MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION
STAFF REPORT

Address: 7118 Carroll Ave., Takoma Park
Meeting Date: 9/1/2021

Resource: Outstanding Resource
Takoma Park Historic District
Report Date: 8/25/2021

Applicant: Alberto Ramos
Public Notice: 8/18/2021

Review: HAWP
Tax Credit: n/a

Permit No.: 963287
Staff: Dan Bruechert

Proposal: Rooftop solar array

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 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 porticocheer. 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 Park¹) 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.

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 to schedule a follow-up site visit.
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: ______  Block: ______  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:

☐ New Construction  ☐ Deck/Porch  ☐ Shed/Garage/Accessory Structure
☐ Addition  ☐ Fence  ☐ Solar
☐ Demolition  ☐ Hardscape/Landscape  ☐ Tree removal/planting
☐ Grading/Excavation  ☐ Roof  ☐ 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.

Signature of owner or authorized agent  Date

For Staff only:
HAWP# 963287
Date assigned______
## HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFYING
[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

<table>
<thead>
<tr>
<th>Owner's mailing address</th>
<th>Owner's Agent's mailing address</th>
</tr>
</thead>
<tbody>
<tr>
<td>7118 Carroll Avenue</td>
<td>3321 75th Avenue</td>
</tr>
<tr>
<td>Takoma Park, MD</td>
<td>Hyattsville, MD</td>
</tr>
<tr>
<td>20912</td>
<td>20785</td>
</tr>
</tbody>
</table>

### Adjacent and confronting Property Owners mailing addresses

| 7114 Carroll Avenue     | 7119 Carroll Avenue            |
| Takoma Park, MD         | Takoma Park, MD                |
| 20912                   | 20912                           |

| 7120 Carroll Avenue     | 7115 Carroll Avenue            |
| Takoma Park, MD         | Takoma Park, MD                |
| 20912                   | 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.
<table>
<thead>
<tr>
<th>Work Item 1:</th>
<th>Roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Current Condition:</td>
<td>Proposed Work:</td>
</tr>
<tr>
<td>Plain Roof</td>
<td>Roof with Solar Panels</td>
</tr>
</tbody>
</table>

| 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**

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<td>Additions/Alterations</td>
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<td>Demolition</td>
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<td>Deck/Porch</td>
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<td>Fence/Wall</td>
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<tr>
<td>Driveway/Parking Area</td>
<td>*</td>
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<tr>
<td>Grading/Excavation/Landscaing</td>
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<tr>
<td>Tree Removal</td>
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<td>Siding/Roof Changes</td>
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<td>Window/Door Changes</td>
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<td>Masonry Repair/Repoint</td>
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<td>Signs</td>
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</tbody>
</table>
THE ALLMAX® PLUS FRAMED 120 HALF-CELL MODULE

120-Cell MONOCRYSTALLINE MODULE

320-335W POWER OUTPUT RANGE

19.7% MAXIMUM EFFICIENCY

0~+5W POSITIVE POWER TOLERANCE

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

Comprehensive Products And System Certificates
- IEC61215/IEC61701/UL1703/IEC61701/IEC62716
- ISO 9001: Quality Management System
- ISO 14001: Environmental Management System
- ISO 14064: Greenhouse gases Emissions Verification
- OHSAS 18001: Occupation Health and Safety Management System

Trina Solar
**ELECTRICAL DATA (STC)**

<table>
<thead>
<tr>
<th>Peak Power Watts-PMAX (Wp)*</th>
<th>320</th>
<th>325</th>
<th>330</th>
<th>335</th>
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</thead>
<tbody>
<tr>
<td>Power Output Tolerance-PMAX (W)</td>
<td>0~ +5</td>
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<td></td>
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<tr>
<td>Maximum Power Voltage-VMP (V)</td>
<td>33.3</td>
<td>33.7</td>
<td>34.0</td>
<td>34.4</td>
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<tr>
<td>Maximum Power Current-IMP (A)</td>
<td>9.60</td>
<td>9.65</td>
<td>9.70</td>
<td>9.75</td>
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<tr>
<td>Open Circuit Voltage-VOC (V)</td>
<td>40.6</td>
<td>41.4</td>
<td>41.8</td>
<td>42.2</td>
</tr>
<tr>
<td>Short Circuit Current-ISC (A)</td>
<td>10.00</td>
<td>10.07</td>
<td>10.14</td>
<td>10.21</td>
</tr>
<tr>
<td>Module Efficiency ηp (%)</td>
<td>18.8</td>
<td>19.1</td>
<td>19.4</td>
<td>19.7</td>
</tr>
</tbody>
</table>

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.

*Measuring tolerance: ±3%.

**ELECTRICAL DATA (NMOT)**

<table>
<thead>
<tr>
<th>Peak Power-PMAX (W)</th>
<th>241</th>
<th>245</th>
<th>249</th>
<th>253</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Voltage-VMP (V)</td>
<td>31.6</td>
<td>32.0</td>
<td>32.2</td>
<td>32.4</td>
</tr>
<tr>
<td>Maximum Power Current-IMP (A)</td>
<td>7.64</td>
<td>7.67</td>
<td>7.72</td>
<td>7.78</td>
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<tr>
<td>Open Circuit Voltage-VOC (V)</td>
<td>38.2</td>
<td>39.0</td>
<td>39.3</td>
<td>39.6</td>
</tr>
<tr>
<td>Short Circuit Current-ISC (A)</td>
<td>8.06</td>
<td>8.12</td>
<td>8.18</td>
<td>8.24</td>
</tr>
</tbody>
</table>

NMOT: Irradiance at 800W/m², 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 [D06H.08(II)], Black [D06H.05(II)]
- **Frame**: 35 mm (1.38 inches) Anodized Aluminium Alloy
- **J-Box**: IP 68 rated
- **Cables**: Photovoltaic Technology Cable 4.0mm² (0.006 inches²), Portrait: N 140mm/P 285mm(5.51/11.22 inches), 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 PMAX: -0.37%/°C
- Temperature Coefficient of VOC: -0.29%/°C
- Temperature Coefficient of ISC: 0.05%/°C

**MAXIMUM RATINGS**

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

**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

*DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection.*

**CAUTION:** READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

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www.trinasolar.com
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.

Enphase IQ 7 and IQ 7+ Microinverters

Easy to Install

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

Productive and Reliable

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

Smart Grid Ready

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

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

To learn more about Enphase offerings, visit enphase.com
# Enphase IQ 7 and IQ 7+ Microinverters

## INPUT DATA (DC)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Commonly used module pairings¹</td>
<td>235 W - 350 W +</td>
<td>235 W - 440 W +</td>
</tr>
<tr>
<td>Module compatibility</td>
<td>60-cell PV modules only</td>
<td>60-cell and 72-cell PV modules</td>
</tr>
<tr>
<td>Maximum input DC voltage</td>
<td>48 V</td>
<td>60 V</td>
</tr>
<tr>
<td>Peak power tracking voltage</td>
<td>27 V - 37 V</td>
<td>27 V - 45 V</td>
</tr>
<tr>
<td>Operating range</td>
<td>16 V - 48 V</td>
<td>16 V - 60 V</td>
</tr>
<tr>
<td>Min/Max start voltage</td>
<td>22 V / 48 V</td>
<td>22 V / 60 V</td>
</tr>
<tr>
<td>Max DC short circuit current (module Isc)</td>
<td>15 A</td>
<td>15 A</td>
</tr>
<tr>
<td>Overvoltage class DC port</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>DC port backfeed current</td>
<td>0 A</td>
<td>0 A</td>
</tr>
<tr>
<td>PV array configuration</td>
<td>1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit</td>
<td></td>
</tr>
</tbody>
</table>

## OUTPUT DATA (AC)

<table>
<thead>
<tr>
<th></th>
<th>IQ 7 Microinverter</th>
<th>IQ 7+ Microinverter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak output power</td>
<td>250 VA</td>
<td>295 VA</td>
</tr>
<tr>
<td>Maximum continuous output power</td>
<td>240 VA</td>
<td>290 VA</td>
</tr>
<tr>
<td>Nominal (L-L) voltage/range²</td>
<td>240 V / 211-264 V</td>
<td>208 V / 183-229 V</td>
</tr>
<tr>
<td>Maximum continuous output current</td>
<td>1.0 A (240 V)</td>
<td>1.15 A (208 V)</td>
</tr>
<tr>
<td>Nominal frequency</td>
<td>60 Hz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Extended frequency range</td>
<td>47 - 68 Hz</td>
<td>47 - 68 Hz</td>
</tr>
<tr>
<td>AC short circuit fault current over 3 cycles</td>
<td>5.8 Arms</td>
<td>5.8 Arms</td>
</tr>
<tr>
<td>Maximum units per 20 A (L-L) branch circuit³</td>
<td>16 (240 VAC)</td>
<td>13 (208 VAC)</td>
</tr>
<tr>
<td>Overvoltage class AC port</td>
<td>III</td>
<td>III</td>
</tr>
<tr>
<td>AC port backfeed current</td>
<td>0 A</td>
<td>0 A</td>
</tr>
<tr>
<td>Power factor setting</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Power factor (adjustable)</td>
<td>0.7 leading ... 0.7 lagging</td>
<td>0.7 leading ... 0.7 lagging</td>
</tr>
</tbody>
</table>

## EFFICIENCY

<table>
<thead>
<tr>
<th></th>
<th>@240 V</th>
<th>@208 V</th>
<th>@240 V</th>
<th>@208 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak CEC efficiency</td>
<td>97.6 %</td>
<td>97.6 %</td>
<td>97.5 %</td>
<td>97.3 %</td>
</tr>
<tr>
<td>CEC weighted efficiency</td>
<td>97.0 %</td>
<td>97.0 %</td>
<td>97.0 %</td>
<td>97.0 %</td>
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</tbody>
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## MECHANICAL DATA

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>-40ºC to +65ºC</td>
</tr>
<tr>
<td>Relative humidity range</td>
<td>4% to 100% (condensing)</td>
</tr>
<tr>
<td>Connector type (IQ7-60-2-US &amp; IQ7PLUS-72-2-US)</td>
<td>MC4 (or Amphenol H4 UTX with additional Q-DCC-S adapter)</td>
</tr>
<tr>
<td>Connector type (IQ7-60-B-US &amp; IQ7PLUS-72-B-US)</td>
<td>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</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>212 mm x 175 mm x 30.2 mm (without bracket)</td>
</tr>
<tr>
<td>Weight</td>
<td>1.08 kg (2.38 lbs)</td>
</tr>
<tr>
<td>Cooling</td>
<td>Natural convection - No fans</td>
</tr>
<tr>
<td>Approved for wet locations</td>
<td>Yes</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>PD3</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Class II double-insulated, corrosion resistant polymeric enclosure</td>
</tr>
<tr>
<td>Environmental category / UV exposure rating</td>
<td>NEMA Type 6 / outdoor</td>
</tr>
</tbody>
</table>

## FEATURES

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Power Line Communication (PLC)</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.</td>
</tr>
<tr>
<td>Disconnecting means</td>
<td>The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.</td>
</tr>
<tr>
<td>Compliance</td>
<td>CA Rule 21 (UL 1741-S1) 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.</td>
</tr>
</tbody>
</table>

---

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](http://enphase.com)

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2018-05-24
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.

**Class A Fire Rating**
Certified to maintain the fire resistance rating of the existing roof.

**Integrated Grounding**
UL 2703 system eliminates separate module grounding components.

**PE Certified**
Pre-stamped engineering letters available in most states.

**Design Software**
Online tool generates a complete bill of materials in minutes.

**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

**NABCEP Certified Training**
Earn free continuing education credits, while learning more about our systems.
Go to IronRidge.com/training
NEW PV SYSTEM: 19.140 kWp
RAMOS RESIDENCE
7118 CARROL AVE, TAKOMA PARK, MD 20912
ASSESSOR’S #: 161301058698

PROJECT INFORMATION
OWNER
NAME: ALBERTO RAMOS
PHONE: 919-724-8129

PROJECT MANAGER
NAME: BRENDAN WELSH
PHONE: 202-505-5401

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

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

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

APPLICABLE CODES & STANDARDS
BUILDING: IBC 2018
ELECTRICAL: NEC 2017
FIRE: IRC 2013

SYSTEM AC SIZE @ STC: 13.920 kW
SYSTEM DC SIZE @ STC: 19.140 kW

DATE: 07.14.2021
REV: 07.26.2021

PROJECT NOTES:
1.1.1 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS’ LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTIONS (AHJ) APPLICABLE CODES.
1.1.2 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
1.1.3 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICROINVERTER IN ACCORDANCE WITH NEC 690.41(B).
1.1.4 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 BOXES: UL 1703 OR UL 1741 ACCESSORY
1.1.5 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
1.1.6 MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
1.1.7 ALL PV SYSTEM COMPONENTS 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.

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.

WORK INCLUDES:
- PV ROOF ATTACHMENTS - IRONRIDGE FLASHFOOT2
- PV RACKING SYSTEM INSTALLATION - IRONRIDGE XR100
- PV MODULE AND INVERTER INSTALLATION - TRINA SOLAR TSM-330DD06H.05(II) / ENPHASE IQ7-60-2-US
- PV EQUIPMENT GROUNDING
- PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- PV LOAD CENTERS (IF INCLUDED)
- PV METERING/MONITORING (IF INCLUDED)
- PV DISCONNECTS
- PV GROUNDING ELECTRICAL & BONDING TO (E) GEC
- PV FINAL COMMISSIONING
- ALL EQUIPMENT RETROFIT FOR PV
- PV GROUNDING ELECTRODE & BONDING TO (E) GEC
- PV FINAL COMMISSIONING
- ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE.

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

ATTACHMENT TYPE:
- IRONRIDGE FLASHFOOT2

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

Owner:
ALBERTO RAMOS RESIDENCE
RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION
7118 CARROL AVE, TAKOMA PARK, MD 20912
APN: 161301058698
2.1.1 SITE NOTES: A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.

2.1.2 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.

2.1.3 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.

2.1.4 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.

2.1.5 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THE CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.

2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.28.

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).

2.2.4 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.

2.2.5 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.

2.2.6 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.

2.2.7 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS’ SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.

2.3.2 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.

2.3.3 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4.1 WIRING & CONDUIT NOTES: 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.

2.4.2 CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.

2.4.3 VOLTAGE DROP LIMITED TO 1.5%.

2.4.4 DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.

2.4.5 AC CONDUCTORS COLORED OR MARKED AS FOLLOWS:

- PHASE A OR L1- BLACK
- PHASE B OR L2- RED
- PHASE C OR L3- BLUE
- NEUTRAL- WHITE OR GREY
- GROUND- GREEN OR YELLOW-GREEN

2.4.6 IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15].

2.5.1 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUND DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.

2.5.2 GROUNDING SYSTEM MUST BE SUPPLIED FROM THE UTILITY SOURCE ACCORDING TO NEC 680.43 AND MINIMUM NEC TABLE 250.122.

2.5.3 GROUNDING SYSTEM MUST BE SUPPLIED FROM THE UTILITY SOURCE ACCORDING TO NEC 680.43 AND MINIMUM NEC TABLE 250.122.

2.5.4 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED PART OF THE GROUNDING SYSTEM SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 AND 250.136(A).

2.5.5 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MINIMUM NEC 690.45.

2.5.6 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MINIMUM NEC 690.45.

2.5.7 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119].

2.6.1 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED ‘LINE’ (TYPICALLY THE UPPER TERMINALS)

2.6.2 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED PERSONNEL BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH.

2.6.3 WIRING SYSTEMS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A), THROUGH (D).

2.6.4 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.

2.6.5 MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).

2.6.6 MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B). IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1698.

3.2.1 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH NEC 705.12 (B)(3).

3.2.2 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(B)(3)].


3.2.4 AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. hüTHER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).

3.2.5 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (B)(2)(1)

3.2.6 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].
ALBERTO RAMOS RESIDENCE
RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION
7128 CARROL AVE, TAKOMA PARK, MD 20912
APN: 161301058698

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

DATE: 07.14.2021

REVISION: A-101.00

FOR OFFICIAL USE ONLY

DRAWN BY: V.P.

PAGE: 23
ALBERTO RAMOS RESIDENCE
RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION
7128 CARROL AVE, TAKOMA PARK, MD 20912

SYSTEM AC SIZE @ STC: 13.920 kW
ARRAY 1 - 9.256 kW
(N) (N) MODULES
TILT: 23 DEGREES
AZIMUTH: 32 DEGREES

SYSTEM DC SIZE @ STC: 19.140 kW
ARRAY 2 - 10.890 kW
(N) (N) MODULES
TILT: 23 DEGREES
ROOF PITCH: 5:12
AZIMUTH: 212 DEGREES

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

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

SYSTEM AC SIZE @ STC: 13.920 kW
SYSTEM DC SIZE @ STC: 19.140 kW

DATE: 07.14.2021
DRAWN BY: V.P.
CONTRACTOR #: 108569
PHONE: 202-505-5401

CONTRACTOR
ADVANCED SOLAR
3321 75TH AVE
HYATTSVILLE, MD 20785
PHONE: 202-905-5401
CONTRACTOR #: 108569

FOR OFFICIAL USE ONLY

ELECTRICAL PLAN
07/14/2021
PAGE 24

ALBERTO RAMOS RESIDENCE
RESIDENTIAL GRID INTERACTIVE SOLAR INSTALLATION
7128 CARROL AVE, TAKOMA PARK, MD 20912
**General Notes**

1. Field verify all measurements
2. Items below may not be on this page

**Roof Properties**

- **Roof Material**: Asphalt Shingle
- **Roof Slope**: 23°
- **Mean Roof Height**: -20 FT

**Solar Attachment Plan**

- **Module**: Trina Solar TSM-330DD06H.05(II)
- **System AC Size @ STC**: 13.920 kW
- **System DC Size @ STC**: 19.140 kW

**Contractor**: Advanced Solar

**Address**: 3321 75th Ave, Hyattsville, MD 20785

**Phone**: 202-505-5401

**Contractor #:** 108569

**Residence**: Alberto Ramos Residence

**Address**: 7118 Carroll Ave, Takoma Park, MD 20912

**APN**: 161301058698

**Phone #:**

**Date**: 07.14.2021

**Rev:** A-103.00
## System Summary

<table>
<thead>
<tr>
<th>Branch #1</th>
<th>Branch #2</th>
<th>Branch #3</th>
<th>Branch #4</th>
</tr>
</thead>
<tbody>
<tr>
<td># Inverters Per Branch</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Max AC Current</td>
<td>16A</td>
<td>16A</td>
<td>16A</td>
</tr>
<tr>
<td>Max AC Output Power</td>
<td>4,000W</td>
<td>4,000W</td>
<td>4,000W</td>
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## Inverters

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Qty.</th>
<th>Make and Model</th>
<th>AC Voltage</th>
<th>Grounding</th>
<th>DC</th>
<th>Rated Power</th>
<th>Max Output Current</th>
<th>Max Input Current</th>
<th>DC Derated (CEC) Efficiency</th>
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</thead>
<tbody>
<tr>
<td>FNS-96</td>
<td>58</td>
<td>Trina Solar TSM-330DD06H (II)</td>
<td>380V</td>
<td>91V</td>
<td>41V</td>
<td>38V</td>
<td>0.0322°F/°C (0.059°F/°C)</td>
<td>25A</td>
<td></td>
</tr>
</tbody>
</table>

## DISCONNECTS

### Inverters
- OCPD:
  - CB1-4: Eaton BR220 CB 20A
  - CB5: Eaton BR210 CB 10A
- BR220: Square D D223NRB OR EQUIVALENT

### Modules
- SW1: Square D D223NRB OR EQUIVALENT

### Electrical Equipment
- Wireway:
  - ET-SPOC-06
- Wiring:
  - ENPHASE IQ7-60-2-US:
    - I1-58: 58 TRINA SOLAR TSM-330DD06H.05(II) 330W 306.4W 10.14A 9.7A 41.8V 34V -0.121V/°C (-0.29%/°C) 20A
  - ENPHASE ENVOY ENV1
  - ENPHASE IQ3-PANEL EP1
  - ENPHASE ENGAGE (TM) TRUNK CABLE
  - ENPHASE ENGAGE (TM) BRANCH TERMINATOR
  - ENPHASE ENGAGE (TM) WATERTIGHT SEALING CAP

### Bill of Materials

<table>
<thead>
<tr>
<th>Category</th>
<th>Make</th>
<th>Model</th>
<th>Number</th>
<th>Ref.</th>
<th>Qty.</th>
<th>Unit</th>
<th>QTY/Unit</th>
<th>Description</th>
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<tbody>
<tr>
<td>Module</td>
<td>TRINA SOLAR</td>
<td>TSM-330DD06H (II)</td>
<td>PM1-58</td>
<td>58</td>
<td>PIECES</td>
<td>1</td>
<td>TRINA SOLAR TSM-330DD06H (II) 330W HALF-CUT CELLS, MONOCRYSTALLINE SILICON</td>
<td></td>
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<tr>
<td>Inverter</td>
<td>ENPHASE</td>
<td>IQ7-60-2-US</td>
<td>I1-58</td>
<td>58</td>
<td>PIECES</td>
<td>1</td>
<td>ENPHASE IQ7-60-2-US 240W INVERTER</td>
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<tr>
<td>Disconnect</td>
<td>SQUARE D</td>
<td>D223NRB</td>
<td>SW1</td>
<td>1</td>
<td>PIECE</td>
<td>1</td>
<td>SQUARE D 2POLE/3POLE 100A 240VAC JANAC-60 OR EQUIVALENT</td>
<td></td>
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<tr>
<td>Misc Electrical Equipment</td>
<td>GEN-CABLE-CLP</td>
<td>EP01</td>
<td>EP01</td>
<td>1</td>
<td>PIECE</td>
<td>1</td>
<td>GEN-CABLE-CLP 3FT TRUNK CABLE</td>
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<tr>
<td>AC Combiner Panel</td>
<td>ENPHASE-EQP-PANEL</td>
<td>EP01</td>
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<td>TRANSFORMER TO CONVERTS THROUGH BUS, WITH 4 TERMINAL BLOCKS</td>
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</table>

## System AC Size @ STC: 13.920 kW
- TRINA SOLAR TSM-330DD06H (II) 330W HALF-CUT CELLS, MONOCRYSTALLINE SILICON

## System DC Size @ STC: 19.140 kW
- ENPHASE IQ7-60-2-US 240W INVERTER

---

**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 #: [REDACTED]

**DATE:** 07.14.2021

**DRAWN BY:** [REDACTED]

**PE STAMP FOR OFFICIAL USE ONLY**
**CAUTION!**

Power to this building is also supplied from roof mounted solar arrays with safety disconnects as shown:

- Interactive Photovoltaic system connected
- Photovoltaic AC disconnect
- Photovoltaic system equipped with rapid shutdown
- Warning: Photovoltaic power source
- Warning! Switch to "Off" position to shut down PV system and reduce shock hazard in array

**PLAQUE**

- Label 1: At each disconnecting means for photovoltaic equipment (NEC 690.13(B)(1)(A)).
- Label 2: Dual power sources. Second source is PV system.
- Label 3: CAUTION! Photovoltaic system circuit is backed.
- Label 4: Interactive Photovoltaic system connected.
- Label 5: At utility meter (NEC 690.36(E)).
- Label 6: Warning! Photovoltaic power source.
- Label 7: At rapid shutdown switch (NEC 690.56(E)).
- Label 8: At AC disconnecting means (NEC 690.13(B)).
- Label 9: At rapid shutdown switch (NEC 690.56(E)).
- Label 10: Power source output connection - do not relocate this overcurrent device.

**DIRECTORY**

- 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)).

- Interconnected Photovoltaic system connected.
- Photovoltaic AC disconnect.

**PLACARDS**

- Label 1: At rapid shutdown system (NEC 690.56(A)).
- Label 2: Dual power sources. Second source is PV system.
- Label 3: At each disconnecting means for photovoltaic equipment (NEC 690.13(B)(1)(A)).
- Label 4: Interactive Photovoltaic system connected.
- Label 5: At utility meter (NEC 690.36(E)).
- Label 6: Warning! Photovoltaic power source.
- Label 7: At rapid shutdown switch (NEC 690.56(E)).
- Label 8: At AC disconnecting means (NEC 690.13(B)).
- Label 9: At rapid shutdown switch (NEC 690.56(E)).
- Label 10: Power source output connection - do not relocate this overcurrent device.

**PERMANENT PLACQUE 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)).
1. FIELD VERIFY ALL MEASUREMENTS

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**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. MIN. FIRE OFFSET: 3' FROM RIDGE
10. RAFTER SPACING: 16" O.C.
11. RAFTER SIZE: 2X6' NOMINAL
12. LAG BOLT DIAMETER: 5/16 IN.
13. LAG BOLT EMBEDMENT: 2 1/2 IN.
14. TOTAL # OF ATTACHMENTS: 113.
15. TOTAL AREA: 1064.37 SQ.FT.
16. TOTAL WEIGHT: 2787.48 LBS.
17. DISTRIBUTED LOAD: 2.62 PSF
18. MAX. HORIZONTAL STANDOFF: 48" IN.
19. MAX. VERTICAL STANDOFF: IN ACCORDANCE WITH MODULE MANUFACTURER'S INSTRUCTIONS.
20. STANDOFF STAGGERING: YES

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**GENERAL NOTES**

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

SYSTEM DC SIZE @ STC: 19.140 kW
SYSTEM AC SIZE @ STC: 13.920 kW

DRAWN BY: [Redacted]
DATE: 07.14.2021

FOR OFFICIAL USE ONLY

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

P.E. STAMP: [Redacted]
DATE: 07.26.2021

SYSTEM DC SIZE @ STC: 21.440 kW
SYSTEM AC SIZE @ STC: 19.140 kW

DRAWN BY: [Redacted]
DATE: 07.14.2021

PE STAMP: [Redacted]
We will be installing 58 Solar Panels on the roof. Please see attached photos and plan set. Thank you!