



HISTORIC PRESERVATION COMMISSION

Marc Elrich
County Executive

Sandra I. Heiler
Chairman

Date: September 11, 2020

MEMORANDUM

TO: Mitra Pedoeem
Department of Permitting Services

FROM: Dan Bruechert
Historic Preservation Section
Maryland-National Capital Park & Planning Commission

SUBJECT: Historic Area Work Permit # 925671 - Solar 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 September 9, 2020 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: Eric O'Neill
Address: 3915 Prospect St., Kensington

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 Dan Bruechert at 301.563.3400 or dan.bruechert@montgomeryplanning.org to schedule a follow-up site visit.



SOLAR PV SYSTEM: 8.125 kWp

ONEILL RESIDENCE

3911 PROSPECT STREET KENSINGTON, MD
USA 20895

APPROVED
Montgomery County
Historic Preservation Commission

Sandra L. Skiles

REVIEWED

By Dan.Bruechert at 2:20 pm, Sep 11, 2020

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PROJECT INFORMATION

OWNER: ERIC ONEILL
ADDRESS: 3911 PROSPECT STREET
KENSINGTON, MD USA 20895

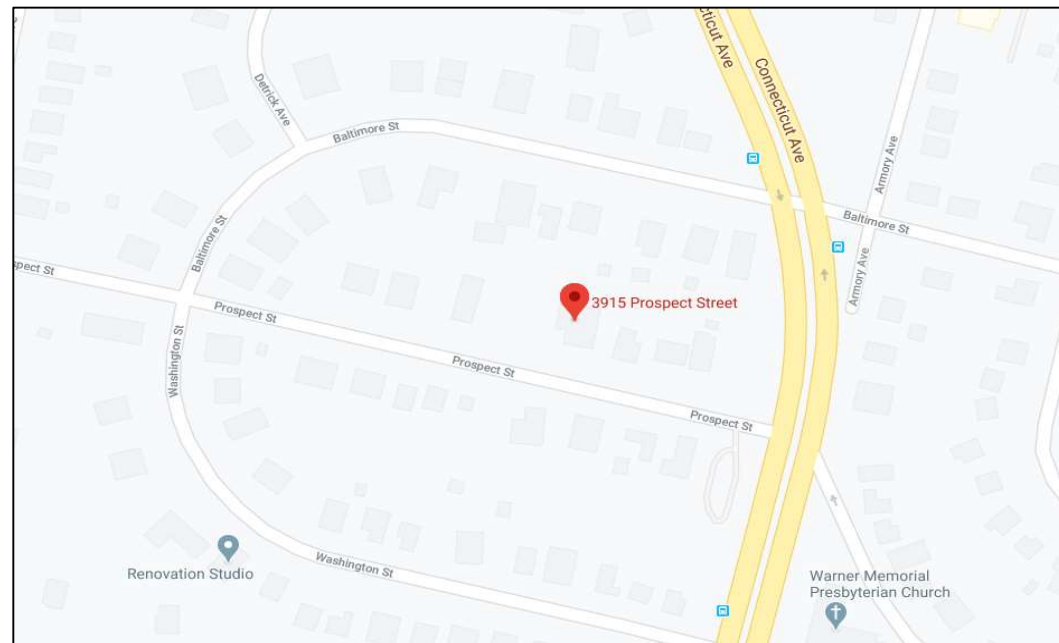
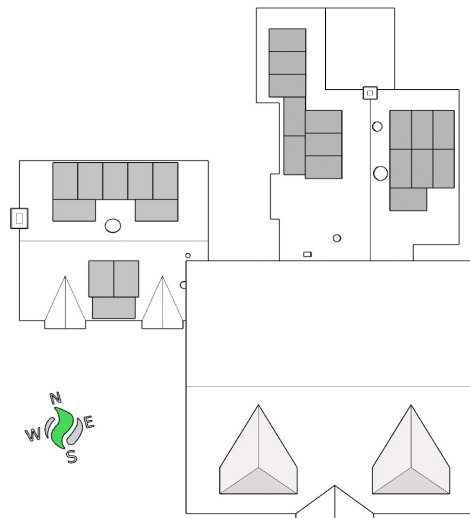
AHJ: MONTGOMERY
ADDRESS: 255 ROCKVILLE PIKE, 2ND
FLOOR ROCKVILLE, MD 20850

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: 8.125 kW
AC RATING: 6 kW
RACKING: UNIRAC SM LIGHT RAIL
MODULE: (25) CS1H-325MS
INVERTER: (25) IQ7-60-2-US

BATTERY: (1) POWERWALL 2



PROJECT SCOPE

THIS PROJECT INVOLVES THE INSTALLATION OF (25) CANADIAN SOLAR 325W SOLAR MODULES. THE SOLAR MODULES WILL BE RACKED USING A PRE-ENGINEERED RACKING SYSTEM. THE RACKED MODULES WILL BE ELECTRICALLY CONNECTED TO (25) ENPHASE DC TO AC POWER INVERTERS, AND (1) TESLA POWERWALLS, AND INTERCONNECTED TO THE LOCAL UTILITY USING MEANS AND METHODS CONSISTENT WITH THE RULES ENFORCED BY THE LOCAL UTILITY AND PERMITTING JURISDICTION.

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E004	EQUIP. RATINGS & SIGNAGE
APPENDIX	MODULE DATASHEET
	INVERTER DATASHEET
	RACKING DATASHEET
	ANCHOR DATASHEET

PROJECT ADDRESS:

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CONTRACTOR INFO:



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BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:

MHIC-30991

DocuSigned by:



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.: 41308 Exp. Date: 01-06-2022
STAMPED AND SIGNED FOR STRUCTURAL ONLY

7/30/2020

DocuSigned by:

Scott Kirby

CAD180010D814CD...

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) PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A) THROUGH (D).

- 3) THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM, AND THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE.
- 4) ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE AND AS REQUIRED BY THE NEC AND AHJ.
- 5) PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.

REV	DATE
IFC	8/4/2020

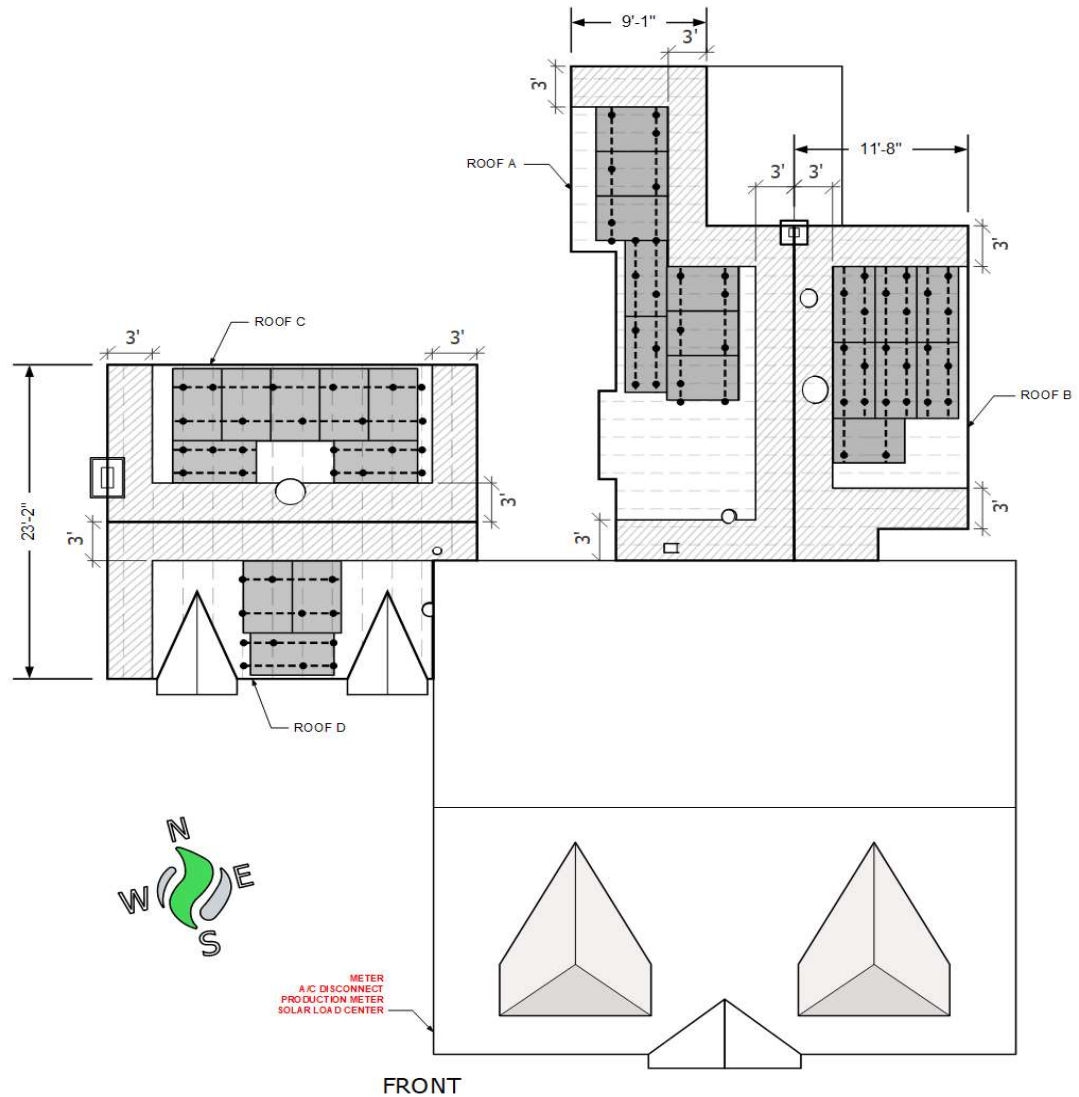
COVER

Z001

ROOF LABEL:	A	B	C	D
MATERIAL:	Architectual Comp. Shingle	Architectual Comp. Shingle	Architectual Comp. Shingle	Architectual Comp. Shingle
PITCH:	31°	31°	18°	18°
AZIMUTH:	283°	103°	14°	194°
PRIMARY SUPPORT:	2x10 RAFTERS	2x10 RAFTERS	2x4 TOP CHORD TRUSSES	2x4 TOP CHORD TRUSSES
PRIMARY SUPPORT SPACING:	16"	16"	24"	24"
LEAST HORIZONTAL DIMENSION:	26'	26'	23'	23'
MEAN HEIGHT:	15'	15'	20'	20'
RACKING:	UNIRAC SM LIGHT RAIL	UNIRAC SM LIGHT RAIL	UNIRAC SM LIGHT RAIL	UNIRAC SM LIGHT RAIL
STANDOFF:	UNIRAC FLASHLOC	UNIRAC FLASHLOC	UNIRAC FLASHLOC	UNIRAC FLASHLOC

FOR PERMITTING USE ONLY

- ALL SOLAR MODULES SUPPORTED BY ROOF ATTACHMENTS 48" O.C.
- SOLAR PHOTOVOLTAIC SYSTEM INSTALLED PARALLEL TO ROOF SURFACE
- SOLAR PHOTOVOLTAIC SYSTEM INSTALLED AT A MAXIMUM HEIGHT OF 6" ABOVE ROOF SURFACE



	ROOF SUPPORT
	MOUNTING RAIL
	ROOF ATTACHMENT
	PV ARRAY
	FIRECODE SETBACK

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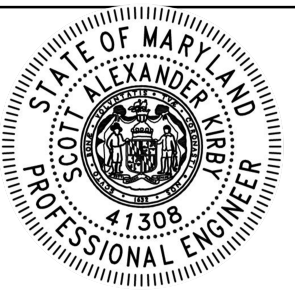
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 Montgomery County
 Historic Preservation Commission

Sandra L. Heiler

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 By Dan.Bruechert at 2:20 pm, Sep 11, 2020

DocuSigned by:



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INSTALLATION NOTES

- 1) ALL RACKING SHALL BE INSTALLED PER MANUFACTUER SPECIFICATIONS
- 2) ALL ROOFING PENETRATIONS SHALL EMBED IN STRUCTURAL MEMBERS AND PROPER FLASHING SEALANT SHALL BE USED TO PROVIDE WATERTIGHT ASSEMBLY
- 3) WHEN POSSIBLE, ALL RACKING STANDOFFS WILL BE STAGGERED AMONGST THE ROOF SUPPORT MEMBERS
- 4) REFER TO PAGE S001 FOR MAXIMUM ALLOWABLE RAIL SPAN AND MODULE OVERHANG, AND ATTACHMENT DETAILS
- 5) ALL RACKING AND STRUCTURAL WORK FOR THIS PROJECT SHALL COMPLY WITH BUILDING CODE, IBC 2018 AND ASCE 7-16

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REV	DATE
IFC	8/4/2020

ATTACHMENT & SITE PLAN

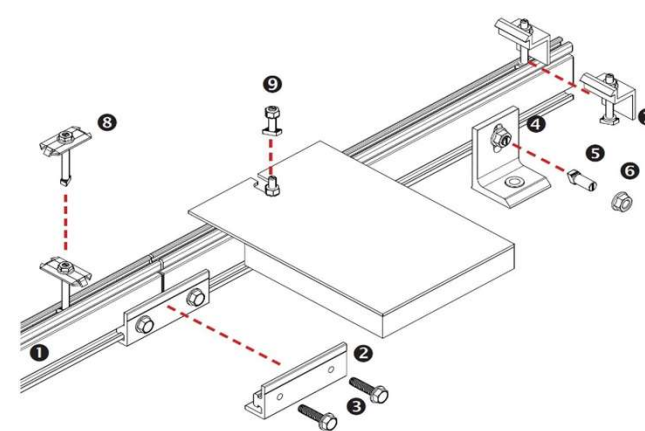
A001

MOUNTING SYSTEM PROPERTIES	
RACKING	UNIRAC SM LIGHT RAIL
STANDOFF	UNIRAC FLASHLOC
FASTENING DETAILS	SEE NOTE 3
MAX. RAIL SPAN	48"
MIN. FASTENER DEPTH	2.25"
MAX. RAIL CANTILEVER	16"
MAX. ARRAY HEIGHT	6"

SITE CONDITIONS	
WIND SPEED	115 MPH
SNOW LOAD	30 PSF
ROOF ZONE (TYP.)	3
BUILDING CODE	IBC 2018
ELECTRICAL CODE	NEC 2017
ASCE VERSION	ASCE 7-16

DEAD LOAD CALCULATION			
LOAD	QTY. OR LIN. FT.	WEIGHT PER (LB)	TOTAL LBS.
MODULES	25	42.3	1057.50
M.L.E.'S	25	2.38	59.50
RACKING	226.4	0.81	183.40
STANDOFF	99	0.5	49.50
TOTAL ARRAY WEIGHT (LBS)			1349.9
TOTAL ARRAY AREA (SQ.FT.)			454.1
DISTRIBUTED LOAD (PSF)			2.97

POINT LOAD CALCULATION	
TOTAL ARRAY WEIGHT (LBS)	1349.90
TOTAL NUMBER OF STANDOFFS (TYP.)	99
POINT LOAD (LBS/STANDOFF)	13.64



- **RAIL:** Supports PV modules. Use row of modules. Aluminum extru: mill, clear anodized, or dark anodiz
 - **RAIL SPLICE:** Non structural sp aligns, and electrically bonds rail si single length of rail. Forms a rigid i inches long, preassembled with bo Available in dark anodized or mill f
 - **L-FOOT:** Use to secure rails thro material to building structure. Refe tables or U-Builder for spacing.
 - **L-FOOT T-BOLT:** (3/8" x 3/4" or 1" L-foot to secure rail to L-foot. Stain Supplied with L-foot in combinatio nut, provides electrical bond between L
 - **SERRATED FLANGE NUT:** Use or to secure and bond rail to Lfoot. St Supplied with L-foot.
 - **MODULE ENDCLAMP:** Provides i endclamp. Pre-assembled aluminur in clear or dark finish. Supplied wa and bolt upright for ease of assem
 - **MODULE MIDCLAMP:** Pre-as provides module to module and mc Stainless steel clamp and T-bolt. / or dark finish.
 - **MICROINVERTER MOUNTING BOI** bolt and nut attaches and bonds rail. Washer at base keeps bolt up assembly.
- NOTE - POSITION INDICATOR:** T-bc the hardware end corresponding to the T-Head.

Wrenches and Torque		
Hardware	Wrench Size	Recommended Torque (ft-lbs)
1/4" Hardware	7/16"	10
3/8" Hardware	9/16"	30
#12 Hardware	5/16"	10

Torques are not designed for use with wood connectors
*w/ Anti-Seize.

Anti-Seize*

Stainless steel hardware can seize up, a process called galling. To significantly reduce its likelihood:

1. Apply minimal lubricant to bolts, preferably Anti-Seize commonly found at auto parts stores
2. Shade hardware prior to installation, and
3. Avoid spinning stainless nuts onto bolts at high speed.

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REV DATE

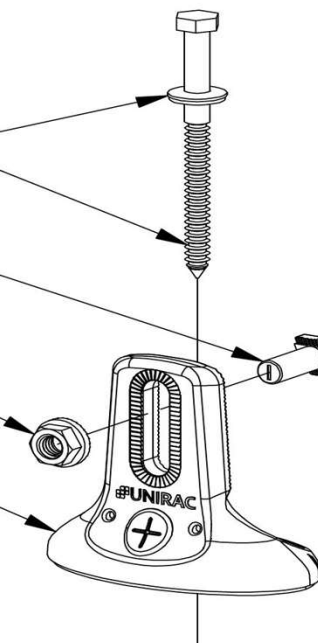
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ASSEMBLY & LOAD CALCS

S001

SS LAG BOLT
W/ SS EPDM BONDED WASHER
SS SERRATED T-BOLT

SS SERRATED FLANGE NUT
FLASHLOC BASE
MILL OR DARK



APPROVED
Montgomery County
Historic Preservation Commission

Sandra L. Heiler

REVIEWED

DocuSigned by **By Dan.Bruechert at 2:20 pm, Sep 11, 2020**

RACKING AND STRUCTURAL NOTES

- 1) ALL RACKING SHALL BE INSTALLED PER MANUFACTUER SPECIFICATIONS
- 2) M.L.E.'S = MODULE LEVEL ELECTRONICS (IE, POWER OPTIMIZERS, MICRO-INVERTERS, CABELS, ETC)
- 3) USE 5/16" X 4"HEX HEAD STAINLESS STEEL LAG SCREWS

4) ALL RACKING AND STRUCTURAL WORK FOR THIS PROJECT SHALL COMPLY WITH BUILDING CODE, IBC 2018 AND ASCE 7-16



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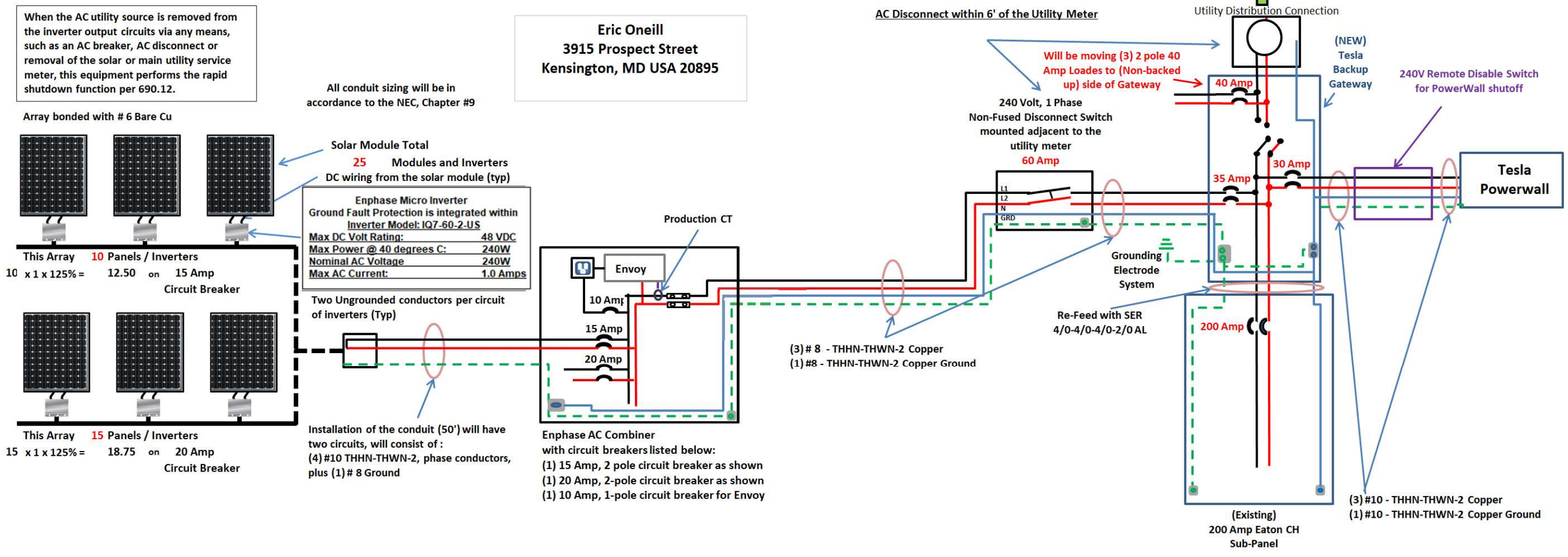
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When the AC utility source is removed from the inverter output circuits via any means, such as an AC breaker, AC disconnect or removal of the solar or main utility service meter, this equipment performs the rapid shutdown function per 690.12.

All conduit sizing will be in accordance to the NEC, Chapter #9

Eric Oneill
 3915 Prospect Street
 Kensington, MD USA 20895

Solar Module Total
 25 Modules and Inverters
 DC wiring from the solar module (typ)

Enphase Micro Inverter
 Ground Fault Protection is integrated within Inverter Model: IQ7-60-2-US
 Max DC Volt Rating: 48 VDC
 Max Power @ 40 degrees C: 240W
 Nominal AC Voltage: 240V
 Max AC Current: 1.0 Amps

Enphase AC Combiner with circuit breakers listed below:
 (1) 15 Amp, 2 pole circuit breaker as shown
 (1) 20 Amp, 2-pole circuit breaker as shown
 (1) 10 Amp, 1-pole circuit breaker for Envoy

(3) # 8 - THHN-THWN-2 Copper
 (1) #8 - THHN-THWN-2 Copper Ground

(3) #10 - THHN-THWN-2 Copper
 (1) #10 - THHN-THWN-2 Copper Ground

- ELECTRICAL NOTES**
- 1) ALL EQUIPMENT TO BE LISTED AND LABELED FOR ITS APPLICATION
 - 2) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC110.26
 - 3) IF USED, PV POWER SOURCE BREAKER TO BE LOCATED AT BOTTOM OF BUS PER NEC690.64(b)(7)
 - 4) LISTING AGENCY NAME AND NUMBER TO BE INDICATED ON INVERTERS AND MODULES PER NEC110.3(b)
 - 5) AC COMBINER PANELS SHALL BE LABELED AS "INVERTER AC COMBINER PANEL"
 - 5) PV POWER SOURCE TO BE SUITABLE FOR BACKFEED PER NEC690.64(b)(5)

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ELECTRICAL - LINE DIAGRAM

E001

Interconnection
Breaker-Tap
Wire Size #8 AWG

WIRE SIZING CALCULATION
2011/2014 NEC Article 310

Full Load Amperage : 25
 Source Voltage : 240
 Length of Run (Feet) : 30
 Load Duty : Continuous
 Conductor Type : THWN-2
 Conductor Material..... : Copper
 Conductor Location : Dry or Wet
 Conductor Insulation Temperature : 90 °C
 Ambient Temperature : 26-30 °C = 78-86 °F
 Terminal Temperature Rating : 60 °C
 Circuit Type : Single Phase 3 Wire (2 phase conductors & neutral)
 Qty. of Circuit Current-Carrying Conductors : 2
 Conductor Requirement:
 Full Load Amps : 25.0
 Load Duty Multiplier : 1.25
 Ambient Temp. Multiplier . : 1.15
 Qty. Conductors Multiplier : 1.0

 Required Conductor Ampacity: 35.94
 Terminal Requirement:
 Full Load Amps : 25.0
 Load Duty Multiplier : 1.25

 Required Terminal Ampacity : 31.25
 Selected Conductor:
 Conductor Ampacity : 55.0
 Ambient Temp. Derate : 0.87
 Qty. Conductors Derate ... : 1.0

 Adjusted Ampacity : 47.85
SELECTED CONDUCTOR SIZE : 8 Awg
 $2 \times \text{Ohms/MilFt} \times \text{Length} \times \text{Amps} \quad 2 \times 0.778 \times 30 \times 35.94$
 $\text{VD} = \text{-----} = 1.17$
 $1000 \times \text{Qty Wires per Phase} \quad 1000 \times 1$
 Volts At Load Terminals..... : 238.83
 Actual Percent Voltage Drop . : 0.49

Combiner to Array
Wire Length 50'
Wire Size #10 AWG

WIRE SIZING CALCULATION
2011/2014 NEC Article 310

Full Load Amperage : 15
 Source Voltage : 240
 Length of Run (Feet) : 50
 Load Duty : Noncontinuous
 Conductor Type : THWN-2
 Conductor Material..... : Copper
 Conductor Location : Dry or Wet
 Conductor Insulation Temperature : 90 °C
 Ambient Temperature : 26-30 °C = 78-86 °F
 Terminal Temperature Rating : 60 °C
 Circuit Type : Single Phase 2 Wire (2 phase conductors, or phase & neutral)
 Qty. of Circuit Current-Carrying Conductors : 2
 Additional Current-Carrying Conductors : 2

 Total Qty. Current-Carrying Conductors : 4
 Conductor Requirement:
 Full Load Amps : 15.0
 Load Duty Multiplier : 1.0
 Ambient Temp. Multiplier . : 1.15
 Qty. Conductors Multiplier : 1.25

 Required Conductor Ampacity: 21.56
 Terminal Requirement:
 Full Load Amps : 15.0
 Load Duty Multiplier : 1.0

 Required Terminal Ampacity : 15.0
 Selected Conductor:
 Conductor Ampacity : 40.0
 Ambient Temp. Derate : 0.87
 Qty. Conductors Derate ... : 0.8

 Adjusted Ampacity : 27.84
SELECTED CONDUCTOR SIZE : 10 Awg
 $2 \times \text{Ohms/MilFt} \times \text{Length} \times \text{Amps} \quad 2 \times 1.24 \times 50 \times 21.56$
 $\text{VD} = \text{-----} = 1.86$
 $1000 \times \text{Qty Wires per Phase} \quad 1000 \times 1$
 Volts At Load Terminals..... : 238.14
 Actual Percent Voltage Drop . : 0.78

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CALCULATION FOR PV BREAKER					
CALCULATION FOR MAIN PV BREAKER & CIRCUITS					
SYSTEM CURRENT:	1	x	25	=	25 A
DESIGN AMPERAGE:	25	x	125%	=	31.25 A
MAIN BUSS RATING:	200	x	120%	=	240 A
EXISTING MAIN BREAKER:				=	200 A
MAX SOLAR BREAKER:	240	-	200	=	40 A
CIRCUIT #1 =	10	x	1 x 125% =		12.5 A
CIRCUIT #2 =	15	x	1 x 125% =		18.75 A

APPROVED
Montgomery County
Historic Preservation Commission

Sandra L. Heiler

REVIEWED
By Dan.Bruechert at 2:20 pm, Sep 11, 2020

- ELECTRICAL NOTES**
- 1) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 90°C 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.

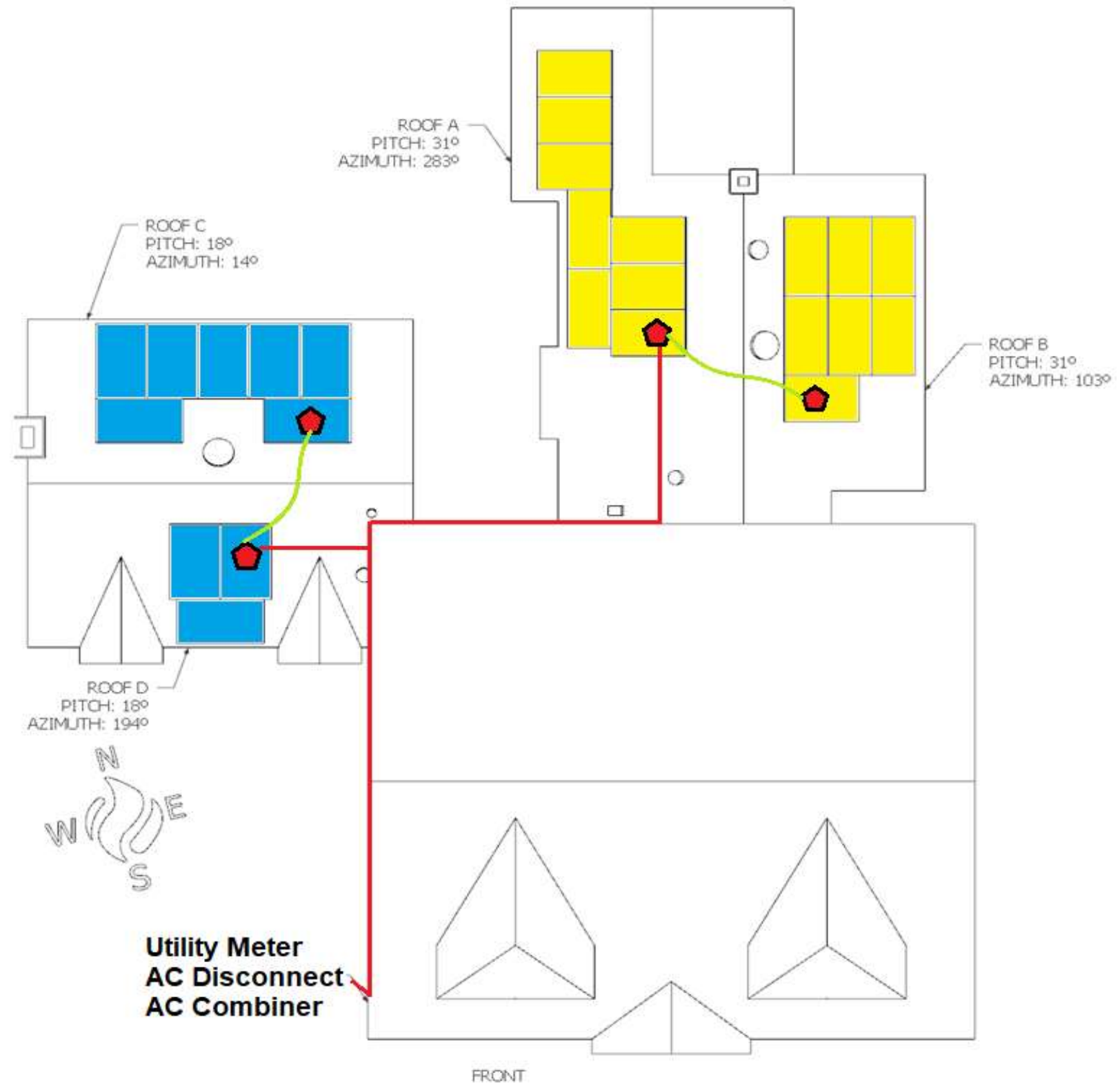
4) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER GEC VIA WEEB LUG PER NEC690.4(c)

REV	DATE
IFC	8/4/2020

ELECTRICAL - WIRE CALCS

E002

- Circuit 1 (10)**
- Circuit 2 (15)**
- Soladeck**
- End Cap**
- Trunk Cable**
- Exterior Conduit**
- Interior Conduit**



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ELECTRICAL NOTES

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STRING & CONDUIT LAYOUT

E003

SOLAR MODULE RATINGS	
Canadian Solar 325 Specifications	
Length:	66.9 in
Width:	39.1 in
Thickness:	1.38 in
Weight:	42.3 lbs
Imp:	8.88 A
Vmp:	36.6 V
Voc:	44.1 V
Isc:	9.45 A
OCPD:	15 A
Pmax:	325 W
Vmax:	1000 V
Temp. Coefficient:	-0.29 %Voc/°C

INVERTER 1 RATINGS	
IQ7-60-2-US Specifications	
Max # Per String:	16
I _{max} (ac):	1 A
V _{max} (dc):	48 V
P _{max} :	240 W
Nom. AC Voltage:	240/208 V
OCPD:	20 A
Weight (Optimizer):	2.38 lbs
I _{max} (Input):	15 A
P _{max} (dc) Input:	N/A 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. [NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE [IFC 605.11.1.1]

PHOTOVOLTAIC DC DISCONNECT

LABEL TO BE INSTALLED AT EACH DC DISCONNECTING MEANS [NEC 690.13(B)]

PHOTOVOLTAIC AC DISCONNECT

LABEL TO BE INSTALLED AT EACH AC DISCONNECTING MEANS [NEC 690.13(B)]

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL TO BE INSTALLED AT RAPID SHUTDOWN SWITCH [NEC 690.56(C)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE [IFC 605.11.1.1]

SOLAR PV SYSTEM DISCONNECT

RATED AC OUTPUT CURRENT: 25 A

NOMINAL OPERATING AC VOLTAGE: 240 V

LABEL TO BE INSTALLED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS AS A POWER SOURCE [NEC 690.54]

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 [NEC 690.13 AND 690.15]

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 [NEC 690.13 AND 690.15]

WARNING

DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

WARNING

INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

LABEL TO BE INSTALLED AT UTILITY METER [NEC 690.56(B)]

SOLAR PV LOADCENTER
8.125 kW DC SOLAR ARRAY
240 VOLT AC SYSTEM

INSTALLED COMPONENTS
(25) Canadian Solar 325W Modules
(25) IQ7-60-2-US Inverters

CIRCUIT CALCULATIONS				
SYSTEM CURRENT:	1	x	25	= 25 A
DESIGN AMPERAGE:	25	x	125%	= 31.25 A
CIRCUIT #1 =	10	x	1 x 125% =	12.5
CIRCUIT #2 =	15	x	1 x 125% =	18.75

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EQUIP. RATINGS & SIGNAGE

E004

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REVIEWED
By Dan.Bruechert at 2:21 pm, Sep 11, 2020

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