HISTORIC PRESERVATION COMMISSION

Marc Elrich
County Executive

Robert Sutton
Chairman

Date: October 26, 2023

MEMORANDUM

TO: Rabbiah Sabbakhan
Department of Permitting Services
FROM: Michael Kyne
Historic Preservation Section
Maryland-National Capital Park & Planning Commission
SUBJECT: Historic Area Work Permit #1043533: Solar panel installation.

The Montgomery County Historic Preservation Commission (HPC) has reviewed the attached application for a Historic Area Work Permit (HAWP). This application was **Approved** at the October 25, 2023 HPC meeting.

The HPC staff has reviewed and stamped the attached construction drawings**.**

THE BUILDING PERMIT FOR THIS PROJECT SHALL BE ISSUED CONDITIONAL UPON ADHERENCE TO THE ABOVE APPROVED HAWP CONDITIONS AND MAY REQUIRE APPROVAL BY DPS OR ANOTHER LOCAL OFFICE BEFORE WORK CAN BEGIN.

Applicant: Jeffrey Luker (Fusion Solar Service, Agent)
Address: 7307 Takoma Avenue, Takoma Park

This HAWP approval is subject to the general condition that the applicant will obtain all other applicable Montgomery County or local government agency permits. After the issuance of these permits, the applicant must contact this Historic Preservation Office if any changes to the approved plan are made. Once work is complete the applicant will contact Michael Kyne at 301.563.3403 or michael.kyne@montgomeryplanning.org to schedule a follow-up site visit.

FOR STAFF ONLY:
HAWP# 1043533
DATE ASSIGNED_____

APPLICATION FOR HISTORIC AREA WORK PERMIT

HISTORIC PRESERVATION COMMISSION
301.563.3400

APPLICANT:

Name: Fusion Solar Services E-mail: permits@fusionss.net

Address: 3600 Commerce Drive City: Baltimore Zip: 21227

Daytime Phone: 4434253023 Tax Account No.: 01059658

AGENT/CONTACT (if applicable):

Name: Fusion Solar Services E-mail: permits@fusionss.net

Address: 3600 Commerce Drive City: Baltimore Zip: 21227

Daytime Phone: 4434253023 Contractor Registration No.: 30991

LOCATION OF BUILDING/PREMISE: MIHP # of Historic Propert Takoma Park

APPROVED
Montgomery County
Historic Preservation Commission

Is the Property Located within an Historic District? X Yes/Distri __No/Indivi

REVIEWED
By Michael Kyne at 4:50 pm, Oct 26, 2023

Is there an Historic Preservation/Land Trust/Environmental Ease de a map of ement H

Are other Planning and/or Hearing Examiner Approvals /Review n? (Conditional Use, Variance, Record Plat, etc.?) If YES, include inf supplemental information.

Building Number: 7307 Street: Takoma Avenue

Town/City: Takoma Park Nearest Cross Street: _____

Lot: P1 Block: 78 Subdivision: _____ Parcel: _____

TYPE OF WORK PROPOSED: See the checklist on Page 4 to verify that all supporting items for proposed work are submitted with this application. Incomplete Applications will not be accepted for review. Check all that apply:

- ☐ New Construction
- ☐ Addition
- ☐ Demolition
- ☐ Grading/Excavation
- ☐ Deck/Porch
- ☐ Fence
- ☐ Hardscape/Landscape
- ☐ Roof
- ☐ Shed/Garage/Accessory Structure
- ☑ Solar
- ☐ Tree removal/planting
- ☐ Window/Door
- ☐ Other:_____

I hereby certify that I have the authority to make the foregoing application, that the application is correct and accurate and that the construction will comply with plans reviewed and approved by all necessary agencies and hereby acknowledge and accept this to be a condition for the issuance of this permit.

Ola Carew
Signature of owner or authorized agent

9/21/2023
Date

HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFING

[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

Owner's mailing address	**Owner's Agent's** mailing address
7307 Takoma Avenue	3600 Commerce Drive Baltimore Md 21227

Adjacent and confronting Property Owners mailing addresses

Jay Dintaman 7309 Takoma Ave	Richard Henrich 7305 Takoma Ave
7305 Baltimore Avenue, Takoma Park 20912	7310 Piney Branch Road, Takoma Park 20912

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APPROVED

Montgomery County

Historic Preservation Commission

Description of Property: Please describe the building and surrounding environment. Include information on significant structures, landscape features, or other significant features of the property:

Roof will be replaced prior to solar panels installation.

Description of Work Proposed: Please give an overview of the work to be undertaken:

Install (13) Roof Mounted Solar Panels. System Size 5.27

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Work Item 1: _____

Description of Current Condition:	Proposed Work:

Work Item 2: _____

Description of Current Condition:	Proposed Work:
REVIEWED ***By Michael Kyne at 4:50 pm, Oct 26, 2023***	APPROVED Montgomery County Historic Preservation Commission

Work Item 3: _____

Description of Current Condition:	Proposed Work:

HISTORIC AREA WORK PERMIT
CHECKLIST OF
APPLICATION REQUIREMENTS

	Required Attachments						
Proposed Work	1. Written Description	2. Site Plan	3. Plans/ Elevations	4. Material Specifications	5. Photographs	6. Tree Survey	7. Property Owner Addresses
New Construction	*	*	*	*	*	*	*
Additions/ Alterations	*	*	*	*	*	*	*
Demolition	*	*	*		*		*
Deck/Porch	*	*	*	*	*	*	*
Fence/Wall	*	*	*	*	*	*	*
Driveway/ Parking Area	*	*		*	*	*	*
Grading/Excavation/Landscaing	*	*		*	*	*	*
Tree Removal	*	*		*	*	*	*
Siding/ Roof Changes	*	*	*	*	*		*
Window/ Door Changes	*	*	*	*	*		*
Masonry Repair/ Repoint	*	*	*	*	*		*
Signs	*	*	*	*	*		*

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By Michael Kyne at 4:50 pm, Oct 26, 2023

APPROVED

Montgomery County

Historic Preservation Commission

Gmail Olajumoke Carew <ocarew@luminasolar.com>

Fwd: FW: Solar Installation at 7307 Takoma Ave, Takoma Park MD

1 message

Steven Coffman <scoffman@luminasolar.com> Wed, Sep 20, 2023 at 2:48 PM
To: Olajumoke Carew <ocarew@luminasolar.com>

Luker email confirmation from neighbors

Steve Coffman
Project Manager
301.509.4376
luminasolar.com

3600 Commerce Dr., Ste 601
Baltimore, MD 21227

Leave us a Review!

Google - Lumina Solar
SolarReviews - Lumina Solar
Facebook - Lumina Solar
Energysage - Lumina Solar
Home Advisor - Lumina Solar

---------- Forwarded message ---------
From: **Jeffrey Luker** <jeffrey.luker@quinnevans.com>
Date: Wed, Sep 20, 2023 at 2:41 PM
Subject: FW: Solar Installation at 7307 Takoma Ave, Takoma Park MD
To: scoffman@luminasolar.com <scoffman@luminasolar.com>

Hi Steve,

Here is 1 of 2 approvals.

Jeffrey Luker, AIA, LEED AP

Principal

Quinn

202 591 2309 direct

202 744 7494 mobile

REVIEWED
By Michael Kyne at 4:50 pm, Oct 26, 2023

APPROVED
Montgomery County
Historic Preservation Commission

From: Richard Henrich <rhenrich@erols.com>
Sent: Wednesday, September 20, 2023 2:29 PM
To: Jeffrey Luker <jeffrey.luker@quinnevans.com>
Cc: 'Steven Coffman' <scoffman@luminasolar.com>
Subject: Solar Installation at 7307 Takoma Ave, Takoma Park MD

Hi Jeff:

I am writing to confirm that I enthusiastically approve your project for the installation of solar panels on your home!

Best regards and congratulations,

Richard Henrich

7305 Takoma Ave

Takoma Park, MD 20912

202-441-0832

2 attachments

image001.png
9K

REVIEWED
By Michael Kyne at 4:50 pm, Oct 26, 2023

image001.png
9K

APPROVED

Montgomery County

Historic Preservation Commission

Gmail

Olajumoke Carew <ocarew@luminasolar.com>

Fwd: FW: Interconnection Approved! ALSO Historic application

Steven Coffman <scoffman@luminasolar.com> Wed, Sep 20, 2023 at 2:48 PM
To: Olajumoke Carew <ocarew@luminasolar.com>

Luker email confirmation from neighbors

Steve Coffman
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Jeffrey Luker, AIA, LEED AP

Principal

Quinn Evans Logo

202 591 2509 direct

202 744 7494 mobile

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By Michael Kyne at 4:50 pm, Oct 26, 2023

APPROVED
Montgomery County
Historic Preservation Commission

From: Jay Dintaman <jaydavmex8@gmail.com>
Sent: Wednesday, September 20, 2023 2:07 PM
To: Jeffrey Luker <jeffrey.luker@quinnevans.com>
Subject: Re: Interconnection Approved! ALSO Historic application

APPROVED
Montgomery County
Historic Preservation Commission

Jeff,

REVIEWED
By Michael Kyne at 4:50 pm, Oct 26, 2023

We have no objections to your proposal to install solar panels on your roof.

Jay Dintaman

7309 Takoma Ave

Sent from my iPhone

> On Sep 20, 2023, at 1:53 PM, Jeffrey Luker <jeffrey.luker@quinnevans.com> wrote:
>
> Richard and Jay,
>
> As discussed, we are planning to replace and add solar panels to our roof. Here is an image of the panel layout:
>
> <image002.jpg>
>
> To include with our application to the Montgomery County Historic Commission we need statement from you stating that you have no objections to the proposed work.
>
> If you are are willing, will you please send me a brief email confirming approval. Or let me know if you have any concerns.
>
> Thank you,
>
> <image001.png> **Jeffrey Luker**, AIA, LEED AP
>
> Principal
>
> 202 591 2509 direct

202 744 7494 mobile

From: Steven Coffman <scoffman@luminasolar.com>
Sent: Wednesday, September 20, 2023 1:43 PM
To: Jeffrey Luker <jeffrey.luker@quinnevans.com>
Subject: Interconnection Approved! ALSO Historic application

Hey Jeff,

Quick update, your utility interconnection has been approved! Waiting on county permits and historical.

For the historical application, we still need the email(s) from Richard and the neighbor on your other side. Just a quick "yes we approve of the solar project" with their name and address will do.

Thanks!

LUMINA SOLAR

Steve Coffman

Project Manager

301.509.4376
luminasolar.com

3600 Commerce Dr., Ste 601
Baltimore, MD 21227

Leave us a Review!

Google - Lumina Solar

SolarReviews - Lumina Solar

Facebook - Lumina Solar

Energysage - Lumina Solar

Home Advisor - Lumina Solar

2 attachm

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APPROVED
Montgomery County
Historic Preservation Commission

image001.png
9K

image001.png
9K

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Montgomery County

Historic Preservation Commission

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APPROVED
Montgomery County
Historic Preservation Commission

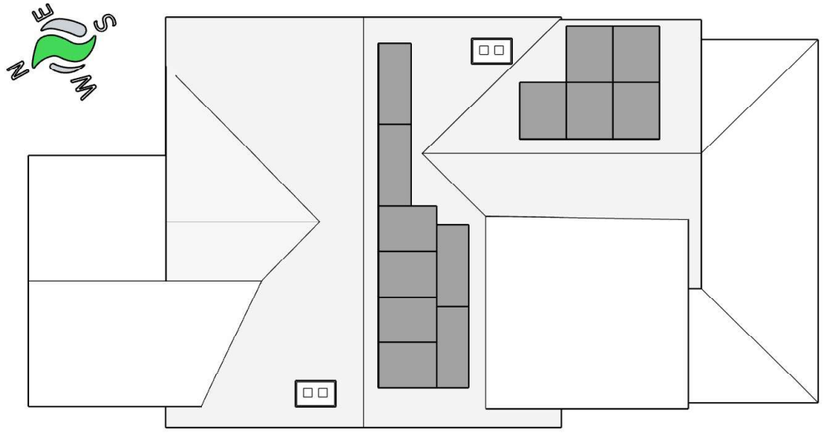
SOLAR PV SYSTEM: 5.265 kWp

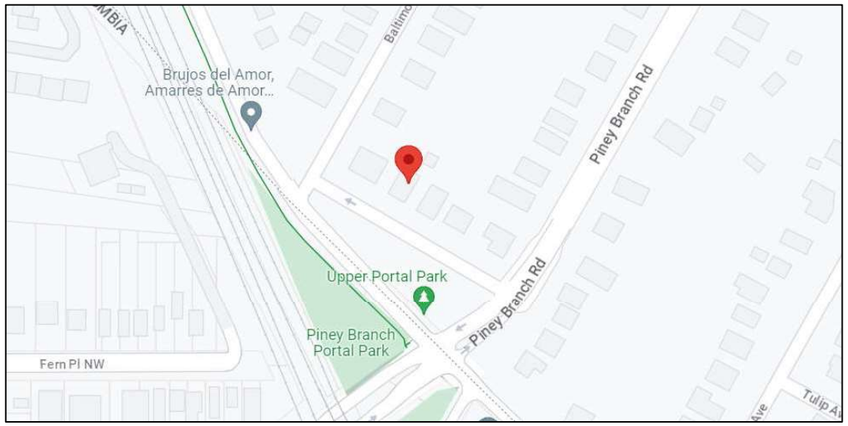
LUKER RESIDENCE

7307 TAKOMA AVENUE TAKOMA PARK MD
UNITED STATES 20912

PROJECT INFORMATION

OWNER:	JEFFERY LUKER
ADDRESS:	7307 TAKOMA AVENUE TAKOMA PARK MD UNITED STATES 20912
AHJ:	MONTGOMERY COUNTY (MD)
ADDRESS:	2425 REEDIE DRIVE WHEATON-GLENMONT, MARYLAND 20902
ZONING:	RESIDENTIAL
BUILDING CODE:	IBC 2018
ELECTRICAL CODE:	NEC 2017
ASCE VERSION:	ASCE 7-16
SNOW LOAD:	30 PSF
WIND SPEED:	115 MPH
WIND EXPOSURE:	B
DC RATING:	5.265 kW
AC RATING:	3.77 kW
RACKING:	UNIRAC SM LIGHT RAIL
MODULE:	(13) REC405AA
INVERTER:	(13) IQ8PLUS-72-2-US





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PROJECT SCOPE

THIS PROJECT INVOLVES THE INSTALLATION OF (13) REC PURE 405W ALL BLACK SOLAR MODULES. THE SOLAR MODULES WILL BE RACKED USING A PRE-ENGINEERED RACKING SYSTEM. THE RACKED MODULES WILL BE ELECTRICALLY CONNECTED TO (13) ENPHASE DC TO AC POWER INVERTERS, AND INTERCONNECTED TO THE LOCAL UTILITY USING MEANS AND METHODS CONSISTENT WITH THE RULES ENFORCED BY THE LOCAL UTILITY AND PERMITTING JURISDICTION.

INDEX OF PAGES	
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E001	ELECTRICAL - LINE DIAGRAM
E002	ELECTRICAL - WIRE CALCS
E003	STRING & CONDUIT LAYOUT
E004	EQUIP. RATINGS & SIGNAGE

PROJECT ADDRESS:

JEFFERY LUKER
7307 TAKOMA AVENUE
TAKOMA PARK MD UNITED
STATES 20912

CONTRACTOR INFO:

FUSION SOLAR SERVICES

3600 COMMERCE DR
SUITE 601
BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:

MHIC-30991

REV	DATE
IFC	8/17/2023

COVER

Z001

STATE OF MARYLAND
ANDREW OESTERREICHER
49910
PROFESSIONAL ENGINEER

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
License No. 49910 Expires: 9/15/24

STAMPED AND SIGNED FOR STRUCTURAL ONLY

DocuSigned by:
Andrew Oesterreicher
4A8006A02EA947F...

FOR ENGINEERING USE ONLY

GENERAL NOTES

1) THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION (AHJ).

2) ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE AND AS REQUIRED BY THE NEC AND AHJ.

3) PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS

4) THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM, AND THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE.

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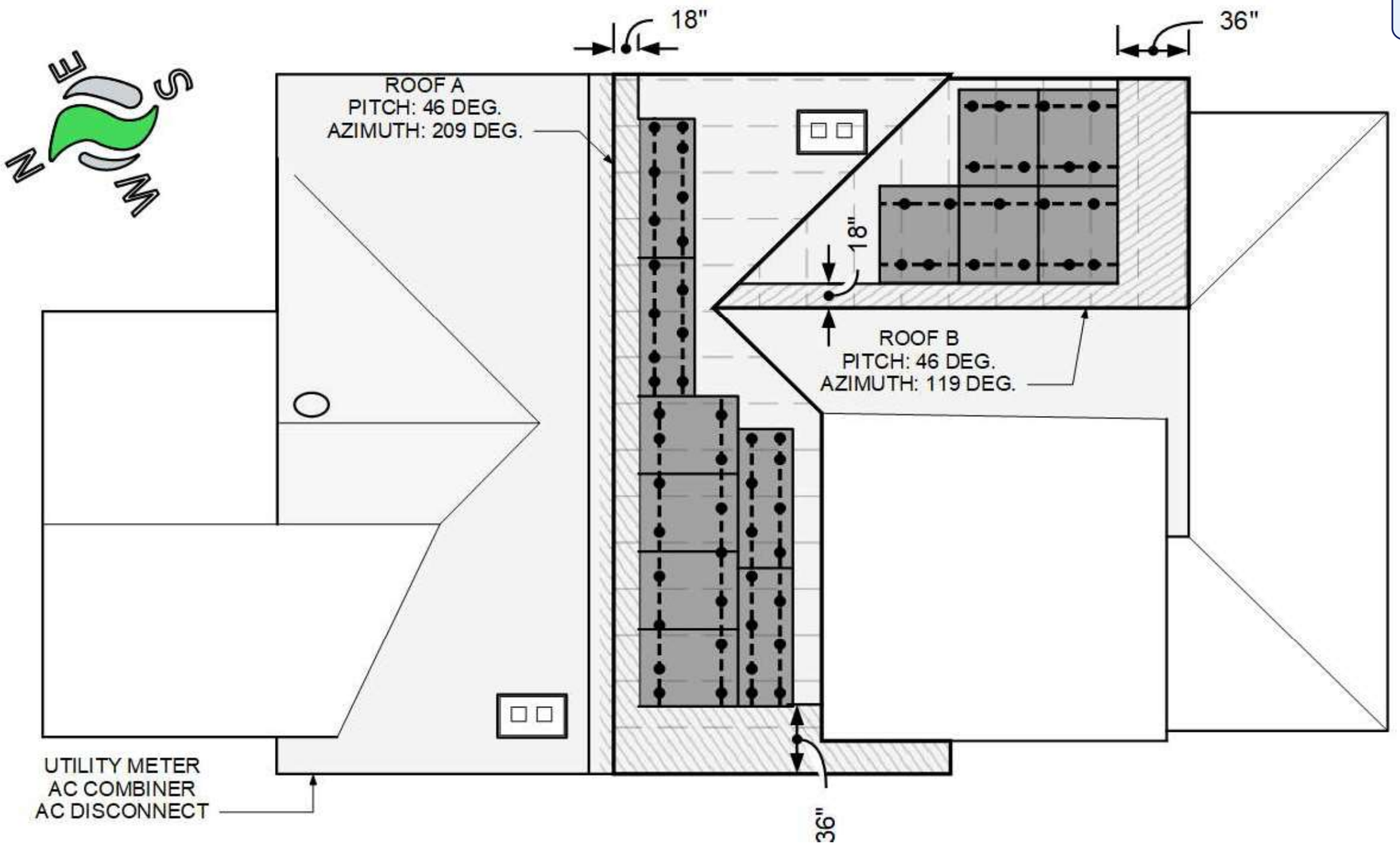

LEGEND

- ROOF SUPPORT
- MOUNTING RAIL
- ROOF ATTACHMENT
- PV ARRAY
- FIRECODE SETBACK

PROJECT ADDRESS:

JEFFERY LUKER
7307 TAKOMA AVENUE
TAKOMA PARK MD UNITED STATES 20912

CONTRACTOR INFO:

FUSION SOLAR SERVICES
3600 COMMERCE DR
SUITE 601
BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:

MHIC-30991

REV	DATE
IFC	8/17/2023

ATTACHMENT PLAN

A001

STATE OF MARYLAND
ANDREW OESTERREICHER
49910
PROFESSIONAL ENGINEER

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland. License No. 49910 Expires: 9/15/24

STAMPED AND SIGNED FOR STRUCTURAL ONLY

DocuSigned by:
Andrew Oesterreicher
4A8006A02EA947F...

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INSTALLATION NOTES

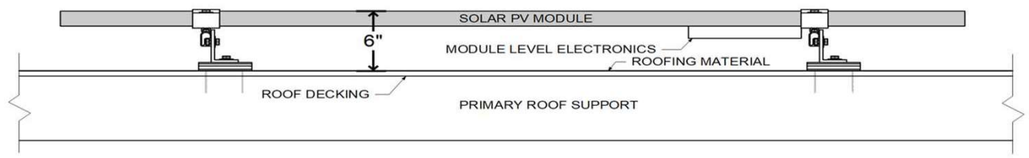
1) ALL SOLAR MODULES SUPPORTED BY ROOF ATTACHMENTS STAGGERED AT 48 IN O.C. (OR AS INDICATED)

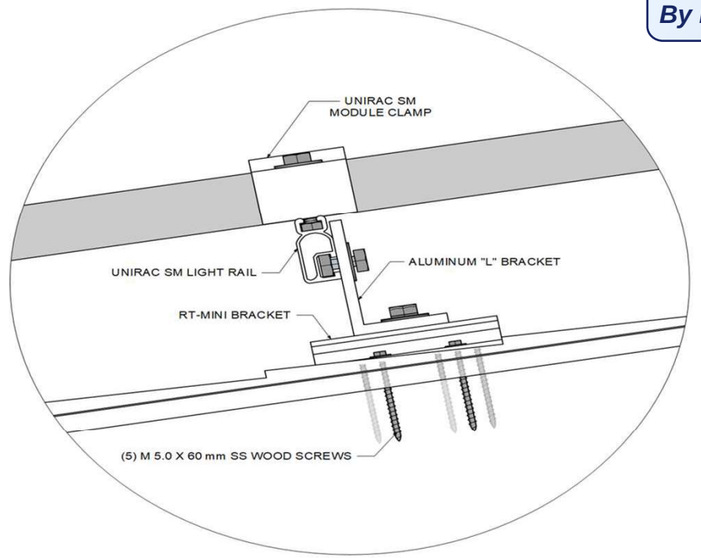
2) SOLAR PHOTOVOLTAIC SYSTEM INSTALLED PARALLEL TO ROOF SURFACE

3) SOLAR PHOTOVOLTAIC SYSTEM INSTALLED AT A MAXIMUM HEIGHT OF 6 IN ABOVE ROOF SURFACE (OR AS INDICATED)

4) ANY ROOFING PENETRATIONS SHALL HAVE PROPER FLASHING SEALANT USED TO PROVIDE WATERTIGHT ASSEMBLY

TOTAL ROOF PLAN AREA =	1993.88 SQ.FT.
TOTAL SOLAR ARRAY AREA =	258.917 SQ.FT.
ARRAY ROOF COVERAGE =	**13** %





ROOF PROPERTIES	ROOF LABEL:	A	B
	MATERIAL:	3-Tab Comp Shingle	3-Tab Comp Shingle
	PITCH:	46°	46°
	AZIMUTH:	209°	119°
	PRIMARY SUPPORT:	3.5x5.5 ROUGH CUT RAFTERS	3.5x5.5 ROUGH CUT RAFTERS
	PRIMARY SUPPORT SPACING:	24"	24"
	SPAN (EAVE TO RIDGE):	10.25'	9.83'
	MEAN HEIGHT:	20'	20'
	RACKING:	UNIRAC SM LIGHT RAIL	UNIRAC SM LIGHT RAIL
	STANDOFF:	RT-MINI	RT-MINI
DEAD & POINT LOAD CALCULATIONS	NUMBER OF MODULES:	8	5
	MODULE WEIGHT (LBS):	360.00	225.00
	M.L.E. WEIGHT (LBS):	19.04	11.90
	RACKING WEIGHT (LBS):	77.44	48.40
	STANDOFF WEIGHT (LBS):	12.00	7.50
	ARRAY WEIGHT (LBS):	468.48	292.80
	ARRAY AREA (SQ.FT.):	159.33	99.58
	DISTRIBUTED LOAD (PSF):	**2.94**	**2.94**
	APPROX. NUMBER OF STANDOFFS:	20	13
	POINT LOAD (LBS/STANDOFF):	**23.42**	**22.52**

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
License No: 49910 Expires: 9/15/24

FOR ENGINEERING USE ONLY

STAMPED AND SIGNED FOR STRUCTURAL ONLY

DocuSigned by:
Andrew Oesterreicher
4A8006A02EA947F...

INSTALLATION NOTES

1) ALL RACKING SHALL BE INSTALLED PER MANUFACTURER SPECIFICATIONS

2) M.L.E.'S = MODULE LEVEL ELECTRONICS (IE, POWER OPTIMIZERS, MICRO-INVERTERS, CABLES, ETC)

3) USE (5) 5.0X60MM ROOFING SCREWS TO MOUNT TO ROOF DECKING OR PURLIN

MOUNTING SYSTEM PROPERTIES	
RACKING	UNIRAC SM LIGHT RAIL
STANDOFF	RT-MINI (5 SCREWS) TO DECKING/PURLIN
MAX. RAIL SPAN (IN)	24
MIN. FASTENER DEPTH (IN)	0.5
MAX. RAIL CANTILEVER (IN)	8
MAX. ARRAY HEIGHT (IN)	5

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PROJECT ADDRESS:

JEFFERY LUKER
7307 TAKOMA AVENUE
TAKOMA PARK MD UNITED STATES 20912

CONTRACTOR INFO:

FUSION SOLAR SERVICES

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BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:

MHIC-30991

REV	DATE
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ASSEMBLY & LOAD CALCS

S001

CONDUCTOR AND CONDUIT SCHEDULE

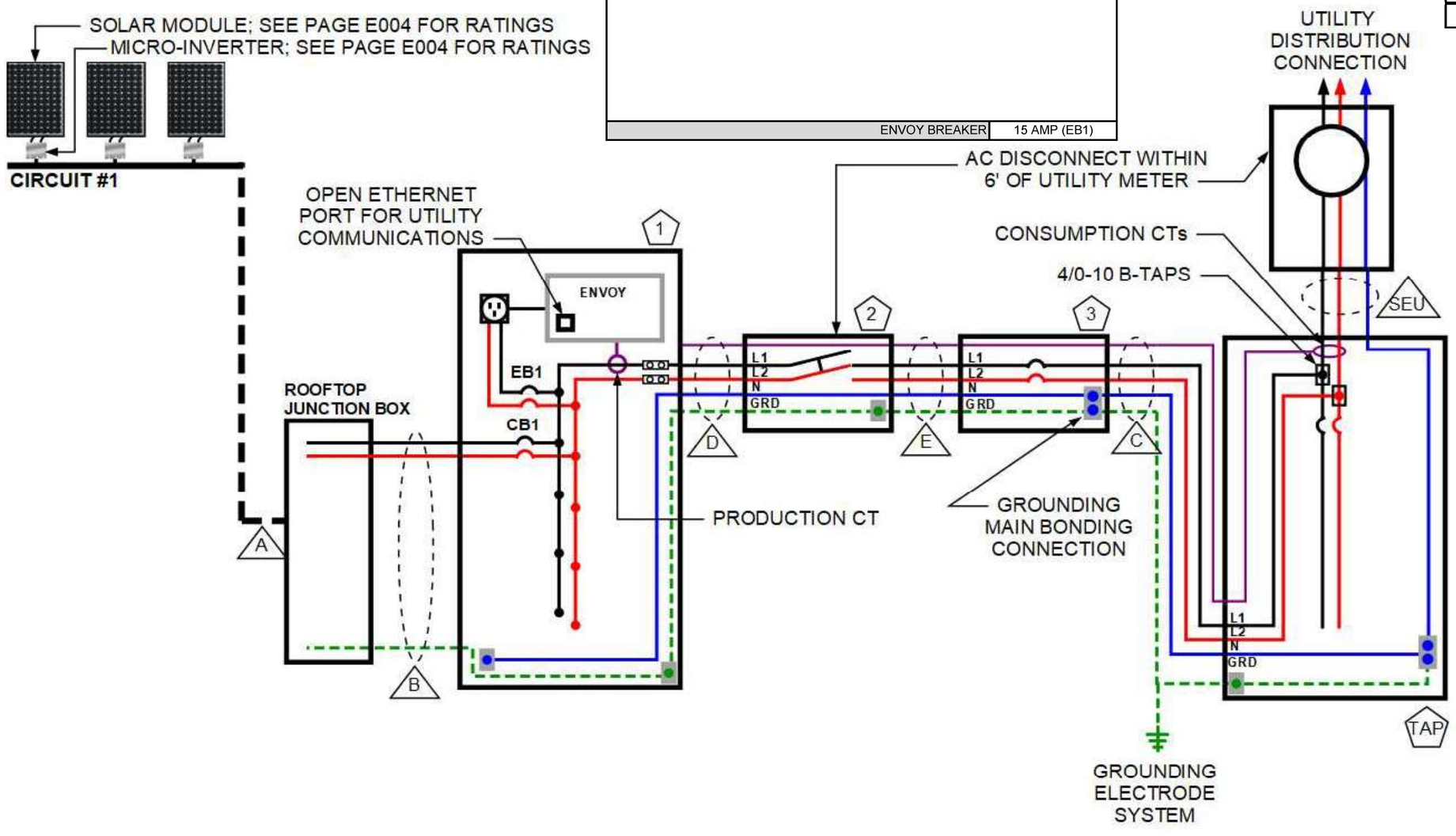
TAG	WIRE SIZE	GROUND SIZE	WIRE TYPE	DESCRIPTION	CONDUIT SIZE	CONDUIT TYPE	LENGTH
SEU	#2/0 AL	N/A	SEU	(2) PHASE CONDUCTORS & (1) NEUTAL	N/A	N/A	5'
A	#12 AWG	#6 AWG	Q-CABLE	(2) PHASE CONDUCTORS & (1) BARE COPPER IN FREE AIR	N/A	N/A	77' (MAX)
B	#10 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) GROUND	0.75"	EMT	40'
C	#6 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) NEUTRAL & (1) GROUND	0.75"	EMT	5'
D	#10 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) NEUTRAL & (1) GROUND	0.75"	EMT	5'
E	#10 AWG	#8 AWG	THWN-2	(2) PHASE CONDUCTORS & (1) NEUTRAL & (1) GROUND	0.75"	EMT	5'

EQUIPMENT SCHEDULE

TAG	EQUIPMENT DETAILS	MOUNTING LOCATION
TAP	150 AMP SQUARE D QO MAIN SERVICE PANEL WITH 150 AMP MAIN BREAKER (150 AMP SERVICE)	SURFACE-MOUNTED ON WALL OPPOSITE UTILITY METER
1	ENPHASE COMBINER (MODEL #X-IQ-AM1-240-4) WITH CIRCUITS AS LISTED IN TABLE	MOUNTED ADJACENT TO UTILITY METER
2	30 AMP NEMA3R NON-FUSED DISCO (MODEL #DU221RB)	MOUNTED ADJACENT TO UTILITY METER
3	125A MBE (MODEL #QO2125BNRB) WITH 2 POLE, 20 AMP QO BREAKER	MOUNTED ADJACENT TO MAIN SERVICE PANEL

CIRCUIT SCHEDULE

CIRCUIT	INVERTER COUNT	AMPERAGE CALCULATION	BREAKER SIZE
#1	13	13 x 1.21 x 125% = 19.66 A	20 AMP (CB1)
		ENVOY BREAKER	15 AMP (EB1)



ELECTRICAL NOTES

WHEN THE AC UTILITY SOURCE IS REMOVED FROM THE INVERTER OUTPUT CIRCUITS VIA ANY MEANS, SUCH AS AN AC BREAKER, AC DISCONNECT, OR REMOVAL OF THE SOLAR OR MAIN UTILITY SERVICE METER, THIS EQUIPMENT PERFORMS THE RAPID SHUTDOWN FUNCTION PER 690.12

ARRAY BONDED WITH #6 BARE Cu

TWO UNGROUNDED CONDUCTORS PER CIRCUIT OF INVERTERS (TYP)

ALL CONDUIT SIZING WILL BE IN ACCORDANCE TO THE NEC, CHAPTER 9

PVC OR LFMC MAY BE USED INSTEAD OF EMT CONDUIT

THE AC DISCONNECT IS LOCKABLE, TAGGABLE, 24/7 UTILITY ACCESSIBLE, LOAD BREAK CAPABLE, AND HAS VISIBLE BREAK.

REVIEWED
By Michael Kyne at 4:50 pm, Oct 26, 2023

APPROVED
Montgomery County
Historic Preservation Commission

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PROJECT ADDRESS:

JEFFERY LUKER
7307 TAKOMA AVENUE
TAKOMA PARK MD UNITED STATES 20912

CONTRACTOR INFO:

FUSION SOLAR SERVICES

3600 COMMERCE DR
SUITE 601
BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:
MHIC-30991

REV	DATE
IFC	8/18/2023

ELECTRICAL - LINE DIAGRAM

E001

CALCULATION FOR PV BREAKER					
SYSTEM CURRENT	1.21	x	13	=	15.73 A
DESIGN AMPERAGE (FLA)	15.73	x	125%	=	19.6625 A
MAIN BUSS RATING	150	x	120%	=	180 A
EXISTING MAIN BREAKER					150 A
MAX SOLAR BREAKER	180	-	150	=	30 A

ARRAY TO COMBINER	
WIRE LENGTH	40 FT
WIRE SIZE	#10 AWG
SYSTEM PROPERTIES	
FULL LOAD AMPERAGE	15.73
SOURCE VOLTAGE	240
LENGTH OF RUN (FT)	40
LOAD DUTY	CONTINUOUS
CONDUCTOR TYPE	THWN-2
CONDUCTOR MATERIAL	COPPER
CONDUCTOR LOCATION	DRY OR WET
CONDUCTOR INSULATION TEMP	75ºC
DISTANCE ABOVE ROOF	ALL INTERIOR CONDUIT
AVERAGE OUTSIDE TEMP (ºF)	94
TEMP ADDER (ºF)	N/A
ADJUSTED AMBIENT TEMP (ºF)	94
TERMINAL TEMP RATING	75ºC
CIRCUIT TYPE	SINGLE PHASE 2-WIRE
QTY. OF CURRENT-CARRYING CONDUCTORS	2
ADDITIONAL CURRENT-CARRYING CONDUCTORS	
TOTAL # OF CURRENT-CARRYING CONDUCTORS	2
CONDUCTOR CONDITIONS OF USE	
LARGEST CIRCUIT FULL LOAD AMPS	15.73
LOAD DUTY MULTIPLIER	1.25
AMBIENT TEMP FACTOR	0.94
QTY. CONDUCTORS IN CONDUIT FACTOR	1.00
CONDUCTOR SELECTION	
MINIMUM REQUIRED CONDUCTOR AMPACITY	20.92
SELECTED CONDUCTOR AMPACITY	35.00
SELECTED CONDUCTOR SIZE (AWG)	10
TERMINAL REQUIREMENT	
LARGEST CIRCUIT FULL LOAD AMPS	15.73
LOAD DUTY MULTIPLIER	1.25
REQUIRED TERMINAL AMPACITY	19.66
VOLTAGE DROP	
OHMS/MILFT	1.240
LENGTH OF RUN (FT)	40
LOAD CURRENT	15.73
VOLTAGE DROP	1.56
VOLTS AT LOAD TERMINAL	238.44
PERCENT VOLTAGE DROP	0.65%

INTERCONNECTION	
METHOD	LINE SIDE TAP
WIRE SIZE	#6 AWG
SYSTEM PROPERTIES	
FULL LOAD AMPERAGE	15.73
SOURCE VOLTAGE	240
LENGTH OF RUN (FT)	15
LOAD DUTY	CONTINUOUS
CONDUCTOR TYPE	THWN-2
CONDUCTOR MATERIAL	COPPER
CONDUCTOR LOCATION	DRY OR WET
CONDUCTOR INSULATION TEMP	75ºC
AMBIENT TEMP	26-30ºC
TERMINAL TEMP RATING	75ºC
CIRCUIT TYPE	SINGLE PHASE 3-WIRE
QTY. OF CURRENT-CARRYING CONDUCTORS	2
CONDUCTOR CONDITIONS OF USE	
FULL LOAD AMPS	15.73
LOAD DUTY MULTIPLIER	1.25
AMBIENT TEMP FACTOR	1.00
QTY. CONDUCTORS IN CONDUIT FACTOR	1.00
CONDUCTOR SELECTION	
MINIMUM REQUIRED CONDUCTOR AMPACITY	19.66
SELECTED CONDUCTOR AMPACITY	65.00
SELECTED CONDUCTOR SIZE (AWG)	6
TERMINAL REQUIREMENT	
FULL LOAD AMPS	15.73
LOAD DUTY MULTIPLIER	1.25
REQUIRED TERMINAL AMPACITY	19.66
VOLTAGE DROP	
OHMS/MILFT	0.491
LENGTH OF RUN (FT)	15
LOAD CURRENT	15.73
VOLTAGE DROP	0.23
VOLTS AT LOAD TERMINAL	239.77
PERCENT VOLTAGE DROP	0.10%

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PROJECT ADDRESS:

JEFFERY LUKER
7307 TAKOMA AVENUE
TAKOMA PARK MD UNITED
STATES 20912

CONTRACTOR INFO:

FUSION SOLAR SERVICES
3600 COMMERCE DR
SUITE 601
BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:
MHIC-30991

REV	DATE
IFC	8/18/2023

ELECTRICAL - WIRE CALCS

E002

ELECTRICAL NOTES

1) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 75ºC AND WET ENVIRONMENT, UNLESS OTHERWISE NOTED.

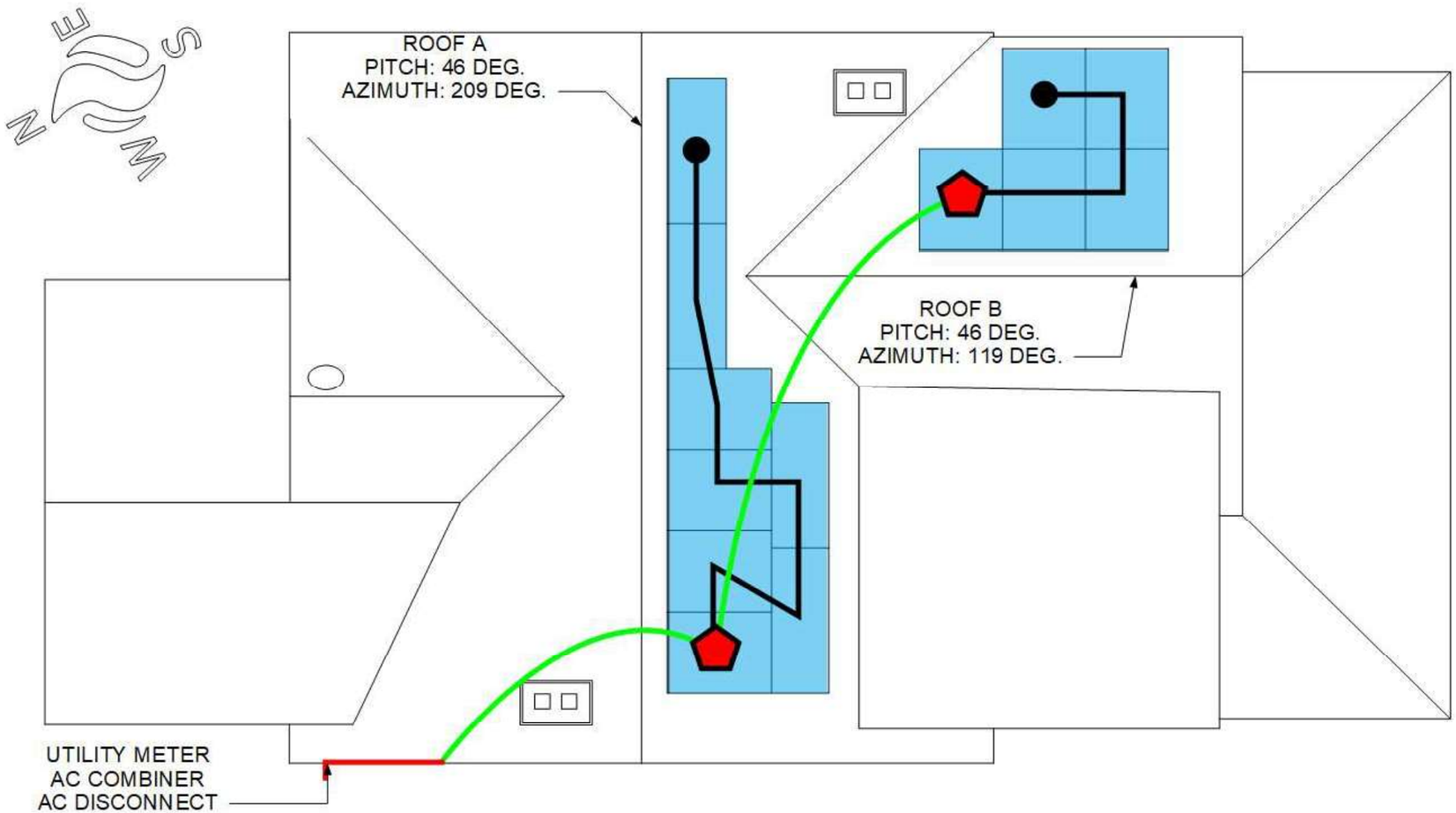
2) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.

3) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER MANUFACTURER'S INSTRUCTION.

LEGEND

- JUNCTION BOX
- SOLADECK
- END CAP
- EXTERIOR CONDUIT
- INTERIOR CONDUIT
- BASEMENT CONDUIT
- TRUNK CABLE

COLOR	CIRCUIT	MODULE COUNT
	#1	13



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CIRCUIT & CONDUIT LAYOUT

E003

SOLAR MODULE RATINGS		
REC Pure 405w All Black Specifications		
Length:	71.7	in
Width:	40	in
Thickness:	1.2	in
Weight:	45.00	lbs
Imp:	9.56	A
Vmp:	42.4	V
Voc:	48.9	V
Isc:	10.14	A
OCPD:	25	A
Pmax:	405	W
Vmax:	1000	V
Temp. Coefficient:	-0.24	%Voc/ºC

INVERTER 1 RATINGS		
Enphase IQ8+ Specifications		
Max # Per String:	13	
Imax (ac):	1.21	A
Vmax (dc):	60	V
Pmax:	290	W
Nom. AC Voltage:	240	V
OCPD:	20	A
Weight (Optimizer):	2.38	lbs
Imax (Input):	15	A
Pmax (dc) Input:	440	V

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL TO BE INSTALLED AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.

LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE

PHOTOVOLTAIC DC DISCONNECT

LABEL TO BE INSTALLED AT EACH DC DISCONNECTING MEANS

PHOTOVOLTAIC AC DISCONNECT

LABEL TO BE INSTALLED AT EACH AC DISCONNECTING MEANS

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL TO BE INSTALLED AT RAPID SHUTDOWN SWITCH

LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE

WARNING

ELECTRICAL SHOCK HAZARD

DO NOT TOUCH TERMINALS! TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL TO BE INSTALLED AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT

WARNING

ELECTRICAL SHOCK HAZARD

IF GROUND FAULT IS INDICATED NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

LABEL TO BE INSTALLED AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT

WARNING

DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL TO BE INSTALLED ON EXTERIOR OF MAIN ELECTRICAL PANEL

WARNING

INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL TO BE APPLIED TO THE DISTRIBUTION EQUIPMENT

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

LABEL TO BE INSTALLED AT UTILITY METER

SOLAR PV LOADCENTER

5.265 kW DC SOLAR ARRAY

240 VOLT AC SYSTEM

INSTALLED COMPONENTS

(13) REC Pure 405w All BlackW Modules

(13) Enphase IQ8+

EMERGENCY CONTACT

LUMINA SOLAR: 800-971-6118

CIRCUIT CALCULATIONS

SYSTEM CURRENT:	1.21	x	13	=	15.73 A
DESIGN AMPERAGE:	15.73	x	125%	=	19.6625 A

CIRCUIT #1 =	13	15.73	19.66

SOLAR PV SYSTEM DISCONNECT

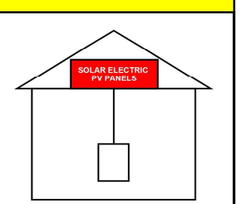
RATED AC OUTPUT CURRENT: **15.73 A**

NOMINAL OPERATING AC VOLTAGE: **240 V**

LABEL TO BE INSTALLED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS AS A POWER SOURCE

SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN

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



LABEL TO BE INSTALLED ON NO MORE THAN 3FT FROM THE SERVICE DISCONNECTING MEANS

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL TO BE INSTALLED ON OR NO MORE THAN 3FT FROM THE RAPID SHUTDOWN SWITCH

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SIGNAGE NOTES

1) ALL PLAQUES AND LABELS SHALL HAVE A RED BACKGROUND (OR AS SHOWN HERE)

2) ALL LETTERING SHALL BE WHITE AND HAVE A MINIMUM HEIGHT OF 3/8" (OR AS SHOWN HERE)

3) FONT SHALL BE ARIAL (OR SIMILAR) AND ALL LETTERING SHALL BE CAPITALIZED

4) ALL PLAQUES AND LABELS SHALL BE OF A MATERIAL SUITABLE FOR THE ENVIRONMENT INSTALLED

REV	DATE
IFC	8/18/2023

EQUIP. RATINGS & SIGNAGE

E004

MODULES, INVERTERS, MISC COMPONENTS

PRODUCT	QTY
REC Pure 405w All Black	13
EnPhase IQ8+ Microinverter	13
Enphase Consumption CTs	2

RACKING & ATTACHMENTS

PRODUCT	QTY
14' Light Rail DRK (315168D)	7
20' Light Rail DRK (315240D)	2
Unirac Bnd Splice Bar Kit (Serrated Drk)	1
Small Endclamps 30-32mm	20
Small Midclamps 30-36mm	16
TBRW-80 T-bolts + Nuts	68
RT-Mini II Base	68
M8-1.25 Flanged Bolt + Nut	68
RT-Mini II 5.0X60mm Screws	340
EcoFasten L-102-3 L Foot Black	68
Micro-Inverter Mounting Assembly (Bolt+Nut+Washer)	13
Grounding Weeblug	5

MISCELLANEOUS & MANUAL ADDITIONS

PRODUCT	QTY
Lumina Salesperson Yard Sign	1
Duct Seal	
Geocel 4500 Caulk/Sealant	

COMBINERS, DISCONNECTS, ENCLOSURES

PRODUCT	QTY
Soladeck	2
Enphase Combiner (Model #X-IQ-AM1-240-4)	1
30 Amp Nema3r Non-Fused Disco (Model #DU221RB)	1
125A MBE (Model #QO2125BNRB)	1

BREAKERS, FUSES, TAPS

PRODUCT	QTY
2 pole, 20 Amp Breaker (For Combiner)	1
B-Tap 2/0-10	2
2 pole, 20 Amp QO Breaker	1

CONDUCTOR ACCESSORIES

PRODUCT	QTY
Enphase Terminator Cap	2
Enphase Seal Cap	
Copper C-Taps	6
WAGO 3-Wire Lever-Nuts	4
Ilsco Aluminum Lay-in Lugs	17

EMT/FMC CONDUIT & ENCLOSURE FITTINGS

PRODUCT	SIZE (IN) & QUANTITY							
	0.5	0.75	1	1.25	1.5	2	2.5	3
FMC (Greenfield) Straps		12						
Straight Connector - Squeeze Clamp with Locknut		8						
One-Hole Rigid Conduit Straps		18						
Rigid Conduit Compression Coupler		4						
EMT Compression Connector with Locknut & Rubber Gasket		11						
LB-Type EMT Conduit Body		1						
LL/LR-Type EMT Conduit Body		2						
Square D B-Hub		2						
EMT Grounding Locknut		10						
Exterior Conduit Roof Mount Assemblies (RTs, RT Screws (5 per) OR Metal Brackets for Metal Roofs OR Foam Blocks)								
Strain Relief Cord Connector with Insulating Plastic Bushing	3							

NOTES

USE 'BR' BREAKERS IN ENPHASE COMBINER

USE APPROPRIATE BREAKERS IN NON-ENPHASE COMBINER PANELS

SEE FOLLOWING PAGE FOR WIRE AND CONDUIT TYPES AND LENGTHS

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SOLAR BOM

X001

CONDUCTOR SCHEDULE

	PRODUCT	QTY
	Enphase IQ Trunk Cable, Landscape	13 UNITS
	#6 Bare Copper Ground	35 FT
	#18 AWG Cu, 7 Strand (CT Wiring)	30 FT

SIZE (AWG)	THWN-2				XHHW-2			
	RED (FT)	BLACK (FT)	WHITE (FT)	GREEN (FT)	RED (FT)	BLACK (FT)	WHITE (FT)	GREEN (FT)
18								
16								
14								
12								
10	80	80	10					
8				85				
6	5	5	5					
4								
3								
2								
1								
1-0								
2-0								
3-0								
4-0								
250								
300								
350								
400								
500								
600								
700								
750								
800								
900								
1000								
1250								
1500								
1750								
2000								

CONDUIT SCHEDULE

	TYPE AND LENGTH (FT)			
SIZE (IN)	PVC	EMT	FMC	LFMC
0.50				
0.75		40	45	
1.00				
1.25				
1.50				
2.00				
2.50				
3.00				

INSTALL LEAD SIGNATURE: _____ **DATE:** _____

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WIRE & CONDUIT BOM

X002

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REV	DATE
IFC	8/18/2023

SERVICE BOM

X003

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INSTALL LEAD SIGNATURE: _____ **DATE:** _____

RAIL AND SPLICE QUANTITY COUNTING METHOD

Module Count	PORTRAIT			LANDSCAPE		
	14' Rail	20' Rail	Splice	14' Rail	20' Rail	Splice
1	1			1		
2		1		2		
3	2				2	
4	1	1	1	4		2
5		2		2	2	2
6	2	1	2		4	2
7	1	2	2	2	3	4
8		3	2			
9	2	2	2			
10		4	2			
11		4	2			
12	2	3	4			

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PROJECT NOTES

X004

AOstructures Inc.
PO Box 413

REVIEWED
By Michael Kyne at 4:50 pm, Oct 26, 2023

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Montgomery County
Historic Preservation Commission

August 17, 2023

TO: Lumina Solar

SUBJECT: Roof-top Solar PV Addition - Luker Residence
7307 Takoma Ave., Takoma Park, MD. 20912

SCOPE OF WORK:
AOstructures, Inc. was asked to provide a structural review for the project at the above subject location. The scope of this report is strictly limited to the items listed below and based on the design criteria listed below. See additional limitations in Appendix B.

- Analyze the existing structure(s) to see if it is/they are suitable to support the additional weight of the proposed roof mounted solar PV system.
- Evaluate the connection capacity of the proposed racking system to the existing roof structure.

PROVIDED INFORMATION:
As-built plans were not provided for our review. The findings of this report are based upon a jobsite evaluation of the existing condition of the existing framing system collected by Lumina Solar as requested by AOstructures, Inc.. All attached structural calculations are based on the provided information and are only deemed valid if the provided information is true and accurate.

OBSERVED CONDITIONS:
The observed roof framing is described below. If field conditions differ, the contractor shall notify the engineer prior to starting construction.

The roof structure of (Both Roof's) consists of composition shingle on roof plywood and skip sheathing that is supported by 2"x6" rafters @ 24"o.c. with ceiling joists acting as rafter ties. The rafters have a max projected horizontal span of 13'-6", with a slope of 45 degrees. The rafters are connected at the ridge to a ridge board and are supported at the eave by a load bearing wall.

CONCLUSIONS:
The existing roof framing members of (Both Roof's) are judged to be adequate to withstand the loading imposed by the installation of the solar panels. No structural retrofits are required.

The spacing of the solar standoffs shall not exceed 24" o.c. and be staggered. All racking hardware shall be installed per manufacturer specifications and utilized within the manufacturers design limitations based on the design criteria of this report. AOstructures, Inc. assumes no responsibility for hardware installed outside the design & install specifications of the manfacturer. All waterproofing shall be provided by the contractor.

DESIGN CRITERIA:

- Applicable Codes = 2018 IBC/IRC, ASCE 7-16
- 66 cell solar PV modules w/ a flush mounted rail based racking system
- Roof Dead Load = 11 psf (Both Roof's)
- Roof Live Load = 20 psf
- Wind Speed = 115 mph, Exposure B, Risk Category II
- Ground Snow Load = 30 psf - Roof Snow Load = 13.2 psf
- Per IBC 1613.1; Seismic check is not required

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
License No. 49910 Expires: 9/15/24

Please contact me with any further questions or concerns regarding this project.

Sincerely,

DocuSigned by:
Andrew Oesterreicher
4A8006A02EA947F...

Andrew Oesterreicher, P.E.
Project Engineer

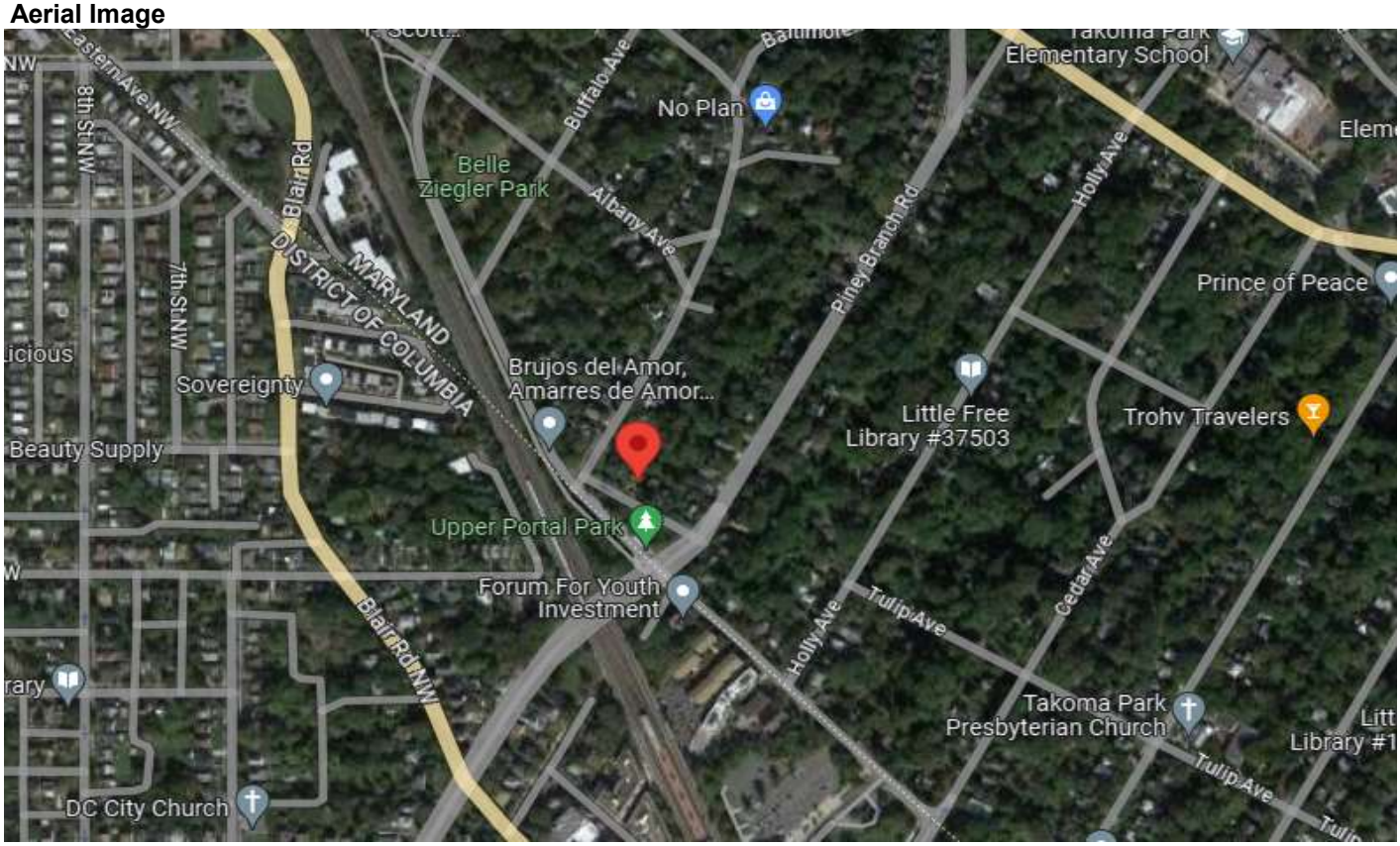
AOstructures Inc.
PO Box 413
Carnelian Bay, CA 96140
916.541.8586
www.AOstructures.com

Address: 7307 Takoma Ave., Takoma Park, MD. 20912

Wind Design

Exposure: B
Wind Speed: 115 mph
Risk Category: II

Aerial Image



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Luker, Jeffery, Takoma Park, MD 2

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Wind Calculations

Per ASCE 7-16 § 29.4.4 - Components and Cladding - Solar Specific

Input Variables				
Wind Speed	115 mph	Roof Slope	45 deg	
Exposure Category	B	Mean Roof Height	30 ft	
Roof Shape	Gable	Effective Wind Area	6.2 sft	(standoff area)

Design Wind Pressure Calculations		
Wind Pressure P = qh (GCp) (γe) (γa)		(Eq. 29.4-7)
qh = 0.00256 * Kz * Kzt * Kd * Ke * V^2		(Eq. 26.10-1)
Kz (Exposure Coefficient) =	0.7	(Table 26.10-1)
Kzt (topographic factor) =	1	(Fig. 26.8-1)
Kd (Wind Directionality Factor) =	0.85	(Table 26.6-1)
Ke (Ground Elevation Factor) =	1	(Table 26.9-1)
V (Design Wind Speed) =	115 mph	(Fig. 26.5-1)
Risk Category =	II	(Table 1.5-1)
(γe) Array Edge Factor =	1.00	29.4.4
(γa) Solar Panel Pressure Equalization =	0.80	(Figure 29.4-8)
qh (γe) (γa) =	16.12	Ultimate Design Level
0.6 * qh (γe) (γa) =	9.67	ASD Design Level

Standoff Uplift Calculations (ASD Level)					
Zone(s) =	3r	2n, 2r, 3e	1, 2e	(+)	
GCp =	-2.88	-2.00	-1.80	0.90	(Fig. 30.3-2D)
ASD Uplift Pressure (psf) =	-27.88	-19.34	-17.40	10.00	
X Tributary Width (ft) =	1.33	2.00	2.00		
Y Tributary Width (ft) =	3.09	3.09	3.09		
Tributary Area (sf) =	4.11	6.17	6.17		
Footing Uplift (lb) =	**-114.7**	**-119.4**	**-107.4**		

Standoff Uplift Check	
Maximum Uplift =	-119 lb
0.6 * DL Resisting =	11 lb
Net Design Uplift =	-108 lb
Standoff Uplift Capacity =	138 lb
138 lb capacity > 108 lb demand	**Therefore, OK**

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GRAVITY LOADS

Roof Snow Load Calculations			
Unobstructed, Slippery Roof Surface?	no		
Roof Slope	45	degrees	
p_g = Ground Snow Load =	30.0	psf	
$p_f = 0.7\ C_e\ C_t\ I\ p_g$			(ASCE7 - Eq 7-1)
C_e = Exposure Factor =	1.0		(ASCE7 - Table 7-2)
C_t = Thermal Factor =	1.0		(ASCE7 - Table 7-3)
I = Importance Factor =	1.0		(ASCE7 - 7.3.3)
p_f = Flat Roof Snow Load =	21.0	psf	
$p_s = C_s p_f$			(ASCE7 - Eq 7-2)
Cs = Slope Factor =	0.63		(ASCE7 - Fig. 7-2)
p_s = Sloped Roof Snow Load =	**13.1**	**psf**	

PV Dead Load =	**3 psf**	(Per Lumina Solar)

Roof Dead Load (Both Roof's)		
Composition Shingle	4.00	psf
Roof Plywood and Skip Sheathing	3.50	
2"x6" Rafters @ 24"o.c.	1.67	
Vaulted Ceiling	0.00	(Ceiling Not Vaulted)
Miscellaneous	1.83	
Total Roof DL (Both Roof's)	**11.0**	**psf**
DL Adjusted to 45 Degree Slope	15.6	psf

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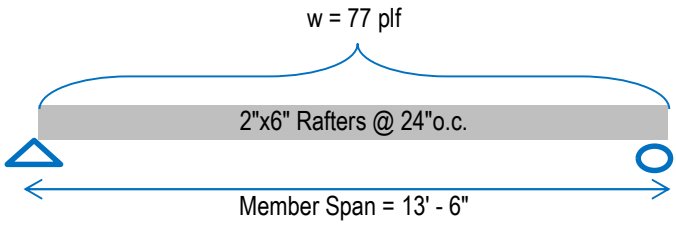
FRAMING CHECK

(Both Roof's) **PASS**

Dead Load	15.6	psf
PV Load	3.0	psf
Snow Load	13.2	psf

Governing Load Combo = DL + LL
Total Load **38.6 psf**



Member Properties

Member Size	S (in^3)	I (in^4)	Lumber Sp/Gr	Member Spacing
2"x6"	12.00	36.00	SP#2	@ 24"o.c.

Check Bending Stress

Fb (psi) = f'b / 1000 x Cd 1.25 x Cf 1.3 x Cr 1.15 (NDS Table 4.3.1)

Allowed Bending Stress = 1868.7 psi

Maximum Moment = (wL^2) / 8
= 1756.724 ft#
= 21080.68 in#

Actual Bending Stress = (Maximum Moment) / S
= 1756.8 psi

Allowed > Actual -- 94.1% Stressed -- Therefor

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Check Deflection

Allowed D... (Total Load) = L/120
= 1.35 in

Deflection Criteria Based on = Simple Span
Actual Deflection (Total Load) = (5*w*L^4) / (384*E*I)
= 1.144 in
= L/142 > L/120 **Therefore OK**

Allowed Deflection (Live Load) = L/180
0.9 in
Actual Deflection (Live Load) = (5*w*L^4) / (384*E*I)
0.594 in
L/273 > L/180 **Therefore OK**

Check Shear

Member Area = 12.0 in^2 Fv (psi) = 175 psi (NDS Table 4A)
Allowed Shear = Fv * A = 2100 lb Max Shear (V) = w * L / 2 = 521 lb

Allowed > Actual -- 24.8% Stressed -- Therefore, OK

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Appendix A: Framing Information & Site Specific Pictures

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Appendix B: General Notes

GENERAL

- The contractor shall verify all dimensions, property setbacks, AHJ/HOA CC&R's, elevations and site conditions before starting work and shall notify AOstructure, Inc, (AOstructures) of any discrepancies.
- All report conclusions represent AOstructures, Inc.'s best professional judgment based upon industry standards.
- Resolve any conflicts on the drawings with AOstructures, Inc before proceeding with construction.
- The design criteria used for this project & listed on the first page of the report is based on the engineers best judgement and/or provided by the ATC council. AHJ specific requests may differ. Please contact our team if the design criteria needs to be modified.
- A site visit was not physically conducted by AOstructures. The accompanying calculations and certification are provided with the understanding that the site building and construction standards meet an acceptable level of industry standards. It shall be the contractors responsibility to identify any irregularities such as inconsistent framing conditions, water damage, fire damage, cracked, split or noticeably deflecting framing members.
- AOstructures is not responsible for enforcing safety measures or regulations. The contractor shall design, construct, and maintain all safety devices including shoring and bracing, and shall be solely responsible for conforming to all local, state and federal safety and health standards, laws and regulations. The contractor shall take necessary precautions to maintain and insure the integrity of the structure during construction. If a lawsuit is filed by one of the contractor's or subcontractor's employees, or any one else, the contractor will indemnify, defend and hold the owner and aostructures, inc harmless of any and all such claims.
- Any and all waterproofing shall be provided by the contractor. AOstrctures is not responsible for waterproofing.
- All hardware shall be installed per manufacturer specifications and within specified design limitations. AOstructures, Inc. assumes no responsibility for incorrectly installed hardware or hardware installed outside of the manfacturer specifications.

USER RELIANCE

- AOstructures was engaged by Lumina Solar (Client) to perform this assessment. This report and the information therein, are for the exclusive use of the Client. This report has no other purpose and shall not be relied upon, or used, by any other person or entity without the written consent of AOStructures. Third parties that obtain this report, or the information within shall have no rights of recourse or recovery against AOstructures, it's officers or employees.

ROOF MOUNTED ARRAY'S

- If an analysis of a supporting stucture is included in our scope of work, the structural assessment only applies to the section of the roof that is directly supporting the proposed solar PV system.
- No structural members can be cut for conduit, etc., unless specifically shown. Obtain prior written approval for installation of any additional conduit, etc.
- It is assumed that a standard quality of construction care was used to construct the original building. It shall be the contractors responsibility to field verify any and all framing member supporting the proposed PV array are in adequate condition. The contractor shall field inspect for sub-standard construction means, signs of dryrot, mold, fire damage, etc. and notify engineer if any compromised material is found on site prior to starting construction.
- It is assumed that there have been no additional loads (HVAC or MEP equipment, additional layers of roofing, etc) added to the building over the course of the structures histroy. The contractor and/or client shall verify this with the property owner and notify AOstructures, Inc. if additional load has been added to the structure already.
- Flexible utility connections must be used at any building seismic joint.
- Care should be taken to ensure that PV arrays do not preclude drainage of rain water.
- Unless otherwise noted, construction material shall be evenly distributed if placed on framed floors or roofs. Loads shall not exceed the allowable loading for the supporting members and their connections.
- All lags or wood screws at the roof shall be stainless steel and installed withing the middle 1/3 of the dimensional width of the framing members.
- All fasteners shall be a minimum of 6" away from any truss panel or hinge joints, truss plates and/or member ends. Field verify location of fasteners prior to starting construction. All fasteners shall be pre-drilled to avoid splitting existing lumber.
- Unless otherwise noted, all lags installed in underlying roof framing members shall be embedded framing.
- AOstructures is not responsible for downslope effects of snow shedding or sliding off of the PV ar landscaping, automobiles, pets, people, etc.. If snow guards are requested by the customer, notify

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Luker, Jeffery, Takoma Park, MD 7

SOLAR'S MOST TRUSTED

REC

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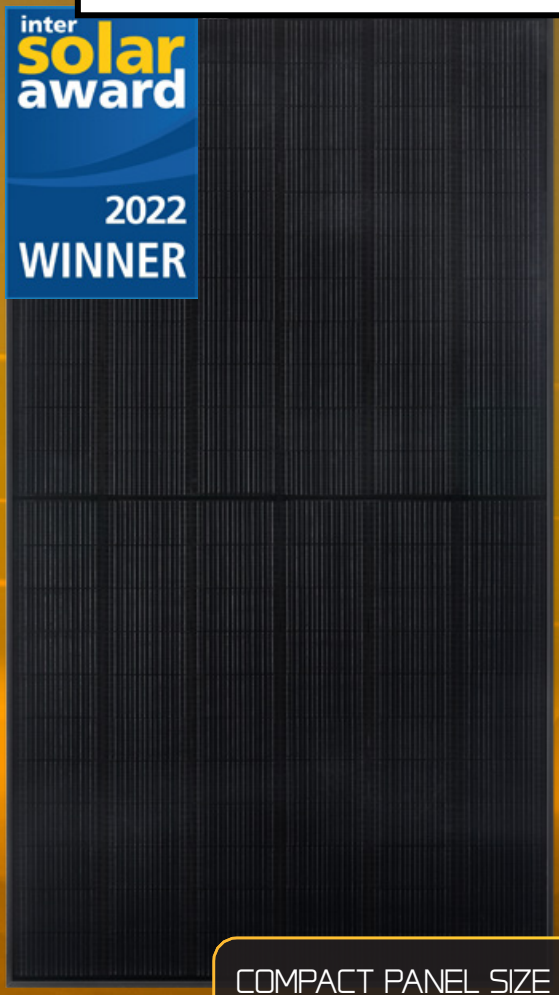
inter solar award 2022 WINNER



REC ALPHA® PURE SERIES

PRODUCT SPECIFICATIONS

COMPACT PANEL SIZE

410 WP
222 W/M²

PRODUCT REC 25 YEAR ProTrust WARRANTY PERFORMANCE LABOR
ELIGIBLE

LEAD-FREE
ROHS COMPLIANT

EXPERIENCE α PERFORMANCE

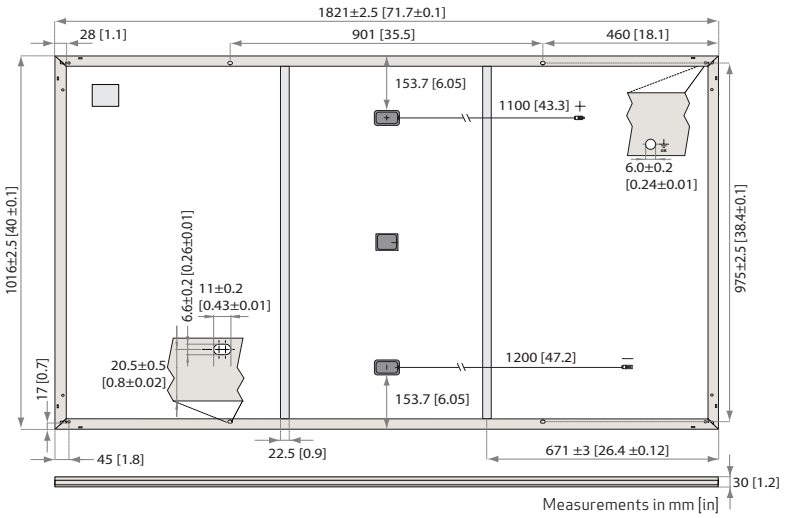
REC ALPHA PURE SERIES

PRODUCT SPECIFICATIONS

REC
SOLAR'S MOST TRUSTED

GENERAL DATA

Cell type:	132 half-cut REC heterojunction cells with lead-free, gapless technology, 6 strings of 22 cells in series
Glass:	3.2 mm solar glass with anti-reflective surface treatment in accordance with EN 12150
Backsheet:	Highly resistant polymer (black)
Frame:	Anodized aluminum (black)
Junction box:	3-part, 3 bypass diodes, lead-free IP68 rated, in accordance with IEC 62790
Connectors:	Stäubli MC4 PV-KBT4/KST4 (4 mm²) in accordance with IEC 62852, IP68 only when connected
Cable:	4 mm² solar cable, 1.1 m + 1.2 m in accordance with EN 50618
Dimensions:	1821 x 1016 x 30 mm (1.85 m²)
Weight:	20.5 kg
Origin:	Made in Singapore



ELECTRICAL DATA — Product Code*: RECxxxAA Pure

STC					
Power Output - P_{MAX} (Wp)	390	395	400	405	410
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V_{MPP} (V)	40.6	41.0	41.4	41.8	42.2
Nominal Power Current - I_{MPP} (A)	9.61	9.64	9.67	9.69	9.72
Open Circuit Voltage - V_{OC} (V)	48.4	48.6	48.8	49.1	49.4
Short Circuit Current - I_{SC} (A)	10.38	10.39	10.40	10.41	10.42
Power Density (W/m²)	211	214	216	219	222
Panel Efficiency (%)	21.1	21.4	21.6	21.9	22.2
NMOT					
Power Output - P_{MAX} (Wp)	297	301	305	308	312
Nominal Power Voltage - V_{MPP} (V)	38.3	38.6	39.0	39.4	39.8
Nominal Power Current - I_{MPP} (A)	7.77	7.79	7.82	7.83	7.85
Open Circuit Voltage - V_{OC} (V)	45.6	45.8	46.0	46.3	46.6
Short Circuit Current - I_{SC} (A)	8.38	8.39	8.40	8.41	8.42

Values at standard test conditions (STC: air mass AM 1.5, irradiance 1000 W/m², temperature 25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 20°C, windspeed 1 m/s). * Where xxx indicates the nominal power class (P_{MAX}) at STC above.

CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 61730	
IEC 62804	PID
IEC 61701	Salt Mist
IEC 62716	Ammonia Resistance
ISO 11925-2	Ignitability (Class E)
IEC 62782	Dynamic Mechanical Load
IEC 61215-2:2016	Hailstone (35mm)
IEC 62321	Lead-free acc. to RoHS EU 863/2015
ISO 14001, ISO 9001, IEC 45001, IEC 62941	

Intertek · Lead-Free · take-e-way WEEE-compliant recycling scheme

TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P_{MAX}:	-0.24 %/°C
Temperature coefficient of V_{OC}:	-0.24 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

*The temperature coefficients stated are linear values

MAXIMUM RATINGS

Operational temperature:	-40 ... +85°C
Maximum system voltage:	1000 V
Maximum test load (front):	+7000 Pa (713 kg/m²)*
Maximum test load (rear):	-4000 Pa (407 kg/m²)*
Max series fuse rating:	25 A
Max reverse current:	25 A

* See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

WARRANTY

	Standard	REC ProTrust	
Installed by an REC Certified Solar Professional	No	Yes	Yes
System Size	All	≤25 kW	25-500 kW
Product Warranty (yrs)	20	25	25
Power Warranty (yrs)	25	25	25
Labor Warranty (yrs)	0	25	10
Power in Year 1	98%	98%	98%
Annual Degradation	0.25%	0.25%	0.25%
Power in Year 25	92%	92%	92%

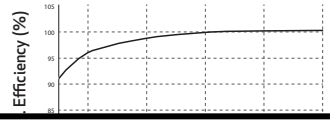
The REC ProTrust Warranty is only available on panels purchased through an REC Certified Solar Professional installer. Warranty conditions apply. See www.recgroup.com for more det

DELIVERY INFORMATION

Panels per pallet:	33
Panels per 40 ft GP/high cube container:	792 (24 pallets)
Panels per 13.6 m truck:	924 (28 pallets)
Panels per 53 ft truck:	891 (27 pallets)

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



Available from:

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Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consum with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality, innovation, and a carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operatio headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.

www.recgroup.com

Specifications subject to change without notice.

Ref: PM-DS-12-06-Rev-9 02.23

ENPHASE

DATA SHEET

IQ8 and IQ8+ Microinverters

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

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

Enphase 25 year limited warranty

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

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

UL CERTIFIED SAFETY

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

Easy to install

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

High productivity and reliability

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

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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	
Enclosure	Class II double-insulated, cor
Environ. category / UV exposure rating	NEMA Ty

COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC P .1-01 This product is UL Listed as PV Rapid Shut Down Equipment on 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Sy to manufacturer's instructions.

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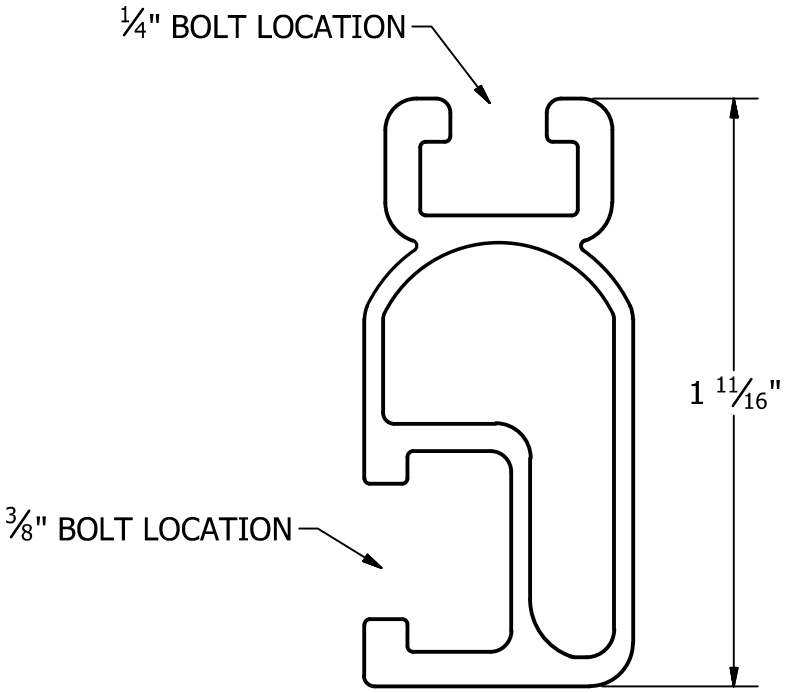
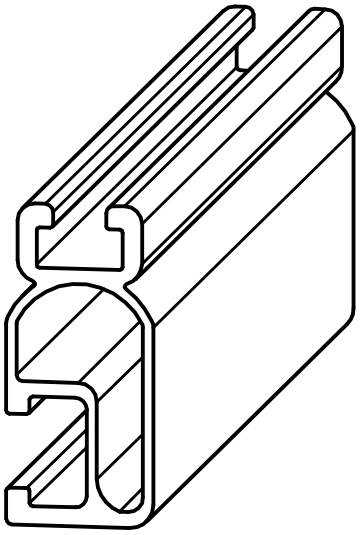
(1) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility (2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.





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PART # TABLE		
P/N	DESCRIPTION	LENGTH
315168M	SM LIGHT RAIL 168" MILL	168"
315168D	SM LIGHT RAIL 168" DRK	168"
315240M	SM LIGHT RAIL 240" MILL	240"
315240D	SM LIGHT RAIL 240" DRK	240"

UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	LIGHT RAIL
REVISION DATE:	9/11/2017

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS

LEGAL NOTICE

SM-P02

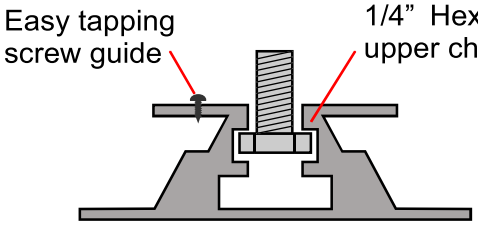
SHEET

RT-MINI

Self-flashing base for asphalt & metal roof-top PV mounting systems

RT-MINI is suitable for mounting any rail system with a conventional L-Foot.

Dual bolt design: M8 or 5/16” for L-Foot & 1/4” for EMT or accessories



ICC ES

ICC ESR 3575

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Call Now for more details

858-935-6064

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Roof T

Smarter PV mounting solutions from top of roof to bottom line

www.roof-tech.us info@roof-tech.us

RT-MINI

Flexible Flashing certified by the International Code Council (ICC)

Engineered to ASTM D 1761 (Standard Test Methods for Mechanical Fasteners in Wood)

Components

RT2-00-MINIBK

PAT : PENDING

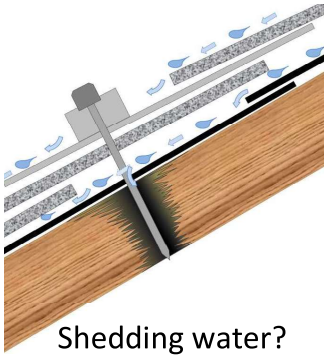
MINI base : 20 ea.
Screw : 40 ea.
Extra RT-Butyl : 10 ea.

Optional items:

5 x 60mm Mounting screw (RT2-04-SD5-60) : 100 ea/Bag
5/16" Hex bolt, washer & nut set (RT-04-BN30SL-US) : 100 ea/Bag
RT-Butyl (RT2-04-BUTYLT) : 10 ea/Box

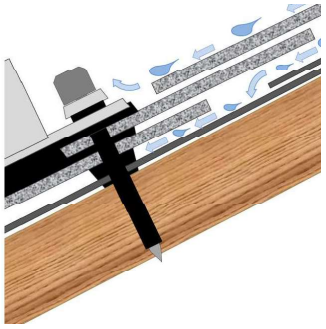
RT-Butyl is Roof Tech's flexible flashing used in 700,000 residential PV systems for the last 24 years. It is the first PV mounting system with Flexible Flashing certified by the ICC.

Metal Flashing Retrofit



Shedding water?

Flexible Flashing



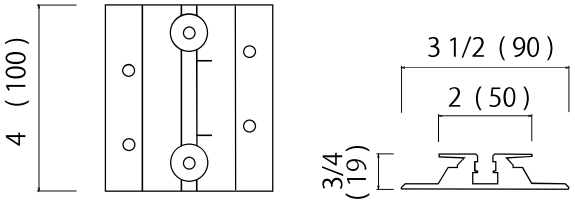
100% Waterproof

ICC ESR-3575

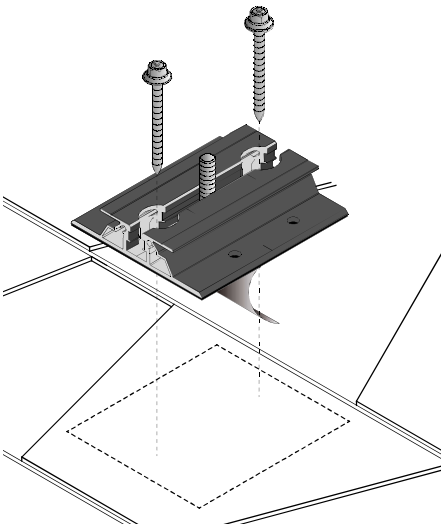
ASTM2140 testing

UV testing (7500 hrs.)

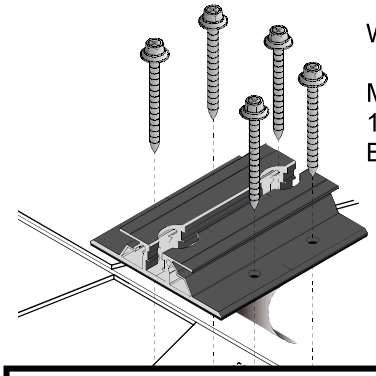
Dimensions in (mm)



Rafter installation



Deck installation



Weight:

Mini- 158.4 g
1 screw- 8.7g
Bolt and nut - 20.4 g

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P.E. Stamped drawings available upon request/support

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Roof Tech Inc.
www.roof-tech.us info@
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858.935.6064