HISTORIC PRESERVATION COMMISSION
WEDNESDAY, FEBRUARY 26, 2020
CITY HALL, ROOM 400 – 8:30 A.M.

AGENDA

1. CALL TO ORDER

2. ROLL CALL

3. APPROVAL OF JANUARY 22, 2020 MINUTES

4. REGULAR BUSINESS
   Deliberations will be held at the end of each case after public comment has been closed. No public comment is allowed during deliberations.

   **CASE NO.**
   **HPC 20-04**
   Public Hearing on the request of Barry and Elizabeth Gray, to obtain a Certificate of Appropriateness to allow for the installation of roof mounted solar panels for the property located at 209 NE Randolph Avenue (Parcel Identification No. 18-04-329-016), Peoria, Illinois (Council District 2)

   **CASE NO.**
   **HPC 20-05**
   Public hearing on the request of Creighton Kinny, to obtain a Certificate of Appropriateness to allow for the installation of roof mounted solar panels for the property located at 1110 NE Glen Oak Avenue (Parcel Identification No. 18-03-152-004), Peoria, Illinois (Council District 3)

5. CITIZENS’ OPPORTUNITY TO ADDRESS THE COMMISSION

6. ADJOURNMENT
A meeting of the Historic Preservation Commission was held on Wednesday, January 22, 2020, at 8:31 a.m., at City Hall, 419 Fulton St., in Room 400 with Chairperson Michael Maloof presiding and with proper notice having been posted.

**ROLL CALL**
The following Historic Preservation Commissioners were present: Marsha Burdette, Jan Krause, Lesley Matuszak, Michael Maloof, Geoff Smith, and David Stotz – 6. Commissioners absent: Marisa Farrell - 1.

City Staff Present: Kerilyn Weick, Megan Nguyen, and Sara Maillacheruvu

**SWARING IN OF SPEAKERS**
Speakers were sworn in by City staff member Megan Nguyen.

**MINUTES**
Commissioner Krause moved to approve the minutes of the Historic Preservation Commission meeting held on October 23, 2019; seconded by Commissioner Matuszak.

The motion was approved viva voce vote 6 to 0.

**REGULAR BUSINESS**

**CASE NO. HPC 20-01**
Public hearing on the request of Joan Dsouza and Duncan Dsouza to obtain a Certificate of Appropriateness in a Class R-6 (Multifamily Residential) District to construct a rear yard deck for the property located at 628 W. High Street (Parcel Identification No. 18-04-352-001), Peoria, IL (Council District 2).

Senior Urban Planner, Kerilyn Weick, Community Development Department, read Case No. HPC 20-01 into the record and provided a summary of the request. She explained that although the house is zoned multifamily residential, it is a single family home.

Joan Dsouza, petitioner, presented on her case. She explained that the deck will be placed in the rear of the house and described deck construction and material.

Chairperson Maloof opened the public hearing at 8:38am. There being no public testimony, the hearing was closed at 8:38am.

Commissioner Matuszak made a motion to approve; Commissioner Stotz seconded.

The motion was APPROVED by a roll call vote 6 to 0.

Yeas: Burdette, Krause, Maloof, Matuszak, Smith, Stotz
Nays: None

**CASE NO. HPC 20-02**
Public hearing on the request of Nathan Frederick to obtain a Certificate of Appropriateness in a Class R-1 (Single Family Residential) District to construct an addition to the side of the dwelling for the property located at 1634 W. Moss Ave. (Parcel Identification No. 18-08-156-007), Peoria, IL (Council District 2).

Senior Urban Planner, Kerilyn Weick, Community Development Department, read Case No. HPC 20-02 into
Nathan Frederick, petitioner, presented on his case. He clarified the location of the addition per the submitted site plans and photos. He mentioned that he has worked closely with Kenyon Architects to ensure that the style of the house is maintained, having done so with previous window replacements.

Discussion was held around whether the neighbors were aware of the development. Mr. Frederick confirmed that he alerted neighbors of the addition. Commissioner Matuszak mentioned that she discussed the issue with neighbors, who expressed support of the addition.

Chairperson Maloof opened the public hearing at 8:54 am. There being no public testimony, the hearing was closed at 8:54 am.

Commissioner Stotz made a motion to approve; Commissioner Matuszak seconded.

The motion was APPROVED by a roll call vote 6 to 0.

Yeas: Burdette, Krause, Maloof, Matuszak, Smith, Stotz
Nays: None

CASE NO. HPC 20-03
Public hearing on the request of Sean Rennau, on behalf of John A. Jumer, to obtain a Certificate of Appropriateness in a Class R-1 (Single Family Residential) District to remove significant landscaping, approve a waiver for fence height, and amend the existing Certificate of Appropriateness for a new driveway and accessory storage structure. This request is for the property located at 1808 W. Moss Avenue (Parcel Identification No. 18-08-156-002), Peoria, Illinois (Council District 2).

Senior Urban Planner, Kerilyn Weick, Community Development Department, read Case No. HPC 20-03 into the record and provided a summary of the request. She explained that the request has three parts. The first is to alter landscaping by removing a tree in the front yard. While this request was first considered administratively, City staff discussed the issue with the Peoria Park District, and the conversation led City staff to deem that the request should go to the Commission. The second and third parts of the request are improvements to the rear yard. The second proposes a six-foot tall entry gate along Martin Luther King, Jr., Dr., which requires a waiver due to gate height. The third proposes amendments to a previous Certificate of Appropriateness to allow for rear yard changes to the driveway.

Discussion was held regarding the various parts of the request. Ms. Weick clarified that the Commission can treat each part on its own, denying/approving each. Upon further discussion, the Commission decided to hear from the petitioner and then decide how, or if, to split the three parts of the request.

Sean Rennau, representative of the petitioner, presented on the request. He explained that the tree proposed for removal will not likely survive the driveway replacement due to root disturbance and would pose a difficulty to driveway contractors. He mentioned that such trees can pose safety hazards for people or cars parked under them.

Discussion was held around the driveway width. The petitioner clarified that it will be made slightly wider, moving the driveway closer to the tree.

The Commission then discussed the replacement of the tree proposed for removal. Mr. Rennau mentioned the property owners are considering planting a replacement tree of a different species. Further discussion was held around the need to maintain a parklike front yard setting along Moss Avenue.

Chairperson Maloof opened the public hearing at 9:21 am. There being no public testimony, the hearing was closed at 9:21 am.

Commissioner Matuszak made a motion to approve the case with the following condition: when the
property owner requests a certificate of appropriateness to widen the driveway, the application shall include a professional landscape plan for the front yard; Commissioner Krause seconded.

The motion was APPROVED by a roll call vote 6 to 0.
Yeas: Burdette, Krause, Maloof, Matuszak, Smith, Stotz
Nays: None

CITIZENS' OPPORTUNITY TO ADDRESS THE COMMISSION
There were no citizen requests to address the Commission.

ADJOURNMENT
Commissioner Matuszak made a motion to adjourn the hearing; Commissioner Stotz seconded. Approved by a viva voce vote 6 to 0 at approximately 9:30am.

Sara Maillacheruvu, Urban Planner
TO: Historic Preservation Commission
FROM: Leah Allison, Senior Urban Planner
DATE: February 26, 2020
CASE NO: HPC 20-04

SUBJECT: Public Hearing on the request of Barry and Elizabeth Gray, to obtain a Certificate of Appropriateness to allow for the installation of roof mounted solar panels for the property located at 209 NE Randolph Avenue (Parcel Identification No. 18-04-329-016), Peoria, Illinois (Council District 2)

NOTIFICATION:
Mailed notification was provided to surrounding property owners within 250 radial feet of the subject site and no less than 15 days prior to the review.

REQUEST SUMMARY:
The petitioner is requesting a Certificate of Appropriateness to install roof-mounted solar panels for the property located at 209 NE Randolph Avenue. The proposed panels would be mounted on flat-roofed house and detached garage. The property is located within the Randolph-Roanoke Local Historic District.

Please refer to the attached application for more detailed information.

DISCUSSION:
The Commission should consider the criteria in Historic Preservation Ordinance Section 16-64, Criteria when determining if the proposed work is compatible and appropriate.

OPTIONS:
- Approve the application as requested.
- Modify and grant the application.
- Deny the application.

If denied, the petitioner will not be able to submit an application for the same improvements until it is modified to fit the Commission’s requests, or a period of 1 year has elapsed.
Disclaimer: Data is provided 'as is' without warranty or any representation of accuracy, timeliness or completeness. The burden for determining fitness for, or the appropriateness for use, rests solely on the requester. The requester acknowledges and accepts the limitations of the Data, including the fact that the Data is in a constant state of maintenance. This website is NOT intended to be used for legal litigation or boundary disputes and is informational only. -Peoria County GIS Division

Map Scale
1 inch = 167 feet
2/4/2020
Disclaimer: Data is provided 'as is' without warranty or any representation of accuracy, timeliness or completeness. The burden for determining fitness for, or the appropriateness for use, rests solely on the requester. The requester acknowledges and accepts the limitations of the Data, including the fact that the Data is in a constant state of maintenance. This website is NOT intended to be used for legal litigation or boundary disputes and is informational only. -Peoria County GIS Division
Certificate of Appropriateness Application
Historic Preservation Commission

Property Information: (The property the work will be performed on)
Address: 209 NE Randolph Ave. Peoria, IL. Zip Code: 61606
Tax ID Number: __-__-__ Architectural Style: Victorian with Flat Roof/1 Thousand

Applicant: (The person/organization applying)
Name: Barry and Elizabeth Gray
Company/Neighborhood Association: ____________________________________________
Address: 209 NE Randolph Ave,
City: Peoria State: IL ZIP: 61606
Daytime Phone: ___309____ 369-1782 Email: lizanne.gray@gmail.com
Applicant Signature: ___________________________ Date: 1/6/2020

Owner: (Skip this section if the applicant and owner information is the same)
Name: _______________________________________
Company/Neighborhood Association: _______________________________________
Address: _______________________________________________________________
City: __________________________________ State: __________ ZIP: __________
Daytime Phone: __________________________ Email: _________________________
Owner Signature: ___________________________ Date: ____________________

Contractor Information: (If available, not required)
Name: MOXIE Solar
Company/Neighborhood Association: _______________________________________
Address: P.O. Box 703
City: North Liberty State: Iowa ZIP: 52317
Daytime Phone: ___319____800-9002 Email: la@moxiesolar.com
Project Description:

Provide a detailed description of the work to be done. Include material types, colors, style, and methods of construction. If the work involves removal of material or structure, indicate how the historical value and visual quality of the structure will be retained and ensure the integrity of the landmark or district. You may attach separate sheets if desired.

Narrative of proposed work:

Installation of a 9.660kW ballasted roof mount, grid tied solar array, productin energy to offset consumption at the Gray's home. Both Home and Garage have flat roof, visibility of the panels will be minimal from ground level. Hook up to grid at Meter located on south side of structure, closest to the parking lot next door.

Materials to be used:
(28) Q. Plus Panels
(2) SolarEdge inverters one at garage and one on south side of home.
Unirack racking system - spec sheet attached
See site plan attached.

Photo included of residential proptery w/ balledes roof mount. Sky view, not visable from ground
Filing Instructions and Information

1) **Completed** applications must be received at least 28 days prior to the next regularly scheduled meeting to be included on the agenda.

2) The following information is required to be submitted with the application:
   a) One color photograph of the structure as seen from the street. (Two are needed for corner properties.)
   b) Color photographs of the portion of the site/buildings to be modified.
   c) Site plans, building elevations, and/or renderings, drawn to scale, illustrating the proposed improvements. All submitted drawings must be folded no larger than 9"x12".
   d) Site plans shall include the following:
      i) Property lines, existing streets and adjacent curb lines, north arrow and scale.
      ii) Locations of all buildings, structures, and sidewalks
      iii) Locations and dimensions of walks, fences, and exterior lighting structures.
      iv) If landscaping is proposed: A landscape plan showing exact location, size, quantity and type of all existing and proposed landscaping. Lawn areas should be indicated as seed or sod.
      v) Square footage of all existing and proposed buildings.
   e) Brochures, colors and/or samples of the product material to be used.
   f) Any other information that may assist the commission in making an informed decision.
   g) Application fees: Commission and Administrative cases $25.00
       Local historic district designation cases $200.00
       Local historic landmark designation cases $50.00

3) The applicant and all historic district properties within 250 radial feet of the subject property will receive notice of the meeting 15 days prior to the meeting.

4) The Historic Preservation Commission has regularly scheduled meetings the fourth Wednesday of each month at City Hall, 419 Fulton St, Room 400, Peoria, IL at 8:30 AM.

5) The format for the meeting follows:
   1. Chairperson proceeds with swearing in procedures
   2. Chairperson announces the case
   3. Staff enters case into the record
      a. Staff presents case
      b. Staff answers questions from the Commission
   4. Petitioner presents case and answers questions from the Commission
   5. Chairperson opens the meeting to the public
   6. Public comments – Chairperson may ask for response/input from staff and petitioner
   7. Petitioner presents closing statements
   8. Public testimony is closed (No further public comment)
   9. Commission deliberates and may consult staff
   10. Commission prepares findings, if applicable
   11. Commission votes

Application and inquiries should be submitted to:

| Historic Preservation Commission Staff | Phone: 309/494-8600 |
| City of Peoria Development Center       | Fax: 309/494-8680 |
| 419 Fulton Street, Room 300             |                |
| Peoria, IL 61602-1217                    |                |
PROJECT NAME: GRAY, BARRY & ELIZABETH

05-1294-1

01

DESCRIPTION
- **SIZE:** 9.660 kW PV Solar System (28 modules)
- **STYLE:** Residential, EPDM membrane roof, ballast mount, grid tied, net-metered
- **LOCATION:** South facing roof of home
- **ORIENTATION:** Landscape, 10° pitch, 190° & 200° azimuths
- **MODULE:** Hanwha Q.PLUS L-G4.2 345W, 78.5"x 39.4"x 1.38" thick, 52.9 lbs
- **RACKING:** Unirac RM-10 Ballasted Roof Mount
- **INVERTER:** SolarEdge String Inverter with Power Optimizers
- **VOLTAGE:** 120/240V, 1Φ
- **MONITORING:** SolarEdge Online Monitoring
- **ADDITIONAL WORK:** Trench from garage to house, then run in conduit through house to meter location. Cat-5 in Trench.
  Install Clipper Creek EV Charging station in Garage.
  Replace existing Main panel with new 200A main panel

WATER PIPE TO GARDEN BURIED AT ABOUT 3 FEET. REQUEST EXACT LOCATION FROM THE CUSTOMER PRIOR TO TRENCHING
PROJECT NAME: GRAY, BARRY & ELIZABETH

SOLAR PHOTOVOLTAIC (PV) SYSTEM WITH SOLAR EDGE

Inverter Type: String Inverter with P400 Panel Optimizers
Minimum String Length: 8 Panels
Minimum String Length: 25 Panels
Maximum Power Per String: 5,250W (DC)
Nominal String Voltage: 350V (DC) @ 240V (AC)
Maximum System Voltage: 500V (DC) @ 240V (AC)

HANWHA Q.PLUS L-G4.2 345W

NEC 690.7 MAXIMUM VOLTAGE

690.7(A): Maximum Photovoltaic System Voltage
Q.Plus L-G4.2 345W Module Voc = 47.46V
Module Voc = (25°C - (-40°C))(-0.0029V/°C)(47.46V) + (47.46V) = 56.41V (DC)
*Each module is connected to Power Optimizer (DC-to-DC Converter)
Module Voc = 56.41V (DC) < P400 Optimizer Vmax Input = 80V (DC)
Optimizer Safety Mode Voc: 1V (DC)

NEC 690.8 CIRCUIT SIZING AND CURRENT

Inverter I-1 Max Continuous Output Current: 21 Amps (AC)
Inverter I-2 Max Continuous Output Current: 16 Amps (AC)

690.8(A)(5): DC-to-DC Converter Output Current.
Inverter I-1 Maximum Input Current: 13.5 Amps (DC)
Inverter I-2 Maximum Input Current: 10.5 Amps (DC)
*Higher current source may be used, the inverter will limit its input current to the value stated above.

NEC 690.9 OVERCURRENT PROTECTION

690.9(B): Overcurrent Device Ratings
Disconnect Fuse: [21A+16A] x 125% = 46.25A > 50 Amp OCPD

NEC 690.12 RAPID SHUTDOWN OF PV SYSTEMS ON BUILDINGS

PLAN: SolarEdge String Inverters with Rapid Shutdown enabled disconnect shall be located next to the service and be labeled in accordance with 690.56(B) and (C).
ROOFMOUNT introduces the Power of Simplicity to the ballasted flat roof solar industry. The system consists of only two major components, minimizing preparation work and installation time. Seamlessly design around roof obstacles, support most framed modules and bond the system with just the turn of a wrench.
SIMPLE DESIGN
TWO MAJOR COMPONENTS. ONE TOOL
RM supports most framed PV modules at 10 degree tilt. The component list consists of only two major components – a fully assembled ballast bay and a universal module clip. Our engineers specified a chemical locking hex bolt, providing a UL2703 certified grounding path from module to ballast bay, with just the turn of a wrench. RM is accessory-rich to support your specific installation needs, because it was designed to conveniently work with off the shelf wire management products. A snap into place, membrane-friendly, rubber roof pad is also available as a low-cost option for roof protection.

AVAILABILITY
NATIONWIDE NETWORK
Unirac maintains the largest network of stocking distributors for our racking solutions. Our partners have distinguished their level of customer support, availability, and overall value, thereby providing the highest level of service to users of Unirac products. Count on our partners for fast and accurate delivery to meet your project needs. Visit Unirac.com for a list of distributors.

INTEGRATED DESIGN TOOLS
DESIGN, SAVE, AND SHARE YOUR ARRAY VISUALLY
U-Builder is the most powerful streamlined design tool for your solar mounting project. Integrated with HelioScope’s technology, U-Builder becomes a powerful online tool that streamlines the process of designing a code compliant solar mounting system. Key benefits allow you to quickly plan project sites, analyze design decisions, and simplify your workflow. You will enjoy the ability to share projects with customers: there’s no need to print results and send to a distributor, just click and share.

UNIRAC CUSTOMER SERVICE MEANS THE HIGHEST LEVEL OF PRODUCT SUPPORT
UNMATCHED EXPERIENCE
CERTIFIED QUALITY
ENGINEERING EXCELLENCE
BANKABLE WARRANTY
DEISGN TOOLS
PERMIT DOCUMENTATION

TECHNICAL SUPPORT
Unirac’s technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

CERTIFIED QUALITY PROVIDER
Unirac is the only PV mounting vendor with ISO certifications for 9001:2008, 14001:2004 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY
Don’t leave your project to chance. Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are receiving products of exceptional quality. ROOFMOUNT is covered by a 20-year manufacturing warranty on all parts.

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN
TO: Historic Preservation Commission
FROM: Leah Allison, Senior Urban Planner
DATE: February 26, 2020
CASE NO: HPC 20-05
SUBJECT: Public hearing on the request of Creighton Kinny, to obtain a Certificate of Appropriateness to allow for the installation of roof mounted solar panels for the property located at 1110 NE Glen Oak Avenue (Parcel Identification No. 18-03-152-004), Peoria, Illinois (Council District 2)

NOTIFICATION:
Mailed notification was provided to surrounding property owners within 250 radial feet of the subject site and no less than 15 days prior to the review.

REQUEST SUMMARY:
The petitioner is requesting a Certificate of Appropriateness to install roof-mounted solar panels for the property located at 1110 NE Glen Oak Avenue. The proposed panels would be mounted on flat-roofed house and detached garage. The property is located within the Glen Oak Local Historic District.

Please refer to the attached application for more detailed information.

DISCUSSION:
The Commission should consider the criteria in Historic Preservation Ordinance Section 16-64, Criteria when determining if the proposed work is compatible and appropriate.

OPTIONS:
- Approve the application as requested.
- Modify and grant the application.
- Deny the application.

If denied, the petitioner will not be able to submit an application for the same improvements until it is modified to fit the Commission’s requests, or a period of 1 year has elapsed.
Disclaimer: Data is provided 'as is' without warranty or any representation of accuracy, timeliness or completeness. The burden for determining fitness for, or the appropriateness for use, rests solely on the requester. The requester acknowledges and accepts the limitations of the Data, including the fact that the Data is in a constant state of maintenance. This website is NOT intended to be used for legal litigation or boundary disputes and is informational only. -Peoria County GIS Division
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Map Scale
1 inch = 42 feet
2/4/2020
Certificate of Appropriateness Application
Historic Preservation Commission

Property Information: (The property the work will be performed on)

Address: 110 NE Glen Oak Ave Zip Code 61603
Tax ID Number: 18-03-152-004 Architectural Style:

Applicant: (The person/organization applying.)

Name: Creighton Kinny
Company/Neighborhood Association: Eagle Point Solar
Address: 2400 Kerper Blvd
City: Davenport State: IA ZIP: 52801
Daytime Phone: (563) 582-4044 Email: CKinny@eaglepointsolar.com
Applicant Signature: Date: 1/27/2020

Owner: (Skip this section if the applicant and owner information is the same)

Name: Steve & Linda Fairbanks
Company/Neighborhood Association:
Address: 1110 NE Glen Oak Ave
City: Peoria State: Illinois ZIP: 61603
Daytime Phone: (309) 229-1062 Email: linda@fairbanks@boglobal.net
Owner Signature: Date: 1/27/2020

Contractor Information: (If available, not required)

Name: Creighton Kinny
Company/Neighborhood Association: Eagle Point Solar
Address: 2400 Kerper Blvd
City: Davenport State: IA ZIP: 52801
Daytime Phone: (563) 582-4044 Email: CKinny@eaglepointsolar.com
Project Description:

Provide a detailed description of the work to be done. Include material types, colors, style, and methods of construction. If the work involves removal of material or structure, indicate how the historical value and visual quality of the structure will be retained and ensure the integrity of the landmark or district. You may attach separate sheets if desired.

Narrative of proposed work:

6.0 kW AC / 5.89 kW DC roof-mounted solar array
CITY OF PEORIA RESIDENTIAL FEE SCHEDULE
APPLIES TO ALL PERMIT TYPES, ROUND COST OF CONSTRUCTION UP TO THE NEXT $1,000
PROCESSING FEE ($50) + PERMIT FEE (COST OF CONSTRUCTION x .006) + PLAN REVIEW ($50)
Only one processing fee will be applied per job if permit applications are received on the same day.
Plan review fee will apply to New Residential, Residential Additions, Residential Alterations, Decks, and Accessory Structures.

<table>
<thead>
<tr>
<th>JOB TYPE</th>
<th>PROCESSING FEE</th>
<th>PERMIT FEE</th>
<th>PLAN REVIEW</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Residential, Residential Addition</td>
<td>$50 + 25%</td>
<td>Construction Cost x .006</td>
<td>$137</td>
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</tr>
<tr>
<td>Residential Alteration, Decks, Accessory Structures</td>
<td>$50</td>
<td>Construction Cost x .006</td>
<td>$50</td>
<td></td>
</tr>
<tr>
<td>Residential Electrical, Mechanical, Plumbing, All Other Residential Permits</td>
<td>$50</td>
<td>Construction Cost x .006</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

CITY OF PEORIA COMMERCIAL FEE SCHEDULE
APPLIES TO ALL PERMIT TYPES, ROUND COST OF CONSTRUCTION UP TO THE NEXT $1,000
PROCESSING FEE ($100) + PERMIT FEE (COST OF CONSTRUCTION x .008) + PLAN REVIEW ($300)
Only one processing fee will be applied per job if permit applications are received on the same day.
Plan review fee will apply to New Commercial, Commercial Additions, and Commercial Alterations. If plan review is required for independent electrical, plumbing, or mechanical applications, the plan review fee is $50.

<table>
<thead>
<tr>
<th>JOB TYPE</th>
<th>PROCESSING FEE</th>
<th>PERMIT FEE</th>
<th>PLAN REVIEW</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Commercial, Commercial Addition</td>
<td>$100</td>
<td>Construction Cost x .008</td>
<td>$300</td>
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<tr>
<td>Commercial Alteration</td>
<td>$100</td>
<td>Construction Cost x .008</td>
<td>$300</td>
<td></td>
</tr>
<tr>
<td>Commercial Electrical, Mechanical, Plumbing, All Other Commercial Permits</td>
<td>$100</td>
<td>Construction Cost x .008</td>
<td>$50 (IF APPLICABLE)</td>
<td></td>
</tr>
</tbody>
</table>

All applications for permits that are submitted subsequent to the initiation of construction shall be assessed at twice the permit fee rate described above. From .006 to .012 for Residential permits, and from .008 to .016 for Commercial permits.
VSE Project Number: U2819.0019.201

January 7, 2020

Eagle Point Solar, LLC
ATTENTION: Tod Hollenback
900 Jackson St., Suite 108
Dubuque, IA 52002

REFERENCE: Fairbanks, Linda Residence: 1110 Northeast Glen Oak Avenue, Peoria, IL 61603
Solar Array Installation

To Whom It May Concern:

Per your request, we have reviewed the existing structure at the above referenced site. The purpose of our review was to determine the adequacy of the existing structure to support the proposed installation of solar panels on the roof as shown on the panel layout plan.

Based upon our review, we conclude that the existing structure is adequate to support the proposed solar panel installation.

Design Parameters

- Risk Category: II
- Design wind speed: 115 mph (3-sec gust) per ASCE 7-10
- Wind exposure category: C
- Ground snow load: 20 psf

Existing Roof Structure

- Roof structure: 2x8 rafters @ 16" O.C.
- Roofing material: composite shingles

Connection to Roof

- Mounting connection: (1) 5/16" lag screw w/ min. 2.5" embedment into framing at max. 48" O.C. along rails
- (2) rails per row of panels, evenly spaced; panel length not to exceed 66 in

Conclusions

Based upon our review, we conclude that the existing structure is adequate to support the proposed solar panel installation. In the area of the solar array, other live loads will not be present or will be greatly reduced (2015 IBC, Section 1607.12.5). The gravity loads, and thus the stresses of the structural elements, in the area of the solar array are either decreased or increased by no more than 5%. Therefore, the requirements of Section 807.4 of the 2015 IEBC are met and the structure is permitted to remain unaltered.
The solar array will be flush-mounted (no more than 6" above the roof surface) and parallel to the roof surface. Thus, we conclude that any additional wind loading on the structure related to the addition of the proposed solar array is negligible. The attached calculations verify the capacity of the connections of the solar array to the existing roof against wind (uplift), the governing load case. Because the increase in lateral forces is less than 10%, this addition meets the requirements of the exception in Section 807.5 of the 2015 IEBC. Thus the existing lateral force resisting system is permitted to remain unaltered.

**Limitations**

Installation of the solar panels must be performed in accordance with manufacturer recommendations. All work performed must be in accordance with accepted industry-wide methods and applicable safety standards. The contractor must notify Vector Structural Engineering, LLC should any damage, deterioration or discrepancies between the as-built condition of the structure and the condition described in this letter be found. Connections to existing roof framing must be staggered, except at array ends, so as not to overload any existing structural member. The use of solar panel support span tables provided by others is allowed only where the building type, site conditions, site-specific design parameters, and solar panel configuration match the description of the span tables. The design of the solar panel racking (mounts, rails, etc.), and electrical engineering is the responsibility of others. Waterproofing around the roof penetrations is the responsibility of others. Vector Structural Engineering assumes no responsibility for improper installation of the solar array.

VECTOR STRUCTURAL ENGINEERING, LLC
IL Firm License: 184.00581C - COA

Wells Holmes, S.E.
IL License: 81.008195 - Expires: 11/30/2020
Project Engineer
Enclosures
WLH/sjs

651 W. Galena Park Blvd., Ste. 101 / Draper, UT 84020 / T (801) 990-1775 / F (801) 990-1776 / www.vectorse.com
**PROJECT:** Fairbanks, Linda Residence

**Components and Cladding Wind Calculations**

**Label:** Solar Panel Array

**SITE-SPECIFIC WIND PARAMETERS:**

<table>
<thead>
<tr>
<th>Basic Wind Speed [mph]</th>
<th>115</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure Category</td>
<td>C</td>
</tr>
<tr>
<td>Risk Category</td>
<td>II</td>
</tr>
</tbody>
</table>

**Notes:** Calculations per ASCE 7-10

**ADDITIONAL INPUT & CALCULATIONS:**

<table>
<thead>
<tr>
<th>Height of Roof, h [ft]</th>
<th>15 (Approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp/Cladding Location</td>
<td>Gable/Hip Roofs 7° &lt; θ ≤ 27°</td>
</tr>
<tr>
<td>Enclosure Classification</td>
<td>Enclosed Buildings</td>
</tr>
</tbody>
</table>

| Zone 1 GCp | 0.9 | Figure 30.4-2B (enter largest abs. value) |
| Zone 2 GCp | 1.7 | (enter largest abs. value) |
| Zone 3 GCp | 2.6 | (enter largest abs. value) |

- α: 9.5 Table 26.9-1
- zₙ [ft]: 900 Table 26.9-1
- Kₐ: 0.85 Table 30.3-1
- Kₓ: 1 Equation 26.8-1
- K₉: 0.85 Table 26.6-1

| Velocity Pressure, qₙ [psf]: 24.4 Equation 30.3-1 |
| GCₚ: 0 Table 26.11-1 |

**PRESSURES:**

\[ p = qₙ \left[ (GC_p) - (GCₚ) \right] \]  
Equation 30.9-1

| Zone 1, p [psf]: 22.0 psf (1.0 W, Interior Zones*) |
| Zone 2, p [psf]: 41.5 psf (1.0 W, End Zones*) |
| Zone 3, p [psf]: 63.5 psf (1.0 W, Corner Zones within a) (a= 3 ft) |

- *Interior Zones*<br>- *End Zones*<br>- *Corner Zones*
### Lag Screw Connection

**Capacity:**
- **Lag Screw Size [in]:** 5/16
- **C_0:** 1.6
- **Embedment [in]:** 2.5
- **Grade:** SPF (G = 0.42)
- **Capacity [lbs/in]:** 205
- **Number of Screws:** 1
- **Prying Coefficient:** 1.4
- **Total Capacity [lbs]:** 586

**Demand:**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Pressure (0.6 Wind) (psf)</th>
<th>Max Tributary Width (ft)</th>
<th>Max. Trib. Area (ft²)</th>
<th>Max. Uplift Force (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13.2</td>
<td>4.0</td>
<td>11.0</td>
<td>145</td>
</tr>
<tr>
<td>2</td>
<td>24.9</td>
<td>4.0</td>
<td>11.0</td>
<td>274</td>
</tr>
<tr>
<td>3</td>
<td>38.1</td>
<td>4.0</td>
<td>11.0</td>
<td>419</td>
</tr>
</tbody>
</table>

**Demand< Capacity:** **CONNECTION OKAY**

1. Embedment is measured from the top of the framing member to the beginning of the tapered tip of the lag screw. Embedment in sheathing or other material is not effective. The length of the tapered tip is not part of the embedment length.
2. 'Max. Trib Area' is the product of the 'Max. Tributary Width' (along the rails) and 1/2 the panel width/height (perpendicular to the rails).
## Calculate Estimated Gravity Loads

### Roof Dead Load (D)

<table>
<thead>
<tr>
<th>Item</th>
<th>Increase due to pitch</th>
<th>Original loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof Pitch/12</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Composite Shingles</td>
<td>2.1</td>
<td>1.03</td>
</tr>
<tr>
<td>1/2&quot; Plywood</td>
<td>1.0</td>
<td>1.03</td>
</tr>
<tr>
<td>Framing</td>
<td>3.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Insulation</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1/2&quot; Gypsum Clg.</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>M, E &amp; Misc</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DL</td>
<td>6</td>
<td>2.0</td>
</tr>
<tr>
<td>PV Array DL</td>
<td>3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Roof Live Load (Lr)

- Existing Design Roof Live Load [psf]: 20 [ASCE 7-10, Table 4-1]
- Roof Live Load With PV Array [psf]: 0 [2015 IBC, Section 1607.12.5]

### Snow Load (S):

<table>
<thead>
<tr>
<th>Item</th>
<th>Existing</th>
<th>Array</th>
<th>w/ Solar Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof Slope [x:12]:</td>
<td>2.8</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Roof Slope [°]:</td>
<td>13</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Snow Ground Load, p_g [psf]:</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Terrain Category:</td>
<td>C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Exposure of Roof:</td>
<td>Fully Exposed</td>
<td>Fully Exposed</td>
<td></td>
</tr>
<tr>
<td>Exposure Factor, C_0:</td>
<td>0.9</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Thermal Factor, C_t:</td>
<td>1.1</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Risk Category:</td>
<td>II</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>Importance Factor, I_s:</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Flat Roof Snow Load, p_f [psf]:</td>
<td>14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Minimum Roof Snow Load, p_m [psf]:</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Unobstructed Slippery Surface?</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Slope Factor Figure:</td>
<td>Figure 7-2b</td>
<td>Figure 7-2b</td>
<td></td>
</tr>
<tr>
<td>Roof Slope Factor, C_s:</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Sloped Roof Snow Load, p_s [psf]:</td>
<td>14</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Design Snow Load, S [psf]:</td>
<td>20</td>
<td>20</td>
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</tbody>
</table>
### Design Loads

<table>
<thead>
<tr>
<th>Load Type</th>
<th>Snow</th>
<th>Live</th>
<th>Dead</th>
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</thead>
<tbody>
<tr>
<td>Roof</td>
<td>20</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Solar</td>
<td>3.0</td>
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</tr>
</tbody>
</table>

### Criteria (UA)

<table>
<thead>
<tr>
<th>Ap,min</th>
<th>Dc</th>
<th>Dl</th>
<th>Dk</th>
</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>160</td>
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</tr>
</tbody>
</table>

### Labels and Data

<table>
<thead>
<tr>
<th>Label</th>
<th>Length' L' (ft)</th>
<th>Roof Tbl (in)</th>
<th>Floor Tbl (in)</th>
<th>Wall Tbl (in)</th>
<th>Addt Live Load (lb)</th>
<th>Addt Solar Load (lb)</th>
<th>Point Load From</th>
<th>Point Load To</th>
<th>Dim</th>
<th>Grade</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1075</td>
<td>16.70</td>
<td>1.33</td>
<td>4.0</td>
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<td></td>
<td></td>
<td>2x8</td>
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<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>R1 (lb)</th>
<th>R2 (lb)</th>
<th>Mmax (lb-in)</th>
<th>Mmax (lb-in)</th>
<th>Vmax (lb)</th>
<th>Vmax (lb)</th>
<th>P1 (lb)</th>
<th>P2 (lb)</th>
<th>P1,500 (lb)</th>
<th>P2,500 (lb)</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.15</td>
<td>1.15</td>
<td>1.30</td>
<td>338</td>
<td>338</td>
<td>1417</td>
<td>1621</td>
<td>3.12</td>
<td>11.20</td>
<td>1.073</td>
<td>1.675</td>
<td>0.788</td>
<td>0.117</td>
<td>50.93 M</td>
</tr>
</tbody>
</table>
Built for solar’s toughest roofs.

IronRidge builds the strongest mounting system for pitched roofs 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.

**UL 2703 Listed System**
Entire system and components meet newest effective UL 2703 standard.

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

**Design Assistant**
Online software makes it simple to create, share, and price projects.

**25-Year Warranty**
Products guaranteed to be free of impairing defects.
**XR Rails**

**XR10 Rail**
A low-profile mounting rail for regions with light snow.
- 6’ spanning capability
- Moderate load capability
- Clear and black finish

**XR100 Rail**
The ultimate residential solar mounting rail.
- 8’ spanning capability
- Heavy load capability
- Clear and black finish

**XR1000 Rail**
A heavyweight mounting rail for commercial projects.
- 12’ spanning capability
- Extreme load capability
- Clear anodized finish

**Bonded Splices**
All rails use internal splices for seamless connections.
- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

**Clamps & Grounding**

**UFOs**
Universal Fastening Objects bond modules to rails.
- Fully assembled & lubed
- Single, universal size
- Clear and black finish

**Stopper Sleeves**
Snap onto the UFO to turn into a bonded end clamp.
- Bonds modules to rails
- Sized to match modules
- Clear and black finish

**CAMO**
Bond modules to rails while staying completely hidden.
- Universal end-cam clamp
- Tool-less installation
- Fully assembled

**Grounding Lugs**
Connect arrays to equipment ground.
- Low profile
- Single tool installation
- Mounts in any direction

**Attachments**

**FlashFoot2**
Flash and mount XR Rails with superior waterproofing.
- Twist-on Cap eases install
- Wind-driven rain tested
- Mill and black finish

**Conduit Mount**
Flash and mount conduit, strut, or junction boxes.
- Twist-on Cap eases install
- Wind-driven rain tested
- Secures ¾” or 1” conduit

**Slotted L-Feet**
Drop-in design for rapid rail attachment.
- Secure rail connections
- Slot for vertical adjusting
- Clear and black finish

**Bonding Hardware**
Bond and attach XR Rails to roof attachments.
- T & Square Bolt options
- Nut uses 7/16” socket
- Assembled and lubricated

**Resources**

**Design Assistant**
Go from rough layout to fully engineered system. For free.
[Go to IronRidge.com/design](http://IronRidge.com/design)

**NABCEP Certified Training**
Earn free continuing education credits, while learning more about our systems.
[Go to IronRidge.com/training](http://IronRidge.com/training)
Single Phase Inverter with HD-Wave Technology for North America

Optimized installation with HD-Wave technology
- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)
## OUTPUT

<table>
<thead>
<tr>
<th>Model</th>
<th>Rated AC Power Output</th>
<th>Max. AC Power Output</th>
<th>AC Output Voltage Min.-Nom.-Max.</th>
<th>AC Output Voltage Min.-Nom.-Max.</th>
<th>AC Frequency (Nominal)</th>
<th>Maximum Continuous Output Current @208V</th>
<th>Maximum Continuous Output Current @240V</th>
<th>GFDI Threshold</th>
<th>Utility Monitoring, Islanding Protection, Country Configurable Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE3000H-US</td>
<td>3000 VA</td>
<td>3000 VA</td>
<td>(183 - 208 - 229) Vac</td>
<td>Vac</td>
<td>59.3 - 60 - 60.9 Hz</td>
<td>16 A</td>
<td>12.5 A</td>
<td>1 A</td>
<td>Yes</td>
</tr>
<tr>
<td>SE3800H-US</td>
<td>3800 VA</td>
<td>3300 VA</td>
<td>211 - 240 - 264 Vac</td>
<td>Vac</td>
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</tr>
<tr>
<td>SE5000H-US</td>
<td>5000 VA</td>
<td>5000 VA</td>
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<td>SE6000H-US</td>
<td>6000 VA</td>
<td>5000 VA</td>
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<tr>
<td>SE7600H-US</td>
<td>7600 VA</td>
<td>6000 VA</td>
<td></td>
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<tr>
<td>SE10000H-US</td>
<td>10000 VA</td>
<td>7600 VA</td>
<td></td>
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<tr>
<td>SE11400H-US</td>
<td>11400 VA</td>
<td>10000 VA</td>
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</tbody>
</table>

## INPUT

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum DC Power @240V</th>
<th>Maximum DC Power @208V</th>
<th>Transformer-less, Ungrounded</th>
<th>Maximum Input Voltage</th>
<th>Nominal DC Input Voltage</th>
<th>Maximum Input Current 208V</th>
<th>Maximum Input Current 240V</th>
<th>Maximum Input Short Circuit Current</th>
<th>Reverse-Polarity Protection</th>
<th>Ground-Fault Isolation Detection</th>
<th>Maximum Inverter Efficiency</th>
<th>CEC Weighted Efficiency</th>
<th>Nighttime Power Consumption</th>
<th>ADDITIONAL FEATURES</th>
<th>INSTALLATION SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE3000H-US</td>
<td>4650 W</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>380 Vdc</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>SE3800H-US</td>
<td>5900 W</td>
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<td></td>
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<td>SE5000H-US</td>
<td>7750 W</td>
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<td>SE6000H-US</td>
<td>9300 W</td>
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<tr>
<td>SE7600H-US</td>
<td>11800 W</td>
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<tr>
<td>SE10000H-US</td>
<td>15500 W</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SE11400H-US</td>
<td>17650 W</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## ADDITIONAL FEATURES

- Supported Communication Interfaces: RS485, Ethernet, ZigBee [optional], Cellular [optional]
- Revenue Grade Data, ANSI C12.20
- Rapid Shutdown - NEC 2014 and 2017 690.12
- Automatic Rapid Shutdown upon AC Grid Disconnect

## STANDARD COMPLIANCE

- Safety: UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07
- Emissions: FCC Part 15, Class B
- Grid Connection Standards: IEEE1547, Rule 21, Rule 14 (Hi)
- INSTALLATION SPECIFICATIONS: UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07
- FCC Part 15 Class B

## INSTALLATION SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>AC Output Conduit Size / AWG Range</th>
<th>DC Input Conduit Size / # of Strings / AWG Range</th>
<th>Dimensions with Safety Switch (HxWxD)</th>
<th>Weight with Safety Switch</th>
<th>Noise</th>
<th>Cooling</th>
<th>Operating Temperature Range</th>
<th>Protection Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE3000H-US</td>
<td>3/4&quot; minimum / 14-6 AWG</td>
<td>3/4&quot; minimum / 1-2 strings / 14-6 AWG</td>
<td>17.7 x 14.6 x 6.8 / 450 x 370 x 174</td>
<td>22 / 10</td>
<td>&lt; 25</td>
<td>Natural Convection</td>
<td>-13 to +140 / -25 to +60 (40°F / 40°C option)</td>
<td>NEMA 3R (Inverter with Safety Switch)</td>
</tr>
</tbody>
</table>

For other regional settings please contact SolarEdge support
(1) For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf
(2) -40 version P/N: SExxxxH-US000NNU4

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**VSUN330-72P**

- **17.04%** Module efficiency
- **330W** Highest power output
- **12 years** Material & Workmanship warranty
- **25 years** Linear power output warranty

- PID-free
- World class poly efficiency
- Tighter product performance distribution and current sorting reduces the mismatch power loss in system operation
- Positive tolerance offer
- Good temperature coefficient enables higher output in high temperature regions
- Excellent performance under low light conditions
- Certified for salt/ammonia corrosion resistance
- Load certificates: wind to 2400Pa and snow to 3400Pa

---

**Munich RE**

- 12-year product warranty
- 25-year linear power output warranty

Involved by Fuji Solar, VSUN is a Japanese solar module solutions provider located in Tokyo that offers Japanese quality solar technologies globally. The group’s business started in Japan in 2006, later spreading to North America, Southeast Asia, and EMEA.

Innovative & Smart – VSUN has been committed to providing greener, cleaner, and more intelligent renewable energy solutions. It is focusing on the new energy market and the development of customized and high-efficiency products.

---

**Note:**
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A Sub-company of **FUJI SOLAR**

Engineered in Japan
vsun@vietnamsunenergy.com
www.vsun-solar.com
### Electrical Characteristics at Standard Test Conditions (STC)

<table>
<thead>
<tr>
<th>Module Type</th>
<th>VSUN330-72P</th>
<th>VSUN325-72P</th>
<th>VSUN320-72P</th>
<th>VSUN315-72P</th>
<th>VSUN310-72P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power - Pmax (W)</td>
<td>330</td>
<td>325</td>
<td>330</td>
<td>315</td>
<td>310</td>
</tr>
<tr>
<td>Open Circuit Voltage - Voc (V)</td>
<td>46.1</td>
<td>46</td>
<td>45.9</td>
<td>45.7</td>
<td>45.6</td>
</tr>
<tr>
<td>Short Circuit Current - Isc (A)</td>
<td>9.28</td>
<td>9.19</td>
<td>9.1</td>
<td>9.01</td>
<td>8.91</td>
</tr>
<tr>
<td>Maximum Power Voltage - Vmpp (V)</td>
<td>37.8</td>
<td>37.6</td>
<td>37.3</td>
<td>37.1</td>
<td>37</td>
</tr>
<tr>
<td>Maximum Power Current - Impp (A)</td>
<td>8.75</td>
<td>8.66</td>
<td>8.57</td>
<td>8.48</td>
<td>8.39</td>
</tr>
<tr>
<td>Module Efficiency</td>
<td>17.04%</td>
<td>16.78%</td>
<td>16.53%</td>
<td>16.27%</td>
<td>16.01%</td>
</tr>
</tbody>
</table>

Standard Test Conditions (STC): irradiance 1,000 W/m²; AM 1.5; module temperature 25°C. Tolerance of Pmpp: ±3%.

Measuring uncertainty of power: ±3%.

### Electrical Characteristics at Normal Operating Cell Temperature (NOCT)

<table>
<thead>
<tr>
<th>Module Type</th>
<th>VSUN330-72P</th>
<th>VSUN325-72P</th>
<th>VSUN320-72P</th>
<th>VSUN315-72P</th>
<th>VSUN310-72P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power - Pmax (W)</td>
<td>243.0</td>
<td>240.1</td>
<td>235.6</td>
<td>231.0</td>
<td>220.0</td>
</tr>
<tr>
<td>Open Circuit Voltage - Voc (V)</td>
<td>42.6</td>
<td>42.5</td>
<td>42.4</td>
<td>42.2</td>
<td>42.1</td>
</tr>
<tr>
<td>Short Circuit Current - Isc (A)</td>
<td>7.49</td>
<td>7.42</td>
<td>7.35</td>
<td>7.27</td>
<td>7.19</td>
</tr>
<tr>
<td>Maximum Power Voltage - Vmpp (V)</td>
<td>34.7</td>
<td>34.6</td>
<td>34.4</td>
<td>34.2</td>
<td>34.1</td>
</tr>
<tr>
<td>Maximum Power Current - Impp (A)</td>
<td>7.02</td>
<td>6.94</td>
<td>6.85</td>
<td>6.78</td>
<td>6.71</td>
</tr>
</tbody>
</table>

Normal Operating Cell Temperature (NOCT): irradiance 800W/m²; wind speed 1 m/s; cell temperature 45°C; ambient temperature 20°C.

Measuring uncertainty of power: ±3%.

### Temperature Characteristics

<table>
<thead>
<tr>
<th>NOCT</th>
<th>45°C (±2°C)</th>
</tr>
</thead>
</table>

### Maximum Ratings

| Voltage Temperature Coefficient | -0.2932%/K |
| Current Temperature Coefficient | +0.045%/K |
| Power Temperature Coefficient   | -0.408%/K |

### Material Characteristics

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>1956 x 930 x 40 mm (L x W x H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>22.0 kg</td>
</tr>
<tr>
<td>Frame</td>
<td>Anodized aluminum profile</td>
</tr>
<tr>
<td>Front Glass</td>
<td>White toughened safety glass, 3.2 mm</td>
</tr>
<tr>
<td>Cell Encapsulation</td>
<td>EVA (Ethylene-Vinyl-Acetate)</td>
</tr>
<tr>
<td>Back Sheet</td>
<td>Composite film</td>
</tr>
<tr>
<td>Cells</td>
<td>6 x 12 pieces polycrystalline solar cells series strings (156.75 mm x 156.75 mm)</td>
</tr>
<tr>
<td>Junction Box</td>
<td>Rated current: 13A, IP: 67, TUV/UL</td>
</tr>
<tr>
<td>Cable &amp; Connector</td>
<td>Length 1200 mm, 1 x 4 mm², compatible with MC4</td>
</tr>
</tbody>
</table>

### Packaging

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>1980 x 1140 x 1120 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container 20'</td>
<td>270</td>
</tr>
<tr>
<td>Container 40'</td>
<td>648</td>
</tr>
<tr>
<td>Container 40THC</td>
<td>708</td>
</tr>
</tbody>
</table>

### System Design

| Temperature Range | -40°C to + 85°C |
| Withstanding Hail | Maximum diameter of 25 mm with impact speed of 23 m/s |
| Maximum Surface Load | 5400 Pa |
| Application class | class A |

### IV-Curves

Excellent performance under weak light condition.