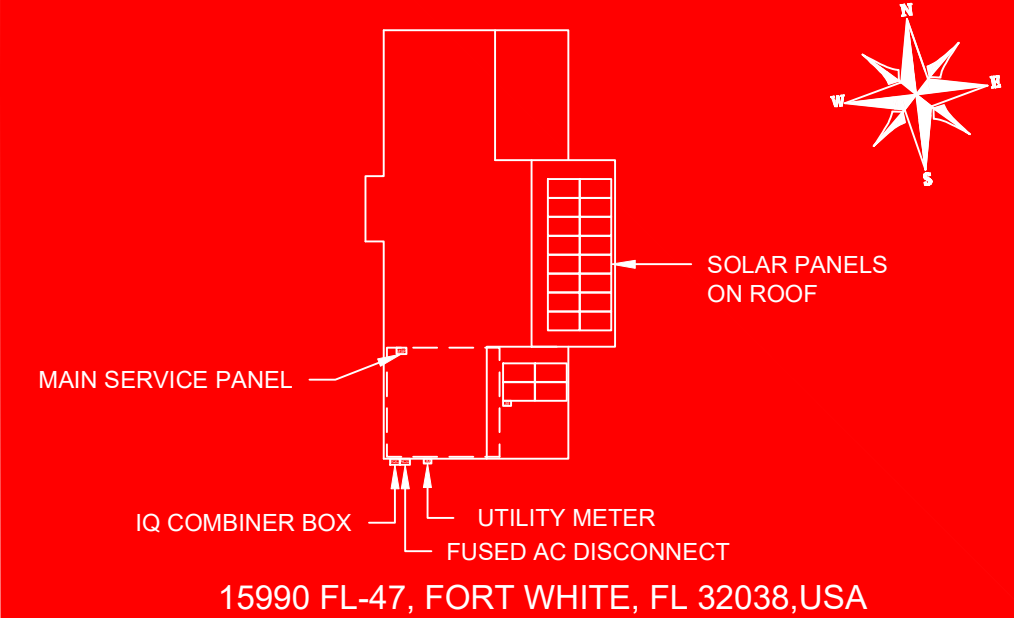
LABEL LOCATION:
MAIN DISCONNECT

EMERGENCY RESPONDER:
THIS SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN



LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
PER NFPA 1 ; 11.12.2.1.1.1

EMERGENCY RESPONDER:
THIS SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN SWITCH
TO THE "OFF" POSITION TO SHUT
DOWN ENTIRE PV SYSTEM



DNA™ 120

Residential | Commercial

Solar for Innovators

DNA™ 120

Solar for Innovators

Designed & Engineered in Silicon Valley 370W | 365W | 360W

Our DNA™ Split Cell Series impressively combines advanced solar technologies to maximize performance. Our patented Dual Nano Absorber (DNA™) Technology allows the panel to operate at high-efficiencies in extreme temperatures. Contact our sales team today to learn more about our line of high-efficiency solar panels.

⚡ Patented DNA™ technology boosts power performance & module efficiency

📏 Advanced split cell technology with 9 ultra-thin busbars allows for less resistance and more photon capture

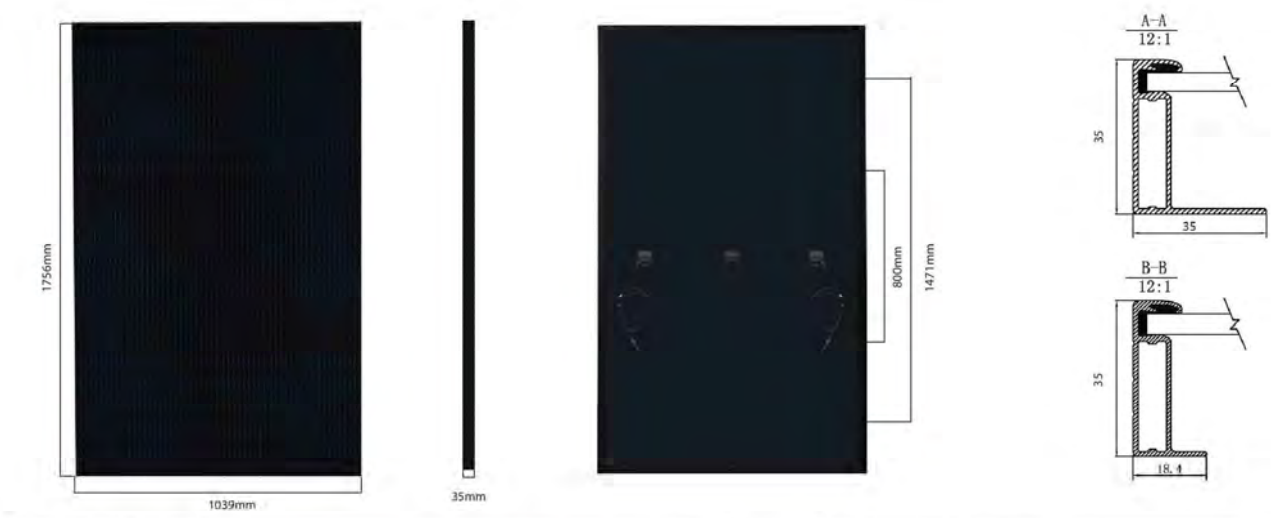
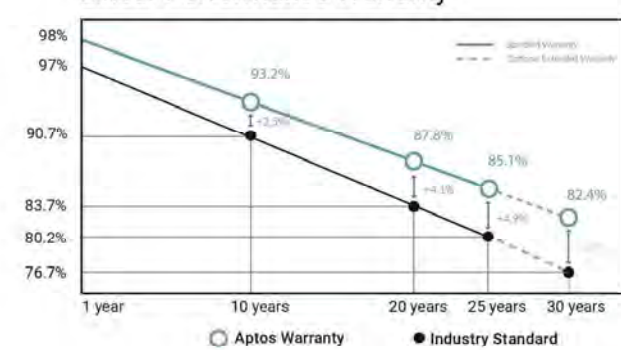
🌳 Ideal solution for applications affected by shading

✨ All-black design for pristine aesthetics
No excessive silver bussing or ribbons

☁️ Robust product design is resilient in extreme weather. Up to 5400 Pa snow load and 210 mph wind speeds



Linear Performance Warranty



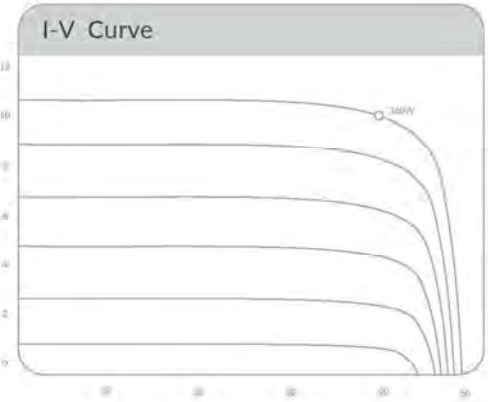
Electrical Specifications	DNA-120-MF26-360W	DNA-120-MF26-365W	DNA-120-MF26-370W
STC Rated Output P _{mpo} (W)	360W	365W	370W
Module Efficiency	19.73%	20.01%	20.29%
Open Circuit Voltage V _{oc} (V)	40.6	40.7	40.8
Short Circuit Current I _{sc} (A)	11.24	11.36	11.51
Rated Voltage V _{mpo} (V)	33.8	33.96	34.06
Rated Current I _{mpo} (A)	10.66	10.75	10.87

Temperature Coefficients	
Temperature Coefficients P _{mpo}	-0.36%
Temperature Coefficients I _{sc}	+0.05%/°C
Temperature Coefficients V _{oc}	-0.29%/°C
Normal Operating Cell Temperature (NOCT)	44°C

Test Operating Conditions	
Maximum Series Fuse	20A
Maximum System Voltage	1,000 VDC (UL&IEC)
Maximum Load Capacity (Per UL 1703)	5400 PA Snow Load / 210mph Wind Rating
Fire Performance Class	Class C/Type 1

Packaging Configuration	
Number of Modules per Pallet	30
Number of Pallets per 40ft. Container	26
Pallet Dimensions	1770 X 1090 X 2365
Pallet Weight (kg)	640
Container Weight (kg)	16640

Mechanical Properties	
Cell Type	Monocrystalline
Glass	3.2mm, anti-reflection coating, high transmission, low iron, tempered glass
Frame	Anodized Aluminum Alloy
Junction Box	IP68
Dimensions	1756 X 1039 X 35mm
Output Cable	4mm2 (EU)12AWG,39.37In.(1200mm)
Weight	45.19lbs.(20.5kg)
Cable Length	1200mm
Encapsulant	POE



Signature with Seal

DOMINGO A. VILLARUEL
LICENSE
No. 85111
STATE OF
FLORIDA
PROFESSIONAL ENGINEER
EXPIRES: 2/28/2023

This item has been electronically signed and sealed by Domingo Villaruel using a Digital Signature and Date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronics copies.

Domingo A Villaruel: A01410D000
00177F3BC588C0001
626D

Digitally signed by Domingo A Villaruel: A01410D0000177F3
BC588C0001626D
Date: 2022.06.27 10:15:22
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CONTRACTOR NAME

SUN SERVICES
FLORIDA
3616 HARDEN BOULEVARD,
LAKE LAND, FL 33803, USA
www.sunservicesusa.com

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PD1
MODULE

SHEET SIZE

ANSI B
11" X 17"



30 Year Warranty

3X IEC Standards

RETC Top Performer

aptos
solar technology

3140 De La Cruz Blvd., Ste 200
Santa Clara, CA 95054
www.aptossolar.com
info@aptossolar.com

Aptos Solar Technology reserves the right to make specification changes without notice



DATA SHEET



IQ8 and IQ8+ 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 super-fast 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 Enphase IQ Battery, Enphase 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 Q-DCC-2 adapter cable with plug-n-play MC4 connectors.



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

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) requirements

* Only when installed with IQ System Controller 2, meets UL 1741.

** IQ8 and IQ8Plus supports split phase, 240V installations only.

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-80-2-US	IQ8PLUS-72-2-US
Commonly used module pairings ¹	W	235 – 350	235 – 440
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell
MPPT voltage range	V	27 – 37	29 – 45
Operating range	V	25 – 48	25 – 58
Min/max start voltage	V	30 / 48	30 / 58
Max input DC voltage	V	50	60
Max DC current ² (module Isc)	A		15
Overvoltage class DC port			II
DC port backfeed current	mA		0
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		IQ8-80-2-US	IQ8PLUS-72-2-US
Peak output power	VA	245	300
Max continuous output power	VA	240	290
Nominal (L-L) voltage/range ³	V		240 / 211 – 264
Max continuous output current	A	1.0	1.21
Nominal frequency	Hz		60
Extended frequency range	Hz		50 – 68
AC short circuit fault current over 3 cycles	Arms		2
Max units per 20 A (L-L) branch circuit ⁴		16	13
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	%	97.5	97.6
CEC weighted efficiency	%	97	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 (HxWxD)		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			
		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01	
Certifications		This product is UL Listed as PV Rapid Shut Down 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) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility>

(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SP-DS-0002-01-EN-US-2022-03-17

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FLORIDA

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www.sunservicesusa.com

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PD2

INVERTER

SHEET SIZE

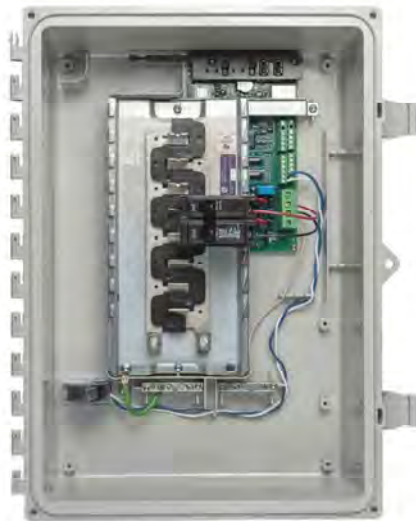
ANSI B
11" X 17"

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IQ8SP-DS-0002-01-EN-US-2022-03-17

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 warranty
- UL listed



To learn more about Enphase offerings, visit 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%).
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 2
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	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors 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

* Consumption monitoring is required for Enphase Storage Systems.

To learn more about Enphase offerings, visit enphase.com

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2018 09-13



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www.sunservicesusa.com

REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PD3
COMBINER

SHEET SIZE

ANSI B
11" X 17"



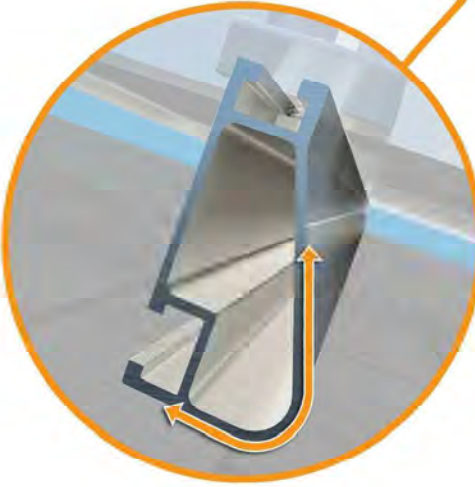
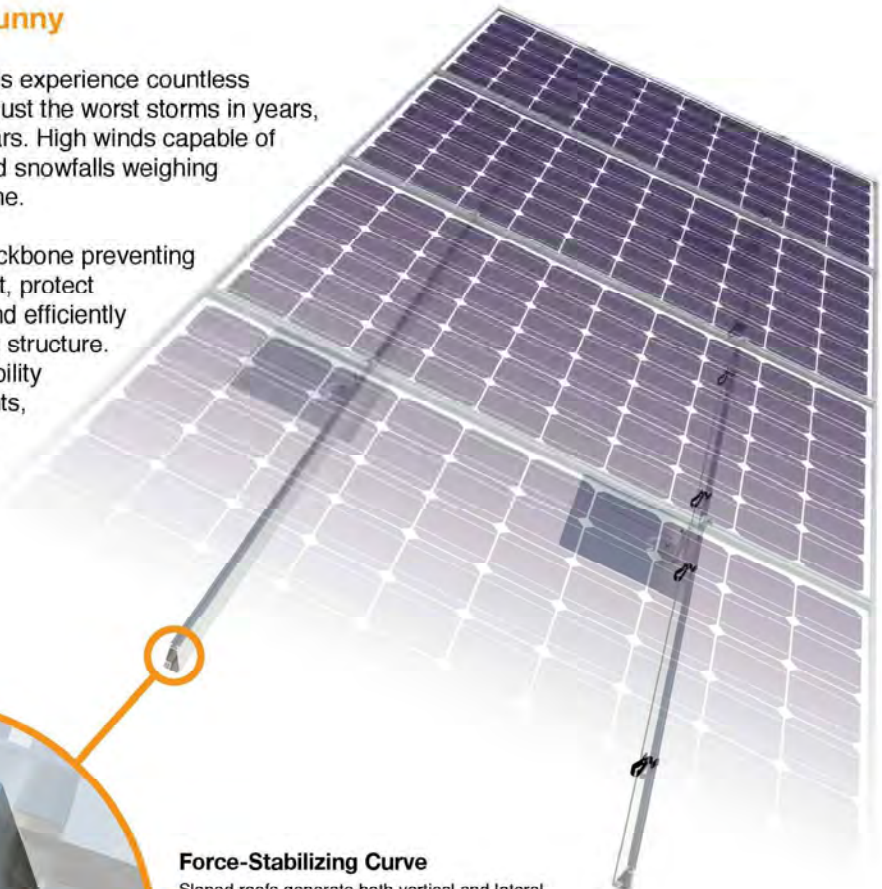
Tech Brief

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve
Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

 XR Rails are compatible with FlashFoot and other pitched roof attachments.

 IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



XR10

XR10 is a sleek, low-profile mounting rail, perfectly matched to regions without snow. It achieves 6 foot spans, while also staying light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30-40	100						
	120						
	140						
	160						
50-70	160						
80-90	160						

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DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PD4
IRONRIDGE

SHEET SIZE

ANSI B
11" X 17"



UFO Family of Components

Tech Brief

Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



Stopper Sleeve
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.



Universal Fastening Object (UFO)
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.



Bonded Splice
Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.



Grounding Lug
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



Bonded Attachments
The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

CONTRACTOR NAME



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DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD
APN #: 21-6S-16-03900-002
15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PD5
IRONRIDGE UFO

SHEET SIZE

ANSI B
11" X 17"

The right way to attach almost anything to metal roofs!

S-5![®]

The Right Way!

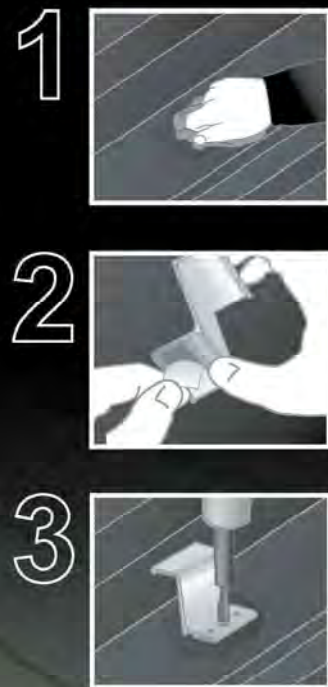
VersaBracket[™]

VersaBracket[™] can be used to mount almost anything to an exposed-fastened roof system and is compatible with almost any trapezoidal exposed-fastened profile. No messy sealants to apply! No chance for leaks! The VersaBracket comes with factory-applied butyl sealant already in the base, and the S-5![®] patented reservoir conceals the sealant from UV exposure, preventing drying and cracks.

Installation is simple! VersaBracket is mounted in the flat of the panel, directly into the supporting structure of the roof, i.e. wood decking, wood or steel purlins or trusses. No surface preparation is necessary; simply wipe away excess oil and debris, peel the release paper from the base, align, and apply. Secure through the pre-punched holes using the appropriate screws for the supporting structure.

VersaBracket is so strong, it will even support heavy-duty applications like snow retention. For exposed-fastened trapezoidal profiles, the VersaBracket is the perfect match for our ColorGard[®] snow retention systems (for corrugated roofs use CorruBracket[™]). VersaBracket is extremely economical and facilitates quick and easy installation.

S-5![®] VersaBracket[™] is the right way to attach almost anything to exposed-fastened roof profiles, including PV through rail methods.



VersaBracket[™]

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

S-5![®]

The Right Way!

VersaBracket[™] can be used for almost any attachment need, including S-5![®] ColorGard[®], on all types of exposed-fastened metal roofing. No messy sealants to apply. The factory-applied butyl sealant waterproofs and makes installation a snap!

To accommodate various rib heights, VersaBracket[™] comes in two heights—the 2.65" VersaBracket-67[™] and the 1.86" VersaBracket-47[™]. The VersaBracket-67 mounting face has no holes or slots; thus, ancillary items are typically secured using self-tapping screws. The VersaBracket-47 comes with a 1" slot on top as the standard part. Other hole and slot configurations available with minimum purchase requirements (contact your distributor for available configurations). Each VersaBracket comes with factory-applied butyl sealant in the base. A structural aluminum attachment bracket, VersaBracket is compatible with most common metal roofing materials. For design assistance, ask your distributor, or use our web-based calculator at www.S-5.com for job-specific system engineering and design of your next snow retention project. Also, please visit our website for more information including CAD details, metallurgical compatibilities, and specifications.

The VersaBracket has been tested for load-to-failure results on wood decking, metal, and wood purlins. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5![®] holding strength is unmatched in the industry.

Example Profile



Example Applications

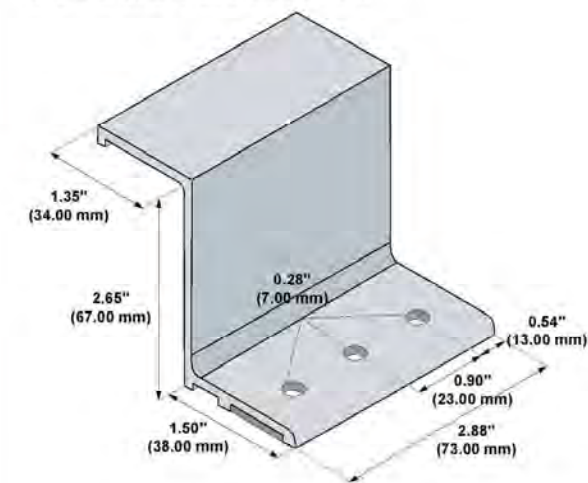


S-5![®] Warning! Please use this product responsibly!

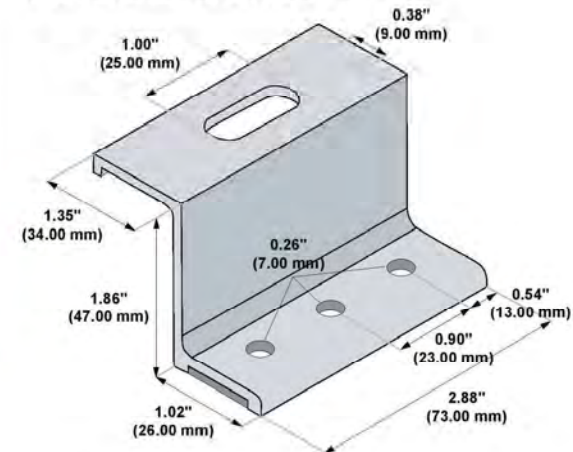
Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents and trademarks visit the S-5! website at www.S-5.com.

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VersaBracket-67[™]



VersaBracket-47[™]



3 holes are provided for versatility. Some installations require only 2 fasteners. See the load table on the S-5! website and the installation instructions for more details.

Due to varied applications, mounting hardware is not furnished with part.

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

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FLORIDA

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT NAME

BRANDI GRISWOLD

APN #: 21-6S-16-03900-002

15990 FL-47,
FORT WHITE, FL 32038, USA

SHEET NAME

PD6

VERSA-BRACKET-47

SHEET SIZE

ANSI B
11" X 17"