

ANGELA STEPHAN

198 SW GRASSY LN FORT WHITE, FL 32038

10.125 kWDC-MODULES
15.2 kWAC-INVERTER
8.60 kWDC GROSS POWER RATING-GPR

SOLAR CONTRACTOR:
SOLAR IMPACT, INC
4509 NW 23RD AVE., SUITE 20
GAINESVILLE, FL 32606
352.338.8221
WWW.SOLARIMPACT.COM

SOLAR CONTRACTOR LICENSE:
CVC56761
EC13012442

PROJECT MANAGER:
DILLON ESTES

PROJECT DESIGNER:
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ENGINEER OF RECORD:
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CLIENT:
ANGELA STEPHAN

GENERAL CONTRACTOR:
N/A

AUTHORITY HAVING JURISDICTION:
COLUMBIA COUNTY BUILDING DEPARTMENT

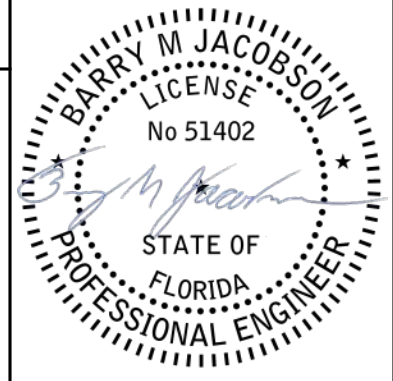
UTILITY:
CLAY ELECTRIC CO-OP



Designed By:

solar impact

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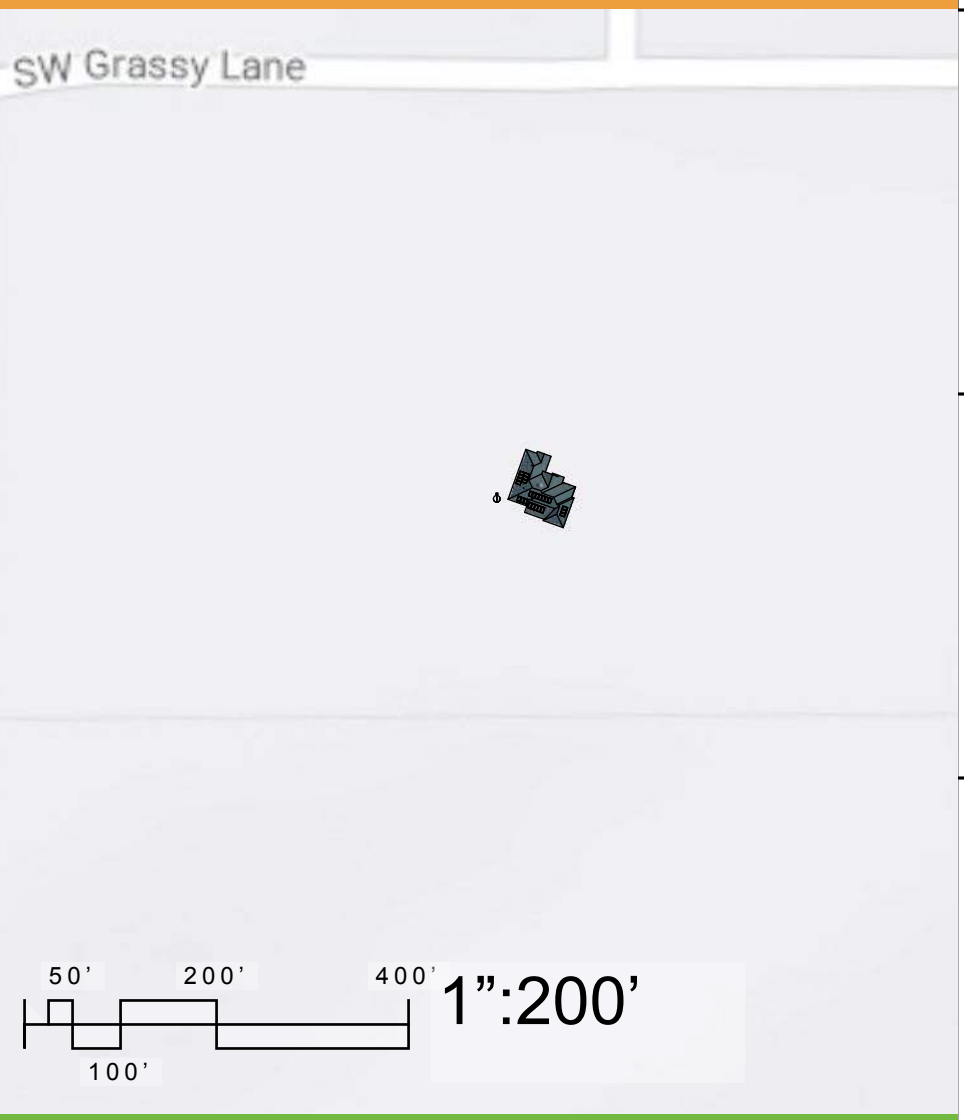
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PARTICIPANTS

THE PROJECT CONSISTS OF 25X Q.CELLS 405W MODULES, 2X TESLA PW+, AND IRONRIDGE RACKING. THE MODULES WILL BE MOUNTED ON THE SOUTHWEST, SOUTHEAST AND NORTHWEST FACE OF THE BUILDING IN THE SAME PLANE AS THE ROOF WITH SLOPES OF 7:12 AND 4:12 AND AZIMUTHS OF 110°, 200°, 290°. THE SYSTEM, TO INCLUDE MODULES, RACKING, AND ROOF MOUNTED CONDUIT WILL BE MECHANICALLY FASTENED TO THE ROOF USING IRONRIDGE FLASHFOOT2 ATTACHMENTS.

- G01: GENERAL NOTES
- A01: EQUIP. LOCATIONS
- A02: ELECTRICAL RISER
- A03: FIRE SAFETY
- E01: LINE DIAGRAM
- E02: PLACARDS
- E03: ELECTRICAL CALCS
- E04: MODULE DATA
- E05: RSD DATA
- E06: INVERTER DATA
- S01: ROOF ZONES
- S02: ROOF CALCS
- S03: ATTACHMENT DATA

- 2020 7TH EDITION FLORIDA BUILDING CODE : BUILDING
- 2020 7TH EDITION FLORIDA BUILDING CODE : RESIDENTIAL
- 2020 7TH EDITION FLORIDA BUILDING CODE : MECHANICAL
- 2020 7TH EDITION FLORIDA BUILDING CODE : PLUMBING
- 2020 7TH EDITION FLORIDA BUILDING CODE : FUEL GAS
- 2020 7TH EDITION FLORIDA BUILDING CODE : ENERGY CONSERVATION
- 2020 7TH EDITION FLORIDA BUILDING CODE : EXISTING BUILDING
- 2020 7TH EDITION FLORIDA BUILDING CODE : ACCESSIBILITY
- 2020 7TH EDITION FLORIDA FIRE PREVENTION CODE (NFPA)
- 2017 NATIONAL ELECTRIC CODE (NEC)



DOCUMENTS SIZED FOR 11" X17" PAPER







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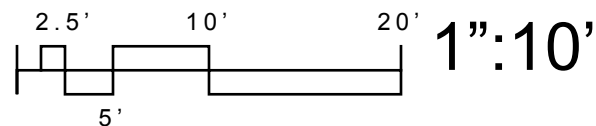
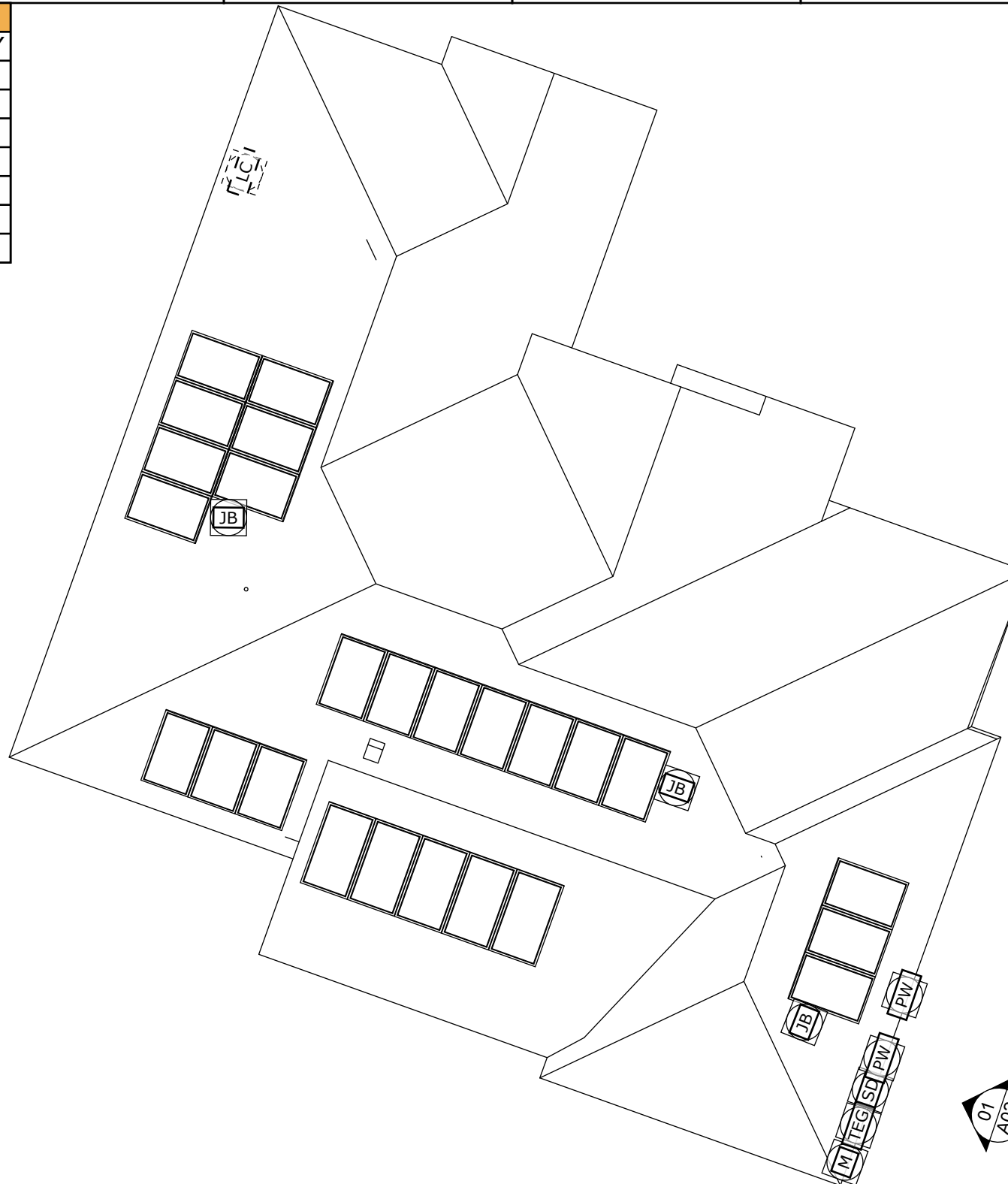
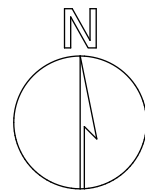
Project Name:
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FORT WHITE, FL
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PAGE TITLE: GENERAL NOTES
PAGE #: G01

SYSTEM SUMMARY		
ITEM	DETAIL	QUANTITY
AC:	KW-AC	15.2
DC:	KW-DC	10.125
MODULES:	HANWAH Q.CELLS Q.PEAK DUO ML-G10.3+ (405W)	25
RSD:	TESLA SOLAR SHUTDOWN DEVICE	10
INVERTER(S):	TESLA POWERWALL+	2
TILT:	31°, 16.3°	-
AZIMUTH:	110°, 200°, 290°	-

-  METER MAIN COMBO
-  SUBPANEL
-  SOLAR DISCONNECT
-  JUNCTION BOX
-  TESLA ENERGY GATEWAY
-  POWERWALL+

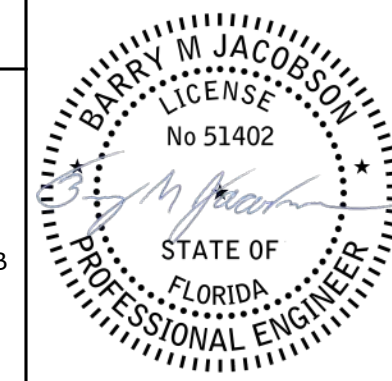


01 - EQUIPMENT LOCATIONS

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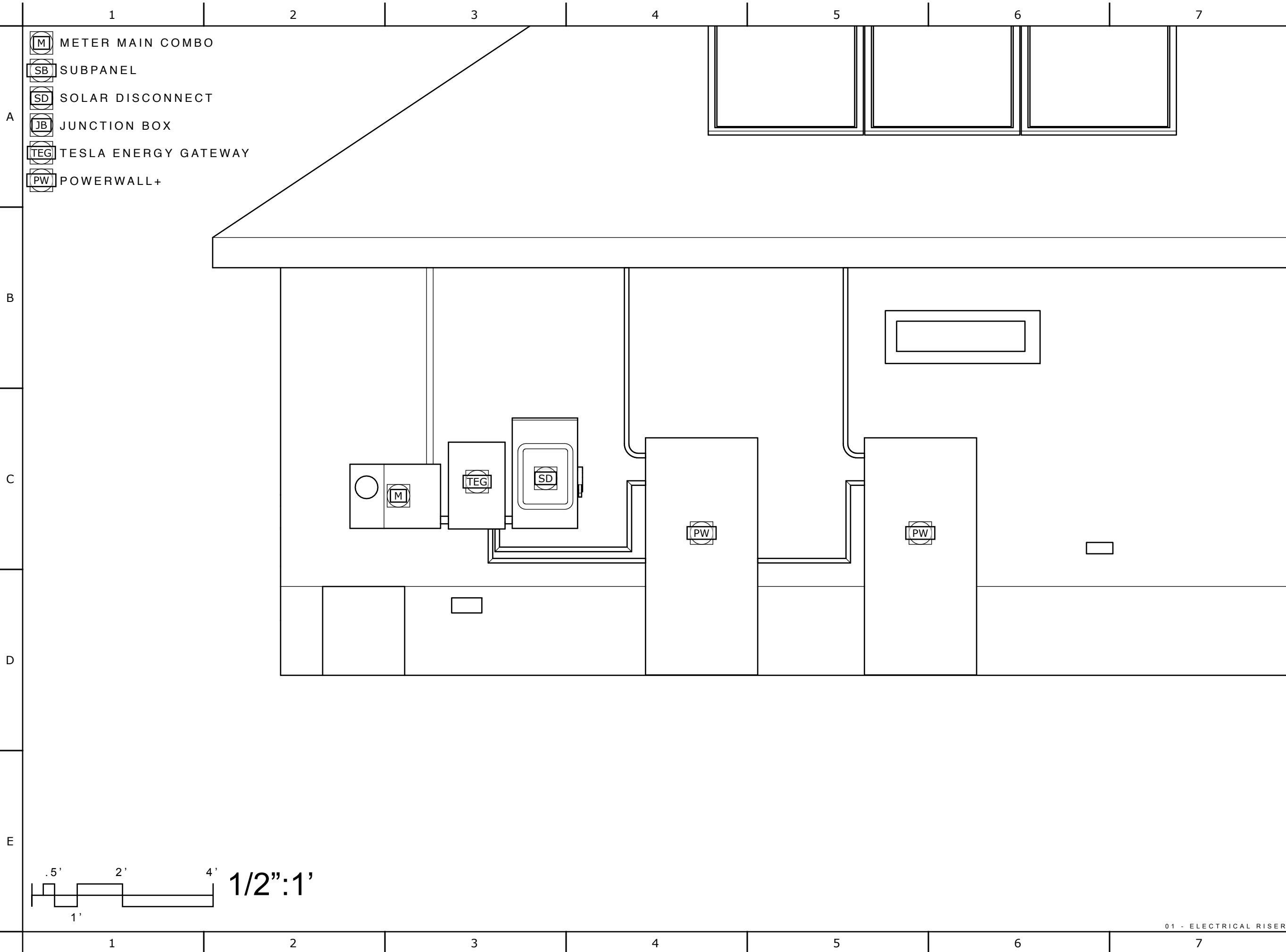
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PAGE TITLE: EQUIPMENT LOCATIONS PAGE #: A01

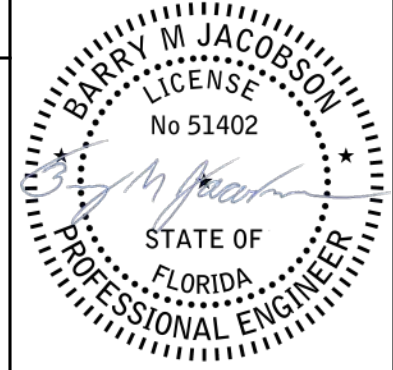


- M METER MAIN COMBO
- SB SUBPANEL
- SD SOLAR DISCONNECT
- JB JUNCTION BOX
- TEG TESLA ENERGY GATEWAY
- PW POWERWALL+

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PAGE TITLE: ELECTRICAL RISER

PAGE #: **A02**

ROOF INFORMATION		
	QUANTITY	UNITS
ARRAY AREA	525	SF
ROOF AREA	4101	SF
PERCENT COVERED	13%	-

LEGEND

WALKWAY 

2020 FBC - RESIDENTIAL, 7TH EDITION

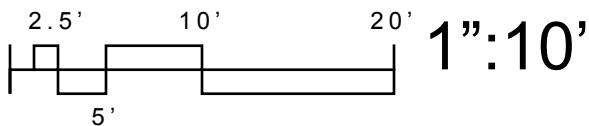
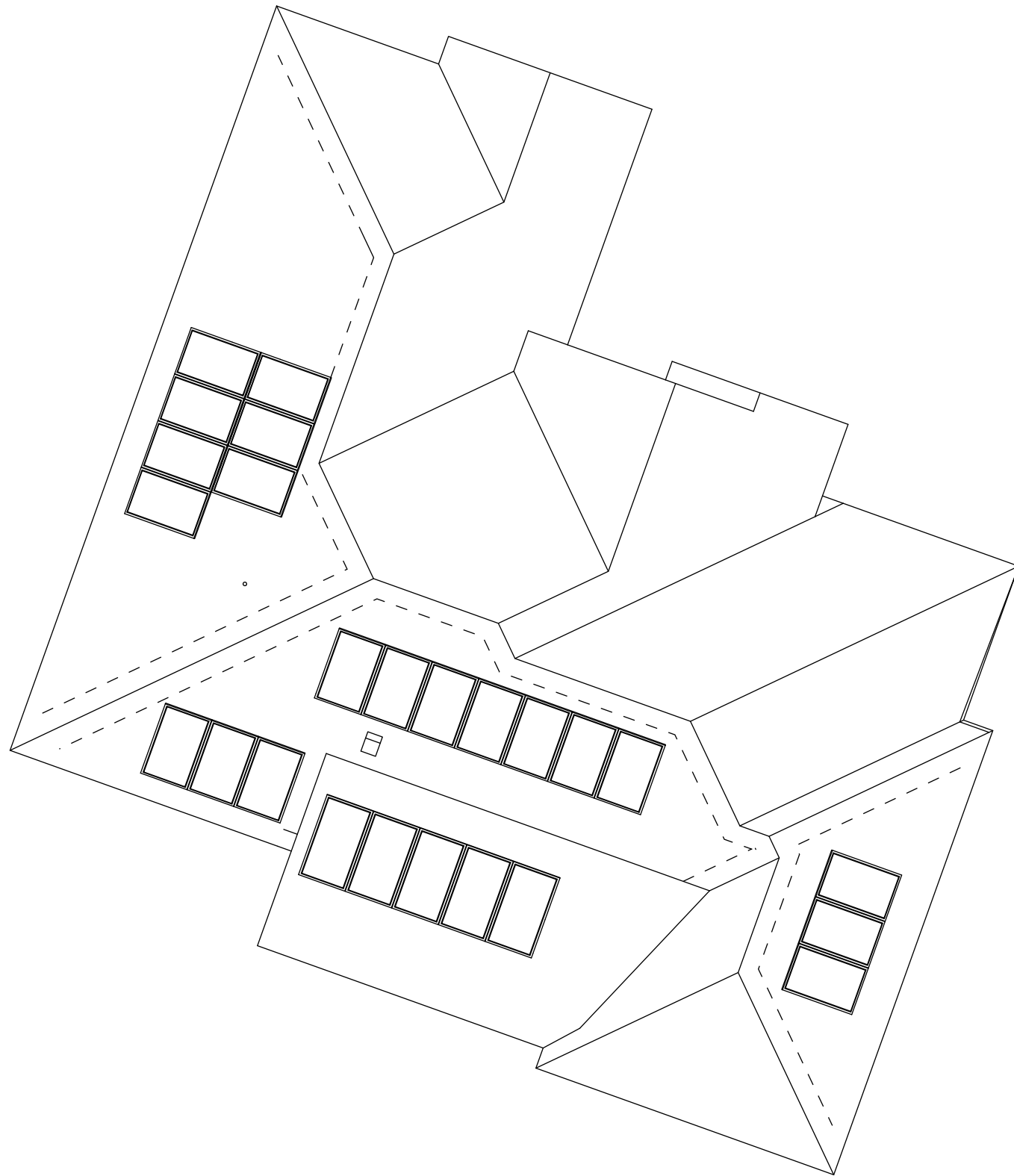
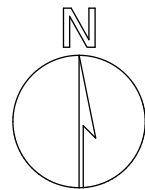
R324.6.1 Pathways

Not fewer than two pathways, on separate roof planes from lowest roof edge to ridge and not less than **36 inches** (914 mm) wide, shall be provided on all buildings. Not fewer than one pathway shall be provided on the street or driveway side of the roof. For each roof plane with a photovoltaic array, a pathway not less than 36 inches wide (914 mm) shall be provided from the lowest roof edge to ridge on the same roof plane as the photovoltaic array, on an adjacent roof plane, or straddling the same and adjacent roof planes. Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be located in areas with minimal obstructions such as vent pipes, conduit or mechanical equipment.

R324.6.2 Setback at Ridge

For photovoltaic arrays occupying not more than **33 percent** of the plan view total roof area, not less than an **18-inch** (457 mm) clear setback is required on both sides of a horizontal ridge. For photovoltaic arrays occupying more than 33 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.

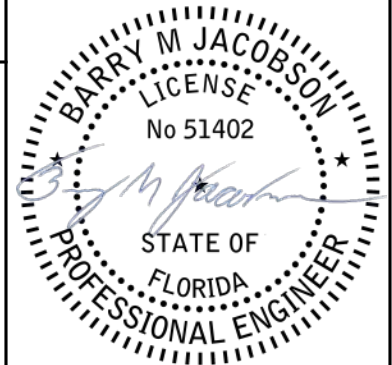
This roof has been evaluated and deemed sufficient to support the added load.



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PAGE TITLE: FIRE SAFETY	PAGE #: A03
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EQUIPMENT SCHEDULE	
TYPE	DESCRIPTION
TRANSFORMER	UTILITY TRANSFORMER, 120/240, 1Ø, 3W
METER	METER MAIN COMBO, 120/240, 1Ø, 3W
ATS	TESLA GATEWAY
SUBPANEL	200A, 120/240, 1Ø, 3W (200A MAIN BREAKER)
SOLAR DISCONNECT	FUSED DISCONNECT, 100A, 120/240, 1Ø, 3W (100A FUSES)
SOLAR INVERTER	TESLA POWERWALL+
JUNCTION BOX	SOLADECK, 600V NEMA 3R
RSD	TESLA SOLAR SHUTDOWN DEVICE
MODULE	HANWAH Q.CELLS Q.PEAK DUO BLK G10+ (405W)

CONDUCTOR SIZES	
(A)	(1 Sets) 2X #2/0 CU + 1X #2/0 CU NEUTRAL + 1X #6 CU GRD IN 2" C.
(B)	(1 Sets) 4X #3 CU + 1X #8 CU GRD IN 2" C.
(C)	(1 Sets) 2X #8 CU + 1X #8 CU NEUTRAL + 1X #10 CU GRD IN 1" C.
(D)	(1 Sets) 4X #10 CU + 1X #10 CU GRD IN 0.75" C.
(E)	(1 Sets) 2X #10 CU PV WIRE + 1X #4 CU SOLID GRD

FIELD APPLIED PLACARDS

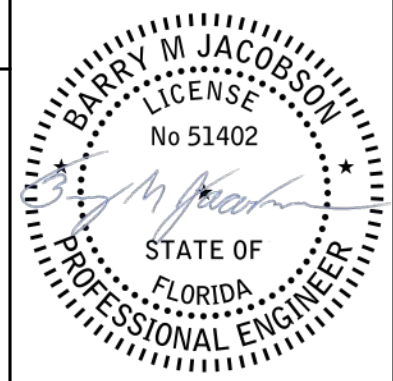
1 SEE PLACARDS PAGE FOR DETAILS

*Note: NEC 705.95(B) says "Neutral Conductor for Instrumentation, Voltage Detection or Phase Detection. A conductor used solely for instrumentation, voltage detection, or phase detection and connected to a single-phase or 3-phase utility-interactive inverter, shall be permitted to be sized at less than the ampacity of the other current-carrying conductors and shall be sized equal to or larger than the equipment grounding conductor."

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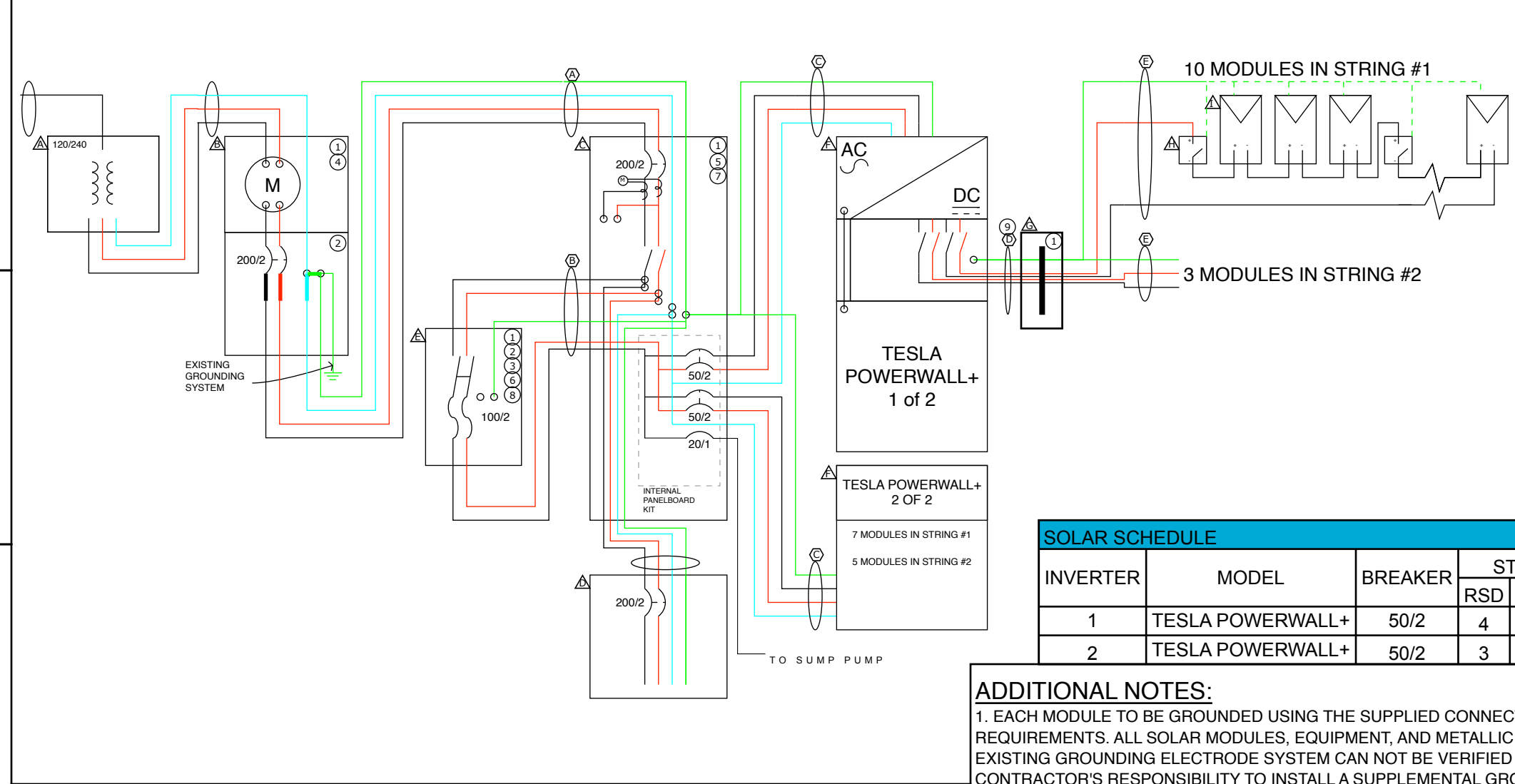
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SOLAR SCHEDULE								
INVERTER	MODEL	BREAKER	STRING 1		STRING 2		STRING 3	
			RSD	MODULES	RSD	MODULES	RSD	MODULES
1	TESLA POWERWALL+	50/2	4	10	1	3	0	0
2	TESLA POWERWALL+	50/2	3	7	2	5	0	0

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

ADDITIONAL NOTES:

1. EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER MANUFACTURER'S REQUIREMENTS. ALL SOLAR MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CAN NOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
2. ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF NATIONAL ELECTRICAL CODE. LABEL SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED IN A CONTRASTING COLOR TO THE PLAQUE. PLAQUE SHALL BE UV RESISTANT IF EXPOSED TO SUNLIGHT.
3. DC CONDUCTORS SHALL BE RUN IN EMT AND SHALL BE LABELED, "CAUTION DC CIRCUIT" OR EQUIV. EVERY 5 FT.
4. EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 250.136(A).
5. CONFIRM LINE SIDE VOLTAGE AT ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.
6. OUTDOOR EQUIPMENT SHALL BE NEMA-3R RATED OR BETTER.
7. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
8. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE. NEC 110.2 - 110.4 / 300.4

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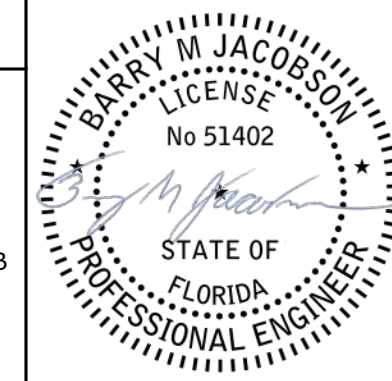
PAGE TITLE: **LINE DIAGRAM**

PAGE #: **E01**

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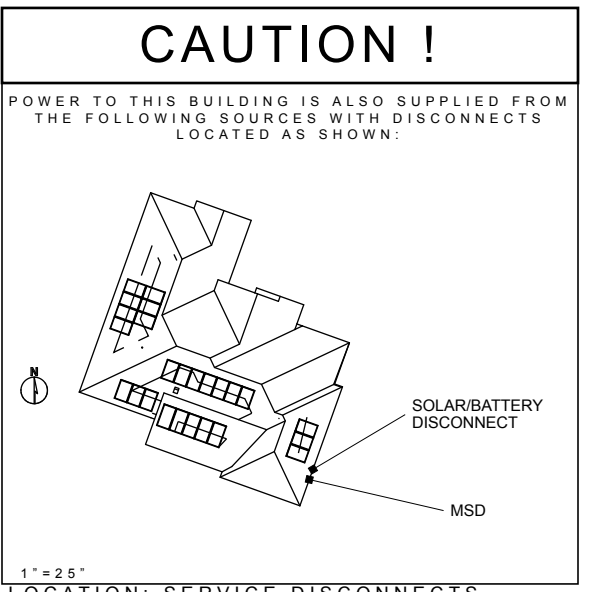
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PAGE TITLE: **PLACARDS**

PAGE #: **E02**

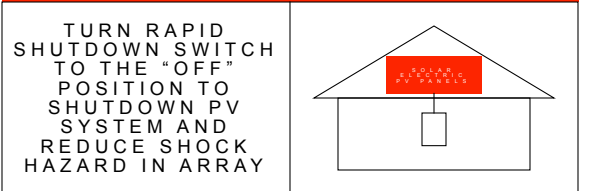
⚠ WARNING
ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LOCATION: METER, MSD, BREAKER PANEL, AC DISCONNECT, ROOF MOUNTED JUNCTION BOX
REF: NEC 706.15 (C)(4) & 690.13(B)



LOCATION: SERVICE DISCONNECTS
REF: 690.10, 690.56(B)
QTY: 2

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN



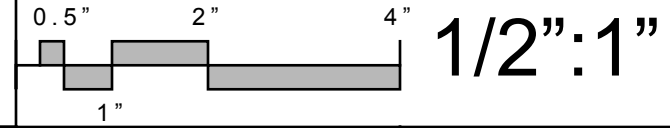
LOCATION: AC & DC DISCONNECTS, POINT OF INTERCONNECTION
REF: NEC 605.11.3.1(1) & 690.56(C)(1)(a)
QTY: 1

⚠ WARNING: DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LOCATION: MAIN SERVICE PANEL & NET METER
REF: NEC 690.31(I)

WARNING: POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LOCATION: PV BREAKER ON LOADCENTER
REF: 705.12(B)(2)(c)



⑥ ENERGY STORAGE SYSTEM DISCONNECT

LOCATION: BATTERY DISCONNECT
REF: NEC 706.15(C)

⑦ PCS CONTROLLED CURRENT SETTING 200 A

THE MAXIMUM OUTPUT CURRENT FROM THIS SYSTEM TOWARDS THE MAIN PANEL IS CONTROLLED ELECTRONICALLY. REFER TO MANUFACTURERS INSTRUCTIONS FOR MORE INFORMATION.

LOCATION: TESLA ENERGY GATEWAY
REF: TESLA INSTALLATION MANUAL

⑧ PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT: 80 A
NOMINAL OPERATING AC VOLTAGE: 240V

LOCATION: TESLA SOLAR INVERTER AC DISCONNECT
REF: 690.54

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT: 40 A
NOMINAL OPERATING AC VOLTAGE: 240V

LOCATION: TESLA POWERWALL +
REF: 690.54

PHOTOVOLTAIC

DC DISCONNECT

LOCATION: DC DISCONNECT
REF: 690.13(B)

RATED MAXIMUM POWER-POINT CURRENT (I _{mp})	13	A
RATED MAXIMUM POWER-POINT VOLTAGE (V _{mp})	480	V
MAXIMUM SYSTEM VOLTAGE (V _{oc})	600	V
MAXIMUM CIRCUIT CURRENT (I _{sc})	15	A

LOCATION: TESLA INVERTERS
REF: NEC 690.53

⑨ SOLAR PV DC CIRCUIT

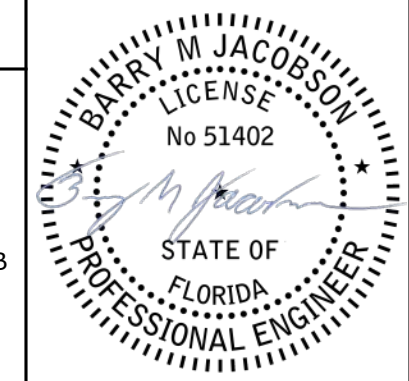
LOCATION: DC CONDUIT EVERY 10' O.C.
REF: 690.31(G)(3)(4)

1	2	3	4	5	6	7
LOCATION INFORMATION			CONDUCTOR, CONDUIT, & OCD SIZES 310.10(H)			
Location	Gainesville AP	Conductor ID in Online	B	C	D	E
Temp, Ambient High (ASHRAE 2%)	34.0 C	Current-carrying Conductor	#3	#8	#10	#10
Temp, Ambient Low (ASHRAE Extreme)	-5.0 C	Insulation Type	THWN2	THWN2	THWN2	THWN2
Temp, Module Test	25.0 C	Side of Service	Load	Load	Load	Load
Temp, Delta Low	-30.0 C	Insulation Temp Rating	90 C	90 C	90 C	90 C
Temp, Below Ground	25.0 C	Conductor Material	Copper	Copper	Copper	Copper
MODULE SPECIFICATIONS AND CALCULATIONS			CURRENT SOURCE			
ITEM	MODULE 1	Current Type	AC	AC	DC	DC
Module Manufacturer	Q Cells	Current Source	Inverters	Inverter 1	Module 1	Module 1
Module Model	Q.PEAK DUO ML-G10+ 405	Parallel Sources Combined	Not Combined	Not Combined	Not Combined	Not Combined
Module Power STC	405 W	# Parallel Sources	2	1	2	1
Module Operating Volt	37.85 VDC	# Sets of Conductors	2	1	2	1
Module Open-circuit Volt	45.09 VDC	# Conduits	1	1	1	1
Module Coeff Volt/Temp	-0.27 %/C	# Sets Conductors per OCD	1	1	1	1
Module Max Volt (Voc*(1+Td*VTCoeff))	48.74 VDC	# Conductors per Conduit	5	4	5	#N/A
Module Operating Current	10.7 A	# Current-Carrying Conductors per Conduit	4	2	4	2
Module Short-Circuit Current	11.19 A	# Grounds per Conduit	1	1	1	1
Module Max-Current (Isc*125%)	13.98 A	# Neutrals per Conduit	0	1	0	0
INVERTER SPECIFICATIONS AND CALCULATIONS			CONDITIONS OF USE CALCULATION 310.15 690.8(B)(2)(b)			
ITEM	INVERTER 1	Source Maximum Current	80.0 A	40.0 A	13.9 A	13.9 A
Inverter Make	Tesla	Conductor Maximum Current	80.0 A	40.0 A	13.9 A	13.9 A
Inverter Model	Powerwall+	TERMINAL CALCULATION 110.14 310.15 690.8(B)(2)(a)				
Inverter Qty	2	Terminal Temp Rating	75 C	75 C	75 C	75 C
Inverter Power	7,680 W	Conductor Ampacity at terminals	100.0 A	50.0 A	30.0 A	30.0 A
Inverter Input Voltage, Max DC	600 VDC	Min Ampacity required >= I _{max} conductor*1.25 690.8(B)(1)	100.0 A	50.0 A	17.4 A	17.4 A
Inverter Input Voltage, Nominal DC	60-550	Conductor Ampacity, with derates and 240.4(D)	110.4 A	52.8 A	30 A	30 A
Inverter Output Voltage, AC	240 VAC	Min Ampacity required >= I _{max} conductor 690.8(B)(2)	80.0 A	40.0 A	13.9 A	13.9 A
Inverter Input Current, Max DC	13.0 ADC	OVER-CURRENT 690.8, 690.9, 240.4B				
Inverter Output Current, AC	40.0 AAC	# of Parallel Sources per OCD	1	1	1	1
Inverter Output Frequency	60 Hz	Min Ampacity required >= # parallel sources*I _{max} source x 1.25	100.0 A	50.0 A	17.4 A	17.4 A
Inverter Phase Qty	1 Phase	Over-current Device	100.0 A	50.0 A	#N/A	#N/A
Inverter UL Listing	UL1741	CONDUIT ANNEX C, CHAPTER 9 TABLE 1, 376.22				
Inverter Grounding	Ungrounded	Conduit Type	EMT	EMT	EMT	Free Air
Modules in Series	10	Nipple (less than or equal to 24-inches)	Nipple	Not Nipple	Not Nipple	Not Nipple
VOLTAGE DROP (WORST CASE), CHAPTER 9, TABLES 8 & 9						
		Conductor Length One-Way	4'	15'	50'	30'
		Power Factor	1	1	#N/A	#N/A
		Resistance	0.25 ohm/kft	0.78 ohm/kft	1.24 ohm/kft	1.24 ohm/kft
		Reactance	0.059 ohm/kft	0.065 ohm/kft	#N/A	#N/A
		Impedance	0.25 ohm/kft	0.78 ohm/kft	#N/A	#N/A
		Source Operating Current	80.0 A	40.0 A	10.7 A	10.7 A
		Conductor Operating Current,	80.0 A	40.0 A	10.7 A	10.7 A
		Nominal Operating Voltage	240.0 V	240.0 V	369.3 V	369.3 V
		Voltage Drop, total	0.16 V	0.93 V	1.32 V	0.79 V
		Voltage Drop, percentage	0.06%	0.39%	0.35%	0.21%

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REV#	DATE	REVISION NOTES

Project Name: **ANGELA STEPHAN**
Project Address: **198 SW GRASSY LN
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Q.PEAK DUO ML-G10+ 395-415

ENDURING HIGH PERFORMANCE



BREAKING THE 20% EFFICIENCY BARRIER
Q ANTIM DUO Z Technology with zero gap cell layout boosts module efficiency up to 21.4%.



THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY
Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry. The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.



INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behavior.



ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID Technology, Anti PID Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™



EXTREME WEATHER RATING
High-tech aluminum alloy frame, certified for high snow (5400Pa) and wind loads (4000Pa)



A RELIABLE INVESTMENT
Inclusive 25-year product warranty and 25-year linear performance warranty².

¹ APT test conditions according to IEC/TS 62804-1:2015, method A (-2500 V, 96h)
² See data sheet on rear for further information.



THE IDEAL SOLUTION FOR:



Roof-top arrays on residential buildings

Engineered in Germany

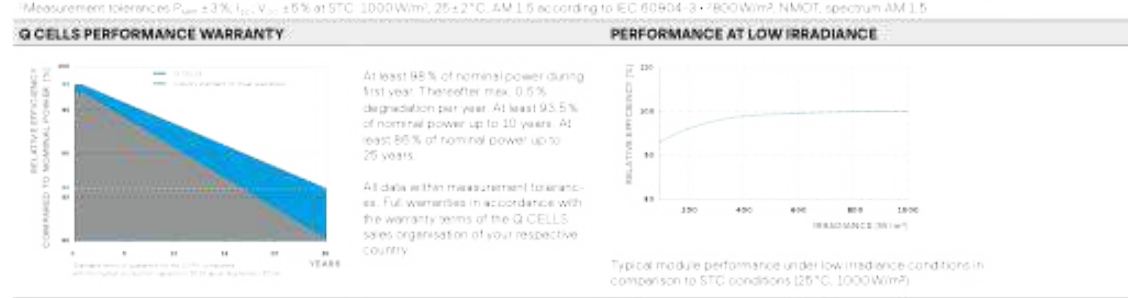


MECHANICAL SPECIFICATION

Format	74.0in x 41.1in x 1.26in (including frame) (1879mm x 1045mm x 32mm)
Weight	48.5lbs (22.0kg)
Front Cover	0.13in (3.2mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 x 22 monocrystalline Q ANTIM solar half cells
Junction Box	2.09-3.98in x 1.26-2.36in x 0.59-0.71in (53-101mm x 32-60mm x 15-18mm), IP67, with bypass diodes
Cable	4mm ² Solar cable (+) ≥ 49.2in (1250mm), (-) ≥ 49.2in (1250mm)
Connector	Stäubli MC4, IP68

ELECTRICAL CHARACTERISTICS

POWER CLASS		395	400	405	410	415
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5W / -0W)						
Power at MPP ¹	P _{MPP} [W]	395	400	405	410	415
Short Circuit Current ¹	I _{SC} [A]	11.13	11.16	11.19	11.22	11.26
Open Circuit Voltage ¹	V _{OC} [V]	45.03	45.06	45.08	45.13	45.16
Current at MPP	I _{MPP} [A]	10.58	10.64	10.70	10.76	10.82
Voltage at MPP	V _{MPP} [V]	37.32	37.59	37.85	38.11	38.37
Efficiency ¹	η [%]	≥ 20.1	≥ 20.4	≥ 20.6	≥ 20.9	≥ 21.1
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT ²						
Power at MPP	P _{MPP} [W]	298.4	300.1	303.9	307.6	311.4
Short Circuit Current	I _{SC} [A]	8.97	8.99	9.02	9.04	9.07
Open Circuit Voltage	V _{OC} [V]	42.46	42.49	42.52	42.56	42.59
Current at MPP	I _{MPP} [A]	8.33	8.38	8.43	8.48	8.53
Voltage at MPP	V _{MPP} [V]	35.59	35.82	36.04	36.27	36.49



TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α [%/K]	+0.04	Temperature Coefficient of V _{OC}	β [%/K]	-0.27
Temperature Coefficient of P _{MPP}	γ [%/K]	-0.34	Nominal Module Operating Temperature - NMOT [°C]		109 ± 5.4 (43 ± 3°C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V _{DC} [V]	1000 (IEC) / 1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating [A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push/Pull ¹ [lbs/ft ²]	75 (3600Pa) / 55 (2600Pa)	Permitted Module Temperature on Continuous Duty	-40°F up to +185°F (-40°C up to +85°C)
Max. Test Load, Push/Pull ¹ [lbs/ft ²]	113 (5400Pa) / 84 (4000Pa)		

¹ See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 9170, CE compliant, Quality Controlled PV - TÜV Rheinland, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (zero cells), ISO 9001 Certification ongoing

PACKAGING INFORMATION

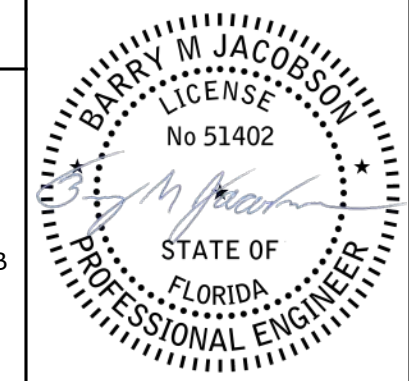
Horizontal packaging	75.4in / 1940mm	43.3in / 1100mm	48.0in / 1220mm	1656 lbs / 751kg	24 pallets	24 pallets	32 modules
----------------------	-----------------	-----------------	-----------------	------------------	------------	------------	------------

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL: +1 949 748 59 99 | EMAIL: inquiry@us.q-cells.com | WEB: www.q-cells.us

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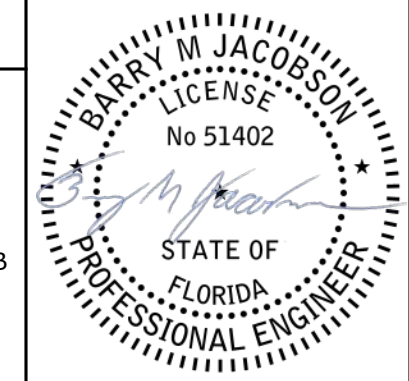
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PAGE TITLE:	PAGE #:
MODULE DATA	E04

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REV#	DATE	REVISION NOTES

Project Name:
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Project Address:
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PAGE TITLE: TESLA RSD / GATEWAY
PAGE #: E05

1 2 3 4 5 6 7

SOLAR SHUTDOWN DEVICE

The Tesla Solar Shutdown Device is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with Powerwall+, solar array shutdown is initiated by turning the Powerwall+ Enable switch off, or by pushing the System Shutdown Switch if one is present.



ELECTRICAL SPECIFICATIONS

Nominal Input DC Current Rating (I _{sc})	12 A
Maximum Input Short Circuit Current (I _{sc})	15 A
Maximum System Voltage	600 V DC

MECHANICAL SPECIFICATIONS

Electrical Connections	MC4 Connector
Housing	Plastic
Dimensions	125 mm x 150 mm x 22 mm (5 in x 6 in x 1 in)
Weight	350 g (0.77 lb)
Mounting Options	ZEP Home Run Clip M4 Screw (#10) MB Bolt (5/16") Nail / Wood screw

RSD MODULE PERFORMANCE

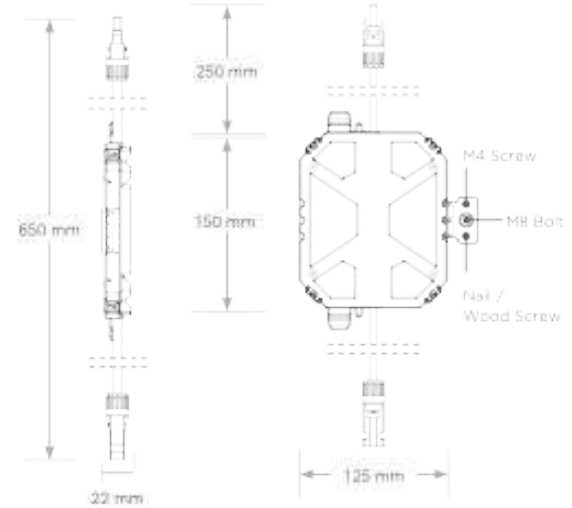
Maximum Number of Devices per String	5
Control	Power Line Excitation
Passive State	Normally open
Maximum Power Consumption	7 W
Warranty	25 years

COMPLIANCE INFORMATION

Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)
RSD Initiation Method	External System Shutdown Switch
Compatible Equipment	See Compatibility Table below

ENVIRONMENTAL SPECIFICATIONS

Ambient Temperature	-40°C to 50°C (-40°F to 122°F)
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Enclosure Rating	NEMA 4 / IP65



POWERWALL Backup Gateway 2

The Backup Gateway 2 for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup. The Backup Gateway 2 controls connection to the grid, automatically detecting outages and providing a seamless transition to backup power. When equipped with a main circuit breaker, the Backup Gateway 2 can be installed at the service entrance. When the optional internal panelboard is installed, the Backup Gateway 2 can also function as a load center. The Backup Gateway 2 communicates directly with Powerwall, allowing you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.



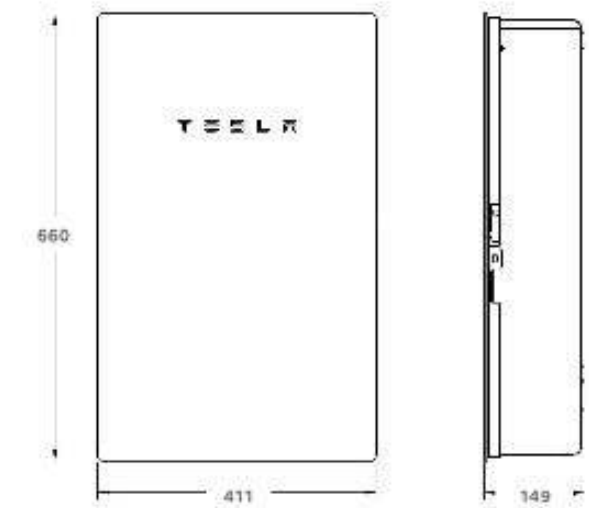
PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240V
Feed-in Type	Split Phase
Grid Frequency	60 Hz
Current Rating	200 A
Maximum Input Short Circuit Current	10 kA ¹
Overcurrent Protection Device	100-200A, Service Entrance Rated
Overvoltage Category	Category IV
AC Meter	Revenue accurate (+/- 0.2%)
Primary Connectivity	Ethernet, Wi-Fi
Secondary Connectivity	Cellular (3G, LTE/4G)
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, and backup
Backup Transition	Automatic disconnect for seamless backup
Modularity	Supports up to 10 AC-coupled Powerwalls
Optional Internal Panelboard	200A 8-space / 12 circuit Eaton BR Circuit Breakers
Warranty	10 years

¹When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes. ²The customer is expected to provide internet connectivity for Backup Gateway 2; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 149 mm (26 in x 16 in x 6 in)
Weight	20.4 kg (45 lb)
Mounting options	Wall mount, Semi-flush mount



COMPLIANCE INFORMATION

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS, CSA 22.2 0.19, CSA 22.2 205
Emissions	FCC Part 15, ICES 003

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	indoor and outdoor rated
Enclosure Type	NEMA 3R

UL 3741 PV HAZARD CONTROL (AND PVRSA) COMPATIBILITY

Tesla Solar Roof and Tesla/Zep ZS Arrays using the following modules are certified to UL 3741 and UL 1741 PVRSA when installed with the Powerwall+ and Solar Shutdown Devices. See the Powerwall+ Installation Manual for detailed instructions and for guidance on installing Powerwall+ and Solar Shutdown Devices with other modules.

Brand	Model	Required Solar Shutdown Devices
Tesla	Solar Roof V3	1 Solar Shutdown Device per 10 modules
Tesla	Tesla Txxx5 (where xxx = 405 to 450 W, increments of 5)	1 Solar Shutdown Device per 3 modules ¹
Hanwha	Q-PEAK DUO BLK-G5	1 Solar Shutdown Device per 3 modules
Hanwha	Q-PEAK DUO BLK-G6+	1 Solar Shutdown Device per 3 modules

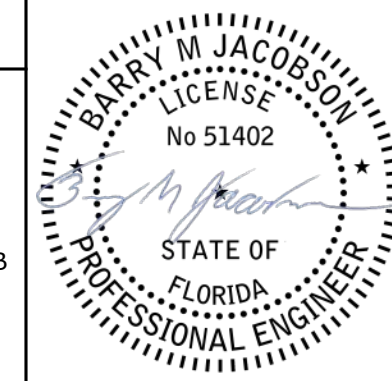
Exception: Tesla solar modules installed in locations where the max Voc for three modules at low design temperatures exceeds 185 V shall be limited to two modules between MCs.

1 2 3 4 5 6 7 01 - TESLA RSD / GATEWAY

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32038**

PAGE TITLE: **TESLA INVERTER**

PAGE #: **E06**



POWERWALL+

Powerwall+ is an integrated solar battery system that stores energy from solar production. Its integrated design and streamlined installation allow for simple connection to any home, and improved surge power capability brings whole home backup in a smaller package. Smart system controls enable owners to customize system behavior to suit their renewable energy needs.

KEY FEATURES

- Integrated battery, inverter, and system controller for a more compact install
- A suite of application modes, including self-powered, time-based control, and backup modes
- Wi-Fi, Ethernet, and LTE connectivity with easy over-the-air updates

NA 2021-09-08

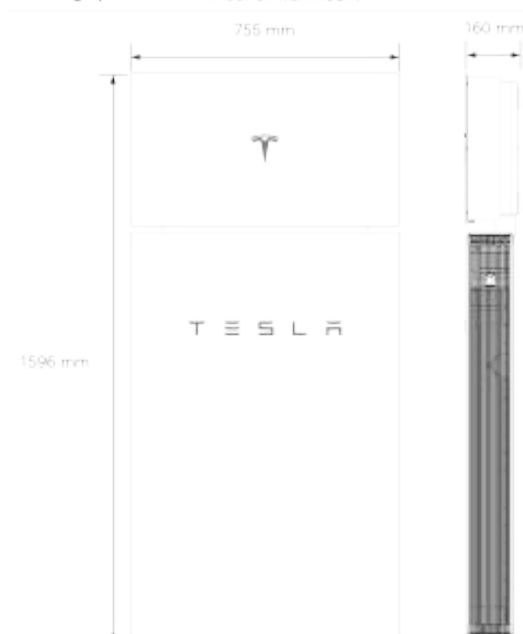
POWERWALL+

PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) SPECIFICATIONS

Model Number	1850000-xx-y
Nominal Battery Energy	13.5 kWh
Nominal Grid Voltage (Input / Output)	120/240 VAC
Grid Voltage Range	211.2 - 264 VAC
Frequency	60 Hz
Phase	240 VAC: 2W+N+GND
Maximum Continuous Power On-Grid	7.6 kW full sun / 5.8 kW no sun ¹
Maximum Continuous Power Off-Grid	9.6 kW full sun / 7 kW no sun ¹
Peak Off-Grid Power (10 s)	22 kW full sun / 10 kW no sun ¹
Maximum Continuous Current On-Grid	32 A output
Maximum Continuous Current Off-Grid	40 A output
Load Start Capability	118 A LRA
PV Maximum Input Voltage	600 VDC
PV DC Input Voltage Range	60 - 550 VDC
PV DC MPPT Voltage Range	60 - 480 VDC
MPPTs	4
Input Connectors per MPPT	1-2-1-2
Maximum Current per MPPT (I _{mp})	13 A
Maximum Short Circuit Current per MPPT (I _{sc})	15 A
Allowable DC/AC Ratio	1.7
Overcurrent Protection Device	50 A breaker
Maximum Supply Fault Current	10 kA
Output Power Factor Rating	+/- 0.9 to 1
Round Trip Efficiency	90%
Solar Generation CEC Efficiency	97.5% at 208 V 98.0% at 240 V
Customer Interface	Tesla Mobile App
Internet Connectivity	Wi-Fi, Ethernet, Cellular LTE/4G ²
PV AC Metering	Revenue grade (+/-0.5%)
Protections	Integrated arc fault circuit interrupter (AFCI), PV Rapid Shutdown
Warranty	10 years

MECHANICAL SPECIFICATIONS

Dimensions	1596 x 755 x 160 mm (62.8 x 29.7 x 6.3 in)
Total Weight	140 kg (310 lb) ³
Battery Assembly	118 kg (261 lb)
Solar Assembly	22 kg (49 lb)
Mounting options	Floor or wall mount



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F) ⁴
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	-20°C to 30°C (-4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	Type 3R
Noise Level @ 1 m	< 40 db(A) optimal, < 50 db(A) maximum

COMPLIANCE INFORMATION

PV Certifications	UL 1699B, UL 1741, UL 3741, UL 1741 SA, UL 1998 (US), IEEE 1547, IEEE 1547.1
Battery Energy Storage System Certifications	UL 1642, UL 1741, UL 1741 PCS, UL 1741 SA, UL 1973, UL 9540, IEEE 1547, IEEE 1547.1, UN 38.3
Grid Connection	United States
Emissions	FCC Part 15 Class B
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

TESLA NA 2021-09-08 TESLA.COM/ENERGY

The building has a shingle roof. The roof support is wood rafter (southern pine) with 2x4 timber (2" horizontal) on 24-inch centers. The section of the roof where the PV will be installed is hipped with a roof slope of 7:12 slope. ASCE 7-16 with adjustment for rooftop solar modules parallel to the roof surface (29.4.4) was used for the roof section with solar. The design wind speed is 130 mph. *The solar modules and racking will add approximately 2.5 psf to the roof. This roof has been evaluated and deemed sufficient to support this added load.*

Roof section with 7:12 slope and flush mounted solar non-exposed modules with XR100 rails

Roof Zone	Max Force (psf)	Attachment Spacing (in)	Max Cantilever	# Rails per Module	Module Area per Attachment	Uplift (lb)
1	-22.77	72 in	29 in	2	18.5	421.3
2r	-27.97	72 in	29 in	2	18.5	517.4
2e	-28.24	72 in	29 in	2	18.5	522.5
3	-30.08	72 in	29 in	2	18.5	556.5

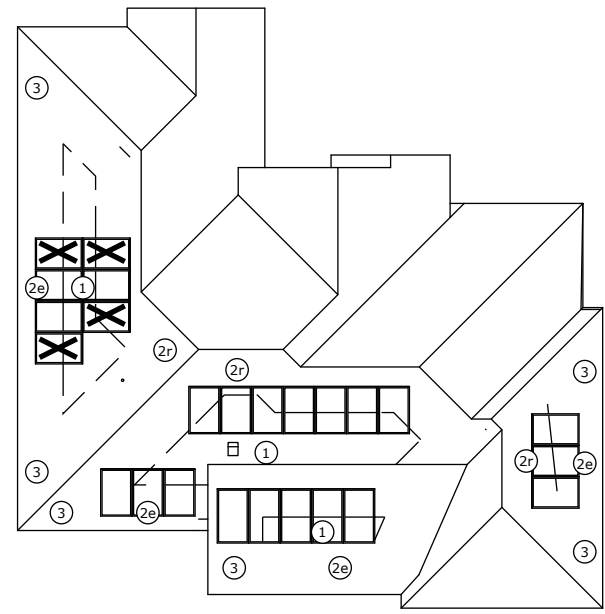
Roof section with 7:12 slope and flush mounted solar exposed modules with XR100 rails

Roof Zone	Max Force (psf)	Attachment Spacing (in)	Max Cantilever	# Rails per Module	Module Area per Attachment	Uplift (lb)
1	-34.16	72 in	29 in	2	18.5	631.9
2r	-41.95	72 in	29 in	2	18.5	776.2
2e	-42.37	72 in	29 in	2	18.5	783.8
3	-45.12	72 in	29 in	2	18.5	834.8

Roof zone #3 is a 6 ft 1 in x 6 ft 1 in square at the lower corners of the roof. Roof zone #2r is the area that is not within zone #3 and is within 6 ft 1 in of the roof ridge or hip. Roof zone #2e is the area that is not within zone #3 and is within 6 ft 1 in of the roof eave. Roof zone #1 is the interior area of the roof that is not within the other zones.

These roof zones refer to the solar modules within that area. Roof attachments extending beyond the solar module that they are supporting are spaced according to the roof zone of the solar module. If a solar module is split between multiple zones, then attachments are spaced according to the portion of the solar module that it is supporting, if at least 50% of the module is within that zone. If less than 50% of the module is within a zone, then use the lowest attachment spacing of the zones underneath that solar module. For example, if a solar module has its lower 40% is in zone 3 and its upper 60% is in zone 2 then the lower rail attachments are spaced by on zone 3 requirements and the upper half are spaced on zone 2 requirements. On the other hand, if 60% is in zone 3 and 40% is in zone 2 then all attachments are spaced base on zone 3 requirements. These Each solar roof attachment will be secured with FlashFoot2 attachments using one 5/16x3.5-inch lag screw in order to provide at least 1097 pounds of design pull-out capacity with a safety factor of 3.

Alternately, each solar roof attachment will be secured with Zilla Double Stud-XL attachments using eight 1/4" x 1-1/2" lag screws in order to provide at least 1,044 pounds of design pull-out capacity with a safety factor of 2.



a 6.11 ft X - EXPOSED MODULES

A module is defined as "exposed" (per Section 29.4.4 of ASCE 7-16) if the distance from any of its free edges (an edge with no connectivity to other modules) to its facing roof edge (eave, ridge, rake, or hip) is greater than half the mean roof height above grade (18 ft 4 in / 2 = 9 ft 2 in) AND if the distance from its free edge to any other adjacent array or module is greater than 4 ft 0 in.

Installation Requirements

Use FlashFoot2 attachments using one 5/16x3.5-inch lag screw. Install the attachment into the 2x4 timber (2" horizontal). Alternately, use Zilla Double Stud-XL attachments using eight 0.25-inch x 1.5-inch lag screws. Install the attachment into the 0.5-inch OSB or plywood decking.

Use IronRidge XR100 rails. Additional manufacturers and models may be used with written confirmation from the engineer of record.

Solar modules shall not be cantilevered more than the maximum allowable cantilever provided by the rail manufacturer and half the allowable support spacing for that zone.

Attachments between solar modules and racks must be between 5 1/8 in and 1 ft 1 3/4 in from the end of the solar modules.

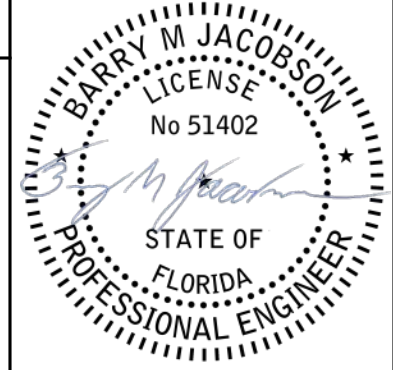
Solar modules shall not be installed within 7 in of the roof edge or change in roof slope.

Nuts and screws for IronRidge components shall be torqued to the settings in the torque table.

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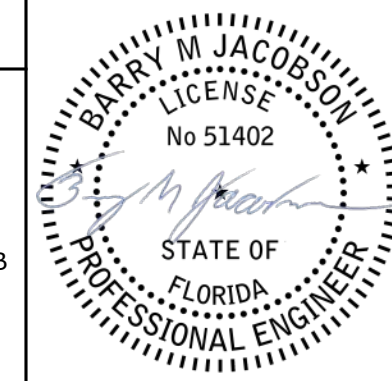
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Project Address: 198 SW GRASSY LN
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PAGE TITLE: ROOF ZONES	PAGE #: S01
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PAGE TITLE: ATTACHMENT DETAILS
PAGE #: S03

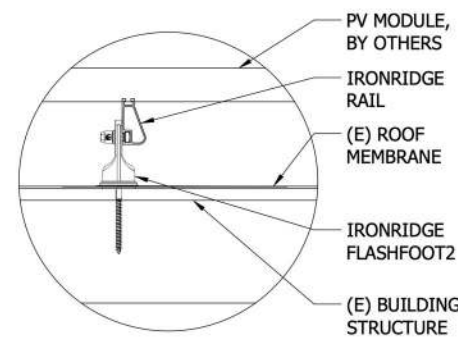
IRONRIDGE
1495 ZEPHYR AVE., HAYWARD, CA 94544
800.227.9523 IRONRIDGE.COM

CLIENT NAME	IRONRIDGE
PROJECT NAME	SLOPED ROOF MOUNT SYSTEM
PROJECT ADDRESS	
SYSTEM RW DC	

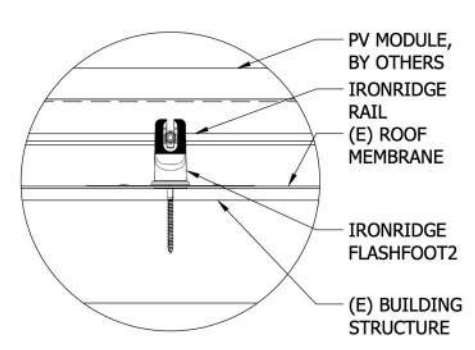
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SNOW LOAD, PSF	
EXPOSURE CAT	
RISK CAT	
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MODULE W/DC	
MODULE QTY	

APPROVAL STATUS		
NOT FOR CONSTRUCTION		
REV#	DESCRIPTION	DATE

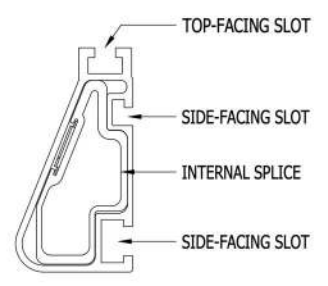
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JOB NO.	3.1 SR
ISSUE DATE	DEC 2018
SHEET NO.	IR 8.4
SHEET SIZE	24X36



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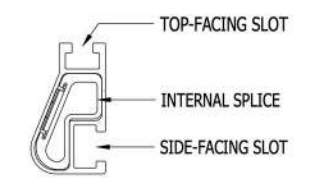
J FLASHFOOT2 DETAIL
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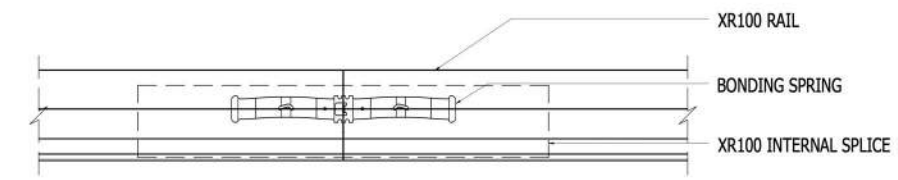
M DETAIL, SPLICE, XR1000
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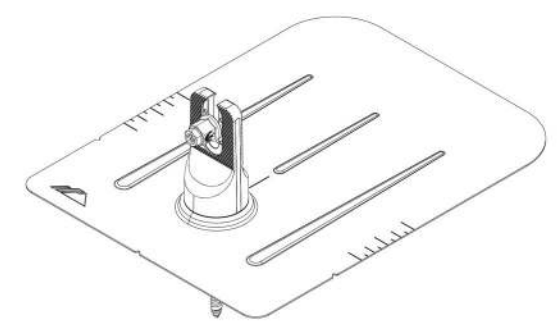
N DETAIL, SPLICE, XR100
1'-0"=1'-0"



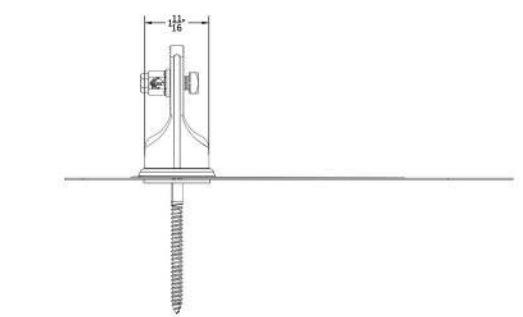
O DETAIL, SPLICE, XR10
1'-0"=1'-0"



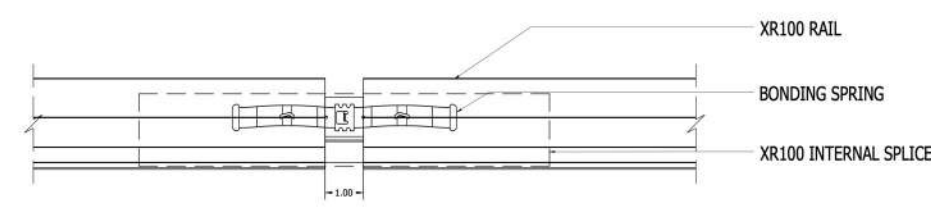
K DETAIL, SPLICE CONNECTION, XR100
6"=1'-0"



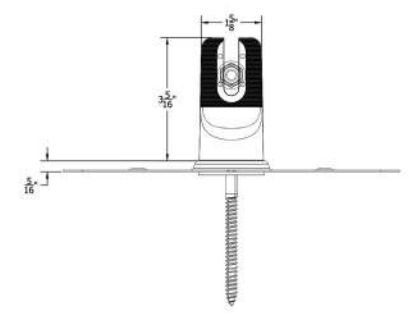
Q IRONRIDGE FLASHFOOT2



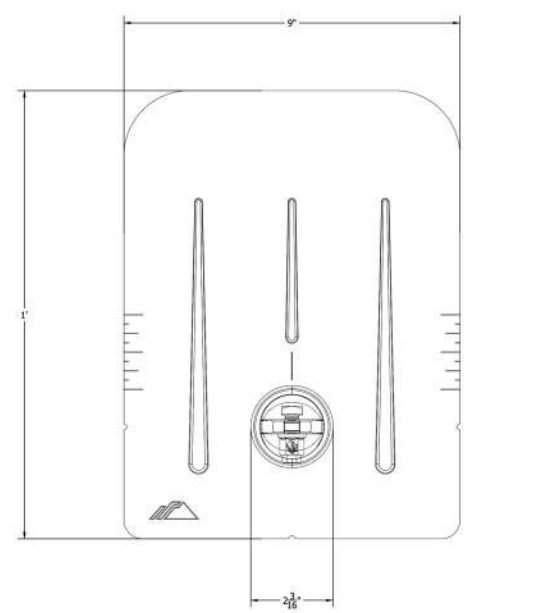
P IRONRIDGE FLASHFOOT2, SIDE VIEW



L DETAIL, THERMAL EXPANSION CONNECTION, XR100
6"=1'-0"



R IRONRIDGE FLASHFOOT2, FRONT VIEW



S IRONRIDGE FLASHFOOT2, PLAN VIEW