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TOWN OF ACTON, MA

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**TOWN OF ACTON
HISTORIC DISTRICT COMMISSION
472 Main Street, Acton, MA 01720**

RE: APPLICATION 2341

Pursuant to Chapter 40C of the General Laws of Massachusetts and the Historic Districts Bylaw of the Town of Acton, the Acton Historic District Commission hereby issues a

DENIAL OF CERTIFICATE OF APPROPRIATENESS
For certain work described in the Application 2341 requiring approval.

Applicant: JC Arrone UMADHAY - SUNPOWER CORPORATION SYSTEM

Telephone: 908-894-9679 Email: SPRI.Massachusetts@sunpowercorp.com

Address: 100 South St. Unit 100B, Hopkinton, MA 01748

Owner: Eugenio Fernandez Ventosa

Telephone: (781) 536-9679

Email: eugenio.fv@gmail.com

Address: 450 Main Street, Acton, MA 01720

Location of Work: Same

District: Center West South

Description of Proposed Work: Installation of roof-mounted solar panels.

Pertinent Provisions governing Approval of the Application:

Local Historic District Bylaw, Ch. P, Sec. P8. Criteria for Determinations:

8.1 In deliberating on applications for CERTIFICATES, the COMMISSION shall consider, among other things, the historic and architectural value and significance of the site, BUILDING or STRUCTURE; the general design, proportions, detailing, mass, arrangement, texture, and material of the EXTERIOR ARCHITECTURAL FEATURES involved; and the relation of such EXTERIOR ARCHITECTURAL FEATURES to similar features of BUILDINGS and STRUCTURES in the surrounding area.

Acton Historic District GUIDELINES for SOLAR INSTALLATIONS in HISTORIC DISTRICTS

1. Primary factors that the HDC shall consider in determining whether to permit the installation of a solar panel or panels on a building are the building's age, historic significance and/or unique architectural character. The older, more historically significant and/or architecturally unique a building, the less willing the HDC should be to permit any solar panels visible from the governing street on which the building is located.

2. Solar panels shall not be permitted on any building's roof surfaces that front on (that is, face) the governing street on which the building is located.

Massachusetts Historical Commission GUIDEBOOK for HISTORIC DISTRICT COMMISSIONS

Solar Panels

Solar panels include both photovoltaic and domestic hot water heaters. Accommodating any modern equipment, including solar panels, should be done in such a way as to minimize visibility from public ways. This is typically accomplished by locating the panels on rear ells, subordinate wings, secondary massings, accessory outbuildings, or on a free-standing array. Installing the panels behind dormers, chimneys or parapets is important so that the panels do not obscure character-defining features. MHC GUIDEBOOK, pp. 31-32.

Findings:

1. Two of the five members of the Historic District Commission, David Shoemaker and Zachary Taillefer, are owners of property within 300 feet of the property at 450 Main Street. As such, both are ineligible to participate in the deliberations on this matter. See HDC Rules and Regulations, Sec. 3.2.5. Because the Commission has only five members, their ineligibility would deprive the HDC of a quorum to review this application. Therefore, Chair David Honn – acting on the advice of Town Counsel – invoked the “Rule of Necessity” to make both eligible to participate. Because he is a direct abutter, that is, owns property adjacent to 450 Main Street, David Shoemaker chose nevertheless to recuse himself in this matter and did not participate in the proceedings. This recusal left the Commission with four voting members, a quorum to consider this matter. See Bylaw P, Sec. 7.7.
2. The building at 450 Main Street is a stone barn built circa 1907 and subsequently converted to a residence. The converted barn is a large, gable-end building with two shingled roof surfaces, one of which faces in a southerly direction. The roof shingles are architectural asphalt shingles, appropriate for historic buildings in a Local Historic District. See Acton HDC Design Guidelines, Roofs, p. 10 (“While most roofs were originally constructed of wood shingles or slate the vast majority have since been replaced with asphalt shingles.”); See also HDC Rules and Regulations, Sec. 3.2.3.
3. This “unusual stone barn” is one of the only examples of a stone barn in Acton. MACRIS ACT.106, Form B-106 (Form B-106). The barn was built for apple storage by Luke Harry Tuttle, a descendant of Horace Tuttle, who was the original owner of the house located at 446 Main Street, the house behind which this building sits. Form B-106. “The converted barn ... has fieldstone walls and shingled gable peaks. Windows with 2/2 sash have nice large stone lintels. In the wide shingle gable end there are two second story 2/2 windows and one in the gable peak. There is also a hay door at the second story level and the large altered multi-light center door has a long transom over it. In its

conversion to a residence, only minor changes were made to the exterior of the building.” Form B-106.

4. The property on which this building is located fronts exclusively on Main Street, and Main Street is therefore the governing way in this matter. See Town Bylaw P, Sec. 6.1.
5. The Application, filed on October 25, 2023, seeks a Certificate of Appropriateness to install 41 black photovoltaic solar panels on the southernmost facing roof surface of the house. This roof surface fronts on, that is, faces, Main Street.
6. The converted barn is approximately 168 feet from Main Street, and the roof surface in question is plainly visible with the unaided eye from Main Street at a height of five feet from the surface of Main Street (hereinafter referred to as “visible from Main Street”).
7. From each of the two principal viewpoints on Main Street, there is vegetation, including a tree, between the converted barn and Main Street. Some of that vegetation is on a neighbor’s property located between the converted barn and Main Street. During the months in which the vegetation is in full bloom, from both viewpoints the roof surface facing Main Street is partially obscured by that vegetation. However, even in that circumstance, the roof surface is visible from Main Street.
8. Although the HDC has approved the roof installation of solar panels on some half dozen buildings within its jurisdiction, none have solar panels on a roof surface that fronts on, that is faces, the governing way for that building.
9. There are solar panels on the rear roof surface of the barn at 14 Newtown Road, a property adjacent to the property here in question. These panels are visible from Main Street, albeit from some distance away. Although 14 Newtown Road is in Acton’s Center Historic District, the governing way for that property is Newtown Road, from which the panels on that barn are not visible and thus not within the HDC’s jurisdiction.
10. In the three Local Historic Districts in Acton, there are many buildings that are at least 100 years old, are historically significant and/or exhibit unique architectural characteristics. None of these buildings have solar panels on a roof surface plainly visible from their respective governing ways.

Conclusions:

1. The roof surface of the converted barn at 450 Main Street on which the proposed 41 solar panels would be installed fronts on, and is visible from, Main Street, the governing way in this matter. The HDC thus has jurisdiction concerning the proposed installation of those solar panels on that roof. Town Bylaw P, Sec. 6.1.
2. The fact that during some months of the year vegetation partially obscures the view of the roof surface from Main Street does not deprive the HDC of jurisdiction. First, the HDC does not consider such vegetation in determining its jurisdiction because vegetation – certainly vegetation on a neighboring property – is not permanent in the way that, for

- these purposes, buildings are. Second, even when the vegetation is in full bloom, the roof surface in question – although partially obscured – is still visible from Main Street.
3. The proposed installation of solar panels on the building's roof surface that fronts on, that is faces, Main Street, the governing way in this matter, would violate Solar Guideline 2, which provides:
 2. Solar panels shall not be permitted on any building's roof surfaces that front on (that is, face) the governing street on which the building is located.
 4. Solar Guideline 2's prohibition is categorical. None of the solar panel installations approved by the HDC include panels on a roof surface that fronts on, that is faces, the governing way on which the building is located. To approve the proposed solar installation in this case could not be justified in the face of the plain language of Solar Guideline 2 or the HDC precedents applying that Guideline.
 5. Quite apart from Guideline 2's categorical mandate, Solar Guideline 1 independently supports disapproval of the proposed installation. The converted barn is over 100 years old. It is one of the few remaining stone barns left in Acton, and – as described in Finding 3 – it exhibits unusual, if not unique, architecture. Built by a descendant of Horace Tuttle, the original owner and inhabitant of the historic home at 446 Main Street and sitting on the original grounds of that home right off the Town's green, the building has substantial historic significance.
 6. The installed panels would almost entirely cover the building's roof visible from Main Street, a character-defining feature of the converted barn. The simple, basic roof shape defines this building. Covering this roof with solar panels would substantially alter, if not destroy, its elemental architecture.

Disapproval of Application for Certificate of Appropriateness:

For the reasons set forth above, by a vote of four to zero at its meeting on November 14, 2023, the Commission DISAPPROVES the Application for a Certificate of Appropriateness for the installation of 41 solar panels on the roof surface of the house at 450 Main Street, which roof surface fronts on, that is faces, Main Street in the Center Historic District of Acton, MA.

Eligibility for Certificate of Hardship:

Pertinent Provisions governing Consideration of Hardship for the Application:

Local Historic District Bylaw, Ch. P, Sec. P7. Procedures for Review of Applications:

Sec. 7.6.1: If the CONSTRUCTION or ALTERATION for which an application for a CERTIFICATE of Appropriateness has been filed shall be determined to be inappropriate and therefore disapproved ... the COMMISSION shall determine whether, owing to conditions especially affecting the BUILDING or STRUCTURE involved; but not affecting the DISTRICT

generally, failure to approve an application will involve a substantial hardship, financial or otherwise, to the applicant and whether such application may be approved without substantial detriment to the public welfare and without substantial derogation from the intent and purposes of this Bylaw. If the Commission determines that owing to such conditions failure to approve an application will involve substantial hardship to the applicant and approval thereof may be made without such substantial detriment or derogation, the COMMISSION shall issue a CERTIFICATE of Hardship,

Local Historic District Bylaw, Ch. P, Sec. P1. Purpose:

The purpose of this bylaw is to aid in the preservation and protection of the distinctive characteristics and architecture of buildings and places significant in the history of the Town of Acton, the maintenance and improvement of their settings and the encouragement of new building designs compatible with the historically significant architecture existing in the Local Historic District(s) when this Bylaw was first adopted in 1990. This Bylaw does not seek to establish an architectural museum, but instead to inform concerning the historical process of architectural growth and adaptation to heighten a sense of educated pride in our heritage.

Findings:

1. The Commission adopts the Findings set forth above in its Disapproval of the application for a Certificate of Appropriateness.
2. In the three Local Historic Districts in Acton, there are many buildings with roof surfaces apparently suitable for solar installation that front (that is, face) the governing way for that building and are thus subject to Solar Guideline Two. Within the Center Historic District on Main Street alone there are several such privately owned buildings (of which the converted barn at 450 Main Street is one) that have unshaded, south-facing roof surfaces that front – that is, face – Main Street. One of these buildings is 460 Main Street, virtually next door to 450 Main Street. In the South and West Historic Districts there are several more privately owned buildings with roof surfaces apparently suitable for solar panels that front on their respective governing ways. None of those buildings have solar installations on those roof surfaces.
3. In the three Local Historic Districts in Acton, there are many privately owned buildings that are at least 100 years old, are historically significant and/or exhibit unique architectural characteristics. The converted barn at 450 Main Street is virtually surrounded by such buildings, all of which are subject to the mandate of both Solar Guideline One and the MHC Guidebook that solar panels be installed so-as to minimize their visibility from the governing way, e.g., “by locating the panels on rear ells, subordinate wings, secondary massings, accessory outbuildings, or on a free-standing array.” MHC GUIDEBOOK, pp. 31-32. None of those buildings have solar installations on roof surfaces plainly visible from their respective governing ways. In one of those

buildings, the Acton Congregational Church at 12 Concord Road, the HDC declined to approve the proposed installation of solar panels on the roof of the historic part of the church, the closest part of the church to Concord Road (the governing way for that building), insisting that the panels instead be installed on a roof surface of a modern accessory building more distant from Concord Road, where the panels are far less visible.

4. The lot at 450 Main Street is just under two acres. The converted barn is located on the front half of the property, and there is ample room to install a free-standing array of solar panels capable of supplying electrical power equal to that supplied by the proposed 41 panel roof-mounted array. Such a free-standing array could be installed, either behind the converted barn or screened from view, so that it is not visible from Main Street. The installation, operation and maintenance of such a free-standing solar array could be substantially equivalent to that of the proposed roof-mounted array. The Owner of 450 Main Street asserts that a free-standing solar array would be substantially more expensive than the proposed roof installation, but he offers no cost comparisons to substantiate that position. The Owner also asserts that a free-standing solar array might create ill will among neighboring property owners. Even if such potential social discomfort might possibly qualify as "a substantial hardship" under Bylaw P, Sec. 7.6.1, which seems unlikely, he again offers no evidence – e.g., photos of free-standing arrays to compare with the photos of the proposed roof-mounted array or conversations he has had with neighbors – to substantiate that possibility.
5. The converted barn is over 100 years old, and its conversion to a residence left its exterior appearance substantially intact. Form B-106. It is one of the few remaining stone barns left in Acton, and it exhibits "unusual," if not unique, architecture. Form B-106. Built by a descendant of Horace Tuttle, the original owner and inhabitant of the historic home at 446 Main Street, and sitting on the original grounds of that home right off the Town's green, Form B-106, the building has substantial historic significance.

Conclusions:

1. The condition which the Owner claims creates a hardship entitling him to a Certificate of Hardship – the disapproval of the proposed installation of 41 solar panels on the south-facing roof of his residence – is not one "especially affecting the BUILDING ... involved, but not affecting the DISTRICT generally." There are two bases for disapproving the requested installation, both of which are broadly applicable to privately owned buildings throughout Acton's three Local Historic Districts.
 - a. First, the proposed installation was disapproved under Guideline Two of **Acton Historic District GUIDELINES for SOLAR INSTALLATIONS in HISTORIC DISTRICTS**, which provides: "Solar panels shall not be permitted on any building's roof surfaces that front on (that is, face) the governing street on which the building is located." As noted in Finding 2, above, there are many

privately owned, historic buildings in Acton's three Local Historic Districts with roof surfaces apparently suitable for solar installation that front (that is, face) the governing way for that building and are thus subject to Solar Guideline Two's categorical prohibition. There are several such buildings on Main Street alone (of which the converted barn at 450 Main Street is one) that have unshaded, south-facing roof surfaces that front – that is, face – Main Street. One such building, a private residence at 460 Main Street, is a virtual next-door neighbor to 450 Main Street. Like the converted barn at 450 Main Street, the house at 460 Main Street has no other roof surface suitable for solar panels. None of the buildings here referenced, including the ones on Main Street, have solar installations on a roof surface that fronts (that is, face) their respective governing ways.

- b. Second, the proposed installation was disapproved under Guideline One of Acton Historic District **GUIDELINES for SOLAR INSTALLATIONS in HISTORIC DISTRICTS**, which provides: "Primary factors that the HDC shall consider in determining whether to permit the installation of a solar panel or panels on a building are the building's age, historic significance and/or unique architectural character. The older, more historically significant and/or architecturally unique a building, the less willing the HDC should be to permit any solar panels visible from the governing street on which the building is located." In the three Local Historic Districts in Acton, there are many privately owned buildings that, like the converted barn at 450 Main Street, are at least 100 years old, are historically significant and/or exhibit unique architectural characteristics. The converted barn at 450 Main Street is virtually surrounded by such buildings, all of which are subject to the mandate of Solar Guideline One, as well as the MHC Guidebook's prescription that solar panels be installed so as to minimize their visibility from the governing way "by locating the panels on rear eells, subordinate wings, secondary massings, accessory outbuildings, or on a free-standing array." MHC **GUIDEBOOK**, pp. 31-32.
2. It is not clear that the "failure to approve [this] application will involve a substantial hardship, financial or otherwise, to the applicant." At least, the Owner has not demonstrated that this is so. The converted barn is located towards the front of a large, almost two-acre lot, which has apparent room for a free-standing solar array either behind the building or otherwise screened from view from Main Street. Such a free-standing array, suggested by the **Massachusetts Historical Commission GUIDEBOOK for HISTORIC DISTRICT COMMISSIONS** as a way to minimize visibility of solar installations (see Guidebook, pp. 31-32), would presumably be substantially equivalent to the proposed roof-mounted array. The Owner asserted that the cost of a free-standing array would be substantially greater than that of the proposed roof-mounted array, and that it could cause social friction with his neighbors, but even if either of these assertions

might possibly constitute a “substantial hardship” under Bylaw P, Sec. 7.6.1, he offered no proof of either assertion.

3. Finally, even if Applicant could demonstrate that the failure to approve a Certificate of Hardship in this case would result in a hardship that meets Bylaw P, sec. 7.6.1’s dual criteria, for the reasons that justified its Disapproval of the application for a Certificate of Appropriateness, the approval of a Certificate of Hardship would result in “substantial detriment to the public welfare and ...substantial derogation from the intent and purposes of [Bylaw P].” As noted in Finding 5, the converted barn is over 100 years old, and its conversion to a residence left its exterior appearance substantially intact. Form B-106. It is one of the few remaining stone barns left in Acton, and it exhibits “unusual,” if not unique, architecture. Form B-106. Built by a descendant of Horace Tuttle, the original owner and inhabitant of the historic home at 446 Main Street, and sitting on the original grounds of that home right off the Town’s green, Form B-106, the building has both distinctive architecture and substantial historic significance. The primary purpose of Bylaw P, Acton’s Local Historic District Bylaw, is “the preservation and protection of the distinctive characteristics and architecture of buildings and places significant in the history of the Town of Acton.” In the circumstances noted above, the approval of a Certificate of Hardship allowing the proposed solar installation on the roof of this converted barn would be in substantial derogation of the intent and purposes of the intent and purposes of Bylaw P and thus of the public welfare.

Denial of Certificates of Hardship and Appropriateness:

For the reasons set forth above, by a vote of four to zero at its meeting on January 9, 2024, the Commission DENIES a Certificate of Hardship and with it DENIES a Certificate of Appropriateness for the installation of 41 solar panels on the roof surface of the house at 450 Main Street.

Any appeal from any part of this decision must be in accordance with the procedures set forth in Bylaw P, Section P12.

Application 2341 received October 25, 2023

Public Hearing: November 14, 2023, cont’d by agreement with the Owner to January 9, 2024.

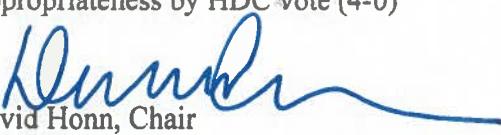
Disapproval of Application by HDC vote (4-0)

Date: November 14, 2023

Denial of Certificates of Hardship and

Appropriateness by HDC vote (4-0)

Date: January 9, 2024


David Honn, Chair

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Application # 2341

**TOWN OF ACTON
HISTORIC DISTRICT COMMISSION
472 Main Street, Acton, MA 01720**

APPLICATION FOR CERTIFICATE

This information will be publicly posted on the Town of Acton website docushare.

Pursuant to Ch. 40C of the General Laws of Massachusetts, application is hereby made for issuance of the following Certificate for work within a Local Historic District (please check one):
Cert. of Appropriateness (Building Alteration/Sign/Fence/Change of Ownership) Fee: \$10
Cert. of Appropriateness (Building Addition other than deck/New Bldg/Demolition) Fee: \$50
Cert. of Hardship (for either category of Appropriateness) Fee: \$10 or \$50 (as appropriate)
Cert. of Non-Applicability No Fee

Fees waived for non-profit or municipal applicants.

Applicant:

JC ARRONE UMADHAY - SUNPOWER CORPORATION SYSTEM

Telephone:

908-894-9679

Address:

100 South St Unit 100B Hopkinton MA 01748

E-mail:

SPRI.Massachusetts@sunpowercorp.com

Property owner and address:

(if different from applicant)

450 MAIN ST ACTON MA 01720

Contact information:

(787) 536-7004 / eugenio.fv@gmail.com

Location of Work: 450 MAIN ST ACTON MA 01720

District: Center West South

No.

Street

Description of Work: (See website Instructions regarding information that is here required)

INSTALLATION OF ROOF-MOUNTED PV SYSTEM – 16.40 KW (41 MODULES)WITH (N)125A LOAD CENTER

The undersigned hereby certifies that the information on this application and any plans submitted herewith are correct, and constitute a complete description of the work proposed. By my signature below, I acknowledge that this application and all its data will be publicly posted on the Town of Acton website docushare.

Signature of applicant



Date: 09/08/2023

Application received by _____ for HDC Date: _____

COA approved/CNA issued by _____ for HDC Date: _____



Acton Building Department
472 Main St
Acton, MA 01720

Acton Historic District Commission
RE: 450 Main St Acton MA

This letter serves as request to the Historic District Commission for the allowance of a photovoltaic solar installation to occur at 450 Main St. The proposed array consists of 41 black panels on the southern most facing roof of the house. As detailed in the data attached, this roof gets the most sun exposure, allowing for the highest benefit from the solar system. The panels are affixed to the roof roughly 3.5" above the roof's surface. The house is not highly visible from the road and does not require any structural modifications to accommodate the planned installation.

Thank you,
SunPower Corporation Systems

Eugenio Fernandez Ventosa
Homeowner

SunPower Corporation Systems
50 Rockwell Rd | Newington CT 0611



Studio umbra

450 Main Street o. 617.481.1627
Acton, MA 01720 c. 787.536.7004
eugenio.fv@studio-umbra.com
www.studio-umbra.com

October 24, 2023

Acton Historic District Commission
472 Main Street
Acton, MA 01720

Re: Proposed Solar Array
450 Main Street
Acton, MA 01720

Dear Acton Historic District Committee:

By these means, we are requesting approval for our solar array installation at 450 Main Street, Acton, Massachusetts. We are a family of 4, with two young daughters living in a converted barn from 1907. Additionally, I own a small Architecture Firm from my basement, with a focus on commercial work and energy retrofits, and public sector work. As we moved in to this house, besides making the space as comfortable and safe for our daughters, we established 2 main goals during our ownership of the building: 1. Preserve its historical value while differentiating the new items from the existing elements; and 2. Maximizing the sustainability of the home with an eventual goal of energy independence.

With this goal of energy independence and carbon footprint reduction, we are trying to reduce our use of natural gas and switch to more efficient electric systems. As a first step we are looking at installing a solar array that will provide the backbone to the house energy requirements, and eventually plan to replace the natural gas boiler and AC condenser with a geothermal system. This HVAC system will be able to be operated by the solar capacity of the roof and further eliminate any unsightly exterior equipment. We want this house to retain its historic elements and charm, yet still operate efficiently and be as safe as possible for our daughters.

The existing structure consisting of 20" thick stone walls and simple gabled wood truss roof with asphalt shingles stands a significant distance from the street, and is mostly covered by houses or vegetation, the house stands 167 feet away from Main Street directly behind 446 Main Street. The proposed solar array consists of 41 black photovoltaic panels installed using 3.5" brackets. All panels will be installed on the south roof, as it is almost perfectly south facing and would get the most sun exposure. Since the remainder of the site is surrounded by trees, moving the solar array elsewhere would mean a far less efficient system, and an eye sore for the surrounding neighbors. The roof on south facing façade would be the least intrusive location for this assembly; even though it would mean they would face Main Street, the panels would not be significantly apparent due to the significant distance from the street, and the significant amount of vegetation buffer between the house and the street. The roof will be mostly visible only when driving north east on Main Street on the small distance between 438 Main Street and 446 Main Street. We additionally plan on planting evergreen vegetation on this side of the house, with the goal of reducing the street noise from the street, which will also aid in further hiding the roof.

Proposed Solar Array
450 Main Street, Acton, MA 01720
October 24, 2023

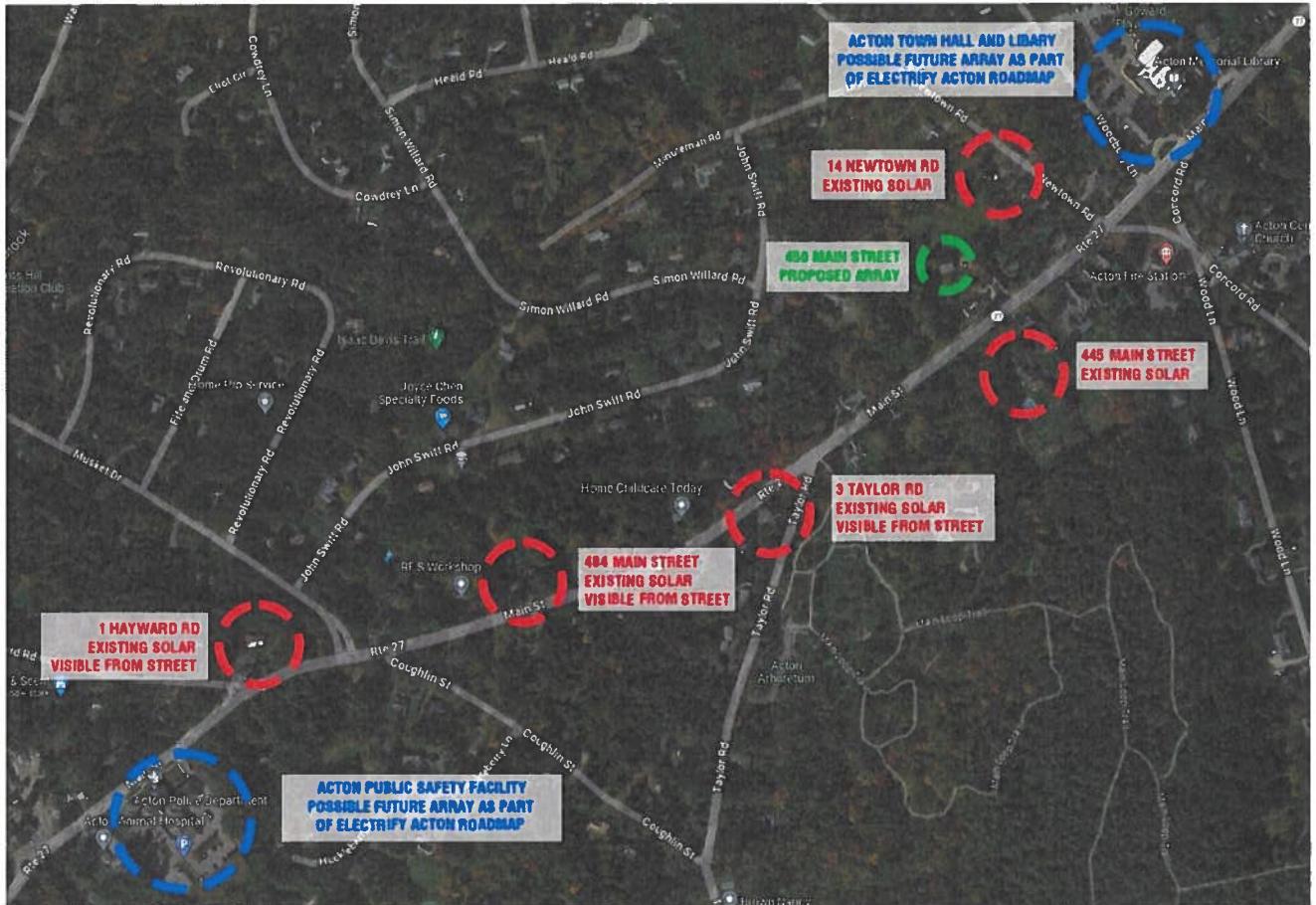


This is the angle from which the roof will be mostly visible, between 438 Main Street and 446 Main Street, behind significant vegetation that mostly obscures the view.

Even though the roof will be partially visible, it will only be so for a small distance when walking or driving northeast on Main Street, between 438 Main Street and 446 Main street, and by that point the viewer will have already been exposed to 3 houses with solar assemblies in their roof in close proximity to 450 Main Street. Additionally, in accordance with the proposed Electrify Acton Roadmap, additional, and significantly larger, solar assemblies may end up being visible from Main Street at the Acton Public Safety Facility and the Acton Town Hall. Because of this, and the fact that the proposed solar assembly will be very well hidden, the proposed project will not significantly affect the fabric of the town and of Main Street.

The solar array will also not detract from the historic elements of the existing house. The current roof was built in 2017 as a replacement to the original slate roof, and the solar array would be different enough from the historic elements to not distract or muddy the historic value, in concordance with current historic preservation efforts and ideas, including the Secretary of the Interior's Standards for the Treatment of Historic Properties.

Proposed Solar Array
450 Main Street, Acton, MA 01720
October 24, 2023



The existing – and proposed – solar arrays system in close proximity to 450 Main Street.

I am passionate of my work as an architect, and feel particular pride in the protection and maintenance of this beautiful house. It is my hope to further its life with the use of energy and weather resilient techniques that will help the house sustain this changing weather patterns and energy requirements, as well as provide the best possible home for my daughters to grow in, by reducing the amount of fossil fuels that would raise the amount of carcinogens in the house.

Finally, we feel this proposed project falls in line with the town of Acton Environmental Sustainability Policy, the Department of Energy Resources, and the Commonwealth of Massachusetts policy of expanding access to Solar Generation and Decarbonization. Please contact me anytime to discuss the above. We look forward to the opportunity of working with you on this project.

Sincerely,

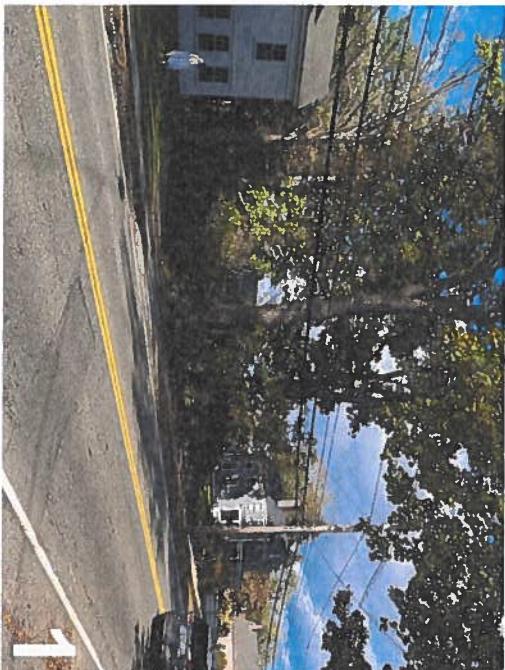
Eugenio Fernandez, AIA
Studio Umbra



Sample photo of proposed solar panels to be used



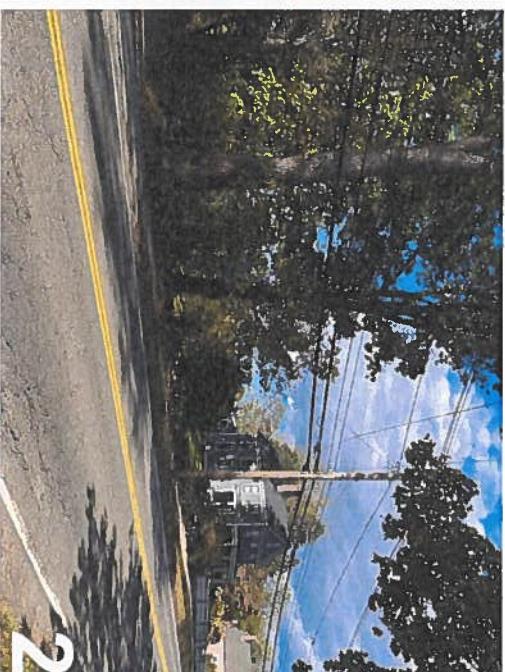
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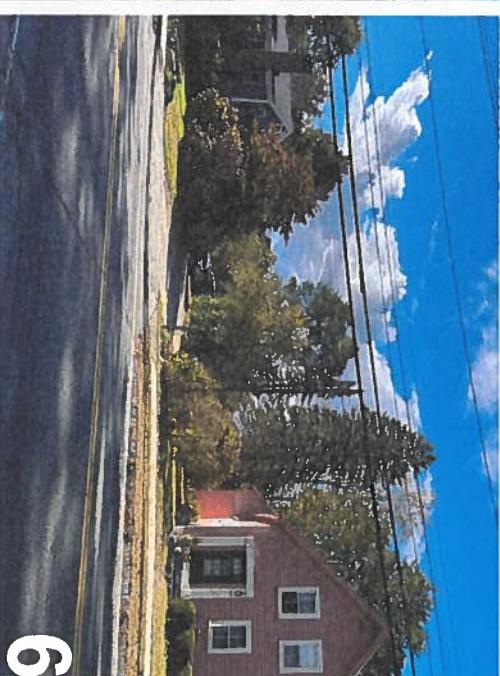
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Studio umbra
architecture
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Dwelling, 1st, 2nd, 3rd
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CC:

450 MAIN STREET, ACTON

Project number
Date
Scale
Drawn By
Ref S#
Ref R#
Re: Drawing #

10/10/23
EFV

P-2



Studio Umbra
architecture
10 197 524 700
10 197 524 700
P.O. Box 22028
Ontario, N4L 2Z8
www.studioumbra.com

450 MAIN STREET, ACTON

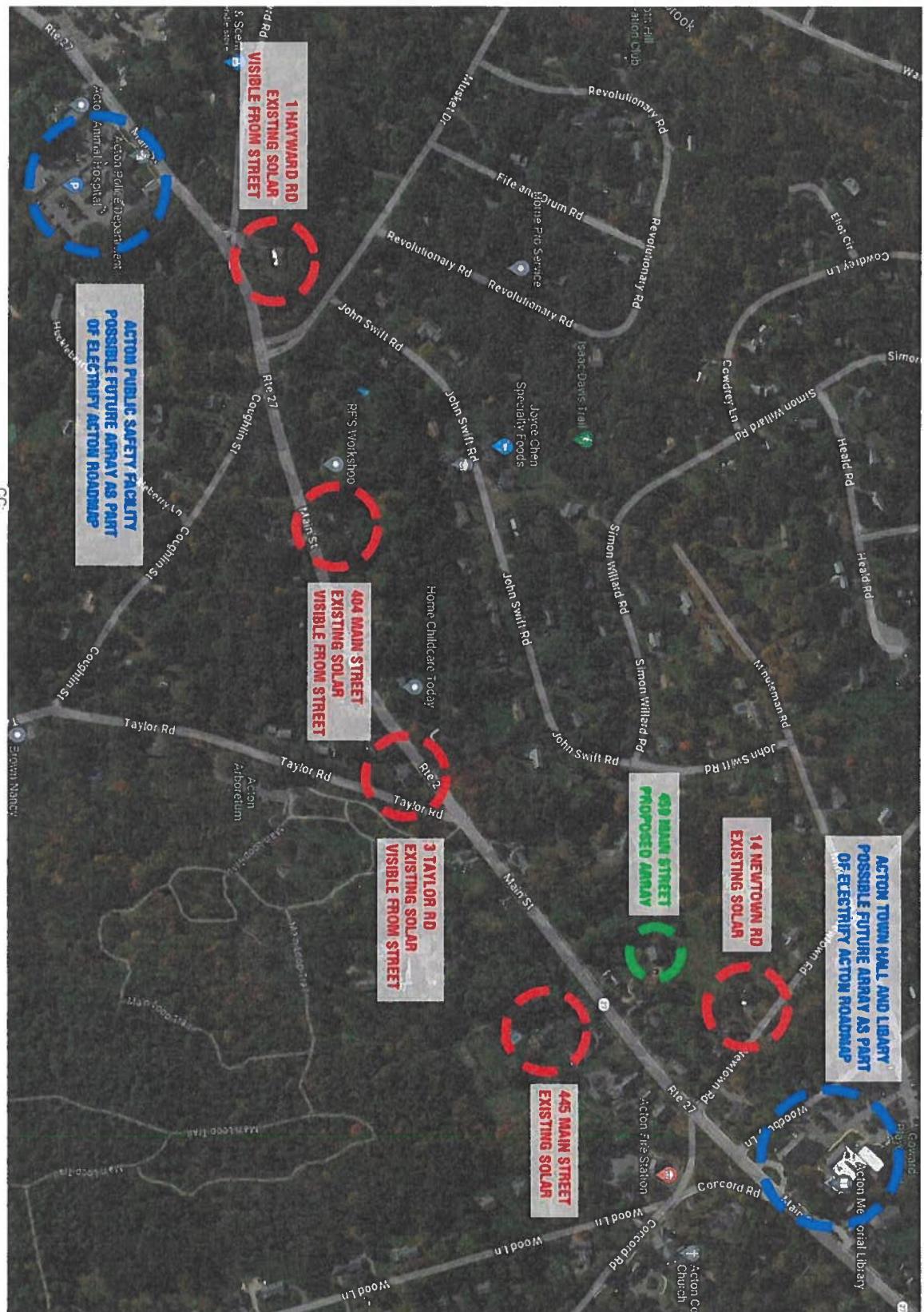
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Project number
Date
Scale
Drawn By
Ref: S#
Ref: RF#
Re: Drawing #

10/10/23
EFV

P-4



Studio Umbra
Arborists
107 Main St.
Acton, MA 01720
(978) 251-1072
info@umbra-arborists.com
www.umbra-arborists.com

CC:

450 MAIN STREET, ACTON



Project number
Date
Scale
Drawn By
Ref A#:
Ref R#:
Drawing #

10/24/23
Author

P-5

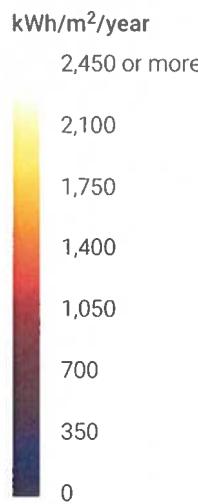
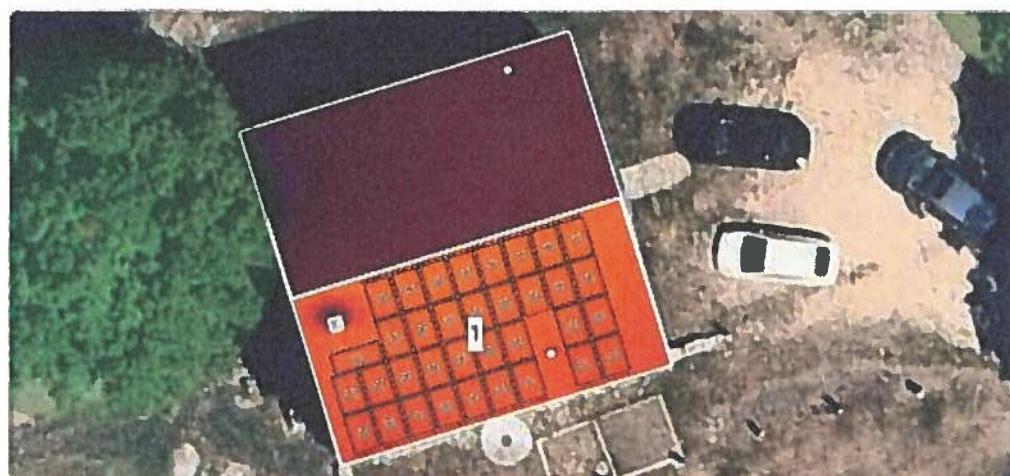
Aurora Shade Report

Customer
 Eugenio Fernandez
 Ventosa
Address
 450 Main Street
 Acton, MA, 01720

Designer
 Ronn Adriel Alabastro
Coordinates
 (42.484969, -71.435828)

Organization
 SunPower (Integration)
Date
 30 June 2023

Annual irradiance



Summary

Array	Panel Count	Azimuth (deg.)	Pitch (deg.)	Annual TOF (%)	Annual Solar Access (%)	Annual TSRF (%)
1	35	163	40	99	91	90
Weighted average by panel count	-	-	-	-	91.3	90.3

Monthly solar access (%) across arrays

Array	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	85	90	92	92	92	94	94	93	93	90	89	84

Customer
Eugenio Fernandez
Ventosa
Address
450 Main Street
Acton, MA, 01720

Designer
Ronn Adriel Alabastro
Coordinates
(42.484969, -71.435828)

Organization
SunPower (Integration)
Date
30 June 2023

Zoomed out satellite view



3D model



3D model with LIDAR overlay



Customer
Eugenio Fernandez
Ventosa
Address
450 Main Street
Acton, MA, 01720

Designer
Ronn Adriel Alabastro
Coordinates
(42.484969, -71.435828)

Organization
SunPower (Integration)
Date
30 June 2023

Street view and corresponding 3D model



I, **Ronn Adriel Alabastro**, certify that I have generated this shading report to the best of my abilities, and I believe its contents to be accurate.

SOLAR INDIVIDUAL PERMIT PACKAGE

EUGENIO FERNANDEZ VENTOSA (N) 16.40 kW GRID TIED PHOTOVOLTAIC SYSTEM

(787) 536-7004
450 MAIN ST

ACTON, MASSACHUSETTS 01720

AHJ: ACTON TOWN
UTILITY: EVERSOURCE ENERGY (FORMERLY NSTAR ELECTRIC COMPANY)

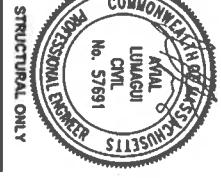
SATELLITE IMAGE



NOTES

SHEET INDEX

SCOPE OF WORK
 - (N) 16.400 kW PHOTOVOLTAIC SYSTEM
 - (41) WAAREE ENERGIES LIMITED WSMDI-400 PV MODULES AND (41) ENPHASE IQ7HS-66-M-US MICROINVERTER
 - POINT OF INTERCONNECTION AT MAIN SERVICE PANEL WITH LINE SIDE TAP



CODE INFORMATION

APPLICABLE CODES, LAWS AND REGULATIONS
 MA STATE BUILDING CODE, 9TH ED. BASE VOLUME
 MA STATE BUILDING CODE, 9TH ED. RESIDENTIAL VOLUME
 EXISTING BUILDING CODE OF MASSACHUSETTS
 MECHANICAL CODE 2015 OF MASSACHUSETTS
 2020 MASSACHUSETTS ENERGY CODE
 ENERGY CONSERVATION CODE 2015 OF MASSACHUSETTS
 NFPA 1, FIRE CODE, 2021 EDITION
 NFPA 70, 2023 MA ELECTRICAL CODE

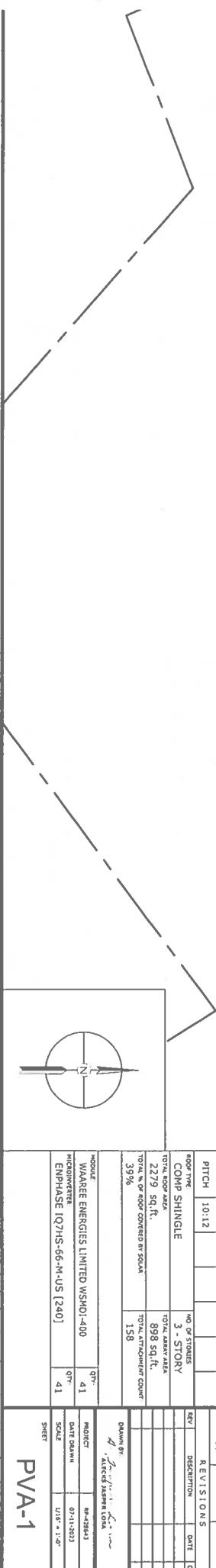
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 RICHMOND, CA 94804
 (510) 540-0550

ELECTRICAL DRAWINGS			
PVE-1	ELECTRICAL SINGLE-LINE DIAGRAM & SPECIFICATIONS	REV.	REVISIONS
PVE-2	ELECTRICAL CALCULATION	DESCRIPTION	DATE
PVE-3	ELECTRICAL DATA & SPECIFICATIONS		DR.
PVE-4	EQUINOX GROUNDING DETAILS		
PVE-5	BRANCH DIAGRAM		

EUGENIO FERNANDEZ VENTOSA
16.40 kW GRID-TIED PHOTOVOLTAIC SYSTEM
450 MAIN ST
ACTON, MASSACHUSETTS 01720
SOLAR INDIVIDUAL PERMIT PACKAGE
COVER SHEET

DRAWN BY	J. FERNANDEZ
PROJEC	No. 57691
DATE DRAWN	07-11-2023
SCALE	1/8"
SPRINT	WTS

PVA-0

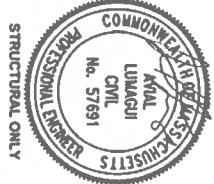


READILY ACCESSIBLE PV
DISCONNECT MEANS

1. FIELD ADJUSTMENTS OF FEWER THAN 5°
MAY BE ALLOWED BASED ON SITE
CONDITIONS AND MEASUREMENTS.

ROOF	1			
MODULE QTY.	41			
AZIMUTH	163°			
PITCH	10:12			
ROOF TYPE	COMP SHINGLE	NO. OF STOREYS		
TOTAL ROOF AREA	2279 Sq. ft.	TOTAL ARRAY AREA	898 Sq. ft.	
TOTAL % OF ROOF COVERED BY SOLAR	35%	TOTAL ATTACHMENT COUNT	158	

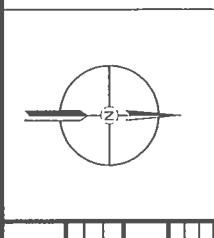
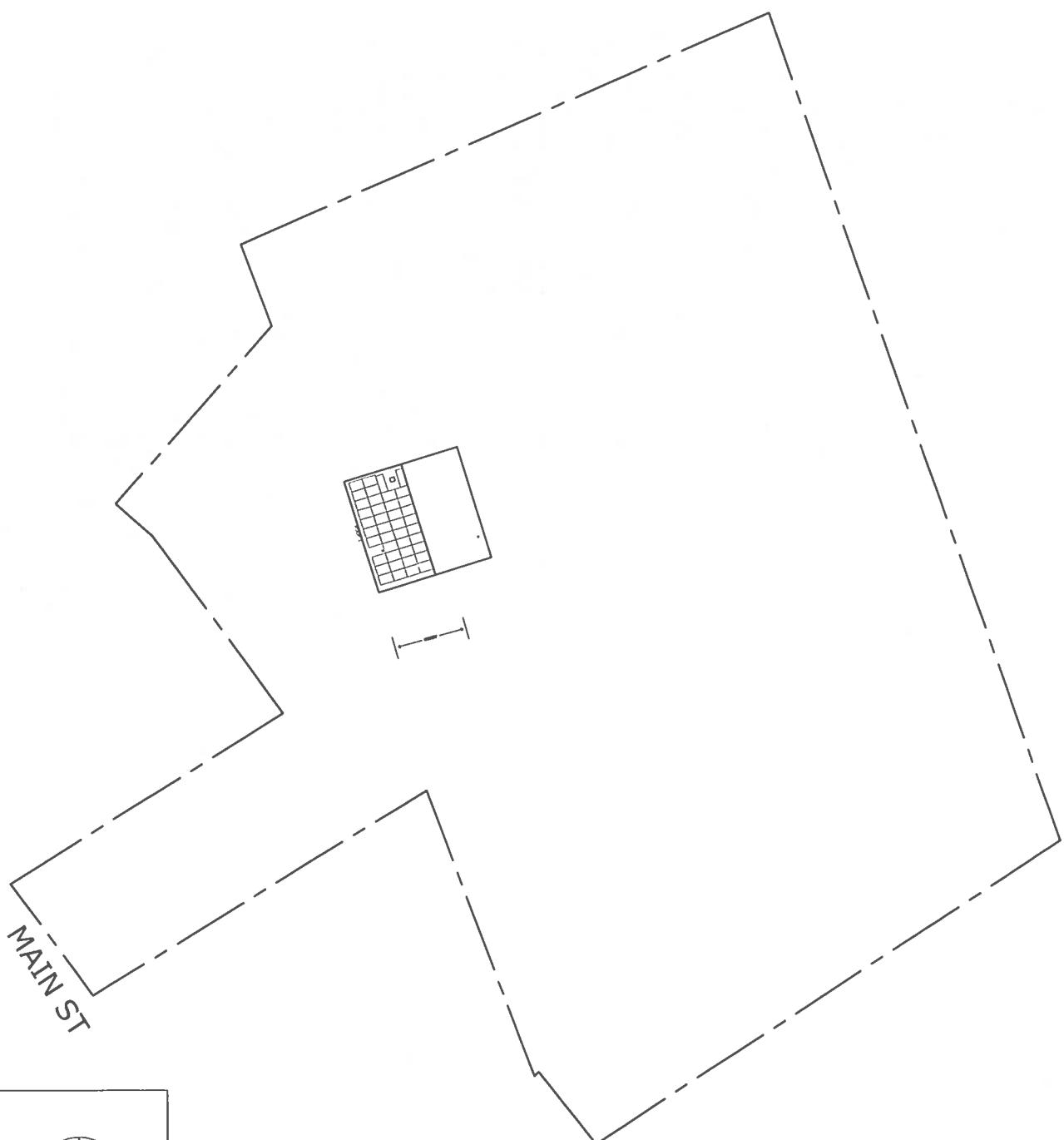
EUGENIO FERNANDEZ VENTOSA
16.40 kW GRID-TIED PHOTOVOLTAIC SYSTEM
450 MAIN ST
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ARRAY LAYOUT



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PVA-1



EUGENIO FERNANDEZ VENTOSA
16.40 kW GRID-TIED PHOTOVOLTAIC SYSTEM
450 MAIN ST
ACTON, MASSACHUSETTS 01720
SOLAR INDIVIDUAL PERMIT PACKAGE
LOT DIAGRAM

REV	REVISIONS

Drawn by
Alec L. Lepine, C.P.

Project No. 21043

Date Drawn 07-11-2023

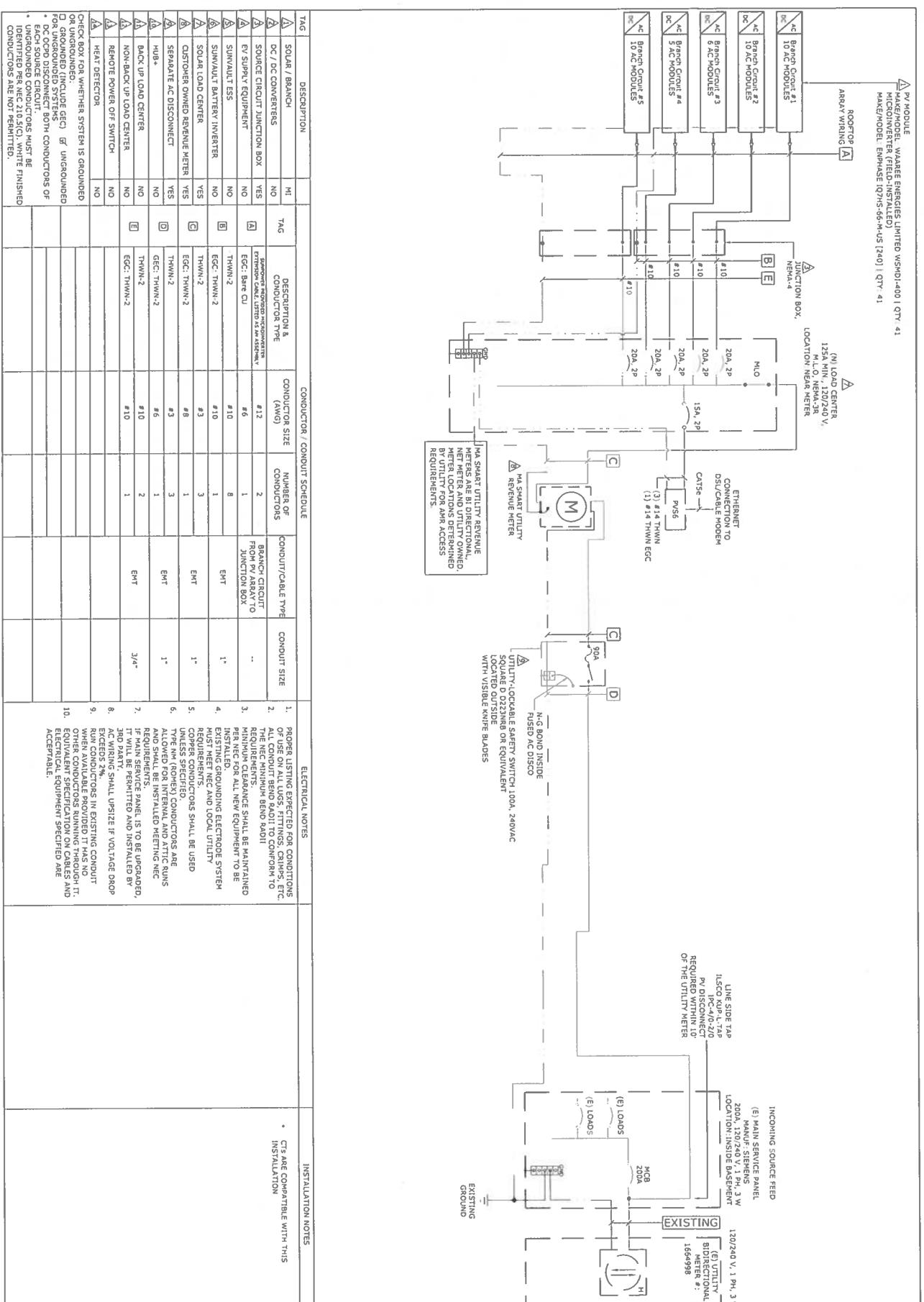
Scale 1/8"

Sheet 1



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TAG	DESCRIPTION	CONDUCTOR / CONDUIT SCHEDULE				ELECTRICAL NOTES
		DESCRIPTION & CONDUCTOR SIZE	NUMBER OF CONDUCTORS	CONDUIT/PIPE TYPE	CONDUIT SIZE	
△ SOLAR / BRANCH	MI					
△ DC / DC CONVERTERS	NO					
△ SOURCE CIRCUIT JUNCTION BOX	YES	Supplied as part of inverter equipment Ethernet cable listed as an assembly	#12	2	BRANCH CIRCUIT	1. PROPER LISTING EXPECTED FOR CONDITIONS OF USE ON ALL LUGS, CRIMPS, ETC. 2. IF USE ON ALL LUGS, CRIMPS, ETC. THE CONNECTOR AND CONDUIT CONFORM TO REQUIREMENTS.
△ EV SUPPLY EQUIPMENT	NO	ECC: Bare CU	#6	1	FROM PV ARRAY TO JUNCTION BOX	3. MINIMUM CLEARANCE SHALL BE MAINTAINED PER NEC FOR ALL NEW EQUIPMENT TO BE INSTALLED. 4. EXISTING GROUNDING ELECTRODE SYSTEM MUST MEET NEC AND LOCAL UTILITY CODE REQUIREMENTS. 5. OTHER CONDUCTORS SHALL BE USED UNLESS SPECIFIED 6. TYPICAL (ROMEX) CONDUCTORS ARE ALLOWED FOR INTERNAL AND ATTIC RUNS AND SHALL BE INSTALLED MEETING NEC REQUIREMENTS. 7. IF MAIN SERVICE PANEL IS TO BE UPGRADED, IT WILL BE PERMITTED AND INSTALLED BY OWNER. 8. GFCI SHALL UPSIZE IF VOLTAGE DROP EFFECTS 9. RUN CONDUCTORS IN EXISTING CONDUIT WHEN AVAILABLE PROVIDED IT HAS NO OTHER CONDUCTORS RUNNING THROUGH IT. 10. EQUIVALENT SPECIFICATION ON CABLES AND ELECTRICAL EQUIPMENT SPECIFIED ARE ACCEPTABLE.
△ SUNVAULT ESS	NO					
△ SUNVAULT BATTERY INVERTER	NO	ECC: THHN-2	#10	8	EMT	
△ SOLAR LOAD CENTER	YES	THHN-2	#10	1		
△ CUSTOMER OWNER REVENUE METER	YES	ECC: THHN-2	#3	3	EMT	
△ SEPARATE AC DISCONNECT	YES	THHN-2	#3	3	EMT	
△ HUB+	NO	ECC: THHN-2	#6	1	EMT	
△ BACK UP LOAD CENTER	NO	THHN-2	#10	2	EMT	
△ NON BACK UP LOAD CENTER	NO	ECC: THHN-2	#10	1	EMT	
△ REMOTE POWER OFF SWITCH	NO					
△ HEAT DETECTOR						
△ CHECK BOX FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED (INCLUDE GEC) OR UNGROUNDED FOR UNGROUNDED SYSTEMS						
△ DC GCF DISCONNECT BOTH CONDUCTORS OF EACH SOURCE CIRCUIT						
△ UNROUNDDED CONDUCTORS MUST BE IDENTIFIED PER NEC 210.5(C). WHITE FINISHED CONDUCTORS ARE NOT PERMITTED.						

EUGENIO FERNANDEZ VENTOSA

450 MAIN ST
ACTON, MASSACHUSETTS 01720

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ELECTRICAL CALCULATIONS

ROOF JCT BOX TO SUBPANEL WIRING					
BRANCH 1	BRANCH 2	BRANCH 3	BRANCH 4	BRANCH 5	
#10	#10	#10	#10	#10	#10
10	10	6	5	10	
240 V	240 V	240 V	240 V	240 V	
16 A	16 A	9.6 A	8 A	16 A	
20.00 A	20.00 A	12.00 A	10.00 A	20.00 A	

CONDUCTOR DE-RATING					
MAXIMUM AMBIENT TEMPERATURE					
34 °C	34 °C	34 °C	34 °C	34 °C	
34 °C	34 °C	34 °C	34 °C	34 °C	
0.96	0.96	0.96	0.96	0.96	
0.5	0.5	0.5	0.5	0.5	
33.33 A	33.33 A	20.00 A	16.67 A	33.33 A	
40 A	40 A	40 A	40 A	40 A	
#10	#10	#10	#10	#10	
#10	#10	#10	#10	#10	
75 FT.	75 FT.	75 FT.	50 FT.		
1.24%	1.24%	0.74%	0.62%	0.83%	

OVERCURRENT PROTECTION					
MINIMUM OCPD = $I_{out} \times 1.25$					
20A, 2P	20A, 2P	20A, 2P	20A, 2P	20A, 2P	
20.00 A	20.00 A	12.00 A	10.00 A	20.00 A	

NOTE: DISTANCE ABOVE ROOF TO BOTTOM OF CONDUIT: >23mm (7/8")					
SUBPANEL 1 TO GRID-TIE WIRING					
VOLTAGE	240 V	#3			
SUM OF BRANCHES: $I_{out_total} = 82.00 A$	65.6 A				
MINIMUM WIRE AMPACITY: $I_{max} = I_{out} \times 1.25$					

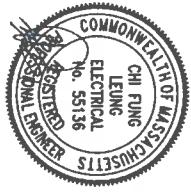
CONDUCTOR DE-RATING					
MAXIMUM AMBIENT TEMPERATURE					
34 °C	34 °C				
34 °C	34 °C				
0.96	0.96				

TEMPERATURE USED FOR AMPACITY DE-RATING					
TEMPERATURE DE-RATING COEFFICIENT					
FILL DE-RATING COEFFICIENT	1.0				
WIREAMP = $I_{out} / (\text{TEMP_COEFF} / \text{FILL_COEFF})$	68.33 A				
WIRE SIZE AMPACITY	115 A				

CONDUCTOR SIZE					
CONDUCTOR SIZE ADJUSTED FOR VOLTAGE DROP					
CONDUCTOR SIZE ADJUSTED FOR VOLTAGE DROP	#3				
ONE WAY CIRCUIT LENGTH	10 FT.				
VOLTAGE DROP	0.13%				

OVERCURRENT PROTECTION					
MINIMUM OCPD = $I_{out} \times 1.25$					
OVERCURRENT PROTECTION	90A, 2P				
VOLTAGE DROP	82.00 A				

EUGENIO FERNANDEZ VENTOSA
16.40 kW GRID-TIED PHOTOVOLTAIC SYSTEM
450 MAIN ST
ACTON, MASSACHUSETTS 01720
SOLAR INDIVIDUAL PERMIT PACKAGE
ELECTRICAL CALCULATION



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REV.	DESCRIPTION	DATE

**PHOTOVOLTAIC POINT OF
INTERCONNECTION**

WARNING: DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC

SYSTEM

MAXIMUM RATED AC OUTPUT CURRENT:
1400W/1000W

65.6 A
Amps

240 V
Volts

SIGNAGE LOCATIONS:

- MAIN SERVICE PANEL
- INDOOR / OUTDOOR SUBPANEL

**SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN
SWITCH TO THE "OFF"
POSITION TO SHOT DOWN
AND REDUCE SHOCK
HAZARD IN THE ARRAY



SIGNAGE LOCATIONS:

- SHALL BE LOCATED ON OR NO MORE THAN 1' (0.30 M) FROM THE SERVICE DISCONNECT MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED

**PHOTOVOLTAIC SYSTEM
AC DISCONNECT**

RATED AC OUTPUT CURRENT:
1400W/1000W

65.6 A
Amps

240 V
Volts

SIGNAGE LOCATIONS:

- INDOOR / OUTDOOR AC DISCONNECT

**RAPID SHUTDOWN SWITCH FOR
SOLAR PV SYSTEM**

DO NOT RELOCATE THIS OVERCURRENT DEVICE
NEC 705.12(B)(3)(2)

SIGNAGE LOCATIONS:

- MAIN SERVICE PANEL
- NEW INDOOR / OUTDOOR LOAD CENTER
- INDOOR / OUTDOOR SUBPANEL

- LABEL SHALL BE LOCATED ON OR NO MORE THAN 1' (0.30 M) FROM THE SWITCH

SIGNAGE NOTES

- MATERIAL USED FOR THE SIGNAGE SHALL BE REFLECTIVE, WEATHER RESISTANT AND SUITABLE FOR THE ENVIRONMENT.
- ALL SIGNAGE SHALL HAVE ALL CAPITAL LETTERS WITH MINIMUM $\frac{1}{8}$ LETTER HEIGHT, WHITE ON RED BACKGROUND.
- MAIN SERVICE DISCONNECT MARKING SHALL BE PLACED ADJACENT TO MAIN SERVICE DISCONNECT IN A LOCATION CLEARLY VISIBLE FROM THE LOCATION WHERE THE LEVER IS OPERATED.
- MARKING IS REQUIRED ON ALL INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, AND JUNCTION BOXES TO ALERT THE FIRE SERVICE TO AVOID CUTTING THEM. MARKINGS SHALL BE PLACED EVERY 10' AT TURNS AND ABOVE AND/OR BELOW PENETRATIONS, AND AT ALL DC COMBINER AND JUNCTION BOXES.
- DO NOT USE SCREWS FOR SIGNAGE ATTACHMENT. USE ONLY APPROVED ADHESIVE.

EUGENIO FERNANDEZ VENTOSA
16.40 kW GRID-TIED PHOTOVOLTAIC SYSTEM

450 MAIN ST
ACTON, MASSACHUSETTS 01720

SOLAR INDIVIDUAL PERMIT PACKAGE
ELECTRICAL DATA & SPECIFICATIONS



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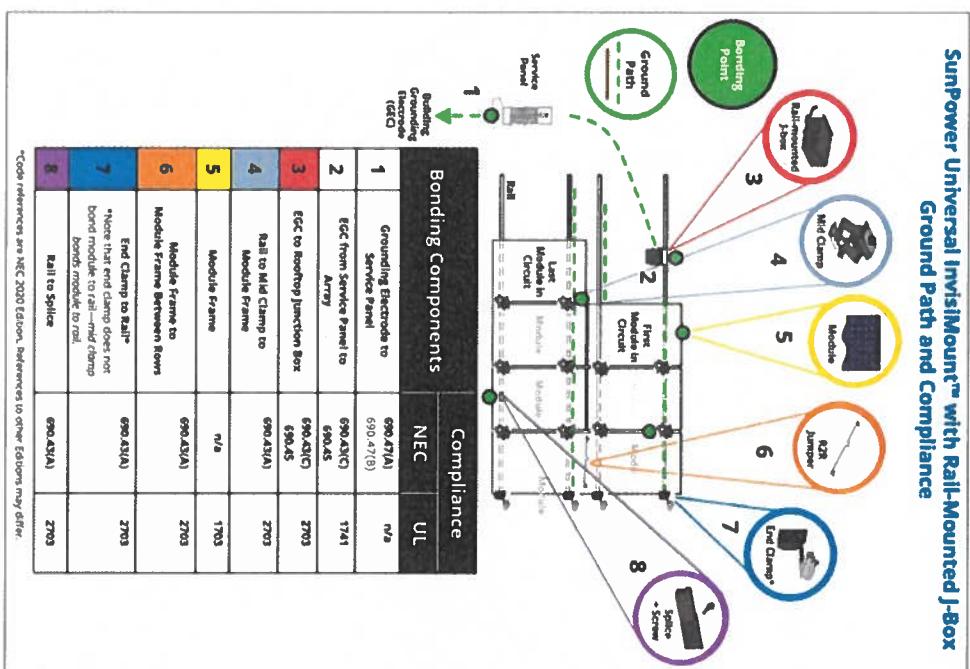


FIGURE 1: SUNPOWER EQUINOX GROUNDING DETAILS

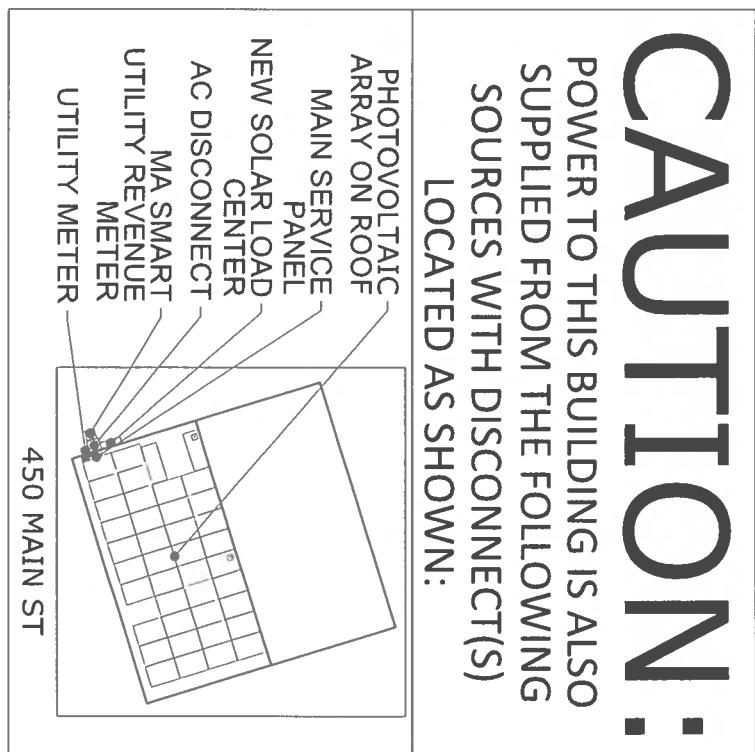
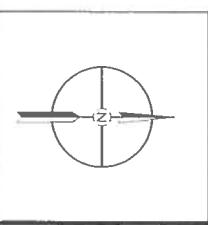
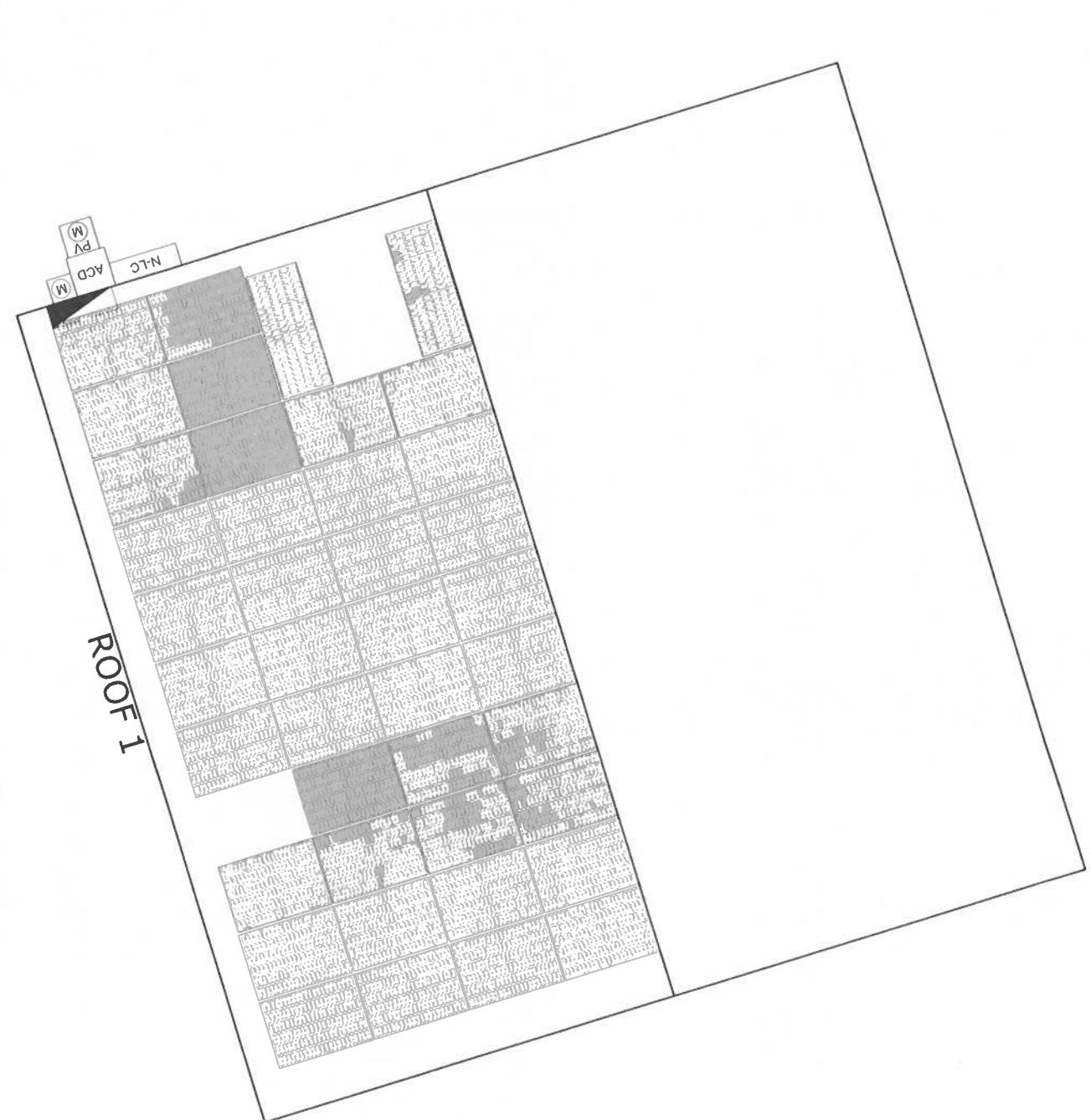


FIGURE 2: PLACARD IDENTIFYING LOCATION OF DISCONNECTS AND POWER SOURCES

EUGENIO FERNANDEZ VENTOSA
16.40 kW GRID-TIED PHOTOVOLTAIC SYSTEM
450 MAIN ST
ACTON, MASSACHUSETTS 01720
SOLAR INDIVIDUAL PERMIT PACKAGE
PLACARD / SUNPOWER EQUINOX
GROUNDING DETAILS



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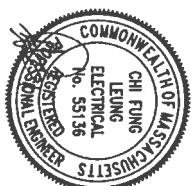
DRAWN BY	J. PATRICK JASPER COA	
REVISIONS		
PROJECT	RP-49843	
DATE DRAWN	07-11-2023	
SCALE	NFS	
NOTE		
SHEET		

PVE-5

EUGENIO FERNANDEZ VENTOSA
16.40 kW GRID-TIED PHOTOVOLTAIC SYSTEM
450 MAIN ST
ACTON, MASSACHUSETTS 01720
SOLAR INDIVIDUAL PERMIT PACKAGE
BRANCH DIAGRAM

ROOF	1					
MODULE QTY.	41					
AZIMUTH	163°					
PITCH	10:12					

PRINT NAME OF CREW LEAD ON SITE:		
CREW LEAD SIGNATURE:		
BRANCH VOLTAGES:	1.	2.
	3.	4.
	5.	6.

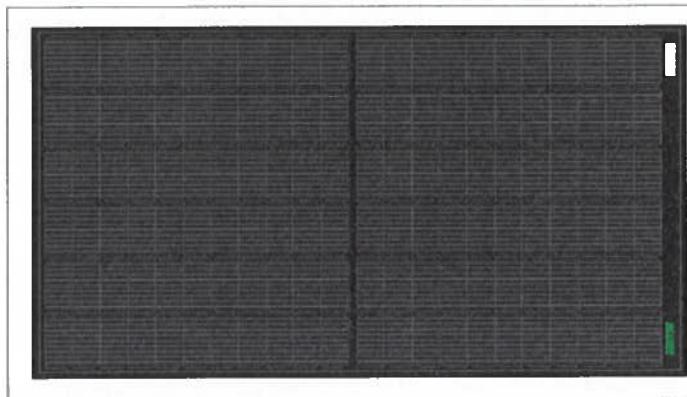


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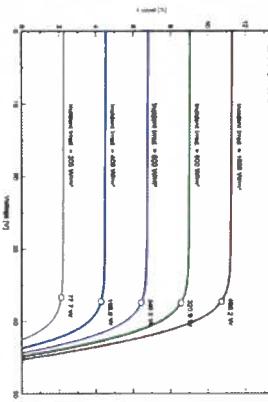
ARKA SERIES

WSMDi-395 to WSMDi-415

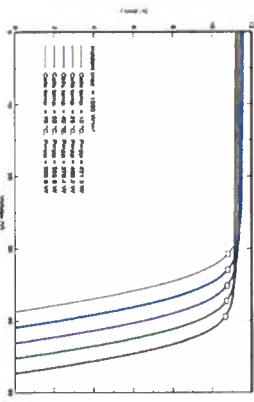
WAAREE
One with the Sun



I-V VARIATION WITH IRRADIANCE



I-V VARIATION WITH TEMPERATURE



INTERNATIONAL & NATIONAL CERTIFICATIONS



IEC 61215 | IEC 61730 | UL61730
IEC TS 62804-1

ISO 9001:2015 | ISO 14001:2015 | ISO 45001:2018
Independent assessment of factories by BLACK & VEATCH

ARKA SERIES

WSMDi-395 to WSMDi-415

ELECTRICAL CHARACTERISTICS

Models	Pmax (W)		Vmp (V)		Imp (A)		Isc (A)		Voc (V)		Module Eff. (%)
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	
WSMDi-395	395	296.8	37.77	34.70	10.47	8.55	11.24	9.08	45.00	42.10	19.73
WSMDi-400	400	300.5	38.00	34.90	10.54	8.62	11.32	9.14	45.22	42.30	20.03
WSMDi-405	405	304.4	38.22	35.10	10.51	8.68	11.40	9.21	45.44	42.50	20.23
WSMDi-410	410	308.2	38.44	35.30	10.58	8.74	11.48	9.27	45.66	42.70	20.53
WSMDi-415	415	312.1	38.66	35.40	10.75	8.81	11.57	9.34	45.88	42.90	20.73

Stress Test Duration (STC): 1000 Hrs at 80°C Cell Temperature, 800 W/m² Irradiance, 1000 Pa Air Mass 1.5. Ambient Temperature 20°C, and 900 Pa Air Pressure. Reduction of 4.5% at 200 m²/m² as per EC 60032-1. Measuring uncertainty ± 3%.

MECHANICAL CHARACTERISTICS

System Voltage	1500 V	Series Fuse Rating	22 A
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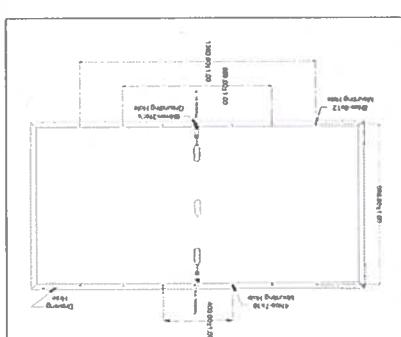
DESIGN SPECIFICATIONS

Length x Width x Thickness (L x W x T)	1924 mm (L) x 1038 mm (W) x 35 mm (T)
Weight	22 kg
Solar Cells per Module (Units) / Arrangement	132 cells (11x6 11x6)
Solar Cell Type & Size	Mono PERC, 83 x 156 mm
Front Glass	3.2 mm Low Iron and Tempered glass with AR Coating
Encapsulate	PID Free & UV Resistant
Junction Box (Protection degree / Material)	IP68 / Weatherproof PPO
Cable & Connector (Protection degree / Type)	IP68 Rated / Sustab M4 Connector
Frame	4 mm & 1200 mm Anodized Aluminum Alloy. Anodization thickness ≥ 15 micron Type 2

THERMAL CHARACTERISTICS

Temperature coefficient of Current (Isc), α (%/°C)	0.055
Temperature coefficient of Voltage (Voc), β (%/°C)	-0.285
Temperature coefficient of Power (Pm), γ (%/°C)	-0.385
NOCT (°C)	43 ± 2
Operating temperature range (°C)	-40 to 85

THERMAL CHARACTERISTICS



Waaree Energies Ltd. is amongst the top Solar Energy Companies and has the country's largest Solar PV Module manufacturing capacity of 5 GW. In addition, it is committed to provide top notch EPC services, project development, rooftop solutions, solar water pumps and also an independent Power Producer. Waaree has its presence in over 325+ locations nationally and 58 countries globally.

* All Waaree solar panels come with certificates and module installations are in designs from our factory tested in our test laboratory.

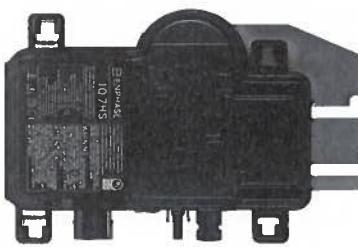
* The electrical data given here is for reference purposes only.
Please confirm your exact requirements with the sales representative while placing your order.
* Refer installation Manual & Waaree warranty document for terms & conditions.
* Waaree Reserves the right to change the specifications without prior notice.

WAAREE
One with the Sun

IQ7HS Microinverter

The high-powered smart grid-ready **IQ7HS Microinverter** with integrated MC4 connectors dramatically **simplifies** the installation process while

achieving the highest system efficiency.



The 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.

- Peak output power: 384 VA
- Maximum continuous output power: 384 VA
- Nominal (L-L) voltage/range²: 240V/210-264V
- Maximum continuous output current: 160A (240V)
- Nominal frequency: 60 Hz
- Extended frequency range: 47 Hz to 68 Hz
- AC short circuit fault current over 3 cycles: 4.82A
- Maximum units per 20 A (L-L) branch circuit⁴: 10
- Overvoltage class: AC port III
- AC port backfeed current: 18 mA
- Power factor setting: 1.0
- Power factor (adjustable): 0.85 leading, 0.85 lagging
- Efficiency: 97.0 %
- GEC weighted efficiency: 96.5 %

To learn more about Enphase offerings, visit enphase.com



To learn more about Enphase offerings, visit enphase.com

IQ7HS Microinverter

INPUT DATA (DC)	IQ7HS-66-M-US
Commonly used module pairings ¹	320W - 460W
Module compatibility?	66 cell/120 half-cell/132 half-cell
Maximum input DC voltage	59V
Peak power tracking voltage	38V - 43V
Operating range	20V - 59V
Min/Max start voltage	30V/55V
Max DC short circuit current (module Isc)	15A
Overvoltage class DC port	II
DC port backfeed current	0A
PV array configuration	1 x 1 ungrounded array. No additional DC side protection required. AC side protection required max 20A per branch circuit
OUTPUT DATA (AC)	@240 VAC
Peak output power	384 VA
Maximum continuous output power	384 VA
Nominal (L-L) voltage/range ²	240V/210-264V
Maximum continuous output current	160A (240V)
Nominal frequency	60 Hz
Extended frequency range	47 Hz to 68 Hz
AC short circuit fault current over 3 cycles	4.82A
Maximum units per 20 A (L-L) branch circuit ⁴	10
Overvoltage class: AC port	III
AC port backfeed current	18 mA
Power factor setting	1.0
Power factor (adjustable)	0.85 leading, 0.85 lagging
EFFICIENCY	@240V
GEC weighted efficiency	97.0 %
MECHANICAL DATA	96.5 %
Ambient temperature range	-40°C to +60°C
Relative humidity range	4% to 100% (condensing)
Connector type	Stainless steel MC4
Dimensions (WxHxD)	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, corrosion resistant polymeric enclosure
Environmental category/UV exposure rating	NEMA type 6/outdoor
Altitude	2000 m
FEATURES	
Communication	Power Line Communication (PLC)
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect means required by NEC 690 and C22.1-2018 Rule 6a-220
Compliance	CA Rule 21 (UL1741-SA), IEEE 1547-2018 (UL1741-SB), UL 62103-1, FCC Part 15 Class B, HECO v1.1, IEC60033 Class B, CAN/CSA-C22.2 No. 107.1-01. This product is UL listed as PV Rapid Shutdown Equipment and conforms with NEC 2014 NEC 2017 and NEC 2020 section 690.12 and C22.1-2018 Rule 6a-218 Rapid Shutdown of
Altitude	Systems, for AC and DC conductors, when installed according to manufacturer's instructions.

- Highest CEC efficiency of 97.0%.
- More than a million hours of power-on testing.
- Class II double-insulated enclosure.
- UL listed
- Smart Grid-Ready
- Complies with advanced grid support, voltage and frequency ride-through requirements.
- Remotely updates and responds to changing grid requirements.
- Configurable for varying grid profiles.
- Meets CA Rule 21 (UL1741-SA) and IEEE 1547-2018 (UL1741-SB)

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

² Provided the module is compatible with all other parameters in the datasheet.

³ Nominal voltage range can be extended beyond the utility limit's min/max. Refer to local requirements to define the number of microinverters per branch in your area.



To learn more about Enphase offerings, visit enphase.com





July 29, 2022

To whom it may concern,

This letter confirms and attests that:

SPWR-A5 is equivalent to Enphase Models::

IQ7HS-66-E-ACM-US, 369 VA, 208Vac Grid Support Utility Interactive Inverter
IQ7HS-66-E-ACM-US, 369 VA, 208Vac Grid Support Utility Interactive Inverter
IQ7HS-66-M-US, 369 VA, 208Vac Grid Support Utility Interactive Inverter
IQ7HS-66-M-US, 369 VA, 240Vac Grid Support Utility Interactive Inverter
IQ7HS-66-E-ACM-US, 384 VA, 240Vac Grid Support Utility Interactive Inverter
IQ7HS-66-M-US, 384 VA, 240Vac Grid Support Utility Interactive Inverter

Regards,

A handwritten signature in black ink, appearing to read "Aranjit Sangha".

Aranjit Sangha
Senior Staff Engineer
Enphase Energy Inc.
1420 North McDowell Blvd.
Petaluma, CA 94954
v: (707) 763-4784 x7098
asangha@enphaseenergy.com

FLASH LOC



FLASH LOC INSTALLATION GUIDE



FLASHLOC is the ultimate attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast – no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the lag bolt and inject sealant into the base. **FLASHLOC**'s patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with lag bolts, sealant, and hardware for maximum convenience. Don't just divert water, **LOC** it out!

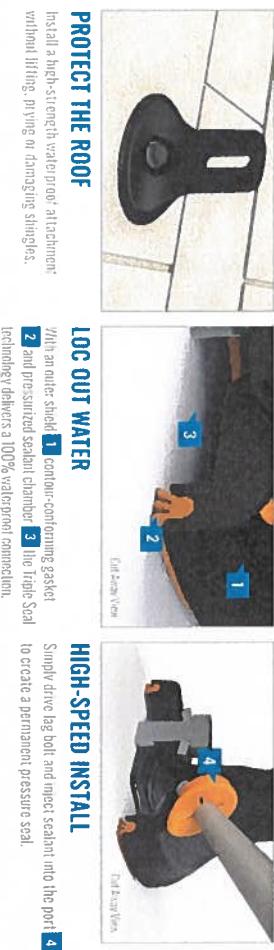
FLASHLOC is the ultimate attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast – no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the lag bolt and inject sealant into the base. **FLASHLOC**'s patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with lag bolts, sealant, and hardware for maximum convenience. Don't just divert water, **LOC** it out!



TESTED TO IAS-100
WIND-DRIVEN RAIN TEST
AND UL441 RAIN TEST



JUNE2021_FLASHLOCOMP_V2



FASTER INSTALLATION. 25-YEAR WARRANTY.

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

BETTER SOLAR STARTS HERE

INSTALLATION GUIDE

PRE-INSTALL

Snaphchalk lines for attachment rows. On shingle roofs, snap lines 1-3/4" below upslope edge of shingle course. Locate rafters and mark attachment locations.

At each location, drill a 7/32" pilot hole. Clean roof surface of dirt, debris, snow, and ice. Next, BACKFILL ALL PILOT HOLES WITH SEALANT.

NOTE: Space mounts per racking system install specifications.

STEP 1: SECURE

Place **FLASHLOC** over pilot hole with lag on down-slope side. Align indicator marks on sides of mount with chalk line. Pass included lag bolt and sealing washer through **FLASHLOC** into pilot hole. Drive lag bolt until mount is held firmly in place.

NOTE: The EFDW in the sealing washer will expand beyond the edge of the metal washer when proper torque is applied.



STEP 2: SEAL

Insert tip of **FLASHLOC** provided sealant into port. Inject until sealant exits both vents. Follow sealant manufacturer's instructions. Follow sealant manufacturer's cold weather application guidelines, if applicable.

Continue array installation, attaching rails to mounts with provided T-bolts.

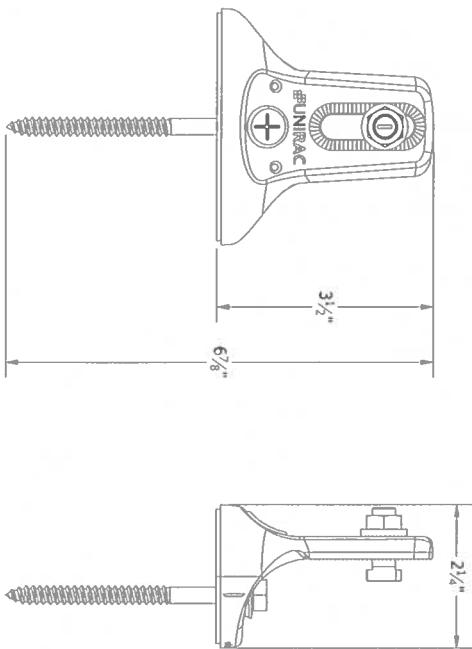
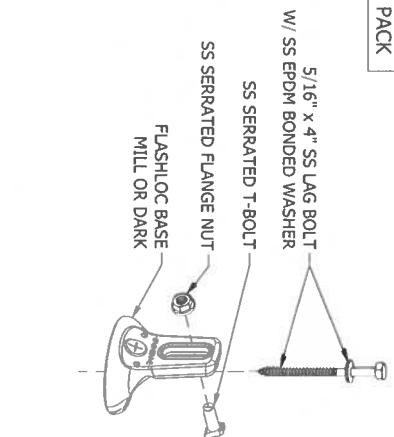
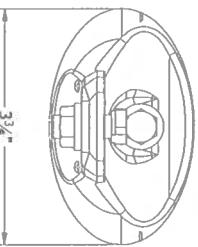


NOTE: When **FLASHLOC** is installed over gap between shingle tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

USE ONLY UNIRAC APPROVED SEALANTS: Cherrylite Durabond 50, Chemlink Al-1, General 45/100, or Unirac S-4.



PART TABLE	
P/N	DESCRIPTION
0040855M	FLASHLOC COMP KIT MILL, 20 PACK
0040855D	FLASHLOC COMP KIT DARK, 20 PACK



UNIRAC 1411 BROADWAY BLVD. NE ALBUQUERQUE, NM 87102 USA PHONE: 505.242.6411 WWW.UNIRAC.COM	PRODUCT LINE: SOLARMOUNT	DRAWING TYPE: PART DRAWING	DESCRIPTION: FLASHLOC COMP KIT	REVISION DATE: 4/28/2020
	DRAWING NOT TO SCALE ALL DIMENSIONS ARE NOMINAL			
	ONE OR MORE US PATENTS PENDING			
	LEGAL NOTICE SHEET			

FL-A01

Test Verification of Conformity

Verification Number: 105370452-LAX-VOC1

On the basis of the tests undertaken, the samples of the below product have been found to comply with the requirements of the referenced specification/standard at the time the tests were carried out. This verification is part of the full test report 105208800LAX-001 and should be read in conjunction with it. This verification replaces previous verification number 105208800LAX-001-LAX-VOC1 dated: 30-12-2022. Additional information in Appendix.

Applicant Name & Address:

SunPower Corporation
1414 Harbour Way South
Suite 1901
Richmond, CA 94804 USA

Product Description:

Photovoltaic Backing System installed using the SunPower InvisiMount Installation Guide 508988 Rev 0
Fire Class Rating:
Class A for Type 1 and Type 2
Fuse Rating: 20 A
Mechanical Load Testing:
Mechanical Load Rating: 10PSF Downward, 5PSF Upward, 5PSF Sloped Load
Module Orientation: Portrait or Landscape
Classic InvisiMount, Universal InvisiMount

Ratings & Principle Characteristics:

SUNPOWER ; InvisiMount

Models/Type References:

Brand Name:

Relevant Standards:

Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs
for Use with Flat-Plate Photovoltaic Modules and Panels [UL 2703-2015
Ed 1+R-24/Mar/2021]

Verification Issuing Office
Name & Address:

Intertek Testing Services NA, Inc.

25800 Commerce Drive

Lake Forest, CA 92630 USA

Date of Tests:

September-27-2022 to October-11-2022

Test Report Number(s):

105208800LAX-001

Signature

Name: Abdullah Alharbi
Position: PV Engineer
Date: 12 April 2023

This verification is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and ability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party other than the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this verification. Only the Client is authorized to permit copying or distribution of this verification. Any use of the Intertek name or any of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test/inspection results reflected in this verification are relevant only to the sample tested/inspected. This verification by Intertek does not imply that the material, product, or service it has ever been under an Intertek certification program.

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 105370452-LAX-VOC1.

Approved Module list

Module Manufacturer	Model
SunPower Corporation	SPR-XXX-###-COM, where X can be "E" or "A" denoting cell type, where YY represents numbers 18, 19, 20, 21, or blanks and ## represents any number from 450 to 310 and 274 to 233.
SunPower Corporation	SPR-EYY-###, where YY represents numbers 18, 19, 20 or 21, and ## represents any number from 345 to 285 and 250 to 225.
SunPower Corporation	SPR-MXX0 & SPR-MAX5-XXX, may be followed by -BLK, where XXX is 385-440.
SunPower Corporation	SPR-E or SPR-X followed by 18, 19, 20, 21, 22, followed by -XXX where XXX is 320-370, may be followed by -BLK, followed by C, D, E, may be followed by -AC.
SunPower Corporation	SPR-XXXE/NE-WHT/BLK-U-YYYACR and SPR-V-WWW-XXX-Y-Z-G-AC, where "XXX" is the wattage of the panel and ranges from 250 to 225, and where "YYY" indicates the inverter voltage used in the module, and can be blank, 240 or 208/240.
SunPower Corporation	SPR-AXXX-G-AC or SPR-AXXXBLK-G-AC Where "XXX" denotes output power, "G" denotes inverters, "BLK" represents backsheet color, "AC" indicates AC module, "ACXX-H-AC" where "XXX" is the wattage range of 350 to 425, "H" Denotes the inverter, and "AC" indicates AC modules.
SunPower Corporation	SPR-MXXX-YYY-Z-AC, where XXX is 380-440.
SunPower Corporation	All models identified must have the Gen 5 frame and have a module fire performance: Type 2
SunPower Corporation	72-cell model with Gen 4.7 frame only: SPR-AXXX-COM or SPR-MAX5-XXX-COM, may be followed by BLK, where XXX is 380-460
SunPower Corporation	66-cell model with Gen 4.7 frame only: SPR-AXXX, may be followed by -COM, and/or -300V, followed by MLS5, where XXX is 350-425.
SunPower Corporation	72-cell model with Gen 4.7 frame only: SPR-AXXX, may be followed by -COM, and/or -300V, followed by MLS5, where XXX is 430-60
Hanwha	SPR-UXXX-BLK, where XXX is 395-415
Hanwha	Q.PEAK DUO BLK-MI-G10-3a-XXX, where XXX is 370-425
Hanwha	Q.PEAK DUO BLK-G10-XXX, where XXX is 355-370
Hanwha	Q.PEAK DUO BLK-MI-G10-3a-XXX, where XXX is 385-405
Hanwha	RECXXXNP2, may be followed by Black, where XXX is 350-380.
Hanwha	RECXXXTP4, may be followed by Black, where XXX is 355-380.
REC	RECXXXAA Black, where XXX is 340-385.

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RECxxxxA.PURE, where xxx is 380-415.
TSM-xxxDE05X.05(I), where xxx is 355-380
C33N-xxxMS, xxx is 375-435
W33D-xxx, xxx is 360-380, 395-415
W33D1B-xxx, xxx is 360-380, 395-415
JFMxxxM-6RL3-8, where xxx is 365-400
DNA-108-BF10-xxxW, xxx is 385-410.
DNA-120-BF26-xxxW, where xxx is 350-370.
DNA-120-MF26-xxxW, where xxx is 360-370

The Universal InvisiMount System was evaluated for fire rating with Type 1 and Type 2 modules.



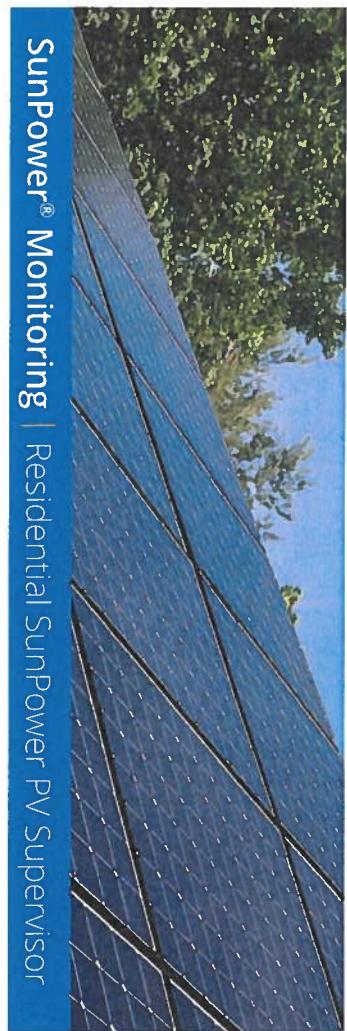
Signature

Name: Abdulla Alhabsi

Position: PV Engineer

Date: 12 April 2023

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SunPower® Monitoring | Residential SunPower PV Supervisor

Improve Support, Reduce Costs

An intuitive monitoring website enables you to:

- See a visual map of customer sites
- Remotely manage hundreds of sites
- Remotely diagnose and troubleshoot system issues
- Drill down for the status of individual devices
- Revenue-quality production metering
- Web-based commissioning
- Remote diagnostics of PVs and inverters
- Durable UL Type 3R enclosure helps reduce maintenance costs
- Easy integration with SunPower eBOs

Add Value for Customers

With mySunPower™ monitoring customers can:

- Track their energy production by day, month, year and in different weather conditions
- See their energy use and estimated bill savings
- Maximize their savings with automatic system alerts and tips
- Customize storage settings and easily monitor and track available battery power
- Receive elective system reports

sunpower.com

SUNPOWER®

SunPower® Pro Fleet
Management for Installers

PVS

SunPower® AC Modules



Site Requirements

This complete solution for residential monitoring and control includes the SunPower® PV Supervisor (PVS) which improves the installation process, overall system reliability, and customer experience:

Internet access

- High-speed internet access via accessible router or switch
- 100-240 VAC (L-N), 50 or 60 Hz
- 208 VAC (L-L in phase 3), 60 Hz

Mechanical

Power

Dimensions

Enclosure rating

Weight

Humidity (max.)

Temperature

Warranty

Certifications

Operating Conditions	
Power	-22°F to +140°F (-30°C to +60°C)
Humidity (max.)	95% non-condensing
Temperature	-4°F to +104°F (-20°C to +40°C)
Warranty	10-year Limited Warranty
Certifications	UL, cUL, CE, UL 51010-1 and -2, FCC Part 15 (Class B)

Communication	
RS-485	* Supports string inverters, external meters, and other auxiliary devices
Integrated metering	* One channel of revenue-quality production metering * Two channels of consumption metering
Ethernet	* 1 LAN (or optional WAN) port
PLC	* Supports SunPower AC modules
WiFi	* 802.11b/g/n, 2.4 GHz and 5 GHz
Cellular	* LTE Cat-4/3G UMTS
ZigBee	* IEEE 802.15.4 MAC, 2.4 GHz ISM band
Data storage	* 60 days
Upgrades	* Automatic firmware upgrades

Web and Mobile Device Support

Customer site	* mysunpower.com
Partner site	* monitor.sunpower.com
Browsers	* Firefox, Safari, and Chrome
Mobile devices	* iPhone®, iPad®, and Android™
Customer app	1 Create account online at mysunpower.com 2 On 3rd mobile device, download the SunPower Monitoring app from Apple App Store or Google Play™ Store 3 Sign in using account email and password



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* Receive elective system reports

5/2015 Rev. 0



InvisiMount™ Rail-Mounted Junction Box (RMJ) v2

70% larger than original InvisiMount J-box. Integrated grounding to InvisiMount rail, replacing grounding lug assembly. Snap-on attachment for fast and secure installation.



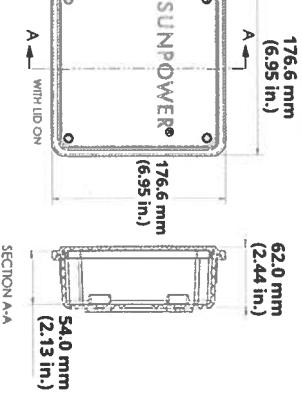
Composition Shingle Roof Transition Junction Box

- Enables transitioning conductors directly through the roof.
- Integrated flashing for peace of mind.
- Compatible with composition shingle roofs.

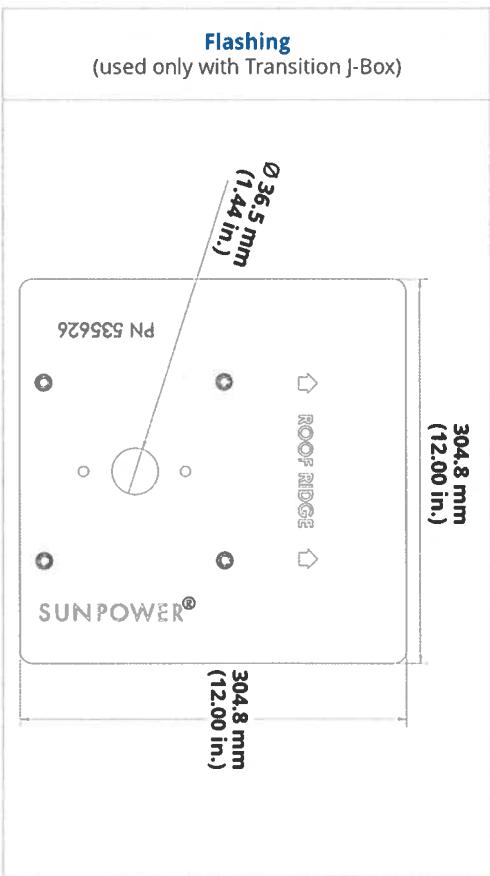
SPECIFICATIONS

Model	RMJ v2	Comp Shingle Transition J-Box
Part Number	530167	530168
Max. Voltage Rating	600 V (AC or DC)	
Ambient Temp. Range	-35°C to 75°C (-31°F to 167°F)	
Enclosure Material	Flame-retardant, UV-resistant, high-impact resistant resin	
Attachment/Flashing Material	304 stainless steel	Steel w/zinc-aluminum coating
Cavity Dimensions	150 x 150 x 62 mm (5.91" x 5.91" x 2.13")	
Enclosure Volume	1150 cc (70 in³)	
Attachment/Flashing Finish	Black oxide	Black powder coat
Compatibility	InvisiMount rail	Comp shingle roofs
Assembled Weight	0.78 kg (1.7 lb)	1.27 kg (2.8 lb)
Certifications & Ratings	<ul style="list-style-type: none"> • Watertight, UL Type 4 • UL 94 SVA • UL 1741 • UL 2703 (with InvisiMount) 	<ul style="list-style-type: none"> • Watertight, UL Type 4 • UL 94 SVA • UL 1741
Additional Hardware Included	<ul style="list-style-type: none"> • 3/4" cord grip • Lay-in lug 	<ul style="list-style-type: none"> • 3/4" cord grip • #12 screws with EPDM washer

COMPONENT DIMENSIONS



J-Box Enclosure
(used in both RMJ and Transition J-box)



Flashing
(used only with Transition J-Box)

Product data sheet

Characteristics

DU323RB
Safety switch, general duty, non fusible, 100A, 3 poles, 30 hp, 240 VAC, NEMA 3R, bolt-on provision

Product availability: Stock - Normally stocked in distribution facility



Price*: 816.00 USD



Product data sheet

Characteristics

D223NRB
Safety switch, general duty, fusible, 100A, 2 poles, 30 hp, 120 VAC, NEMA 3R, bolt-on provision, neutral factory installed

Product availability: Stock - Normally stocked in distribution facility



Price*: 480.00 USD



Main

Product	Single Throw Safety Switch
Current Rating	100 A
Certifications	UL listed file E2875
Enclosure Rating	NEMA 3R
Disconnect Type	Non-usable disconnect switch
Factory Installed Neutral	None
Mounting Type	Surface
Number of Poles	3
Electrical Connection	Lugs
Duty Rating	General duty
Voltage Rating	240 V AC
Wire Size	AWG 14...AWG 1 copper AWG 12...AWG 1 aluminum

Complementary

Short-circuit withstand	200 kA
Maximum Horse Power Rating	15 hp 240 V AC 60 Hz 1 phase NEC 430.52
Tightening torque	30 lb/in (3.95 N.m) 0.00...0.01 in ² (2.08...5.26 mm ²) AWG 14...AWG 10
Height	17.5 in (444.50 mm)
Width	10.5 in (266.70 mm)

* Price is 'Last Price' and may be subject to a trade discount - check with your local distributor or retailer for actual price

Mar 28 2021



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Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications



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Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Main

Product	Single Throw Safety Switch
Current Rating	100 A
Certifications	UL listed file E2875
Enclosure Rating	NEMA 3R
Disconnect Type	Fusible disconnect switch
Factory Installed Neutral	Natural (factory installed)
Short Circuit Current Rating	100 kA maximum depending on fuse H, K or R
Mounting Type	Surface
Number of Poles	2
Electrical Connection	Lugs
Duty Rating	General duty
Voltage Rating	240 V AC
Wire Size	AWG 14...AWG 1 copper AWG 12...AWG 1 aluminum

Complementary

Maximum Horse Power Rating	7.5 hp 240 V AC 60 Hz 1 phase NEC 240.6
Tightening torque	15 hp 240 V AC 60 Hz 1 phase NEC 240.6
Height	17.5 in (444.50 mm)
Width	10.5 in (266.70 mm)

* Price is 'Last Price' and may be subject to a trade discount - check with your local distributor or retailer for actual price

Mar 28 2021



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Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

ILSCO

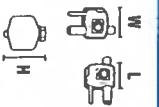
KUP-L-Tap® Insulation Piercing Connectors

Dual Rated

TYPE IPC



- Body is molded from tough, resilient glass-filled nylon
- Compact design
- Tin plated copper contact teeth
- Insulation piercing
- Perforated end tabs
- Pre-filled with silicone lubricant
- Versatile
- Increased safety
- Horizontal line end
- Temperature rating 90°C



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studio umbra
architecture
1075 5th Street
1075 5th Street

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450 MAIN STREET, ACTON

MAIN STREET

438 MAIN
STREET

446 MAIN
STREET

452 MAIN
STREET

460 MAIN
STREET

450 MAIN
STREET

6
NEWTOWNE
ROAD

10
NEWTOWNE
ROAD

14
NEWTOWNE
ROAD

NEWTOWNE ROAD

53' - 6"
51' - 0"

1 SITE PLAN
1" = 50'-0"



Project number	10/10/23
Date	10/10/23
Scale	1" = 50'-0"
Drawn By	Author
Ref AS#	
Ref RF#	
Re Ref#	
Re Drawing #	

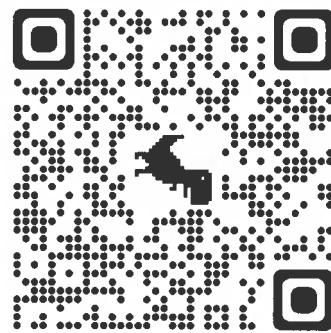
P-1



Studio umbra
architecture
107 535 7000
P.O. Box 2000
Ontario, N6 Z2A9
info@studio-umbra.com

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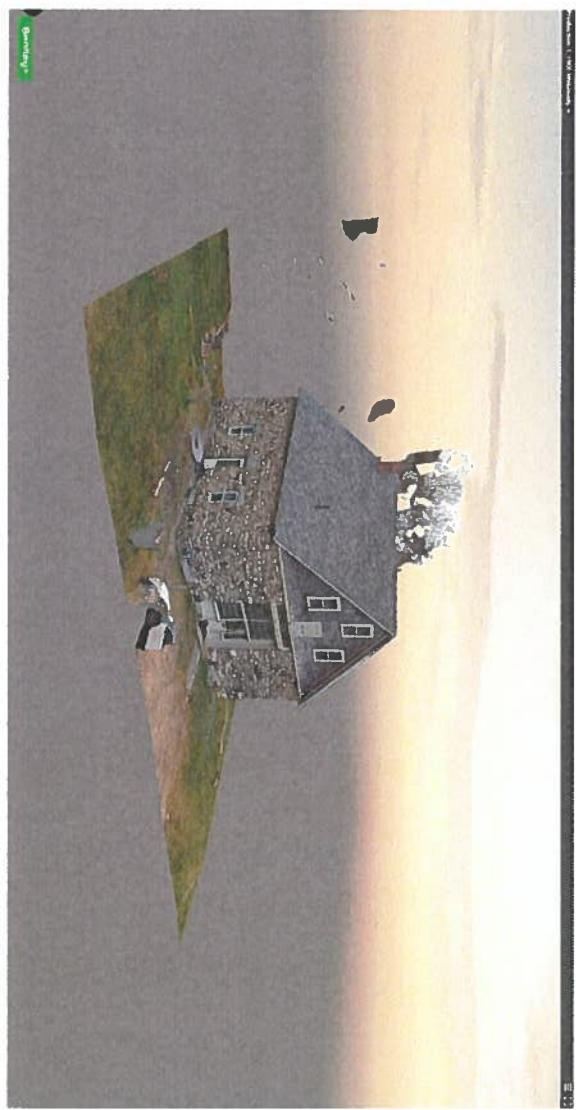
450 MAIN STREET
PHOTOGRAMMETRY MODEL
QR LINK CODE



PHOTOGRAMMETRY MODEL NOTES

<https://hosting.studio-umbra.com/450%20Main/App>

1. REFER TO INCLUDED QR CODE FOR PHOTOGRAMMETRIC MODEL SHOWING EXISTING CONDITIONS OF THE BUILDING AND OF THE EXTERIOR WORK AREA. GC SHALL BECOME FAMILIAR WITH EXISTING CONDITIONS OF THE BUILDING AND FULL EXTENT OF THE SCOPE OF WORK PRIOR TO SUBMITTING A BID OR COMMENCEMENT OF WORK. PHOTOGRAMMETRY MODEL CONSISTS OF A 3D SCAN OF THE CURRENT CONDITION OF THE BUILDING USING AN AERIAL DRONE.
2. PHOTOGRAMMETRY MODEL IS FOR REFERENCE ONLY. SEE ARCHITECTURAL DRAWINGS FOR FULL SCOPE OF WORK. EXISTING CONDITIONS AS SHOW IN MODEL MAY HAVE CHANGED AND BE DIFFERENT THAN CURRENTLY PRESENT.
3. PHOTOGRAMMETRY MODEL CAN BE MEASURED, HOWEVER ALL MEASUREMENTS TAKEN FROM MODEL MUST BE FIELD VERIFIED. NO MEASUREMENTS TAKEN OFF OF PHOTOGRAMMETRIC MODEL SHALL BE DEEMED VALID UNLESS CONFIRMED IN FIELD.
4. REFER TO TOP RIGHT MENU SELECTION WITHIN BENTLEY UI FOR NAVIGATION CONTROLS.
5. REFER TO TOP RIGHT MENU SELECTION WITHIN BENTLEY UI FOR MEASURING TOOLS. NOTE ALL MEASUREMENTS GIVEN IN METRIC UNITS.



Project number	10/10/23
Date	1-03
Scale	1/4"
Drawn By	EFV
Ref/S#	
Ref/R#	
Re: Drawing #	

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