

HISTORIC AND DESIGN REVIEW COMMISSION

April 03, 2019

HDRC CASE NO: 2019-144
ADDRESS: 306 BARRERA
LEGAL DESCRIPTION: NCB 718 BARRERA STREET TOWNHOUSE SUBD, BLOCK 3 LOT 4
ZONING: MF-25 IDZ
CITY COUNCIL DIST.: 1
DISTRICT: Lavaca Historic District
APPLICANT: Courtney Marino/Momentum Solar
OWNER: Lewis Fisher
TYPE OF WORK: Roof top Solar Panels
APPLICATION RECEIVED: March 12, 2019
60-DAY REVIEW: May 11, 2019
CASE MANAGER: Adam Rajper
REQUEST:

The applicant is requesting a Certificate of Appropriateness for approval to install rooftop solar panels.

APPLICABLE CITATIONS:

Historic Design Guidelines, Chapter 4, Guidelines for New Construction

6. Designing for Energy Efficiency

A. BUILDING DESIGN

- i. *Energy efficiency*—Design additions and new construction to maximize energy efficiency.
- ii. *Materials*—Utilize green building materials, such as recycled, locally-sourced, and low maintenance materials whenever possible.
- iii. *Building elements*—Incorporate building features that allow for natural environmental control – such as operable windows for cross ventilation.
- iv. *Roof slopes*—Orient roof slopes to maximize solar access for the installation of future solar collectors where compatible with typical roof slopes and orientations found in the surrounding historic district.

B. SITE DESIGN

- i. *Building orientation*—Orient new buildings and additions with consideration for solar and wind exposure in all seasons to the extent possible within the context of the surrounding district.
- ii. *Solar access*—Avoid or minimize the impact of new construction on solar access for adjoining properties.

C. SOLAR COLLECTORS

- i. *Location*—Locate solar collectors on side or rear roof pitch of the primary historic structure to the maximum extent feasible to minimize visibility from the public right-of-way while maximizing solar access. Alternatively, locate solar collectors on a garage or outbuilding or consider a ground-mount system where solar access to the primary structure is limited.
- ii. *Mounting (sloped roof surfaces)*—Mount solar collectors flush with the surface of a sloped roof. Select collectors that are similar in color to the roof surface to reduce visibility.
- iii. *Mounting (flat roof surfaces)*—Mount solar collectors flush with the surface of a flat roof to the maximum extent feasible. Where solar access limitations preclude a flush mount, locate panels towards the rear of the roof where visibility from the public right-of-way will be minimized.

FINDINGS:

- a. The primary structure at 306 Barrera is a two-story single-family residence constructed in c. 2015. The structure is non-contributing to the Lavaca Historic District.
- b. LOCATION – The applicant is requesting approval to install 17 solar panels on the north elevation of the two-story structure. The roof has a very low slope. According to Guidelines 6.C.i for Additions, solar collectors should be located on a side or rear roof pitch to the maximum extent possible. Staff finds that the location of the panels is appropriate and

that the panels are minimally visible from the public right-of-way based on their placement and the minimal pitch of the roof.

- c. PITCH – The panels will be installed flush with the roof pitch. Staff finds the proposal consistent with the Guidelines.

RECOMMENDATION:

Staff recommends approval based on findings a through c with the following stipulations:

- i. That the solar panels maintain at least 18” of separation from the roof eaves.



Flex Viewer

Powered by ArcGIS Server

Printed: Mar 27, 2019

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PLAN KEY	
PV-1	COVER PAGE
PV-1.1	COVER PAGE CONT.
PV-2	PANEL LAYOUT
PV-2.1	PLOT PLAN
PV-3	LAYOUT DETAIL
PV-4	ELECTRICAL
PV-5	EQUIPMENT LABELS
PV-6	EQUIPMENT SKETCH

SYSTEM INFORMATION	
MODULE	HANWHA Q.PEAK DUO BLK-G5 315
INVERTER	ENPHASE IQ6-60-2-US
RACKING	ECOFASTEN ROCK-IT SYSTEM
SYSTEM SIZE (DC)	5.355 KW
LOCATION	29.414765, -98.486197

GENERAL NOTES:

THIS PV SYSTEM HAS BEEN DESIGNED TO MEET THE MINIMUM DESIGN STANDARDS FOR BUILDING AND OTHER STRUCTURES OF THE 2017 TEXAS STATE UNIFORM CODE, ALL ASPECTS OF THE INSTALLATION SHALL COMPLY WITH THE 2015 INTERNATIONAL RESIDENTIAL CODE. WITH ALL TEXAS AMENDMENTS, ASCE 7-10, NEC 2014 (NFPA 70), ALL LOCAL GOVERNING COUNTY AND MUNICIPAL ORDINANCES ADOPTED BY REFERENCE OR ENACTED BY LAW, ALL INSTALLATION INSTRUCTIONS PREPARED BY THE MANUFACTURER.

AN 36" WIDE (FREE OF SOLAR EQUIPMENT) SHALL BE PROVIDED ALONG AT LEAST ONE SIDE OF THE ROOF ON THE SAME SIDE AS THE SOLAR EQUIPMENT OR ON ANOTHER SIDE OF THE RIDGE THAT DOES NOT HAVE SOLAR EQUIPMENT ON IT. IN ADDITION AN 36" WIDE PATHWAY(FREE OF SOLAR EQUIPMENT) SHALL BE PROVIDED FROM AT LEAST ONE EAVE.

ROOF SHALL HAVE NO MORE THAN TWO LAYERS OF COVERING IN ADDITION TO THE SOLAR EQUIPMENT.

INSTALLATION OF SOLAR EQUIPMENT SHALL BE FLUSH MOUNTED, PARALLEL TO AND NO MORE THAN 6-INCHES ABOVE THE SURFACE OF THE ROOF.

WEIGHT OF THE INSTALLED SYSTEM SHALL NOT EXCEED MORE THAN 5-PSF FOR PHOTOVOLTAIC AND NO MORE THAN 6-PSF FOR RESIDENTIAL SOLAR HOT WATER SYSTEMS.

ANY PLUMBING VENTS ARE NOT TO BE CUT OR COVERED FOR SOLAR EQUIPMENT INSTALLATION. ANY RELOCATION OR MODIFICATION OF THE VENT REQUIRES A PLUMBING PERMIT AND INSPECTION.

INVERTER PLACEMENT:

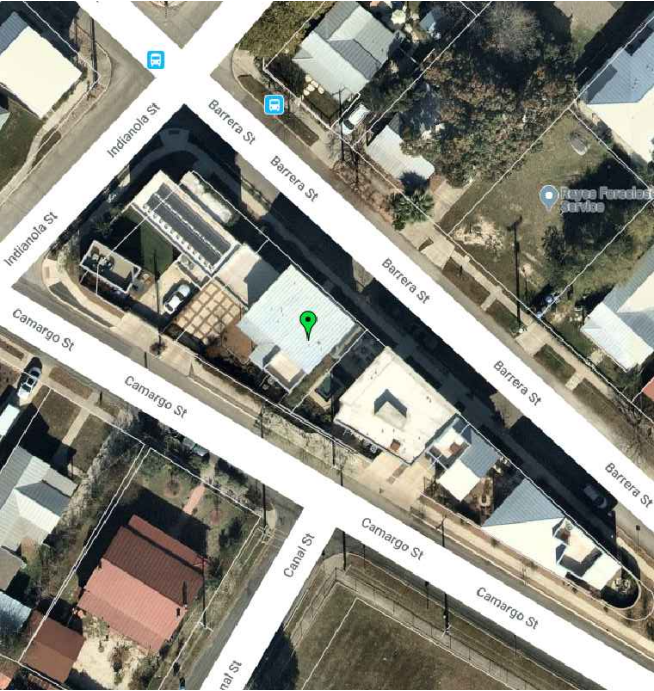
SYSTEM UTILIZES "ENPHASE" MICRO-INVERTERS WITH RAPID SHUTDOWN CONTROL LOCATED ON THE BACK SIDE OF EACH MODULE.

BUILDING REVIEW NOTE:


TOWN BUILDING PLANS EXAMINER HAS RECEIVED THE ENCLOSED DOCUMENT FOR MINIMUM ACCEPTABLE PLAN SUBMITTAL REQUIREMENTS OF THE TOWN AS SPECIFIED IN THE BUILDING AND/OR RESIDENTIAL CODE OF THE STATE OF TEXAS. THIS REVIEW DOES NOT GUARANTEE COMPLIANCE OF THAT CODE. THAT RESPONSIBILITY IS GUARANTEED UNDER THE SEAL AND SIGNATURE OF THE TEXAS LICENSED DESIGN PROFESSIONAL OF RECORD. THAT SEAL AND SIGNATURE HAS BEEN INTERPRETED AS AN ATTESTATION THAT, TO THE BEST OF THE LICENSEE'S BELIEF AND INFORMATION, THE WORK IN DOCUMENT IS:

1. ACCURATE
2. CONFORMS WITH GOVERNING CODES APPLICABLE AT THE TIME OF THE SUBMISSION.
3. CONFORMS WITH REASONABLE STANDARDS OF PRACTICE AND WITH VIEW TO THE SAFEGUARDING OF LIFE, HEALTH, PROPERTY AND PUBLIC WELFARE IS THE RESPONSIBILITY OF THE LICENSEE.

SATELLITE AERIAL PHOTO




BILL OF MATERIALS	
MODULES	17
INVERTERS	17
CLAMP ASSEMBLY	20
COUPLING ASSEMBLY	20
BONDING CLIP	2
SKIRTS	5
ENPHASE COMBINER BOX	1
60A NON-FUSIBLE AC DISCONNECT	1
25A BACKFEED BREAKER	1



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ENGINEERING LETTER ATTACHED HAS SPECIFICATIONS FOR WIND AND LOAD CALCULATIONS FOR SOLAR INSTALLATION SPANS & ATTACHMENTS TO MEET LOCAL AND STATE BUILDING CODE COMPLIANCE. WARNING THAT IT IS A VIOLATION OF THE LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ARCHITECT, TO ALTER AN ITEM IN ANY WAY.



CUSTOMER INFORMATION

LEWIS FISHER - MS24286
306 BARRERA ST
SAN ANTONIO, TX 78210
(210) 269-3832

JURISDICTION: BEXAR COUNTY
UTILITY: CPS ENERGY
UTILITY ACCT #:
UTILITY METER #:

PV SYSTEM INFORMATION

SYSTEM SIZE (DC): 5.355 KW
17 MODULES: HANWHA Q.PEAK DUO BLK-G5 315
17 INVERTERS: ENPHASE IQ6-60-2-US

PROJECT INFORMATION		
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COVER PAGE

PV-1



HANWHA Q.PEAK DUO BLK-G5 315
315 WATT MODULE
66.3" X 39.4" X 1.26"
(SEE DATASHEET)

CLIMATIC & GEOGRAPHIC DESIGN
CRITERIA TABLE R301.2(1)

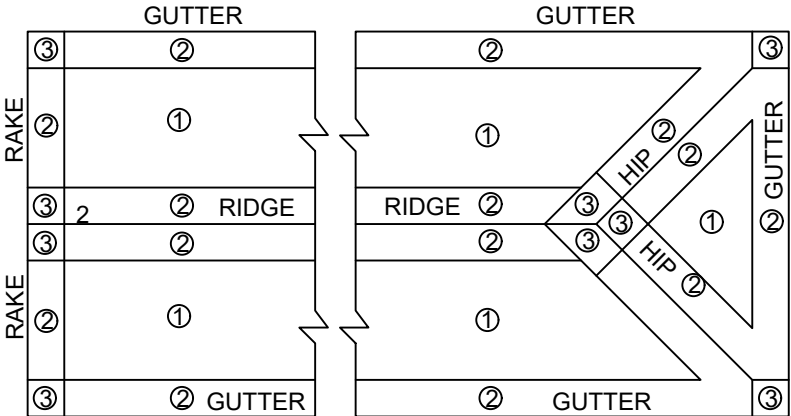
GROUND SNOW LOAD	5 LBS/SF
SPEED (MPH)	115 MPH
TOPOGRAPHIC EFFECTS	B
SPECIAL WIND REGION	NO
WIND BORNE DEBRIS ZONE	2
SEISMIC DESIGN CATEGORY	C
CLIMATE ZONE	2A
WIND EXPOSURE CATEGORY	B

1. ALL WIND DESIGN CRITERIA ARE FOR GABLE AND HIP RESIDENTIAL ROOFS CONSIDERED FROM AN ANGLE OF MIN. 9.5° ($\frac{\pi}{12}$) TO MAX. 45° ($\frac{1\pi}{2}$) NOT TO EXCEED 30' MEAN ROOF HEIGHT WITH A MIN. $\frac{5}{16}$ " LAG BOLT (ASTE A276) STAINLESS STEEL INTO THE RAFTER OR BLOCKING BETWEEN RAFTERS W/ MIN. EMBEDMENT OF 3"
2. THIS STRUCTURAL DESIGN REFLECTS STRUCTURAL CONNECTIONS TO THE EXISTING STRUCTURE ONLY. MODULE TO ROCK-IT LOADING AND CERTIFICATION PER MECHANICAL LOAD TESTS IAW/ANSI UL2703 CONDUCTED ON BEHALF OF ECOFASTEN SOLAR BY TUV RHEELAND REFERENCE FILE L2-ELS150128a (REV 1)
3. ROOF SEALANTS SHALL CONFORM TO ASTM C920 AND ASTM 6511 AND IS THE RESPONSIBILITY OF THE CONTRACTOR TO FILL ALL HOLES WATER TIGHT.
4. "ROCK-IT" ATTACHMENTS ARE MANUFACTURED BY ECOFASTEN SOLAR, PHOENIX, ARIZONA. AND SHALL BE INSTALLED IN STRICT COMPLIANCE WITH MANUFACTURERS PRINTED INSTRUCTIONS.

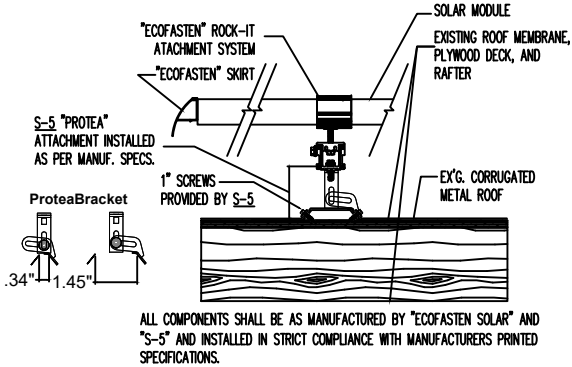
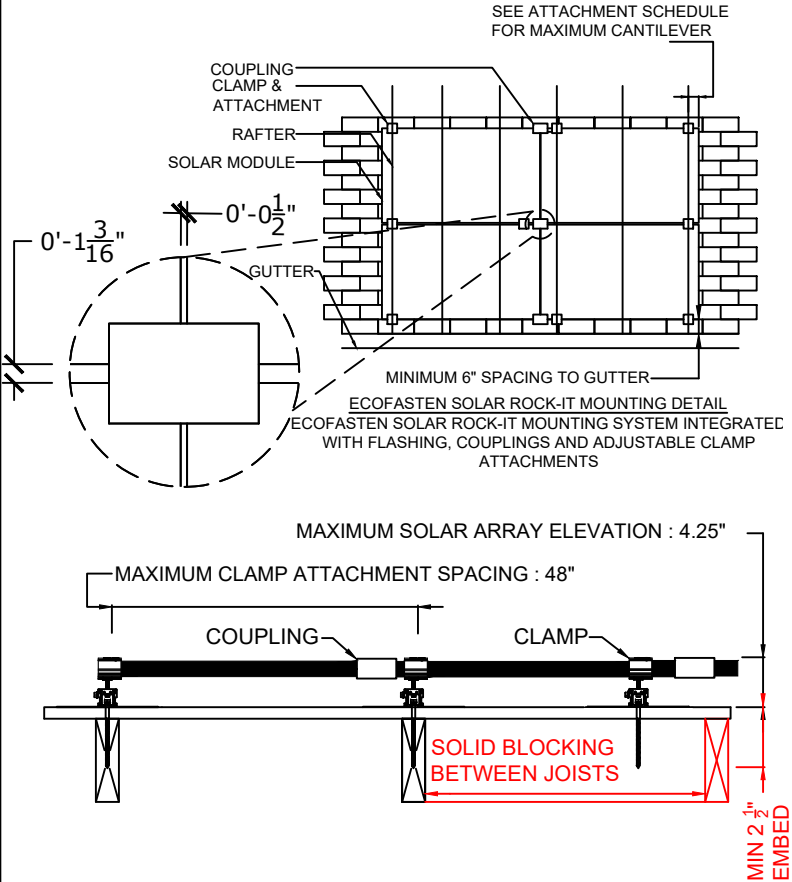
ROCK-IT TO RAFTER ATTACHMENT SPACING SCHEDULE

ULTIMATE DESIGN WIND SPEED (MPH)	ROOF ZONE 1 MAX. SPAN / MAX. CANTILEVER (INCHES)	ROOF ZONE 2 & 3 MAX. SPAN / MAX. CANTILEVER (INCHES)
125	48" O.C. / 16" MAX.	32" O.C. / 12" MAX.
130	48" O.C. / 16" MAX.	32" O.C. / 12" MAX.
140	48" O.C. / 16" MAX.	24" O.C. / 10" MAX.
150	40" O.C. / 16" MAX.	16" O.C. / 8" MAX.
160	32" O.C. / 12" MAX.	16" O.C. / 8" MAX.
170	32" O.C. / 12" MAX.	14" O.C. / 8" MAX.

TABLE REFLECTS ATTACHMENT SPACINGS THAT EXCEED MANUFACTURERS SPECIFICATIONS FOR WIND LOADS AS PER ASCE 07-10. RISK CATEGORY II TOPOGRAPHIC EFFECTS B,C, & D AND ROOF WIND ZONES 1,2,& 3. ROOF ZONES 2 & 3 ARE WITHIN 36" OF ANY OUTER EDGE, HIP, RIDGE, OR GUTTER LINE FOR STRUCTURES 30'- 0" OR LESS MEAN ROOF HEIGHT.



ROOF WIND ZONES AS PER IRC R301.2(7)
ROOF ZONES 2 & 3 ARE 36" FROM OUTTER ROOF EDGES,
RIDGES, HIPs, RAKES, AND GUTTER EDGES FOR STRUCTURES
BELOW 30'-0" MEAN ROOF HT.



FASTENER REQUIREMENTS:

TOTAL ARRAY AREA = 308.39 SQ FT
WIND LOAD: ASCE 10 (SEE CALCULATIONS, STRUCTURAL CERTIFICATION) 50 PSF MAX
TOTAL UPLIFT 50 PSF X 308.39 = 15419.35 LBS

FASTENER:

LAG SCREW SPEC 203.2, 8/04: (FLAT WASHERS TO BE USED WITH LAG BOLTS)
LAG BOLT WITHDRAWAL VALUE 5/16" DIA., 266 LB/IN X 2-INCH THREAD DEPTH:
532LB. CAP. EACH
MINIMUM NUMBER OF LAG BOLTS REQUIRED: 15419.35 LBS/532 LBS/LAG BOLT = 29
MAXIMUM SPAN BETWEEN MOUNTING FEET BOLTS "X" USE 48" MAX ALLOWED AS PER SCHEDULE

STRUCTURAL STATEMENT:

THE EXISTING STRUCTURE IS ADEQUATE TO SUPPORT THE NEW LOADS IMPOSED BY THE PHOTOVOLTAIC MODULE SYSTEM INCLUDING UPLIFT & SHEAR.EXISTING RAFTER SIZES & DIMENSIONS CONFIRM TO IRC-2015 TABLE R802.5(1)-RAFTER SPANS.

MOUNTING BRACKETS AND HARDWARE MEET OR EXCEED STATE OF TEXAS CODE REQUIREMENTS FOR THE DESIGN CRITERIA OF THE TOWN.



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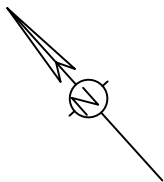
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COVER PAGE

PV-1.1

SCALE: 1/8" = 1'-0"



BARRERA ST

FRONT OF RESIDENCE

FIRE SETBACK
(36" VENTILATION,
36" ROOF ACCESS)

RIDGE

R1

GUTTER

DRIVEWAY

CAMARGO STREET

SOLAR INSTALLER NOTES:
NO ADDITIONAL STRUCTURAL SUPPORT REQUIRED

ROOF	MODULE COUNT	AZIMUTH	TILT	SHADING
R1	17	222°	11°	99%



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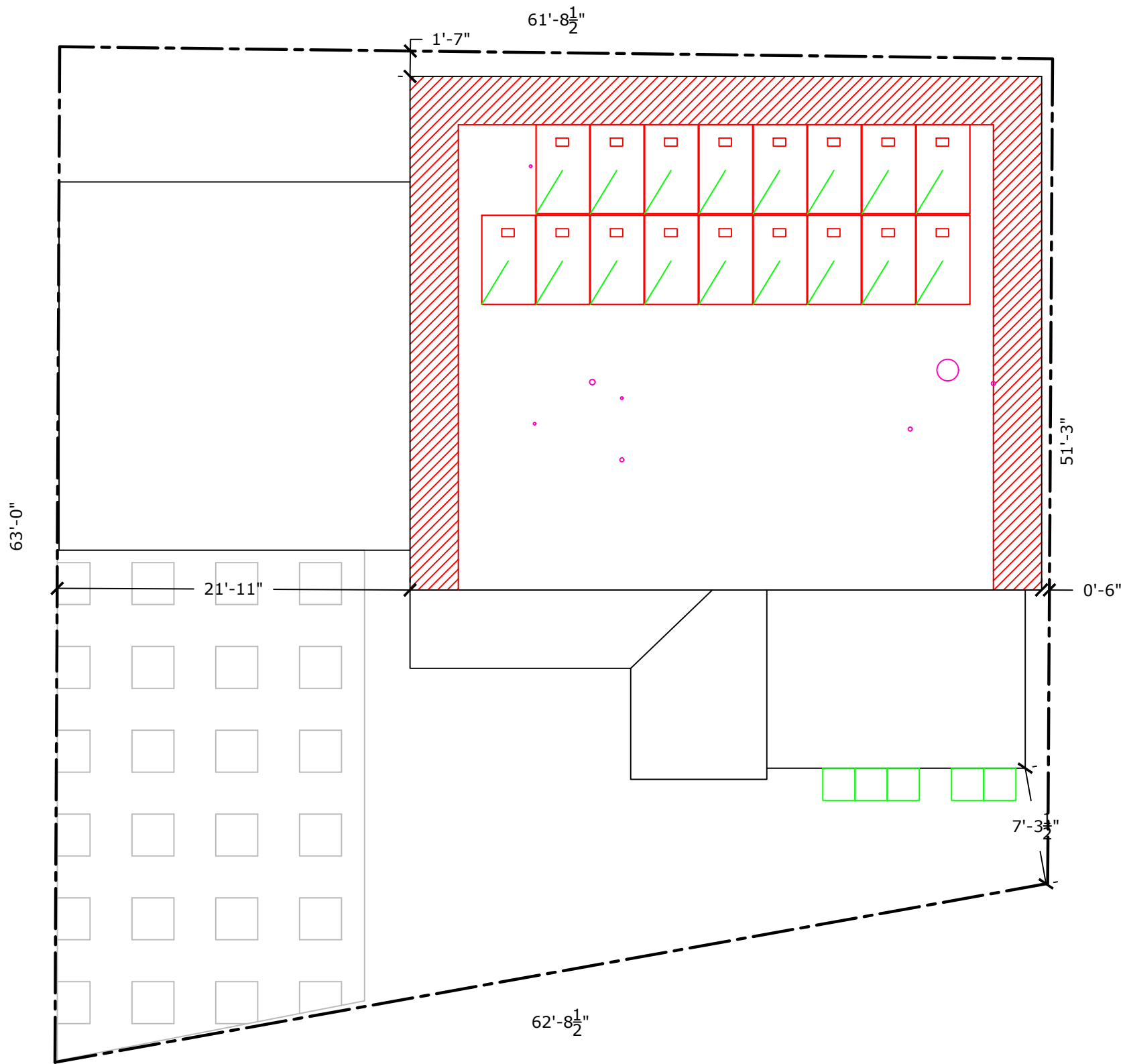
PANEL LAYOUT

PV-2

SYMBOL LEGEND

MSP	MAIN SERVICE PANEL		CHIMNEY
SP	SUB-PANEL		SKYLIGHT
M	UTILITY METER		VENT
AC DISC	AC DISCONNECT		PIPE VENT
UDC	UTILITY DISCONNECT		FAN
LC	LOAD CENTER		SATELLITE DISH
N3R	NEMA 3R BOX W/ ENVOY-S		FIRE SETBACKS
CB	COMBINER BOX		GROUND ACCESS
	PITCH DIRECTION		
	MODULE		MODULE THAT DO NOT QUALIFY FOR REBATE

SCALE: 1/8" = 1'-0"



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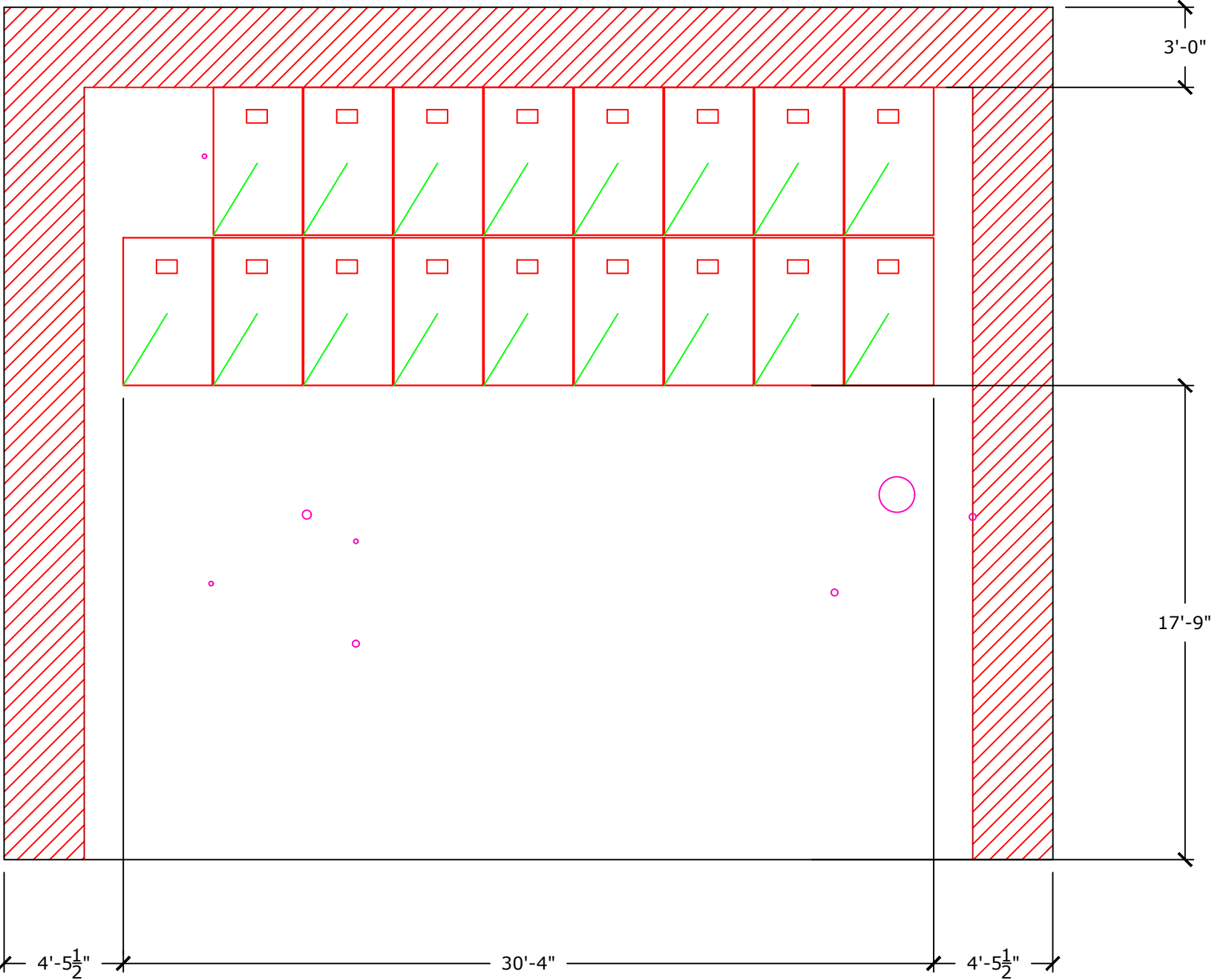
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PLOT PLAN

PV-2.1

R1 - ARRAY 1 LAYOUT DETAIL
SCALE: 3/16" = 1'-0"
AZIMUTH: 222°
TILT: 11°
SHADING: 99%




SOLAR INSTALLER NOTES:
NO ADDITIONAL STRUCTURAL SUPPORT REQUIRED



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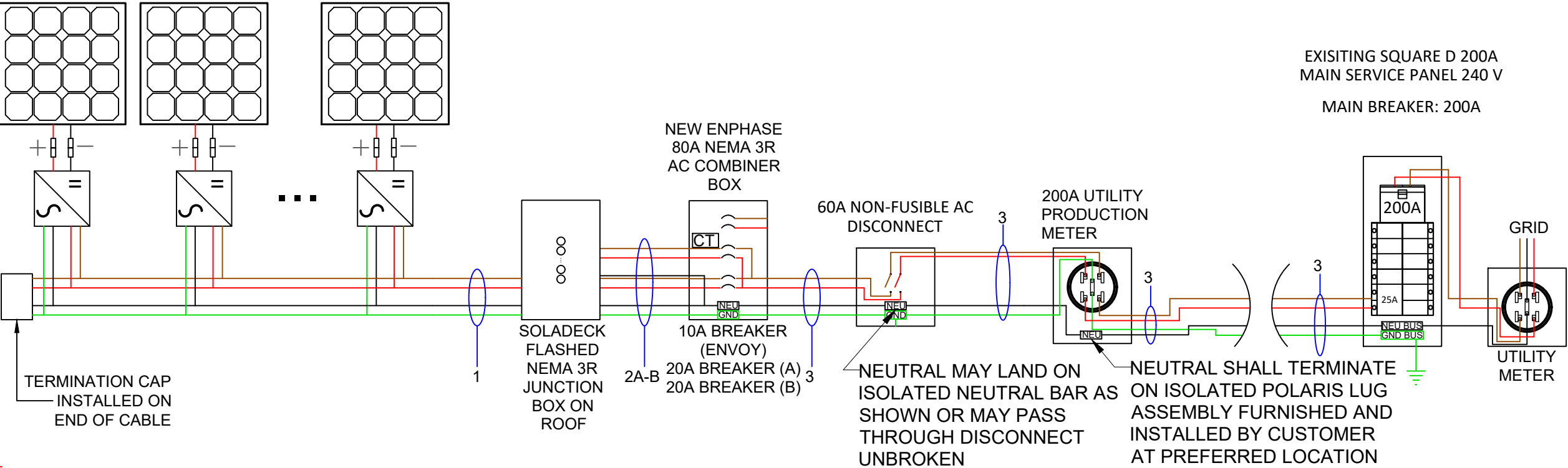
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LAYOUT DETAIL

PV-3

17 HANWHA Q.PEAK DUO BLK-G5 315 315W MODULES PAIRED WITH
17 ENPHASE IQ6-60-2-US MICRO-INVERTERS

BRANCH CIRCUIT A
8 MICRO-INVERTERS
BRANCH CIRCUIT B
9 MICRO-INVERTERS



120% RULE
(BUS RATING x 1.2) - MAIN BREAKER = BACKFEED AVAILABLE
(200A x 1.2) - 200A = 40A BACKFEED AVAILABLE

ELECTRICAL NOTES:

- 1. ALL CALCULATIONS FOR VOC, VMAX, IMP AND ISC HAVE BEEN CALCULATED USING THE MANUFACTURED STRING CALCULATOR BASED ON ASHRAE 2% HIGH AND EXTREME MINIMUM TEMPERATURE COEFFICIENTS.
- 2. THE ENTIRE ARRAY IS BONDED ACCORDING TO (NEC 690.46 - 250.120 PARAGRAPH C).
- 3. SYSTEM IS CONSIDERED AN AC MODULE SYSTEM. NO DC CONDUCTORS ARE PRESENT IN CONDUIT, COMBINER, JUNCTION BOX, DISCONNECT AND COMPLIES WITH 690.6 - NO DC DISCONNECT AND ASSOCIATED DC CABLING ARE REQUIRED.

- 4. SYSTEM COMPLIES WITH 690.12 RAPID SHUTDOWN AND ASSOCIATED LABELING AS PER 690.56(C). AC VOLTAGE AND SYSTEM OPERATING CURRENT SHALL BE PROVIDED AS PER 690.52.
- 5. CONDUCTORS IN CONDUIT ARE AC CONDUCTORS - BRANCH CIRCUITS. AND NOT PV SOURCE CIRCUITS. 690.6.
- 6. ALL GROUNDING SHALL COMPLY WITH 690.47(A) IN THAT THE AC MODULES WILL COMPLY WITH 250.64.
- 7. NO TERMINALS WILL BE ENERGIZED IN THE OPEN POSITION IN THIS AC MODULE SYSTEM - 690.17, 690.6.
- 8. THIS SYSTEM COMPLIES WITH NEC 2014.

- 9. WHERE APPLICABLE: INTERCONNECTION SHALL COMPLY WITH 705.12(D)(3), 705.12(D)(2)(3)(B), 705.12(A) AS PERMITTED BY 230.86(6).
- 10. BRANCH CIRCUIT CALCULATION FOR WIRE TAG 1 DISPLAYS THE LARGEST BRANCH CIRCUIT IN SYSTEM. OTHER BRANCH CIRCUITS WILL HAVE LOWER DESIGN CURRENT THAN THE ONE SHOWN.
- 11. ALL CONDUCTORS ARE SIZED BASED ON NEC 2014 ARTICLE 310.
- 12. ALL EQUIPMENT TERMINAL IS RATED AT 75°C.
- 13. INVERTER NOC (NOMINAL OPEN CURRENT) OBTAINED FROM EQUIPMENT DATASHEET

SOLAR INSTALLER NOTES:
NEW 200A MAIN BREAKER INSTALLATION REQUIRED.
PV EQUIPMENT WILL BE INSTALLED LEFT OF THE WINDOW.

Wire Tag	Conduit	Wire Qty	Wire Gauge	Wire Type	Temp. Rating	Wire Ampacity (A)	Temp. Derate	Conduit Fill Derate	Derated Ampacity (A)	Inverter Qty	NOC (A)	NEC Correction	Design Current (A)	Ground Size	Ground Wire Type
1	OPEN AIR	2	12 AWG	Trunk Cable	90°C	30	0.91	1	27.30	9	0.96	1.25	10.80	12 AWG	Trunk Cable
2A	1" EMT	2	10 AWG	THWN-2	90°C	40	0.91	0.8	29.12	8	0.96	1.25	9.60	08 AWG	THWN-2
2B	1" EMT	2	10 AWG	THWN-2	90°C	40	0.91	0.8	29.12	9	0.96	1.25	10.80	08 AWG	THWN-2
3	1" EMT	3	08 AWG	THWN-2	75°C	50	0.91	1	45.50	17	0.96	1.25	20.40	06 AWG	THWN-2



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ELECTRICIAN

NABCEP Certification Number
032611-198

Jeffrey Marinello

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INFORMATION


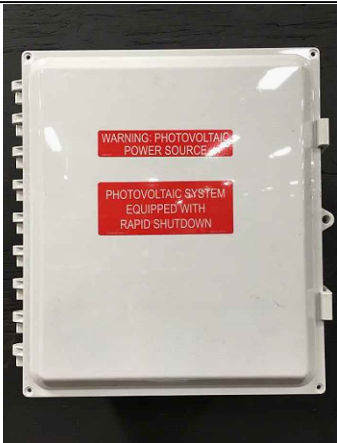






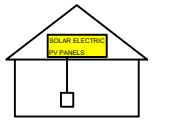


SYSTEM SIZE (DC): 5.355 KW
17 MODULES: HANWHA Q.PEAK DUO
BLK-G5 315
17 INVERTERS: ENPHASE IQ6-60-2-US

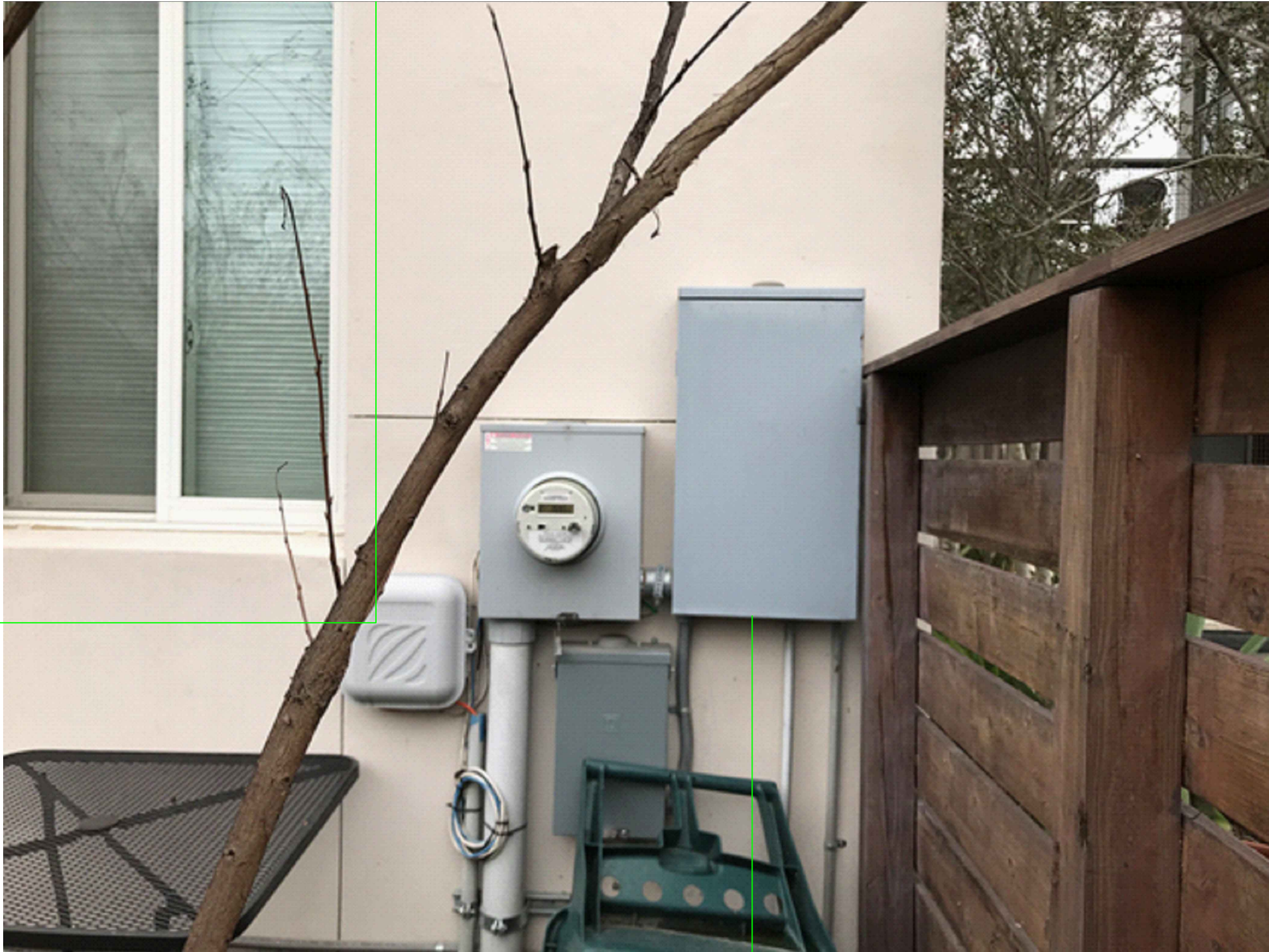
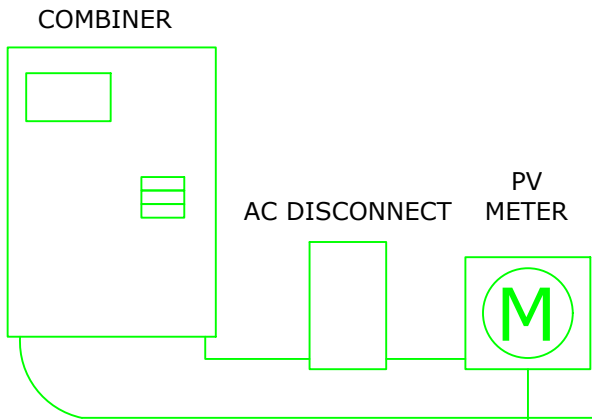
PROJECT INFORMATION

INITIAL	DATE: 3/5/2019	DESIGNER: MM
REV:	DATE:	DESIGNER:
REV:	DATE:	DESIGNER:

ELECTRICAL

PV-4

TAG	LABEL		QUANTITY	LOCATION	NOTE	EXAMPLES		
Ⓐ	<div>CAUTION: AC SOLAR VOLTAGE</div>		12	AC CONDUITS	1 AT EVERY SEPARATION BY ENCLOSURES / WALLS / PARTITIONS / CEILINGS / FLOORS <u>OR</u> NO MORE THAN 10'			
Ⓑ	<div><div>⚠️ WARNING</div><div>PHOTOVOLTAIC POWER SOURCE</div></div>	<div>PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN</div>	1	COMBINER BOX	1 AT ANY COMBINER BOX			PRO CUSTOM SOLAR LLC D.B.A. MOMENTUM SOLAR 325 HIGH STREET, METUCHEN, NJ 08840 (732) 902-6224 MOMENTUMSOLAR.COM
Ⓒ	<div><div>⚠️ WARNING</div><div>ELECTRICAL SHOCK HAZARD DO NOT TOUCH TERMINALS TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION</div></div>		1	JUNCTION BOX	1 AT ANY JUNCTION BOX			STRUCTURAL ENGINEERING DANIEL W. DUNZIK RA LEED - AP LICENSE # 26995 (908) 872-3664 370 BURNT HILL ROAD SKILLMAN, NJ 08558 ENGINEERING LETTER ATTACHED HAS SPECIFICATIONS FOR WIND AND LOAD CALCULATIONS FOR SOLAR INSTALLATION SPANS & ATTACHMENTS TO MEET LOCAL AND STATE BUILDING CODE COMPLIANCE. WARNING THAT IT IS A VIOLATION OF THE LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ARCHITECT, TO ALTER AN ITEM IN ANY WAY.
Ⓓ	<div><div>PV SYSTEM AC DISCONNECT RATED AC OUTPUT CURRENT 16.32A NOMINAL OPERATING AC VOLTAGE 240 V</div><div><div>⚠️ CAUTION</div><div>POWER TO THIS SERVICE IS ALSO SUPPLIED FROM ON-SITE SOLAR GENERATION AC SYSTEM DISCONNECT</div></div></div> <div><div>⚠️ WARNING</div><div>ELECTRICAL SHOCK HAZARD DO NOT TOUCH TERMINALS TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION</div><div>PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN</div></div>	1	AC DISCONNECT	1 OF EACH AT FUSED AC DISCONNECT COMPLETE VOLTAGE AND CURRENT VALUES ON DISCONNECT LABEL				
Ⓔ		<div>PV METER</div>	1	PV METER SOCKET	1 AT PV METER SOCKET AND ONE DIRECTORY PLACARD			CUSTOMER INFORMATION LEWIS FISHER - MS24286 306 BARRERA ST SAN ANTONIO, TX 78210 (210) 269-3832
Ⓕ	<div><div>⚠️ WARNING</div><div>DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM</div></div>	<div>REVENUE METER</div>	1	UTILITY METER	1 AT UTILITY METER AND ONE DIRECTORY PLACARD			JURISDICTION: BEXAR COUNTY UTILITY: CPS ENERGY UTILITY ACCT #: UTILITY METER #:
Ⓖ	<div><div>SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN</div><div><div>TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY</div><div></div></div></div> <div><div>⚠️ WARNING</div><div>DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM</div></div>	1	INTERCONNECTION POINT	1 OF EACH AT BUILDING INTERCONNECTION POINT AND ONE DIRECTORY PLACARD				
	<div>LINE SIDE TAP</div>		1	INTERCONNECTION TAP BOX				
	<div>WARNING: INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE</div>		1	BACKFEED PANEL				PV SYSTEM INFORMATION SYSTEM SIZE (DC): 5.355 KW 17 MODULES: HANWHA Q.PEAK DUO BLK-G5 315 17 INVERTERS: ENPHASE IQ6-60-2-US
							PROJECT INFORMATION	
							INITIAL DATE: 3/5/2019 DESIGNER: MM	
							REV: DATE: DESIGNER:	
							REV: DATE: DESIGNER:	
							EQUIPMENT LABELS	
							PV-5	



EQUIPMENT SKETCH

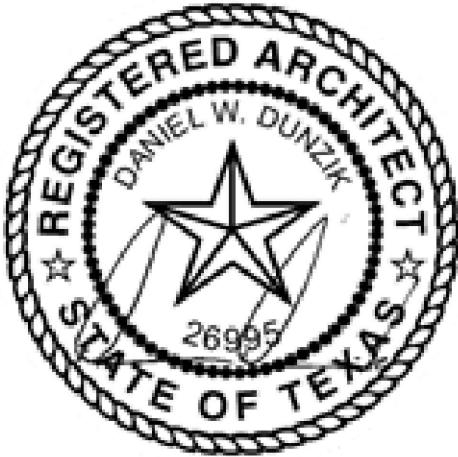
PROPOSED PV EQUIPMENT LOCATED ON **SOUTH** FACING WALL NEAR ELECTRICAL METER. PV EQUIPMENT WILL BE INSTALLED IMMEDIATELY LEFT OF WINDOW.



PRO CUSTOM SOLAR LLC D.B.A. MOMENTUM SOLAR
325 HIGH STREET, METUCHEN, NJ 08840
(732) 902-6224
MOMENTUMSOLAR.COM

**STRUCTURAL
ENGINEERING**

DANIEL W. DUNZIK RA LEED - AP
LICENSE # 26995
(908) 872-3664
370 BURNT HILL ROAD
SKILLMAN, NJ 08558
ENGINEERING LETTER ATTACHED HAS SPECIFICATIONS FOR WIND AND LOAD CALCULATIONS FOR SOLAR INSTALLATION SPANS & ATTACHMENTS TO MEET LOCAL AND STATE BUILDING CODE COMPLIANCE. WARNING THAT IT IS A VIOLATION OF THE LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ARCHITECT, TO ALTER AN ITEM IN ANY WAY.



**CUSTOMER
INFORMATION**

LEWIS FISHER - MS24286
306 BARRERA ST
SAN ANTONIO, TX 78210
(210) 269-3832
JURISDICTION: BEXAR COUNTY
UTILITY: CPS ENERGY
UTILITY ACCT #:
UTILITY METER #:

**PV SYSTEM
INFORMATION**

SYSTEM SIZE (DC): 5.355 KW
17 MODULES: HANWHA Q.PEAK DUO
BLK-G5 315
17 INVERTERS: ENPHASE IQ6-60-2-US

PROJECT INFORMATION

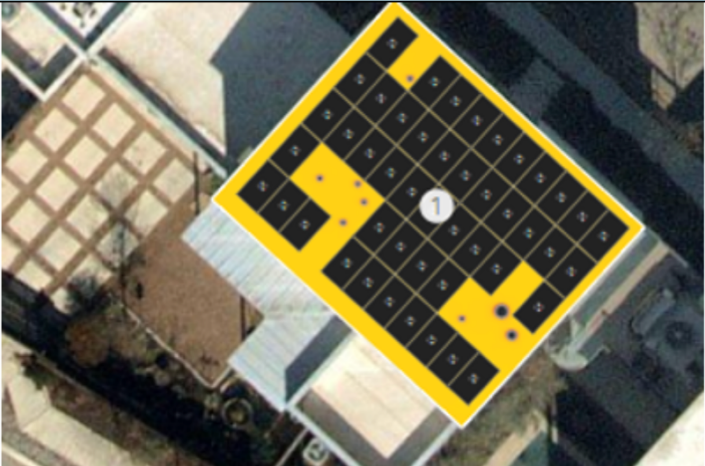
INITIAL	DATE: 3/5/2019	DESIGNER: MM
REV:	DATE:	DESIGNER:
REV:	DATE:	DESIGNER:

EQUIPMENT SKETCH

PV-6

Customer Information

Customer Name	LEWIS FISHER	
Phone	(210) 269-3832	
Email	lfisher741@gmail.com	
Street Address	306 BARRERA ST	
City	San Antonio	
State	TX	
Zip Code	78210	
County		



Sub-A

MSP/
meter/

Sub-B

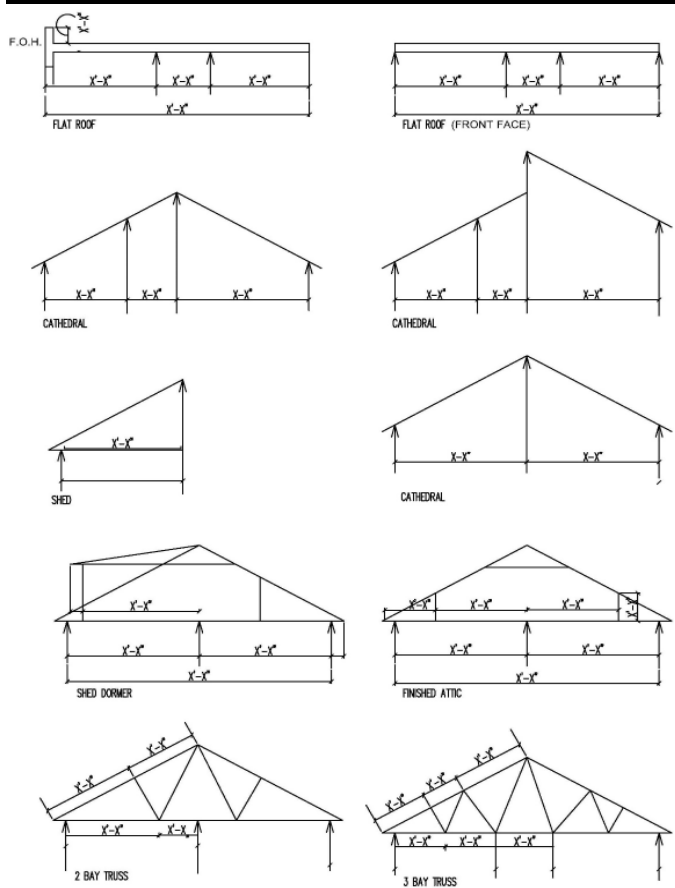
Assessor: Mark Sellers
Date: 2/27/19

- Roof Planes
- Meter Location
- Main Service Panel
- North

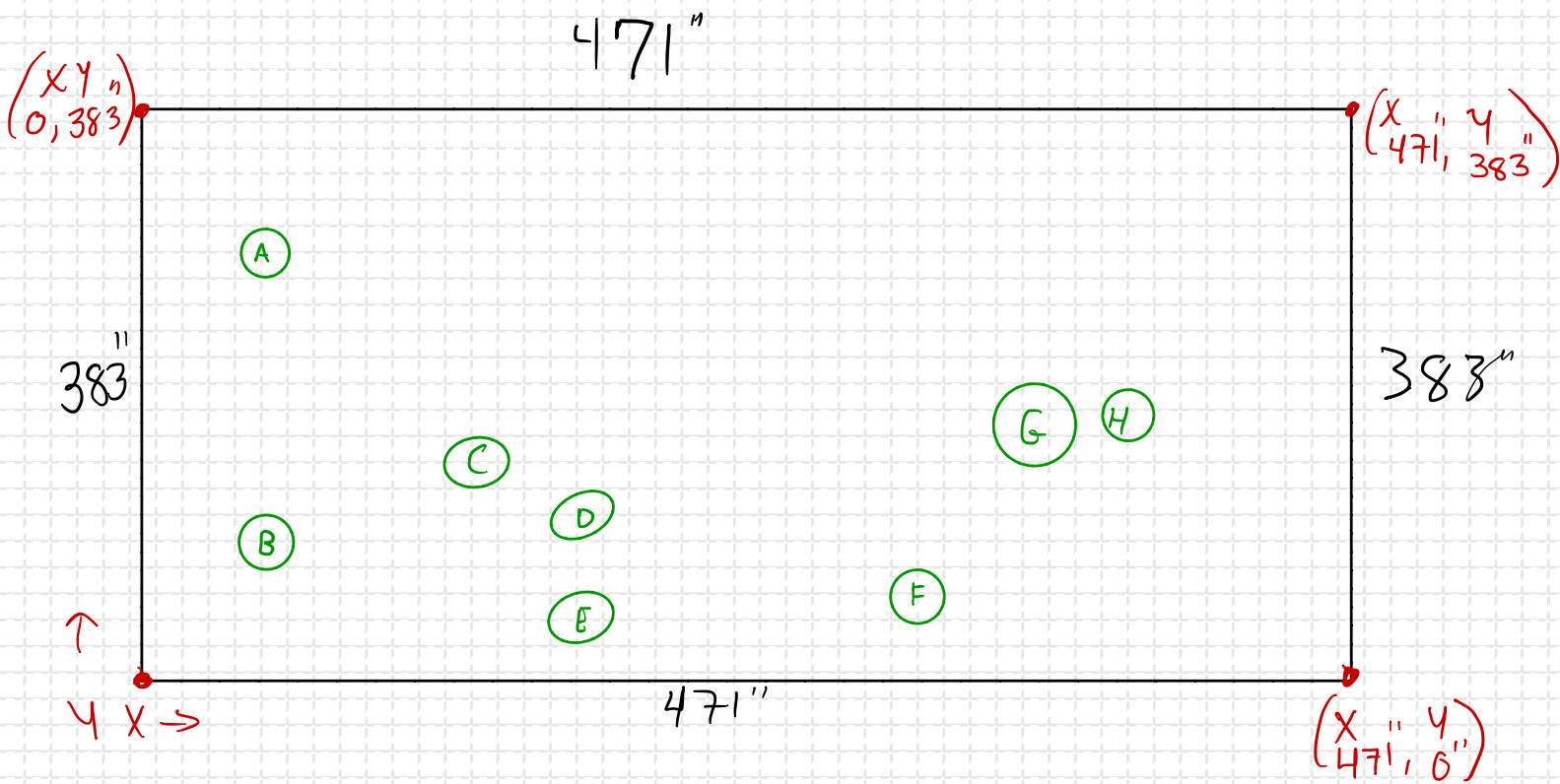
- Property Line/Fence
- Trees
- Driveway
- Street

Total Roof Planes: 1
Number of Stories: 2

EXTERIOR ELECTRICAL ASSESSMENT					
SERVICE	OVERHEAD/UNDER	NUMBER OF METERS	LOCATED OVER	OBSTRUCTIONS IN FRONT OF METER	
	Under	1	Ext. home	N/A	
ADDITIONAL EQUIPMENT	NOTE RATINGS AND ANY ADDITIONAL ELECTRICAL EQUIPMENT ON THE EXTERIOR OF THE HOUSE				
	MSP				
	Square D		120/240	235	Ext. home
Sub-B	Square D	60	120/240	235	Ext. home
INTERIOR ELECTRICAL ASSESSMENT					
PANEL	Sub-A BRAND	BUS RATING	PANEL RATING	VOLTAGE	LOCATION
	Square D	70	120/240	235	Garage
GROUND	WATER MAIN	LOCATION	ADD. GROUNDING	LOCATION	OBSTRUCTIONS
GEN DISCO	BRAND	kW	ATS/MANUAL	FULL SERVICE	LOCATION
ADDITIONAL EQUIPMENT	NOTE RATINGS AND ADDITIONAL ELECTRICAL EQUIPMENT ON THE INTERIOR OF THE HOUSE				
INTERIOR SPACE	FINISHED?	OBSTRUCTIONS	MSP TO METER	MSP TO WATER MAIN	
			2"		



NOTES
<p>Metal roof</p> <p>No attic access, measured for a LBW</p> <p>Was unable to measure roof due to not having a 40' ladder</p>



AP#: 1 Azimuth: 222 Pitch: 11

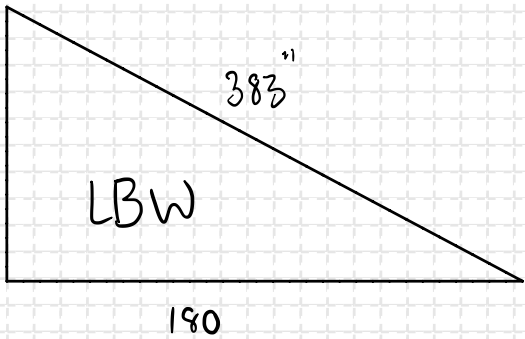
Number each origin and label positive (X,Y) Directions

Layers: 1

Obstruction Type	Origin	(A-Z)	Type	X	Y	Height	Diameter/Dimensions	Age of Shingle: <u>Metal</u> Missing Shingles: Y \ N Loose Granuals: Y \ N Bouncy: Y \ N Soft Spots: Y \ N Existing Leaks: Y \ N
Pipe Chim Vent Stack Skylight Service Drop Dish Attic Fan		A	Pipe	90"	316"	14	2	
		B	Pipe	93"	124"	13	2	
		C	Pipe	136"	155"	22	4	
		D	Pipe	158	143	12	2	
		E	Pipe	158"	97	13	3	
		F	Pipe	373"	120	13	3	
		G	Skylight	401"	164	11	16	
		H	Pipe	435"	154	15	3	
		I		-	-			
		J		-	-			

Draw section plane wire frame.
Include spans of Structural Members and load-bearing walls

Sheathing: <u>-</u>		
Soffit: <u>14"</u>		
Ground to Gutter: <u>30'</u>		
Width:		
	Size	Spacing
Rafter		
Collar Tie		
Kneewall		
Strut		
Truss		
Truss Braces		
*Indicate non-nominal lumber		
Structural Issues:	Y \ N	
Broken Rafters:	Y \ N	
Cedar Shake:	Y \ N	
Vermiculite Insulation:	Y \ N	









306



Q.PEAK DUO BLK-G5 300-320

Q.ANTUM SOLAR MODULE

The new **Q.PEAK DUO BLK-G5** solar module from Q CELLS impresses with its outstanding visual appearance and particularly high performance on a small surface thanks to the innovative **Q.ANTUM DUO** technology. Q.ANTUM's world-record-holding cell concept has now been combined with state-of-the-art circuitry half cells and a six-busbar design, thus achieving outstanding performance under real conditions — both with low-intensity solar radiation as well as on hot, clear summer days.



Q.ANTUM TECHNOLOGY: LOW LEVELIZED COST OF ELECTRICITY

Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.3 %.



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 (5400 Pa) and wind loads (4000 Pa) regarding IEC.



A RELIABLE INVESTMENT

Inclusive 12-year product warranty and 25-year linear performance guarantee².



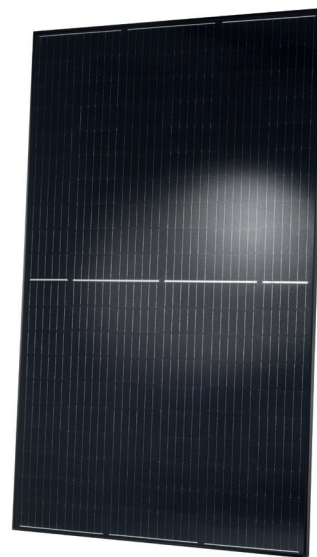
STATE OF THE ART MODULE TECHNOLOGY

Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

THE IDEAL SOLUTION FOR:



Rooftop arrays on
residential buildings

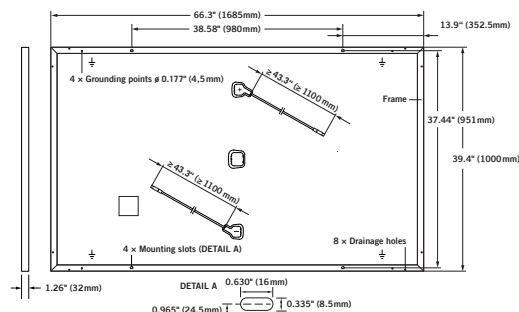


¹ APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168h)

² See data sheet on rear for further information.

MECHANICAL SPECIFICATION

Format	66.3 in × 39.4 in × 1.26 in (including frame) (1685 mm × 1000 mm × 32 mm)
Weight	41.2 lbs (18.7 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 20 monocrystalline Q.ANTUM solar half-cells
Junction box	2.76-3.35 in × 1.97-2.76 in × 0.51-0.83 in (70-85 mm × 50-70 mm × 13-21 mm), decentralized, IP67
Cable	4 mm ² Solar cable; (+) ≥ 43.3 in (1100 mm), (–) ≥ 43.3 in (1100 mm)
Connector	Multi-Contact MC4, IP65 and IP68



ELECTRICAL CHARACTERISTICS

POWER CLASS			300	305	310	315	320
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5 W / –0 W)							
Minimum	Power at MPP ²	P _{MPP} [W]	300	305	310	315	320
	Short Circuit Current*	I _{SC} [A]	9.72	9.78	9.83	9.89	9.94
	Open Circuit Voltage*	V _{OC} [V]	39.48	39.75	40.02	40.29	40.56
	Current at MPP*	I _{MPP} [A]	9.25	9.31	9.36	9.41	9.47
	Voltage at MPP*	V _{MPP} [V]	32.43	32.78	33.12	33.46	33.80
	Efficiency ²	η [%]	≥ 17.8	≥ 18.1	≥ 18.4	≥ 18.7	≥ 19.0
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NOC ³							
Minimum	Power at MPP ²	P _{MPP} [W]	222.3	226.0	229.7	233.5	237.2
	Short Circuit Current*	I _{SC} [A]	7.84	7.88	7.93	7.97	8.02
	Open Circuit Voltage*	V _{OC} [V]	36.93	37.18	37.43	37.69	37.94
	Current at MPP*	I _{MPP} [A]	7.28	7.32	7.36	7.41	7.45
	Voltage at MPP*	V _{MPP} [V]	30.55	30.88	31.20	31.52	31.84

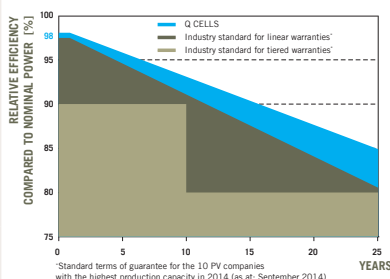
¹ 1000 W/m², 25 °C, spectrum AM 1.5 G

² Measurement tolerances STC ± 3%; NOC ± 5%

³ 800 W/m², NOCT, spectrum AM 1.5 G

* typical values, actual values may differ

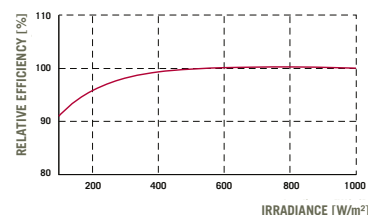
Q CELLS PERFORMANCE WARRANTY



At least 98 % of nominal power during first year.
Thereafter max. 0.54 % degradation per year.
At least 93.1 % of nominal power up to 10 years.
At least 85 % of nominal power up to 25 years.

All data within measurement tolerances.
Full warranties in accordance with the warranty terms of the Q CELLS sales organization of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α	[%/K]	+0.04	Temperature Coefficient of V _{OC}	β	[%/K]	–0.28
Temperature Coefficient of P _{MPP}	γ	[%/K]	–0.37	Normal Operating Cell Temperature	NOCT	[°F]	113 ± 5.4 (45 ± 3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V _{sys}	[V]	1000 (IEC) / 1000 (UL)	Safety Class	II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating	C (IEC) / TYPE 1 (UL)
Design load, push (UL) ²	[lbs/ft ²]	75 (3600 Pa)	Permitted module temperature on continuous duty	–40 °F up to +185 °F (–40 °C up to +85 °C)
Design load, pull (UL) ²	[lbs/ft ²]	55.6 (2666 Pa)	² see installation manual	

QUALIFICATIONS AND CERTIFICATES

UL 1703; VDE Quality Tested; CE-compliant;
IEC 61215 (Ed.2); IEC 61730 (Ed.1) application class A



PACKAGING INFORMATION

Number of Modules per Pallet	32
Number of Pallets per 53' Trailer	30
Number of Pallets per 40' High Cube Container	26
Pallet Dimensions (L × W × H)	69.3 in × 45.3 in × 46.9 in (1760 mm × 1150 mm × 1190 mm)
Pallet Weight	1415 lbs (642 kg)

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.

300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

Enphase IQ 7 and IQ 7+ Microinverters

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

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

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



Easy to Install

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

Productive and Reliable

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

Smart Grid Ready

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

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



To learn more about Enphase offerings, visit enphase.com



Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US / IQ7-60-B-US		IQ7PLUS-72-2-US / IQ7PLUS-72-B-US	
Commonly used module pairings ¹	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	IQ 7 Microinverter		IQ 7+ Microinverter	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range ²	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit ³	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	@240 V	@208 V	@240 V	@208 V
Peak CEC efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US)	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Connector type (IQ7-60-B-US & IQ7PLUS-72-B-US)	Friends PV2 (MC4 intermateable). Adaptors for modules with MC4 or UTX connectors: - PV2 to MC4: order ECA-S20-S22 - PV2 to UTX: order ECA-S20-S25			
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.

2. Nominal voltage range can be extended beyond nominal if required by the utility.

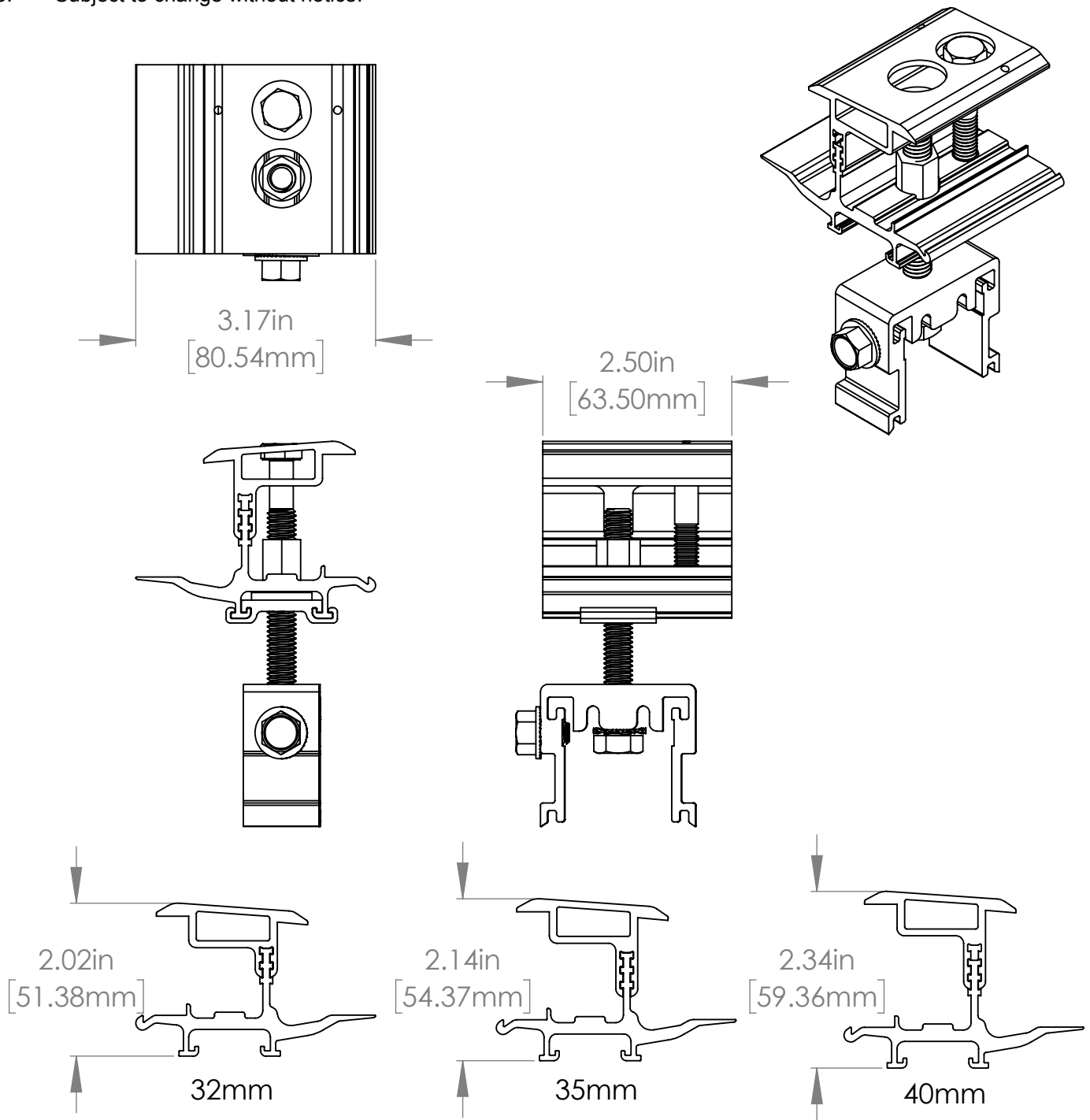
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit enphase.com



Cut Sheet - Rock-It-4.0-Mount

1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.



Toll Free Phone 1.888.766.4273
Toll Free Fax 1.888.766.9994



Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

4741 W Polk Street Ste. 4
Phoenix, AZ 85043

Material: See Spec Sheet

Scale: 1:2

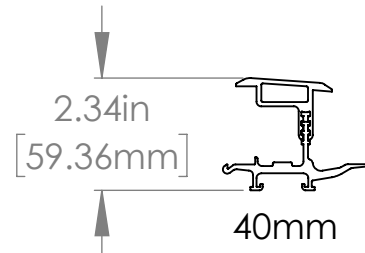
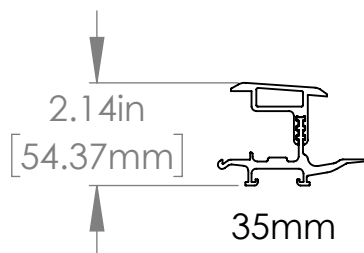
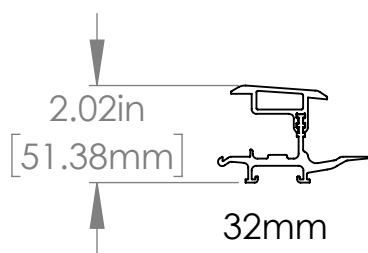
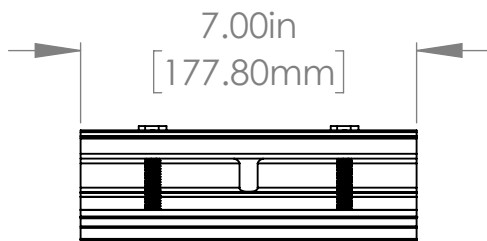
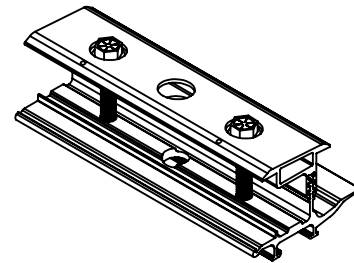
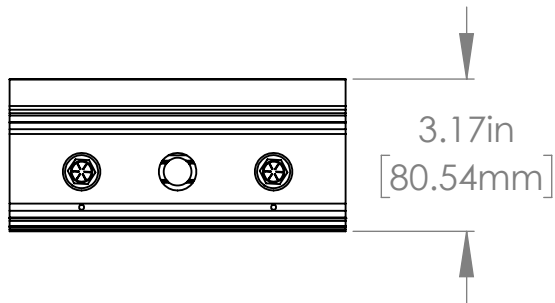
6/28/2017

ASG: -

EFS: x

Cut Sheet - Rock-It-4.0-Coupling

1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.



Toll Free Phone 1.888.766.4273
Toll Free Fax 1.888.766.9994



Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

4741 W Polk Stree Ste. 4
Phoenix, AZ 85043

Material: See Spec Sheet

Scale: 1:4

6/28/2017

ASG: -

EFS: x



September 19, 2018

EcoFasten
4741 West Polk Street, Ste. 4
Phoenix, AZ 85043
TEL: (877) 859-3947

Attn.: Engineering Department,

Re: Engineering Certification for the EcoFasten Rock-it System Installation Manual

This letter is to document that PZSE, Inc.-Structural Engineers has reviewed EcoFasten Rock-it System Installation Manual published October 12, 2015 and specifically the "Loading Tables".

SCOPE OF THE SYSTEM:

The EcoFasten Rock-it System is a solar panel support system for installing solar photovoltaic arrays on sloped roofs of buildings. Typically, such buildings are residential with shingle or tile roofs. The number and spacing of attachments to the roof structure can vary depending on various site-specific criteria including, but not limited to, roof slope, spacing of supporting structural members, and environmental loading.

SCOPE OF OUR REVIEW:

PZSE, Inc.-Structural Engineers provided a review of the following:

- Rock-it System Design Methodology
- Rock-it System Installation Manual
- Rock-it System Loading Tables

and has determined that all information, data, and analysis contained within the Installation Manual are based on, and are in compliance with, the structural requirements of the following Reference Documents:

- Minimum Design Loads for Buildings and other Structures, ASCE/SEI 7-02/7-05/7-10
- International Building Code, 2003/2006/2009/2012/2015 Edition, by International Code Council, Inc.
- Aluminum Design Manual, 2010 Editions, by The Aluminum Association

This letter certifies that the EcoFasten Rock-it System Installation Manual and Loading Tables are in compliance with the above Reference Documents.



DESIGN RESPONSIBILITY:

The Rock-it System Installation Manual is intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, the user of the Installation Manual has sole responsibility for the accuracy of the design and integrity of the system.

The Installation Manual does not check the capacity of the building structure to support the loads imposed on the building by the array, such as bending strength of roof rafters spanning between supports. This requires additional knowledge of the building and is outside the scope of the Installation Manual and our review.

If you have any questions on the above, do not hesitate to call.

Prepared By:
PZSE, Inc. - Structural Engineers
Roseville, CA



Daniel W. Dunzik

Architect LEED-AP

370 Burnt Hill Rd. Skillman, NJ. 08558

908-872-3664

Studiogdesign@comcast.net

March 1, 2019

San Antonio, TX

Attn: Construction Official

Re: Proposed Photovoltaic Solar Panel Installation

Lewis Fisher

306 Barrera Street

San Antonio, TX 78210

Dear Plan Reviewer:

Certification: I have reviewed the engineering testing reports for the racking and attachments to be used on this project and I certify that the products are capable of supporting the code required loads and are suitable for this installation when installed in strict compliance with the manufacturers printed instructions.

Regarding the solar panel array installation on the above referenced project please note that an inspection was performed, and analysis of the existing structure was conducted. There is adequate structural capacity for the installation of the array with the following recommendations:

1. The array will be installed on the existing roof. The roof is constructed of 2"x8" wood rafters @ 24" O.C. spanning 15' with 1/2" plywood sheathing. The new array (See Site map by contractor) will add 2.63 Lb. / Sf. overall to the roof. No additional structure support is required for the existing roof structure.

2. The system shall be secured to the roof using the "EcoFasten Solar" ROCK-IT SYSTEM 4.0 attachment system secured to the metal roof with the "S-5" mounting system. The attachment system shall be UL 1703 approved tested. When mounted in landscape or portrait attachments shall be spaced @ 48" o.c. max. with each row staggered in roof wind zone 1. Attachments shall be spaced @ 32" o.c. max. in wind zone 2 & 3. The maximum panel cantilever length shall be 16" in wind zone 1,2, &3 except when mounted in portrait the maximum cantilever length shall be 12" in wind zone 3 only. Provide 6 mil. vapor barrier between dissimilar metal fasteners. Provide water tight gasket and sealant at all penetrations. Attachments shall follow panel rows as specified by the system manufacturer's installation manual. The panel angle shall match the roof slope.

Structural Design Loads per ASCE 7-10

- Dead Loads = 10 psf (+2.6psf, New Solar Panels) = 12.6 psf.- Live Load =20psf

Total dead weight on attachment = 18Lb. Max.

Ch. 30 Wind Loads Components and Cladding

windloads = 115 mph Exposure B zone 1=+/-21.8 psf., Zone 2&3=+/-52.4 psf.

Area of Panels largest array = 326.34sf

Tributary area panels/attachment max. 326.34sf/ 40_{min} = 8sf.

Min Number of Attachments =40.

Wind pressure 21.8 x Area 326.34/ 40 No. Attachments = 271

TABLE 10.3.1 NDS Pull out strength of 5/16"x4" lags in rafter =W'= WxCdxCt =266lbs/in

Daniel W. Dunzik

Architect LEED-AP

370 Burnt Hill Rd. Skillman, NJ. 08558

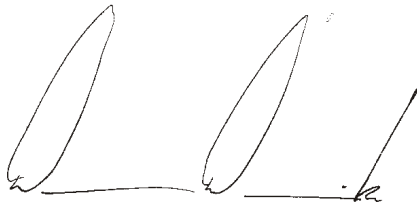
908-872-3664

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embedment x 3"embedment = 798 x1.6Cd x1.0Ct = 1,276 Lbs Max. > 271lbs/attachment OK

3. Solar modules shall be UL-1703 rated. Refer to manufacturers specifications sheets.
4. Positive drainage of the system shall be so as not to void the existing roof warrantee.
5. All aspects of the installation shall comply with the 2018 International Residential Code With all Texas amendments, ASCE7-10, NEC 2017(NFPA70), All Local Governing County and Municipal Ordinances adopted by reference or enacted by law, All installation instructions prepared by the manufacturer.

If you have any questions relating to this matter, please contact me at your earliest convenience. Thank you.

A handwritten signature in black ink, appearing to read 'D. Dunzik', with a horizontal line underneath.

Daniel W. Dunzik, RA. LEED-AP
TX. Lic. No. 26995