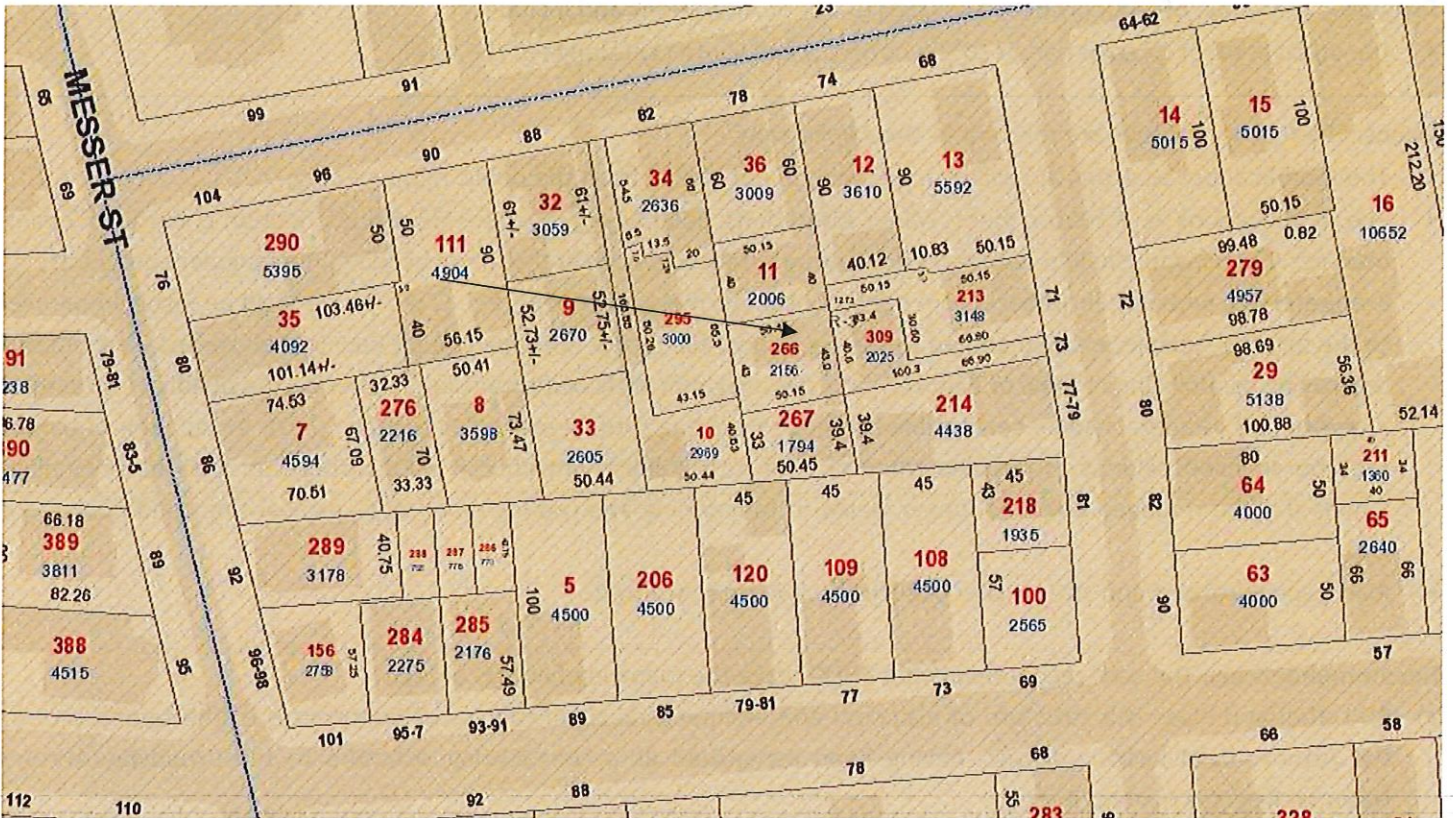
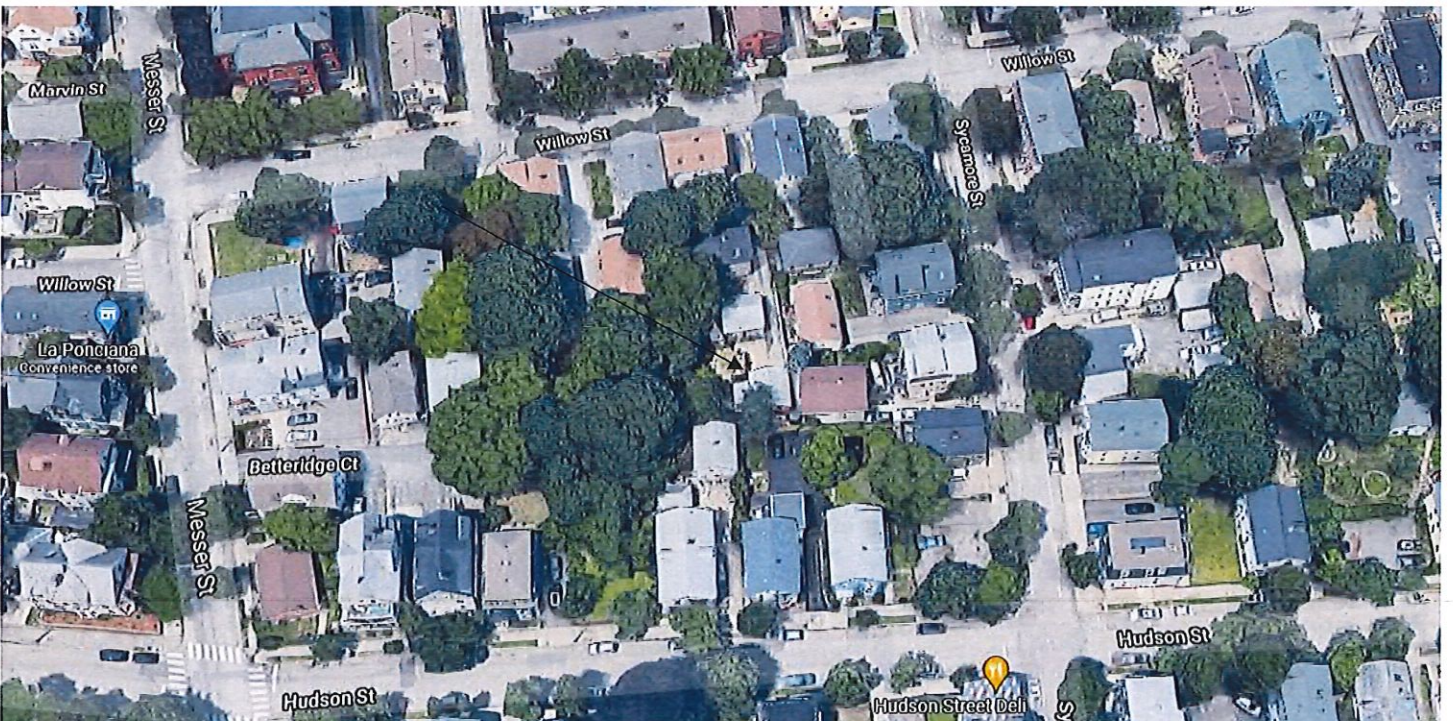


6. CASE 22.010, 15 LYTHERLAND PLACE, House, c1870 (ARMORY)
1½-story; end-gable; clapboard cottage; with side-hall plan.
CONTRIBUTING



Arrow indicates 15 Lytherland Place



Arrow indicates project location, looking north.

Applicant/Contractor: Ashley Fennelly, Solar Wolf Energy, 771 Washington Street, Auburn, MA 01501

Owner: Mark Wilcox, 15 Lytherland Place, Providence, RI 02909

Proposal: The scope of work proposed consists of Minor Alterations and includes

- the installation of 17 solar panels to the north (5) and south (12) slopes of the roof.

Issues: The following issues are relevant to this application:

- The modifications as proposed will be minimally- to not-visible from the public rights-of-way;
- The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, in the following manner: Panel layout shall be sympathetic or appropriate to design and scale of building. Rectangular configurations are preferred, with ample setback from edge of roof, dormers, chimneys, etc. (2.A); Panels shall be installed parallel to the existing roof slope and matched as closely as possible to the roof plane (2.B); Panels shall be installed without destroying or replacing original or historic materials or significantly compromising or altering the building's structural integrity (2.C); Panels shall be compatible in color to existing roofing insofar as possible (2.D); Installation of panels shall be as inconspicuous as possible when viewed from public right-of-way (2.E); Installation shall be reversible. Panels shall be removed when no longer viable or functioning and roofing restored to pre-existing conditions (2.F); and,
- Plans, specifications and streetscape pictures have been submitted.

Recommendations: The staff recommends the PHDC make the following findings of fact:

- a) 15 Lytherland Place is a structure of historical and architectural significance that contributes to the significance of the Armory local historic district, having been recognized as a contributing structure to the Broadway/Armory National Register Historic District;
- b) The modifications as proposed meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, and the application is considered complete; and,
- c) The work as proposed is in accord with PHDC Standards 8 & 9 as follows: 8) the work will be done so that it does not destroy the historic character of the property or the district; and, 9) Whenever possible... alterations to structures shall be done in such a manner that if removed in the future, the essential form and integrity of the structure and the site will be unimpaired.

Staff recommends a motion be made stating that: The application is considered complete. 15 Lytherland Place is a structure of historical and architectural significance that contributes to the significance of the Armory local historic district, having been recognized as a contributing structure to the Broadway/Armory National Register Historic District. The Commission grants Final Approval of the proposal as submitted as the proposed alteration is appropriate having determined that the proposed alteration does not destroy the historic character of the property or the district and are historically and architecturally compatible with the property and district as the proposed alteration meets Minor Alterations: Solar Energy Systems Guidelines, Section 2, is reversible and be minimally- to not-visible from the public rights-of-way, and the recommendations in the staff report, with staff to review any additional required details.



15 Lytherland Place

GENERAL NOTES

- All electrical materials shall be new and listed by recognized electrical testing laboratory
Custom made equipment shall have complete test data submitted by the manufacturer attesting to its safety
- Outdoor equipment shall be NEMA 3R rated or equivalent
- All metallic equipment shall be grounded
- Contractor shall obtain electrical permits prior to installation and shall coordinate all inspections, testing commissioning and acceptance with the client, utility co. and city inspectors as needed.
- The electrical contractor shall verify the exact locations of service points and service sizes with the serving utility company and comply with all utility companies requirements.
- Drawings are diagrammatic only, routing of raceways shall be option of the contractor unless otherwise noted and shall be coordinated with other trades.
- If the roof material or the roof structure not adequate for PV installation, call the engineer of record print to installation. The contractor is responsible to verify that the roof is capable of withstanding the extra weight.
- If the distances for cable runs are different than shown, the contractor shall notify the electrical engineer to validate the wire size. Final drawings will be red-lined and updated as appropriate.
- Whenever a discrepancy in quality of equipment arises on the drawing or specifications, the contractor shall be responsible for providing and installing all materials and services required by the strictest conditions noted on the drawings or in the specifications to ensure complete compliance and longevity of the operable system required by the engineer of record.

PHOTOVOLTAIC NOTES:

- Rooftop mounted photovoltaic panels and modules shall be tested, listed and identified by recognized testing laboratory
- Solar system shall not cover any plumbing or mechanical vents
- Modules and support structures shall be grounded unless racking has integrated ground.
- Removal of an interactive inverter or other equipment shall not disconnect the bonding connection between the grounding electrode conductor and the photovoltaic source and/or output circuit grounded conductors.
- All PV modules and associated equipment and wiring shall be protected from physical damage.
- Live parts of PV source circuits and PV output circuits over 150v to ground shall not be accessible to other than qualified persons while energized.
- Inverter is equipped with integrated DC disconnect, thus providing ground fault protection
- All conductors shall be copper and 75 deg rated
- A single conductor shall be permitted to be used to perform the multiple functions of dc grounding, AC grounding and bonding between AC and DC systems.
- Non-current carrying metal parts of equipment shall be effectively bonded together. Bond both ends of raceways.

ENGINEERINC

Engineerinc.io,
303 N Glenoaks Blvd Suite 200
Burbank, CA 91502
(747) 333 - 5991
new@engineerinc.io

SHEET INDEX

SITE MAP & PV LAYOUT	PV 1.0
ELECTRICAL 1-LINE DIAGRAM	PV 2.0
SYSTEM LABELING DETAIL	PV 3.0
PROPERTY PLAN	PV 4.0
ATTACHMENT LAYOUT	PV 5.0
MODULE DATA SHEET	D 6.0
RACKING DATA SHEET	D 7.0
MONITORING SYSTEM DATA SHEET	D 8.0
ATTACHMENT DATA SHEET	D 9.0

GOVERNING CODES

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES:

- 2017 National Electrical Code
 - 2018 International Residential Code
 - 2018 International Building Code
 - 2018 International Energy Conservation Code
- AS ADOPTED BY THE STATE OF RHODE ISLAND
ALL OTHER ORDINANCE ADOPTED BY THE LOCAL GOVERNING AGENCIES

SYSTEM RATING

DC 5.69KW STC
AC 5.44KW STC

EQUIPMENT SUMMARY

17 SUNPOWER 335W AC MODULES
WITH INTEGRATED MICROINVERTERS

ELECTRICAL INFORMATION

EXISTING
METER NUMBER :#77161502
MAIN SERVICE PANEL BUS SIZE: 100A
MAIN SERVICE BREAKER SIZE: 100A
MOUNTING SYSTEM: INVISIMOUNT

BUILDING INFORMATION

CONSTRUCTION TYPE: V-B
OCCUPANCY: R3
ROOF: Comp. Shingle
Rafter 2 x 6 @ 24" O.C.



M. Hakhamaneshi

Date Certified and
Signed: 11/17/2021

CONTRACTOR

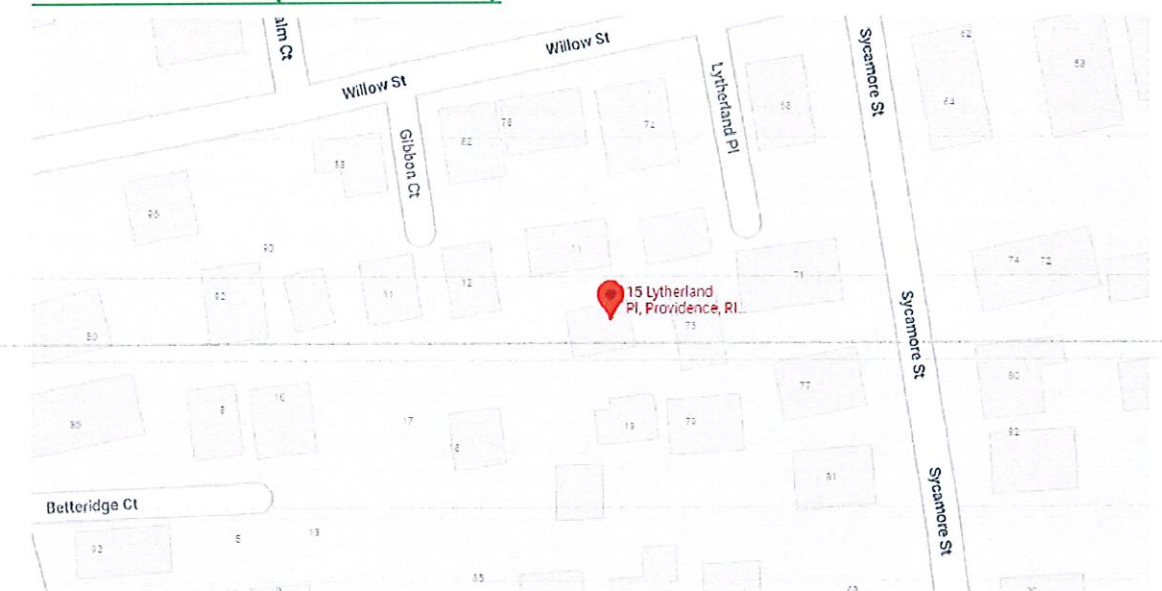
Solar Wolf Energy

Address: 771 Washington St.
Auburn, MA 01501
Phone number: (888) 878-4396
License#: B-940672

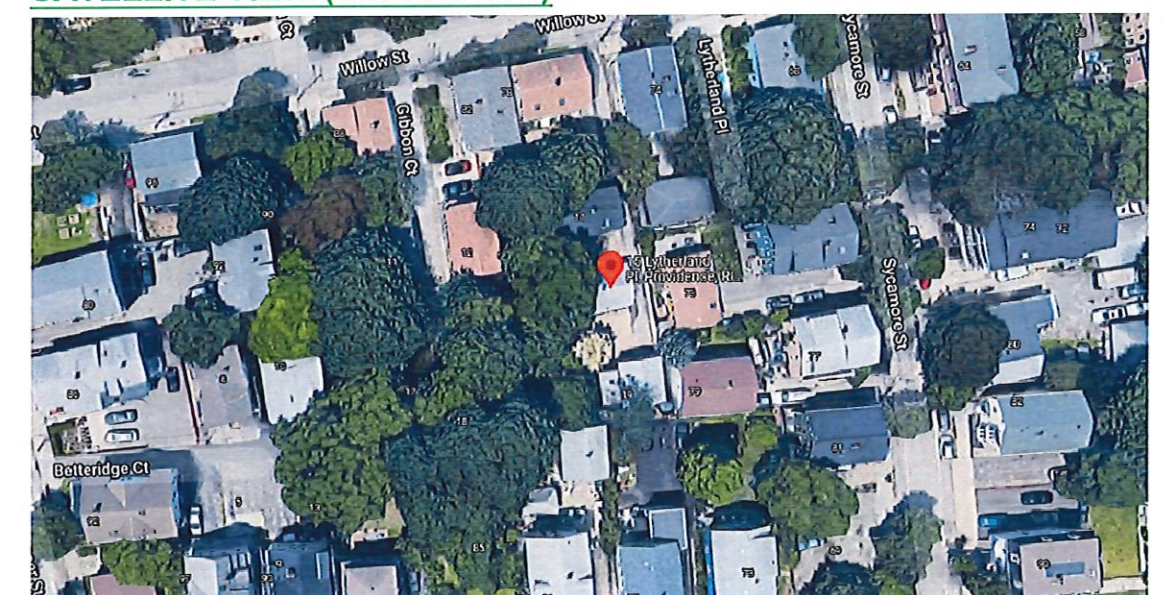


Owner: _____ Mark Wilcox
Property Address: _____ 15 Lytherland PI Providence, RI 02909
Property Type: _____ Single Family Residence
Parcel Number: _____ PROV:36L:266
Drawn by: _____ New@engineerinc.io
Date: _____ 11/16/2021

VICINITY MAP (SCALE: NTS)



SATELLITE VIEW (SCALE: NTS)





SCALE: 1/8" = 1'-0"

Solar PV Array 2
 5 - SunPower 335W Modules
 5 - Built-in Microinverters
 Pitch: 34 Deg
 Orientation: 350 Deg

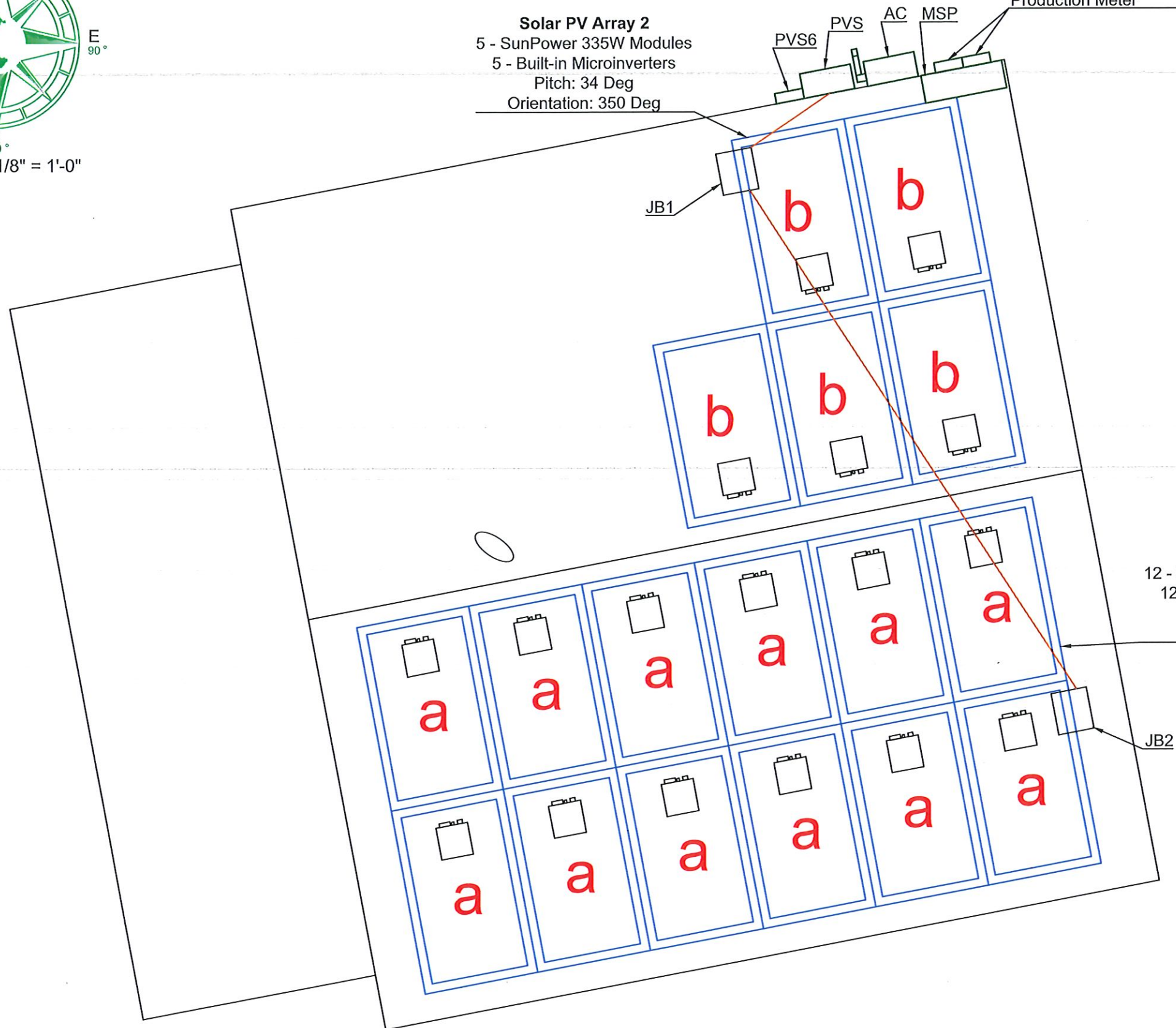
Existing Utility Revenue
 Meter Socket
 Production Meter

SOLAR MODULES

17 SunPower
 Model #X21-335-BLK-E-AC
MICROINVERTER
 INVERTER TYPE: Micro
 17 FACTORY-INTEGRATED
 Model #X21-335-BLK-E-AC (240V)

INDEX

MSP.....(E) **100A** Main Service Panel
 AC.....(N) 30A AC Disconnect
 PVS.....(N) 125A PV Sub Panel
 PVS6.....(N) PV Monitoring System
 JB.....(N) Junction Box
 EMT Conduit
 FMT Conduit
 Setback



Solar PV Array 1
 12 - SunPower 335W Modules
 12 - Built-in Microinverters
 Pitch: 34 Deg
 Orientation: 170 Deg

CONTRACTOR

Solar Wolf Energy
 Address: 771 Washington St.
 Auburn, MA 01501
 Phone number: (888) 878-4396
 License#: B-940672



SITE MAP & PV LAYOUT

ENGINEER INC

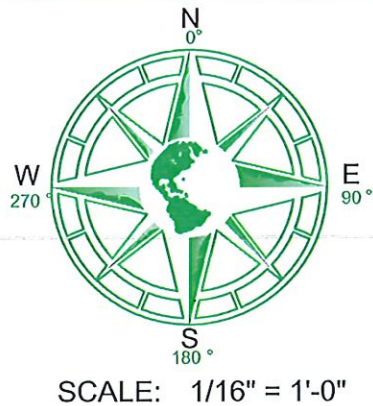
Drawn by: New@engineerinc.io
 DATE: 11/16/2021

Project Name:
 Mark Wilcox
 Property Address:
 15 Lytherland Pl
 Providence, RI 02909

Project: PV SYSTEM Scale: AS INDICATED

PV 1.0

NOTE: Conduit in attic shall be minimum 18 inches from roof sheathing



SCALE: 1/16" = 1'-0"

ENGINEERINC

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Burbank, CA 91502
(747) 333 - 5991
new@engineerinc.io



LEGEND

MSP.....Main Service Panel
AC..... AC Disconnect
PVS..... PV Sub Panel
PVS6..... PV Monitoring System

CONTRACTOR

Solar Wolf Energy
Address: 771 Washington St.
Auburn, MA 01501
Phone number: (888) 878-4396
License#: B-940672



M. Hakhamaneshi

Date Certified and Signed: 11/17/2021

PROPERTY PLAN

ENGINEERINC

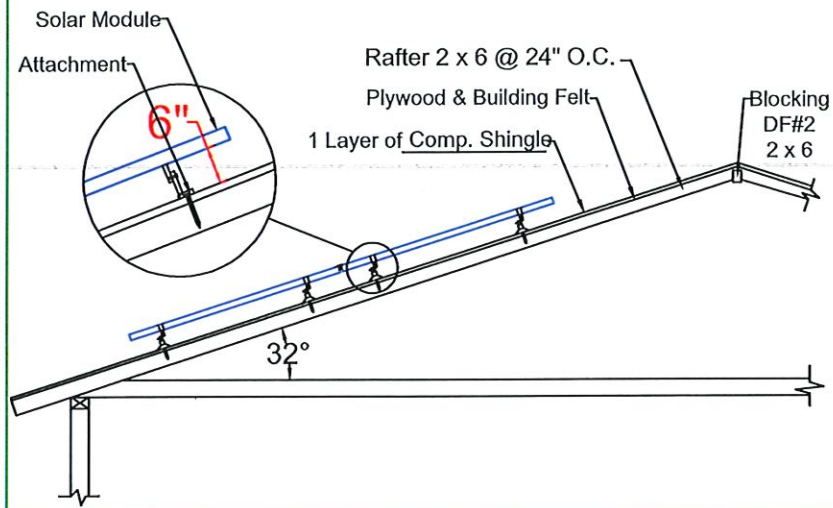
Drawn by: New@engineerinc.io
DATE: 11/16 /2021

Project Name:
Mark Wilcox
Property Address:
15 Lytherland Pl
Providence, RI 02909

Project: PV SYSTEM Scale: AS INDICATED

PV 4.0

MODULES ON ARRAY 2



POINT LOAD CALCULATION PER ARRAY

Module Weight (lbs)	42.9
# Of Modules	17
Total Module Weight (lbs)	729.3
Rack Weight (lbs)	145.86
Total System Weight (lbs)	875.16
# Of Standoffs	35
Max Span Between Standoffs (in)	48
Loading Per Standoff (lbs)	25.00
Total Area (sq.ft.)	306
Loading (PSF)	2.86

DESIGN CRITERIA

Modules:
17
Max Distributed Load: 3 PSF

ENGINEERINC

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303 N Glenoaks Blvd Suite 200
Burbank, CA 91502
(747) 333 - 5991
new@engineerinc.io

Prior to the commencement of work, the contractor shall verify the existing roof and framing conditions. Notify New@engineerinc.io of any Discrepancies prior to starting construction. Prior to the commencement of work, the contractor shall inspect framing for any damage such as water damage, cracked framing, etc. and notify New@engineerinc.io if any issues are found.

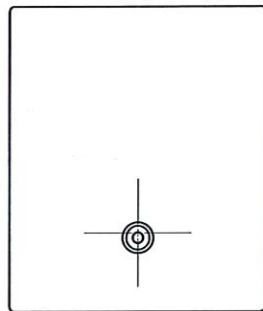
These Plans are stamped for structural code compliance of the roof framing supporting the proposed PV installation reference only. These plans are not stamped for water leakage. PV modules, racking, and attachment components must follow manufacturer guidelines and requirements.

Attachments to be installed in a staggered orientation to properly distribute loads.

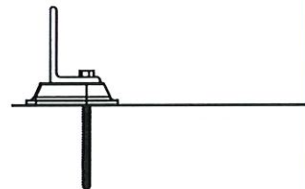


PEGASUS COMP SHINGLE DETAILS

LightSpeed Flashing



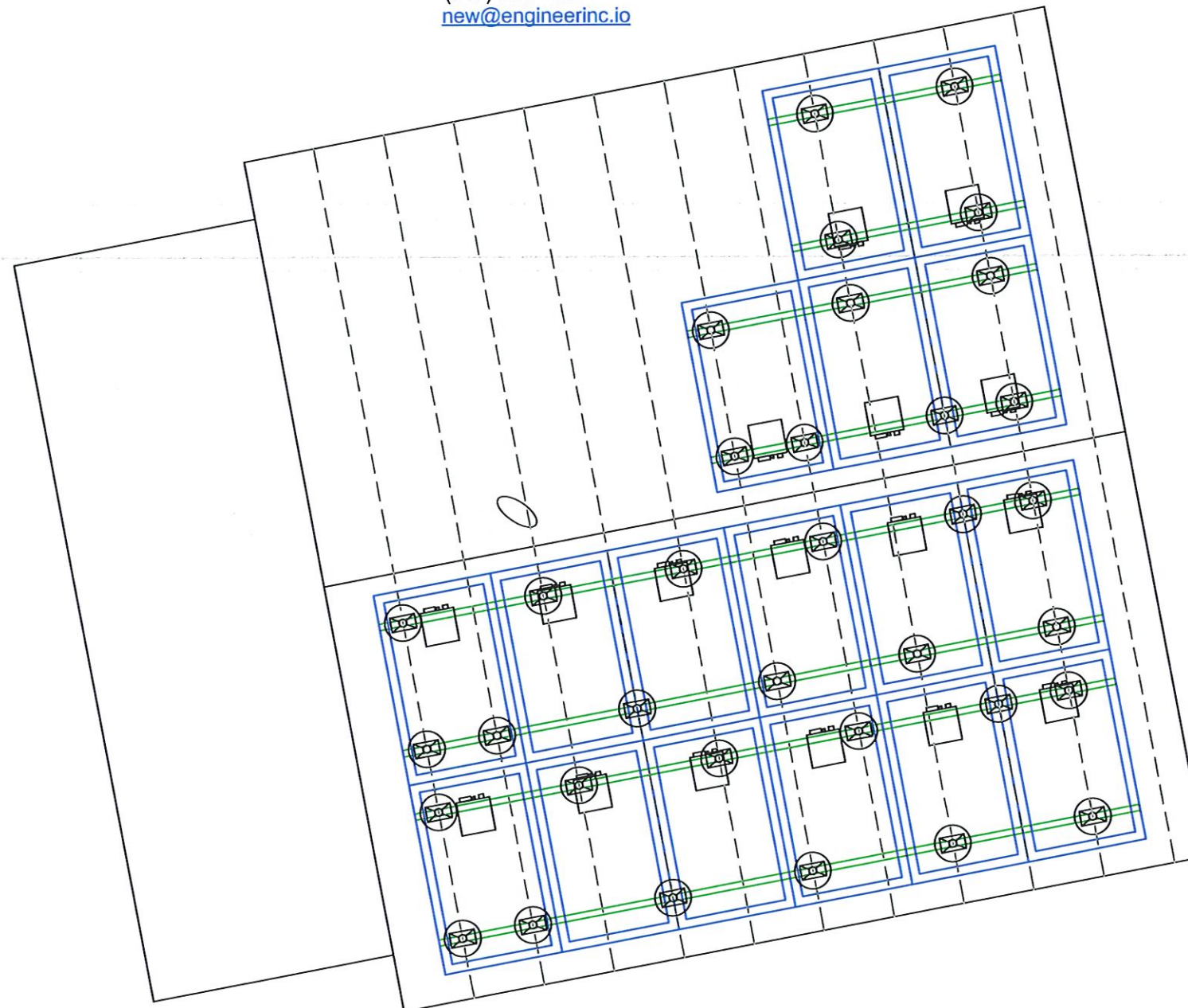
ROOF ASSEMBLY



Support Block



EPDM WASHER



CONTRACTOR

Solar Wolf Energy
Address: 771 Washington St.
Auburn, MA 01501
Phone number: (888) 878-4396
License#: B-940672



MANOUCHEHR HAKHAMANESHI



REGISTERED
PROFESSIONAL ENGINEER
CIVIL

M. Hakhamaneshi

Date Certified and Signed: 11/17/2021

ATTACHMENT LAYOUT

ENGINEERINC

Drawn by: New@engineerinc.io
DATE: 11/16/2021

Project Name:
Mark Wilcox
Property Address:
15 Lytherland Pl
Providence, RI 02909

Project: PV SYSTEM Scale: AS INDICATED

PV 5.0



SUNPOWER®

X-Series: X21-350-BLK | X21-335-BLK | X20-327-BLK

SunPower® Residential AC Module

Built specifically for use with the SunPower Equinox™ system, the only fully integrated solution designed, engineered and warranted by one manufacturer.



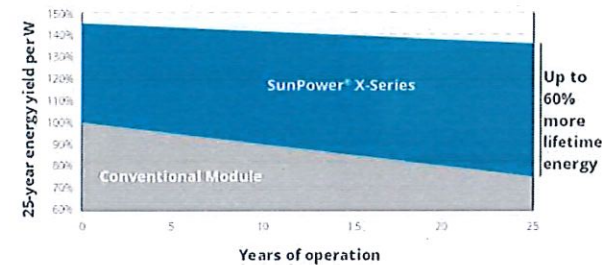
Maximum Power. Minimalist Design.

Industry-leading efficiency means more power and savings per available space. With fewer modules required and hidden microinverters, less is truly more.



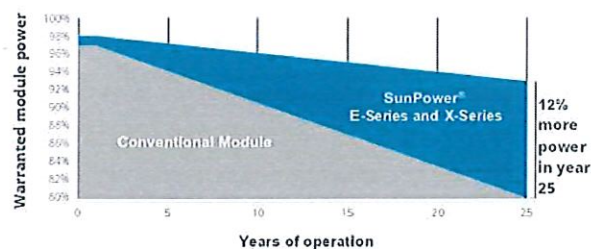
Highest Lifetime Energy and Savings.

Designed to deliver 60% more energy over 25 years in real-world conditions like partial shade and high temperatures.¹



Best Reliability. Best Warranty.

With more than 25 million modules deployed around the world, SunPower technology is proven to last. That's why we stand behind our module and microinverter with the industry's best 25-year Combined Power and Product Warranty, including the highest Power Warranty in solar.



Fundamentally Different. And Better.



The SunPower® Maxeon® Solar Cell

- Enables highest-efficiency modules available.²
- Unmatched reliability.³
- Patented solid metal foundation prevents breakage and corrosion.



Factory-integrated Microinverter

- Simpler, faster installation
- Integrated wire management, rapid shutdown
- Engineered and calibrated by SunPower for SunPower modules

X-Series: X21-350-BLK | X21-335-BLK | X20-327-BLK SunPower® Residential AC Module

AC Electrical Data		
	@240 VAC	@208 VAC
Inverter Model: Enphase IQ 7XS (IQ7XS-96-ACM-US)		
Peak Output Power	320 VA	320 VA
Max. Continuous Output Power	315 VA	315 VA
Nom. (L-L) Voltage/Range ¹ (V)	240 / 211-264	208 / 183-229
Max. Continuous Output Current (A)	1.31	1.51
Max. Units per 20 A (L) Branch Circuit ²	12 (single phase)	10 (two pole) wye
CEC Weighted Efficiency	97.5%	97.0%
Nom. Frequency	60 Hz	
Extended Frequency Range	47-68 Hz	
AC Short Circuit Fault Current Over 3 Cycles	5.8 A rms	
Overvoltage Class AC Port	III	
AC Port Back-feed Current	18 mA	
Power Factor Setting	1.0	
Power Factor (adjustable)	0.7 lead / 0.7 lag	

No active phase balancing for three-phase installations

	DC Power Data		
	X21-350-BLK-E-AC	X21-335-BLK-E-AC	X20-327-BLK-E-AC
Nom. Power ¹ (Prom)	350 W	335 W	327 W
Power Tol.	+5/-0%	+5/-0%	+5/-0%
Module Efficiency	21.5%	21.0%	20.4%
Temp. Coef. (Power)	-0.29%/°C	-0.29%/°C	-0.29%/°C

Shade Tol.

- Three bypass diodes
- Integrated module-level maximum power point tracking

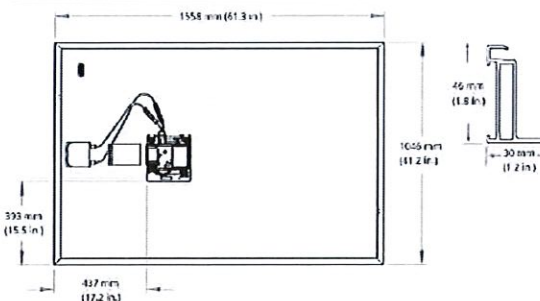
Tested Operating Conditions	
Operating Temp.	-40°F to +185°F (-40°C to +85°C)
Max. Ambient Temp.	122°F (50°C)
Max. Load	Wind: 62 psf, 3000 Pa, 305 kg/m ² front & back Snow: 125 psf, 6000 Pa, 611 kg/m ² front
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)

Mechanical Data	
Solar Cells	96 Monocrystalline Maxeon Gen III
Front Glass	High-transmission tempered glass with anti-reflective coating
Environmental Rating	Outdoor rated
Frame	Class 1 black anodized (highest AAMA rating)
Weight	42.9 lbs (18.5 kg)
Recommended Max. Module Spacing	1.3 in. (33 mm)

1 SunPower 360 W compared to a conventional module on same-sized arrays (260 W, 16% efficient, approx. 1.6 m²). 48 more energy per watt based on third-party module characterization and PVFIM, 0.75%/yr slower degradation (Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, 2013).
 2 Based on search of datasheet values from websites of top 10 manufacturers per IHS, as of January 2017.
 3 #1 rank in Fraunhofer PV Durability Initiative for Solar Modules: Part 3 "PV Tech Power Magazine, 2015, Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, 2013.
 4 Factory set to 1547a-2014 default settings. CA Rule 21 default settings profile set during commissioning. See the Equinox Installation Guide #518101 for more information.
 5 Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25°C) NREL calibration standard: 50MS current, LACC5 FF and voltage. All DC voltage is fully contained within the module.
 6 This product is UL Listed as PVRE and conforms with NEC 2014 and NEC 2017 690.12; and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors; when installed according to manufacturer's instructions.

See www.sunpower.com/facts for more reference information.
 For more details, see extended datasheet www.sunpower.com/datasheets Specifications included in this datasheet are subject to change without notice.
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Warranties, Certifications, and Compliance	
Warranties	<ul style="list-style-type: none"> • 25-year limited power warranty • 25-year limited product warranty
Certifications and Compliance	<ul style="list-style-type: none"> • UL 1703 • UL 1741 / IEEE-1547 • UL 1741 AC Module (Type 2 fire rated) • UL 62109-1 / IEC 62109-2 • FCC Part 15 Class B • ICES-0003 Class B • CAN/CSA-C22.2 NO. 107.1-01 • CA Rule 21 (UL 1741 SA)¹ (includes VoltVar and Reactive Power Priority) • UL Listed PV Rapid Shutdown Equipment²
	<p>Enables installation in accordance with:</p> <ul style="list-style-type: none"> • NEC 690.6 (AC module) • NEC 690.12 Rapid Shutdown (inside and outside the array) • NEC 690.15 AC Connectors, 690.33(A)-(E)(1)
	<p>When used with InvisiMount racking and InvisiMount accessories (UL 2703):</p> <ul style="list-style-type: none"> • Module grounding and bonding through InvisiMount • Class A fire rated <p>When used with AC module Q Cables and accessories (UL 6703 and UL 2238):³</p> <ul style="list-style-type: none"> • Rated for load break disconnect
PiD Test	Potential-induced degradation free



SUNPOWER®
 531946 RevA

Please read the Safety and Installation Instructions for details.

CONTRACTOR

Solar Wolf Energy
 Address: 771 Washington St.
 Auburn, MA 01501
 Phone number: (888) 878-4396
 License#: B-940672



MODULE DATA SHEET

ENGINEERING INC

Drawn by: New@engineeringinc.io
 DATE: 11/16/2021

Project Name:
Mark Wilcox
 Property Address:
 15 Lytherland Pl
 Providence, RI 02909

Project: **PV SYSTEM** Scale: **AS INDICATED**

D 6.0



SunPower® InvisiMount™ | Residential Mounting System

Simple and Fast Installation

- Integrated module-to-rail grounding
- Pre-assembled mid and end clamps
- Levitating mid clamp for easy placement
- Mid clamp width facilitates consistent, even module spacing
- UL 2703 Listed integrated grounding

Flexible Design

- Addresses nearly all sloped residential roofs
- Design in landscape and portrait with up to 8' rail span
- Pre-drilled rails and rail splice
- Rails enable easy obstacle management

Customer-Preferred Aesthetics

- #1 module and #1 mounting aesthetics
- Best-in-class system aesthetics
- Premium, low-profile design
- Black anodized components
- Hidden mid clamps and capped, flush end clamps

Part of Superior System

- Built for use with SunPower DC and AC modules
- Best-in-class system reliability and aesthetics
- Optional rooftop transition flashing, rail-mounted J-box, and wire management rail clips
- Combine with SunPower modules and SunPower EnergyLink® monitoring app



Elegant Simplicity

SunPower® InvisiMount™ is a SunPower-designed rail-based mounting system. The InvisiMount system addresses residential sloped roofs and combines faster installation time, design flexibility, and superior aesthetics. The InvisiMount product was specifically envisioned and engineered to pair with SunPower modules. The resulting system-level approach amplifies the aesthetic and installation benefits—for homeowners and for installers.

sunpower.com



SunPower® InvisiMount™ | Residential Mounting System

InvisiMount Components



InvisiMount Component Details		
Mid clamp	Black oxide stainless steel 300 series	63 g (2.2 oz)
End clamp	Black anodized aluminum 6000 series	110 g (3.88 oz)
Rail	Black anodized aluminum 6000 series	830 g/m (9 oz/ft)
Rail splice	Aluminum alloy 6000 series	830 g/m (9 oz/ft)
Rail bolt	M10-1.5 x 25 mm, custom T head SS304	18 g (0.63 oz)
Rail nut	M10-1.5, DIN 6923 SS304	nominal
Ground lug assembly	SS304, A2-70 bolt, tin-plated copper lug	106.5 g (3.75 oz)
Row-to-row grounding clip	SS 301 with SS 304 M6 bolts	75 g (2.6 oz)
Row-to-row spacer	Black POM-grade plastic	5 g (0.18 oz)

InvisiMount Component LRFD Capacities ¹		
Mid clamp	Uplift	664 lbf
	Shear	540 lbf
End clamp	Uplift	899 lbf
	Shear	220 lbf
Rail	Moment, upward	548 lbf-ft
	Moment, downward	580 lbf-ft
Rail splice	Moment, upward	548 lbf-ft
	Moment, downward	580 lbf-ft
L-foot	Uplift	1000 lbf
	Shear	390 lbf

InvisiMount Operating Conditions	
Temperature	-40° C to 90° C (-40° F to 194° F)
Max. Load (LRFD)	• 3000 Pa uplift • 6000 Pa downforce

Roof Attachment Hardware Supported by Design Tool	
Application	• Composition Shingle Rafter Attachment • Composition Shingle Roof Decking Attachment • Curved and Flat Tile Roof Attachment • Universal interface for other roof attachments

InvisiMount Warranties And Certifications	
Warranties	• 25-year product warranty • 5-year finish warranty
Certifications	• UL 2703 Listed • Class A Fire Rated

Roof Attachment Hardware Warranties	
Refer to roof attachment hardware manufacturer's documentation.	

¹ Module frame that is compatible with the InvisiMount system required for hardware interoperability.
² SunPower recommends that all Equinox™, InvisiMount™, and AC module systems always be designed using the InvisiMount Span Tables #524734. If a designer decides to instead use the component capacities listed in this document to design a system, note that the capacities shown are Load and Resistance Factor Design (LRFD) design loads, and are NOT to be used for Allowable Stress Design (ASD) calculations; and that a licensed Professional Engineer (PE) must then stamp all calculations. If you have any questions please contact SunPower Technical Support at 1-855-977-7867.
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CONTRACTOR

Solar Wolf Energy
 Address: 771 Washington St.
 Auburn, MA 01501
 Phone number: (888) 878-4396
 License#: B-940672



RACKING DATA SHEET

ENGINEERING

Drawn by: New@engineerinc.io
 DATE: 11/16/2021

Project Name:
Mark Wilcox
 Property Address:
 15 Lytherland Pl
 Providence, RI 02909

Project: PV SYSTEM Scale: AS INDICATED

D 7.0