ANN ARBOR HISTORIC DISTRICT COMMISSION

Staff Report

ADDRESS: 217 S Seventh Street, Application Number HDC10-108

DISTRICT: Old West Side Historic District

REPORT DATE: September 9, 2010

REPORT PREPARED BY: Jill Thacher, Historic Preservation Coordinator

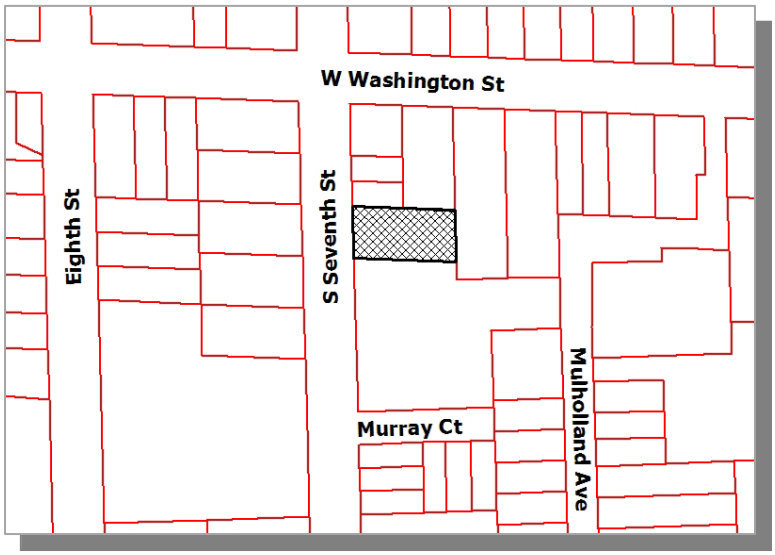
REVIEW COMMITTEE DATE: Tuesday, September 7, 2010

	OWNER	**APPLICANT**
Name:	Matthew & Kelly Grocoff	Same
Address:	217 South Seventh St Ann Arbor, MI 48103	
Phone:	(734) 709-7955	

BACKGROUND: This 1 ¾ story gable-fronter features a full-width front porch and cut stone foundation. This address first appears in City Directories in 1903 as the home of renter George Rustine, an engineer, and his wife Alice C. The Rustines probably also lived there in 1902, when they are listed as living in a house with no address on the same block. In 1910, Herman C. Steinke, a painter, and his wife lived there. In 1914 the owner was Philip Gauss, Jr., and the Gauss family continued to live at the address until 1947.

The house was purchased by the current owners in 2006, and they have removed asphalt siding and repaired the original wood clapboards, repaired the original wood windows throughout the house and installed new storms, installed a geothermal heating /cooling/hot water system, insulated the attic and walls, and performed numerous other energy efficiency activities.

LOCATION: This site is located on the east side of South Seventh Street, south of West Washington and north of West Liberty.



APPLICATION: The applicant seeks HDC approval to install solar panels on the south-facing slope of the roof. The overall dimensions of the panels would be 32' 4 ¼" by 15' 4". They would cover the entire roof except 2' 6" at the top (below the ridge), 3" on each side, and 5 ½" above the bottom eave (see roof layout drawing). The panels would be black with black trim.

APPLICABLE REGULATIONS:

From the Secretary of the Interior's Standards for Rehabilitation:

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

9. New additions, exterior alterations, or related new construction 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.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

From the Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings:

Roofs

Recommended*:* Identifying, retaining, and preserving roofs--and their functional and decorative features—that are important in defining the overall historic character of the building.

Not Recommended: Changing the configuration of a roof by adding new features such as dormer windows, vents, or skylights so that the historic character is diminished.

Energy Efficiency

Recommended*:* Placing a new addition that may be necessary to increase energy efficiency on non-character-defining elevations.

Not Recommended: Designing a new addition which obscures, damages, or destroys character-defining features.

Mechanical Equipment

Recommended: Providing adequate structural support for new mechanical equipment.

Not Recommended: Failing to consider the weight and design of new mechanical equipment so that, as a result, historic structural members or finished surfaces are weakened or cracked.

Installing a new mechanical system so that character-defining structural or interior features are radically changed, damaged, or destroyed.

STAFF FINDINGS:

1. The solar panels would be parallel to the angle of the roof and the top surface of the panel would be slightly less than 6" from the roof surface, per the submitted drawings. Panels would cover 83% of the roof surface, and extend to nearly the width of the roof.

The roof of this house has reddish-brown asphalt shingles, and the solar panels are black-on-black. The photographs provided with the application show that the panels selected are very low profile and have a consistent dark color that minimizes the appearance of a grid. Additional information on the panels and installation can be found in an email from the applicant that is attached to the application.

2. Staff's opinion is that it may be desirable to cover the entire roof surface of this house with panels since the panels and the roof color don't match exactly. Covering more of the roof may be less conspicuous than covering a patch that will contrast with the roof. This particular roof is visible from the street and sidewalk, but less obvious than many because of its slightly elevated setting and screening by trees on the property.

3. The proposed solar panels would be located 2 ½ feet below the ridge and would not impact the chimney. The current chimney does not match the more decorative one in the historic photo below -- it was probably replaced or possibly shortened.

4. Staff feels that the proposed solar panels do not destroy, obscure, diminish, or damage character-defining features of the house, and are easily removable and reversible.

POSSIBLE MOTIONS: (Note that the motions are only suggested. The Review Committee, consisting of staff and at least two Commissioners, will meet with the applicant on site and then make a recommendation at the meeting.)

I move that the Commission issue a certificate of appropriateness for 217 South Seventh Street, a contributing building in the Old West Side Historic District, to install solar panels on the roof as proposed. The work is compatible in exterior design, arrangement, texture, material and relationship to the rest of the building and the surrounding area and meets *The Secretary of the Interior's Standards for Rehabilitation* and *Guidelines for Rehabilitating Historic Buildings,* in particular standards 2, 9, and 10 and the guidelines for roofs, mechanical equipment, and energy efficiency.

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MOTION WORKSHEET:

I move that the Commission

____ Issue a Certificate of Appropriateness

____ Deny the Application

For the work at 217 S Seventh Street in the Old West Side Historic District

____ As proposed.

____ Provided the following condition(S) is (ARE) met: 1) CONDITION(s)

The work

____ Is generally compatible with the size, scale, massing, and materials and meets the Secretary of the Interior's Standards for Rehabilitation, standard(S) number(S) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

____ Is not generally compatible with the size, scale, massing and materials, and DOES NOT MEET the Secretary of the Interior's Standards for Rehabilitation, standard(S) number(S) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 for the following reason(S): 1) REASON(s)

ATTACHMENTS: application, email from applicant, drawings, photographs

217 S Seventh Street (August 2010, courtesy of the applicant)

217 S Seventh (2006, courtesy of applicant)

217 S Seventh, Gauss family (undated, courtesy of

applicant)

217 S Seventh (2010, courtesy of applicant)

ANN ARBOR HISTORIC DISTRICT COMMISSION APPLICATION

100 N. Fifth Avenue, Ann Arbor, MI 48104 (734) 794-6000, x42608 Fax: (734) 994-8312
Historic Preservation Coordinator Email: jthacher@a2gov.org; www.a2gov.org

Section 1: Property Being Reviewed and Ownership Information

Address of Property: 217 S. 7th St.

Historic District: Old west Side

Name of Property Owner *(If different than the applicant)*:
Matthew & Kelly Grocoff

Address of Property Owner: same

Daytime Phone and E-mail of Property Owner: 734-709-7955

Signature of Property Owner: _____ *date:* 8/5/10

Section 2: Applicant Information

Name of Applicant: Matthew + Kelly Grocoff

Address of Applicant: Same

Daytime Phone: (____)

Fax: (____)

E-mail: mgrocoff@gmail.com

Applicant's Relationship to Property: ✓ owner; ____ architect; ____ contactor; ____ other

Signature of applicant: _____ *date:* 8/5/10

Section 3: Building Use (check all that apply)

✓ Residential ✓ Single Family _____ Multiple Family _____ Rental

_____ Commercial _____ Institutional

Section 4: Stille-DeRossett-Hale single state construction code act
(this item MUST BE INITIALED for your application to be PROCESSED)

Public Act 169, Michigan's Local Historic Districts Act, was amended April 2004 to include the following language: "*...the applicant has certified in the application that the property where the work will be undertaken has, or will have before the proposed completion date, a a fire alarm or smoke alarm complying with the requirements of the Stille-DeRossett-Hale single state construction code act, 1972 PA 230, MCL 125.1501 to 125.1531.*"

Please initial here: _____

Section 5: Description of Proposed Changes (attach additional sheets as necessary)

1. Provide a brief summary of proposed changes. Adding solar panels to south roof. 27 ~~Bay~~ - 30 panels. Flat on roof with brackets from behind so not visible on surface. Color: Black with black trim. Panels will lay against eachother with virtually no gap between, creating a seamless line for improved aesthetics.
2. Provide a description of existing conditions. Currently we are using energy from a coal fired power plant and are contributing to climate change. ☹
3. What are the reasons for the proposed changes? See above. By adding solar we will become the first house in a historic district to achieve net zero energy and we will be the oldest home in America to be net-zero.
4. Attach any additional information that will further explain or clarify the proposal, and indicate these attachments here.
   Please see email summary and photos of house sent via email.
5. Attach photographs of the existing property, including at least one general photo and detailed photos of proposed work area.

Staff Use Only

Date Submitted: _____ Application to _____Staff or _____HDC

Project No.: **HDC** _____ Fee Paid: _____

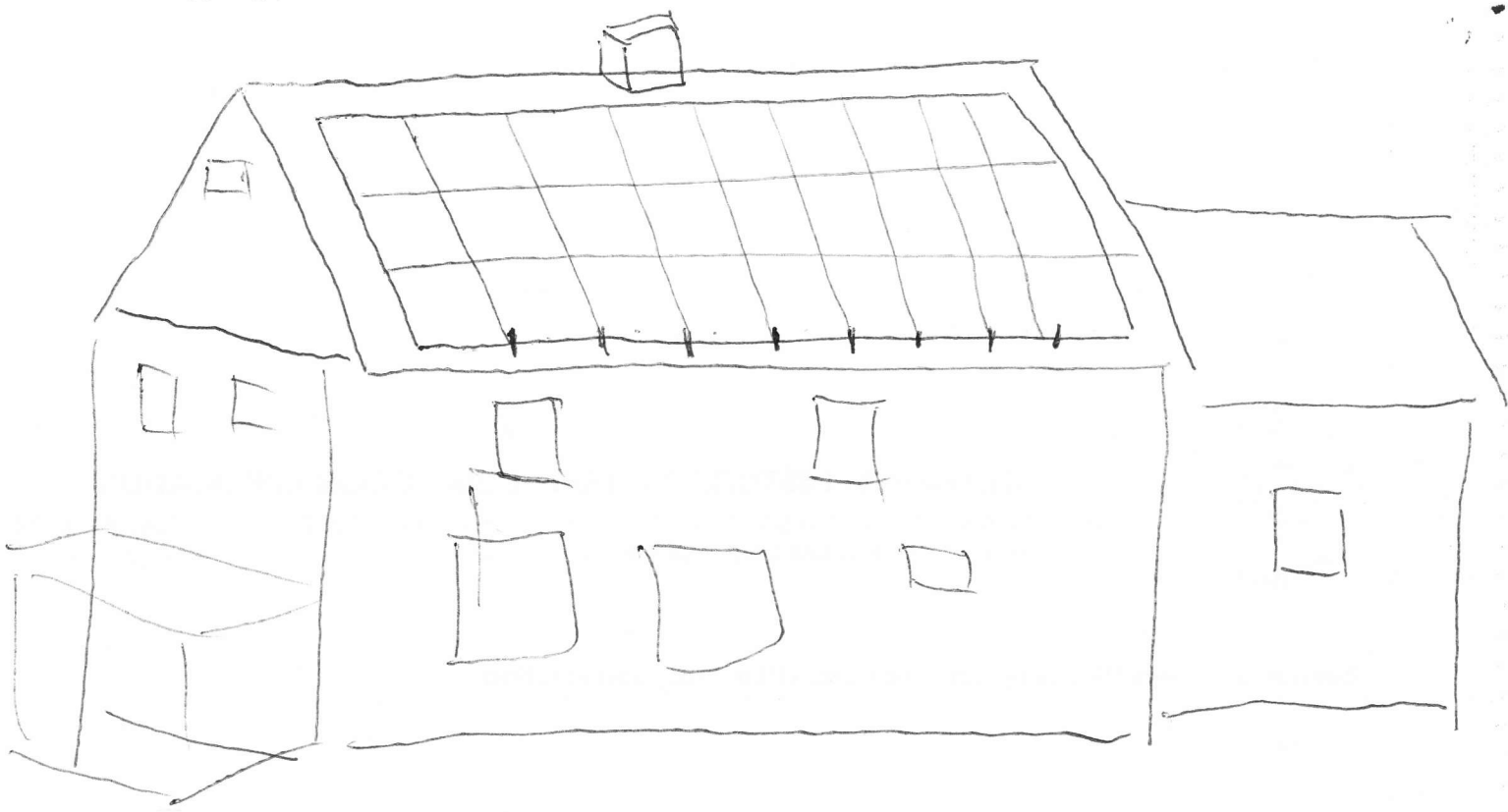
Pre-filing Staff Reviewer & Date: _____ Date of Public Hearing: _____

Application Filing Date: _____ Action: _____HDC COA; _____HDC Denial

Staff signature: _____ _____HDC NTP; _____ Staff COA

Comments: _____

- South facing roof - not visible from street
-
- Panels will lay flat against roof (roof is 45° pitch)
- Panels are black on black frame
- Panels frames will touch seamlessly -
- Brackets are attached from back of panel and will not be seen.



- Panels are approximately 2" thick and will be bracketing from back of panel (not side) and rise about 1.5" above roof. They are essentially flat and create a single black span. ~~with no extra~~

From: Matt Grocoff [m.grocoff@gmail.com]
Sent: Monday, August 23, 2010 11:58 PM
To: Thacher, Jill
Cc: Kelly Grocoff; Daren Griffith
Subject: Grocoff Solar application
Attachments: Solar low profile roof.jpeg; solar sunpower.jpeg; Sunpower 225 Black panels.pdf; Sunpower 315 panel specs.pdf; sunpower_solar_panels.jpeg; SunPower_vs_Conventional_small.jpeg; URASSY-0002-L-Foot-Standard-Rail-Detail-A.pdf; Victorian with solar.jpeg; ELECTRICAL SCHEMATIC.pdf; sm_datash.pdf

Jill:

Below is information from our installer. Attached are several drawings and photos. Our installer will be sending an artist's rendering some time tomorrow (Tuesday).

The system will be approximately 8.1 kw system. By making our home more efficient, we've reduced our energy bills to only $950 per year or approximately 9,500 kwh per year. The 8.1 kw system, combined with Enphase micro-inverters is projected to produce approximately 12,000 kw per year. This will produce enough energy to power all of our utility needs plus an electric vehicle for 12,000 miles per year. This will make us the first home in a historic district to achieve net zero and make it the oldest net zero energy house in America.

Before installing solar we improved the efficiency by doing the following:
* restored the historic windows (reducing leakage by 70%)
* added storms with Low-E glass
* added R50 Insulation in the attic
* sealed all gaps in attic floor (upstairs ceiling)
* filled the walls with cellulose insulation
* added 1.5 gallon per minute shower heads to reduce our hot water requirements
* installed geothermal heating, a/c and hot water
* installed a 95% efficient energy recovery ventilator
* installed motion sensor light switches and CFL or LED lights.
* sealed the basement sill plate with spray foam insulation

1) A measured drawing of the roof and panels, showing where the panels will be located. If you need wiggle room, say so on the drawing (like, “overall panel dimensions of X by X ft,plus or minus 4 inches on any side”).

See attached “Roof Layout” diagram. Most of the roof surface will be covered with panels. There will be approximately 3” of roof exposed at bottom and side edges. The top row of panels will be approximately 2.5 feet from the the roof ridge to allow for protrusion of

chimney.

2) A drawing showing the bracket/roof/panel configuration, including the overall height of the panel off the roof face, and where/how many brackets will be required and how they will be attached to the house. [“Bracket” may not be the right term: if not, please substitute the correct one.] The manufacturer or sales rep should be able to supply this and other technical information. More info is better - - if they have other specs available, include them!

Essentially there is a mounting point every 4’ along the rail system. Each panel requires 2 rails, 1 on the top and 1 on the bottom to attach to. These rails are laid out across the entire row of panels and then the panels are attached to the rails. The rails are attached to the roof via a mounting system such as an L-bracket or Quick mount Flashing with a small standoff attached directly to a rafter. The height of the panels off the roof face is about 2-4” and they are all even. Once all the panels are mounted you cannot tell from ground level that there is a gap between the roof and panels.

Please see attached Unirac- Solarmount racking system information for a visual look at the mounting hardware.

This hardware will be black anodized to match the panel framing and to have low visibility.

3) Provide information on the optimal solar location and configuration, and reasons why other configurations are not viable (address, at a minimum, an overall smaller panel area and why panels can’t be put somewhere other than on the roof, e.g. freestanding in the backyard, on a garage, etc. [I don’t even know if you have a garage, Matt, this is all hypothetical - - let me know if it’s not clear what I’m getting at.])

* On the Grocoff property the optimal location is on the south facing roof on the main section of the house. There is no garage to work with and the back yard has too many trees to do pole mounted or ground racking as they will shade the array. His south facing roof is on the side of his house and not easily visible from the street. His pitch angle is perfect for our solar fraction and he barely has enough roof area to cover his usage. Although there is a small roof above the kitchen in the back of the house, it is shaded by trees in the morning and by the main part of the house in the afternoon.
* The optimal solar location is always due south facing or solar south facing no matter what. Solar panels facing due West for example will see only around 75% of the performance verse facing south.
* For several reasons the roof is the ideal location, however when space does not permit, or there is little or no south facing roof exposure then other options must be considered such as ground racking, pole mounted or awning mounted. The roof is the ideal location because it is out of the way and in many cases cannot be seen.
* The roof angle and the fact that it is typically above surrounding trees that would

shade the panels helps make the solar system perform better.
*
* Finally panels on the roof also help preserve the structure by carrying away heat build up from the attic, preventing UV rays from damaging the shingles, and adding a barrier against weather. The panel area needed is solely determined by the annual electric demand of the house. Every house is different in what their electric usage is like. For example two houses in the same neighborhood, with the exact same floor plan, and the same number of people living in the home may use entirely different amounts of energy. Some people are tech junkies and have lots of electronics where others may be very conservative and not even own a television. For this reason we do not factor in the house square footage when sizing the system. Homes with very little south facing exposure will need to maximize their roof space to try and get enough energy for their usage and may need to completely fill their roof with panels.

4) Photos of installations identical or very similar to yours, like the Santa Cruz house (if it reflects what yours will look like). Don't include photos of other roof types (Spanish tile) or different styles of panels, these will be more confusing than helpful.

See attached photos of homes with SunPower solar panels as well as spec sheets with photos and panel dimensions.

5) $100, payable over the phone to Mia Gale at 794-6265 x42661, or in person on the sixth floor. Tell them it's for a September HDC meeting application.

I will call Mia sometime this week for payment.

Matthew Grocoff, Esq.
www.Greenovation.TV™
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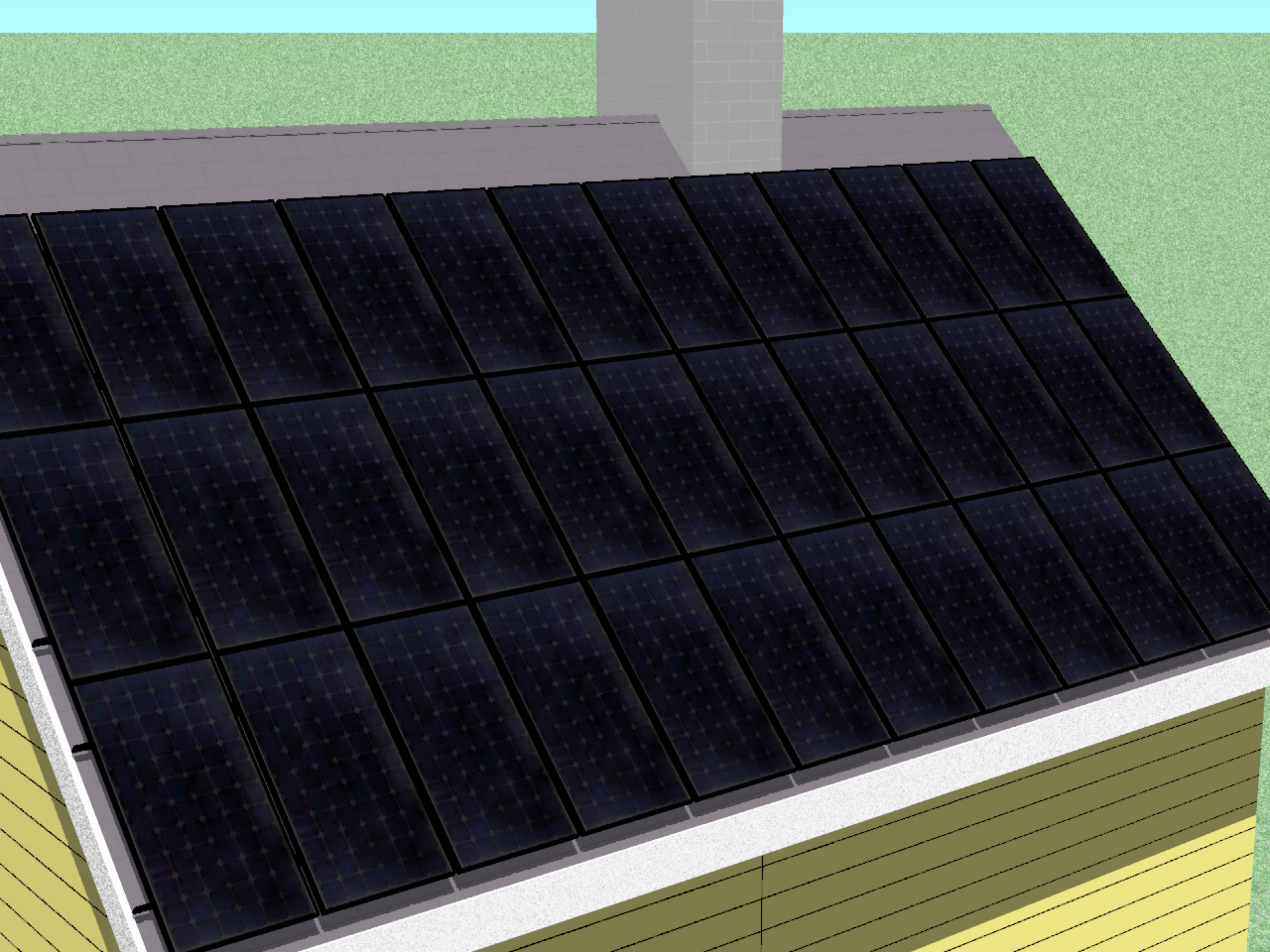
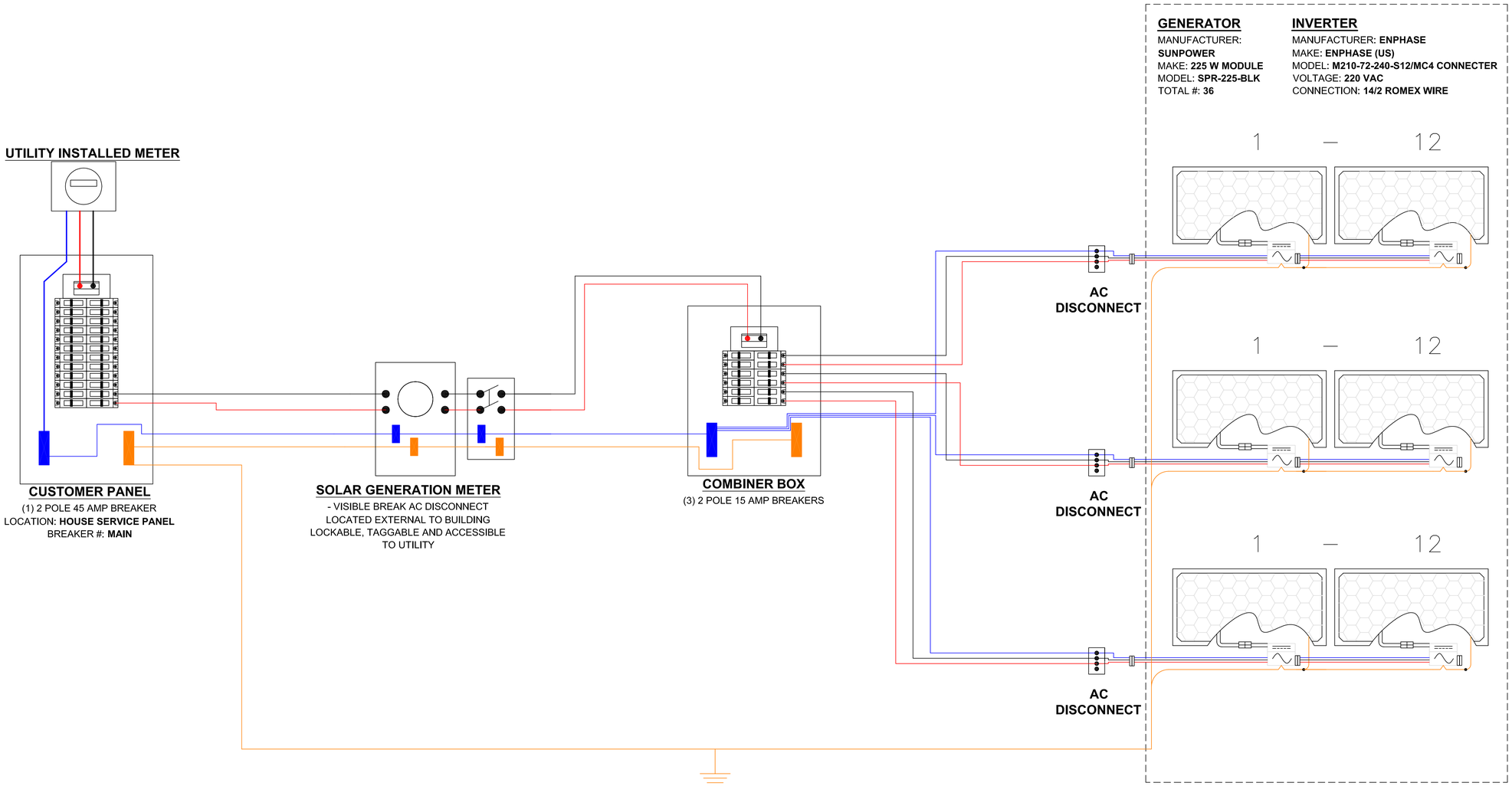
(734) 224-8877

Listen to our Greenovation segments on The Environment Report syndicated on public radio stations. http://environmentreport.org/search.php?query=grocoff

http://www.greenovationtv.com/2010/04/old-is-the-new-green-forget-the-prius-renovate-that-old-house/





General Notes

ELECTRICAL SCHEMATIC

- GROUNDING WIRE USED IS TO BE #6 STRANDED BARE COPPER WIRE

- 14/2 ROMEX IS TO BE USED FOR ALL ADDITIONAL WIRIING

No.	Revision/Issue	Date

Firm Name and Address

JAMES B. CONGDON
PHOTOVOLTAIC ENGINEER

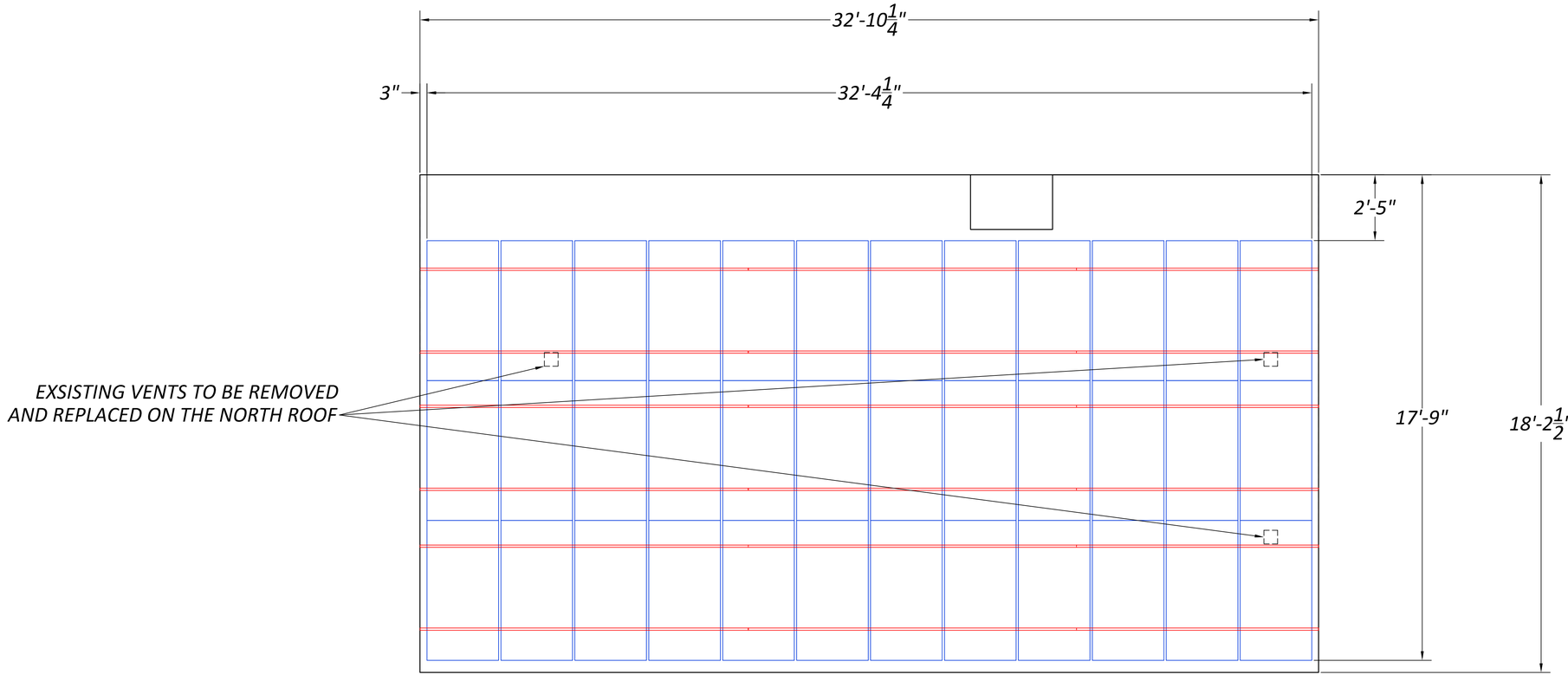
MECHANICAL ENERGY SYSTEMS
8130 N. CANTON CENTER RD.
CANTON, MI 48187

Project Name and Address

GROCOFF
8.100 kW PHOTOVALTIC SYSTEM

217 S. 7TH STREET
ANN ARBOR, MI 48103

Project	Sheet
GROCOFF	**1 of 3**
Date: AUGUST 23rd, 2010	
Scale: N/A	



General Notes

ROOF LAYOUT

No.	Revision/Issue	Date

Firm Name and Address

JAMES B. CONGDON
PHOTOVOLTAIC ENGINEER

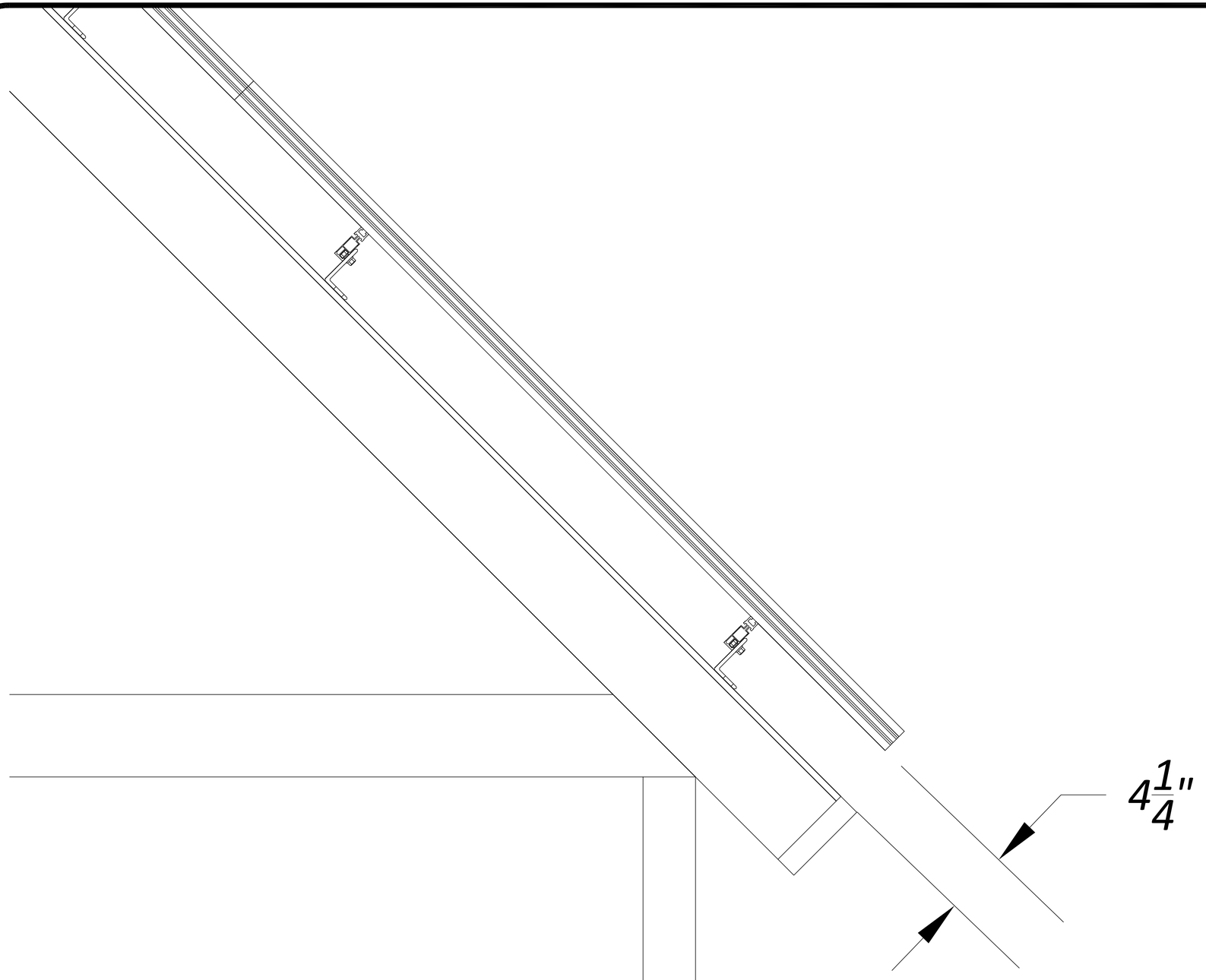
MECHANICAL ENERGY SYSTEMS
8130 N. CANTON CENTER RD.
CANTON, MI 48187

Project Name and Address

GROCOFF
8.100 kW PHOTOVALTIC SYSTEM

217 S. 7TH STREET
ANN ARBOR, MI 48103

Project	Sheet
GROCOFF	2 of 3
Date: AUGUST 23rd, 2010	
Scale: N/A	



General Notes

ROOF LAYOUT SIDE PROFILE

No.	Revision/Issue	Date

Firm Name and Address

JAMES B. CONGDON
PHOTOVOLTAIC ENGINEER

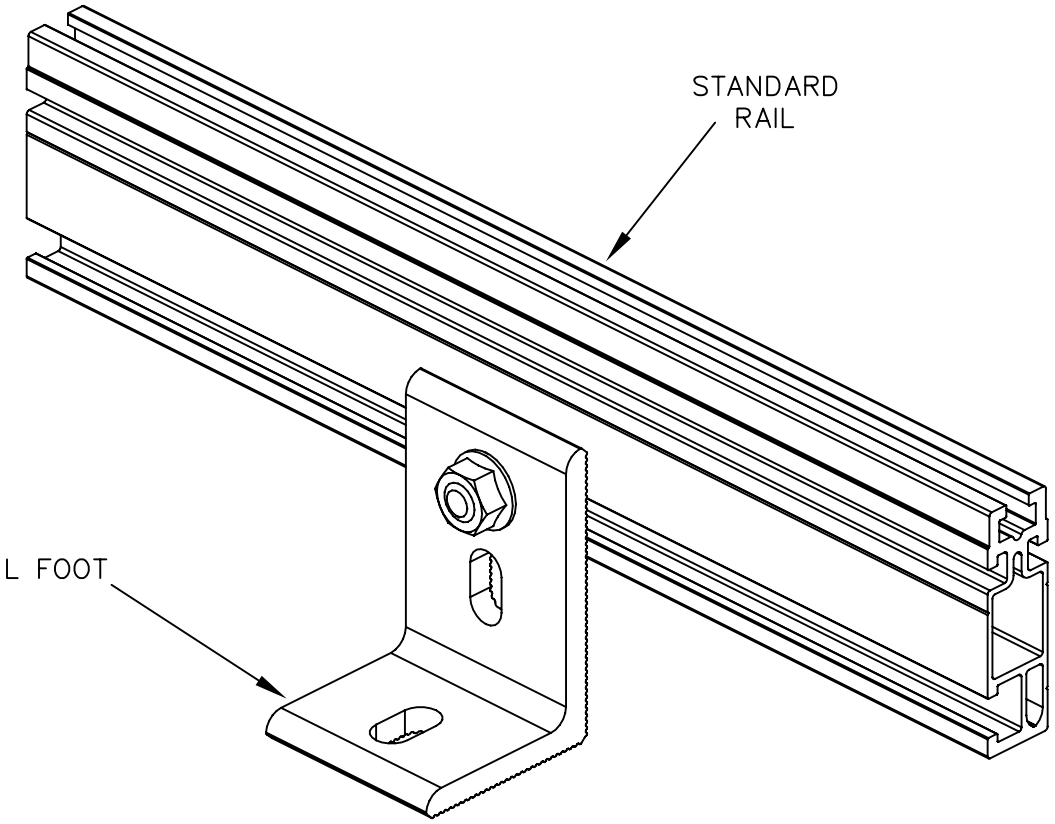
MECHANICAL ENERGY SYSTEMS
8130 N. CANTON CENTER RD.
CANTON, MI 48187

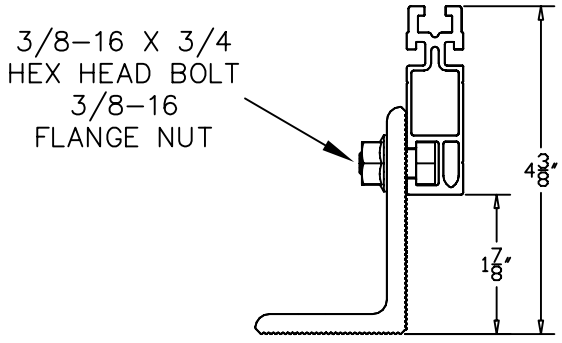
Project Name and Address

GROCOFF
8.100 kW PHOTOVALTIC SYSTEM

217 S. 7TH STREET
ANN ARBOR, MI 48103

Project	Sheet
GROCOFF	3 of 3
Date: AUGUST 23rd, 2010	
Scale: N/A	





UNIRAC®

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ALBUQUERQUE, NM 87102 USA
PHONE 505.242.6411
UNIRAC.COM

URASSY–0002

Installation Detail

SolarMount Rail
L-Foot Connection

SUNPOWER

225 SOLAR PANEL

EXCEPTIONAL EFFICIENCY AND PERFORMANCE

BENEFITS

Highest Efficiency
SunPower™ Solar Panels are the most efficient photovoltaic panels on the market today.

Attractive Design
Unique design combines high efficiency and a sleek, black appearance to blend elegantly with the roof.

More Power
Our panels produce more power in the same amount of space—up to 50% more than conventional designs and 100% more than thin film solar panels.

Reliable and Robust Design
Proven materials, tempered front glass, and a sturdy anodized frame allow panel to operate reliably in multiple mounting configurations.

The SunPower™ 225 Solar Panel provides a revolutionary combination of high efficiency and attractive, sleek appearance. Utilizing 72 back-contact solar cells and a black backsheet, the SunPower 225 blends elegantly with the roof and delivers a total panel conversion efficiency of 18.1%. The panel's reduced voltage-temperature coefficient and exceptional low-light performance attributes provide outstanding energy delivery per peak power watt.

SunPower's High Efficiency Advantage - Up to Twice the Power

	Thin Film	Conventional	SunPower
Peak Watts / Panel	65	170	225
Efficiency	9.0%	13.0%	18.1%
Peak Watts / ft² (m²)	**8 (90)**	**12 (130)**	**17 (181)**

SPR-225-BLK-U

About SunPower

SunPower designs, manufactures and delivers high-performance solar electric technology worldwide. Our high-efficiency solar cells generate up to 50% more power than conventional solar cells. Our high-performance solar panels, roof tiles and trackers deliver significantly more energy than competing systems.

c UL us

SUNPOWER™

225 SOLAR PANEL

EXCEPTIONAL EFFICIENCY AND PERFORMANCE

Electrical Data

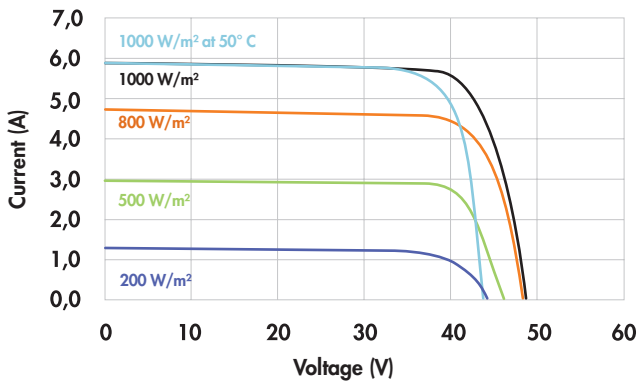
Measured at Standard Test Conditions (STC): irradiance of 1000W/m², AM 1.5, and cell temperature 25° C

Peak Power (+/-5%)	P_{max}	225 W
Rated Voltage	V_{mpp}	41.0 V
Rated Current	I_{mpp}	5.49 A
Open Current Voltage	V_{oc}	48.5 V
Short Circuit Current	I_{sc}	5.87 A
Maximum System Voltage	UL	600 V
Temperature Coefficients		
	Power	-0.38% / K
	Voltage (V_{oc})	-132.5mV / K
	Current (I_{sc})	3.5mA / K
NOCT		46° C +/-2° C
Series Fuse Rating		20 A

Mechanical Data

Solar Cells	72 SunPower all-back contact monocrystalline
Front Glass	High transmission tempered glass
Junction Box	IP-65 rated with 3 bypass diodes Dimensions: 32 x 155 x 128 (mm)
Output Cables	1000mm length cables / MultiContact (MC4) connectors
Frame	Anodized aluminum alloy type 6063 (black)
Weight	33.1 lbs. (15.0 kg)

I-V Curve



Current/voltage characteristics with dependence on irradiance and module temperature.

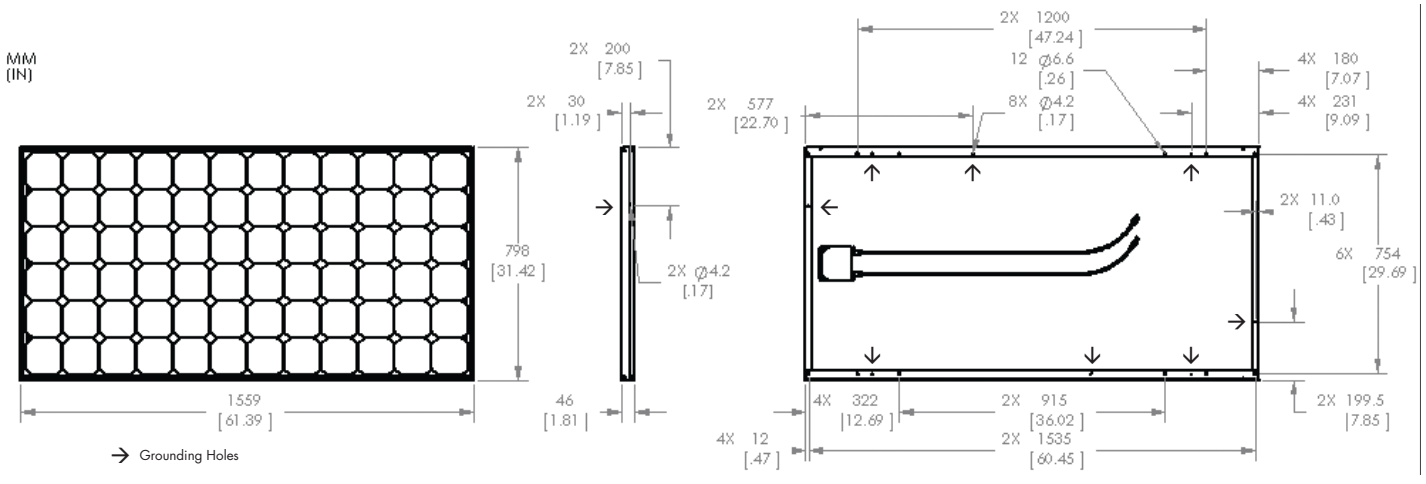
Tested Operating Conditions

Temperature	-40° F to +185° F (-40° C to + 85° C)
Max load	113 psf 550kg/m² (5400 Pa) front – e.g. snow; 50 psf 245kg/m² (2400 Pa) front and back – e.g. wind
Impact Resistance	Hail 1 in (25 mm) at 52mph (23 m/s)

Warranties and Certifications

Warranties	25 year limited power warranty
	10 year limited product warranty
Certifications	Tested to UL 1703. Class C Fire Rating

Dimensions



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

Visit sunpowercorp.com for details

sunpowercorp.com

Document #001-42188 Rev*B / LTR_EN

SUNPOWER

315 SOLAR PANEL

EXCEPTIONAL EFFICIENCY AND PERFORMANCE

BENEFITS

Highest Efficiency
SunPower™ Solar Panels are the most efficient photovoltaic panels on the market today.

More Power
Our panels produce more power in the same amount of space—up to 50% more than conventional designs and 100% more than thin film solar panels.

Reduced Installation Cost
More power per panel means fewer panels per install. This saves both time and money.

Reliable and Robust Design
Proven materials, tempered front glass, and a sturdy anodized frame allow panel to operate reliably in multiple mounting configurations.

SPR-315E-WHT-D

The planet's most powerful solar panel.

The SunPower™ 315 Solar Panel provides today's highest efficiency and performance. Utilizing 96 back-contact solar cells, the SunPower 315 delivers a total panel conversion efficiency of 19.3%. The 315 panel's reduced voltage-temperature coefficient, anti-reflective glass and exceptional low-light performance attributes provide outstanding energy delivery per peak power watt.

SunPower's High Efficiency Advantage - Up to Twice the Power

	Thin Film	Conventional	SunPower
Peak Watts / Panel	65	215	315
Efficiency	9.0%	12.8%	19.3%
Peak Watts / ft² (m²)	**8 (90)**	**12 (128)**	**18 (193)**

About SunPower

SunPower designs, manufactures and delivers high-performance solar electric technology worldwide. Our high-efficiency solar cells generate up to 50% more power than conventional solar cells. Our high-performance solar panels, roof tiles and trackers deliver significantly more energy than competing systems.

c UL us

SUNPOWER™

315 SOLAR PANEL

EXCEPTIONAL EFFICIENCY AND PERFORMANCE

Electrical Data

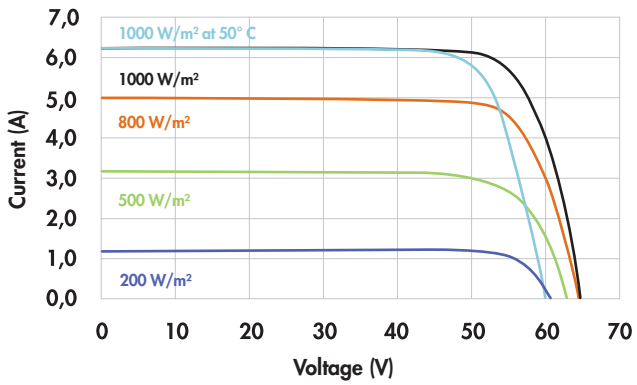
Measured at Standard Test Conditions (STC): irradiance of 1000W/m², AM 1.5, and cell temperature 25° C

Peak Power (+5/-3%)	P_{max}	315 W
Rated Voltage	V_{mpp}	54.7 V
Rated Current	I_{mpp}	5.76 A
Open Circuit Voltage	V_{oc}	64.6 V
Short Circuit Current	I_{sc}	6.14 A
Maximum System Voltage	UL	600 V
Temperature Coefficients		
	Power	-0.38% / K
	Voltage (V_{oc})	-176.6mV / K
	Current (I_{sc})	3.5mA / K
NOCT		45° C +/-2° C
Series Fuse Rating		15 A

Mechanical Data

Solar Cells	96 SunPower all-back contact monocrystalline
Front Glass	High transmission tempered glass with anti-reflective (AR) coating
Junction Box	IP-65 rated with 3 bypass diodes Dimensions: 32 x 155 x 128 (mm)
Output Cables	1000mm length cables / MultiContact (MC4) connectors
Frame	Anodized aluminum alloy type 6063 (black); stacking pins
Weight	41.0 lbs (18.6 kg)

I-V Curve



Current/voltage characteristics with dependence on irradiance and module temperature.

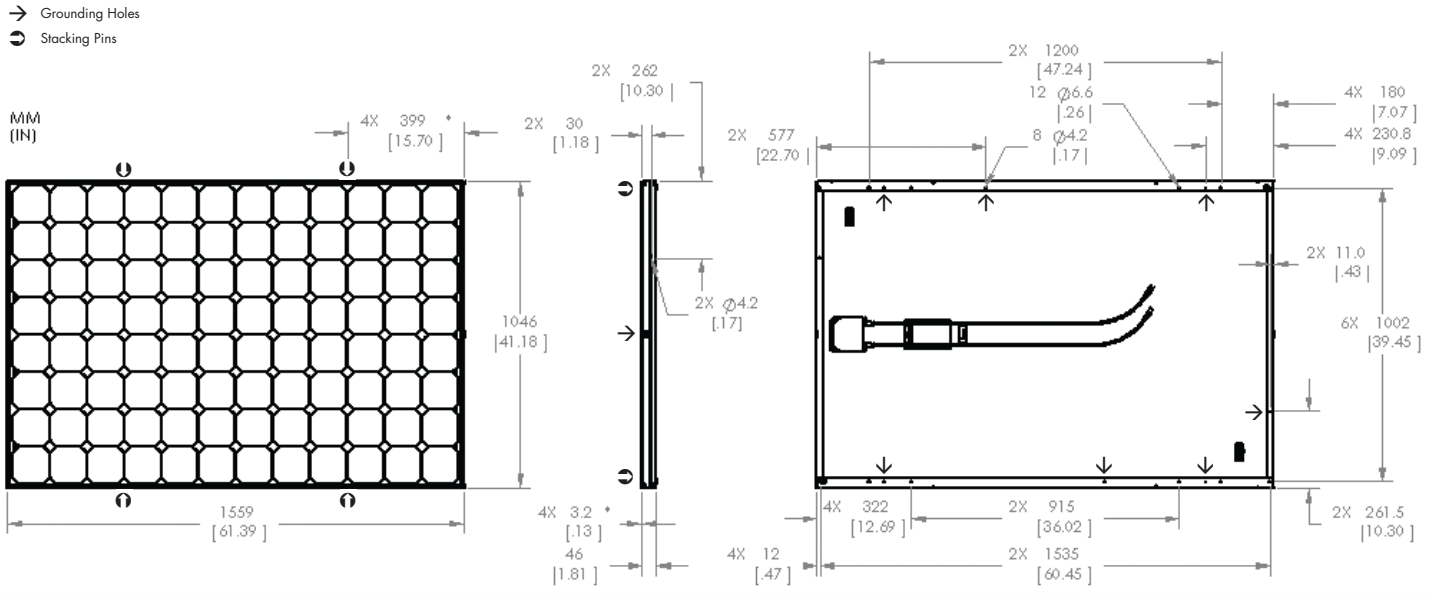
Tested Operating Conditions

Temperature	-40° F to +185° F (-40° C to + 85° C)
Max load	50 psf 245 kg/m² (2400 Pa) front and back – e.g. wind
Impact Resistance	Hail 1 in (25 mm) at 52mph (23 m/s)

Warranties and Certifications

Warranties	25 year limited power warranty
	10 year limited product warranty
Certifications	Tested to UL 1703. Class C Fire Rating

Dimensions



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

Visit sunpowercorp.com for details

sunpowercorp.com

Document #001-52285 Rev*A / LTR_EN

SolarMount®

PV's most versatile mounting system

SolarMount is the most versatile PV mounting rail system on the market today.

We've engineered installer-friendly components for maximum flexibility, allowing you to solve virtually any PV mounting challenge.

The universal SolarMount rail system has three options which can be assembled into a wide variety of PV mounting structures to accommodate any job site.

Unirac provides a technical support system complete with installation and code compliance documentation, an on-line estimator and design assistance to help you solve the toughest challenges.

UNIRAC®
Bright Thinking in Solar

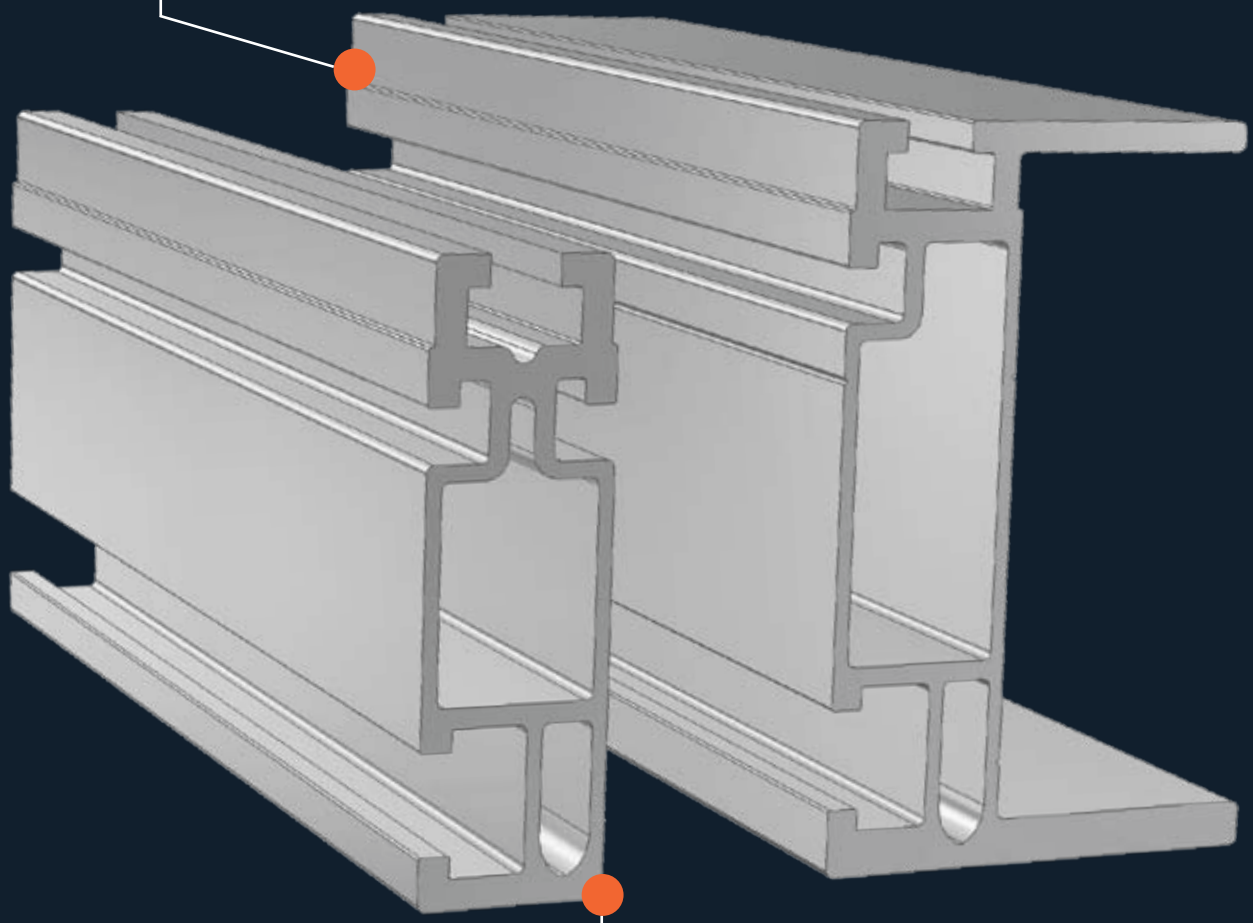
Visit us online at www.unirac.com

SOLARMOUNT® RAIL OPTIONS

PV's most versatile mounting system

SolarMount® HD

HD (heavy duty) rail adds the SolarMount advantage to PV PoleTops®, U-LAs (see separate data sheets), and custom applications that require long spans.

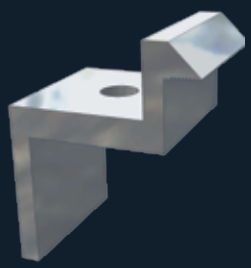


Standard SolarMount®

Standard rail gives you ultimate flexibility, including bottom mounting and tilt-up options.

MODULE MOUNTING

Assembly Sequence Is Your Choice



Top Mounting Clamps

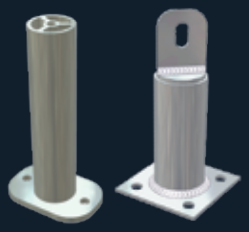
Ideal for flush mount applications, such as residential rooftops, where it is most convenient to secure footings and rails before installing modules, top mounting clamps securely grip any point of the module frame, freeing you from the constraints of module mounting holes.

Bottom Mounting Clips

Use bottom mounting clips (standard and HD rail only) whenever you prefer to preassemble the array using module mounting holes. Simply fit the clip into its rail slot over the mounting bolt for a secure connection. Adjust the clip position anywhere along the rail slot.

ATTACHMENT OPTIONS

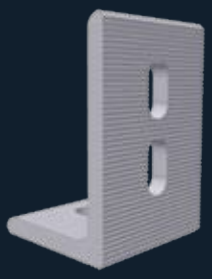
Flexible Components Speed Installation



Standoffs

Use standoffs whenever flashed installations are required, on tile roofs, for example. Two-piece aluminum standoff allow precise placement of
a flashing over a secured base prior to the installation of the standoff itself.

All standoff types come in four standard heights: 3, 4, 6, and 7 inches. Appropriate flashings are available.



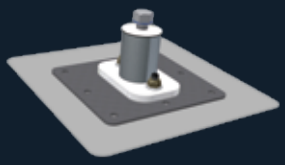
Serrated L-feet

Standard for ground mount installations on residential and commercial rooftops ,use L-feet alone above asphalt composition shingles or in conjunction with flat top standoffs. Mount standard or light rails. Configure to either of two rail heights, one promoting air flow for cooling, the other offering close-to-the-roof aesthetics

Strut-in-Tube Style Legs

Quickly set the precise tilt angle required. Styles are available for high profile (1 or 2 legs per rail) and low profile installations.

Each series offers three leg lengths so that you can adjust to exactly the tilt angle you want—up to a maximum of 60 degrees—without cutting and drilling at the job site.



FastFoot™

The FastFoot™ attachment features Eco-Fasten technology by the Alpine Snow Guard Company, allowing attachments to metal, concrete and wood decks without compromising the integrity of the roof.

Tile Hook

Made from cast aluminum, the tile hook attachment provides SolarMount with a cost-effective solution for barrel or Spanish tile roofs. All required lag bolts and hardware are included. Refer to the tile hook engineering data for max load capabilities.

KEY BENEFITS

of SolarMount® Rail

Maximum flexibility

- Flush, high-profile or low-profile configurations
- Roof or ground mount
- Pitched or flat roof

Ease of installation

- Installer-friendly components
- Minimized penetration with longer attachment spans than competitive products
- Designed with customer input
- Grounding and wire management options

Complete technical support

- Installation and code compliance documentation
- Online estimator
- Person-to-person customer service

Core component for Unirac mounting solutions

- Three rail options to accommodate any job site
- Incorporated into other major product lines

UNIRAC

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Bright Thinking in Solar

Component Specifications

6061-T6 and 6063-T5

- SolarMount ballast frame

6105-T5 aluminum extrusion

- SolarMount® rails
- Mounting clips and clamps
- Tilt legs and L-feet
- Two-piece standoffs

Severe Condition 4 (very severe) zinc-plated welded steel

- One-piece standoffs

18-8 stainless steel

- Fasteners

Code Compliant

The SolarMount® system is PE certified. Call Unirac for documentation applicable to your building code

Warranty

SolarMount® is covered by a 10-year limited product warranty and a 5-year limited finish warranty.

For complete warranties, download any SolarMount® installation manual from our web site.

UNIRAC®

Bright Thinking in Solar

Visit us online at www.unirac.com

SUNPOWER PANELS PRODUCE UP TO 50% MORE POWER

This means you can:

- Maximize your roof space to produce the most power
- Use 50% less space to generate the same amount of power


SHARP


BeFree Solar.com