

**STAFF REPORT: 9/8/2021 MEETING**

**PREPARED BY: D. RIEDEN**

**APPLICATION NUMBER: #21-7397**

**ADDRESS: 3290 SHERBOURNE**

**HISTORIC DISTRICT: SHERWOOD FOREST**

**APPLICANT: MARK HAGERTY**

**PROPERTY OWNER: JEREMY WAGNER-KAISER**

**DATE OF PROVISIONALLY COMPLETE APPLICATION: 7/19/2021**

**DATE OF STAFF SITE VISIT: 7/22/2021**

**SCOPE: SOLAR PANELS ON ROOF OF HOUSE AND GARAGE**

**EXISTING CONDITIONS**

Built in 1928, this 2 and half-story single-family English Tudor Revival style stands near the corner lot of Sherbourne and Kingston roads, facing south, on Sherbourne. The cross-gabled brown brick dwelling features foundation stone masonry, wood-beam details, and a massive chimney as its front-facing feature. A round tower over the front door is tucked in the southeast corner. The steeply sloped asphalt-shingled roof has dormers with roofs facing east and west respectively. The rear elevation is hidden from public view. A concrete drive runs on the western edge of the property to the detached, hipped pyramid roofed garage. The open front lawn is shaded by a street tree, which is divided by a front path that leads to a foundation planted garden.



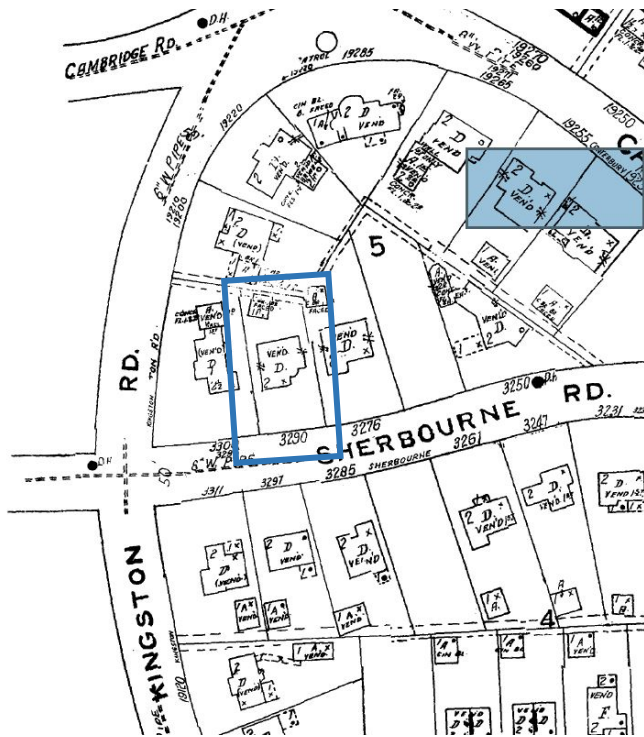
*Site Photo 1, by Staff July 22, 2021: (Southwest) side/front elevations.*



*Site Photo 2 by Staff February 7, 2021: (Southeast) side/front elevations.*

The Detroit Property Index lists available information on the property. Previous HDC approved work are listed on this property as follows:

- December 1, 2016      COA    New asphalt roof
- February 8, 2017    COA    Reconstruct rear porch
- June 11, 2021        COA    Remove door in rear, brick in with matching brick
- June 22, 2021        COA    Install 2 new downspouts, remove/replace concrete for drainage



Sanborn Map, Vol. 16, P004



Aerial of Parcel 02004914. 3290 Sherbourne

**PROPOSAL**

The current owner is working through a contractor, and has provided an application, roof plan, site photos with labels, sample images of the solar panels, and product details for the following proposed work: Install thirty-nine (39) roof-mounted, Jinko 370W solar panels, each panel with a micro inverter underneath, and three (3) Enphase IQ combiners near meter at the rear elevation. See attached detailed documents provided by the applicant.

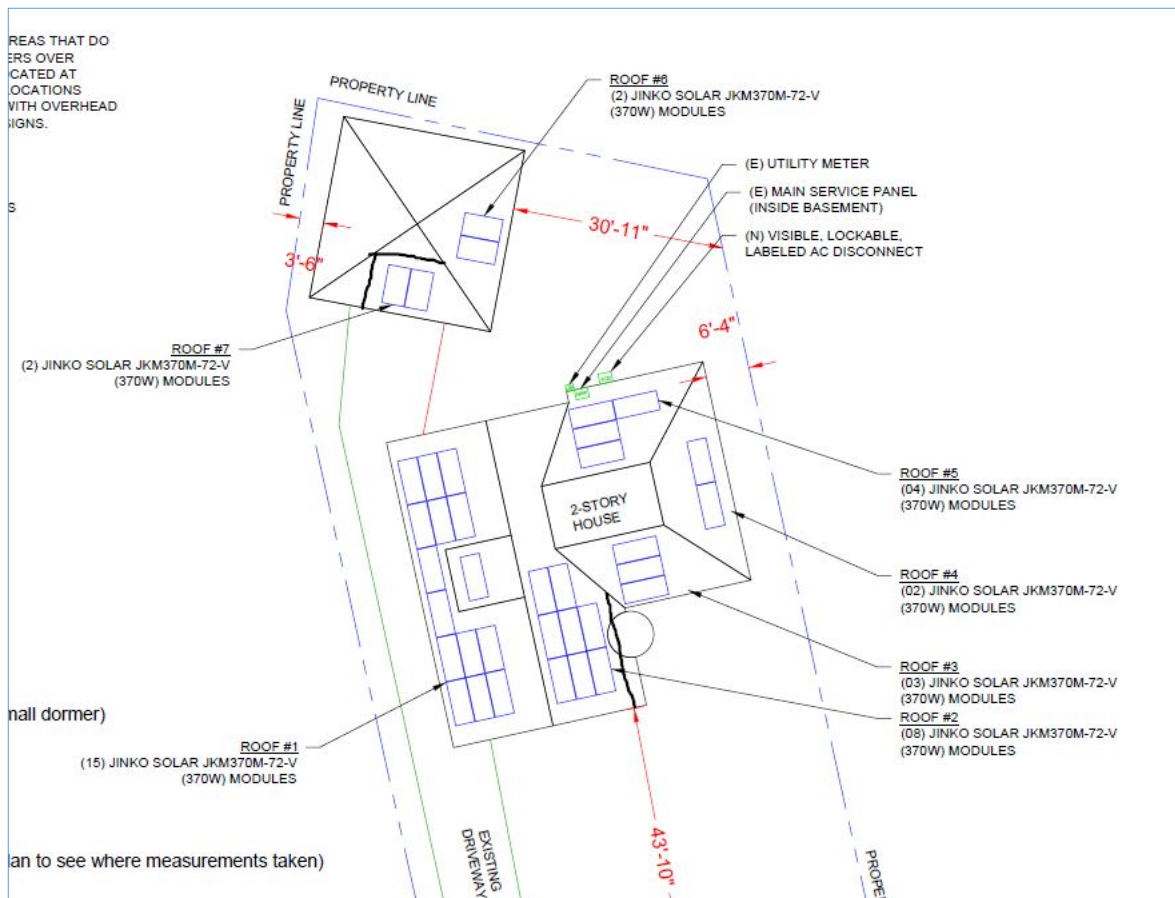


Figure 1 Excerpt from Application Roof Plan

## STAFF OBSERVATIONS AND RESEARCH

- Staff visited the site on July 22, 2021. Staff photographed the property from the public right-of-way and observed that both the front (south), sides (southwest and southeast) of the house have high public visibility. The rear view was taken from Kingston street, and has little or no visibility of the garage. (See staff photos enclosed)
- The proposed location of the solar panels on the front and side roof elevations, with its steep pitch, would be highly visible to the public. (See Roof Plan, roofs #1, #2, #3).
- The proposed location of the solar panels on the side shed dormer roofs on the side elevations of the house has a much flatter pitch and therefore much less visible to the public. (See Roof Plan, roofs #1 and #4)
- The proposed location of the solar panels on the northwest roof and on the south and southeast roof of the garage is not visible to the public. (See Roof Plan, roofs #5, #6, #7)
- The proposed equipment location to the on the north (rear) elevation of the house may be an appropriate location, because it is largely out of public view and within proximity to an existing utility meter.
- The roof with its steep gabled inclines is a character-defining feature identified in the Elements of Design for Sherwood Forest Historic District:
  - *“Relationship of architectural details. The architectural elements and details of each structure generally relate to its style. Residential buildings derived from characteristic elements and details displayed on vernacular English Revival-influenced buildings include arched windows and door openings, steeply pitched gables, towers, and sometimes half-timbering. Tall, clustered chimney stacks and decorative chimney pots are features of the district. Classical styles display modest*

- detail, mostly in wood. Porches, shutters, window frames, cornices, and dormer windows are commonly, although not always, treated...*” (Section 21-2-178-d (10))
- *“Relationship of roof shapes. A variety of roof shapes exists, relating to the style of the buildings. Common on English Revival buildings are steeply sloped pitched or hipped roofs with complex arrangements of secondary roof shapes, including steeply sloped gables, clipped gables, and shed roofs. These roofs are commonly interrupted by gabled, shed and multi-sided dormers and substantial chimneys which are sometimes clustered...”* (Section 21-2-178-d (11))
  - The front elevation and side roof elevations are important and distinctive character-defining features of the house. The side dormer roofs, rear facing roof and garage roof are less important.

## ISSUES

- Solar panel installations that negatively impact the historic character of a property do not meet the Secretary of the Interior’s Standards for Rehabilitation. Therefore, NPS guidelines prescribe that solar panels should be minimally visible.
- Because the front and side elevations of the roof (See Roof Plan, roofs #1, #2, #3) are distinctive character-defining features and are highly visible to the public, Staff recommends that these locations are not appropriate and must be preserved under Secretary of the Interior's Standards for Rehabilitation, specifically Standards:

*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.*

*5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.*

- The proposed garage roof, rear location of the solar panels, and on the flatter, shed dormers, are considered appropriate because these elevations are less important character-defining features, and the installation proposed is minimally visible for minimal impact. (See Roof Plan, roofs #4, #5, #6, #7 and only shed dormer roof of roof #1)

## RECOMMENDATION

### Section 21-2-78, Determination of Historic District Commission

#### Recommendation #1: Installation of solar panels at front and side roof elevations of the house

Staff finds that the placement of the solar panels on the front and side visible elevations of the house destroys the historic character of this property and removes distinctive features. The proposed solar panels at front elevation location of the roof alters distinctive character-defining features of the property, and introduces a material and design that does not retain the historic character of the property. Staff therefore recommends that the Commission issue a Denial for the proposed location of the front and side elevations use for solar panels, as it does not conform to the Elements of Design for the Sherwood Forest Historic District nor does it meet the Secretary of the Interior's Standards for Rehabilitation, specifically Standards:

*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.*

*5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.*

*9. New additions, exterior alterations, or related new construction shall not destroy historic materials*

*that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.*

Recommendation #2: Installation of solar panels on the garage roof, rear and dormer roof elevations of the house  
HDC staff recommends the Commission issue an approval for the below work items because they meet the Secretary of the Interior's Standards for Rehabilitation and conform to the Elements of Design for the Sherwood Forest Historic District:

- Solar panels at the proposed garage roof and rear elevation, and shed dormer roof locations on the house. (See Roof Plan, roofs #4, #5, #6, #7 and only shed dormer roof of roof #1)
- Solar panel equipment at rear of house near utility meter.



















THIS IS A 3-PAGE FORM - ALL INFORMATION IS REQUIRED FOR PROJECT REVIEW

# HISTORIC DISTRICT COMMISSION PROJECT REVIEW REQUEST

City of Detroit - Planning & Development Department  
2 Woodward Avenue, Suite 808  
Detroit, Michigan 48226

DATE: 6/28/21

## PROPERTY INFORMATION

ADDRESS(ES): 3290 Sherbourne Rd

AKA:

PARCEL ID: 020004914

HISTORIC DISTRICT: Sherwood Forset

SCOPE OF WORK: (Check ALL that apply)

<input type="checkbox"/> Windows/ Doors	<input type="checkbox"/> Walls/ Siding	<input type="checkbox"/> Painting	<input type="checkbox"/> Roof/Gutters/ Chimney	<input type="checkbox"/> Porch/Deck/ Balcony	<input type="checkbox"/> Addition
<input type="checkbox"/> Demolition	<input type="checkbox"/> Signage	<input type="checkbox"/> New Building	<input type="checkbox"/> Major Alteration <small>(3+ scope items)</small>	<input type="checkbox"/> Site Improvements <small>(landscape, trees, fences, patios, etc.)</small>	

BRIEF PROJECT DESCRIPTION: Roof Mounted Solar Array  
Roof Mounted Solar Array

## APPLICANT IDENTIFICATION

Property Owner/  
Homeowner       Contractor       Tenant or  
Business Occupant       Architect/Engineer/  
Consultant

NAME: Mark Hagerty

COMPANY NAME: Michigan Solar Solutions

ADDRESS: 11780 NW Monroe Rd

CITY: Riverdale

STATE: MI

ZIP: 48877

PHONE: 2489233456 ext 3

MOBILE:

EMAIL:

## PROJECT REVIEW REQUEST CHECKLIST

Please attach the following documentation to your request:

\*PLEASE KEEP FILE SIZE OF ENTIRE SUBMISSION UNDER 30MB\*

- Completed Building Permit Application** (highlighted portions only)
- ePLANS Permit Number** (only applicable if you've already applied for permits through ePLANS)
- Photographs** of ALL sides of existing building or site
- Detailed photographs** of location of proposed work (photographs to show existing condition(s), design, color, & material)
- Description of existing conditions** (including materials and design)
- Description of project** (if replacing any existing material(s), include an explanation as to why replacement--rather than repair--of existing and/or construction of new is required)
- Detailed scope of work** (formatted as bulleted list)
- Brochure/cut sheets** for proposed replacement material(s) and/or product(s), as applicable

**NOTE:**  
Based on the scope of work, additional documentation may be required.  
See [www.detroitmi.gov/hdc](http://www.detroitmi.gov/hdc) for scope-specific requirements.

Upon receipt of this documentation, staff will review and inform you of the next steps toward obtaining your building permit from the Buildings, Safety Engineering and Environmental Department (BSE&ED) to perform the work.

**SUBMIT COMPLETED REQUESTS TO: [HDC@DETROITMI.GOV](mailto:HDC@DETROITMI.GOV)**

P2 - BUILDING PERMIT APPLICATION

Date: 6/28/21

PROPERTY INFORMATION

Address: 3290 Sherbourne Rd Floor: Suite#: Stories:
AKA: Lot(s): Subdivision:
Parcel ID#(s): Total Acres: Lot Width: Lot Depth:
Current Legal Use of Property: Proposed Use:
Are there any existing buildings or structures on this parcel? [X] Yes [ ] No

PROJECT INFORMATION

Permit Type: [ ] New [X] Alteration [ ] Addition [ ] Demolition [ ] Correct Violations
[ ] Foundation Only [ ] Change of Use [ ] Temporary Use [ ] Other:
[ ] Revision to Original Permit #: (Original permit has been issued and is active)

Description of Work (Describe in detail proposed work and use of property, attach work list)
Roof Mounted Solar Array

[ ] MBC use change [ ] No MBC use change

Included Improvements (Check all applicable; these trade areas require separate permit applications)

[ ] HVAC/Mechanical [ ] Electrical [ ] Plumbing [ ] Fire Sprinkler System [ ] Fire Alarm

Structure Type

[ ] New Building [ ] Existing Structure [ ] Tenant Space [ ] Garage/Accessory Building
[ ] Other: Size of Structure to be Demolished (LxWxH) cubic ft.

Construction involves changes to the floor plan? [ ] Yes [ ] No
(e.g. interior demolition or construction to new walls)

Use Group: Type of Construction (per current MI Bldg Code Table 601)

Estimated Cost of Construction \$ By Contractor \$ By Department

Structure Use

[ ] Residential-Number of Units: [ ] Office-Gross Floor Area [ ] Industrial-Gross Floor Area
[ ] Commercial-Gross Floor Area: [ ] Institutional-Gross Floor Area [ ] Other-Gross Floor Area

Proposed No. of Employees: List materials to be stored in the building:

PLOT PLAN SHALL BE submitted on separate sheets and shall show all easements and measurements
(must be correct and in detail). SHOW ALL streets abutting lot, indicate front of lot, show all buildings,
existing and proposed distances to lot lines. (Building Permit Application Continues on Next Page)

For Building Department Use Only

Intake By: Date: Fees Due: DngBld? [ ] No

Permit Description:

Permit #:

Current Legal Land Use: Proposed Use:

Permit#: Date Permit Issued: Permit Cost: \$

Zoning District: Zoning Grant(s):

Lots Combined? [ ] Yes [ ] No (attach zoning clearance)

Revised Cost (revised permit applications only) Old \$ New \$

Structural: Date: Notes:

Zoning: Date: Notes:

Other: Date: Notes:



**IDENTIFICATION (All Fields Required)**

**Property Owner/Homeowner**  Property Owner/Homeowner is Permit Applicant  
Name: Jeremy Wagner-Kaiser Company Name: \_\_\_\_\_  
Address: 3290 Sherbourne RD City: Detroit State: MI Zip: 48221  
Phone: 7343581093 Mobile: \_\_\_\_\_  
Driver's License #: \_\_\_\_\_ Email: kalium@gmail.com

**Contractor**  Contractor is Permit Applicant  
Representative Name: Mark Hagerty Company Name: Michigan Solar Solutions  
Address: 11780 NW Monroe Rd City: Riverdale State: MI Zip: 48877  
Phone: 2489233456 ext 3 Mobile: \_\_\_\_\_ Email: mkiehl@michigansolarsolutions.com  
City of Detroit License #: \_\_\_\_\_

**TENANT OR BUSINESS OCCUPANT**  Tenant is Permit Applicant  
Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Email: \_\_\_\_\_

**ARCHITECT/ENGINEER/CONSULTANT**  Architect/Engineer/Consultant is Permit Applicant  
Name: \_\_\_\_\_ State Registration#: \_\_\_\_\_ Expiration Date: \_\_\_\_\_  
Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Phone: \_\_\_\_\_ Mobile: \_\_\_\_\_ Email: \_\_\_\_\_

**HOMEOWNER AFFIDAVIT** (Only required for residential permits obtained by homeowner.)

I hereby certify that I am the legal owner and occupant of the subject property and the work described on this permit application shall be completed by me. I am familiar with the applicable codes and requirements of the City of Detroit and take full responsibility for all code compliance, fees and inspections related to the installation/work herein described. I shall neither hire nor sub-contract to any other person, firm or corporation any portion of the work covered by this building permit.

Print Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(Homeowner)

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_ A.D. \_\_\_\_\_ County, Michigan  
Signature: \_\_\_\_\_ My Commission Expires: \_\_\_\_\_  
(Notary Public)

**PERMIT APPLICANT SIGNATURE**

I hereby certify that the information on this application is true and correct. I have reviewed all deed restrictions that may apply to this construction and am aware of my responsibility thereunder. I certify that the proposed work is authorized by the owner of the record and I have been authorized to make this application as the property owner(s) authorized agent. Further I agree to conform to all applicable laws and ordinances of jurisdiction. **I am aware that a permit will expire when no inspections are requested and conducted within 180 days of the date of issuance or the date of the previous inspection and that expired permits cannot be**

Print Name: Mark Hagerty Signature: [Signature] Date: 6/28/21  
(Permit Applicant)

Driver's License #: \_\_\_\_\_ Expiration: \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_ A.D. \_\_\_\_\_ County, Michigan  
Signature: \_\_\_\_\_ My Commission Expires: \_\_\_\_\_  
(Notary Public)

Section 23a of the state construction code act of 1972, 1972PA230, MCL 125.1523A, prohibits a person from conspiring to circumvent the licensing requirements of this state relating to persons who are to perform work on a residential building or a residential structure. Visitors of Section 23a are subject to civil fines.

This application can also be completed online. Visit [detroitmi.gov/bseed/elaps](http://detroitmi.gov/bseed/elaps) for more information.





**Submit Photos - PDF or JPEG files:**

1. Provide current, color photographs showing each full side of the building or site – provide complete shots, as best as possible

Please see the attached photos to see all four sides of the home and the two sides of the garage (these are the two planes we propose to install panels and are not visible from the ROW)

Labeled: WagerFront; WagnerEastPanels; WagnerBackPanels;  
WagnerWestPanels; WagnerGaragePanels; WagnerGaragePanels2

2. Provide detailed photographs at each location(s) of proposed exterior work. Photographs are to show existing condition(s), design, color and material. Provide photos showing where any panels and accessory equipment will be installed

Please see the attached photos for location of proposed equipment.

WagnerWestPanels: Shows proposed roof plane 1, installing 15 panels

WagnerEastPanels: Shows proposed roof plane 2, installing 8 panels; roof plane 3, installing 3 panels; and roof plane 4, installing 2 panels

WagnerBackPanels: Shows proposed roof plane 5, installing 4 panels

WagnerGaragePanels2: Shows proposed roof plane 6, installing 2 panels

WagnerGaragePanels: Shows proposed roof plane 7, installing 2 panels

WagnerMeterLocation2: This is where the AC disconnect and the Enphase combiner box will be installed. The disconnect is required to be within 5ft of the electric meter.

**Written info / Narrative for Commission – PDF or Word file:**

1. **Description of existing conditions** (including existing materials and design of roof where panels will be installed)

Asphalt Shingles with a 14/12 pitch (50 degrees)

2. **Description of project** (including an explanation as to why panels need to be installed as proposed)

We propose to install 39 solar panels to the existing roof of the home. The amount of solar panels was chosen due to the size of the roof planes as well as the electrical needs of the home. Facing the panels in a southern direction will allow production to be the greatest for the home. East and West facing panels also provide valuable production. It is not of benefit to face the

panels to the North as they will not produce enough solar energy to be useful. The home sits in such a way that in order to install solar panels they will be visible from the street. Every effort is made to seamlessly have the installation blend into the roof. The panels do not extend past the roof structure (top/bottom/or sides) and will sit about 6 inches above the roof itself. Please see the diagrams provided for more clarity.

3. **Detailed scope of proposed work for approval** (formatted as bulleted list of all items that will be installed on the exterior of the home) including, but not limited to:

- the location, quantity and size of panels to be installed

39 Jinko 370w panels to be installed on the roof of the home. Each panel is 78.23x39.05x1.57 inch These panels are black with black frames.(See attached data sheet for more information)

- the location, number and size of any and all additional equipment, including but not limited to, utility meters, ac disconnect, power inverters, batteries, solar decks, attic fans, new conduits

39 micro inverters Enphase IQ7Plus to be installed under each panel. These will not be seen. (See attached data sheet for more information)

Enphase IQ combiner 3 to be installed near the existing electrical meter, located on the back of the house. (See attached data sheet for more information)

AC disconnect to be installed within 5 ft of the electrical meter, located on the back of the house.

Ironridge XR100Rails and Ironridge flashfoot2 -- mounting system used to mount solar panels to the roof. Rails are black (See attached data sheets for more information)

**Product Specs - PDF or JPEG files:**

Provide a brochure / cut sheets for proposed replacement material(s) and/or product(s) listed above in scope of work

Please see the attached data sheets on all equipment that will be used.

**Dimensioned Plan / Rendering - PDF or JPEG files:**

- Detailed, Dimensioned plan showing full scope of installation – including proposed locations for all accessory items required listed in scope of work

See the attached Plot Plan showing the location of all panels and equipment.

See additional Plot Plan showing roof measurements and the size of the array

- If panels are visible mentioned previously that you will have to submit a demonstration showing the impact that the solar panels will have from the right of way. Most applicants submit a renderings from a pedestrian view.

Please see the attached photos that shows the panels that are visible from the ROW:

WagnerEastPanels and WagnerWestPanels

Please see attached photos that shows what the proposed panels will look on a roof similar to Mr. Wagners.

Example1; Example2; Example3

There is no way to draw panels onto a picture and give a proper rendering of what they will look like. I have submitted a plot plan showing the layout of all array's on the roof along with a plot plan showing the measurements of all roof plans along with the size of each array. I have attached pictures showing all roof planes and labeled them with how many panels will be placed there along with a picture showing where the additional will be installed near the meter on the back of the home. In addition I have included three extra pictures of other projects we have installed showing how a black on black panel looks on a black shingled roof so that you can get an idea how these panels will look on the roof of Mr. Wagner's home.

**● ROOF ACCESS POINT**

ROOF ACCESS POINT SHALL NOT BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

**NOTE:**  
VISIBLE, LABELED, LOCKABLE DISCONNECT LOCATED 5' FROM UTILITY METER

**EQUIPMENT SUMMARY**  
 39 JINKO SOLAR JKM370M-72-V (370W) MODULES  
 39 ENPHASE IQ7A-72-2-US,240V  
 05 ENPHASE ENCHARGE 3-1P-NA BATTERY  
 01 ENPHASE ENPOWER SMART SWITCH  
 SYSTEM SIZE: 14.43 kW DC STC  
 SYSTEM SIZE: 13.61 kW AC

Roof #1 A (the big array)  
 Measures 515"x 220"  
 The array is 38'6" x 9'9" covering 297.3sqft

Roof #1 B (single panel)  
 Measures 124"x 108"  
 The array is 6'5" x 3'3" covering 21.4sqft

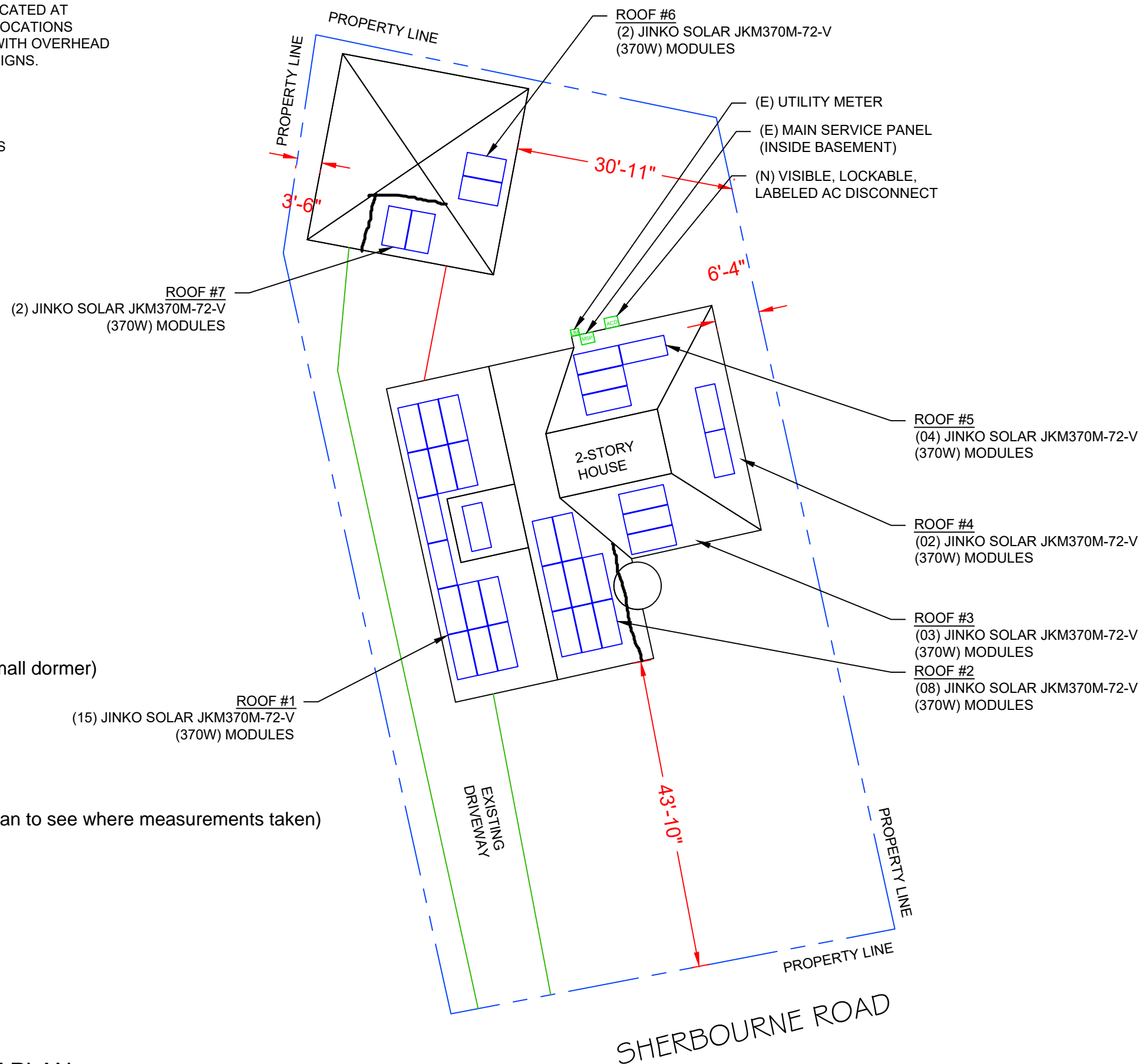
Roof #2  
 Measures 245"x 515"  
 The lower part of the roof is 205"  
 The array is 19'3" x 9'9" covering 169.9sqft

Roof #3  
 Measures 120"x 70"  
 The array is 9'9" x 6'5" covering 64.7sqft

Roof #4  
 Measures 220"x 50" (to the bottom of the small dormer)  
 The array is 12'10" x 3'3" covering 42.4sqft

Roof #5  
 Measures 175"x 70"  
 The array is 12'10" x 9'9" covering 85.5sqft

Roof #6 and Roof #7  
 Measure 122"x116" (see the lines on roof plan to see where measurements taken)  
 The array is 6'6" x 6'5" covering 43.1sqft



**MSS** MichiganSolarSolutions  
**Michigan Solar Solutions**  
 50202 Dennis Court,  
 Wixom, MI 48393

REVISIONS

DESCRIPTION	DATE	REV

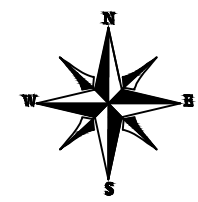
Signature with Seal

CUSTOMER INFORMATION  
**JEREMY WAGNER KAISER**  
 3290 SHERBOURNE ROAD,  
 DETROIT, MI 48221

SHEET NAME  
**PLOT PLAN WITH ROOF PLAN**

SHEET SIZE  
**ANSI B  
 11" X 17"**

SHEET NUMBER  
**PV-1**





Roof Plane 2  
8 Panels with  
4.5 being visible  
from ROS


Roof Plane 3  
3 panels

Roof Plane 4  
2 Panels





AC  
Disconnect  
with in 5ft of  
the Electric  
meter  
Enphase  
combiner  
box



**Roof Plane 6**  
**2 Solar Panels**  
**Not Visible**





Roof Plane 7  
15 Panels, one will be  
on the dormer





Roof Plane 5  
4 Solar Panels  
Not visible from  
ROW

1

**Roof Plane 7**  
**2 Solar Panels**  
**Not Visible**





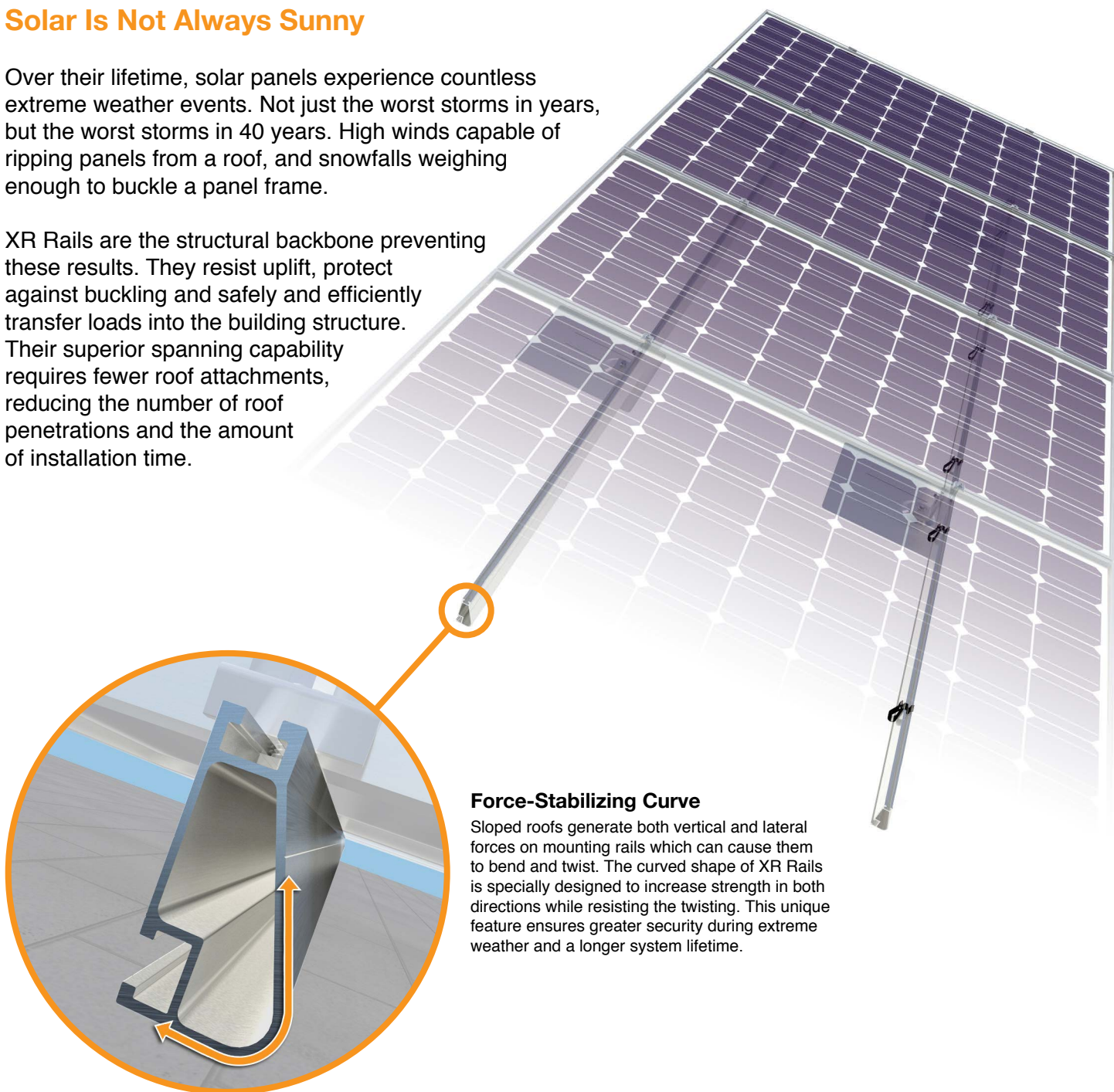


MICHIGAN  
SOLAR SOLUTIONS

## Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



### Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

### Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

### Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



## XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



### XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

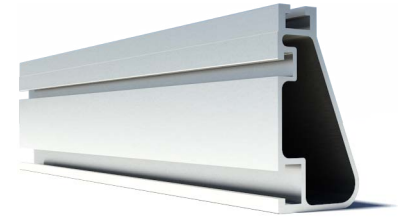
- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



### XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



### XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

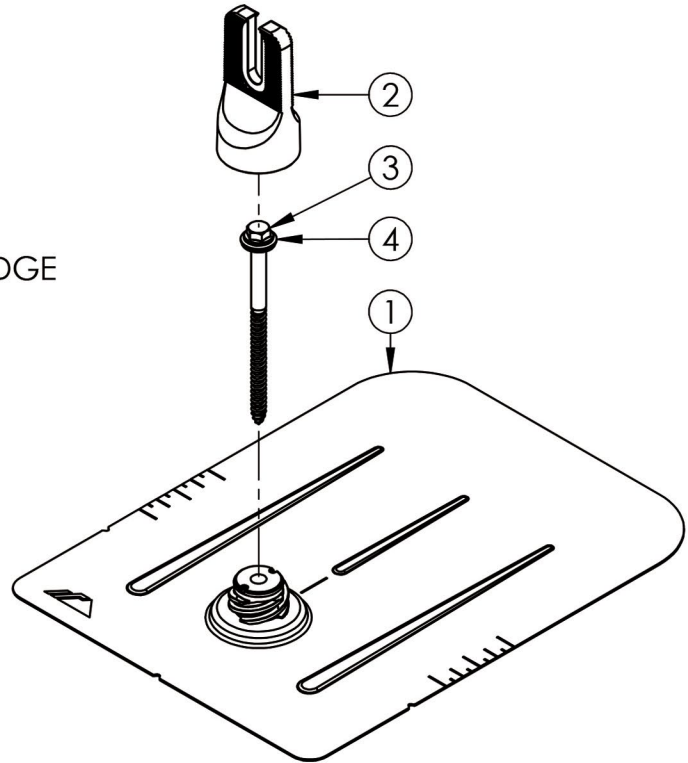
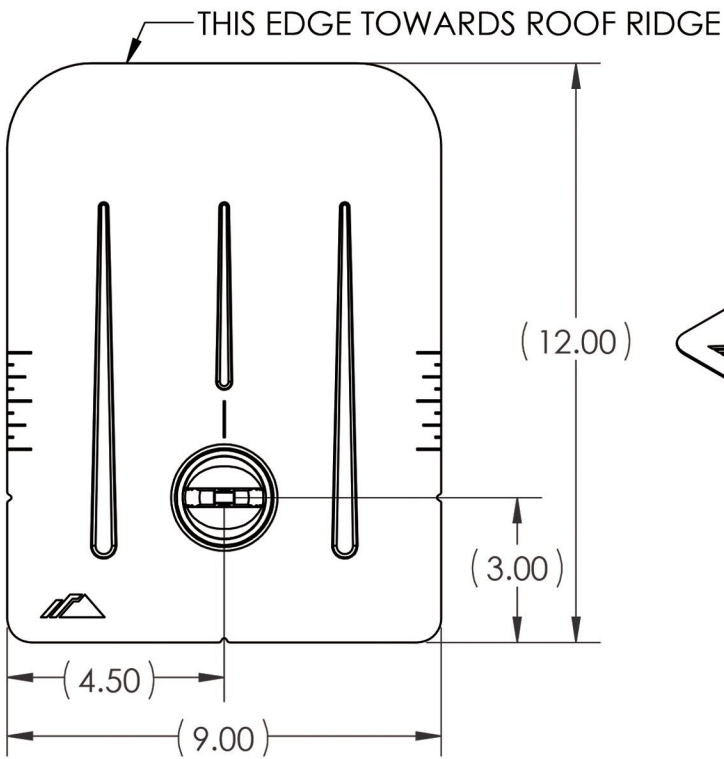
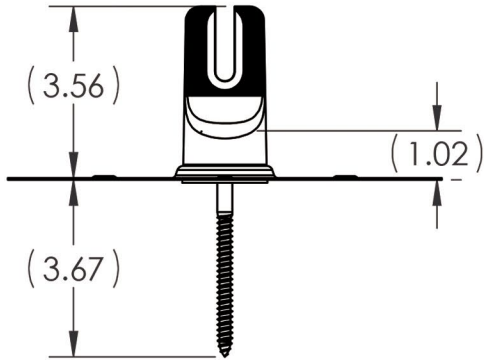
- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

## Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit [IronRidge.com](http://IronRidge.com) for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100					XR1000	
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						





NO.	DESCRIPTION
1	ASSY, FLASHING, MILL OR BLACK
2	ASSY, CAP, MILL OR BLACK
3	BOLT LAG 5/16 X 4.75"
4	WASHER, EPDM BACKED

**KIT, FLASHFOOT2**
**SIZE**  
**A**

DO NOT SCALE DRAWING

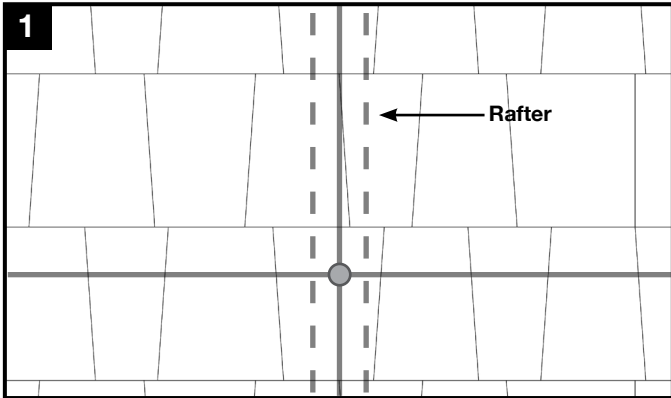
SCALE: 1:4

WEIGHT: 0.88 lbs

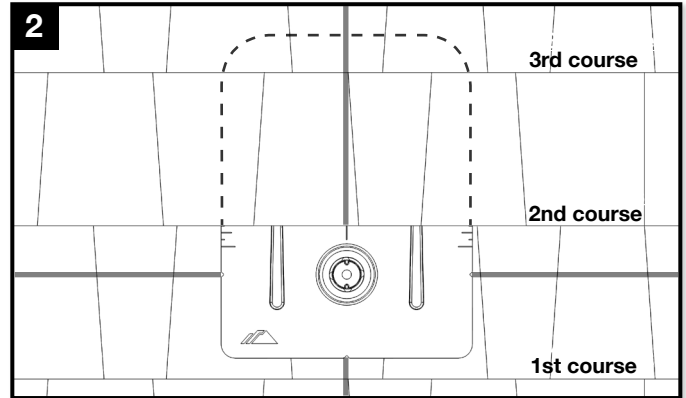
SHEET 1 OF 1

# Installation

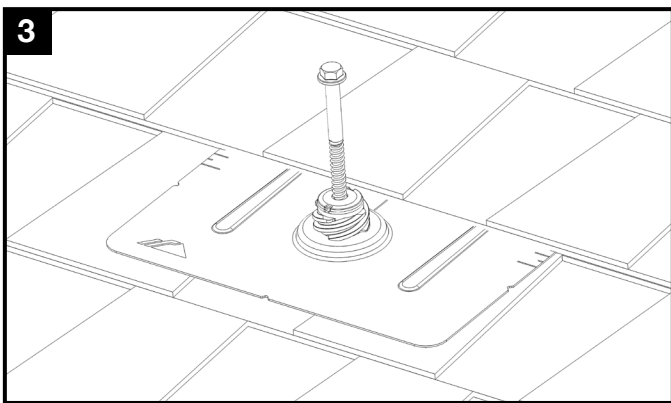
**Tools Required:** tape measure, chalk line, stud finder, roofing bar, caulking gun, driver with 1/4" bit and 7/16" hex socket.



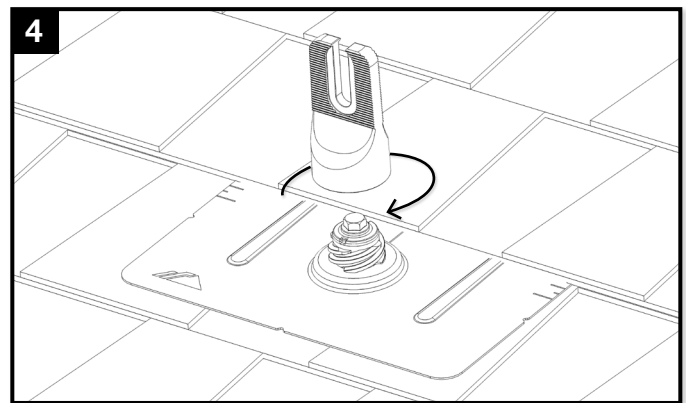
Locate rafters and snap vertical and horizontal lines to mark flashing locations. Drill 1/4" pilot holes, then fill with roofing manufacturer's approved sealant.



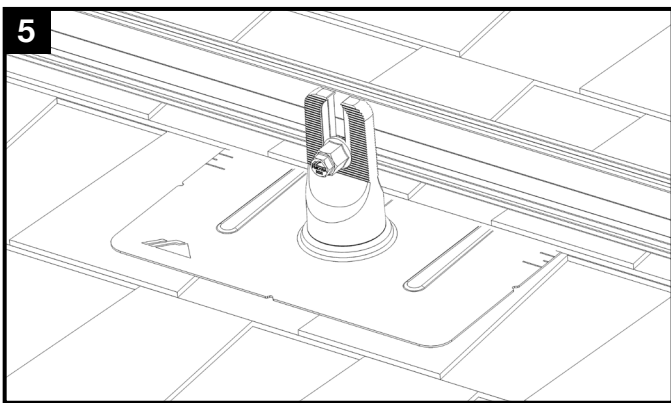
Slide flashing, between 1st and 2nd course, so the top is at least 3/4" above the edge of the 3rd course and the bottom is above the edge of the 1st course.



Line up pilot hole with flashing hole and insert lag bolt with bonded washer through flashing. Tighten lag bolt until fully seated.



Place Cap onto flashing in desired orientation for E/W or N/S rails and rotate 180 degrees. FlashFoot 2 is now installed and ready for IronRidge XR Rails.



Attach rails to either side of the open slot using bonding hardware. Level rail at desired height, then torque to 250 in-lbs (21 ft-lbs).

### Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

### Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

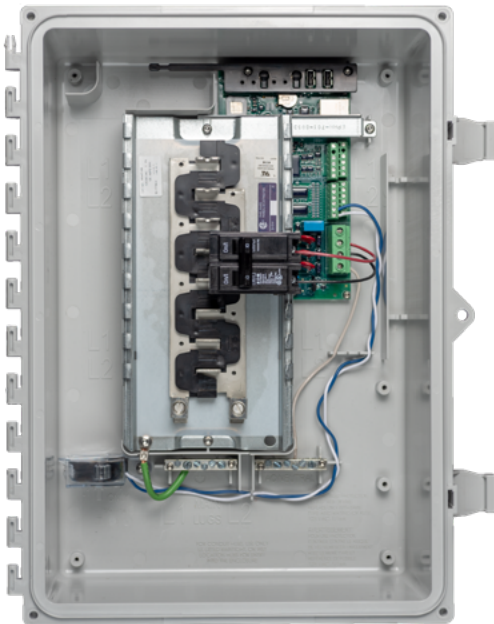
### UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See IronRidge Flush Mount Installation Manual for full ratings.

# Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



## Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring
- Supports Ensemble Communications Kit for communication with Enphase Encharge™ storage and Enphase Enpower™ smart switch

## Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

## Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- UL listed



To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



# Enphase IQ Combiner 3

## MODEL NUMBER

IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
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## ACCESSORIES and REPLACEMENT PARTS (not included, order separately)

Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan)	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)
Consumption Monitoring* CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
* Consumption monitoring is required for Enphase Storage Systems	
Ensemble Communications Kit COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replace the default solar shield with this Ensemble Combiner Solar Shield to match the look and feel of the Enphase Enpower™ smart switch and the Enphase Encharge™ storage system
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3

## ELECTRICAL SPECIFICATIONS

Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80 A of distributed generation / 95 A with IQ Envoy breaker included
Envoy breaker	10A or 15A rating GE Q-line/Siemens Type QP /Eaton BR series included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy

## MECHANICAL DATA

Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" x 6.63"). Height is 21.06" (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	<ul style="list-style-type: none"><li>• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors</li><li>• 60 A breaker branch input: 4 to 1/0 AWG copper conductors</li><li>• Main lug combined output: 10 to 2/0 AWG copper conductors</li><li>• Neutral and ground: 14 to 1/0 copper conductors</li></ul> Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)

## INTERNET CONNECTION OPTIONS

Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	CELLMODEM-M1 4G based LTE-M cellular modem (not included). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.

## COMPLIANCE

Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

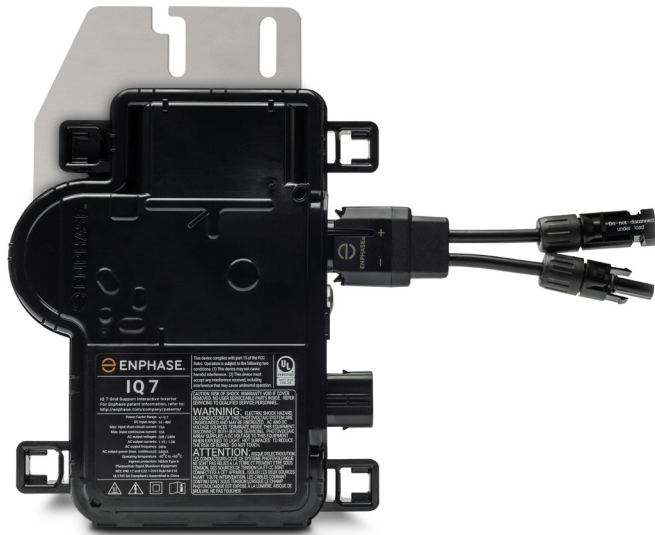
To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

# Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.



## Easy to Install

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

## Productive and Reliable

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

## Smart Grid Ready

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

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



# Enphase IQ 7 and IQ 7+ Microinverters

<b>INPUT DATA (DC)</b>	<b>IQ7-60-2-US</b>		<b>IQ7PLUS-72-2-US</b>	
Commonly used module pairings <sup>1</sup>	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module I <sub>sc</sub> )	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
<b>OUTPUT DATA (AC)</b>	<b>IQ 7 Microinverter</b>		<b>IQ 7+ Microinverter</b>	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range <sup>2</sup>	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit <sup>3</sup>	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	18 mA		18 mA	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
<b>EFFICIENCY</b>	<b>@240 V</b>	<b>@208 V</b>	<b>@240 V</b>	<b>@208 V</b>
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
<b>MECHANICAL DATA</b>				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
<b>FEATURES</b>				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

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

2. Nominal voltage range can be extended beyond nominal if required by the utility.

3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

