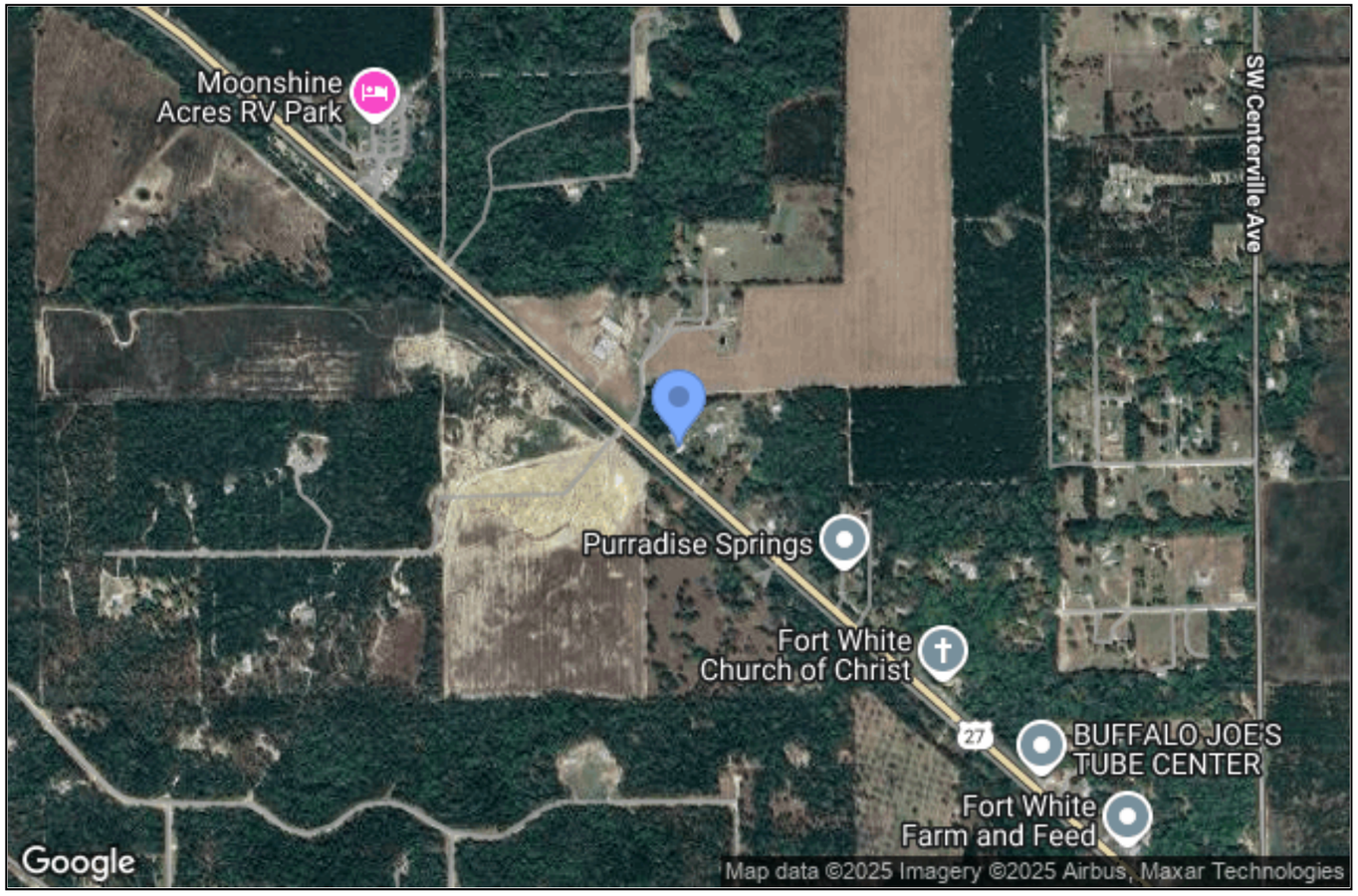
MOCK MELVIN E JR

9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES
29.9401404,-82.7381174

SYSTEM TIER (UTILITY): TIER 1 (11.06 KWDC*0.85 = 9.4 KWAC)
SCOPE OF WORK: INSTALLATION OF SOLAR PANELS AND ASSOCIATED ELECTRICAL EQUIPMENT.



01 VICINITY

02 AERIAL

PROJECT INFORMATION

DISTRICTS
COUNTY: COLUMBIA COUNTY
JURISDICTION: UN-INCORPORATED COLUMBIA

DESIGN SPECS
WIND EXPOSURE: B
RISK CATEGORY: II
WIND SPEED (MPH): 130
SNOW LOAD (PSF): 0

GOVERNING CODES
BUILDING: FBC 2023/ASCE 7-22
ELECTRICAL: NEC 2020
FIRE: FFPC, 8th ed. (2023)/NFPA 1 2021 ed.
GENERAL: UN-INCORPORATED COLUMBIA ORDINANCES

SYSTEM
SIZE (KWDC): 11.06
EST KWH/YR: 16787
PANELS: 28
PANEL: MSE395SX9R
INVERTER(S): IQ8PLUS-72-2-US
VOLTAGE (V): 240

SHEET INDEX

COVER	T1
GENERAL	G1
LAYOUT	S1
LOCATIONS PLAN	SL1
ATTACHMENT PLAN	SP1-SP2
ATTACHMENT DETAIL	SA1
ELECTRICAL DIAGRAM	E1
LABELS	EL1
DATASHEETS	D1-D7

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MOCK MELVIN E JR

9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES

PROJECT ID: 4212025-9607

CONTRACTOR: -

FLORIDA STATE ENERGY

6901 TPC DRIVE STE 650,
ORLANDO, FL 32822

(407) 718-9980

ENGINEER: CA33343

ECUIP ENGINEERING

1646 W SNOW AVE 9 TAMPA, FL 33606

Ryan S Gittens 2025.04.23 14:20:07 -04'00'

RYAN S GITTENS
PE90605

DATE	BY	VER	DESCRIPTION
04.23.25	BF	1	INITIAL DESIGN

T1

PAPER: ARCHB

SCALE:

GENERAL

1.1 THE PROJECT IS DESIGNED IN GENERAL ACCORDANCE WITH FBC 2023/ASCE 7-22 AND OTHER REFERENCED CODES.
1.2 ABBREVIATIONS OTHER THAN AS PROVIDED ARE INDUSTRY STANDARD.
1.3 CONDITION AND CONSTRUCTION OF ROOF ASSEMBLY SHALL BE VERIFIED BY PHYSICAL INSPECTION AND ACCEPTED BY CONTRACTOR PRIOR TO COMMENCEMENT.
1.4 WORK TO BE COMPLETED SHALL BE VERIFIED BY INSTALLER AND ELECTRICIAN PRIOR TO COMMENCEMENT AND MATERIAL ORDER.
1.5 ALL CONTRACTORS AND SUB-CONTRACTORS SHALL INSPECT THE SITE AND ALL RESPECTIVE BUILDINGS IMMEDIATELY BEFORE PREPARING ANY BID AND BEFORE ORDERING ANY MATERIALS, AND SHALL PROVIDE CONTRACTOR WRITTEN NOTICE OF ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND THE PLANS.
1.6 REQUIRED PLAN DIMENSIONS NOT PROVIDED SHALL BE CONFIRMED WITH ENGINEER OF RECORD. DIMENSIONS IN PARENTHESES ARE FOR ENGINEERING REFERENCE ONLY.
1.7 UNPLANNED ALTERATION OF STRUCTURAL ROOF OR WALL FRAMING SHALL REQUIRE WRITTEN APPROVAL BY THE EOR AND OWNER; PLANS SHALL BE SO REVISED.
1.8 BEST MANAGEMENT PRACTICES SHALL BE EXERCISED AT ALL TIMES TO MAINTAIN A SAFE AND CLEAN JOBSITE IN COORDINATION WITH PROPERTY OWNER AS APPLIES TO PARKING, TRASH REMOVAL, STORAGE, SOUND, UTILITIES AND TIMES OF WORK.
1.9 NO WORK SHALL BE PERFORMED IN RIGHT-OF-WAY OR EASEMENTS WITHOUT WRITTEN PERMISSION FROM THE APPROPRIATE PERMITTING AGENCY AND OWNER.
1.10 IN THE EVENT OF WEATHER AND OTHER CIRCUMSTANCES THAT COULD MATERIALLY AFFECT BUILDING CONDITIONS OR INSTALLATION, CONTRACTOR SHALL PERFORM A RE-INSPECTION AS REQUIRED THEN ADJUST PROJECT SCHEDULE TO INCLUDE RESPECTIVE PLAN REVISIONS.
1.11 INTERIOR FINISHES INCLUDING DRYWALL, FLOORING, PAINT, AND TRIM WORK SHALL BE REPAIRED IF MODIFIED OR DAMAGED DURING INSTALLATION PROCESS.

ROOF FIRE SAFETY

2.1 FIRE PROTECTION PROCEDURES SHALL BE FOLLOWED IN ACCORDANCE WITH FFPC, 8th ed. (2023)/NFPA 1 2021 ed.. WORK SHALL BE INSPECTED PRIOR TO COVER BY BUILDING INSPECTOR, AND EOR UPON REQUEST.
2.2 ACCESS POINT FOR FIRE DEPT. LADDER(S) SHALL BE CLEAR OF OPENINGS/OBSTRUCTIONS.
2.3 WORK SHALL BE PERFORMED IN ACCORDANCE WITH ROOF SAFETY RATING (CLASS A). (UL 790/ASTM E108)

NOTE TO INSTALLER

3.1 ALL PANELS SHALL BE ATTACHED TO EXISTING ROOF STRUCTURE USING THE REQUIRED NUMBER OF ATTACHMENTS IN THE PROPER CONFIGURATION AS DEFINED IN THIS PLAN SET.
3.2 ALL PANELS SHALL BE FULLY OUTSIDE OF ANY ROOF AREAS DEFINED AS FIRE SETBACK IN THIS SITE PLAN. FIRE SETBACKS ARE DEFINED BY THE DIMENSIONS IN RED AND ARE CONSIDERED ABSOLUTE.
3.3 ANY DIMENSIONS NOTED AS "MAX" SHALL BE BE UNDERSTOOD TO BE ABSOLUTE REQUIREMENTS WITH A TOLERANCE OF +-0.0"
3.4 ANY DIMENSIONS NOTED AS "MIN SHALL BE BE UNDERSTOOD TO BE ABSOLUTE REQUIREMENTS WITH A TOLERANCE OF +-0.0"
3.5 STANDARD DIMENSIONS (NOT INCLUDING FIRE SETBACKS) SHALL BE UNDERSTOOD TO BE REQUIREMENTS WITH A TOLERANCE OF +-2.0"
3.6 ANY DIMENSIONS NOTED AS APPROX SHALL BE UNDERSTOOD TO BE APPROXIMATE IN NATURE AND SHOULD BE USED AS A GUIDE. EXACT PLACEMENT OF THE PANELS RELATIVE TO THESE DIMENSIONS ARE LEFT TO THE INSTALLERS DISCRETION ASSUMING THAT ALL OTHER DEFINED REQUIREMENTS ARE MET.
3.7 ANY DIMENSIONS IN PARENTHESES () ARE FOR ENGINEERING REFERENCE ONLY AND ARE NOT NEEDED FOR INSTALLATION.
3.8 IT IS THE CONTRACTOR RESPONSIBILITY TO INSTALL THE SYSTEM AND ITS SUPPORTS AS INDICATED IN THESE PLANS. THE CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD IF SITE CONDITIONS DIFFER FROM WHAT IS DEPICTED ON PLANS.

ATTACHMENT SYSTEM

4.1 ATTACHMENT SYSTEM AND FLASHING METHOD SHALL BE CONSTRUCTED ACCORDING MANUFACTURER'S INSTALLATION MANUAL AND AS SPECIFIED BY EOR.

01 GENERAL NOTES

ELECTRICAL CERTIFICATION

1.1 PER FL STATUTE 377.705: I RYAN S GITTENS PE#: PE90605 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE, FBC 107

STRUCTURAL CERTIFICATION

2.1 PER FL STATUTE 377.705: I RYAN S GITTENS PE#: PE90605 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE INSTALLATION OF THE SOLAR MODULES IS IN COMPLIANCE WITH FBC 2023 8TH EDITION, CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES, AND EQUIPMENT DEAD LOADS

STRUCTURAL EVALUATION

3.1 THE EXISTING STRUCTURE APPEARS TO BE BUILT TO INDUSTRY STANDARDS AND IS IN ORIGINAL CONDITION. IF STRUCTURALLY SOUND, THE EXISTING ROOF STRUCTURE IS CAPABLE OF ITS CODE REQUIRED LOADS. THE ADDITIONAL LOADS SUPERIMPOSED BY THE PHOTOVOLTAIC SYSTEM ARE NEGLIGIBLE AND WILL HAVE NO EFFECT ON ROOF PERFORMANCE. THE EXISTING ROOF IS CAPABLE OF SUPPORTING THE ADDITIONAL LOADS.

02 CERTIFICATIONS

EQUIPMENT NOTES

1.1 NEW EQUIPMENT CLEARANCES: 36" (FRONT), 30" (WORK AROUND), 6 FT (OH) (NEC 110.26)
1.2 NEW EQUIPMENT AND COMPONENTS SHALL BE CERTIFIED BY A NATIONAL LABORATORY.
1.3 EQUIPMENT SHALL BE INSTALLED AND USED ACCORDING TO INSTALLATION MANUAL OR SPECIFICATIONS, AND SHALL BE RATED FOR OUTDOOR USE IF INSTALLED OUTSIDE

GENERAL NOTES

2.1 INSTALLER SHALL FURNISH ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY FOR THE INSTALLATION OF A COMPLETE ELECTRICAL SYSTEM PURSUANT TO THE PLANS IN ACCORDANCE WITH THE BUILDING CODE, OSHA AND ALL OTHER APPLICABLE CODES AND ORDINANCES.
2.2 ELECTRICAL WORK AND RESPECTIVE PREPARATION WORK SHALL BE PERFORMED BY PROPERLY LICENSED SUBCONTRACTORS.
2.3 MATERIALS SHALL BE INCLUDED IN THE PLANS AND ANY NECESSARY EQUIVALENT SUBSTITUTIONS SHALL BE APPROVED BY THE EOR
2.4 CONDUCTORS SHALL BE COPPER OF 98% CONDUCTIVITY. CABLES SHALL BE RATED FOR APPLICABLE VOLTAGE, SINGLE-CONDUCTOR IN THERMOPLASTIC INSULATION SUITABLE FOR CONTINUOUS OPERATION AT 75° C. INSULATION SHALL BE COLOR-CODED #6 AND SMALLER. COLOR-CODED TAPE SHALL BE USED ON #4 AND LARGER.
2.5 CONDUCTORS SHALL BE RUN IN CONDUIT WHEN NOT BENEATH MODULES. EXPOSED CONDUIT IS PERMITTED IN GARAGES OR OTHER AREAS ACCEPTABLE TO OWNER AND AS APPROVED BY EOR.
2.6 FLEXIBLE CONDUIT SHALL BE USED FOR VIBRATING EQUIPMENT AND RECESSED MOUNTED FIXTURES AND SHALL BE SEALED WITH LIQUID TIGHT IF EXPOSED TO WEATHER WITH GREEN BOND CONDUCTOR INSTALLED TOGETHER AT CIRCUIT CONDUCTORS. GALVANIZED EMT WITH SET-SCREW MAY BE USED FOR INTERIOR LOCATIONS. PVC WITH GREEN BOND CONDUCTOR (NEC 250) MAY BE USED IN UG LOCATIONS.
2.7 FOR PIERCING TAPS, THE TOTAL AREA OF ALL CONDUCTORS, SPLICES, AND TAPS INSTALLED AT ANY CROSS SECTION OF THE WIRING SPACE SHALL NOT EXCEED 75 PERCENT OF THE CROSS-SECTIONAL AREA OF THAT SPACE (NEC 312.8.A).
2.8 PV AC DISCONNECT, WHEN INSTALLED, SHALL BE SERVICE ENTRANCE RATED IF CONNECTED TO SUPPLY SIDE OF SERVICE AND MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE AND BE A VISIBLE BREAK SWITCH.
2.9 ALL FUSES SHALL BE (R) RATED AND SHALL HAVE APPROPRIATE REJECTION CLIPS
2.10 THE SUGGESTED EQUIPMENT MOUNTING LOCATION MAY BE ADJUSTED AT INSTALLER'S DISCRETION SO LONG AS LOCAL AHJ REQUIREMENTS ARE ADHERED TO

CONDUIT NOTES

3.1 PVC SCH 40 OR SCH 80 MAY BE USED AS REQUIRED FOR ADDITIONAL SAFETY OR FOR RUNS <= FT WITH UPSIZE ACCORDING TO FILL TABLE.
3.2 ELECTRICAL METALLIC TUBING (EMT) NEC Art. 358:
3.3 1. EMT SHALL BE FASTENED EVERY 10 FT & FROM BOX, FITTING, TERMINAL POINT.
3.4 2. BENDS BETWEEN PULL POINTS SHALL COMBINE LESS THAN OR EQUAL TO 360°.
3.5 3. CONNECTORS SHALL BE CORROSION RESISTANT.
3.6 4. GASKETS SHALL BE WATERTIGHT.
3.7 5. COUPLINGS AND CONNECTORS SHALL BE RAIN-TIGHT OR RAIN-TIGHT/INSULATED. NEC FILL TABLES
3.8 RIGID PVC CONDUIT TABLE: SCHEDULE 80-C10/40-C11
3.9 FLEXIBLE METALLIC CONDUIT-TABLE C3
3.10 LIQUIDTIGHT FLEXIBLE CONDUIT TABLE-METALLIC C7/NON-METALLIC (FNMC-B)-CS

ELECTRICIAN NOTES:

4.1 1. CONFIRM GROUND CONDUCTOR (EGC) & EXISTING GROUNDING ELECTRODE (GE)
4.2 2. CONFIRM BUSBAR RATINGS & FEEDERS. IF ACTUAL CONDITIONS DIFFER, NOTIFY EOR.
4.3 3. CONDUCTORS MAY BE COMBINED USING RATED JUNCTIONS BOXES/CONDUIT UP-SIZE.
4.4 EXPANSION NOTE: FITTINGS SHALL BE INSTALLED BETWEEN SECURELY-MOUNTED ELBOWS AND TERMINATION POINTS (NOT INCL. WYES). IF JOINT IS VERTICAL, OPEN-END SHALL BE SECURELY FASTENED IN DOWN POSITION W/COUPLING INSTALLED CLOSE TO TOP OF RUN W/ BARREL ALSO DOWN AND LOWER END SECURED AT BOTTOM TO ALLOW UPWARD MOVEMENT. (SEC. 352.44 NEC)

BONDING & GROUNDING NOTE:

5.1 1. MODULES SHALL BE BONDED BY BONDING MID-CLAMPS ACCORDING TO INSTALLATION MANUAL MODULES WHICH CAN NOT BE FULLY BONDED SHALL BE PROPERLY GROUND USING GROUNDING LUG WIRED DIRECTLY TO SYSTEM GROUND WIRE. ALTERNATIVES REQUIRE A CUSTOMIZED PLAN FROM EOR.
5.2 2. (2) ROD AND PIPE ELECTRODES REQUIRED. ROD AND PIPE ELECTRODES SHALL NOT BE LESS THAN 2.44 M (8 FT) IN LENGTH AND SHALL CONSIST OF THE FOLLOWING MATERIALS: COPPER, GALVANIZED STEEL, STAINLESS STEEL
5.3 3. GROUNDING ELECTRODES OF PIPE OR CONDUIT SHALL NOT BE SMALLER THAN METRIC DESIGNATOR 21 (TRADE SIZE 3/4) AND, WHERE OF STEEL, SHALL HAVE THE OUTER SURFACE GALVANIZED OR OTHERWISE METAL-COATED FOR CORROSION PROTECTION.
5.4 4. ROD-TYPE GROUNDING ELECTRODES OF STAINLESS STEEL AND COPPER OR ZINC-COATED STEEL SHALL BE AT LEAST 15.87 MM (5/8 IN.) IN DIAMETER, UNLESS LISTED.
5.5 5. THE METAL WATER PIPING SYSTEM SHALL BE BONDED AS REQUIRED PER NEC 250.104
5.6 6. INTERSYSTEM BONDING REQUIRED PER NEC 250.94

SMOKE ALARM NOTES:

6.1 INTERCONNECTED SMOKE ALARMS SHALL BE INSTALLED THROUGHOUT THE DWELLING, INCLUDING IN ROOMS, ATTACHED GARAGES, AND AREAS IN WHICH ESS ARE INSTALLED IN COMPLIANCE WITH LOCAL BUILDING CODE. WHERE ESS ARE INSTALLED IN AN ATTACHED GARAGE OR AREA IN WHICH SMOKE ALARMS CANNOT BE INSTALLED IN ACCORDANCE WITH THEIR LISTING, AN INTERCONNECTED LISTED HEAT ALARM SHALL BE INSTALLED AND BE CONNECTED TO THE SMOKE ALARM SYSTEM REQUIRED BY THE LOCAL BUILDING CODE PER NFPA 855 EDITION 2020 15.9.2.

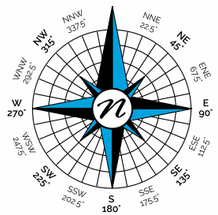
SURGE PROTECTION NOTE:

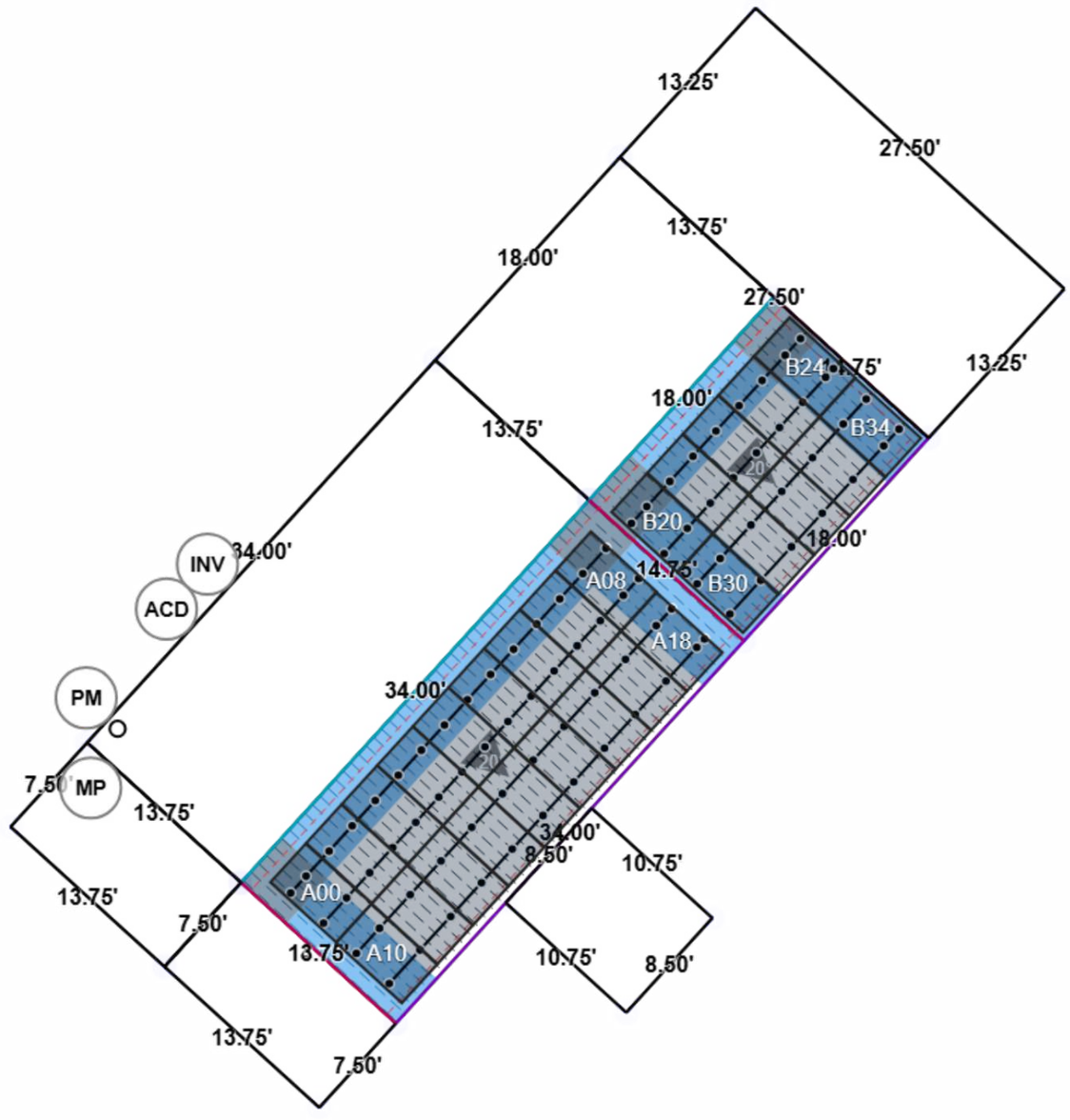
7.1 PER NEC 230.67(D) WHERE SERVICE EQUIPMENT IS REPLACED, A SURGE-PROTECTIVE DEVICE (SPD) SHALL BE PROVIDED TO NEW SERVICE EQUIPMENT

03 ELECTRICAL NOTES

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	G1
	FLORIDA STATE ENERGY	ECUIP ENGINEERING		04.23.25	BF	1	INITIAL DESIGN	
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	6901 TPC DRIVE STE 650, ORLANDO, FL 32822	1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605					PAPER: ARCHB
PROJECT ID: 4212025-9607	(407) 718-9980							SCALE:

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS





01 PLAN VIEW

EQUIPMENT LEGEND

- PM -POWER METER
- MP -MAIN PANEL
- ACD -AC DISCONNECT
- INV -INVERTER/COMBINER

ZONE WIDTHS

PITCHED:

- < NA' > -1
- < 4' > -2
- < 4' > -3

ROOF TYPE 2
MATERIAL: METAL
ATTACHMENT: (86) S5!-PROTEA
RAIL: (195') PEGASUS

RELEVANT DIMS
LEAST HORIZ DIM: 36'
ROOF HEIGHT(S), h/EXPOSED DIST, d1: 15'/7.5'
ZONE WIDTH, a: 4'

ARRAY(S)
MODULES: (28) MSE395SX9R
ARRAY AREA: 606 SQFT

02 SYSTEM SUMMARY

GENERAL

1.1 EXISTING VENTS, SKYLIGHTS OR EXHAUST OUTLETS SHALL NOT BE COVERED BY THE SOLAR PV SYSTEM.
1.2 MODULES SHALL NOT OVERHANG ANY RIDGE, HIP OR ROOF EDGE.
1.3 CONTRACTOR SHALL NOTIFY ENGINEER/DESIGNER OF ANY CHANGES.
1.4 PANELS SHALL BE A MINIMUM OF 10IN AWAY FROM ROOF EDGE.

03 NOTES

BASED ON OUR REVIEW, THE EXISTING MEMBERS COMPLY WITH FBC 2023/ASCE 7-22 DESIGN SPAN RATINGS WITH SUFFICIENT CAPACITY TO SUPPORT THE NEW LOADS IMPOSED BY THE PROPOSED SOLAR ARRAY. THE SPECIFICATIONS SHOWN IN THIS CONSTRUCTION PLAN WERE DESIGNED PER FBC 2023/ASCE 7-22 FOR A WIND SPEED OF 130 MPH, EXPOSURE CATEGORY B FOR RISK CATEGORY II BUILDING WITH 0 PSF GROUND SNOW LOAD.

04 STRUC. EVALUATION/CERTIFICATION

MOCK MELVIN E JR

9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES

PROJECT ID: 4212025-9607

CONTRACTOR: -
FLORIDA STATE ENERGY
6901 TPC DRIVE STE 650,
ORLANDO, FL 32822
(407) 718-9980

ENGINEER: CA33343
ECUIP ENGINEERING
1646 W SNOW AVE 9 TAMPA, FL 33606

Ryan S Gittens 2025.04.23 14:20:07 -04'00'
RYAN S GITTENS
PE90605

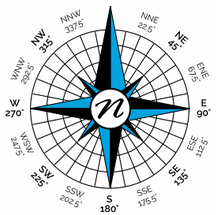
DATE	BY	VER	DESCRIPTION
04.23.25	BF	1	INITIAL DESIGN

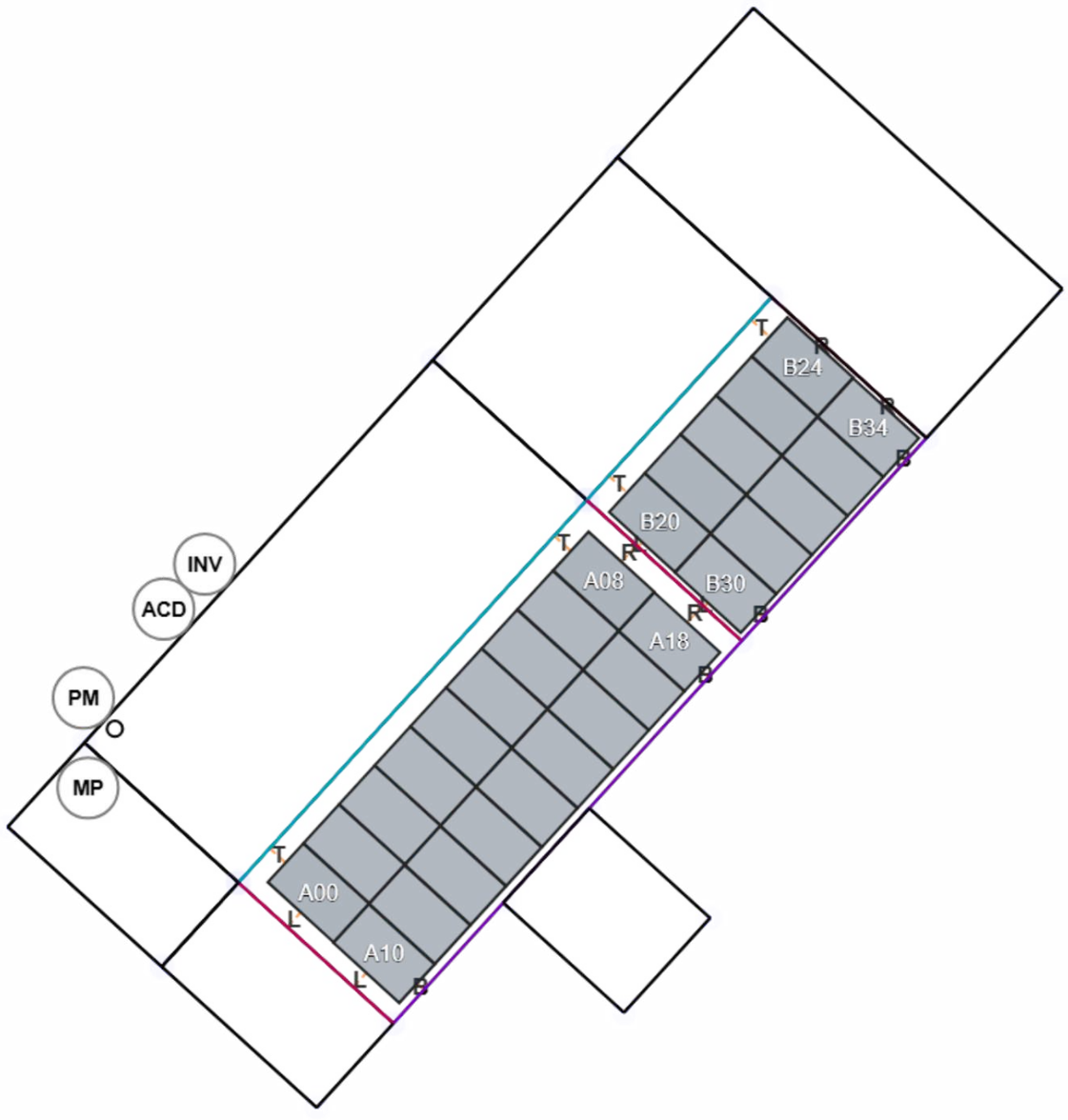
S1

PAPER: ARCHB

SCALE: 1"=9.52'

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS





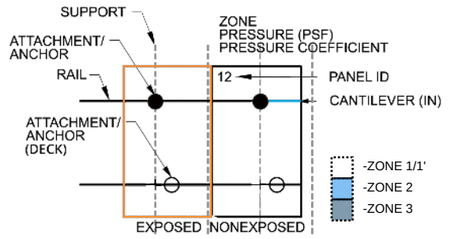
ARRAY OFFSETS

PANEL ID	SIDE	DIM (in)
A00	T	17.04
A00	L	15.84
A08	T	17.88
A08	R	17.64
A18	R	18.24
A18	B	6.6
A10	B	7.44
A10	L	15.24
B20	T	19.68
B20	L	4.92
B24	T	20.04
B24	R	3.6
B34	R	4.08
B34	B	4.44
B30	B	4.8
B30	L	4.32

01 LOCATIONS PLAN

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	SL1
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	FLORIDA STATE ENERGY 6901 TPC DRIVE STE 650, ORLANDO, FL 32822 (407) 718-9980	ECUIP ENGINEERING 1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605	04.23.25	BF	1	INITIAL DESIGN	PAPER: ARCHB
PROJECT ID: 4212025-9607								SCALE: 1"=NaN'

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS



LEGEND

ARRAY
MODULE: (18) MSE395SX9R
TOTAL AREA: 389.48 SQFT

HARDWARE
RAIL: 125' PEGASUS
ATTACHMENT: (54) S5!-PROTEA
ANCHORAGE: RIB/SEAM

FRAMING
SIZE: MIN. 2X4
SPACING: 24" OC

ROOF
MEAN HEIGHT: 15'
MATERIAL: METAL (9" OC RIBS/SEAMS)
SHAPE: GABLE

PARAMETERS

DEAD LOAD CALC
LOADS:
Panel = 48.5lbs
Anchors = ~2lbs
Rail = 0.72lbs/ft
Misc = 1.6lbs/panel

DEADLOAD PER ROW, Fdr:
Fdr = (lbs/panel*#panels/row) + (lbs/ft-rail*ft-rail/row)*2 + (lbs/anchor*#anchors/row) + (misc-lbs/panel*#panels/row) (lbf)

DIST DEADLOAD, Fdd:
Fdd = Fdr/(area/panel*#panels/row) (psf)

DEADLOAD PER ANCHOR, Fda:
Fda = Fdr/(#anchors/row) (lbs)

PANELS PARALLEL TO SURFACE, 29.4.4
CRITERIA:
- Panels parallel to roof surface (within 2 deg)
- Max height of panel above roof, h1 & h2 OF 10"
- Min panel gap of 0.25"
- Min edge distance 2*h2
- Max panel chord length of 6.7'

UPLIFT ON ONE PANEL, Fup = P*A (lbf)
Per ASCE 2.4, 26.10.2 & 29.4.4
P = pasd = 0.6*p = 0.6*qh*(GCp)*(YE)*(Ya), A = load area

UPLIFT PER ROW, Fur = SUM(Fup(0):Fup(n)) (lbf)
Where Fup(0):Fup(n) = loads from first to last panel in row

UPLIFT PER ANCHOR, Fua = Fur/(#ANCHORS/ROW) (lbf)

LOAD PER ANCHOR, Fa = 0.6*Fda + Fua (lbf)

SAFETY FACTOR, SF = Ftest/Fa

VELOCITY PRESSURE qh = 0.00256*Kz*Kzt*Kd*Ke*V^2 = 25 (lb/sqft)
Where Kz = 0.57, Kzt = 1, Kd = 0.85, Ke = 1, V = 130

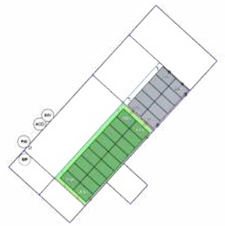
EXT PRESSURE COEFFICIENT, GCp:
GCp varies per roof & zone, 30.3-2A-I to 30.3.7: Aeff = 21.64 sqft (1 panel)

EXPOSURE FACTOR, YE:
YE = 1.5 for uplift loads on panels that are exposed and within a distance 2*h2 from the end of a row at an exposed edge of the array; YE = 1.0 elsewhere for uplift loads and for all downward loads, as illustrated in Fig. 29.4-7. A panel is defined as exposed if d1 to the roof edge > 0.5h and one of the following applies: 1. d1 to the adjacent array > 2*h2 or 2. d2 to the next adjacent panel > 2*h2.

PRESSURE EQUALIZATION FACTOR, Ya:
Ya is given as 0.58 per 29.4.4, 29.4-8 with h2 = 5"+ & panel gap = 0.37"

LOAD CALCS PER FBC 2023/ASCE 7-22

ZONES
f0: 1' (Flat)
f1: 1 (Flat)
f2: 2 (Flat)
f3: 3 (Flat)
g1: 1 (Gable)
g2: 2 (Gable)
g3: 3 (Gable)
h1: 1 (Hip)
h2: 2 (Hip)
h3: 3 (Hip)

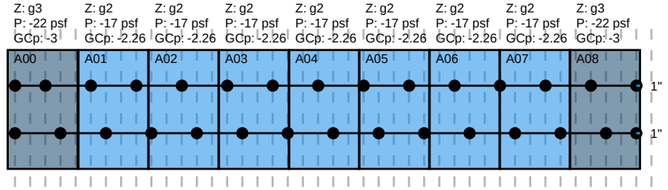


PLANE A | AZ: 132° | P: 20° | TOF: 95%

ROW: 0 (9 MODS)

DIST LOAD, Fdd:	2.73 psf
POINT LOAD, Fda:	19 lbs
ROOF PITCH:	07-20 deg
PANEL TILT:	0
AZIMUTH:	132 deg
UPLIFT/ROW, Fur:	-3466 lbf

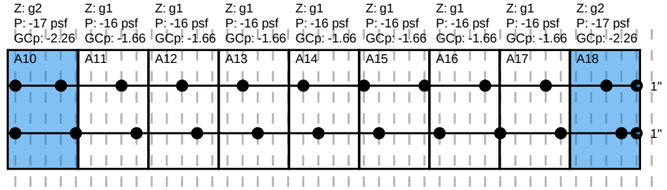
	RAIL1	RAIL2
ANCHORS:	15	15
LOAD/ANCHOR, Fa:	-104 lbf	-104 lbf
TEST LOAD/ANCHOR:	-550 lbf	-550 lbf
SF:	5.28	5.28
NOM SPAN:	27"	27"
MAX SPAN:	32"	32"
MAX CANTILEVER:	9"	9"



ROW: 1 (9 MODS)

DIST LOAD, Fdd:	2.69 psf
POINT LOAD, Fda:	23.85 lbs
ROOF PITCH:	07-20 deg
PANEL TILT:	0
AZIMUTH:	132 deg
UPLIFT/ROW, Fur:	-3142 lbf

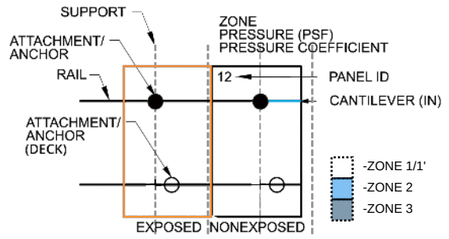
	RAIL1	RAIL2
ANCHORS:	12	12
LOAD/ANCHOR, Fa:	-117 lbf	-117 lbf
TEST LOAD/ANCHOR:	-550 lbf	-550 lbf
SF:	4.72	4.72
NOM SPAN:	36"	36"
MAX SPAN:	36"	36"
MAX CANTILEVER:	10"	10"



01 ATTACHMENT PLAN

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	SP1
	FLORIDA STATE ENERGY	ECUIP ENGINEERING		04.23.25	BF	1	INITIAL DESIGN	
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	6901 TPC DRIVE STE 650, ORLANDO, FL 32822	1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605					PAPER: ARCHB
PROJECT ID: 4212025-9607	(407) 718-9980							SCALE:

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS



LEGEND

ARRAY
MODULE: (10) MSE395SX9R
TOTAL AREA: 216.38 SQFT

HARDWARE
RAIL: 70' PEGASUS
ATTACHMENT: (32) S5!-PROTEA
ANCHORAGE: RIB/SEAM

FRAMING
SIZE: MIN. 2X4
SPACING: 24" OC

ROOF
MEAN HEIGHT: 15'
MATERIAL: METAL (9" OC RIBS/SEAMS)
SHAPE: GABLE

PARAMETERS

DEAD LOAD CALC
LOADS:
Panel = 48.5lbs
Anchors = ~2lbs
Rail = 0.72lbs/ft
Misc = 1.6lbs/panel

DEADLOAD PER ROW, Fdr:
Fdr = (lbs/panel*#panels/row) + (lbs/ft-rail*ft-rail/row)*2 + (lbs/anchor*#anchors/row) + (misc-lbs/panel*#panels/row) (lbf)

DIST DEADLOAD, Fdd:
Fdd = Fdr/(area/panel*#panels/row) (psf)

DEADLOAD PER ANCHOR, Fda:
Fda = Fdr/(#anchors/row) (lbs)

PANELS PARALLEL TO SURFACE, 29.4.4
CRITERIA:
- Panels parallel to roof surface (within 2 deg)
- Max height of panel above roof, h1 & h2 OF 10"
- Min panel gap of 0.25"
- Min edge distance 2*h2
- Max panel chord length of 6.7'

UPLIFT ON ONE PANEL, Fup = P*A (lbf)
Per ASCE 2.4, 26.10.2 & 29.4.4
P = pasd = 0.6*p = 0.6*qh*(GCp)*(YE)*(Ya), A = load area

UPLIFT PER ROW, Fur = SUM(Fup(0):Fup(n)) (lbf)
Where Fup(0):Fup(n) = loads from first to last panel in row

UPLIFT PER ANCHOR, Fua = Fur/(#ANCHORS/ROW) (lbf)

LOAD PER ANCHOR, Fa = 0.6*Fda + Fua (lbf)

SAFETY FACTOR, SF = Ftest/Fa

VELOCITY PRESSURE qh = 0.00256*Kz*Kzt*Kd*Ke*V^2 = 25 (lb/sqft)
Where Kz = 0.57, Kzt = 1, Kd = 0.85, Ke = 1, V = 130

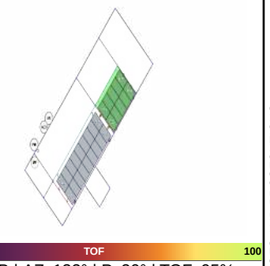
EXT PRESSURE COEFFICIENT, GCp:
GCp varies per roof & zone, 30.3-2A-I to 30.3.7: Aeff = 21.64 sqft (1 panel)

EXPOSURE FACTOR, YE:
YE = 1.5 for uplift loads on panels that are exposed and within a distance 2*h2 from the end of a row at an exposed edge of the array; YE = 1.0 elsewhere for uplift loads and for all downward loads, as illustrated in Fig. 29.4-7. A panel is defined as exposed if d1 to the roof edge > 0.5h and one of the following applies: 1. d1 to the adjacent array > 2*h2 or 2. d2 to the next adjacent panel > 2*h2.

PRESSURE EQUALIZATION FACTOR, Ya:
Ya is given as 0.58 per 29.4.4, 29.4-8 with h2 = 5"+ & panel gap = 0.37"

LOAD CALCS PER FBC 2023/ASCE 7-22

ZONES
f0: 1' (Flat)
f1: 1 (Flat)
f2: 2 (Flat)
f3: 3 (Flat)
g1: 1 (Gable)
g2: 2 (Gable)
g3: 3 (Gable)
h1: 1 (Hip)
h2: 2 (Hip)
h3: 3 (Hip)

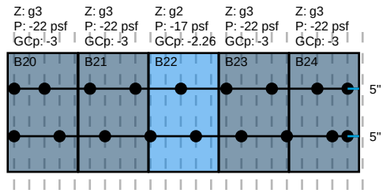


PLANE B | AZ: 132° | P: 20° | TOF: 95%

ROW: 2 (5 MODS)

DIST LOAD, Fdd:	2.75 psf
POINT LOAD, Fda:	18.57 lbs
ROOF PITCH:	07-20 deg
PANEL TILT:	0
AZIMUTH:	132 deg
UPLIFT/ROW, Fur:	-2262 lbf

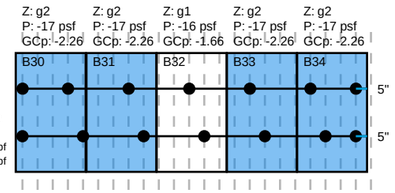
	RAIL1	RAIL2
ANCHORS:	9	9
LOAD/ANCHOR, Fa:	-115 lbf	-115 lbf
TEST LOAD/ANCHOR:	-550 lbf	-550 lbf
SF:	4.8	4.8
NOM SPAN:	27"	27"
MAX SPAN:	32"	32"
MAX CANTILEVER:	9"	9"



ROW: 3 (5 MODS)

DIST LOAD, Fdd:	2.7 psf
POINT LOAD, Fda:	20.88 lbs
ROOF PITCH:	07-20 deg
PANEL TILT:	0
AZIMUTH:	132 deg
UPLIFT/ROW, Fur:	-1783 lbf

	RAIL1	RAIL2
ANCHORS:	7	7
LOAD/ANCHOR, Fa:	-115 lbf	-115 lbf
TEST LOAD/ANCHOR:	-550 lbf	-550 lbf
SF:	4.79	4.79
NOM SPAN:	36"	36"
MAX SPAN:	36"	36"
MAX CANTILEVER:	10"	10"



01 ATTACHMENT PLAN

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MOCK MELVIN E JR

9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES

PROJECT ID: 4212025-9607

CONTRACTOR: -

FLORIDA STATE ENERGY

6901 TPC DRIVE STE 650, ORLANDO, FL 32822

(407) 718-9980

ENGINEER: CA33343

ECUIP ENGINEERING

1646 W SNOW AVE 9 TAMPA, FL 33606

Ryan S Gittens 2025.04.23 14:20:07 -04'00'

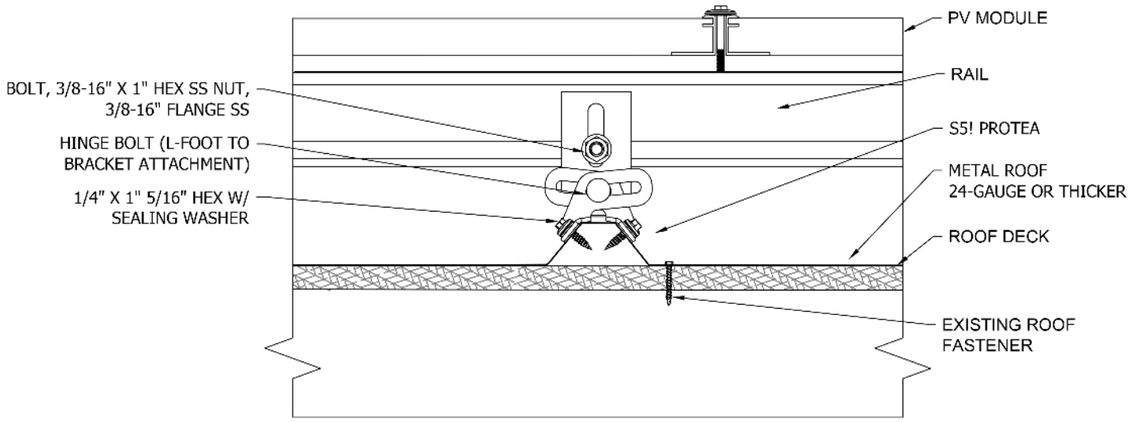
RYAN S GITTENS PE90605

DATE	BY	VER	DESCRIPTION
04.23.25	BF	1	INITIAL DESIGN

SP2

PAPER: ARCHB

SCALE:

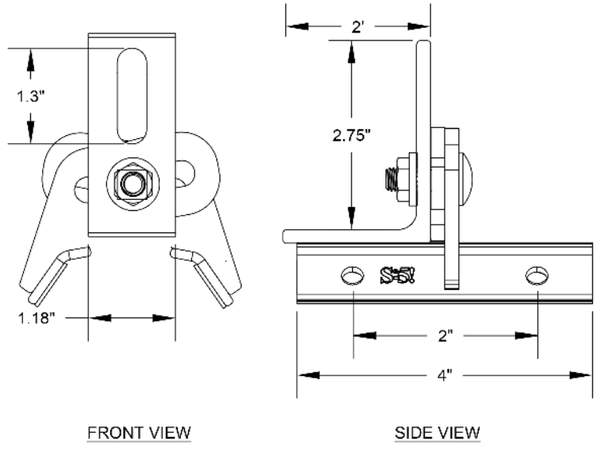


01 ANCHORAGE DETAIL

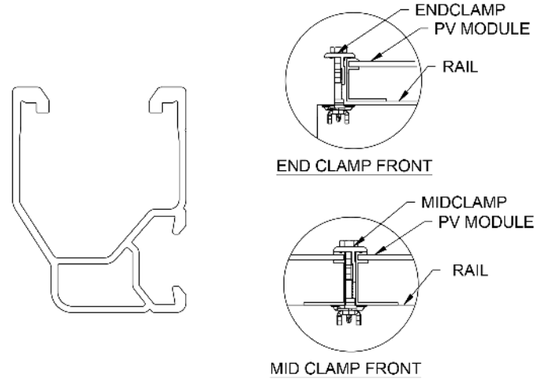
GENERAL

1.1 DESIGNED PER FBC 2023/ASCE 7-22 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.
1.2 CONTRACTOR IS RESPONSIBLE FOR INSTALLING PV MODULES, RACKING & RACKING SUPPORTS IN ACCORDANCE WITH THE MANUFACTURER INSTALLATION INSTRUCTIONS NOT SHOWN IN THIS PLAN.
1.3 WITHDRAWAL VALUES GIVEN PER NDS BASED ON SG OF 0.5 WHERE APPLICABLE OR MANUFACTURER SUPPLIED 3RD PARTY UPLIFT TESTING REPORTS WITH APPLICABLE SAFETY FACTORS.
1.4 ALL PENETRATIONS SHALL BE FLASHED OR SEALED IN A MANNER THAT PREVENTS MOISTURE FROM ENTERING THE WALL AND ROOF USING ASTM C920 COMPLAINT SEALANT IN PILOT HOLES AND AROUND FASTENERS.
1.5 THE SUPPORTING ROOF STRUCTURE SHALL BE CONVENTIONAL WOOD FRAMED OR METAL CONSTRUCTION WITH PRE-ENGINEERED TRUSSES OR ROOF FRAMING MEMBERS.
1.6 EXISTING STRUCTURE IS ASSUMED TO BE IN COMPLIANCE WITH APPLICABLE BUILDING CODES AT THE TIME OF CONSTRUCTION.
1.7 IT IS THE CONTRACTOR RESPONSIBILITY TO INSTALL THE SYSTEM AND ITS SUPPORTS AS INDICATED IN THESE PLANS. THE CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD IF SITE CONDITIONS DIFFER FROM WHAT IS DEPICTED ON PLANS.

02 NOTES



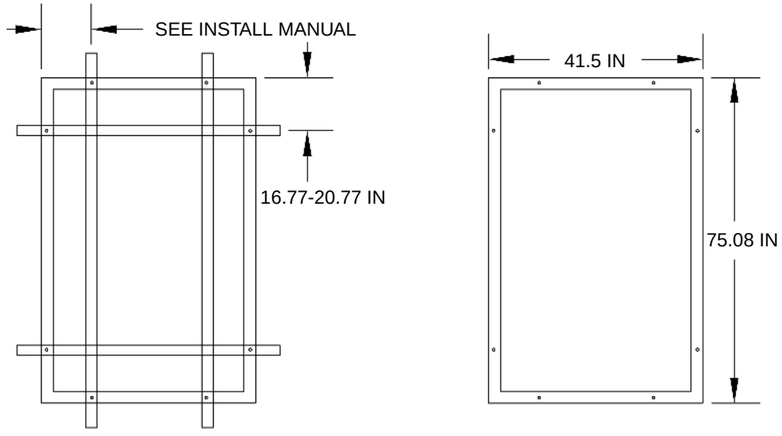
FRONT VIEW SIDE VIEW



PEGASUS RAIL AND CLAMPS

03 ANCHOR DETAIL

04 RACK & CLAMPS DETAIL



MISSION SOLAR
MSE395SX9R

05 MODULE DETAILS

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	FLORIDA STATE ENERGY 6901 TPC DRIVE STE 650, ORLANDO, FL 32822 (407) 718-9980	ECUIP ENGINEERING 1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605
PROJECT ID: 4212025-9607			

DATE	BY	VER	DESCRIPTION
04.23.25	BF	1	INITIAL DESIGN

SA1
PAPER: ARCHB
SCALE:

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

GENERAL

1.1 CONTRACTOR SHALL COMPLY WITH FBC 2023/ASCE 7-22, NEC 2020 AND EQUIPMENT INSTALLATION INSTRUCTIONS NOT SHOWN IN THIS PLAN.
1.2 ALL EQUIPMENT SHALL BE LISTED PER NEC 690.4(B).
1.3 PV SOURCE CONDUCTORS ARE SIZED BE EXPOSED TO DIRECT SUNLIGHT WHEN INSTALLED IN RACEWAYS 7/8" OR LESS ABOVE ROOF. ADJUSTMENTS ARE BASED ON MAX CURRENT OF 16A, 35C AMBIENT TEMP, NEC 310.15(B)(2) AND T310.15(B)(1).
1.4 ALL EQUIPMENT SHALL BE RATED FOR INSTALL LOCATION. ROOF & OUTDOOR JUNCTION BOXES SHALL BE OUTDOOR RATED
1.5 INTERCONNECTION EQUIPMENT SHALL BE RATED FOR AVAILABLE FAULT CURRENT.
1.6 NEC 230.67(D) WHERE SERVICE EQUIPMENT IS REPLACED, A SURGE-PROTECTIVE DEVICE (SPD) SHALL BE PROVIDED.

SYSTEM

2.1 THE ENPHASE SYSTEM IS NON-ISOLATED AND UNGROUNDED. NEITHER THE NEGATIVE NOR POSITIVE CONDUCTOR IS GROUNDED AND HAS A COMMON AC AND DC EQUIPMENT GROUNDING TERMINAL THEREFORE NO DC GEC IS REQUIRED.
2.2 ENPHASE IQ SERIES MICROINVERTERS REQUIRE NO GROUND OR GROUNDED CONDUCTOR BECAUSE THE DC CIRCUIT IS ISOLATED AND INSULATED FROM GROUND.
2.3 THE INVERTER IS EQUIPPED WITH A RAPID SHUTDOWN FEATURE WHICH CONFORMS TO NEC 690.12.
2.4 INTERCONNECTION SHALL BE MADE BY LINE-SIDE-TAP PER ARTICLE 705.11 USING CONNECTORS UL LISTED FOR THIS PURPOSE. TAP CONDUCTORS SHALL BE NO MORE THAN 10FT IF INSIDE BUILDING PER 705.11(C). TAP & ENCLOSURE SHALL COMPLY WITH NEC 312.8(A) (CROSS SECTIONAL AREA FILL).
2.5 NO MORE THAN 4 BRANCHES (OR 8 CONDUCTORS) SHALL BE RUN IN A SINGLE CONDUIT USING #10 WIRE. USE MULTIPLE CONDUITS/JBOX AS REQUIRED TO SATISFY THIS LIMIT.

GROUNDING

3.1 ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690.
3.2 FRAMED PV MODULES SHALL BE BONDED TOGETHER USING LUGS OR RACKING INTEGRATED GROUNDING CLAMPS.
3.3 EQUIPMENT GROUNDING SHALL BE INSTALLED PER NEC 250.120(C), SIZED PER 690.45 & BE A MINIMUM OF #6 WHEN EXPOSED TO DAMAGE.
3.4 INTERSYSTEM BONDING DEVICE REQUIRED AT SERVICE WHEN COMMUNICATION DEVICES ARE PRESENT PER 250.94.
3.5 EXISTING GROUNDING ELECTRODE SYSTEM (GES) SHALL COMPLY WITH 250.64, 250.53 & 250.62 & BE OF THE TYPES & SIZE LISTED IN 250.52.
3.6 EXISTING GROUNDING ELECTRODE SYSTEM (GES) SHALL BE SIZED PER 250.66 & T250.66: TYP. #4 GEC (FIELD VERIFY).
3.7 METAL WATER PIPES SHALL BE GROUNDED PER 250.104(A)

01 NOTES

ID	RUN	VOLTS(V)	CURRENT(A)	VD(%)	LEN(FT)	CONDUCTOR	SIZE	SETS	OHM/KFT	CONDUIT	MIN SIZE	#CCC	EGC	OCPD(A)	TERM(C)	TEMP FAC	FILL FAC	BASE AMP	ADJ AMP
A	BR-JBOX	240	15.73	1	38.53	Q-CABLE	#12	1	1.98	FREE AIR	3/4"	2	#10	20	75	1	1	25	25
B	JBOX-COMB	240	15.73	1	61.52	THHN/THWN-2	#10	1	1.24	PVC/EMT	3/4"	6	#10	20	75	1	0.8	35	32
C	COMB-DISC	240	33.88	1	45.53	THHN/THWN-2	#8	1	0.778	PVC/EMT/FMC/NMLT	3/4"	3	#10	45	75	1	1	50	50
D	DISC-PCC	240	33.88	1	72.14	THHN/THWN-2	#6	1	0.491	PVC/EMT/FMC/NMLT	3/4"	3	NA	NA	75	1	1	65	65

02 MODULE RATINGS

MAKE	MISSION SOLAR
MODEL	MSE395SX9R
RATED POWER (W)	395
MPP VOLTAGE (V)	36.99
MPP CURRENT (A)	10.68
OC VOLTAGE (V)	45.18
SC CURRENT (A)	11.24

03 INVERTER RATINGS

MAKE	ENPHASE
MODEL	IQ8PLUS-72-2-US
MAX INPUT VOLTAGE (V)	60
MAX INPUT SC CURRENT (A)	15
NOM AC VOLTAGE (V)	240
MAX AC CURRENT (A)	1.21
NOM AC POWER (W)	290

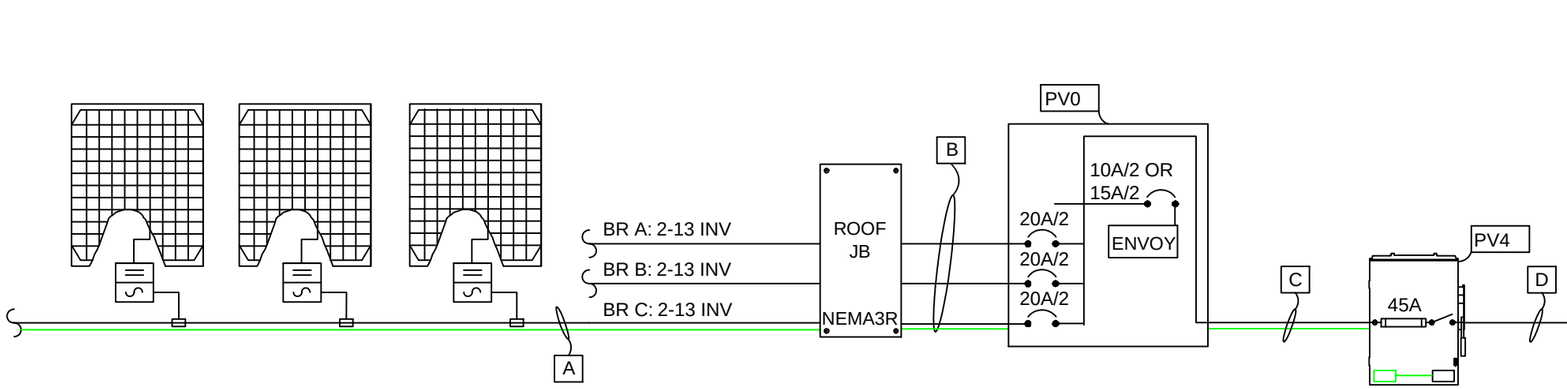
# PV MODULES	28
# BRANCH CIRCUITS	3
# INVERTERS	28
MIN-MAX BR SIZE (INV)	2-13
STC DC RATING (KW)	11.06
AC OUTPUT RATING (KW)	8.12
DC/AC RATIO	1.36

04 SYSTEM

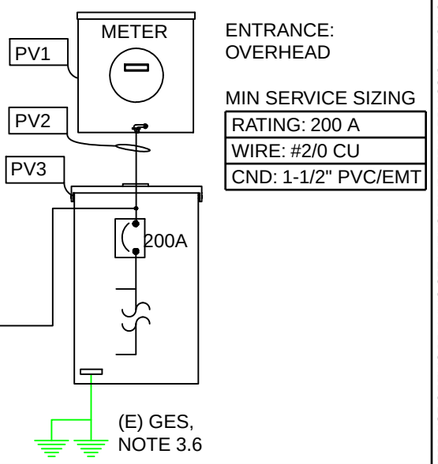
PV0	(N) ENPHASE IQ COMBINER
PV1	(E) MIN 200A METER OR CT CABINET
PV2	(E) 200A SERVICE CONDUCTORS
PV3	(E) 200A MAIN PNL W/ (E) 200A MAIN
PV4	(N) 60A, SERV RATED AC DISC, 45A FUSES

05 CONDUCTOR SCHEDULE

06 EQUIPMENT SCHEDULE



07 ELECTRICAL LINE DIAGRAM



ENTRANCE: OVERHEAD

MIN SERVICE SIZING

RATING: 200 A
WIRE: #2/0 CU
CND: 1-1/2" PVC/EMT

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	FLORIDA STATE ENERGY 6901 TPC DRIVE STE 650, ORLANDO, FL 32822 (407) 718-9980	ECUIP ENGINEERING 1646 W SNOW AVE 9 TAMPA, FL 33606
PROJECT ID: 4212025-9607		Ryan S Gittens 2025.04.23 14:20:07 -04'00' RYAN S GITTENS PE90605

DATE	BY	VER	DESCRIPTION
04.23.25	BF	1	INITIAL DESIGN

E1

PAPER: ARCHB

SCALE:

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

! WARNING

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

NEC 706.15(C)(4), NEC 690.13(B)
LOCATION(S): 3
Combiner Box/Circuits/Enclosures

PHOTOVOLTAIC AC DISCONNECT

NEC 690.13(B)
LOCATION(S): 4, 5
AC Disconnect/Breaker/POC

! WARNING

DUAL POWER SOURCE
SECOND POWER SOURCE IS PV SYSTEM

NEC 705.12(C), NEC 690.59
LOCATION(S): 6
Production/Net Meter

PHOTOVOLTAIC AC DISCONNECT	
RATED AC OUTPUT CURRENT	33.88
NOMINAL OPERATING AC VOLTAGE	240

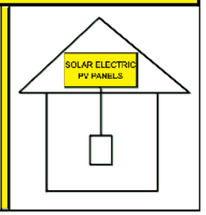
NEC 690.54
LOCATION(S): 3, 4
Inverter/POC/Breaker Panel/Pull Boxes

PV SYSTEM DISCONNECT

NEC 690.13(B)
LOCATION(S): 4, 5
Main Service Disconnect

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



NFPA 1 11.12.2.1.1.1.1
LOCATION(S): 5

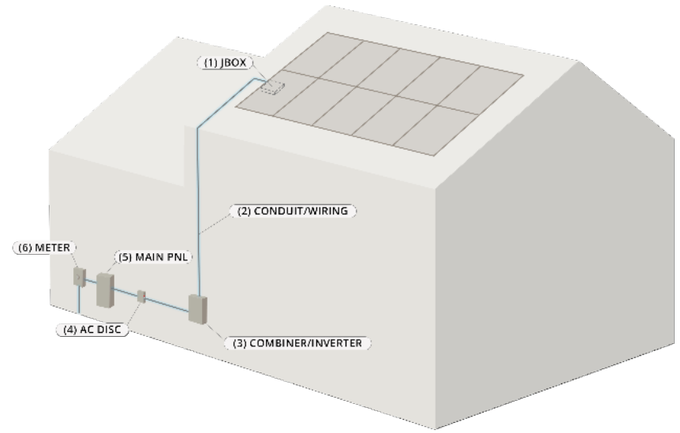
RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NFPA 1 11.12.2.1.1.8
LOCATION(S): 4
Rapid Shutdown Switch

EMERGENCY CONTACT

FLORIDA STATE ENERGY
(407) 718-9980

UTILITY REQ'D
LOCATION(S): 4, 6
Main Service Disconnect



01 LABELS

02 NOTES

GENERAL

1.1 LABEL MATERIALS SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT, NEC 110.21(B)(3).
1.2 EXACT MATERIALS USED ARE SUBJECT TO THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS SHALL BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.4 LABELS WILL BE REFLECTIVE AND MEET THE REQUIREMENTS OF NFPA 1-11.12.2.1.1.2

MOCK MELVIN E JR

9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES

PROJECT ID: 4212025-9607

CONTRACTOR: -

FLORIDA STATE ENERGY

6901 TPC DRIVE STE 650,
ORLANDO, FL 32822

(407) 718-9980

ENGINEER: CA33343

ECUIP ENGINEERING

1646 W SNOW AVE 9 TAMPA, FL 33606

Ryan S Gittens 2025.04.23 14:20:07 -04'00'

RYAN S GITTENS
PE90605

DATE	BY	VER	DESCRIPTION
04.23.25	BF	1	INITIAL DESIGN

EL1

PAPER: ARCHB

SCALE:

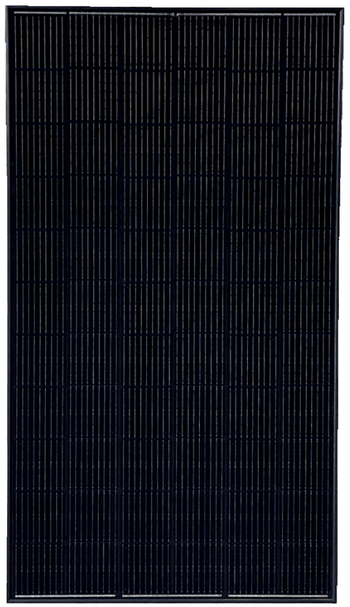
UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MSE PERC 66

MISSION SOLAR ENERGY

395W
Class leading power output

Positive Power Tolerance
-0 to +3%



True American Quality
True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas where we manufacture our modules. We produce American, high-quality solar modules ensuring the highest-in-class power output and best-in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long term.

Demand the best. Demand Mission Solar Energy.

Certified Reliability
- Tested to UL 61730 & IEC Standards
- PID resistant
- Resistance to salt mist corrosion

Advanced Technology
- 9 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications

Extreme Weather Resilience
- Up to 5,400 Pa front load & 3,600 Pa back load
- Tested load to UL 61730
- 40 mm frame

BAA Compliant for Government Projects
- Buy American Act
- American Recovery & Reinvestment Act

MODULES ASSEMBLED DESIGNED & ENGINEERED IN THE USA OF U.S. AND NON-U.S. PARTS

FRAME-TO-FRAME 25 YEAR WARRANTY

FRAME-TO-FRAME WARRANTY

Degradation guaranteed not to exceed 2% in year one and 0.58% annually from years two to 30 with 84.08% capacity guaranteed in year 25.
For more information, visit www.missionsolar.com/warranty

CERTIFICATIONS

CEC · TÜV SUD · c UL us LISTED

UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.

C-SA2-MKTG-0027 REV 4 03/18/2022

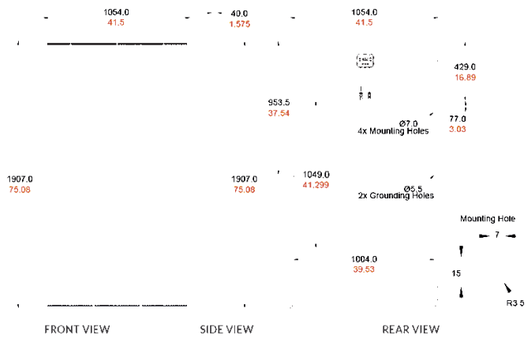
www.missionsolar.com | info@missionsolar.com

Class Leading
390-400W

MSE PERC 66

BASIC DIMENSIONS

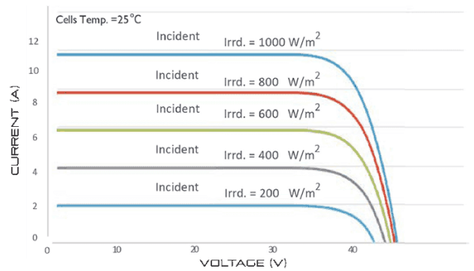
[UNITS: MM/IN]



CURRENT-VOLTAGE CURVE

MSE385SX9R: 385WP, 66 CELL SOLAR MODULE

Current-voltage characteristics with dependence on irradiance and module temperature



CERTIFICATIONS AND TESTS

IEC	61215, 61730, 61701
UL	61730

TÜV SUD · CEC · c UL us LISTED

Mission Solar Energy

8303 S. New Braunfels Ave., San Antonio, Texas 78235
www.missionsolar.com | info@missionsolar.com

ELECTRICAL SPECIFICATION

PRODUCT TYPE			MSExxxSX9R (xxx = P_{max})		
Power Output	P_{max}	W_p	390	395	400
Module Efficiency		%	19.4	19.7	19.9
Tolerance		%	0/+3	0/+3	0/+3
Short Circuit Current	I_{sc}	A	11.19	11.24	11.31
Open Circuit Voltage	V_{oc}	V	45.04	45.18	45.33
Rated Current	I_{mp}	A	10.63	10.68	10.79
Rated Voltage	V_{mp}	V	36.68	36.99	37.07
Fuse Rating		A	20	20	20
System Voltage		V	1,000	1,000	1,000

TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	43.75°C (±3.7%)
Temperature Coefficient of Pmax	-0.367%/°C
Temperature Coefficient of Voc	-0.259%/°C
Temperature Coefficient of Isc	0.033%/°C

OPERATING CONDITIONS

Maximum System Voltage	1,000Vdc
Operating Temperature Range	-40°F to 185°F (-40°C to +85°C)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1*
Front & Back Load (UL Standard)	Up to 5,400 Pa front and 3,600 Pa back load, Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

*Mission Solar Energy uses quality sourced materials that result in a Type 1 fire rating. Please note, the 'Fire Class' Rating is designated for the fully-installed PV system, which includes, but is not limited to, the module, the type of mounting used, pitch and roof composition.

MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon
Cell Orientation	66 cells (6x11)
Module Dimension	1,907mm x 1,054mm x 40mm
Weight	48.5 lbs. (22 kg)
Front Glass	3.2mm tempered, low-iron, anti-reflective
Frame	40mm Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.2m, Wire 4mm2 (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

SHIPPING INFORMATION

Container Feet	Ship To	Pallet	Panels	390W Bin
53'	Most States	30	780	304.20 kW
Double Stack	CA	26	676	263.64 kW

PALLET [26 PANELS]

Weight	Height	Width	Length
1,300 lbs. (572 kg)	47.56 in (120.80 cm)	46 in (116.84 cm)	77 in (195.58 cm)

Mission Solar Energy reserves the right to make specification changes without notice.

C-SA2-MKTG-0027 REV 4 03/18/2022

www.missionsolar.com | info@missionsolar.com

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	D1
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	FLORIDA STATE ENERGY 6901 TPC DRIVE STE 650, ORLANDO, FL 32822 (407) 718-9980	ECUIP ENGINEERING 1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605	04.23.25	BF	1	INITIAL DESIGN	PAPER: ARCHB
PROJECT ID: 4212025-9607								SCALE:

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-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 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)		**IQ8-60-2-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	
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	
Acoustic noise at 1 m		<60 dBA	
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, 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, 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-2021-10-19

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	D2
	FLORIDA STATE ENERGY	ECUIP ENGINEERING		04.23.25	BF	1	INITIAL DESIGN	
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	6901 TPC DRIVE STE 650, ORLANDO, FL 32822	1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605					PAPER: ARCHB
PROJECT ID: 4212025-9607	(407) 718-9980							SCALE:

ENPHASE

DATA SHEET

X-IQ-AM1-240-5
X-IQ-AM1-240-5C

IQ Combiner 5/5C

The IQ Combiner 5/5C consolidates interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications. IQ Combiner 5/5C uses wired control communication and is compatible with IQ System Controller 3/3G and IQ Battery 5P.

The IQ Combiner 5/5C, IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provide a complete grid-agnostic Enphase Energy System.

IQ Series Microinverters
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) simplify the installation process.

IQ System Controller 3/3G
Provides microgrid interconnection device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power.

IQ Battery 5P
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT Microinverters.

IQ Load Controller
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life.

Enphase 5 year limited warranty

NOM

UL CERTIFIED SAFETY US/CA SÛRETÉ US/CA E341166

5-year limited warranty

*For country-specific warranty information, see the https://enphase.com/installers/resources/warranty page.

© 2024 Enphase Energy. All rights reserved. Enphase, the e and CC logos, IQ, and certain other marks listed at https://enphase.com/trademark-usage-guidelines are trademarks of Enphase Energy, Inc. in the U.S. and other countries.
Data subject to change.

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect (CELLMODEM-M1-06-SP-05), only with IQ Combiner 5C
- Supports flexible networking: Wi-Fi, Ethernet, or cellular
- Provides production metering (revenue grade) and consumption monitoring

Easy to install

- Mounts to one stud with centered brackets
- Supports bottom, back, and side conduit entries
- Supports up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV branch circuits
- Bluetooth-based Wi-Fi provisioning for easy Wi-Fi setup

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- 5-year limited warranty
- 2-year labor reimbursement program coverage included for both the IQ Combiner SKUs[1]
- UL1741 Listed

IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5)	IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSIC12.20 ±0.5%), consumption monitoring (±2.5%), and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat.
IQ Combiner 5C (X-IQ-AM1-240-5C)	IQ Combiner 5C with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (±2.5%) and IQ Battery monitoring (±2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05)[1]. Includes a silver solar shield to deflect heat.
WHAT'S IN THE BOX	
IQ Gateway printed circuit board	IQ Gateway is the platform for total energy management for comprehensive, remote maintenance, and management of the Enphase Energy System
Busbar	80 A busbar with support for one IQ Gateway breaker and four 20 A breaker for installing IQ Series Microinverters and IQ Battery 5P
IQ Gateway breaker	Circuit breaker, 2-pole, 10 A/15 A
Production CT	Pre-wired revenue-grade solid-core CT, accurate up to ±0.5%
Consumption CT	Two consumption metering clamp CTs, shipped with the box, accurate up to ±2.5%
IQ Battery CT	One battery metering clamp CT, shipped with the box, accurate up to ±2.5%
CTRL board	Control board for wired communication with IQ System Controller 3/3G and the IQ Battery 5P
Enphase Mobile Connect (only with IQ Combiner 5C)	4G-based LTE-M1 cellular modem (CELLMODEM-M1-06-SP-05) with a 5-year T-Mobile data plan
Accessories kit	Spare control headers for the COMMS-KIT-02 board
ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
CELLMODEM-M1-06-SP-05	4G-based LTE-M1 cellular modem with a 5-year T-Mobile data plan
CELLMODEM-M1-06-AT-05	4G-based LTE-M1 cellular modem with a 5-year AT&T data plan
Circuit breakers (off-the-shelf)	Supports Eaton BR2XX, Siemens Q2XX and GE/ABB THQL21XX Series circuit breakers (XX represents 10, 15, 20, 30, 40, 50, or 60). Also supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with the hold-down kit.
Circuit breakers (provided by Enphase)	BRK-10A-2-240V, BRK-15A-2-240V, BRK-20A-2P-240V, BRK-15A-2P-240V-B, and BRK-20A-2P-240V-B (more details in the "Accessories" section)
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 5/5C
XA-ENV2-PCBA-5	IQ Gateway replacement printed circuit board (PCB) for IQ Combiner 5/5C
X-IQ-NA-HD-125A	Hold-down kit compatible with Eaton BR-B Series circuit breakers (with screws)
XA-COMMS2-PCBA-5	Replacement COMMS-KIT-02 printed circuit board (PCB) for IQ Combiner 5/5C
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage and frequency	120/240 VAC, 60 Hz
Busbar rating	125 A
Fault current rating	10 kAIC
Maximum continuous current rating (input from PV/storage)	64 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR, Siemens Q, or GE/ABB THQL Series distributed generation (DG) breakers only (not included)
Maximum total branch circuit breaker rating (input)	80 A of distributed generation/95 A with IQ Gateway breaker included
IQ Gateway breaker	10 A or 15 A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-CLAMP)	A pair of 200 A clamp-style current transformers is included with the box
IQ Battery metering CT	200 A clamp-style current transformer for IQ Battery metering, included with the box

[1] A plug-and-play industrial-grade cell modem for systems of up to 60 microinverters. Available in the United States, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.

IQC-5-5C-DSH-00007-4.0-EN-US-2024-06-13

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	D3
	FLORIDA STATE ENERGY	ECUIP ENGINEERING		04.23.25	BF	1	INITIAL DESIGN	
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	6901 TPC DRIVE STE 650, ORLANDO, FL 32822	1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605					PAPER: ARCHB
PROJECT ID: 4212025-9607	(407) 718-9980							SCALE:

BUCHANAN CONSTRUCTION PRODUCTS

BTAP®

UL Listed
Pressure Cable Connectors
File No. E-5238

INSULATION-PIERCING TAP CONNECTORS | CONECTORES DE DERIVACIÓN QUE PERFORAN EL AISLAMIENTO

Suitable for use on the line side of service equipment.

Adecuado para uso en el lado de la línea del equipo de servicio.

Installation Instructions:

⚠ Warning

Improperly installed electrical wiring can be dangerous and cause electrical fires. The connector chosen must be sized to the wires being used. Consult local building code before doing any electrical work. For assistance, refer to an instructional book or consult a qualified electrician.

⚠ Warning

Contact with electricity can cause serious injury or death. Use on insulated cable only. [RHH, RHW(-2). THHN. THHW, THW, THWN, USE, XHHW(-2). Consult factory for other insulation types]. If the installation is to be made on an energized run, the tap conductor must be under no load and must not be grounded. Use electrically insulated gloves. De-energize the run cable if there are any questions of these conditions being met.

1. Determine the direction for the tap conductor to exit and discard one end cap. **See figure 1.**
2. Position the main (or feeder) side of the connector around the run cable and tighten the bolt finger tight. **See figure 2.** If required, loosen the bolt slightly to allow the connector to open completely. **DISASSEMBLY NOT RECOMMENDED**. The plastic "Turbo" spacer holds the connector open which eases installation and ensures proper connections.
3. Cut the end of the tap cable squarely. **DO NOT STRIP CABLE INSULATION.**
4. Insert the tap cable into the tap side of the connector until it is seated in the remaining end cap. **See figure 3.**
5. Continue tightening the torque regulating bolt with a standard box or socket wrench until the torque regulating piece breaks away. If the connector has two (2) assembly bolts, alternately tighten until the hexagonal torque devices break away. **See figures 4a & 4b.** Note that the plastic "turbo" spacer on the side will also break. To make the installation even easier and to relieve torque from the cables, a second wrench can be used on the hexagonal piece on the bottom of the connector.

   DO NOT use gripping type pliers, pipe, open ended or adjustable wrenches as these may damage the hexagonal torque regulating device. A torque wrench is not required.

   MAKE SURE ONLY THE TOP HEXAGONAL TORQUE DEVICE OF THE BOLT HEAD IS USED FOR ASSEMBLY. THE SECOND HEX PIECE [CLOSER TO THE BODY OF THE CONNECTOR] IS USED FOR DISASSEMBLY.

Note: The torque regulating bolt ensures the correct torque is applied to the conductors without using a torque wrench. Important information such as run and tap ranges, voltage ratings and material/temperature ratings is marked on the connector.

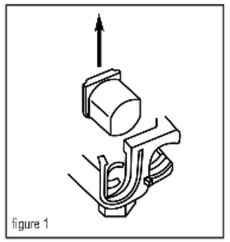


figure 1

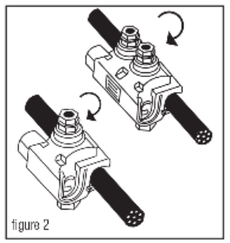


figure 2

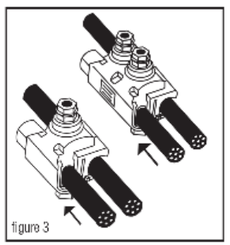
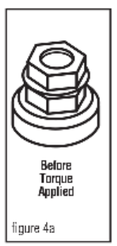
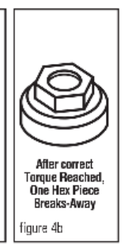


figure 3


Before Torque Applied
figure 4a


After correct Torque Reached, One Hex Piece Breaks-Away
figure 4b

Instalación Instrucciones:

⚠ Advertencia

Los cables eléctricos mal instalados pueden ser peligrosos y provocar incendios. El conector escogido debe ser de un tamaño adecuado para los cables que se utilicen. Consulte los códigos de construcción locales antes de efectuar trabajos eléctricos. Si necesita ayuda, consulte un libro de instrucciones o consulte con un electricista capacitado.

⚠ Advertencia

Use sólo en cable aislado. [RHH, RHW(-2). THHN. THHW, THW. THWN, USE. XHHW(-2). Consulte con la fábrica para obtener información sobre otros tipos de aislamiento]. Si se va a hacer la instalación sobre un cable con corriente el conductor derivado debe estar libre de carga y no debe estar aterado. Use guantes con aislamiento eléctrico. Quite le la corriente al cable del cual se hace la derivación si no se pueden cumplir estas condiciones. El contacto con electricidad puede producir lesiones graves o mortales.

1. Determine la dirección en la que el conductor derivado saldrá y deseche la tapa terminal sobrante. **Vea la ilustración 1.**
2. Coloque el lado principal (o de alimentación) del conector alrededor del cual se hace la derivación y apriete firmemente el dedo del perno. **Vea la ilustración 2**. Si hace falta, afloje el perno ligeramente para permitir que el conector se abra completamente. **NO ES RECOMENDABLE DESARMAR EL CONECTOR.** El espaciador "Turbo" de plástico mantiene al conector abierto, lo cual facilita la instalación y asegura que las conexiones se hagan correctamente.
3. Corte el extremo del cable de derivación perpendicularmente a su eje. **NO PELE EL AISLAMIENTO DEL CABLE.**
4. Inserte el cable de derivación en el lado de derivación del conector hasta que tope contra la tapa terminal que queda. **Vea la ilustración 3.**
5. Continué apretando este perno que regula la torsión con una llave estándar o de cubo hasta que la pieza que regula la torsión se parta y se separe. Si el conector tiene dos (2) pernos de ensamblaje, apriételos alternativamente hasta que el dispositivo de regulación de torció se parta. **Vea la ilustración 4a y 4b**. Observe que el espaciador "turbo" de plástico en el costado también se fracturará. Para hacer esta instalación aún más fácil y para aliviar la torsión de los cables, se puede usar una segunda llave sobre la pieza hexagonal al fondo del conector.

   NO USE alicates de presión, llaves de turbo, llaves comunes o ajustables ya que éstas pueden dañar el dispositivo hexagonal que regula la torsión. No se requiere una llave de torsión.

   ASEGÚRESE QUE SE USE, PARA EL ENSAMBLADO, SÓLO EL DISPOSITIVO SUPERIOR DE REGULACIÓN DE TORSIÓN DE LA CABEZA DEL PERNO. LA SEGUNDA PIEZA HEXAGONAL (LA MÁS CERCANA AL CUERPO DEL CONECTOR) SE USA SÓLO PARA DESARMAR EL CONECTOR.

Nota: El perno regulador de torsión garantiza la aplicación de la torsión correcta a los conductores sin usar una llave de torsión. La información importante de longitud de cable pelado y de toma, las clasificaciones de materiales y temperatura está marcada en el conector.

B-TAP® INSULATION PIERCING TAP CONNECTORS TORQUE AND CURRENT RATINGS

(Solid and/or Stranded)

CATALOG#	MAIN	TAP	NOMINAL TORQUE	TAP CURRENT RATIING (IN AMPS)*
BTC2/0-14	2/0-4	10-14+	80 IN. LBS.	40
BTC1/0-10	1/0-8	2-10++	80 IN. LBS.	130
BTC4/0-10	4/0-3	2-10+++	125 IN. LBS.	130
BTC4/0-6	4/0-2	1/0-6	160 IN. LBS.	170
BTC4/0-2	4/0-2	4/0-2	160 IN. LBS.	260
BTC250-6	250-4	4/0-6	160 IN. LBS.	260
BTC250-4	250-1	3/0-4	160 IN. LBS.	225
BTC250-2	250-1/0	4/0-2	160 IN. LBS.	260
BTC350-1/0	350-1/0	350-1/0	330 IN. LBS.	350
BTC500-4	500-2/0	4/0-4	330 IN. LBS.	260
BTC500-1/0	500-4/0	350-1/0	330 IN. LBS.	350
BTC500-14	750-3/0	10-14 ++++	80 IN. LBS.	40
BTC750-250	750-250	500-250	330 IN. LBS.	430

+10-14 Cu SOLID/STRANDED; 10-12 Al SOLID/STRANDED
++2-10 Cu SOLID/STRANDED; 2-10 Al STRANDED
+++2-10 Cu SOLID/STRANDED; 2-8 Al STRANDED
++++10-14 Cu SOLID/STRANDED; 10-12 Al STRANDED

Full line is 600V dual-rated, 194°F(90°C)

* Based on NEC Table 310-16 1996 (Not more than 3 insulated conductors in a raceway at ambient temperature of 30° C) for the largest tap wire size.

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

ADVERTENCIA: Cáncer y Daño Reproductivo - www.P65Warnings.ca.gov.

One year limited warranty. See idealind.com for more information.

Garantía limitada de un año. Visite www.idealind.com para obtener detalles de la garantía.

CONSTRUCTION PRODUCTS BUCHANAN
1800 S. Prairie Drive
Sycamore, IL, U.S.A.
800-435-0705 • www.idealind.com

PA-0304-1

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	D4
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	FLORIDA STATE ENERGY 6901 TPC DRIVE STE 650, ORLANDO, FL 32822 (407) 718-9980	ECUIP ENGINEERING 1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605	04.23.25	BF	1	INITIAL DESIGN	PAPER: ARCHB
PROJECT ID: 4212025-9607								SCALE:

S-5!®
The Right Way!™

ProteaBracket™

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket™ is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

ProteaBracket* can be used for rail mounting or "direct-attach" with S-5! PVKIT™

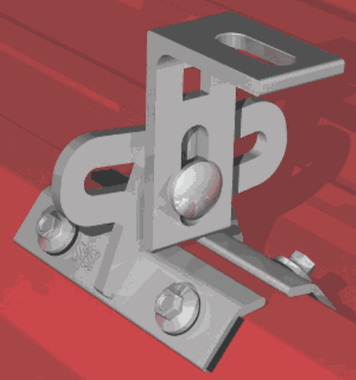
*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

The right way to attach solar PV to trapezoidal roof profiles!

NEW

NOW AVAILABLE IN ALUMINUM

ProteaBracket™



Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot™
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty*

*See www.S-5.com for details.

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

MADE IN THE USA

S-5!®
The Right Way!™

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

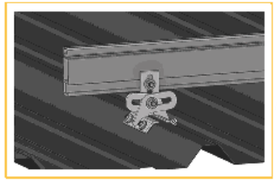
ProteaBracket™ is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

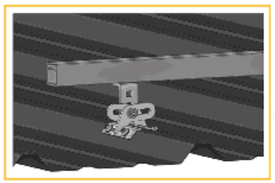
For design assistance, ask your distributor, or visit **www.S-5.com** for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5!® holding strength is unmatched in the industry.

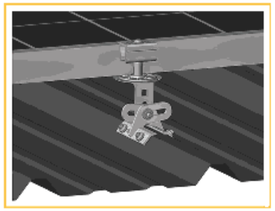
Multiple Attachment Options:



Side Mount Rail



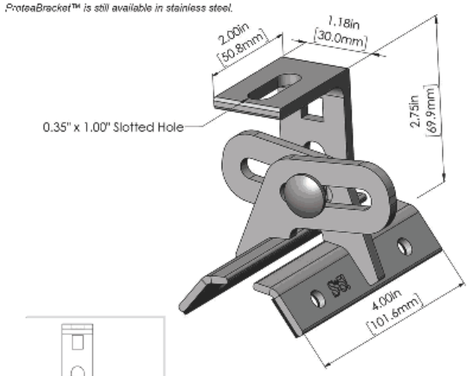
Bottom Mount Rail

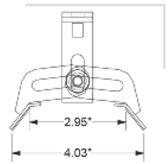


w/ S-5! PVKIT™ (rail-less)

ProteaBracket™

ProteaBracket™ is still available in stainless steel.

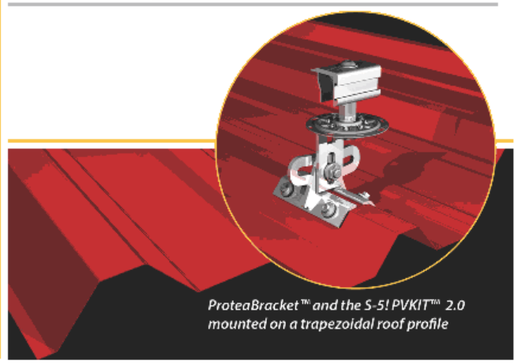




ProteaBracket fits profiles up to 3 inches

INSTALLATION:

No surface preparation needed. (1) Wipe away excess oil and debris. **(2)** Peel off adhesive release paper. **(3)** Align and mount bracket directly onto crown of panel. **(4)** Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket™ and the S-5! PVKIT™ 2.0 mounted on a trapezoidal roof profile

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.

Copyright 2015 Metal Roof Innovations, Ltd. S-5! products are patent protected. S-5! aggressively protects its patents, trademarks, and copyrights. Version 0/080.

Distributed by

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION	D5
	FLORIDA STATE ENERGY	ECUIP ENGINEERING		04.23.25	BF	1	INITIAL DESIGN	
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	6901 TPC DRIVE STE 650, ORLANDO, FL 32822	1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605					PAPER: ARCHB
PROJECT ID: 4212025-9607	(407) 718-9980							SCALE:

5.2.4.1 Load Duration Factor (C_D)

Lumber strength is affected by the cumulative duration of maximum variable loads experienced during the life of the structure. In other words, strength is affected by both the load intensity and its duration (i.e., the load history). Because of its natural composition, wood is better able to resist higher short-term loads (i.e., transient live loads or impact loads) than long-term loads (i.e., dead loads and sustained live loads). Under impact loading, wood can resist about twice as much stress as the standard 10-year load duration (i.e., "normal duration") to which wood bending stress properties are normalized in the NDS.

When other loads with different duration characteristics are considered, it is necessary to modify certain tabulated stresses by a load duration factor (C_D) as shown in Table 5.3. Values of the load duration factor, C_D, for various load types are based on the total accumulated time effects of a given type of load during the useful life of a structure. C_D increases with decreasing load duration.

Where more than one load type is specified in a design analysis, the load duration factor associated with the shortest duration load is applied to the entire combination of loads. For example, for the load combination, *Dead Load + Snow Load + Wind Load*, the load duration factor, C_D, is equal to 1.6.

TABLE 5.3 Recommended Load Duration Factors for ASD

Load Type	Load Duration	Recommended C_D Value
Permanent (dead load)	Lifetime	0.9
Normal	Ten years	1.0
Occupancy (live load)[1]	Ten years to seven days	1.0 to 1.25
Snow[2]	One month to seven days	1.15 to 1.25
Temporary construction	Seven days	1.25
Wind and seismic[3]	Ten minutes to one minute	1.6 to 1.8
Impact	One second	2.0

Source: Based on NDS•2.3.2 and NDS•Appendix B (AF&PA, 1997).

Notes:

[1]The NDS uses a live load duration of ten years (C_D = 1.0). The factor of 1.25 is consistent with the time effect factor for live load used in the new wood LRFD provisions (AF&AP, 1996a).

[2]The NDS uses a snow load duration of one month (C_D = 1.15). The factor of 1.25 is consistent with the time effect factor for snow load used in the new wood LRFD provisions (AF&PA, 1996a).

[3]The NDS uses a wind and seismic load duration of ten minutes (C_D = 1.6). The factor may be as high as 1.8 for earthquake loads which generally have a duration of less than 1 minute with a much shorter duration for ground motions in the design level range.

Withdrawal:

Tables 3 and 4 present average ultimate withdrawal loads for wood and sheet metal screws in plywood-and-metal joints, based on analysis of test results. Wood screws are threaded for only 2/3 of their length. Sheet metal screws typically have higher ultimate load than wood screws in the smaller gages because of their full-length thread.

Values shown in Table 3 for wood screws are based on 1/4-inch protrusion of the wood screw from the back of the panel. This was to assure measurable length of thread embedment in the wood, since the tip of the tapered wood screw may be smaller than the pilot hole. This was not a factor for sheet metal screws due to their uniform shank diameters.

TABLE 3

WOOD AND SHEET METAL SCREWS: METAL-TO-PLYWOOD CONNECTIONS[a,b]

Depth of Threaded Penetration (inch)	Average Ultimate Withdrawal Load (lbf) Screw Size #6	#8	#10	#12	#14	#16
3/8	150	180	205	–	–	–
1/2	200	240	275	315	350	–
5/8	250	295	345	390	440	–
3/4	300	355	415	470	525	–
1	–	–	–	625	700	775
1-1/8	–	–	–	705	790	875
2-1/4	–	–	–	–	1580	–

(a) Plywood was C-D grade with exterior glue (all plies Group 1).

(b) Values are **not** design values.

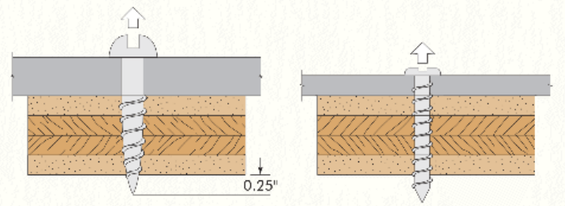


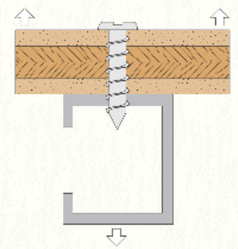
TABLE 4

SHEET METAL SCREWS: PLYWOOD-TO-METAL CONNECTIONS[a]

Framing	Plywood Performance Category	Average Ultimate Withdrawal Load (lbf)[b] Screw Size #8	#10	#12	#14	1/4"-20 Self Tapping Screw
0.080-inch Aluminum	1/4	130	150	170	180	220
	1/2	350	470	500	520	500
	3/4	660	680	790	850*	790*
0.078-inch Galvanized Steel (14 gage)	1/4	130	150	170	180	220
	1/2	350	470	500	520	500
	3/4	660	680	800	900	850

(a) Plywood was A-C EXT (all plies Group 1).

(b) Values are **not** design values. Loads denoted by an asterisk(*) were limited by screw-to-metal-framing strength; others were limited by plywood strength.



MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION
	FLORIDA STATE ENERGY	ECUIP ENGINEERING		04.23.25	BF	1	INITIAL DESIGN
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	6901 TPC DRIVE STE 650, ORLANDO, FL 32822	1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605				
PROJECT ID: 4212025-9607	(407) 718-9980						

D6

PAPER: ARCHB

SCALE:

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS

PEGASUS SOLAR™
A Better Day on the Job

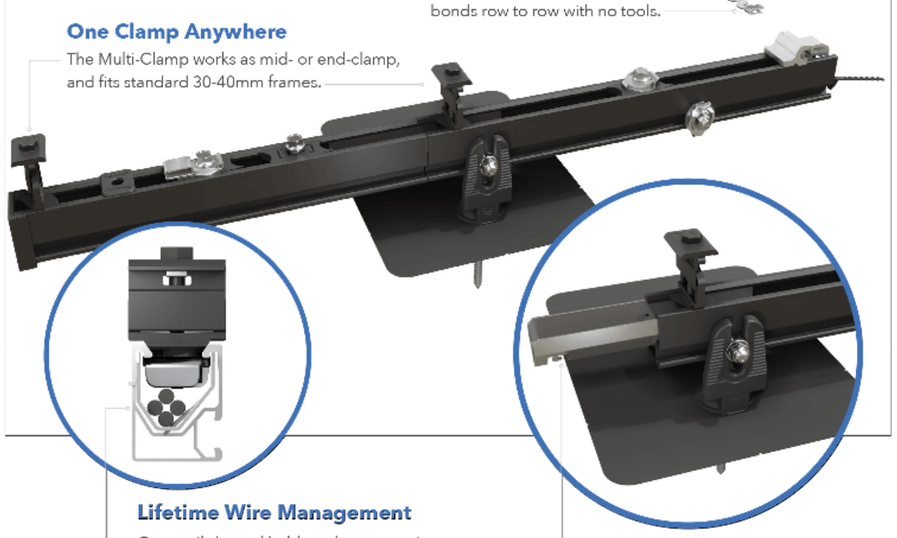
RAIL SYSTEM

Instant Bonding

The N-S Bonding Jumper bonds row to row with no tools.

One Clamp Anywhere

The Multi-Clamp works as mid- or end-clamp, and fits standard 30-40mm frames.



Lifetime Wire Management

Open rail channel holds and protects wires. Clamps won't pinch wires after tightening.

Bonding Structural Splice

Connect rails instantly, without tools, interference or limitations.

Next-Level Solar Mounting

A complete system for hassle-free rooftop installation, from watertight mounts to lifetime wire management.

Simplicity
1/2"socket for everything. One clamp for mid or end. No tool splicing and bonding. Easy wire management.

Code Compliant
UL 2703 listed
LTR-AE-001-2012 listed
Class A fire rating for any slope
ASCE 7-16 PE Certified

Premium Aesthetics
The narrowest panel gap available. Optional Hidden End Clamps and End Caps provide a flush look on the edge of the array.

Watertight for Life
Secured on industry-leading Pegasus Mounts, for composite shingle and tile roofs. Backed by a 25-year warranty.

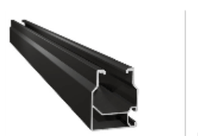
Pegasus Solar Inc | 506 West Ohio Avenue, Richmond, CA 94804 | T: 510.210.3797 | **www.pegasussolar.com**

PEGASUS SOLAR™

RAIL SYSTEM

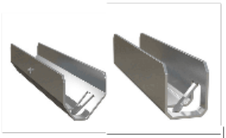
Pegasus Rail

Available in 14' and 7' lengths for easy layout and shipping.
Open-channel design holds MC4 connectors, PV wire and trunk cables.
Black and Mill finish



Pegasus Max Rail

Maximum-strength design.
Meets specifications for high snow-load and hurricane zones.
Black and Mill finish



Splice and Max Splice

Installs by hand.
Works over mounts.
Structurally connects and bonds rails automatically; UL2703 listed as reusable.

Dovetail T-bolt

Dovetail shape for extra strength.
Uses ½" socket.

Multi-Clamp

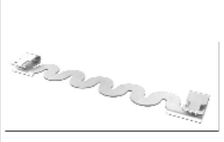
Fits 30-40mm PV frames, as mid- or end-clamp.
Twist-locks into position; doesn't pinch wires in rail.
Bonds modules to rail; UL2703 listed as reusable

Hidden End Clamp

Offers premium edge appearance.
Preinstalled pull-tab grips rail edge, allowing easy, one-hand installation.
Tucks away for reuse.

Ground Lug

Holds 6 or 8 AWG wire.
Mounts on top or side of rail.
Assembled on MLPE Mount.
UL2703 listed as reusable.



N-S Bonding Jumper

Installs by hand, eliminates row-to-row copper wire.
UL2703 listed as reusable only with Pegasus Rail.

MLPE Mount

Secures and bonds most micro-inverters and optimizers to rail.
Connectors and wires easily route underneath after installation.
UL2703 listed as reusable.

Cable Grip

Secures four PV wires or two trunk cables.
Stainless-steel backing provides durable grip.
Eliminates sagging wires.

Wire Clip

Hand operable.
Holds wires in channel.
Won't slip.

End Cap and Max End Cap

Fits flush to PV module and hides raw or angled cuts.
Hidden drain quickly clears water from rail.

Certifications:
- UL 2703, Edition 1
- LTR-AE-001-2012
- ASCE 7-16 PE certified
- Class A fire rating for any slope roof

FREE
PEGASUS SOLAR
Design Tool

Quickly calculate the most efficient layout, spans and materials needed to suit your job. Visit the Pegasus Customer Portal. **pegassolar.com/portal**

LOAD		SPAN			
SNOW (PSF)	WIND (MPH)	32"	4'	6'	8'
0	120				
	160				
	190				
15	140				
	160				
	190				
30	160				
	190				
45	190				
70	190				
110	190				

PEGASUS RAIL PEGASUS MAX RAIL

For reference only. Spans above are calculated using ASCE 7-16 for a Gable Roof, Exposure Category B, 7-20deg roof angle, 30ft mean roof height with non-exposed modules. For PE certified span tables, visit www.pegasussolar.com/spans.

Patents pending. All rights reserved. ©2021 Pegasus Solar Inc.

Pegasus Solar Inc | 506 West Ohio Avenue, Richmond, CA 94804 | T: 510.210.3797 | **www.pegasussolar.com**

MOCK MELVIN E JR	CONTRACTOR: -	ENGINEER: CA33343	Ryan S Gittens 2025.04.23 14:20:07 -04'00'	DATE	BY	VER	DESCRIPTION
9607 U.S. 27 FORT WHITE FLORIDA 32038 UNITED STATES	FLORIDA STATE ENERGY 6901 TPC DRIVE STE 650, ORLANDO, FL 32822 (407) 718-9980	ECUIP ENGINEERING 1646 W SNOW AVE 9 TAMPA, FL 33606	RYAN S GITTENS PE90605	04.23.25	BF	1	INITIAL DESIGN
PROJECT ID: 4212025-9607							

D7

PAPER: ARCHB

SCALE:

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS