

**MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION**  
**STAFF REPORT**

<b>Address:</b>	7118 Carroll Ave., Takoma Park	<b>Meeting Date:</b>	9/1/2021
<b>Resource:</b>	Outstanding Resource <b>Takoma Park Historic District</b>	<b>Report Date:</b>	8/25/2021
<b>Applicant:</b>	Alberto Ramos	<b>Public Notice:</b>	8/18/2021
<b>Review:</b>	HAWP	<b>Tax Credit:</b>	n/a
<b>Permit No.:</b>	963287	<b>Staff:</b>	Dan Bruechert
<b>Proposal:</b>	Rooftop solar array		

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**STAFF RECOMMENDATION**

Staff recommends the HPC **approve** the HAWP.

**ARCHITECTURAL DESCRIPTION**

**SIGNIFICANCE:** Outstanding Resource to the Takoma Park Historic District  
**STYLE:** Colonial Revival  
**DATE:** c.1910

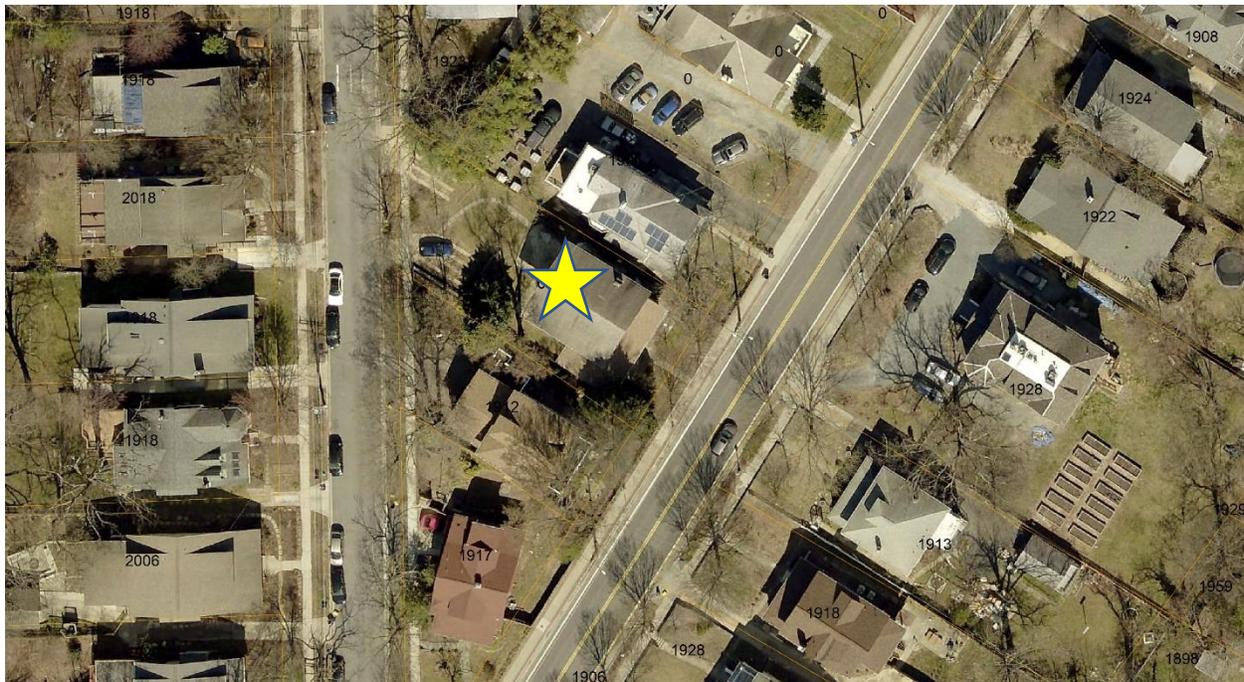


Figure 1: 7118 Carroll Ave., Takoma Park

**PROPOSAL**

The applicant proposes to install 58 solar panels on the roof the subject property.

**APPLICABLE GUIDELINES**

When reviewing alterations and new construction within the Takoma Park Historic District several documents are to be utilized as guidelines to assist the Commission in developing their decision. These documents include the historic preservation review guidelines in the approved and adopted amendment for the *Takoma Park Historic District (Guidelines)*, *Montgomery County Code Chapter 24A (Chapter 24A)*, and *the Secretary of the Interior's Standards for Rehabilitation (Standards)*, and Historic Preservation Commission Policy No. 20-01: ADDRESSING EMERGENCY CLIMATE MOBILIZATION THROUGH THE INSTALLATION OF ROOF-MOUNTED SOLAR PANELS. The pertinent. The pertinent information in these documents is outlined below.

***Takoma Park Historic District Guidelines***

There are two very general, broad planning and design concepts which apply to all categories. These are:

The design review emphasis will be restricted to changes that are at all visible from the public right-of-way, irrespective of landscaping or vegetation (it is expected that the majority of new additions will be reviewed for their impact on the overall district), and,

The importance of assuring that additions and other changes to existing structures act to reinforce and continue existing streetscape, landscape, and building patterns rather than to impair the character of the district.

Outstanding Resources have the highest level of architectural and/or historical significance. While they will receive the most detailed level of design review, it is permissible to make sympathetic alterations, changes and additions. The guiding principles to be utilized by the Historic Preservation Commission are the *Secretary of the Interior's Standards for Rehabilitation*

Specifically, some of the factors to be considered in reviewing HAWPs on Outstanding Resources:

Plans for all alterations should be compatible with the resource's original design; additions, specifically, should be sympathetic to existing architectural character, including massing, height, setback, and materials

Emphasize placement of major additions to the rear of existing structures so that they are less visible from the public right-of-way

All changes and additions should respect existing environmental settings, landscaping, and patterns of open space

***Montgomery County Code; Chapter 24A-8***

- (a) The commission shall instruct the director to issue a permit, or issue a permit subject to such conditions as are found to be necessary to ensure conformity with the purposes and requirements of this chapter, if it finds that:
  - (1) The proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district; or
  - (2) The proposal is compatible in character and nature with the historical, archeological, architectural or cultural features of the historic site or the historic district in which an historic

- resource is located and would not be detrimental thereto or to the achievement of the purposes of this chapter; or
- (d) In the case of an application for work on an historic resource located within an historic district, the commission shall be lenient in its judgment of plans for structures of little historical or design significance or for plans involving new construction, unless such plans would seriously impair the historic or architectural value of surrounding historic resources or would impair the character of the historic district. (Ord. No. 9-4, § 1; Ord. No. 11-59.)

***Secretary of the Interior’s Standards for Rehabilitation:***

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportions, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

***Historic Preservation Commission Policy No. 20-01: ADDRESSING EMERGENCY CLIMATE MOBILIZATION THROUGH THE INSTALLATION OF ROOF-MOUNTED SOLAR PANELS***

Now, THEREFORE:

WHEREAS, Historic Area Work Permit decisions are guided by the criteria in Section 24A, The Secretary of the Interior’s Standards for Rehabilitation, and pertinent guidance from applicable master plan amendments and/or site or district-specific studies;

WHEREAS, The Secretary of the Interior’s Standards for Rehabilitation as interpreted by the National Park Service limit the placement of rooftop solar panels under Standards 2, 9, and 10 to less conspicuous locations;

WHEREAS, the County Council has established a Climate Emergency;

WHEREAS, the Historic Preservation is a body established by the County Executive and County Council;

WHEREAS, Section 24-8(b)(6) states, “In balancing the interest of the public in preserving the historic site or historic resource located within an historic district, with the interests of the public from the use and benefit of the alternative proposal, the general public welfare is better served by granting the permit;”

WHEREAS, the widespread use of solar panels, both for hot water and for electricity production, will reduce greenhouse gases in the county, in accordance with the aims of the Emergency Climate Mobilization resolution (Resolution No.: 18-974), it shall be the policy of the Historic Preservation Commission that:

1. The preferred locations for solar panel installation(s) on a designated historic site or an historic resource located within an historic district is a) on the rear of the property, b) on non-historic building additions, c) on accessory structures, or d) in ground-mounted arrays;
2. If it is not feasible to install solar panels in one of the identified preferred locations due to resource orientation or other site limitations; and,

3. The roof is determined to be neither architecturally significant, nor a character-defining feature of the resource, nor is it a slate or tile roof, that unless it can be demonstrated that the solar array will be installed without damaging the historic character of the resource or historic fabric; then
4. The public welfare is better served by approving a Historic Area Work Permit for solar panels on all visible side or front roof slopes under Section 24A-8(b)(6).
5. A Historic Area Work Permit (HAWP) is required for all work referenced in this policy.

### **STAFF DISCUSSION**

The subject property is a two-story house with a front gable roof and a wrap-around porch with a port-cochere. Though the house faces Carroll Ave., vehicles access the property from Park Ave. The applicant proposes installing a total of fifty-eight solar panels on the roof of the subject property. Thirty-three of the panels are to be installed in a single array on the left (south-facing) roof slope, and the remaining twenty-five will be installed on the right (north-facing) roof slope.

Staff finds that the proposal includes a large number of solar panels, but nonetheless finds that the panels will not significantly detract from the historic character of the subject property or surrounding district. In evaluating the proposal, Staff first considers the preferred locations for solar panels. The lot is not large enough for a ground-mounted array, nor is there an accessory building in the rear of the property. The house has not been added onto, so there is not a building addition that can be utilized. Finally, because the roof of the subject property is a front gable, there is not a rear slope to install the panels so that they would be less visible from the public right-of-way (again, because the house has access from both Carroll and Park Aves., any alterations to a rear roof slope would still be visible from a right-of-way). Based on this analysis, Staff concludes that the only location for solar panels at the subject property is on the roof.

Staff further finds that the asphalt-shingled front gable roof is not architecturally significant and the proposed work will not permanently damage historic materials or the historic design. Staff finds that both the left and right roof slopes will be visible from the right-of-way.

The evaluation then comes down to the configuration and placement of the proposed panels. Staff finds that the most successful solar installations occur when the solar panels are installed in a single square or rectangular configuration. This simple rectilinear form better blends into the background instead of drawing visual attention by including additional corners and gaps in the array. The panels on the left roof slope will be installed in an 11 × 3 panel configuration, while the panels on the right are arranged in a 2 × 8 configuration at the front with an additional nine panels in a 3 × 3 arrangement at the rear. Staff finds that even though these panels will be visible from certain angles from the right-of-way they will not detract from the historic character of the house or surrounding district. Unlike the previously reviewed solar panel case involving an Outstanding Resource, (14 Crescent Place, Takoma Park<sup>1</sup>) the entirety of one roof slope is not visible from the right-of-way. Only partial slopes are visible at the subject property. Staff also notes that the neighboring property at 7120 Carroll also installed a roof-mounted solar array which was limited to the left roof slope. This was done for two reasons. First, the Solar Policy had not been adopted by the HPC when this HAWP was submitted. Second, the open lot to the right of 7120 Carroll makes the entirety of the right roof slope visible from the right-of-way. Staff finds that while the proposed array includes a large number of panels, the configuration and placement does not detract from the character of the house or surrounding district and recommends the HPC approve the HAWP.

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<sup>1</sup> See the Staff Report here: <https://montgomeryplanning.org/wp-content/uploads/2021/06/II.G-14-Crescent-Place-Takoma-Park.pdf>.

**STAFF RECOMMENDATION**

Staff recommends that the Commission **approve** the HAWP application under the Criteria for Issuance in Chapter 24A-8(b)(1) and (2) and the *Takoma Park Historic District Guidelines*, having found that the proposal will not substantially alter the exterior features of the historic resource and is compatible in character with the district and the purposes of Chapter 24A;

and with the *Secretary of the Interior's Standards for Rehabilitation* #2, 9, and 10;

and with the general condition that the applicant shall present an electronic set of drawings, if applicable, to Historic Preservation Commission (HPC) staff for review and stamping prior to submission for the Montgomery County Department of Permitting Services (DPS) building permits;

and with the general condition that final project design details, not specifically delineated by the Commission, shall be approved by HPC staff or brought back to the Commission as a revised HAWP application at staff's discretion;

and with the general condition that the applicant shall notify the Historic Preservation Staff if they propose to make **any alterations** to the approved plans. Once the work is completed the applicant will contact the staff person assigned to this application at 301-563-3400 or [dan.bruechert@montgomeryplanning.org](mailto:dan.bruechert@montgomeryplanning.org) to schedule a follow-up site visit.



FOR STAFF ONLY:  
HAWP# 963287  
DATE ASSIGNED \_\_\_\_\_

# APPLICATION FOR HISTORIC AREA WORK PERMIT

HISTORIC PRESERVATION COMMISSION  
301.563.3400

**APPLICANT:**

Name: Alberto Ramos

E-mail: albertoramos7118@gmail.com

Address: 7118 Carroll Avenue

City: Takoma Park Zip: 20912

Daytime Phone: 301-891-3926

Tax Account No.: 01058698

**AGENT/CONTACT (if applicable):**

Name: Advanced Solar

E-mail: permits@advanced.solar

Address: 3321 75th Avenue

City: Hyattsville Zip: 20785

Daytime Phone: 240-593-5892

Contractor Registration No.: 108569

**LOCATION OF BUILDING/PREMISE:** MIHP # of Historic Property 37/03

Is the Property Located within an Historic District?  Yes/District Name City of Takoma Park  
 No/Individual Site Name \_\_\_\_\_

Is there an Historic Preservation/Land Trust/Environmental Easement on the Property? If YES, include a map of the easement, and documentation from the Easement Holder supporting this application.

Are other Planning and/or Hearing Examiner Approvals /Reviews Required as part of this Application? (Conditional Use, Variance, Record Plat, etc.?) If YES, include information on these reviews as supplemental information.

Building Number: \_\_\_\_\_ Street: 7118 Carroll Avenue

Town/City: Takoma Park Nearest Cross Street: Park Avenue

Lot: 3 Block: 2 Subdivision: 0025 Parcel: 0000

**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:**

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> New Construction   | <input type="checkbox"/> Deck/Porch          | <input type="checkbox"/> Shed/Garage/Accessory Structure |
| <input type="checkbox"/> Addition           | <input type="checkbox"/> Fence               | <input checked="" type="checkbox"/> Solar                |
| <input type="checkbox"/> Demolition         | <input type="checkbox"/> Hardscape/Landscape | <input type="checkbox"/> Tree removal/planting           |
| <input type="checkbox"/> Grading/Excavation | <input type="checkbox"/> Roof                | <input type="checkbox"/> Window/Door                     |
|   |  | <input type="checkbox"/> 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.

*Alberto Ramos*  
Signature of owner or authorized agent

8/11/2021  
Date

**HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFYING**  
[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

<b>Owner's mailing address</b>  7118 Carroll Avenue Takoma Park, MD 20912	<b>Owner's Agent's mailing address</b>  3321 75th Avenue Hyattsville, MD 20785
<b>Adjacent and confronting Property Owners mailing addresses</b>	
7114 Carroll Avenue Takoma Park, MD 20912	7119 Carroll Avenue Takoma Park, MD 20912
7120 Carroll Avenue Takoma Park, MD 20912	7115 Carroll Avenue Takoma Park, MD 20912
118 Park Avenue Takoma Park, MD 20912	

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

We are installing solar panels on the roof. We are not changing anything else.

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

We will be installing solar panels on the roof.

Work Item 1: <u>Roof</u>	
Description of Current Condition: Plain Roof	Proposed Work: Roof with Solar Panels

Work Item 2: _____	
Description of Current Condition:	Proposed Work:

Work Item 3: _____	
Description of Current Condition:	Proposed Work:

**HISTORIC AREA WORK PERMIT  
CHECKLIST OF  
APPLICATION REQUIREMENTS**

	Required Attachments						
Proposed Work	I. 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/ Landscaping	*	*		*	*	*	*
Tree Removal	*	*		*	*	*	*
Siding/ Roof Changes	*	*	*	*	*		*
Window/ Door Changes	*	*	*	*	*		*
Masonry Repair/ Repoint	*	*	*	*	*		*
Signs	*	*	*	*	*		*

# THE ALLMAX<sup>M</sup> PLUS<sup>+</sup>

## FRAMED 120 HALF-CELL MODULE



**120-Cell**  
MONOCRYSTALLINE MODULE

**320-335W**  
POWER OUTPUT RANGE

**19.7%**  
MAXIMUM EFFICIENCY

**0~+5W**  
POSITIVE POWER TOLERANCE

PRODUCTS	BACKSHEET COLOR	POWER RANGE
TSM-DD06H.08(II)	White	320-335W
TSM-DD06H.05(II)	Black	320-330W

FRAME COLOR: Black

### Increased value



- Reduce BOS cost with high power bin
- Low thermal coefficients for greater energy production at higher temperature

### Half-cell design brings higher efficiency



- New cell string layout and split J-box location to reduce the energy loss caused by inter-row shading
- Integrated LRF (Light Redirecting Film) to enhance power, specially for ground-mount applications (optional)
- Lower cell connection power losses due to half-cell layout (120 monocrystalline)

### Highly reliable due to stringent quality control



- Over 30 in-house tests (UV, TC, HF etc)
- Increased module robustness to minimize micro-cracks
- PID resistant and free of snail trails
- Internal test requirement of Trina more stringent than certification authority

### Certified to withstand the most challenging environmental conditions



- 2400 Pa negative load
- 5400 Pa positive load

Founded in 1997, Trina Solar is the world's leading comprehensive solutions provider for solar energy. We believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

### Comprehensive Products And System Certificates

IEC61215/IEC61730/UL1703/IEC61701/IEC62716  
 ISO 9001: Quality Management System  
 ISO 14001: Environmental Management System  
 ISO14064: Greenhouse gases Emissions Verification  
 OHSAS 18001: Occupation Health and Safety Management System

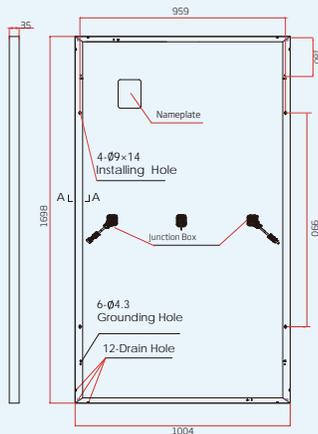


### LINEAR PERFORMANCE WARRANTY

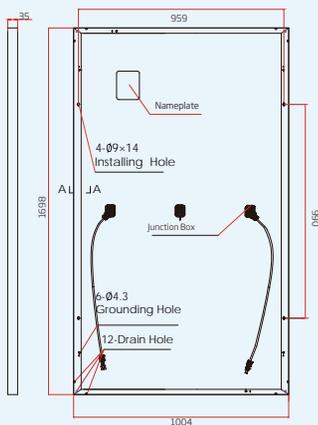
10 Year Product Warranty · 25 Year Linear Power Warranty



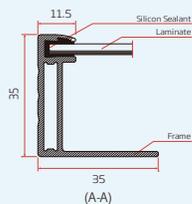
DIMENSIONS OF PV MODULE(mm)



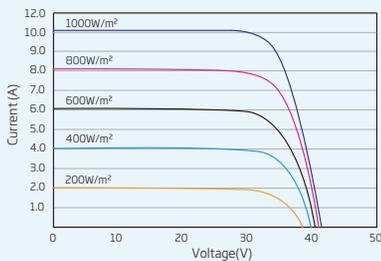
String Inverter Configuration



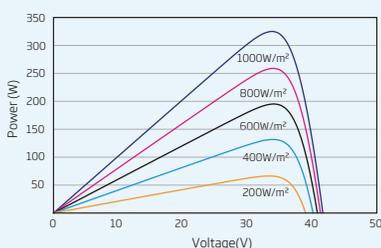
Microinverter or Optimizer Configuration



I-V CURVES OF PV MODULE(325W)



P-V CURVES OF PV MODULE(325W)



ELECTRICAL DATA (STC)

Peak Power Watts-P <sub>MAX</sub> (Wp)*	320	325	330	335
Power Output Tolerance-P <sub>MAX</sub> (W)	0 ~ +5			
Maximum Power Voltage-V <sub>MPP</sub> (V)	33.3	33.7	34.0	34.4
Maximum Power Current-I <sub>MPP</sub> (A)	9.60	9.65	9.70	9.75
Open Circuit Voltage-V <sub>OC</sub> (V)	40.6	41.4	41.8	42.2
Short Circuit Current-I <sub>SC</sub> (A)	10.00	10.07	10.14	10.21
Module Efficiency η <sub>m</sub> (%)	18.8	19.1	19.4	19.7

STC: Irradiance 1000W/m<sup>2</sup>, Cell Temperature 25°C, Air Mass AM1.5.  
\*Measuring tolerance: ±3%.

ELECTRICAL DATA (NMOT)

Maximum Power-P <sub>MAX</sub> (Wp)	241	245	249	253
Maximum Power Voltage-V <sub>MPP</sub> (V)	31.6	32.0	32.2	32.4
Maximum Power Current-I <sub>MPP</sub> (A)	7.64	7.67	7.72	7.78
Open Circuit Voltage-V <sub>OC</sub> (V)	38.2	39.0	39.3	39.6
Short Circuit Current-I <sub>SC</sub> (A)	8.06	8.12	8.18	8.24

NMOT: Irradiance at 800W/m<sup>2</sup>, Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline
Cell Orientation	120 cells (6 × 20)
Module Dimensions	1698 × 1004 × 35 mm (66.85 × 39.53 × 1.38 inches)
Weight	18.7 kg (41.2 lb)
Glass	3.2 mm (0.13 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant Material	EVA
Backsheet	White [DD06H.08(II)]; Black [DD06H.05(II)]
Frame	35 mm (1.38 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm <sup>2</sup> (0.006 inches <sup>2</sup> ), Portrait: N 140mm/P 285mm(5.51/11.22inches) Landscape: N 1200 mm /P 1200 mm (47.24/47.24 inches)
Connector	MC4

TEMPERATURE RATINGS

NMOT(Nominal Module Operating Temperature)	41°C (±3°C)
Temperature Coefficient of P <sub>MAX</sub>	- 0.37%/°C
Temperature Coefficient of V <sub>OC</sub>	- 0.29%/°C
Temperature Coefficient of I <sub>SC</sub>	0.05%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1000V DC (IEC) 1000V DC (UL)
Max Series Fuse Rating	20A

(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

10 year Product Workmanship Warranty
25 year Linear Power Warranty

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 30 pieces
Modules per 40' container: 780 pieces



# 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.



## 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 <sup>1</sup>	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 I <sub>sc</sub> )	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 <sup>2</sup>	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 <sup>3</sup>	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.			

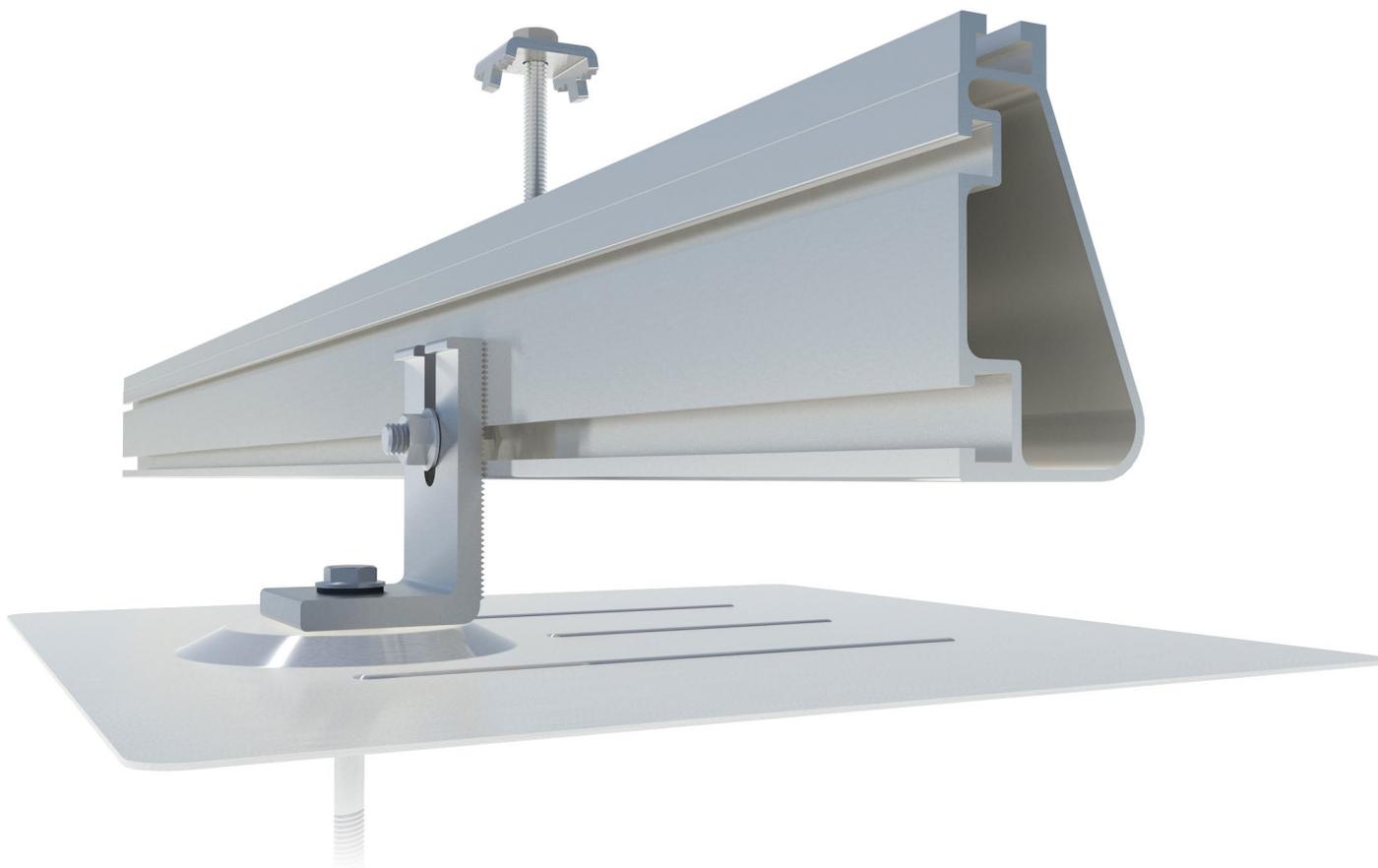
1. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.

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](https://enphase.com)





### Built for solar's toughest roofs.

IronRidge builds the strongest roof mounting system in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 20-year warranty.



#### Strength Tested

All components evaluated for superior structural performance.



#### PE Certified

Pre-stamped engineering letters available in most states.



#### Class A Fire Rating

Certified to maintain the fire resistance rating of the existing roof.



#### Design Software

Online tool generates a complete bill of materials in minutes.



#### Integrated Grounding

UL 2703 system eliminates separate module grounding components.



#### 20 Year Warranty

Twice the protection offered by competitors.

## XR Rails

### XR10 Rail



A low-profile mounting rail for regions with light snow.

- 6' spanning capability
- Moderate load capability
- Clear & black anod. finish

### XR100 Rail



The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear & black anod. finish

### XR1000 Rail



A heavyweight mounting rail for commercial projects.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish

### Internal Splices

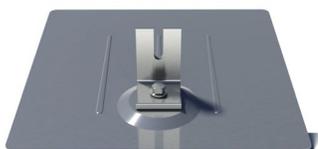


All rails use internal splices for seamless connections.

- Self-tapping screws
- Varying versions for rails
- Grounding Straps offered

## Attachments

### FlashFoot



Anchor, flash, and mount with all-in-one attachments.

- Ships with all hardware
- IBC & IRC compliant
- Certified with XR Rails

### Slotted L-Feet



Drop-in design for rapid rail attachment.

- High-friction serrated face
- Heavy-duty profile shape
- Clear & black anod. finish

### Standoffs



Raise flush or tilted systems to various heights.

- Works with vent flashing
- Ships pre-assembled
- 4" and 7" Lengths

### Tilt Legs



Tilt assembly to desired angle, up to 45 degrees.

- Attaches directly to rail
- Ships with all hardware
- Fixed and adjustable

## Clamps & Grounding

### End Clamps



Slide in clamps and secure modules at ends of rails.

- Mill finish & black anod.
- Sizes from 1.22" to 2.3"
- Optional Under Clamps

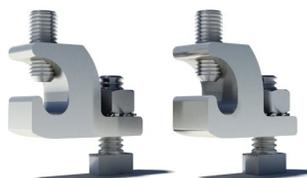
### Grounding Mid Clamps



Attach and ground modules in the middle of the rail.

- Parallel bonding T-bolt
- Reusable up to 10 times
- Mill & black stainless

### T-Bolt Grounding Lugs



Ground system using the rail's top slot.

- Easy top-slot mounting
- Eliminates pre-drilling
- Swivels in any direction

### Accessories



Provide a finished and organized look for rails.

- Snap-in Wire Clips
- Perfected End Caps
- UV-protected polymer

## Free Resources



### Design Assistant

Go from rough layout to fully engineered system. For free.

[Go to IronRidge.com/rm](http://IronRidge.com/rm)



### NABCEP Certified Training

Earn free continuing education credits, while learning more about our systems.

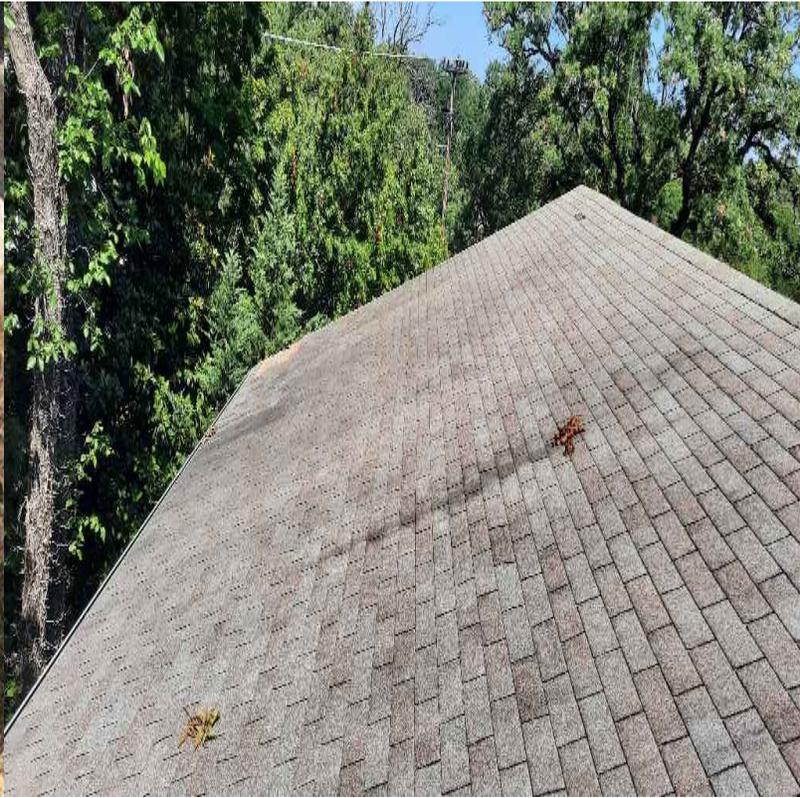
[Go to IronRidge.com/training](http://IronRidge.com/training)



3321 75th Avenue  
Suite F  
202-505-5401

**Customer Info**  
Alberto Ramos  
7118 Carrol AVE  
Takoma Park, MD 20912

## Photos



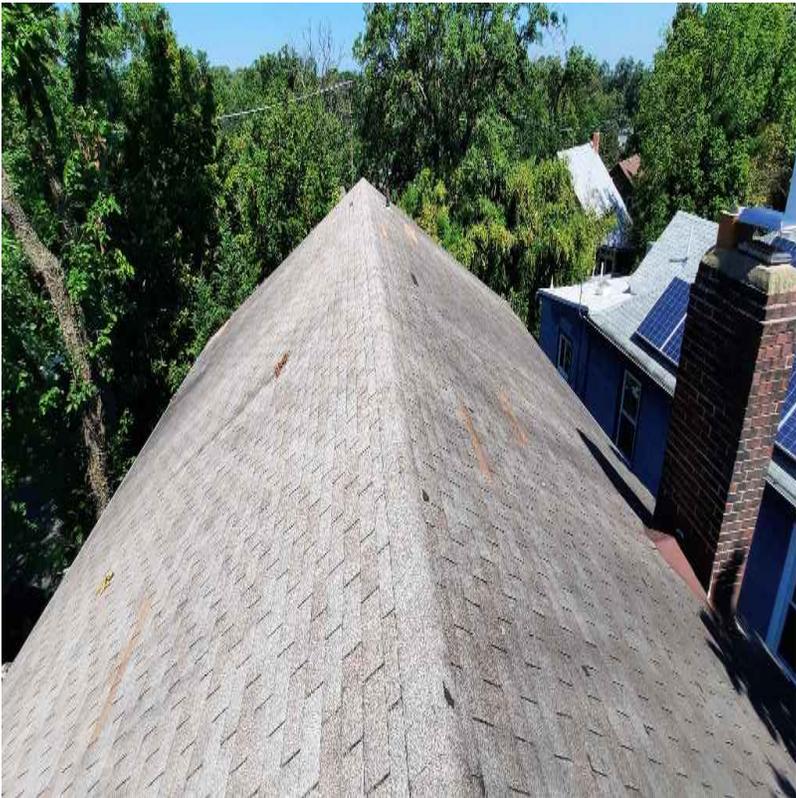
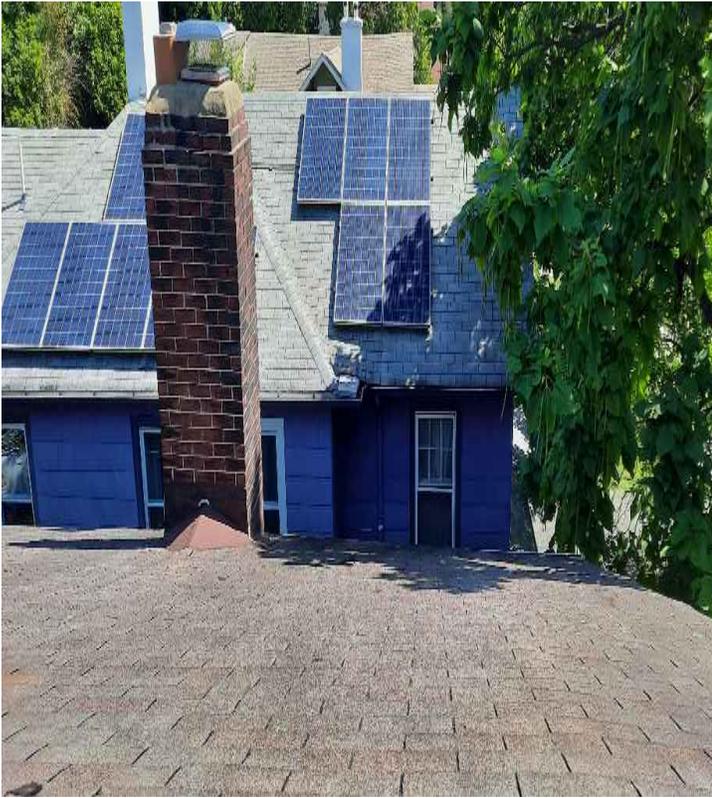
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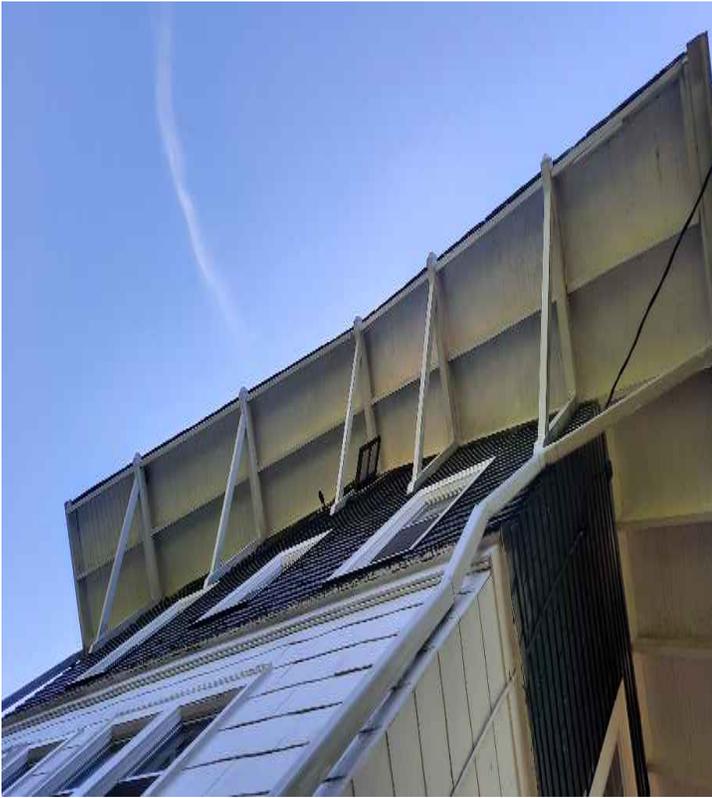
**flat roof**



**flat roof**

**flat roof**



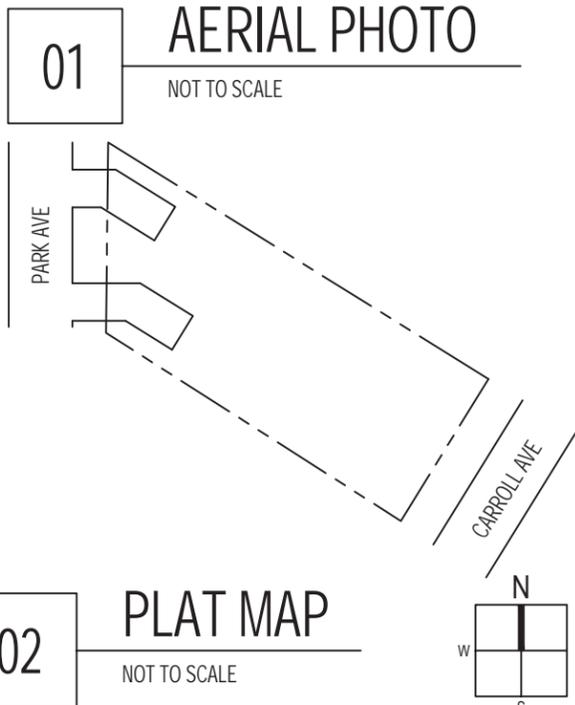


# GENERAL NOTES

# NEW PV SYSTEM: 19.140 kWp

## RAMOS RESIDENCE

7118 CARROL AVE,  
TAKOMA PARK, MD 20912  
ASSESSOR'S #: 161301058698



## SHEET LIST TABLE

SHEET NUMBER	SHEET TITLE
T-001	COVER PAGE
G-001	NOTES
A-101	SITE PLAN
A-102	ELECTRICAL PLAN
A-103	SOLAR ATTACHMENT PLAN
E-601	LINE DIAGRAM
E-602	DESIGN TABLES
E-603	PLACARDS
S-501	ASSEMBLY DETAILS

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## PROJECT INFORMATION

**OWNER**  
NAME: ALBERTO RAMOS

**PROJECT MANAGER**  
NAME: BRENDAN WELSH  
PHONE: 919-724-8129

**CONTRACTOR**  
NAME: ADVANCED SOLAR  
PHONE: 202-505-5401

**AUTHORITIES HAVING JURISDICTION**  
BUILDING: MONTGOMERY COUNTY  
ZONING: MONTGOMERY COUNTY  
UTILITY: PEPCO

**DESIGN SPECIFICATIONS**  
OCCUPANCY: II  
CONSTRUCTION: SINGLE-FAMILY  
ZONING: RESIDENTIAL  
GROUND SNOW LOAD: 35 PSF  
WIND EXPOSURE: B  
WIND SPEED: 111 MPH

**APPLICABLE CODES & STANDARDS**  
BUILDING: IBC 2018  
ELECTRICAL: NEC 2017  
FIRE: IFC 2015

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- 1.1.1 **PROJECT NOTES:**
- 1.1.2 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'S (AHJ) APPLICABLE CODES.
- 1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- 1.1.4 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICROINVERTER IN ACCORDANCE WITH NEC 690.41(B)
- 1.1.5 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4:  
PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE  
INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519  
COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY
- 1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
- 1.1.7 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
- 1.1.8 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
- 1.2.1 **SCOPE OF WORK:**
- 1.2.2 PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT.  
P.E. APPROVAL GIVEN FOR STRUCTURAL PORTION OF WORK ONLY.
- 1.3.1 **WORK INCLUDES:**
- 1.3.2 PV ROOF ATTACHMENTS - IRONRIDGE FLASHFOOT2
- 1.3.3 PV RACKING SYSTEM INSTALLATION - IRONRIDGE XR100
- 1.3.4 PV MODULE AND INVERTER INSTALLATION - TRINA SOLAR TSM-330DD06H.05(II) / ENPHASE IQ7-60-2-US
- 1.3.5 PV EQUIPMENT GROUNDING
- 1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- 1.3.7 PV LOAD CENTERS (IF INCLUDED)
- 1.3.8 PV METERING/MONITORING (IF INCLUDED)
- 1.3.9 PV DISCONNECTS
- 1.3.10 PV GROUNDING ELECTRODE & BONDING TO (E) GEC
- 1.3.11 PV FINAL COMMISSIONING
- 1.3.12 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
- 1.3.13 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

### SCOPE OF WORK

SYSTEM SIZE: STC: 58 x 330W = 19.140kW  
PTC: 58 x 306.4W = 17.771kW  
(58) TRINA SOLAR TSM-330DD06H.05(II)  
(58) ENPHASE IQ7-60-2-US

ATTACHMENT TYPE: IRONRIDGE FLASHFOOT2

MSP UPGRADE: NO

### CONTRACTOR

ADVANCED SOLAR  
3321 75TH AVE  
HYATTSVILLE, MD 20785  
PHONE: 202-505-5401  
CONTRACTOR #: 108569



## ALBERTO RAMOS RESIDENCE

RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION  
7118 CARROL AVE, TAKOMA PARK, MD 20912  
APN: 161301058698  
PHONE #:

### COVER PAGE

SYSTEM AC SIZE @ STC: 13.920 kW  
(58) TRINA SOLAR TSM-330DD06H.05(II)  
(58) ENPHASE IQ7-60-2-US

SYSTEM DC SIZE @ STC: 19.140 kW

PAGE:

DRAWN BY:  
V.P.

REV:

DATE:  
07.14.2021

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(SHEET 1)  
21

1	<p><b>2.1.1 SITE NOTES:</b></p> <p>2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.</p> <p>2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.</p> <p>2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.</p> <p>2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.</p> <p>2.1.6 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.</p>	4.5.1	<p><b>GROUNDING NOTES:</b></p> <p>2.5.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.</p> <p>2.5.3 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.</p> <p>2.5.4 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).</p> <p>2.5.5 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTURERS' INSTRUCTIONS.</p> <p>2.5.6 EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.</p>	2.5.7	<p>THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.</p> <p>2.5.8 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]</p> <p>2.5.9 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.</p>	2.5.10	<p>GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS</p>		
2	<p><b>2.2.1 EQUIPMENT LOCATIONS:</b></p> <p>2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.</p> <p>2.2.3 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C).</p> <p>2.2.4 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.</p> <p>2.2.5 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.</p> <p>2.2.6 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.</p> <p>2.2.7 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.</p>	2.6.1	<p><b>DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:</b></p> <p>2.6.2 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).</p> <p>2.6.3 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH</p> <p>2.6.4 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).</p> <p>2.6.5 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.</p> <p>2.6.6 MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).</p> <p>2.6.7 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.</p>	2.7.1	<p><b>INTERCONNECTION NOTES:</b></p> <p>2.7.2 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]</p> <p>2.7.3 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].</p> <p>2.7.4 THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD [NEC 705.12(B)(2)(3)].</p> <p>2.7.5 AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).</p> <p>2.7.6 FEEDER TAP INTERCONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (B)(2)(1)</p> <p>2.7.7 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42</p> <p>2.7.8 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].</p>	2.7.8		FOR OFFICIAL USE ONLY	
3	<p><b>2.3.1 STRUCTURAL NOTES:</b></p> <p>2.3.2 RACKING SYSTEM &amp; PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAI MANUFACTURER'S INSTRUCTIONS.</p> <p>2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED &amp; SEALED PER LOCAL REQUIREMENTS.</p> <p>2.3.4 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.</p> <p>2.3.5 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.</p> <p>2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.</p>	2.7.1		2.7.2		2.7.3		2.7.4	
4	<p><b>2.4.1 WIRING &amp; CONDUIT NOTES:</b></p> <p>2.4.2 ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.</p> <p>2.4.3 CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.</p> <p>2.4.4 VOLTAGE DROP LIMITED TO 1.5%.</p> <p>2.4.5 DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.</p> <p>2.4.6 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:</p> <p style="padding-left: 20px;">PHASE A OR L1- BLACK</p> <p style="padding-left: 20px;">PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE</p> <p style="padding-left: 20px;">PHASE C OR L3- BLUE, YELLOW, ORANGE**, OR OTHER CONVENTION</p> <p style="padding-left: 20px;">NEUTRAL- WHITE OR GREY</p> <p>IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].</p>	2.7.1		2.7.2		2.7.3		2.7.4	
5		2.7.5		2.7.6		2.7.7		2.7.8	

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*Richard B. Gordon*

<p><b>CONTRACTOR</b></p> <p>ADVANCED SOLAR 3321 75TH AVE HYATTSVILLE, MD 20785 PHONE: 202-505-5401 CONTRACTOR #: 108569</p>		<p><b>ALBERTO RAMOS RESIDENCE</b></p> <p>RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION 7118 CARROL AVE, TAKOMA PARK, MD 20912 APN: 161301058698 PHONE #:</p>	<p style="text-align: center;"><b>NOTES</b></p> <p>SYSTEM AC SIZE @ STC: 13.920 kW (58) TRINA SOLAR TSM-330DD06H.05(I1) (58) ENPHASE IQ7-60-2-US</p> <p>SYSTEM DC SIZE @ STC: 19.140 kW</p> <p>DRAWN BY: V.P.      DATE: 07.14.2021</p> <p>REV:      PAGE: <b>G-001.00</b> (SHEET 2) <b>22</b></p>
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ROOF PROPERTIES	
ROOF MATERIAL	ASPHALT SHINGLE
ROOF SLOPE	23°
MEAN ROOF HEIGHT	~20 FT

PARK AVE

METER  
AC DISCONNECT  
AC COMBINER BOX

ENTRANCE

2'-1"

54'-8"

AREA OF WORK

17'-3"

28'-10"

CARROLL AVE

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### GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

----- PROPERTY LINE

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PE STAMP

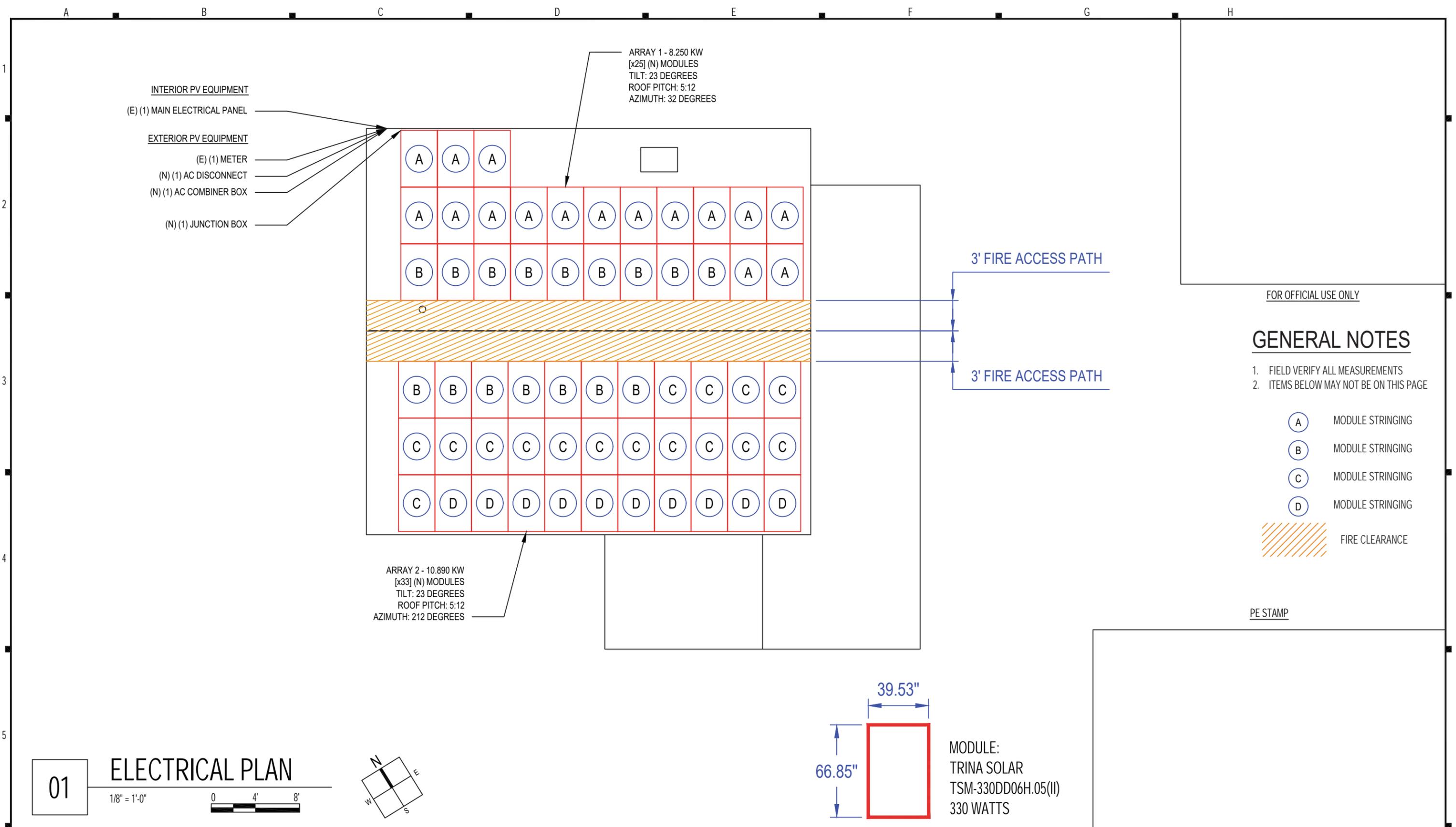
**01** **SITE PLAN**  
1/16" = 1'-0"  
0 8' 16'

**CONTRACTOR**  
ADVANCED SOLAR  
3321 75TH AVE  
HYATTSVILLE, MD 20785  
PHONE: 202-505-5401  
CONTRACTOR #: 108569



**ALBERTO RAMOS RESIDENCE**  
RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION  
7118 CARROL AVE, TAKOMA PARK, MD 20912  
APN: 161301058698  
PHONE #:

SITE PLAN		PAGE:
SYSTEM AC SIZE @ STC: 13.920 kW (58) TRINA SOLAR TSM-330DD06H.05(II) (58) ENPHASE IQ7-60-2-US	SYSTEM DC SIZE @ STC: 19.140 kW	<b>A-101.00</b> (SHEET 3) 23
DRAWN BY: V.P.	DATE: 07.14.2021	



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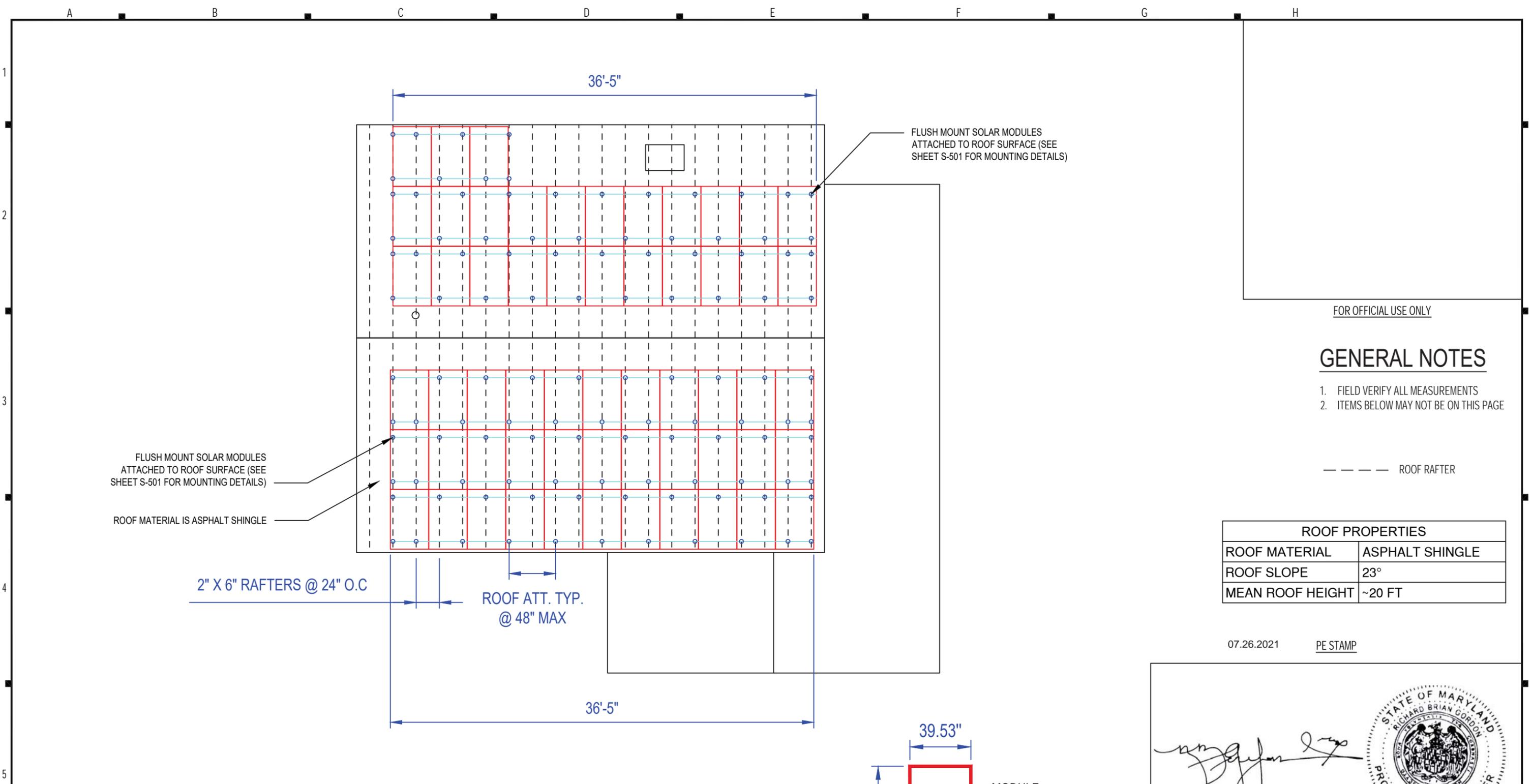
**GENERAL NOTES**

- FIELD VERIFY ALL MEASUREMENTS
- ITEMS BELOW MAY NOT BE ON THIS PAGE

- (A) MODULE STRINGING
- (B) MODULE STRINGING
- (C) MODULE STRINGING
- (D) MODULE STRINGING
- FIRE CLEARANCE

PE STAMP

<p><b>CONTRACTOR</b></p> <p>ADVANCED SOLAR          3321 75TH AVE          HYATTSVILLE, MD 20785          PHONE: 202-505-5401          CONTRACTOR #: 108569</p>		<p><b>ALBERTO RAMOS RESIDENCE</b></p> <p>RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION          7118 CARROL AVE, TAKOMA PARK, MD 20912          APN: 161301058698          PHONE #:</p>	<p><b>ELECTRICAL PLAN</b></p> <p>SYSTEM AC SIZE @ STC: 13.920 KW          (58) TRINA SOLAR TSM-330DD06H.05(II)          (58) ENPHASE IQ7-60-2-US</p> <p>DRAWN BY:          V.P.</p>	<p>SYSTEM DC SIZE @ STC: 19.140 KW</p> <p>DATE:          07.14.2021</p>	<p>PAGE:</p> <p><b>A-102.00</b>          (SHEET 4)          24</p>
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### GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

--- ROOF RAFTER

ROOF PROPERTIES	
ROOF MATERIAL	ASPHALT SHINGLE
ROOF SLOPE	23°
MEAN ROOF HEIGHT	~20 FT

07.26.2021 PE STAMP

*[Handwritten Signature]*

39.53"  
66.85"

MODULE:  
TRINA SOLAR  
TSM-330DD06H.05(I1)  
330 WATTS

**01** SOLAR ATTACHMENT PLAN

1/8" = 1'-0"

**CONTRACTOR**  
ADVANCED SOLAR  
3321 75TH AVE  
HYATTSVILLE, MD 20785  
PHONE: 202-505-5401  
CONTRACTOR #: 108569



**ALBERTO RAMOS RESIDENCE**  
RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION  
7118 CARROL AVE, TAKOMA PARK, MD 20912  
APN: 161301058698  
PHONE #:

SOLAR ATTACHMENT PLAN	
SYSTEM AC SIZE @ STC: 13.920 kW (58) TRINA SOLAR TSM-330DD06H.05(I1) (58) ENPHASE IQ7-60-2-US	SYSTEM DC SIZE @ STC: 19.140 kW
DRAWN BY: V.P.	DATE: 07.14.2021
REV:	PAGE: <b>A-103.00</b> (SHEET 5) 25

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

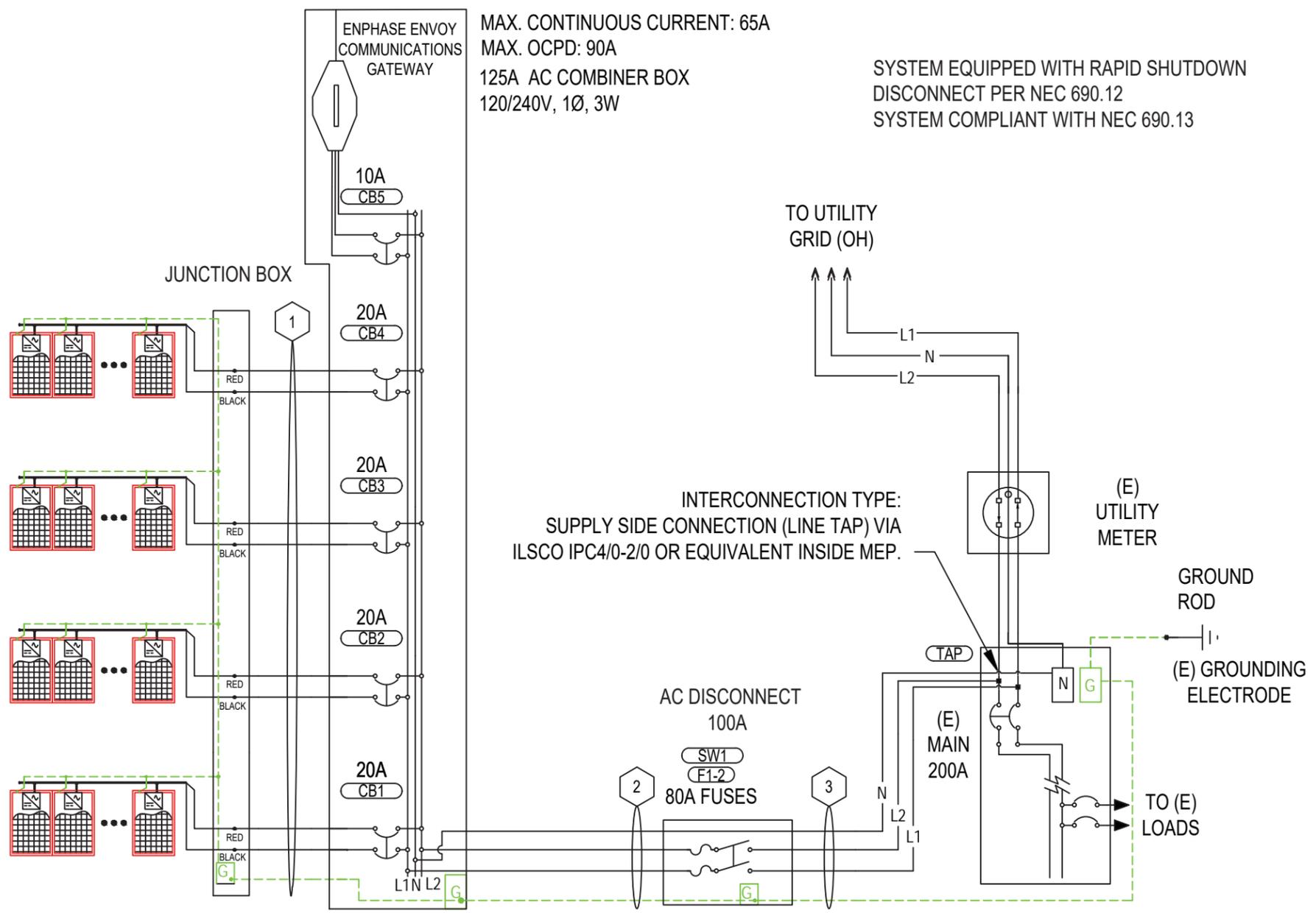
ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
1	1	10 AWG THWN-2, COPPER	0.75" DIA EMT	8	20A	10 AWG THWN-2, COPPER	0.91 (35.2 °C)	0.7	16A	20A	40A	25.48A	75°C	35A
2	1	4 AWG THWN-2, COPPER	0.75" DIA EMT	2	80A	8 AWG THWN-2, COPPER	0.91 (35.2 °C)	1	58A	72.5A	95A	86.45A	75°C	85A
3	1	4 AWG THWN-2, COPPER	0.75" DIA EMT	2	N/A	8 AWG THWN-2, COPPER	0.91 (35.2 °C)	1	58A	72.5A	95A	86.45A	75°C	85A

- (A) MODULE STRINGING
- (B) MODULE STRINGING
- (C) MODULE STRINGING
- (D) MODULE STRINGING

MAX. CONTINUOUS CURRENT: 65A  
 MAX. OCPD: 90A  
 125A AC COMBINER BOX  
 120/240V, 1Ø, 3W

SYSTEM EQUIPPED WITH RAPID SHUTDOWN  
 DISCONNECT PER NEC 690.12  
 SYSTEM COMPLIANT WITH NEC 690.13

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INTERCONNECTION TYPE:  
 SUPPLY SIDE CONNECTION (LINE TAP) VIA  
 ILSCO IPC4/0-2/0 OR EQUIVALENT INSIDE MEP.

(E) MAIN ELECTRICAL PANEL  
 240/120 V 1Ø, 3W  
 MAIN BUSS: 200A

(58) TRINA SOLAR  
 TSM-330DD06H.05(II)

(58) ENPHASE  
 IQ7-60-2-US

50' MAX 3/4 EMT:  
 (8) #10 THWN  
 (1) #10 GROUND

10' MAX 1 EMT:  
 (2) #4 THWN  
 (1) #8 GROUND  
 (1) #8 NEUTRAL

10' MAX 1 EMT:  
 (2) #4 THWN  
 (1) #8 GROUND  
 (1) #8 NEUTRAL

PE STAMP

CONTRACTOR  
 ADVANCED SOLAR  
 3321 75TH AVE  
 HYATTSVILLE, MD 20785  
 PHONE: 202-505-5401  
 CONTRACTOR #: 108569



**ALBERTO RAMOS RESIDENCE**  
 RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION  
 7118 CARROL AVE, TAKOMA PARK, MD 20912  
 APN: 161301058698  
 PHONE #:

LINE DIAGRAM  
 SYSTEM AC SIZE @ STC: 13.920 kW  
 SYSTEM DC SIZE @ STC: 19.140 kW  
 (58) TRINA SOLAR TSM-330DD06H.05(II)  
 (58) ENPHASE IQ7-60-2-US  
 DRAWN BY: V.P.  
 DATE: 07.14.2021

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SYSTEM SUMMARY				
	BRANCH #1	BRANCH #2	BRANCH #3	BRANCH #4
INVERTERS PER BRANCH	16	16	16	10
MAX AC CURRENT	16A	16A	16A	10A
MAX AC OUTPUT POWER	4,000W	4,000W	4,000W	2,500W
ARRAY STC POWER	19,140W			
ARRAY PTC POWER	17,771W			
MAX AC CURRENT	58A			
MAX AC POWER	14,500W			
DERATED (CEC) AC POWER	14,500W			

MODULES											
REF.	QTY.	MAKE AND MODEL	P <sub>MAX</sub>	P <sub>TC</sub>	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING	
PM1-58	58	TRINA SOLAR TSM-330DD06H.05(I)	330W	306.4W	10.14A	9.7A	41.8V	34V	-0.121V/°C (-0.29%/°C)	20A	

INVERTERS										
REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OC <sub>PD</sub> RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-58	58	ENPHASE IQ7-60-2-US	240V	FLOATING	20A	240W	1A	15A	48V	97.0%

DISCONNECTS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	SQUARE D D223NRB OR EQUIV.	100A	240VAC

OCPDS			
REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1-4	4	20A	240VAC
CB5	1	10A	240VAC
F1-2	2	80A	240VAC

ASHRAE EXTREME LOW	-15°C (5.0°F), SOURCE: WASHINGTONNATIONAL (38.87°; -77.03°)
ASHRAE 2% HIGH	35.2°C (95.4°F), SOURCE: WASHINGTONNATIONAL (38.87°; -77.03°)

BILL OF MATERIALS							
CATEGORY	MAKE	MODEL NUMBER	REF	QTY	UNIT	QTY/UNIT	DESCRIPTION
MODULE	TRINA SOLAR	TSM-330DD06H.05(I)	PM1-58	58	PIECES	1	TRINA SOLAR TSM-330DD06H.05(I) 330W 120 HALF-CUT CELLS, MONOCRYSTALLINE SILICON
INVERTER	ENPHASE	IQ7-60-2-US	I1-58	58	PIECES	1	ENPHASE IQ7-60-2-US 240W INVERTER
DISCONNECT	SQUARE D	D223NRB	SW1	1	PIECE	1	SQUARE D D223NRB, FUSED, 2-POLE, 100A, 240VAC OR EQUIVALENT
MISC ELECTRICAL EQUIPMENT		GEN-CABLE-CLIP	HDWR61-351	290	PIECES	1	GENERIC CABLE CLIP
AC COMBINER PANEL		ENPHASE-IQ3-PANEL	EP1	1	PIECE	1	ENPHASE IQ COMBINER 3 (X-IQ-AM1-240-3)
MONITORING		ENPHASE-ENVOY	ENV1	1	PIECE	1	ENPHASE ENVOY
WIRING	ENPHASE	Q-12-10-240	EN1-58	58	PIECES	1	ENPHASE ENGAGE (TM) TRUNK CABLE
WIRING	ENPHASE	Q-TERM-10	EN59	1	BUNDLE	10	ENPHASE ENGAGE (TM) BRANCH TERMINATOR
WIRING	ENPHASE	Q-SEAL-10	EN60	1	BUNDLE	10	ENPHASE ENGAGE (TM) WATERTIGHT SEALING CAP
WIRING		GEN-10-AWG-THWN-2-CU-RD	WR1	180	FEET	1	10 AWG THWN-2, COPPER, RED (LINE 1)
WIRING		GEN-10-AWG-THWN-2-CU-BLK	WR1	180	FEET	1	10 AWG THWN-2, COPPER, BLACK (LINE 2)
WIRING		GEN-10-AWG-THWN-2-CU-GR	WR1	45	FEET	1	10 AWG THWN-2, COPPER, GREEN (GROUND)
WIRING		GEN-4-AWG-THWN-2-CU-RD	WR2-3	20	FEET	1	4 AWG THWN-2, COPPER, RED (LINE 1)
WIRING		GEN-4-AWG-THWN-2-CU-BLK	WR2-3	20	FEET	1	4 AWG THWN-2, COPPER, BLACK (LINE 2)
WIRING		GEN-8-AWG-THWN-2-CU-WH	WR2-3	20	FEET	1	8 AWG THWN-2, COPPER, WHITE (NEUTRAL)
WIRING		GEN-8-AWG-THWN-2-CU-GR	WR2-3	20	FEET	1	8 AWG THWN-2, COPPER, WHITE (GROUND)
WIREWAY	ENPHASE	ET-SPLK-05	EN7	1	BUNDLE	5	ENPHASE ENGAGE (TM) ENGAGE COUPLER
WIREWAY		GEN-EMT-0.75" DIA	WW1-3	65	FEET	1	EMT CONDUIT, 0.75" DIA
OCPD	EATON	BR220	CB1-4	4	PIECES	1	CIRCUIT BREAKER, 20A, 240VAC
OCPD	EATON	BR210	CB5	1	PIECE	1	CIRCUIT BREAKER, 10A, 240VAC
OCPD	GENERIC MANUFACTURER	GEN-FU-80A-240VAC	F1-2	2	PIECES	1	FUSE, 80A, 240VAC
TRANSITION BOX	GENERIC MANUFACTURER	GEN-AWB-TB-4-4X	JB1	1	PIECE	1	TRANSITION/PASS-THROUGH BOX, WITH 4 TERMINAL BLOCKS

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CONTRACTOR  
 ADVANCED SOLAR  
 3321 75TH AVE  
 HYATTSVILLE, MD 20785  
 PHONE: 202-505-5401  
 CONTRACTOR #: 108569



**ALBERTO RAMOS RESIDENCE**  
 RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION  
 7118 CARROL AVE, TAKOMA PARK, MD 20912  
 APN: 161301058698  
 PHONE #:

DESIGN TABLES

SYSTEM AC SIZE @ STC: 13.920 kW (58) TRINA SOLAR TSM-330DD06H.05(I) (58) ENPHASE IQ7-60-2-US	SYSTEM DC SIZE @ STC: 19.140 kW
DRAWN BY: V.P.	DATE: 07.14.2021
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**! WARNING !**  
ELECTRIC SHOCK HAZARD  
TERMINALS ON BOTH LINE AND LOAD SIDES  
MAY BE ENERGIZED IN THE OPEN POSITION.

**LABEL 1**  
AT EACH DISCONNECTING MEANS FOR  
PHOTOVOLTAIC EQUIPMENT  
[NEC 690.13 AND 690.15]

**SOLAR PV SYSTEM EQUIPPED  
WITH RAPID SHUTDOWN**

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

**LABEL 1**  
AT RAPID SHUTDOWN SYSTEM  
[NEC 690.56(C)(1)(A)].

**! WARNING !**  
DUAL POWER SOURCES.  
SECOND SOURCE IS PV SYSTEM

**LABEL 3**  
AT POINT OF INTERCONNECTION; LABEL, SUCH AS LABEL 5 OR LABEL 6 MUST IDENTIFY  
PHOTOVOLTAIC SYSTEM  
[NEC 705.12(B)(4)]

**! CAUTION !**  
PHOTOVOLTAIC SYSTEM  
CIRCUIT IS BACKFED

**LABEL 4**  
AT POINT OF INTERCONNECTION; LABEL, SUCH AS LABEL 5 OR LABEL 6 MUST IDENTIFY  
PHOTOVOLTAIC SYSTEM  
[NEC 705.12(B)(4)]

INTERACTIVE PHOTOVOLTAIC SYSTEM  
CONNECTED  
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED  
NE SIDE OF THE HOUSE

**PLAQUE**  
PERMANENT PLAQUE OR  
DIRECTORY PROVIDING  
THE LOCATION OF THE  
SERVICE  
DISCONNECTING MEANS  
AND THE PHOTOVOLTAIC  
SYSTEM DISCONNECTING  
MEANS IF NOT IN THE  
SAME LOCATION  
[NEC 690.56(B)]  
WHERE THE PV SYSTEMS  
ARE REMOTELY LOCATED  
FROM EACH OTHER, A  
DIRECTORY IN  
ACCORDANCE WITH 705.10  
SHALL BE PROVIDED AT  
EACH PV SYSTEM  
DISCONNECTING MEANS.  
PV SYSTEM EQUIPMENT  
AND DISCONNECTING  
MEANS SHALL NOT BE  
INSTALLED IN BATHROOMS  
[NEC 690.4(D),(E)]

INTERACTIVE PHOTOVOLTAIC SYSTEM  
CONNECTED

**LABEL 5**  
AT UTILITY METER  
[NEC 690.56(B)]

**PHOTOVOLTAIC  
AC DISCONNECT**  
OPERATING CURRENT: 58A AC  
OPERATING VOLTAGE: 240V AC

**LABEL 6**  
AT POINT OF INTERCONNECTION, MARKED  
AT DISCONNECTING MEANS  
[NEC 690.54]

**PHOTOVOLTAIC SYSTEM  
EQUIPPED WITH RAPID  
SHUTDOWN**

**LABEL 7**  
AT RAPID SHUTDOWN SWITCH  
[NEC 690.56(C)].

**WARNING: PHOTOVOLTAIC  
POWER SOURCE**

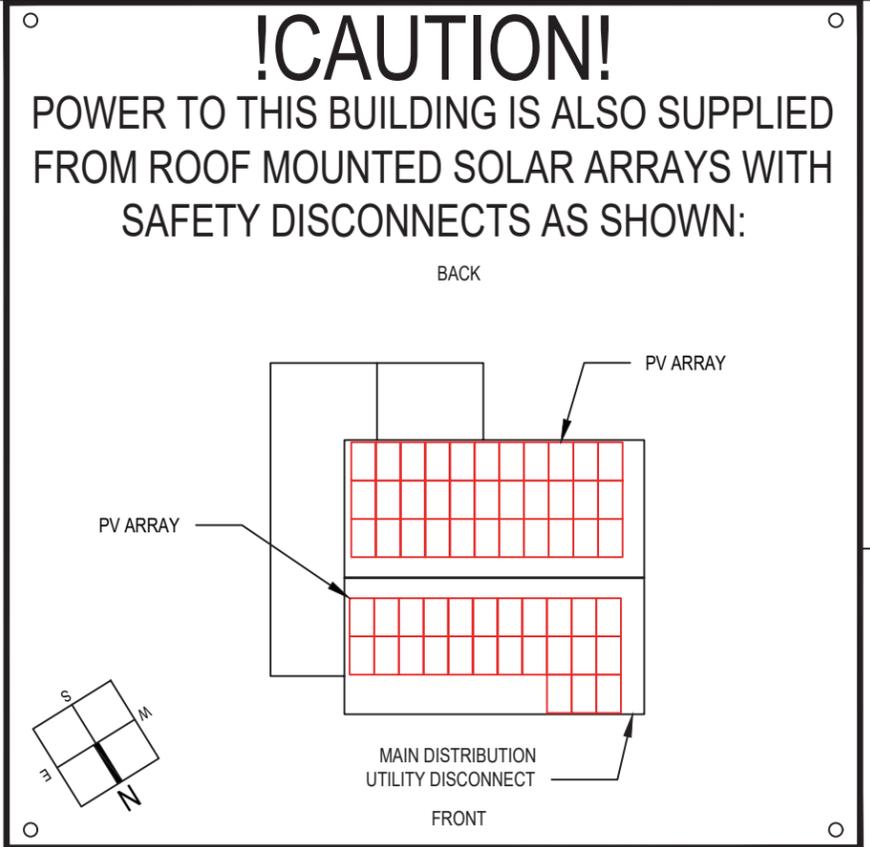
**LABEL 8**  
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING  
METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE  
SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS,  
OR FLOORS.  
[NEC 690.31(G)]

**PHOTOVOLTAIC  
AC DISCONNECT**

**LABEL 9**  
AT EACH AC DISCONNECTING MEANS  
[NEC 690.13(B)]  
**LABELING NOTES**  
1.1 LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE CHAPTER 12,  
OSHA STANDARD 1910.145, ANSI Z535  
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.  
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.  
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.  
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE  
BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

**! WARNING !**  
POWER SOURCE OUTPUT  
CONNECTION - DO NOT RELOCATE  
THIS OVERCURRENT DEVICE

**LABEL 10**  
AT POINT OF INTERCONNECTION  
OVERCURRENT DEVICE  
[NEC 705.12(B)(2)(3)(B)]



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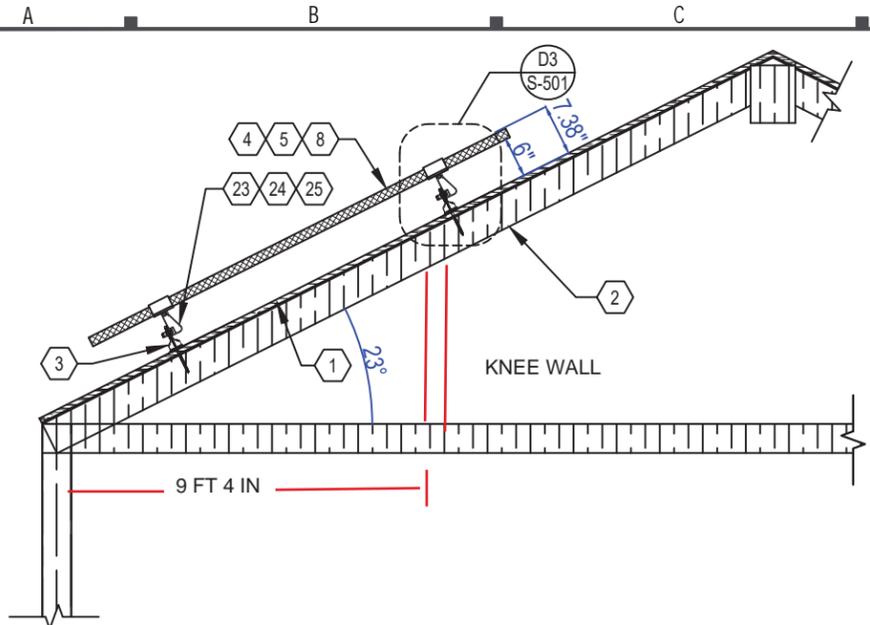
**CONTRACTOR**  
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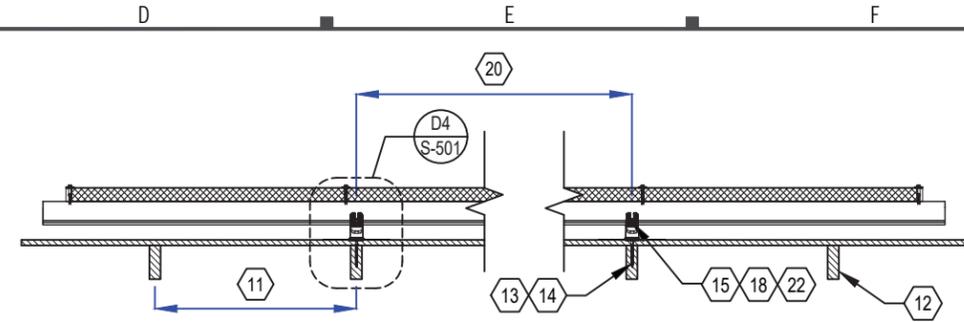
ALBERTO RAMOS RESIDENCE

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7118 CARROL AVE, TAKOMA PARK, MD 20912  
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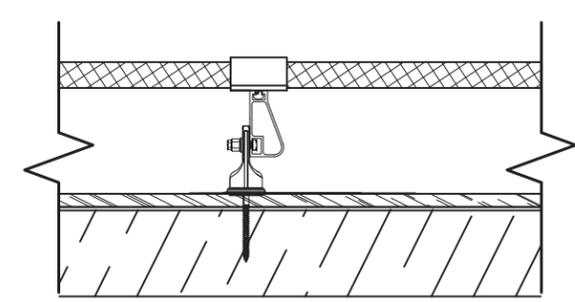
<b>PLACARDS</b>		PAGE:  <span style="font-size: 24px; font-weight: bold;">E-603.00</span> <small>(SHEET 8)</small> <span style="font-size: 24px; font-weight: bold;">28</span>
SYSTEM AC SIZE @ STC: 13.920 kW (58) TRINA SOLAR TSM-330DD06H.05(I1) (58) ENPHASE IQ7-60-2-US	SYSTEM DC SIZE @ STC: 19.140 kW	
DRAWN BY: V.P.	REV:	DATE: 07.14.2021



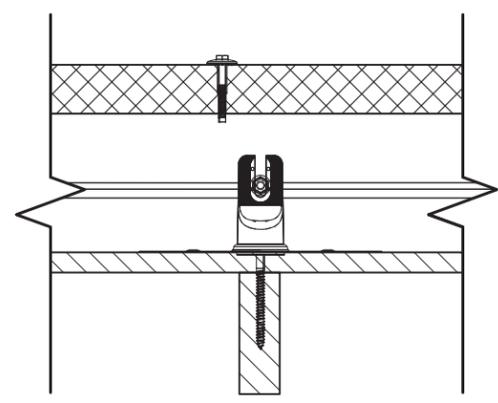
**D1** RACKING DETAIL (TRANSVERSE)  
NOT TO SCALE



**D2** RACKING DETAIL (LONGITUDINAL)  
NOT TO SCALE



**D3** DETAIL (TRANSVERSE)  
NOT TO SCALE



**D4** DETAIL (LONGITUDINAL)  
NOT TO SCALE

**GENERAL NOTES**

1. FIELD VERIFY ALL MEASUREMENTS

**SHEET KEYNOTES**

1. ROOF MATERIAL: ASPHALT SHINGLE
2. ROOF STRUCTURE: RAFTER
3. ATTACHMENT TYPE: IRONRIDGE FLASHFOOT2
4. MODULE MANUFACTURER: TRINA SOLAR
5. MODULE MODEL: TSM-330DD06H.05(II)
6. MODULE LENGTH: 66.85"
7. MODULE WIDTH: 39.53"
8. MODULE WEIGHT: 41.2 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: 3' FROM RIDGE
11. RAFTER SPACING: 24 IN. O.C.
12. RAFTER SIZE: 2X6' NOMINAL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 2 1/2 IN.
15. TOTAL # OF ATTACHMENTS: 113.
16. TOTAL AREA: 1064.37 SQ.FT.
17. TOTAL WEIGHT: 2787.48 LBS.
18. WEIGHT PER ATTACHMENT: 24.67 LBS.
19. DISTRIBUTED LOAD: 2.62 PSF
20. MAX. HORIZONTAL STANDOFF: 48" IN.
21. MAX. VERTICAL STANDOFF: IN ACCORDANCE WITH MODULE MANUFACTURER'S INSTRUCTIONS.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIV.): IRONRIDGE
24. RAIL MODEL (OR EQUIVALENT): XR100
25. RAIL WEIGHT: 0.68 PLF
26. MAX. RAFTER SPAN: 9 FT. 4 IN.

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07.26.2021 PE STAMP

*Signature*

**CONTRACTOR**  
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<b>ASSEMBLY DETAILS</b>		<b>S-501.00</b> <small>(SHEET 9)</small>
SYSTEM AC SIZE @ STC: 13.920 kW (58) TRINA SOLAR TSM-330DD06H.05(II) (58) ENPHASE IQ7-60-2-US	SYSTEM DC SIZE @ STC: 19.140 kW	
DRAWN BY: V.P.	DATE: 07.14.2021	PAGE:
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We will be installing 58 Solar Panels on the roof. Please see attached photos and plan set. Thank you!