City of Huron
Agenda for the Planning Commission/DRB
Thursday, September 5, 2024 5:00pm.

I. Call to Order

II. Roll Call

III. **Adoption of the Minutes (5-8-24, 5-22-24, 6-26-24, 7-17-24)**

IV. Audience Comments (3-minute time limit) *Please step to the podium and state your name and address for the record.

V. New Business

120 Tiffin Ave	PPN42-01826.000	Zoning: R-2	Roof Mounted Solar Panels
1249 Wheeler Dr	PPN42-00561.004	Zoning: R-3	Roof Mounted Solar Panels
730 River Road	PPN42-00811.000	Zoning: I-2	Wall Signage & Exterior Change

VI. Adjournment

1126.18 SOLAR STRUCTURES.

(a) Purpose. It is the purpose of this chapter to regulate the construction, modification, operation and abandonment by discontinuation of use of solar energy systems in the City of Huron, subject to reasonable conditions that will protect the public health, safety, and welfare while preserving the enjoyment of private property, promoting orderly land use, and development; allowing the safe, effective, and efficient use of solar energy systems. Solar energy systems shall be considered a permitted use in any zoning district, subject to the requirements of any other applicable chapter of this Code.

(b) Definitions.

(1) "Abandonment" means choosing to give up or discontinue use of the solar energy generation system in whole or part.

(2) "Alternating-current (ac) module" means a complete, environmentally protected unit consisting of solar cells, optics, inverter, and other components, exclusive of tracker, designed to generate ac power when exposed to sunlight.

(3) "Applicant" means the person or entity filing an application under this Chapter.

(4) "Array" means a mechanically integrated assembly of modules or panels with a support structure and foundation, tracker, and other components, as required, to form a direct-current power producing unit.

(5) "Facility owner" means the entity or entities having equity interest in the solar energy facility, including their respective successors and assigns.

(6) "Ground mount" means a solar electrical system that is mounted directly to ground mounted structure instead of solely on a building wall or roof.

(7) "Operator" means the entity responsible for the day-to-day operation and maintenance of the solar energy system.

(8) "Solar cell" means the basic photovoltaic device that generates electricity when exposed to light.

(9) "Solar energy system (active or passive)" means the equipment, assembly or building construction and requisite hardware that provides and is used for collecting, transferring, converting, storing, or using incident solar energy for water heating, space heating, cooling, generating, electricity, or other applications that would otherwise require the use of a conventional source of energy such as petroleum products, natural gas, manufactured gas, or electricity produced from a nonrenewable resource. Such systems include Passive Solar Energy Systems that capture the Sun's energy in building design and construction components; Solar Thermal Energy Systems that convert sunlight to heat as in a hot water tank or swimming pool; and Photovoltaic Solar Energy Systems that convert sunlight to electricity.

(10) "Solar panel" means one of any type of assembly that produces energy, either electrical, heat or hot water for use or distribution include PV (Photovoltaic) an electrical device consisting of an array of connected solar cells, heat collectors and interstitial spaces including trombe panels, or hydronic panels for water heating systems.

(11) "Solar photovoltaic systems" means the total components and subsystems that, in combination convert solar energy into electrical energy suitable for connection to utilization load.

(c) Applicability.

(1) No person shall construct, erect, maintain, extend, or remove a solar system in any zoning district in the City without compliance with the provisions of this chapter and applicable related requirements of the entire ordinance.

(2) Solar energy systems constructed prior to the effective date of this chapter shall not be required to meet the requirements of this code; unless any physical condition or modification renders such system un-repairable or un-usable. If any pre-existing solar energy system is damaged or destroyed such an extent that is cannot be returned to original service, or any such damage or modification creates an unsafe condition it shall be replaced or removed in conformity to this chapter and pursuant to Section 1121.07.

(3) Like-kind replacements of panels shall require applicable electrical or general building permits.

(4) Like-kind replacements of entire ground-mount solar energy systems shall require proper zoning approval and applicable electrical/building permits. Existing installations shall provide emergency disconnect locations to the City of Huron Building Department.

(d) Contents of Application.

(1) Solar structures shall only be an accessory use in residential (R) and commercial (B) zoning districts. Ground-mounted solar panels are a conditional accessory use at any residential or non-residential building, excluding Industrial (I) zones, where they are permitted by right. In all districts, solar equipment including solar panels, may be located on the roof in compliance with all requirements of this Code including building height and screening, after approval by the Design Review Board. Nothing in this regulation shall preclude standalone systems for small accessory lighting, ventilation or battery storage systems either roof or ground-mounted not to exceed twelve (12) square feet.

(2) An application for a solar energy system shall be approved in compliance with the standards and criteria of this Chapter and shall include:

A. A narrative describing the proposed solar energy system including the approximate generating capacity of the project and the number, manufacturer, and model of the solar panels to be installed, their individual generating capacity and a description of ancillary systems.

B. A site plan to scale of the subject property showing the planned location of the solar panels, setback lines, proposed and existing ancillary equipment buildings, and structures. For systems with more than thirty-five percent (35%) of roof area facing the street, elevation(s) shall be provided to scale.

C. Certified approval from the Homeowners Association (HOA) and/or an approval letter from the HOA legal representative, if applicable.

(e) Design and Performance Standards.

(1) Lighting. Solar energy systems shall be lit only if required by an applicable authority. Lighting of other parts of the solar energy systems, such as appurtenant structures shall be limited to that required for safety and operational purposes, and shall be reasonably shielded from abutting structures.

(2) Appearance and Signage. The factory or original equipment manufacturer identification and/or logo are permitted. Required signage and emergency services disconnect placard shall be appropriate warning signs (Danger-High Voltage or Caution-Electrical Shock Hazard or any other recognized safety precaution signage) installed at the base of the solar array.

(3) Construction Codes. To extent applicable, the solar system shall comply with the Ohio Building Code and any other applicable building and fire codes.

(4) Electrical Codes. Permit applications for solar energy systems shall be accompanied by a line-drawing of the electrical components, as supplied by the manufacturer, in sufficient detail to allow for determination that the manner of installation conforms to all relevant and applicable local, state, and national codes, including the current national electric code NEC (NFPA 70). Solar energy systems interconnected to local utility shall have/ provide surge and lightning arrestors. All solar energy systems shall be grounded to reduce lightning strikes. All electrical lines and utility wires shall be buried underground.

(5) Utility Notification. Permits for solar energy systems shall not be issued until evidence has been provided that the utility company approves the customer's intent to install an interconnected customer-owned generator. Applicant shall supply the letter of approval from the utility company at the time of application.

(6) Completion. A solar energy system installation shall commence within six months of the issuance of the zoning permit and shall be completed and operational within one year from the date of commencement of installation. Commencement of installation shall be the date the solar panels are placed into position. If the solar energy system is not completed within the stated time period, the facility owner or operator or the landowner shall be required, at his or their expense, to complete decommissioning of the site within 180 days without exception.

(7) Solar Access Easements. Ohio R.C. 5301.63 sets forth the requirements for solar access, for the pwpose of ensuring adequate access of solar energy collection devices to sunlight, any person may grant a solar access easement. Such easements shall be in writing and subject to the same conveyance and recording requirements as other easements. Any instrument creating a solar easement shall be recorded in the Erie County Recorder's Office.

(8) Installation. Solar Panels must be installed in accordance with the manufacturer's design and operation standards, as well as all local county, state, and federal guidelines. Reasonable access for emergency response shall be provided to all solar systems and components including a twenty-four (24) inches clear area around all flat-roof or ground-mounted solar array(s).

(9) Roof-Mounted. Roof-mounted solar energy systems shall be permitted in all zoning districts provided the roof-mounted solar system meets all other requirements of the zoning and building regulations, including design review, and all applicable local and state fire and building codes. Pitched roof-mounted arrays shall be parallel to the roof. The distance between the roof and the uppermost portion of the solar panels shall not exceed eighteen (18) inches. Pitched-roof-mounted solar systems shall not be located within twelve (12) inches of the edge of the roof. Roof-mounted panels on a flat roof shall not project vertically more than five (5) feet from the surface of the roof and shall be buffered as prescribed by the Zoning Code.

(10) Ground-Mounted.

A. Ground-mounted solar panels located on the ground or attached to a framework located on the ground shall not exceed fifteen (15) feet in height above the adjacent grade.

B. All related mechanical equipment, other than the actual photoelectric panels shall be fully buffered from the adjacent properties by fencing and/or by evergreen plantings as prescribe by city ordinance and must be maintained and effective through the life of the system. Buffering shall permit work access to panel and shall conform to Chapter 1131.

C. Ground-mounted solar panel arrays shall not exceed thirty percent (30%) of the remaining rear yard area within the setbacks defined by other chapters of the Zoning Code.

D. Non-Residential. Ground-mounted solar energy systems shall be permitted by right in all Industrial (I) Zones. Any proposed ground-mounted solar energy system may be located within any yard subject to applicable setback requirements for accessory structures and front setback requirements for principal structures within the designated I District.

E. Residential. No ground installations are permitted by right. Any proposed ground-mounted solar panels are conditional uses based on full compliance with this Zoning Code and approval from the Board of Building and Zoning Appeals.

(i) If approved, ground-mounted solar energy systems shall not be permitted in the front or side yard of a residential property. It shall be permitted in the rear yard of a residence. Such equipment shall be subject to the applicable rear yard coverage regulations and setbacks for accessory structures in residential districts as set forth in Section 1121.06 or other prevailing chapters of the Zoning Code.

F. Commercial and Retail Business. No ground installations are permitted by right in Business (B) Zones. Any proposed ground-mounted solar panels are conditional uses based on full compliance with this Zoning Code and approval from the Board of Building and Zoning Appeals.

(i) If approved, ground-mounted solar energy systems shall not be permitted in the front or side yard of a residential property. It shall be permitted in the rear yard of a residence. Such equipment shall be subject to the applicable rear yard coverage regulations and setbacks for accessory structures in residential districts as set forth in Section 1121.06 and/or other prevailing chapters of the Zoning Code.

(f) Fees. See Chapter 1321 for the fee schedule pertaining to conditional use, accessory structures, and electrical fees.

(g) Abandonment.

(1) At such a time a solar energy system is scheduled to be abandoned or operation is to be discontinued, the applicant will notify the Building Official and Planning Department of the proposed date of abandonment or discontinuation of use. If applicant fails to notify either department, then in that event the provisions contained under subsection (g)(2) herein below shall apply.

(2) Upon abandonment or discontinuation of use, the owner shall physically remove the solar energy system within 180 days from the date of abandonment or discontinuation of use. This period may be extended sixty (60) days at the request of the owner but only upon the approval of the Building Official. "Physically remove" shall include, but not be limited to:

A. Removal of the solar energy system and related above grade structures.

B. Restoration of the location of the solar energy system to its natural condition, except that any landscaping, grading may remain in the after-conditions.

(3) In the event that an applicant fails to give such notice, the system shall be considered abandoned or discontinued if the system is out-of-service for a continuous six-month period. After the six-month period of inoperability, the Building Official shall issue a Notice of Abandonment to the owner and operator of the solar energy system and, if residential, the property owner. The owner shall have the right to respond to the Notice of Abandonment within thirty (30) days from Notice receipt time. The Building Official shall withdraw the Notice of Abandonment and notify the owner that the Notice has been withdrawn if the owner provides information that demonstrates the solar energy system has not been abandoned.

(4) If the owner fails to respond to the Notice of Abandonment or if after review by the Building Official it is determined that the solar energy system has been abandoned or use discontinued, the owner of the solar energy system shall remove the system at the owner's sole expense within sixty (60) days of receipt of the Notice of Abandonment. An extension may be granted to the applicant for just cause by the Building Official.

(h) Severability. Should any section, subdivision, clause, or phrase of this chapter be declared by the courts to be invalid, the validity of the chapter as a whole, or in part, shall not be affected other than the part invalidated.

(i) Penalty. See Section 1139.01 for Zoning Code violations.

(Ord. 2022-60. Passed 1-10-23.)

TO: Chairman Boyle and Members of the Planning Commission
FROM: Christine Gibboney, Administrative Assistant
RE: 120 Tiffin Ave- Roof Mounted Solar Panels
DATE: August 21, 2024

Address: 120 Tiffin Ave PPN 42-01826.000 Current Zoning: R-2

Owner/Applicant: Cynthia White, Owner
Applicant- Sunergy Solar LLC

Subject Matter/Background
Applicant is proposing to install a 4.92KW roof mounted solar panel system. The system consists of twelve (12) panels.

Land Use and Zoning
R-2 One and Two-Family Residential District – Residential Use

Staff Analysis/ Recommendation:
Pursuant to the recently created code, Section 1126.18 Solar Structures (d) (1), approval of the Design Review Board is required before the issuance of permits. The residence is a single-family home on Tiffin Ave. The Residential Zoning application is complete and the plan review by Zoning has found the application to be compliant with Section 1126.18.

The proposed roof mounted solar panel system contains 12 panels, roof array area=257.88sq. ft. to be installed on the pitched roof of a single-story residential structure.

- The total roof area is 1144.90sq.ft., roof area covered by the array is 23%.
- The panel attachment detail reflects less than a 6" rise from the roof to the top side of the panel (18' max per the code).
- The code requires that the system shall not be located within 12" of the edge of the roof, as proposed the system meets this requirement.
- The home is not located within any known HOA.

Applicable Code Sections

1126.18 Solar Structures (attached)

Staff has provided the application to the Fire Department for any comment/input relative to any regulations that may apply in the Fire Code

Upon approval from the DRB, the application will be submitted to the Building Department for the review and issuance of the Building Permit(s).

Attachments:
Application & Plans

City of Huron
Planning and Zoning Dept.
417 Main St. Huron, Ohio 44839
P: 419-433-5000
F: 419-433-5120

Residential Zoning Permit Application

Property Owner
Name: Cynthia White
Address, City, State, Zip: 120 Tiffin Ave, Huron, OH, 44839
Phone: 419-602-7428
Email: Cindywhyt@gmail.com

Contractor (must be registered with the City of Huron)
Name: Dennis St Clair | Sunergy Solar LLC
Address, City, State, Zip: 7625 Little Rd Ste 200A, New Port Richey FL 34654
Phone: 727-375-9375
Email: permitting@gosunergy.com

Location of Project
Address: 120 Tiffin Ave County Parcel Number: 42-01826.000 Lot #: _____

Zoning District & Flood Zone
Zoning District: _____ (R-1 R-1A R-2 R-3 B-1 B-2 B-3 I-1 I-2 P-1 MU)
Flood Zone: not included (A AE AO AH X-SHADED X)

Project Information

New Construction: ☐ **Deck/Porch:** ☐
Addition to Existing Structure: ☐ **Swimming Pool** ☐
Detached Garage/Shed/Storage: ☐ **Demolition:** ☐ **Height of Structure:**___
Fence: ☐ **Linear Ft.:**_____ **Other:** Solar

Description of proposed project: (include complete details, square footage and height)
Install 4.92KW roof mounted solar panel system

ESTIMATED VALUE OF PROPOSED PROJECT: $ 27,326.01

SETBACKS FROM PROPERTY LINES: (Not applicable for Fences or Demolition Projects)
Front Yard Setback: _____ Rear Yard Setback: _____ Height of Structure:_____

Side Yard Setbacks: (Left) _____ (Right) _____

SITE PLAN: A complete site plan must accompany this application. The site plan must include the following information:

_____ Dimensions of the Lot /Property Lines, measurements from the property lines to the foundation

_____ Size and Location of the Existing Structure(if applicable)

_____ Size, Location and Height of the Proposed Structure

_____ Front, Rear, and Side Setbacks of Existing Structure(if applicable)

_____ Front, Rear, and Side Setbacks of Proposed Structure

_____ Dimensions from existing structures to the Proposed Structure

_____ Height of the Proposed Structure or Structure to be demolished. (if applicable)

_____ Location of Sidewalks and Driveways (if applicable) **ROW Driveway Application Required**

_____ Height of Fence (front yard 4' max; side and rear yards 6' max)

STORMWATER PLAN: Applicable for all additions, new construction. Contact the City Engineer for plan detail required: 419-433-5000 ext. 1103

_____ Site Plan with drainage patterns, flow lines for surface water.

Location of any temporary stormwater inlets and piping, including discharge points.

Location and description of measures to prevent stormwater drainage to adjacent properties (Example: silt fence).

Location of catch basins near property and containment measures planned.

Concrete washout location and description of containment measures.

POST CONSTRUCTION PERMANENT STORMWATER CONTROLS

Surface flow(s) of planned stormwater flow.

Downspout locations and route/piping/discharge points planned for stormwater

Yard inlets/other drainage items to control stormwater, if applicable.

Floor elevation of proposed structure and elevation of adjacent streets.

SURVEY MAP OR LEGAL PLAT:

_____ A survey map or legal plat must be provided with the application.

I hereby certify that I am the owner of record of the named property or that the proposed work is authorized by the owner of record and/or I have been authorized to make this application as an authorized agent, and we agree to conform to all applicable laws, regulations, and ordinances. All information contained within this application and supplemental materials is true and accurate to the best of my knowledge and belief.

Incomplete applications will not be accepted, please complete all applicable sections and include all specified plans as listed above.

Applicant Signature: _____ Date: 7/29/24

Owner Signature: Cynthia White Date: 7/29/24

PLEASE NOTE, DO NOT APPLY FOR PERMITS UNLESS YOU ARE READY TO BEGIN YOUR PROJECT WITHIN 6 MONTHS. PERMITS FEES ARE DUE AND PAYABLE AT THE TIME OF ISSUANCE AND ARE NON-REFUNDABLE. ZONING PERMITS EXPIRE 12 MONTHS FROM DATE OF ISSUANCE. IF YOUR PROJECT REQUIRES A BUILDING PERMIT, SUBMIT THE BUILDING PERMIT APPLICATION AND REQUIRED CONSTRUCTION PLANS WITH THIS APPLICATION.

For use by City of Huron Zoning Department:

Date of Submission:7-30-24 Required Plans Included?: YES

Comments/Additional Information requested: DRB APPROVAL REQUIRED, SECTION 1126.18

Denial date and reason:_____

HURON TOWNSHIP
BUILDING DEPARTMENT
APPLICATION
(Accessory Use)

Jurisdiction:
Huron Twp. ☒ Huron City ☐ Milan Village ☐ Berlin Village ☐ Margaretta Twp. ☐
Oxford Twp. ☐ Castalia Village ☐

Property Owner:
Name: Cynthia White
Address: 120 Tiffin Ave, Huron, OH, 44839
Telephone # (419) 602-7428

Contractor:
Name: Dennis St Clair | Sunergy Solar LLC
Address: 7625 Little Rd Ste 200A, New Port Richey FL 34654
Telephone # (727) 375-9375

Location of Project:
Street Address: 120 Tiffin Ave, Huron, OH, 44839
Lot #: _____

Project Scope

New Structure ☐ Replacement ☐

Building/Structure Use:

Storage ☐ Garage ☐ Equipment ☐

Swimming Pool (over 24" deep) ☐ Wind Turbine ☐

Other ☒ SOLAR

Size of Structure: _____x_____ Area: 257.88 sq. ft.

Setbacks
(Projects in Huron Township Only)
(All other projects require approval of the appropriate Zoning Inspector and that approval must accompany this application)

Structure will be located in the front ☐ side ☐ rear ☐ yard ☐

Setbacks: (from property lines)
front yard _____ft. rear yard _____ft.
side yards (facing structure)
east side _____ft. west side _____ft.

Overall height of proposed structure from grade: _____ft.

HURON TWP. BUILDING DEPT.
BUILDING APPLICATION
(Accessory Structure)

Flood Zone of Subject Property: A ☐ B ☐ C ☐ D ☐
(If the property is located in an A zone, a Flood Elevation Certificate is required to accompany this application or no action will be taken.)

What permits are being applied for?
Structural ☒ Electrical ☒
Note: If electrical work is included in this project and the required permit is not applied for, and issued, a 200% penalty will be assessed against the owner of the property in addition to the normal permit fee…..

Value of Work Being Done: $ 27,326.01

CONSTRUCTION SPECIFICATIONS:
The structure must have the following:
1. Some type of approved anchoring system is required to avoid displacement. Explain anchoring system _____
   _____
2. Approved truss ties (hurricane straps) shall be installed.

A complete set of Plans, Specifications, and a Site Plan must accompany this application. It is not necessary to submit complete electrical as it will be inspected on-site by the appropriate Inspectors.

Wind Energy Conversion Systems require complete plans, including all loads, stamped by a Ohio (certified & licensed) design professional (Engineer or Architect)

_____
_____
ZONING APPROVAL: _____
DATE OF APPROVAL: _____

Date of Submittal: _____ Plans approved by: _____
Site Plan Submitted: Yes No Permit # & Date: _____
Plans Submitted: Yes No
Received By: _____

HURON TOWNSHIP BUILDING DEPARTMENT
ELECTRICAL PERMIT APPLICATION

Jurisdiction:

BAY VIEW ☐ BERLIN VILLAGE ☐ CASTALIA ☐ GROTON ☐

HURON CITY ☒ HURON TWP ☐ MARGARETTA ☐ MILAN VILLAGE ☐

OXFORD ☐

APPLICANT'S NAME Dennis St Clair | Sunergy Solar LLC

ADDRESS, PHONE NUMBER & EMAIL permitting@gosunergy.com

7625 Little Rd Ste 200A, New Port Richey, FL 34654

727-375-9375

OWNER'S NAME Cynthia White

ADDRESS, PHONE # 419-602-7428

120 Tiffin Ave, Huron, OH, 44839

PROJECT LOCATION:

120 Tiffin Ave, Huron, OH, 44839

SCOPE OF PROJECT: Install 4.92KW roof mounted solar panel system

If the project is Commercial/Industrial fill out the Plan Approval Application.

****

DO NOT WRITE BELOW THIS LINE

****

Date Submitted: _____ Permit Issued: Yes No

Received by: _____ Date: _____ Permit #: _____

REMARKS: _____

August 12, 2024

To: City Of Huron Building Department
417 Main St,
Huron, OH 44839.

Re: Cynthia White
120 Tiffin Ave,
Huron, OH 44839

To whom it may concern,

A. This letter is a response to the rejection comments of the proposed Solar PV system at the address above.

Discrepancy:

1. Minimum setback of 12'' from the edge of the roof is required.

Corrections:

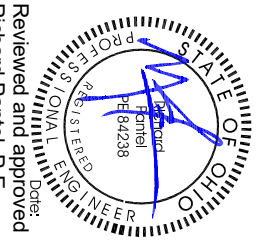
Revised plans to provide 12” setback from the roof edges (Page S001).

All changes are clouded.

Please contact me if you have any questions.

Sincerely,

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
Date: 07/25/2024



PHOTOVOLTAIC ROOF MOUNT SYSTEM

12 MODULES-ROOF MOUNTED - 4.920 KW DC, 3.900 KW AC

120 TIFFIN AVE, HURON, OH 44839

PROJECT DATA

PROJECT ADDRESS: 120 TIFFIN AVE, HURON, OH 44839

OWNER: CYNTHIA WHITE

DESIGNER: ESR

SCOPE: 4.920 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 12 HYUNDAI SOLAR HIS-S410YH(BK) 410W PV MODULES WITH 12 ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN

AUTHORITIES HAVING JURISDICTION:
BUILDING: CITY OF HURON
ZONING: CITY OF HURON
UTILITY: OHIO EDISON

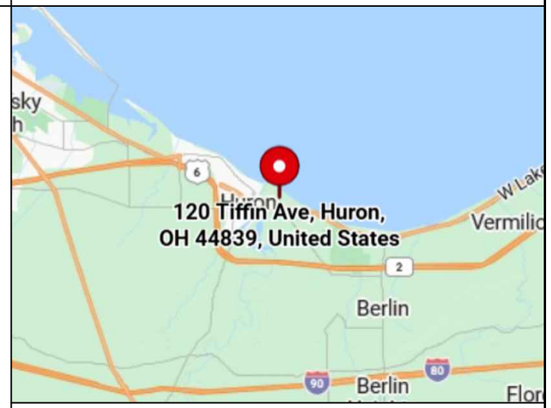
SHEET INDEX

SIGNATURE

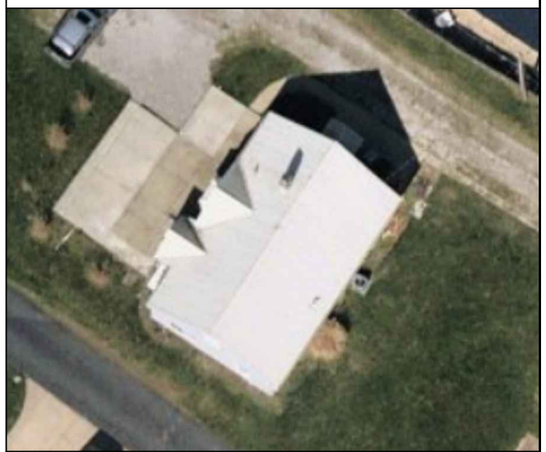
GENERAL NOTES

1. ALL COMPONENTS ARE UL LISTED AND NEC CERTIFIED, WHERE WARRANTED.
2. THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2023.
3. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
4. ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
5. WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
6. HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
7. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 2023 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
8. PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
9. PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
10. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
11. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
12. INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
13. THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
14. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
15. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
16. SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
17. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
18. DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
19. ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
20. WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
21. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
22. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
23. IN ACCORDANCE WITH 2021 IFC 1205.5, 2018 IFC 1204.4, AND 2015 IFC 605.11.2 A CLEAR, BRUSH-FREE AREA OF 10 FEET(3048 MM) SHALL BE REQUIRED FOR GROUND-MOUNTED PHOTOVOLTAIC ARRAYS.
24. PANEL LAYOUT ORIENTATION IS SUBJECT TO CHANGE ON DESIGNED MOUNTING PLANES.
25. ALL PERMANENTLY INSTALLED LUMINARIES, EXCLUDING THOSE IN KITCHEN APPLIANCES, SHALL HAVE AN EFFICIENCY OF AT LEAST 45 LUMENS-PER-WATT OR SHALL UTILIZE LAMPS WITH AN EFFICIENCY OF NOT LESS THAN 65 LUMENS-PER-WATT.
26. MOUNTING SYSTEMS SHALL BE LISTED AND LABELLED IN ACCORDANCE WITH UL 2703 TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THEIR LISTINGS.

VICINITY MAP



HOUSE PHOTO



CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

2023 NATIONAL ELECTRIC CODE, NFPA 70 (NEC)
AMENDED 2019 RESIDENTIAL CODE OF OHIO
2024 OHIO BUILDING CODE (2021 IBC)
2024 OHIO MECHANICAL CODE (2021 IMC)
2024 OHIO PLUMBING CODE (2021 IPC)
2024 OHIO EXISTING BUILDING CODE
2024 OHIO FIRE CODE (2021 IFC)

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SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

STATE OF OHIO
Richard Pantel
PE.84238
PROFESSIONAL ENGINEER
REGISTERED
Date:

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
07/25/2024

PROJECT NAME & ADDRESS

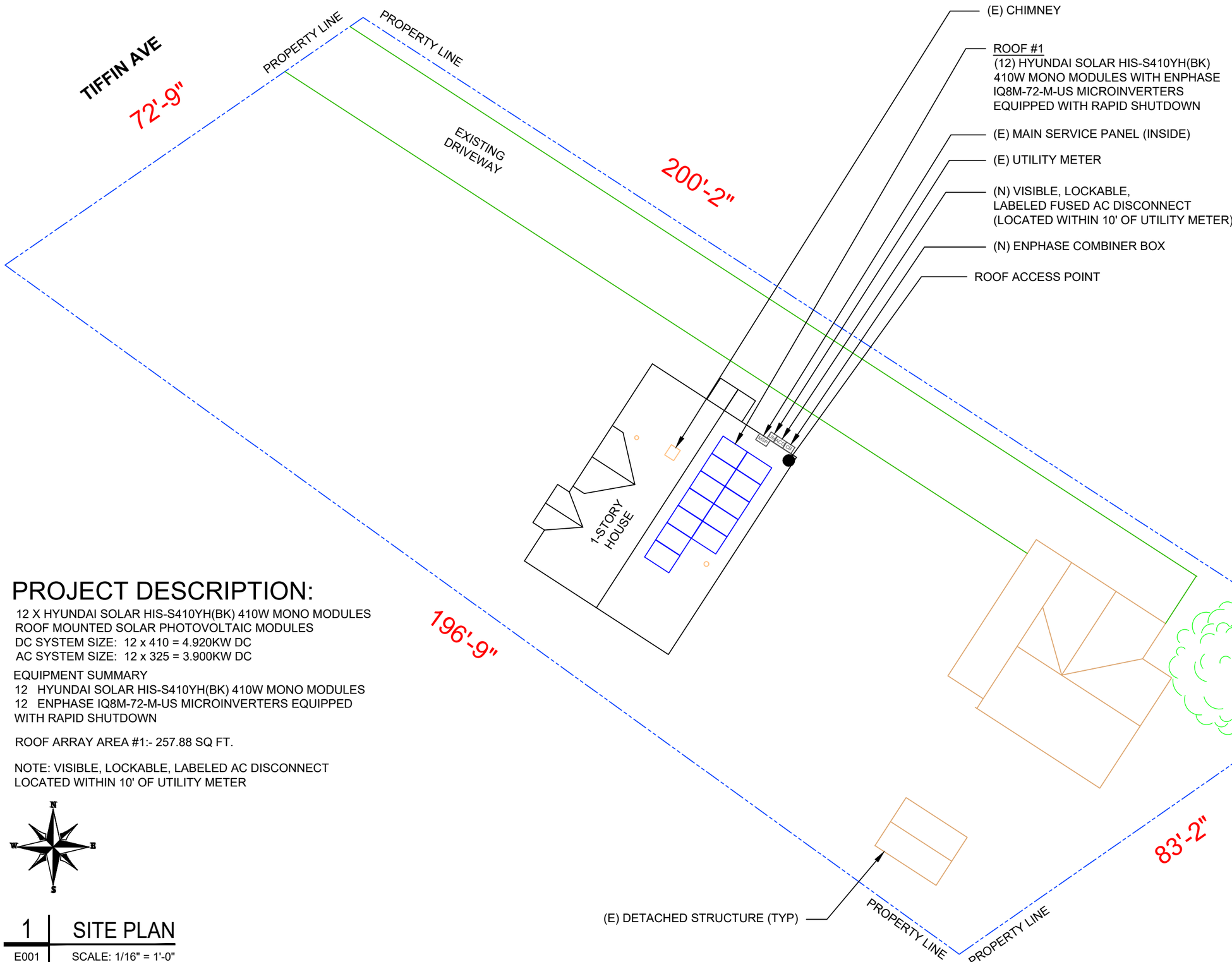
WHITE RESIDENCE
120 TIFFIN AVE, HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
G001



PROJECT DESCRIPTION:

12 X HYUNDAI SOLAR HIS-S410YH(BK) 410W MONO MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 12 x 410 = 4.920KW DC
AC SYSTEM SIZE: 12 x 325 = 3.900KW DC

EQUIPMENT SUMMARY
12 HYUNDAI SOLAR HIS-S410YH(BK) 410W MONO MODULES
12 ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN

ROOF ARRAY AREA #1:- 257.88 SQ FT.

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT LOCATED WITHIN 10' OF UTILITY METER

1 SITE PLAN
E001 SCALE: 1/16" = 1'-0"

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SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

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HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
SITE PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E001

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 12 MODULES
MODULE TYPE = HYUNDAI SOLAR HIS-S410YH(BK) 410W MONO MODULES
MODULE WEIGHT = 46.51 LBS / 21.1KG.
MODULE DIMENSIONS = 75.74" x 40.86" = 21.49 SF

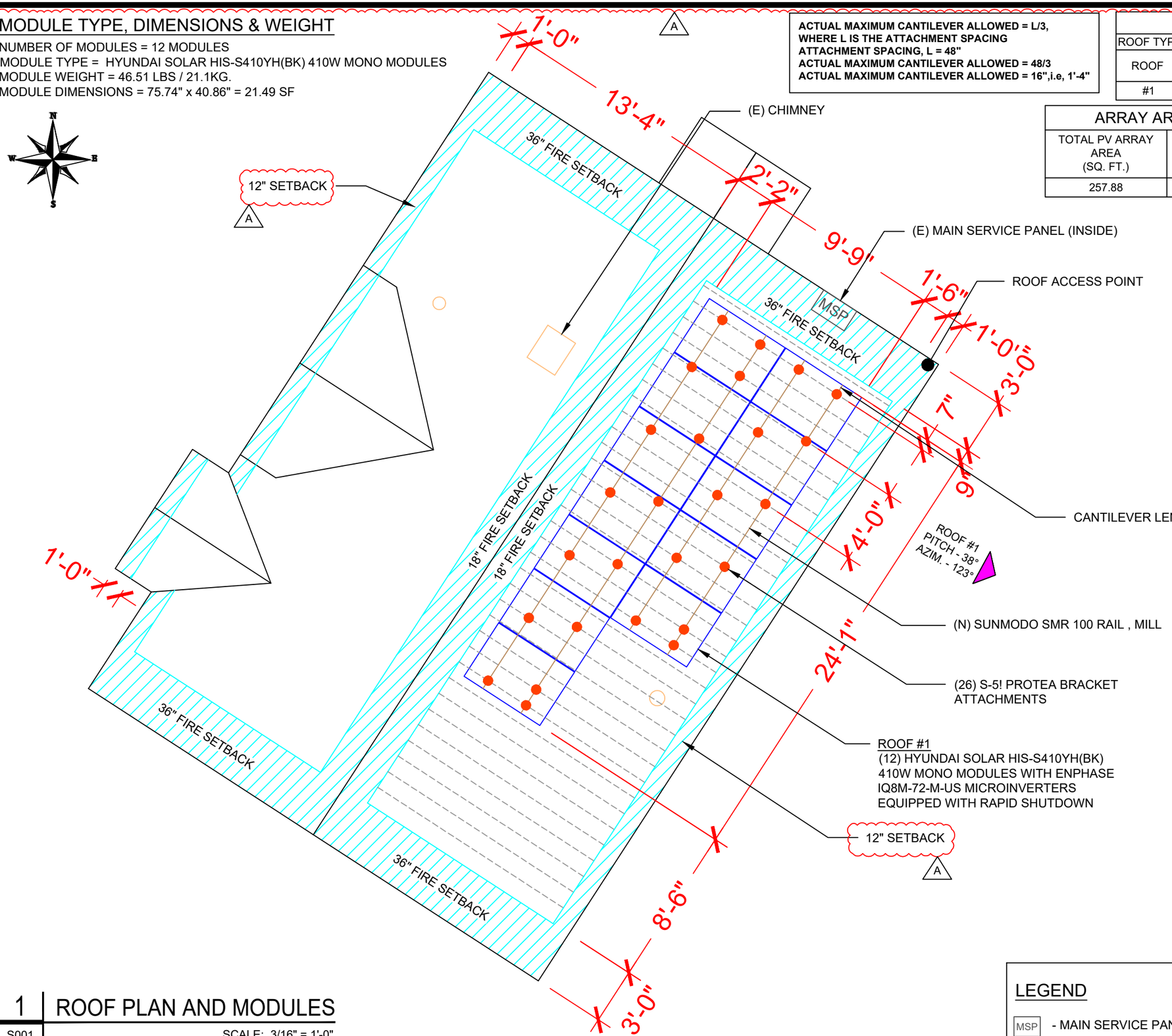
ACTUAL MAXIMUM CANTILEVER ALLOWED = L/3,
WHERE L IS THE ATTACHMENT SPACING
ATTACHMENT SPACING, L = 48"
ACTUAL MAXIMUM CANTILEVER ALLOWED = 48/3
ACTUAL MAXIMUM CANTILEVER ALLOWED = 16",i.e, 1'-4"

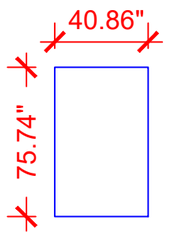
ROOF DESCRIPTION

ROOF TYPE				METAL
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	SEAM SPACING
#1	12	38°	123°	12"

ARRAY AREA & ROOF AREA CALC'S

TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
257.88	1144.90	23





HYUNDAI SOLAR
HIS-S410YH(BK)
410W MODULES

LEGEND

MSP - MAIN SERVICE PANEL
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- SEAM

1 ROOF PLAN AND MODULES
S001 SCALE: 3/16" = 1'-0"

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HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
ROOF PLAN AND MODULES

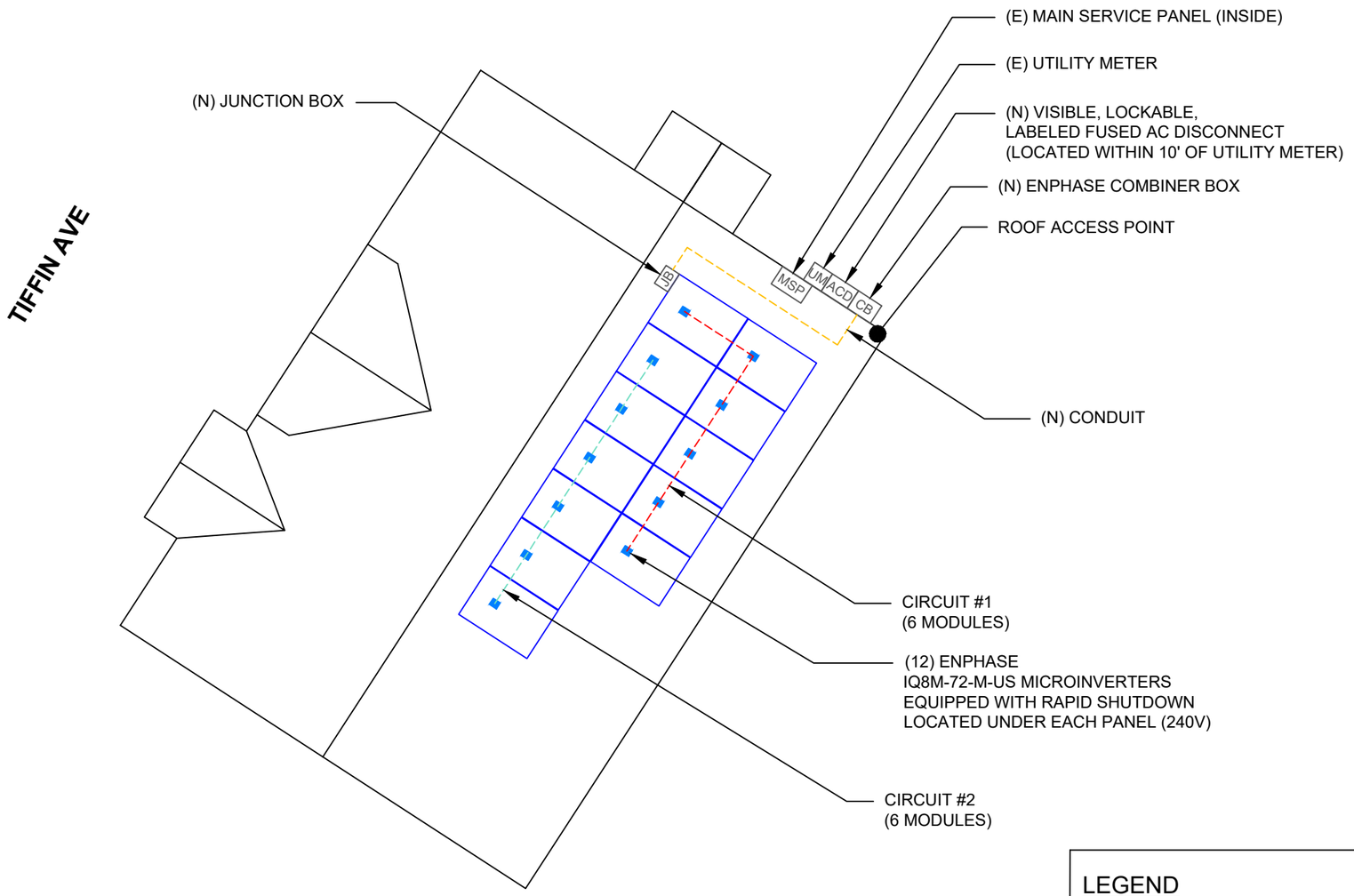
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S001

CIRCUIT LEGENDS
CIRCUIT #1
CIRCUIT #2

NOTE : CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOF

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	12	HYUNDAI SOLAR HIS-S410YH(BK) 410W MODULE
MICRO INVERTERS	12	ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN
JUNCTION BOX	1	JUNCTION BOX
RAIL	7	SUNMODO SMR 100 RAIL , MILL
SPLICES	4	SPLICES
MID MODULE CLAMPS	20	MID MODULE CLAMPS
END CLAMPS	8	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	26	S-5! PROTEA BRACKET ATTACHMENTS



LEGEND

- CB - COMBINER BOX
- ACD - AC DISCONNECT
- UM - UTILITY METER
- MSP - MAIN SERVICE PANEL
- JB - JUNCTION BOX
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- SEAM
- CONDUIT

1 ELECTRICAL PLAN
E002 SCALE: 1/8" = 1'-0"

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07/25/2024

PROJECT NAME & ADDRESS

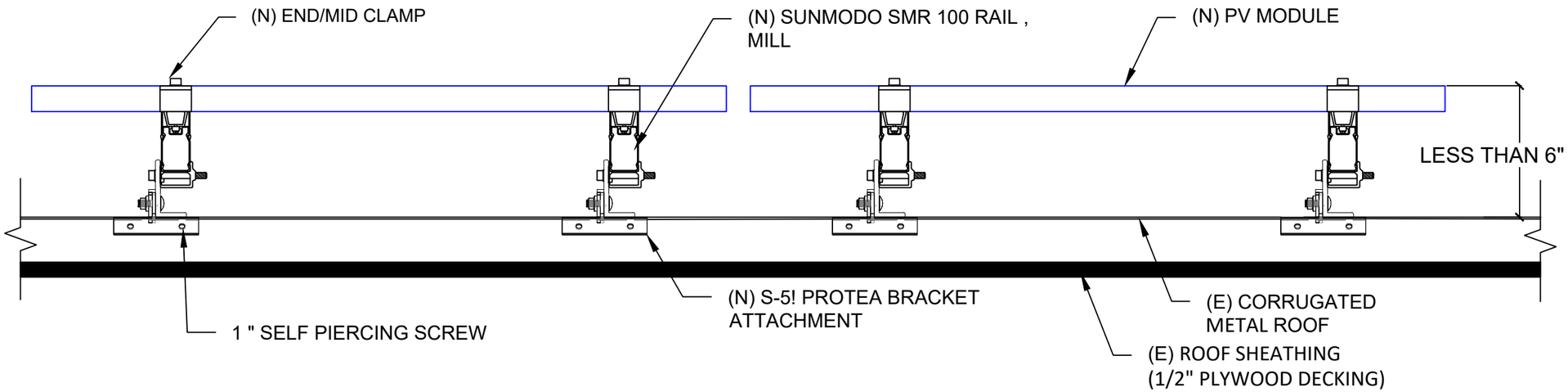
WHITE RESIDENCE
120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
ELECTRICAL PLAN

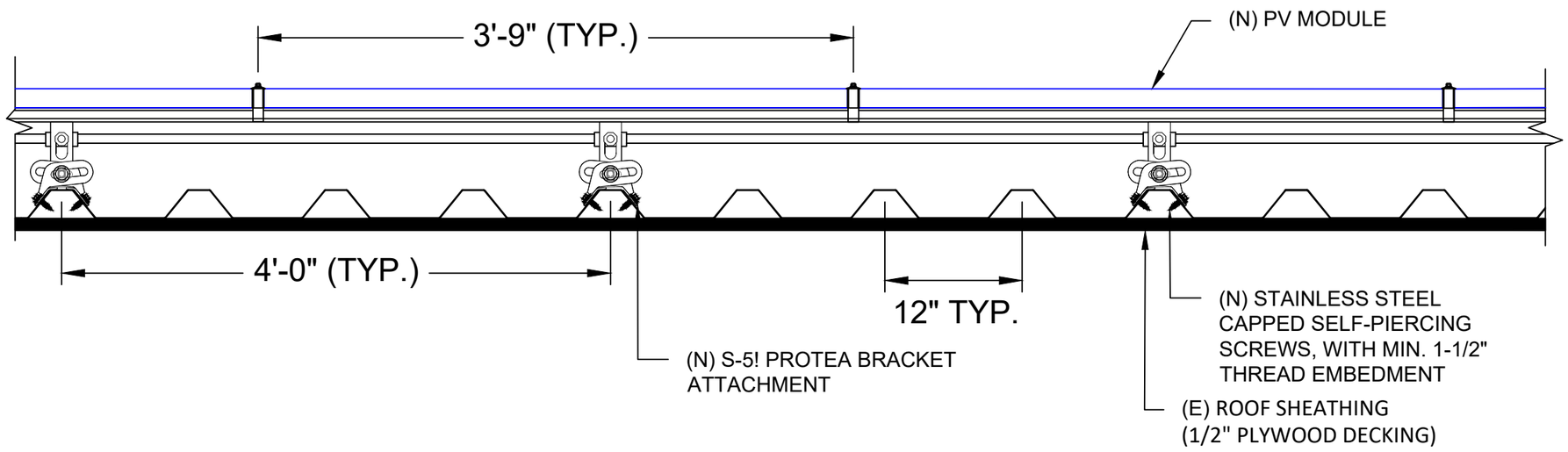
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E002



S002 | ATTACHMENT DETAIL (SIDE VIEW)

SCALE: N.T.S.



2 S002 | ATTACHMENT DETAIL (FRONT VIEW)

SCALE: N.T.S.

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SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
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PROJECT NAME & ADDRESS

WHITE RESIDENCE

120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
STRUCTURAL DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S002

DC SYSTEM SIZE: 12 x 410 = 4.920KW DC
AC SYSTEM SIZE: 12 x 325 = 3.900KW DC

(12) HYUNDAI SOLAR HIS-S410YH(BK) 410W MONO MODULES WITH
(12) ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN
LOCATED UNDER EACH PANEL (240V)

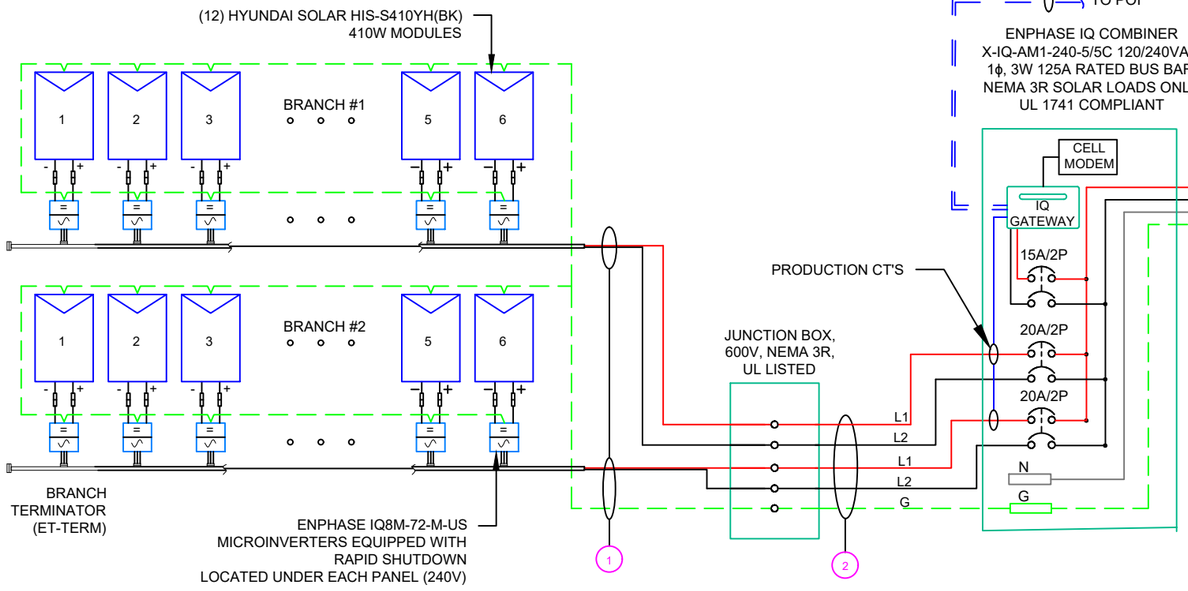
(2) BRANCH CIRCUITS OF 6 MODULES ARE CONNECTED IN PARALLEL

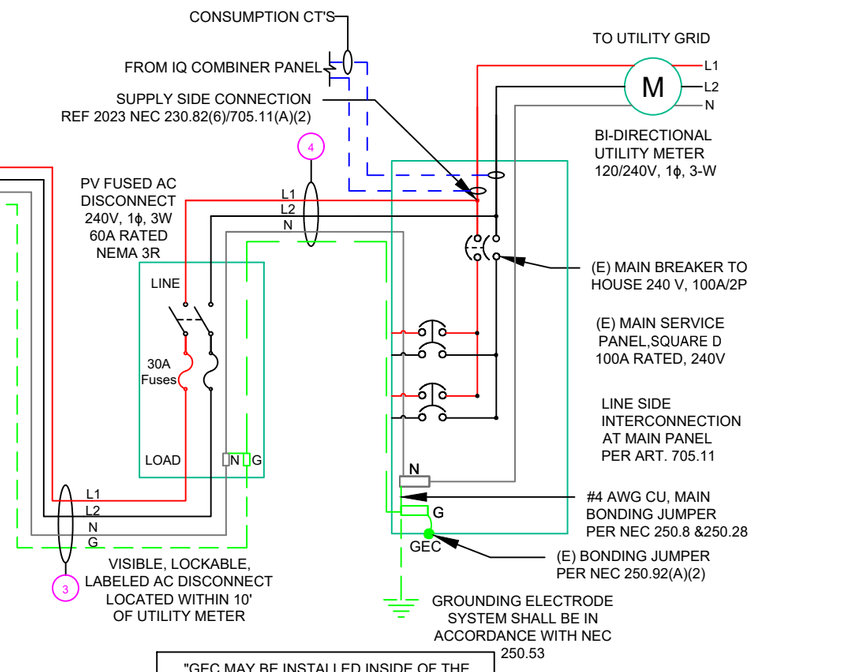
INTERCONNECTION NOTES:
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

DISCONNECT NOTES:
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

RACKING NOTE:
1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

GROUNDING & GENERAL NOTES:
1. **GROUNDING ELECTRODES AND GROUNDING ELECTRODE CONDUCTORS.** ADDITIONAL GROUNDING ELECTRODES SHALL BE PERMITTED TO BE INSTALLED IN ACCORDANCE WITH 250.52 AND 250.54.GROUNDING ELECTRODES SHALL BE PERMITTED TO BE CONNECTED DIRECTLY TO THE PV MODULE FRAME(S) OR SUPPORT STRUCTURE PER [NEC 690.47(B)]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. ALL NEW SERVICE INSTALLATIONS AND REPLACEMENTS REQUIRE A SURGE-PROTECTIVE DEVICE (SPD) IN ACCORDANCE WITH [NEC 230.67]. THE SPD SHALL BE TYPE 1 OR TYPE 2 AND IS REQUIRED TO BE AN INTEGRAL PART OF THE SERVICE EQUIPMENT OR LOCATED IMMEDIATELY ADJACENT THERETO.





"GEC MAY BE INSTALLED INSIDE OF THE SAME RACEWAY AS THE TAP CONDUCTORS IF STRANDED, IN THE EVENT THAT EXISTING GEC CANNOT BE IDENTIFIED, OR IS NOT ACCESSIBLE FOR PROPER GROUNDING MEANS OF SOLAR SYSTEM."

OCPD CONDUCTOR SIZE	
BREAKER/FUSE SIZE	WIRE GAUGE SIZE (75°C,COPPER)
20A	10 AWG
25A	10 AWG
30A	10 AWG
35A	8 AWG
40A	8 AWG
45A	8 AWG
50A	8 AWG
60A	6 AWG
70A	4 AWG
80A	4 AWG
90A	3 AWG
100A	3 AWG
110A	2 AWG
125A	1 AWG
150A	1/0 AWG
175A	2/0 AWG
200A	3/0 AWG

	QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
1	(4)	CU#12AWG -	ENPHASE ENGAGE CABLE (L1 & L2 NO NEUTRAL)	N/A	N/A
	(1)	CU #6AWG -	BARE COPPER IN FREE AIR		
2	(4)	CU#10AWG -	THWN-2 L1 &L2	ENT OR LFMC IN ATTIC	3/4"
	(1)	CU #10AWG -	CU,THWN-2 GND #12/2 ROMEX IN ATTIC		
3	(2)	CU #10AWG -	THWN-2 OR THHN L1 &L2	EMT, LFMC OR PVC	3/4"
	(1)	CU #10AWG -	CU,THWN-2 OR THHN N		
	(1)	CU #10AWG -	CU,THWN-2 OR THHN GND		
4	(3)	CU #6AWG -	THWN-2 OR THHN L1, L2 & N	EMT, LFMC OR PVC	3/4"
	(1)	CU #6AWG -	CU,THWN-2 OR THHN GND		

NOTE : "CONDUIT SIZE IS MINIMUM REQUIRED PER NEC300.17. CONTRACTOR MAY UPSIZE AS NEEDED".

1 ELECTRICAL LINE DIAGRAM
E003 SCALE: NTS

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SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
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PE.84238
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Date:
Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
07/25/2024

PROJECT NAME & ADDRESS
WHITE RESIDENCE
120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E003

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN
MIN/MAX DC VOLT RATING	22V MIN/ 58V MAX
MAX INPUT POWER	260W-460W
NOMINAL AC VOLTAGE RATING	240V/ 211-264V
MAX AC CURRENT	1.35A
MAX MODULES PER CIRCUIT	11 (SINGLE PHASE)
MAX OUTPUT POWER	325 VA

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HYUNDAI SOLAR HIS-S410YH(BK) 410W MODULE
VMP	38.1V
IMP	10.76A
VOC	45.9V
ISC	11.40A
TEMP. COEFF. VOC	-0.268%/°C
MODULE DIMENSION	75.74"L x 40.86"W x 1.37"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-19°
AMBIENT TEMP (HIGH TEMP 2%)	34°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.268%/°C

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

AC CALCULATIONS

CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
CIRCUIT 1	JUNCTION BOX	240	8.10	10.13	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	34	2	30	0.96	1	28.8	PASS			0.20	N/A	#N/A
CIRCUIT 2	JUNCTION BOX	240	8.10	10.13	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	34	2	30	0.96	1	28.8	PASS			0.20	N/A	#N/A
JUNCTION BOX	COMBINER BOX	240	8.10	10.13	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	34	4	40	0.96	0.8	30.72	PASS	20	1.24	0.167	3/4"ENT	6.94
COMBINER BOX	AC DISCONNECT	240	16.20	20.25	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	34	2	40	0.96	1	38.4	PASS	5	1.24	0.084	3/4"EMT	10.42
AC DISCONNECT	POI	240	16.20	20.25	30	CU #6 AWG	CU #6 AWG	CU #6 AWG	65	PASS	34	2	75	0.96	1	72	PASS	5	0.491	0.033	3/4"EMT	24.92

Circuit 1 Voltage Drop	0.484
Circuit 2 Voltage Drop	0.484

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3. WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOX, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.
11. CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOF .....NEC 310.15(B)(3)(C)

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07/25/2024

PROJECT NAME & ADDRESS

WHITE RESIDENCE
120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
WIRING CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E004

CAUTION:
AUTHORIZED SOLAR
PERSONNEL ONLY!

LABEL-1:
LABEL LOCATION:
AC DISCONNECT

⚠ WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL- 2:
LABEL LOCATION:
AC DISCONNECT
COMBINER
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
CODE REF: NEC 690.13(B)

⚠WARNING **DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

LABEL- 3:
LABEL LOCATION:
UTILITY METER
MAIN SERVICE PANEL
SUBPANEL
CODE REF: NEC 705.12(C) & NEC 690.59

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL- 4:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
COMBINER
CODE REF: NEC 110.27(C) & OSHA 1910.145 (f) (7)

CAUTION

ALTERNATIVE POWER SUPPLY
AC SYSTEM DISCONNECT

LABEL-5:
LABEL LOCATION:
AC DISCONNECT

⚠ WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL- 6:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

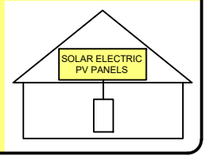
⚠ WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

LABEL- 7:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL- 8:
LABEL LOCATION:
AC DISCONNECT
CODE REF:NEC 690.56(C)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL- 9:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.56(C)(2)

PHOTOVOLTAIC

AC DISCONNECT

LABEL- 10:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.13(B)

PHOTOVOLTAIC AC DISCONNECT

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	16.20 A

LABEL- 11:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
AC DISCONNECT
CODE REF: NEC 690.54

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

LABEL- 12:
LABEL LOCATION:
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)
CODE REF: NEC 690.13(B)

CAUTION
POWER TO THIS SERVICE IS ALSO SUPPLIED FROM ON-SITE SOLAR/WIND GENERATION

AC SYSTEM DISCONNECT

LABEL-13:
LABEL LOCATION:
AC DISCONNECT

SUNERGY SOLAR LLC
EMERGENCY CONTACT
(727) 375-9375

LABEL- 14:
LABEL LOCATION:
MAIN SERVICE DISCONNECT
CODE REF: NFPA 1 (11.12.2.1.5)

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

STATE OF OHIO
Richard Pantel
PE.84238
REGISTERED
PROFESSIONAL ENGINEER
Date:

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
07/25/2024

PROJECT NAME & ADDRESS

WHITE RESIDENCE
120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

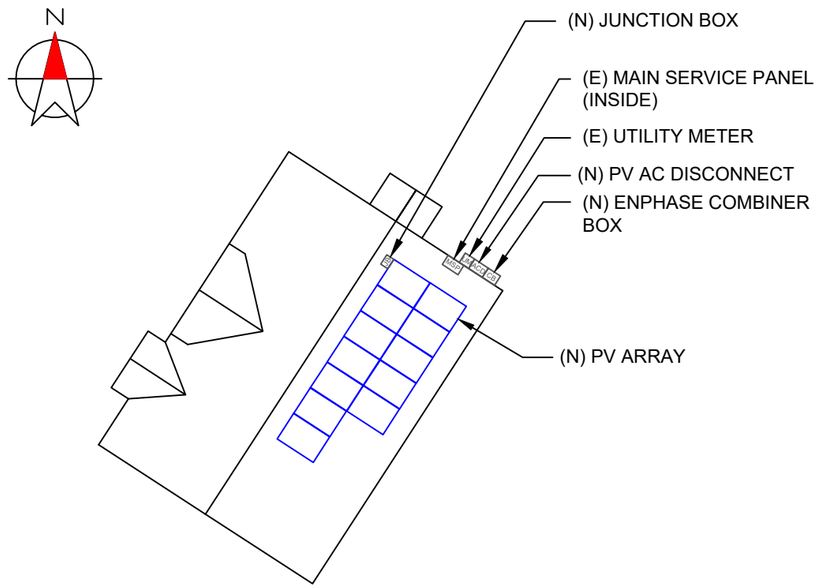
SHEET NAME
LABELS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E005

CAUTION:

MULTIPLE SOURCES OF POWER



120 TIFFIN AVE, HURON, OH 44839

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(A)&(B), [NEC 705.10])

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2023 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY

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SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

PROJECT NAME & ADDRESS

WHITE RESIDENCE

120 TIFFIN AVE, HURON, OH 44839

DRAWN BY: ESR

SHEET NAME: PLACARD

SHEET SIZE: ANSI B 11" X 17"

SHEET NUMBER: E006

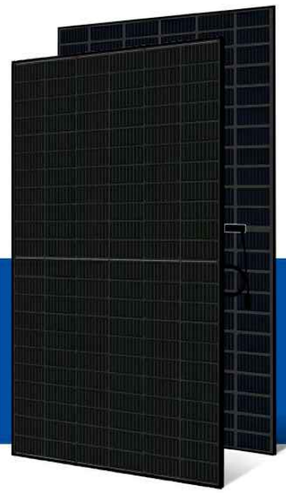
HYUNDAI SOLAR MODULE

25 YR WARRANTY Product & Performance

YH SERIES

Dual Black Max

HiS-S385YH(BK) HiS-S390YH(BK) HiS-S395YH(BK)
HiS-S400YH(BK) HiS-S405YH(BK) HiS-S410YH(BK)



Bifacial Cells **132**

More Power Generation In Low Light

UL 1,500V IEC 1,500V Saves BOS Costs

All black Module For Sleek Design (Black Meshed T-Back sheet)

Maximized Power Generation

Increased total power output through capturing light from both the front and back of Bifacial solar modules. Back side power gain up to 25% of the front output depending on PV system design.

Half-Cut & Multi-Wire Technology

9 Wires

Improved current flow with half-cut technology and 9 thin wiring technology allows high module efficiency of up to 20.5%. It also reduces power generation loss due to micro-cracks.

Anti-LID / PID

Both LID(Light Induced Degradation) and PID(Potential Induced Degradation) are significantly reduced to ensure higher actual yield during lifetime.

Mechanical Strength

Tempered glass and reinforced frame design withstand rigorous weather conditions such as heavy snow(5,400Pa) and strong wind(4,000Pa).

UL / VDE Test Labs

Hyundai's R&D center is an accredited test laboratory of both UL and VDE.

Reliable Warranty

HYUNDAI

Global brand with powerful financial strength provide reliable 25-year warranty.

Hyundai's Warranty Provisions

25 YEARS
- 25-Year Product Warranty
  - Materials and workmanship

25 YEARS
- 25-Year Performance Warranty
  - Initial year : 98.0%
  - Linear warranty after second year: with 0.54%p annual degradation, 85.0% is guaranteed up to 25 years

About Hyundai Energy Solutions

Established in 1972, Hyundai Heavy Industries Group is one of the most trusted names in the heavy industries sector and is a Fortune 500 company. As a global leader and innovator, Hyundai Heavy Industries is committed to building a future growth engine by developing and investing heavily in the field of renewable energy.

As a core energy business entity of HHI, Hyundai Energy Solutions has strong pride in providing high-quality PV products to more than 3,000 customers worldwide.

Certification

US LISTED

- UL61730 certified by UL, Type 1(for Fire Class A)

Printed Date : 03/2022(final)

www.hyundai-es.co.kr

HYUNDAI ENERGY SOLUTIONS

Electrical Characteristics

		Mono-Crystalline Type(HiS-S____YH(BK))					
		385	390	395	400	405	410
Nominal Output (Pmpp)	W	385	390	395	400	405	410
Open Circuit Voltage (Voc)	V	44.5	44.8	45.0	45.3	45.6	45.9
Short Circuit Current (Isc)	A	11.04	11.11	11.18	11.25	11.33	11.40
Voltage at Pmax (Vmpp)	V	37.1	37.3	37.5	37.7	37.9	38.1
Current at Pmax (Impp)	A	10.40	10.47	10.54	10.61	10.69	10.76
Module Efficiency	%	19.3	19.5	19.8	20.0	20.3	20.5
Cell Type	-	Mono crystalline, 9busbar					
Maximum System Voltage	V	1,500					
Temperature Coefficient of Pmax	%/K	-0.347					
Temperature Coefficient of Voc	%/K	-0.268					
Temperature Coefficient of Isc	%/K	+0.032					

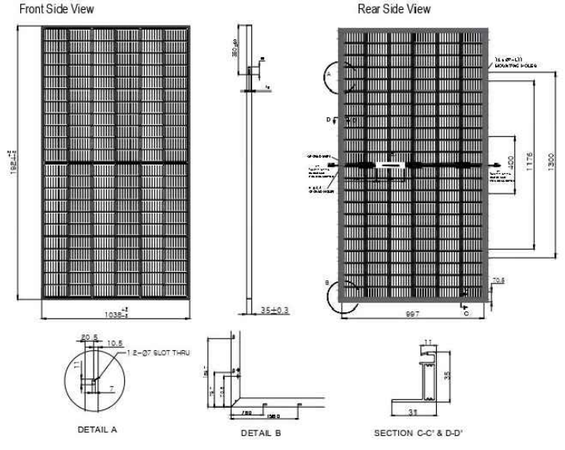
* All data at STC (Measurement tolerances Pmpp ±3%; Isc ; Voc ±3%). Above data may be changed without prior notice.

Additional Power Gain from rear side		385	390	395	400	405	410
5%	W	399	404	410	415	425	431
15%	W	437	443	449	454	466	472
25%	W	475	482	488	494	506	513

Mechanical Characteristics

Dimensions	1,038 mm (W) x 1,924 mm (L) x 35 mm(H)
Weight	Approx. 21.1 kg
Solar Cells	132 half cut bifacial cells (2 parallel x 66 half cells in series)
Output Cables	Cable : 1,200mm / 4mm² Connector : MC4 genuine connector
Junction Box	IP68, weatherproof, IEC certified (UL listed)
Bypass Diodes	3 bypass diodes to prevent power decrease by partial shade
Construction	Front : 3.2mm, High Transmission, AR Coated Tempered Glass Encapsulant : EVA I Back Sheet : Black Meshed Transparent Backsheet
Frame	Anodized aluminum alloy type 6063

Module Diagram (unit : mm)

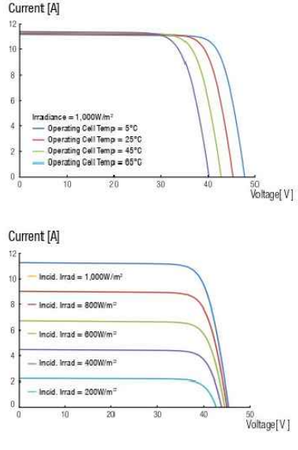


Installation Safety Guide

- Only qualified personnel should install or perform maintenance.
- Be aware of dangerous high DC voltage.
- Do not damage or scratch the rear surface of the module.
- Do not handle or install modules when they are wet.

Nominal Operating Cell Temperature	45.5°C ± 2
Operating Temperature	-40°C ~ +85°C
Maximum System Voltage	DC 1,500V
Maximum Reverse Current	20A
Maximum Test Load	Front 5,400 Pa (113psf) Rear 4,000 Pa (84psf)

I-V Curves



Printed on FSC certified eco-friendly paper.

HYUNDAI ENERGY SOLUTIONS

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SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

PROJECT NAME & ADDRESS

WHITE RESIDENCE
120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
MODULE DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD001

ENPHASE

DATA SHEET

IQ8M and IQ8A Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC), which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built using advanced 55 nm technology with high-speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.

Connect PV modules quickly and easily to the IQ8 Series Microinverters that have integrated MC4 connectors.

CERTIFIED SAFETY

IQ8 Series Microinverters are UL Listed as PV rapid shutdown equipment and conform with various regulations when installed according to manufacturer's instructions.

* Meets UL 1741 only when installed with IQ System Controller 2.
** IQ8M and IQ8A support split-phase, 240 V installations only.

Easy to install

- Lightweight and compact with plug-and-play connectors
- Power line communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB 3rd Ed.)

Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc) in the same system.

IQ8M and IQ8A Microinverters

INPUT DATA (DC)	UNITS	IQ8M-72-M-US	IQ8A-72-M-US
Commonly used module pairings[1]	W	260–460	295–500
Module compatibility		To meet compatibility, PV modules must be within maximum input DC voltage and maximum module I_{sc} listed below. Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator	
MPPT voltage range	V	30–45	32–45
Operating range	V	16–58	
Minimum/Maximum start voltage	V	22/58	
Maximum input DC voltage	V	60	
Maximum continuous input DC current	A	12	
Maximum input DC short-circuit current	A	25	
Maximum module I_{sc}	A	20	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1 x 1 ungrounded array; no additional DC side protection required; AC side protection requires max 20 A per branch circuit	
OUTPUT DATA (AC)	**UNITS**	**IQ8M-72-M-US**	**IQ8A-72-M-US**
Peak output power	VA	330	366
Maximum continuous output power	VA	325	349
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	
Minimum and Maximum grid voltage[2]	V	211–264	
Maximum continuous output current	A	1.35	1.45
Nominal frequency	Hz	60	
Extended frequency range	Hz	47–68	
AC short circuit fault current over three cycles	Arms	2	
Maximum units per 20 A (L-L) branch circuit[3]		11	
Total harmonic distortion	%	<5	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading–0.85 lagging	
Peak efficiency	%	97.8	97.7
CEC weighted efficiency	%	97.5	97
Nighttime power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to 60°C (-40°F to 140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		Stäubli MC4	
Dimensions (H x W x D)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.1 kg (2.43 lbs)	
Cooling		Natural convection–no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion-resistant polymeric enclosure	
Environmental category/UV exposure rating		NEMA Type 6/outdoor	

(1) No enforced DC/AC ratio.
(2) Nominal voltage range can be extended beyond nominal if required by the utility.
(3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8M and IQ8A Microinverters

COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3rd Ed.), FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV rapid shutdown equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.

IQ8MA-MC4-DSH-00205-1.0-EN-US-2023-09-07

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SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

PROJECT NAME & ADDRESS

WHITE RESIDENCE

120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
MICROINVERTER DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD002

ENPHASE

DATASHEET

X-IQ-AM1-240-5
X-IQ-AM1-240-5C

IQ Combiner 5/5C

The IQ Combiner 5/5C consolidates interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications. IQ Combiner 5/5C uses wired control communication and is compatible with IQ System Controller 3/3G and IQ Battery 5P.

The IQ Combiner 5/5C, along with IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provides you with a complete grid-agnostic Enphase Energy System.

IQ Series Microinverters
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) dramatically simplify the installation process

IQ System Controller 3/3G
Provides microgrid interconnection device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power

IQ Battery 5P
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT Microinverters

IQ Load Controller
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life

Enphase 5 year limited warranty

5-year limited warranty

UL LISTED

Smart
- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect (CELLMODEM-M1-06-SP-05), only with IQ Combiner 5C
- Supports flexible networking: Wi-Fi, Ethernet, or cellular
- Provides production metering (revenue grade) and consumption monitoring

Easy to install
- Mounts to one stud with centered brackets
- Supports bottom, back, and side conduit entry
- Supports up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV branch circuits
- Bluetooth based Wi-Fi provisioning for easy Wi-Fi setup

Reliable
- Durable NRTL-certified NEMA type 3R enclosure
- 5-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKUs
- UL1741 listed

IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5)	IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSIC12.20 ±0.5%), consumption monitoring (± 2.5%) and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat
IQ Combiner 5C (X-IQ-AM1-240-5C)	IQ Combiner 5C with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (±2.5%) and IQ Battery monitoring (±2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05)[1], includes a silver solar shield to deflect heat
WHAT'S IN THE BOX	
IQ Gateway printed circuit board	IQ Gateway is the platform for total energy management for comprehensive, remote maintenance and management of the Enphase IQ System
Busbar	125A busbar with support for 1 x IQ Gateway breaker and 4 x 20A breaker for installing IQ Series Microinverters and IQ Battery 5P
IQ Gateway breaker	Circuit breaker, 2-pole, 10 A/15 A
Production CT	Prewired revenue-grade solid core CT, accurate up to 0.5%
Consumption CT	Two consumption metering clamp CTs, shipped with the box, accurate up to 2.5%
IQ Battery CT	One battery metering clamp CT, shipped with the box, accurate up to 2.5%
CTRL board	Control board for wired communication with IQ System Controller 3/3G and the IQ Battery 5P
Enphase Mobile Connect (only with IQ Combiner 5C)	4G-based LTE-M1 cellular modem (CELLMODEM-M1-06-SP-05) with a 5-year T-Mobile data plan
Accessories kit	Spare control headers for CTRL board
ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
CELLMODEM-M1-06-SP-05	4G-based LTE-M1 cellular modem with a 5-year T-Mobile data plan
CELLMODEM-M1-06-AT-05	4G-based LTE-M1 cellular modem with a 5-year AT&T data plan
Circuit breakers (off-the-shelf)	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers Supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with hold-down kit
Circuit breakers (provided by Enphase)	BRK-10A-2-240V, BRK-15A-2-240V, BRK-20A-2P-240V, BRK-15A-2P-240V-B, and BRK-20A-2P-240V-B (More details in "Accessories" section)
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 5/5C
XA-ENV2-PCBA-5	IQ Gateway replacement printed circuit board (PCB) for Combiner 5/5C
X-IQ-NA-HD-125A	Hold-down kit compatible with Eaton BR-B series circuit breakers (with screws)
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage	120/240 VAC, 60 Hz
Busbar rating	125 A
Fault curent rating	10 kAIC
Maximum continuous current rating (input from PV/storage)	64 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series distributed generation (DG) breakers only (not included)
Maximum total branch circuit breaker rating (input)	80 A of distributed generation/95 A with IQ Gateway breaker included
IQ Gateway breaker	10 A or 15 A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-CLAMP)	A pair of 200 A clamp-style current transformers is included with the box
IQ Battery metering CT	200 A clamp-style current transformer for IQ Battery metering, included with the box

[1] A plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)

IQC-5-5C-DSH-00007-2.0-EN-US-2023-09-27

MECHANICAL DATA	
Dimensions (WxHxD)	37.5 cm x 49.5 cm x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40°C to 46°C (-40°F to 115°F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors • Always follow local code requirements for conductor sizing
Communication (In-premise connectivity)	Built-in CTRL board for wired communication with IQ Battery 5P and IQ System Controller 3/3G. Integrated Power Line Communication for IQ Series Microinverters
Altitude	Up to 2,600 meters (8,530 feet)
COMMUNICATION INTERFACES	
Integrated Wi-Fi	802.11b/g/n (dual band 2.4 GHz/5 GHz), for connecting the Enphase cloud via the internet
Wi-Fi range (recommended)	10 m
Bluetooth	BLE4.2, 10 m range to configure Wi-Fi SSID
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included), for connecting to the Enphase Cloud via the internet
Mobile Connect	CELLMODEM-M1-06-SP-05 or CELLMODEM-M1-06-AT-05 (included with IQ Combiner 5C)
Digital I/O	Digital input/output for grid operator control
USB 2.0	For Mobile Connect
Access point (AP) mode	For connection between the IQ Gateway and a mobile device running the Enphase Installer App
Metering ports	Up to two Consumption CTs, one IQ Battery CT, and one Production CT
Power line communication	90–110 kHz
Web API	Refer to https://developer-v4.enphase.com
Local API	Refer to guide for local API
COMPLIANCE	
IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003
IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1, IEEE 1547: 2018 (UL 1741-SB, 3rd Ed.) IEEE 2030.5/CSIP Compliant Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
COMPATIBILITY	
IQ System Controller 3/3G	SC200D111C240US01, SC200G111C240US01
IQ Battery 5P	IQBATTERY-5P-1P-NA
Microinverter	IQ6, IQ7, and IQ8 Series Microinverters

IQC-5-5C-DSH-00007-2.0-EN-US-2023-09-27

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

PROJECT NAME & ADDRESS

WHITE RESIDENCE

120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
COMBINER BOX DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD003

S-5!®

The Right Way!™

NEW

NOW AVAILABLE IN ALUMINUM

ProteaBracket™

ProteaBracket™

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket™ is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

ProteaBracket* can be used for rail mounting or "direct-attach" with S-5! PVKIT™

*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot™
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty*

*See www.S-5.com for details.

The right way to attach solar PV to trapezoidal roof profiles!

888-825-3432 | www.S-5.com |

MADE IN THE USA

S-5!® The Right Way!™

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

ProteaBracket™ is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

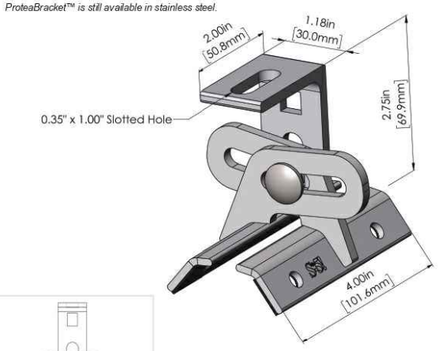
Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

For design assistance, ask your distributor, or visit **www.S-5.com** for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5!® holding strength is unmatched in the industry.

ProteaBracket™

ProteaBracket™ is still available in stainless steel.

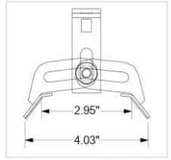


Multiple Attachment Options:

Side Mount Rail

Bottom Mount Rail

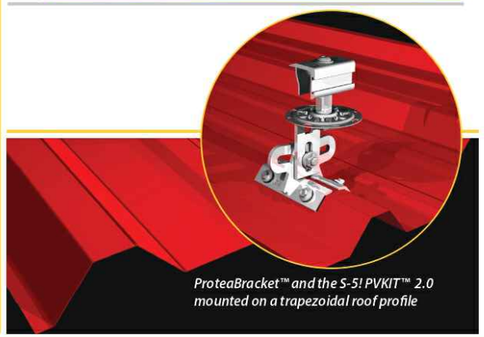
w/ S-5! PVKIT™ (rail-less)



ProteaBracket fits profiles up to 3 inches

INSTALLATION:

No surface preparation needed. (1) Wipe away excess oil and debris. **(2)** Peel off adhesive release paper. **(3)** Align and mount bracket directly onto crown of panel. **(4)** Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket™ and the S-5! PVKIT™ 2.0 mounted on a trapezoidal roof profile

S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5! website at www.S-5.com.

Distributed by

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

PROJECT NAME & ADDRESS

WHITE RESIDENCE

120 TIFFIN AVE,
HURON, OH 44839

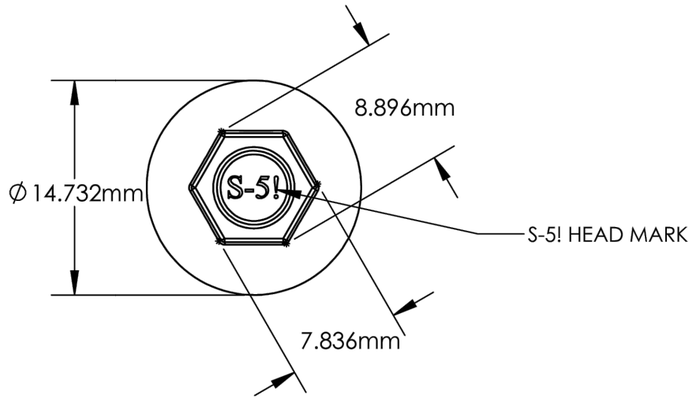
DRAWN BY
ESR

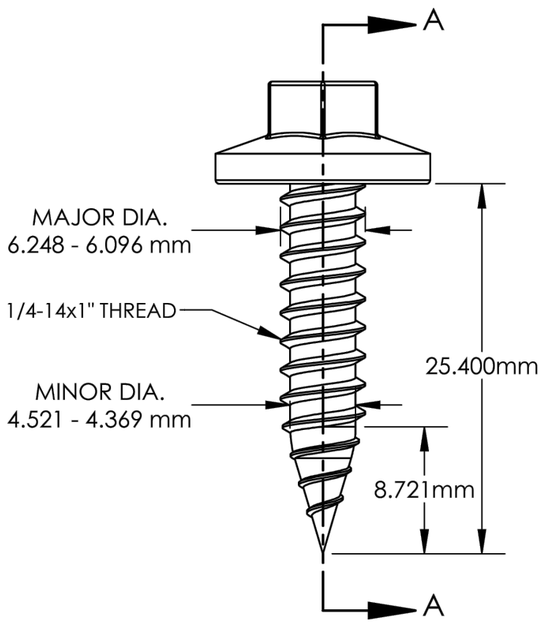
SHEET NAME
ATTACHMMENT DATASHEET

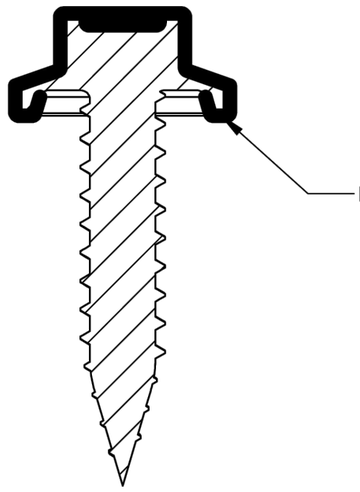
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD004

SCREW

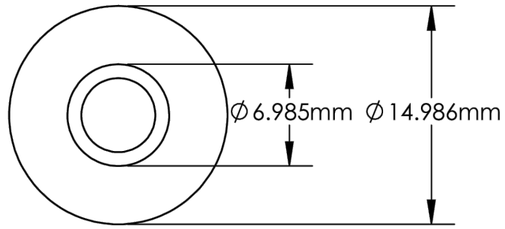


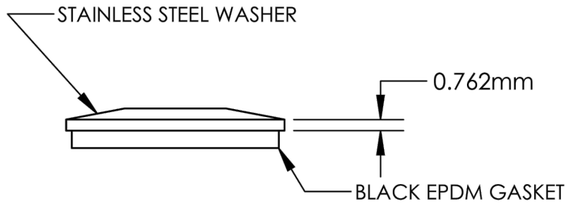




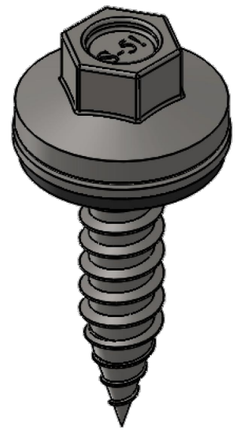
SECTION A-A

WASHER





ASSEMBLY



NOTES:
1. ALL DIMENTONS NOMINAL UNLESS OTHERWISE SPECIFIED
2. MATERIAL: CARBON STEEL INSERT WITH 304 STAINLESS STEEL CAP
3. CARBON STEEL INSERT TO BE COATED WITH 1000 HOUR RUSTPERT PER ASTM B-117 PRIOR TO CAP ASSEMBLY

Revision History			
REV.	DESCRIPTION	DATE	APPROVED
A	Released for Quote	10/03/2017	PL

MATERIAL:	BRK SHARP CORNERS: Yes	S-5! The Right Way!	METAL ROOF INNOVATIONS, LTD. 8655 TABLE BUTTE RD COLORADO SPRINGS, CO 80908 719-495-0518 719-495-0045(FAX)
FINISH:	REQUIRED STAMP:	TITLE: 1/4-14x1" Self Piercing Screw	
EST. CRS SECT AREA:	PACKAGING NUMBER:	DRAWING NO.: -	DRAWN BY: Paul Leitch
CUT LENGTH:	PART HARDWARE:	DATE: 10/03/2017	
DIE NUMBER:	MATING PART NUMBER REF:	SCALE: 2:1	FILE NAME
CUTTING TOLERANCES:			
MACHINE TOLERANCES:	MATING PARTS:	S-5!® PRODUCTS ARE PROTECTED BY MULTIPLE U.S. AND FOREIGN PATENTS. VISIT OUR WEBSITE AT WWW.S-5.COM FOR COMPLETE INFORMATION ON PATENTS AND TRADEMARKS.	

sunergy

SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/25/2024	
REVISION	08/12/2024	A

PROJECT NAME & ADDRESS
WHITE RESIDENCE
120 TIFFIN AVE,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
SCREW DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD005

iRooFA™

Instant Roof Framing Analysis

www.iroofa.solar

tel: 540.313.5317 - email: info@iRooFA.solar

STRUCTURAL ANALYSIS

for the

ROOFTOP PV SOLAR INSTALLATION

Project: Cynthia White, 120 Tiffin Ave, Huron, OH 44839

Prepared for:

Sunergy

7625 Little Rd Ste 200a - New Port Richey, FL 34654

Calculation Report Index

Project Number: 66.408357.2, Rev. 0

Report Date: 07/25/2024

Report Prepared by:

STATE OF OHIO Richard Pantel PE.84238 REGISTERED PROFESSIONAL ENGINEER Date:

Richard Pantel, P.E.

OH License No. PE.84238

Sealed 07/25/2024

V240625
ID.L1PW

Loading Summary

Exposure and Occupancy Categories		
B		*Exposure Category (ASCE 7-16 Table 26.7.3, Page 266)*
II		*Building Use Occupancy / Risk Category (ASCE 7-16 Table 1.5-1, Page 4)*

Wind Loading:			
v	115	*mph*	*Over-ridden per client request. Original data from Municipality provided wind / snow loadings.*
qz	20.14	*psf*	*Velocity qz, calculated at height z [ASD]*

Snow Loading			
pg	36.91	*psf*	*Ground Snow Load pg (Over-ridden per client request. Original data from Municipality provided wind / snow loadings.)*
Total Snow Load			
ps	23.25	*psf*	*Effective snow load on roof and modules*

Module Data			
HYUNDAI ENERGY SOLUTIONS CO.: HiS-S410YH(BK)			
Dimensions	*mm*	*ft*	*in*
Length	1,924	6.31	75.75
Width	1,038	3.41	40.87
Area (m^2, ft^2)	2.0	21.50	
Weight	kg	lb	
Module	21.10	46.52	

Roof Panel (Cladding) Loading Summary		Module Loading Summary			
Support Point Loads		*Upward*	*Upward*	*Upward*	*Downward*
Roof Zones		1,2e,2r	2n,3r	3e	All
Net load per module	*lb*	-87	-113	-151	327

Positive values indicate net downward force

Primary Stanchion: S5 ProteaBracket

Stanchion Fastener Pull-out and Spacing Calculations					
Framing spacing			*ft*	2.00	
Rails / Module			*ea*	2	
Max proposed stanchion span			*ft*	4.00	
# fasteners per stanchion				4	
Bolt thread embedment depth			*in*	0.50	
Safety Factor				1.10	
Pull-out for 1/4 threaded fasteners			*lb/in*	186	
Factored max fastener uplift capacity			*lb*	338	
Fastener details	*Material*	Stainless	*Size*	1/4	*Predrill hole 0.12" dia or use self tapping*
Max stanchion uplift capacity			*lb*	400	
Max support point uplift capacity			*lb*	338	

Roof Zones		*1,2e,2r*	*2n,3r*	*3e*
Net lift per module	*lb*	87	113	151
Min tot bolt thread embedment depth rq'd	*in*	0.13	0.17	0.22
Net uplift pressure 7. 0.60D - 0.6W	*psf*	-6.87	-8.92	-11.95
Allowable lift area / support point	*sf*	49.17	37.88	28.25
Max rail span per framing spacing	*ft*	4.00	4.00	4.00
Landscape Modules				
Length along rafter	*ft*	3.41		
Lift calc'ed max stanchion EW spacing	*ft*	> 6	> 6	> 6
Max stanchion EW spacing	*ft*	4.00	4.00	4.00
Maximum module area / support point	*sf*	6.81	6.81	6.81
Factored lift per support point	*lb*	-47	-61	-81
Portrait Modules				
Length along rafter	*ft*	6.31		
Lift calc'ed max stanchion EW spacing	*ft*	> 6	> 6	> 6
Max stanchion EW spacing	*ft*	4.00	4.00	4.00
Maximum module area / support point	*sf*	12.62	12.62	12.62
Factored lift per support point	*lb*	-87	-113	-151

Plywood Nailing Calculations				
Nail Size	*Gauge*	*Shank Dia*	*Length*	*W*
8D	10	0.134	2.5	54
10D	9	0.148	3	59
Load Duration Factor - Wind	1.6			
AWC 11.3.1 W'=W*Cd*Cm*Ct*Ceg*LD				
8D withdrawl force @ 2" penetration (lb)	138			
10D withdrawl force @ 2.5" penetration (lb)	189			
		1,2e,2r	*2n,3r*	*3e*
# 8D's Req'd / stanchion in Landscape	*ea*	0.34	0.44	0.59
# 10D's Req'd / stanchion in Landscape	*ea*	0.25	0.32	0.43
# 8D's Req'd / stanchion in Portrait	*ea*	0.63	0.81	1.09
# 10D's Req'd / stanchion in Portrait	*ea*	0.46	0.60	0.80

Stanchion support threaded fastener sizes are indicated in the Module Loading Summary table above. Lift forces were determined from GCp and other coefficients contained in the ASCE nomographs

Conclusions

We were asked to review the roof of Cynthia White, located at 120 Tiffin Ave, Huron, OH, by Sunergy, to determine its suitability to support a PV solar system installation.

The referenced building's roof structure was field measured by Sunergy. The attached framing analyses reflect the results of those field measurements combined with the PV solar module locations shown on the PV solar roof layout design prepared by Sunergy. Loads are calculated to combine the existing building and environmental loads with the proposed new PV array loads.

The Sunmodo SMR 100 racking and S5 ProteaBracket stanchions were selected for this project by Sunergy. The racking and support stanchions shall be placed as shown on their plans, dated 07/25/2024, and shall be fastened to the roof framing using fastener sizes indicated in this report. Rack support spacing shall be no more than that shown above. Note that support points for alternating rows shall share the same truss. Intermediate rows shall move the support points laterally to the next truss.

Google Location Map

Framing Summary

	Ex. Framing	Total Ex DL
MP 1: Truss @ 24" OC	0.79 psf	4.38 psf

** Wood species used in these calculations assumes spruce, pine or fir, #2 grade.*

Based upon the attached calculations, the existing roof's framing system is capable of supporting the additional loading for the proposed PV solar system along with the existing building and environmental loads. No supplemental roof framing structural supports are required. Minimum required anchorage fastening is described above.

Fastener notes: 1) Install fasteners with head and where required, washer, flush to material surface (no gap). Do not over-torque.

References and Codes:

1) *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures*
2) *2021 IBC*
3) *2024 Ohio Building Code / 2019 Ohio Residential Code*
4) *American Wood Council, NDS 2018,Table 12.2A, 12.3.3A.*
5) *American Wood Council, Wood Structural Design, 1992, Figure 6.*

Geometric Data			
Θ	*deg.*	38.00	*Angle of roof plane from horizontal, in degrees*
ω	*deg.*	0.00	*Angle the solar panel makes with the roof surface*
L	*ft.*	39.33	*Length of roof plane, in feet (meters)*
W	*ft.*	18.00	*Plan view width of roof plane, in feet (meters)*
h	*ft.*	15.00	*Average height of roof above grade, in feet (meters)*

Roof Wind Zone Width			
	use, a =	3.00	*ft*

Wind Velocity Pressure, q_z evaluated at the height z						
q_z=	20.14	*psf*	*Vasd* q_z=	12.34	*psf*	Basic wind pressure
V=	115	mph				

Framing Data		
Wood type	US Spruce	
Wood source, moisture content	White 0.12%	
# Framing Members / Support		1
Rafter / Truss OC	*in*	24.00
Member Total Length	*ft*	18.00

2	# Rafters / Rack Support Width
4.00	Rack Support Spacing (ft)
48	Max. Rack Support Spacing (in)
2	Max # of mod's / Truss top chord

Member Properties		**Member**
Name		(1) 2x4
Repetitive Member Factor (Cr)		1.15

** Mem properties based upon field measurements*

Truss top chord

Module Physical Data			
Weight	kg	lb	psf load
Module	21.10	46.52	2.16
4 Stanchions	1.27	2.8	0.13

Existing Dead Loads	*Units*	*Value*	*Description*
Roof Deck & Surface	*psf*	3.59	*Truss members' self weight added to FEA analysis*

Rack Support Spacing and Loading				
Across rafters	*ft*	4.0		
Along rafter slope	*ft*	6.3		
Area / support point	*sf*	12.6		
Uphill gap between modules	*in*	1.0	0.08	*ft*

Member Total Length	*ft*	18.00	
Maximum member free span	*ft*	18.00	Truss top chord span

ASCE 7-16 **Method for Calculating Uplift on PV Modules**

Notation
Lp = Panel chord length.
p = uplift wind pressure
γa = Solar panel pressure equalization factor, defined in Fig. 29.4-8.
γE = Array edge factor as defined in Section 29.4.4.
θ = Angle of plane of roof from horizontal, in degrees.

29.4.4 Rooftop Solar Panels Parallel to the Roof Surface on Buildings of All Heights and Roof Slopes.

Θ >= 7 deg TRUE

Min.d1: Exposed	**FALSE**
Max.d1: Exposed	**TRUE**
1.5(Lp) =	5.11
γE =	1.5
γa =	0.67

Use EXPOSED for uplift calculations

$p = qh(GCp)(\gamma_E)(\gamma_a)$ (lb/ft2) (29.4-7)

Zones	1,2e,2r	2n,3r	3e
GCp	-1.47	-1.74	-2.15
p, Windload (psf)	-18.12	-21.53	-26.59

Downward, Zones All Zones
GCp 0.77

ASCE 7-16 Chapter 2 Combinations of Loads, Table 2.4, Page 8 (in psf)				
Zones	1,2e,2r	2n,3r	3e	All Zones
2.2 SYMBOLS AND NOTATION	*Module Upward*	*Module Upward*	*Module Upward*	*Downward*
D = dead load of PV Module + Stanchion	2.29	2.29	2.29	2.29
S = snow load	23.25	23.25	23.25	23.25
W = wind load = (Vu Windload) = (Vasd Windload / 0.6)	-18.12	-21.53	-26.59	9.46

2.4 Combining Nominal Loads Using Allowable Stress Design (in psf)				
2.4.1 Basic Combinations. Loads listed herein shall be considered to act in the following combinations; whichever produces the most unfavorable effect in the building, foundation, or structural member being considered. Effects of one or more loads not acting shall be considered.				
Combination Formulae	*Upward*	*Upward*	*Upward*	*Downward*
Use this loading combination for DOWNWARD for Proposed PV Dead Load				
6. D + 0.75L - 0.75(0.60W) + 0.75(Lr or S or R)	25.55	25.55	25.55	29.81
Module Support point load (lb)	323	323	323	376
Cr Factored Module Support point load (lb)	280	280	280	327

Use this loading combination for UPWARD for Proposed PV Dead Load				
7. 0.60D - 0.6W	-6.87	-8.92	-11.95	6.67
Module Support point load (lb)	-87	-113	-151	84

DOWNWARD

Presume loading directly over member.

Combined Dead and Wind Pressure Downward Loading					
	Truss top chord span				
PV Module Row	Point load loc's from Left support	Point Load #'s	Module Support Point Load	Comment	Module Orientation
	ft from left		*lb*		
1	3.17		327		Portrait
1	9.48			Support placed on adjoining truss	Portrait
2	9.57			Support placed on adjoining truss	Portrait
2	15.88		327		Portrait

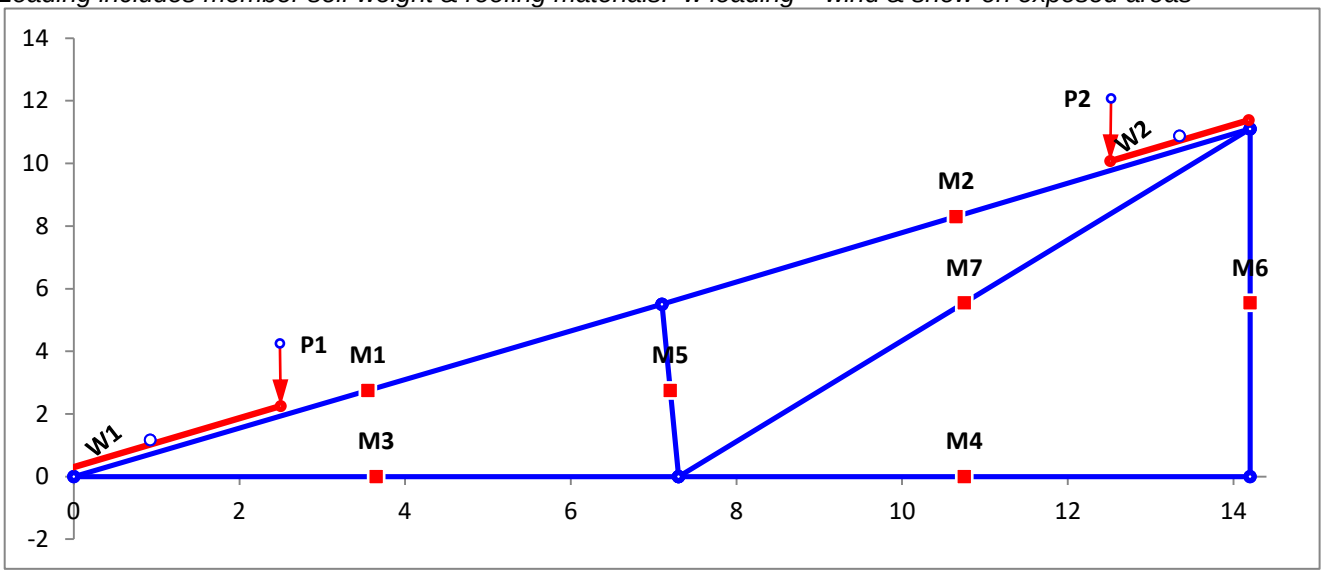
Truss Data and Loading for MP 1

Roof slope (degrees)	38.00			Length of roof plane	18.00
Top ridge height above floor plane	11.08			Length of floor plane	14.25

Truss Segments

Roof Plane		*Floor Plane*		*Diagonals*		*Diagonals*	
Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*
1	2x4	3	2x4	5	2x4	7	2x4
2	2x4	4	2x4	6	2x4		

** Loading includes member self weight & roofing materials. w loading = wind & snow on exposed areas*



Snow Loading Analysis

where:

		Fully Exposed	Exposure category
Ce	=	0.9	Exposure Factor, Ce (ASCE 7-16 Table 7.3-1, Page 58)
Ct	=	1.0	Thermal Factor, Ct (ASCE 7-16 Table 7.3-2, Page 58)
Is	=	1.0	Snow Importance Factor, Is (ASCE 7-16 Table 1.5-2, Page 5)
p_g	=	36.91	Ground Snow Load pg (Over-ridden per client request. Original data from Municipality
p_f	=	**0.7CeCtIsPg**	Flat Roof Snow Load, pf (ASCE 7-16 Table 7.3-1, Page 58)
p_f	=	**23.25**	psf
			but where Pf is not less than the following:
			Minimum Snow Load pm (ASCE 7-16 Table 7.3.4, Page 53)
p_m	=	**20**	psf. When Pg > 20 psf, then use Pf = 20 psf x Is
p_f	=	**23.25**	psf. Resultant Snow pressure to be used with Roof slope factor below
p_s	=	$C_s p_f$	Sloped Roof Snow Load ps (ASCE 7-16 Table 7.4, Page 54)
			Roof Type Warm Roofs

Roof slope factor Cs for Warm Roofs, where Ct = 1.0

Roof surface condition = Slippery Roof

C_s	=	1.00	Roof Slope Factor, Cs (ASCE 7-16 Table 7-2a, Page 59)

Total Snow Load

p_s	=	**23.25**	**psf**	Roof snow load

FEA Calculation Results for Roof Plane MP 1 for Sunergy Client CYNTHIA WHITE

IDSPL - 2D Frame Analysis of a 2D frame subject to distributed loads, point loads and moments

Equilibrium check	FX	FY
Total applied forces	0.00	2180
Total output reactions	0.00	-2180
Output error	-3.99E-13	-9.09E-13

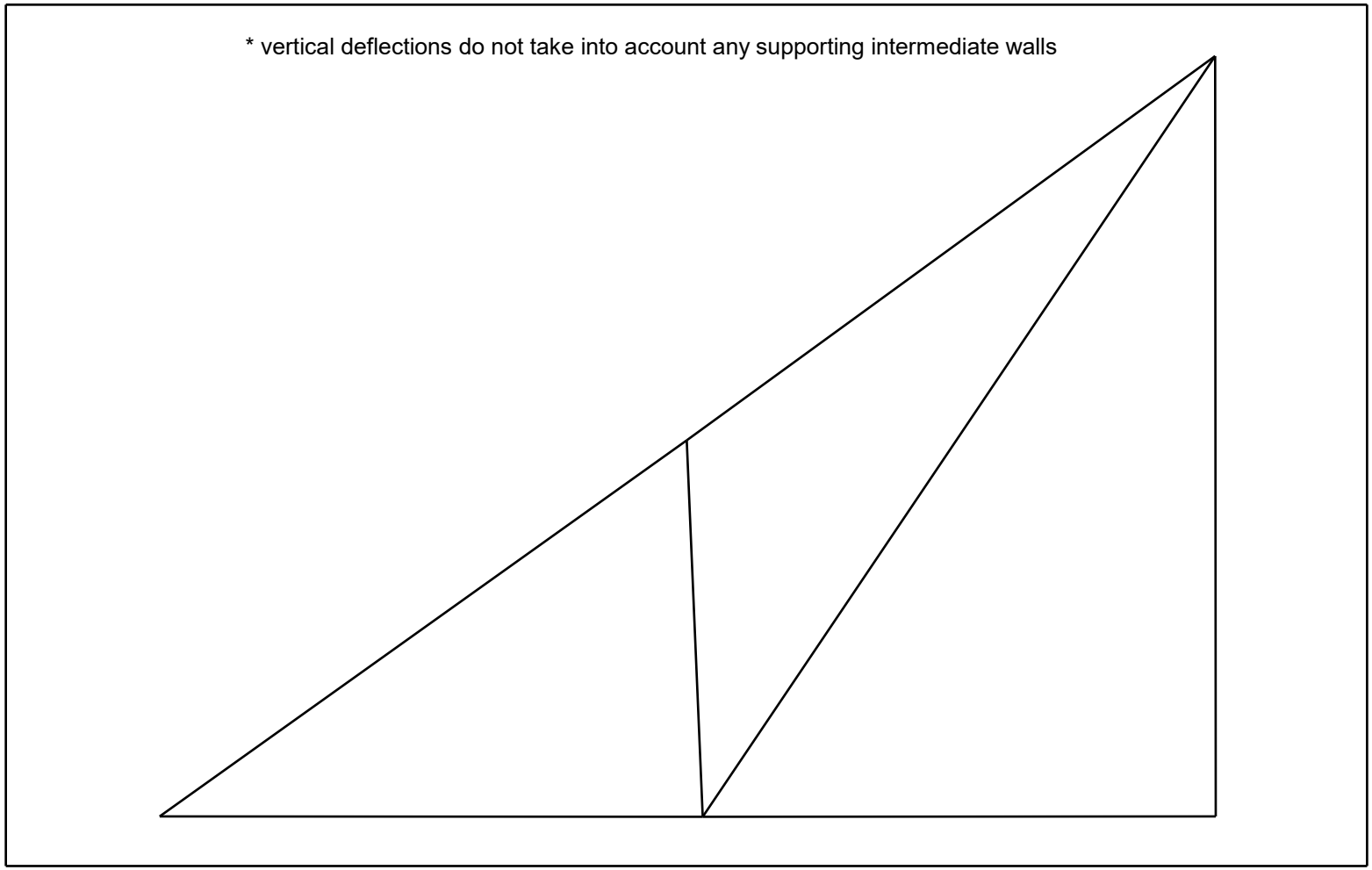
0.0001

	Shear	Mom	Ax		
Max (psi)	6	57	732		
Allowable (psi)	115	950	5,610	Maximum Deflections	
# of segments/beam		1		-4.93E-03	-5.20E-03

** vertical deflections do not take into account any supporting intermediate walls*

Node Results			Beam End Results			
Direction	Deflection	Reaction	Beam	Shear	Axial	BM
DX1	0.00E+00	0	1-1	-938	-1031	2282
DY1	0.00E+00	-528	1-2	-589	-1301	-4611
RZ1	6.93E-04	0	2-1	-7294	-246	-10406
DX2	-4.92E-03	0	2-2	-6147	-1151	-74448
DY2	5.20E-03	0	3-1	-418	1389	-2282
RZ2	3.89E-04	0	3-2	-332	1389	-5360
DX3	-1.83E-03	0	4-1	473	3417	-4830
DY3	8.70E-04	0	4-2	473	3417	-1567
RZ3	4.58E-03	0	5-1	-3103	6043	11287
DX4	6.87E-04	0	5-2	-3104	6022	-5795
DY4	3.15E-03	0	6-1	3417	1179	-1567
RZ4	-1.74E-05	0	6-2	3417	1106	36362
DX5	2.28E-03	0	7-1	3802	-3667	-11817
DY5	0.00E+00	-1652	7-2	3854	-3750	38085
RZ5	-6.10E-04	0				

Beam	X	Shear	Mom	Axial	DX	DY	RZ
1	0.00	-938	2282	-1031	0.00E+00	0.00E+00	6.93E-04
1	8.98	-638	-4399	-1263	-4.93E-03	-5.19E-03	3.05E-04
2	0.00	-7294	-10406	-246	-4.92E-03	-5.20E-03	3.89E-04
2	9.04	-6594	-62137	-798	-2.35E-03	-4.62E-04	-1.53E-02
3	0.00	-418	-2282	1389	0.00E+00	0.00E+00	6.93E-04
3	7.30	-381	-5144	1389	6.87E-04	-3.15E-03	4.49E-06
4	0.00	473	-4830	3417	6.87E-04	-3.15E-03	-1.74E-05
4	6.90	473	-1567	3417	2.28E-03	0.00E+00	-4.73E-04
5	0.00	-3103	11287	6043	6.87E-04	-3.15E-03	-1.74E-05
5	5.50	-3104	-5795	6027	-4.92E-03	-5.20E-03	-1.38E-05
6	0.00	3417	-1567	1179	2.28E-03	0.00E+00	-6.10E-04
6	11.10	3417	36362	1117	-1.83E-03	-8.69E-04	4.61E-03
7	0.00	3802	-11817	-3667	6.87E-04	-3.15E-03	-1.74E-05
7	13.07	3847	38089	-3740	-1.83E-03	-8.69E-04	4.75E-03



Scaled 2X Deflected Truss Plot
Roof Plane MP 1 for Sunergy Client CYNTHIA WHITE

TO: Chairman Boyle and Members of the Planning Commission
FROM: Christine Gibboney, Administrative Assistant
RE: 1249 Wheeler Drive- Roof Mounted Solar Panels
DATE: August 21, 2024

Address: 1249 Wheeler Dr PPN 42-00561.004 Current Zoning: R-3

Owner/Applicant: James Tremelling, Owner
Applicant- Sunergy Solar LLC

Subject Matter/Background
Applicant is proposing to install a 4.92KW roof mounted solar panel system. The system consists of twelve (12) total panels (3 on one roof section, 9 on another)

Land Use and Zoning
R-2 One and Two-Family Residential District – Residential Use

Staff Analysis/ Recommendation:
Pursuant to the recently created code, Section 1126.18 Solar Structures (d) (1), approval of the Design Review Board is required before the issuance of permits. The residence is a single-family home on Wheeler Drive. The Residential Zoning application is complete and the plan review by Zoning has found the application to be compliant with Section 1126.18.

The proposed roof mounted solar panel system contains 12 total panels (Roof Array #1 consisting of 9 panels, Roof Array#2 consisting of 3 panels), roof array area=257.88sq. ft. to be installed on pitched roofs of a two- story residential structure.

- The total roof area is 2281.95sq.ft., roof area covered by the array is 11%.
- The panel attachment detail reflects less than a 6" rise from the roof to the top side of the panel (18' max per the code).
- The code requires that the system shall not be located within 12" of the edge of the roof, as proposed the system meets this requirement.
- The home is not located within any known HOA.

Applicable Code Sections

1126.18 Solar Structures (attached)

Staff has provided the application to the Fire Department for any input relative to any regulations that may apply in the Fire Code.

Upon approval from the DRB, the application will be submitted to the Building Department for the review and issuance of the Building Permit(s).

Attachments:
Application & Plans

City of Huron
Planning and Zoning Dept.
417 Main St. Huron, Ohio 44839
P: 419-433-5000
F: 419-433-5120

Residential Zoning Permit Application

Property Owner
Name: James Tremelling
Address, City, State, Zip: 1249 Wheeler Dr, Huron, OH, 44839
Phone: 419-202-1664
Email: jetjap@aol.com

Contractor (must be registered with the City of Huron)
Name: Dennis St Clair | Sunergy Solar LLC
Address, City, State, Zip: 7625 Little Rd Ste 200A, New Port Richey FL 34654
Phone: 727-375-9375
Email: permitting@gosunergy.com

Location of Project
Address: 1249 Wheeler Dr County Parcel Number: 42-00561.004 Lot #: _____

Zoning District & Flood Zone
Zoning District: _____ (R-1 R-1A R-2 R-3 B-1 B-2 B-3 I-1 I-2 P-1 MU)
Flood Zone: not included (A AE AO AH X-SHADED X)

Project Information

New Construction: ☐ **Deck/Porch:** ☐
Addition to Existing Structure: ☐ **Swimming Pool** ☐
Detached Garage/Shed/Storage: ☐ **Demolition:** ☐ **Height of Structure:**___
Fence: ☐ **Linear Ft.:**_____ **Other:** Solar

Description of proposed project: (include complete details, square footage and height)
Install 4.92KW roof mounted solar panel system

ESTIMATED VALUE OF PROPOSED PROJECT: $ 27,686.45

SETBACKS FROM PROPERTY LINES: **(Not applicable for Fences or Demolition Projects)**
Front Yard Setback: _____ Rear Yard Setback: _____ Height of Structure:_____

Side Yard Setbacks: (Left) _____ (Right) _____

SITE PLAN: A complete site plan must accompany this application. The site plan must include the following information:

_____ Dimensions of the Lot /Property Lines, measurements from the property lines to the foundation

_____ Size and Location of the Existing Structure(if applicable)

_____ Size, Location and Height of the Proposed Structure

_____ Front, Rear, and Side Setbacks of Existing Structure(if applicable)

_____ Front, Rear, and Side Setbacks of Proposed Structure

_____ Dimensions from existing structures to the Proposed Structure

_____ Height of the Proposed Structure or Structure to be demolished. (if applicable)

_____ Location of Sidewalks and Driveways (if applicable) **ROW Driveway Application Required**

_____ Height of Fence (front yard 4' max; side and rear yards 6' max)

STORMWATER PLAN: Applicable for all additions, new construction. Contact the City Engineer for plan detail required: 419-433-5000 ext. 1103

_____ Site Plan with drainage patterns, flow lines for surface water.

Location of any temporary stormwater inlets and piping, including discharge points.

Location and description of measures to prevent stormwater drainage to adjacent properties (Example: silt fence).

Location of catch basins near property and containment measures planned.

Concrete washout location and description of containment measures.

POST CONSTRUCTION PERMANENT STORMWATER CONTROLS

Surface flow(s) of planned stormwater flow.

Downspout locations and route/piping/discharge points planned for stormwater

Yard inlets/other drainage items to control stormwater, if applicable.

Floor elevation of proposed structure and elevation of adjacent streets.

SURVEY MAP OR LEGAL PLAT:

_____ A survey map or legal plat must be provided with the application.

I hereby certify that I am the owner of record of the named property or that the proposed work is authorized by the owner of record and/or I have been authorized to make this application as an authorized agent, and we agree to conform to all applicable laws, regulations, and ordinances. All information contained within this application and supplemental materials is true and accurate to the best of my knowledge and belief.

Incomplete applications will not be accepted, please complete all applicable sections and include all specified plans as listed above.

Applicant Signature: _____ Date: 7/29/24

Owner Signature: _____ Date: 7/29/24

PLEASE NOTE, DO NOT APPLY FOR PERMITS UNLESS YOU ARE READY TO BEGIN YOUR PROJECT WITHIN 6 MONTHS. PERMITS FEES ARE DUE AND PAYABLE AT THE TIME OF ISSUANCE AND ARE NON-REFUNDABLE. ZONING PERMITS EXPIRE 12 MONTHS FROM DATE OF ISSUANCE. IF YOUR PROJECT REQUIRES A BUILDING PERMIT, SUBMIT THE BUILDING PERMIT APPLICATION AND REQUIRED CONSTRUCTION PLANS WITH THIS APPLICATION.

For use by City of Huron Zoning Department:

Date of Submission: 7-30-24 Required Plans Included? YES

Comments/Additional Information requested: DRB APPROVAL REQUIRED- SECTION 1126.18

Denial date and reason:_____

HURON TOWNSHIP
BUILDING DEPARTMENT
APPLICATION
(Accessory Use)

Jurisdiction:
Huron Twp. ☒ Huron City ☐ Milan Village ☐ Berlin Village ☐ Margaretta Twp. ☐
Oxford Twp. ☐ Castalia Village ☐

Property Owner:
Name: James Tremelling
Address: 1249 Wheeler Dr, Huron, OH, 44839
Telephone # (419) 202-1664

Contractor:
Name: Dennis St Clair | Sunergy Solar LLC
Address: 7625 Little Rd Ste 200A, New Port Richey FL 34654
Telephone # (727) 375-9375

Location of Project:
Street Address: 1249 Wheeler Dr, Huron, OH, 44839
Lot #: _____

Project Scope

New Structure ☐ Replacement ☐

Building/Structure Use:

Storage ☐ Garage ☐ Equipment ☐

Swimming Pool (over 24" deep) ☐ Wind Turbine ☐

Other ☒ SOLAR

Size of Structure: _____x_____ Area: 257.88 sq. ft.

Setbacks
(Projects in Huron Township Only)
(All other projects require approval of the appropriate Zoning Inspector and that approval must accompany this application)

Structure will be located in the front ☐ side ☐ rear ☐ yard ☐

Setbacks: (from property lines)
front yard _____ft. rear yard _____ft.
side yards (facing structure)
east side _____ft. west side _____ft.

Overall height of proposed structure from grade: _____ft.

HURON TWP. BUILDING DEPT.
BUILDING APPLICATION
(Accessory Structure)

Flood Zone of Subject Property: A ☐ B ☐ C ☐ D ☐
(If the property is located in an A zone, a Flood Elevation Certificate is required to accompany this application or no action will be taken.)

What permits are being applied for?
Structural ☒ Electrical ☒
Note: If electrical work is included in this project and the required permit is not applied for, and issued, a 200% penalty will be assessed against the owner of the property in addition to the normal permit fee…..

Value of Work Being Done: $ 27,686.45

CONSTRUCTION SPECIFICATIONS:
The structure must have the following:
1. Some type of approved anchoring system is required to avoid displacement. Explain anchoring system _____
   _____
2. Approved truss ties (hurricane straps) shall be installed.

A complete set of Plans, Specifications, and a Site Plan must accompany this application. It is not necessary to submit complete electrical as it will be inspected on-site by the appropriate Inspectors.

Wind Energy Conversion Systems require complete plans, including all loads, stamped by a Ohio (certified & licensed) design professional (Engineer or Architect)

_____
_____
ZONING APPROVAL: _____
DATE OF APPROVAL: _____

Date of Submittal: _____ Plans approved by: _____
Site Plan Submitted: Yes No Permit # & Date: _____
Plans Submitted: Yes No
Received By: _____

HURON TOWNSHIP BUILDING DEPARTMENT
ELECTRICAL PERMIT APPLICATION

Jurisdiction:

BAY VIEW ☐ BERLIN VILLAGE ☐ CASTALIA ☐ GROTON ☐

HURON CITY ☒ HURON TWP ☐ MARGARETTA ☐ MILAN VILLAGE ☐

OXFORD ☐

APPLICANT'S NAME Dennis St Clair | Sunergy Solar LLC

ADDRESS, PHONE NUMBER & EMAIL permitting@gosunergy.com

7625 Little Rd Ste 200A, New Port Richey, FL 34654

727-375-9375

OWNER'S NAME James Tremelling

ADDRESS, PHONE # 419-202-1664

1249 Wheeler Dr, Huron, OH, 44839

PROJECT LOCATION:

1249 Wheeler Dr, Huron, OH, 44839

SCOPE OF PROJECT: Install 4.92KW roof mounted solar panel system

If the project is Commercial/Industrial fill out the Plan Approval Application.

****

DO NOT WRITE BELOW THIS LINE

****

Date Submitted: _____ Permit Issued: Yes No

Received by: _____ Date: _____ Permit #: _____

REMARKS: _____

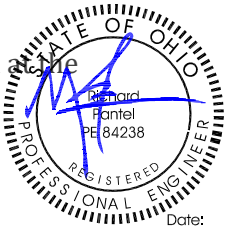
August 8, 2024

To: City Of Huron Building Department
417 Main St,
Huron, OH 44839.

Re: James Tremelling
1249 Wheeler Dr,
Huron, OH 44839

To whom it may concern,

A. This letter is a response to the rejection comments of the proposed Solar PV system at the address above.



Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
08/08/2024

Discrepancy:

1. Minimum setback of 12'' from the edge of the roof is required.

Corrections:

Revised plans to provide 12” setback from the roof edges (Page S001).

All changes are clouded.

Please contact me if you have any questions.

Sincerely,

PHOTOVOLTAIC ROOF MOUNT SYSTEM

12 MODULES-ROOF MOUNTED - 4.920 KW DC, 3.900KW AC

1249 WHEELER DR, HURON, OH 44839

PROJECT DATA

PROJECT ADDRESS: 1249 WHEELER DR, HURON, OH 44839

OWNER: JAMES TREMELLING

DESIGNER: ESR

SCOPE: 4.920 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 12 HYUNDAI SOLAR HiS-S410YH(BK) 410W PV MODULES WITH 12 ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN

AUTHORITIES HAVING JURISDICTION:
BUILDING: CITY OF HURON
ZONING: CITY OF HURON
UTILITY: OHIO EDISON

SHEET INDEX

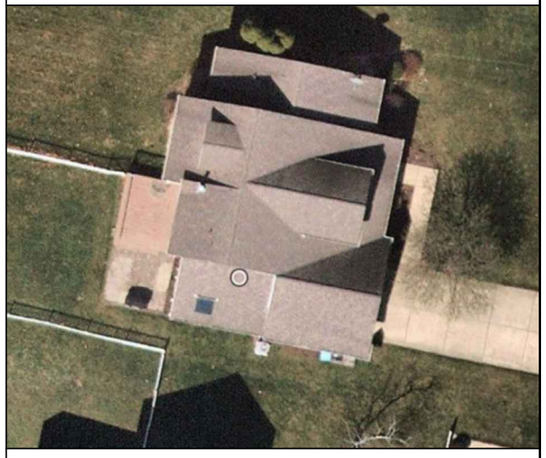
SIGNATURE

GENERAL NOTES

1. ALL COMPONENTS ARE UL LISTED AND NEC CERTIFIED, WHERE WARRANTED.
2. THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2023.
3. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
4. ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
5. WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
6. HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
7. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 2023 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
8. PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
9. PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
10. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
11. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
12. INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
13. THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
14. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
15. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
16. SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
17. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
18. DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
19. ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
20. WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
21. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
22. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
23. IN ACCORDANCE WITH 2021 IFC 1205.5, 2018 IFC 1204.4, AND 2015 IFC 605.11.2 A CLEAR, BRUSH-FREE AREA OF 10 FEET(3048 MM) SHALL BE REQUIRED FOR GROUND-MOUNTED PHOTOVOLTAIC ARRAYS.
24. PANEL LAYOUT ORIENTATION IS SUBJECT TO CHANGE ON DESIGNED MOUNTING PLANES.
25. ALL PERMANENTLY INSTALLED LUMINARIES, EXCLUDING THOSE IN KITCHEN APPLIANCES, SHALL HAVE AN EFFICIENCY OF AT LEAST 45 LUMENS-PER-WATT OR SHALL UTILIZE LAMPS WITH AN EFFICIENCY OF NOT LESS THAN 65 LUMENS-PER-WATT.
26. MOUNTING SYSTEMS SHALL BE LISTED AND LABELLED IN ACCORDANCE WITH UL 2703 TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THEIR LISTINGS.

VICINITY MAP

HOUSE PHOTO



CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

2023 NATIONAL ELECTRIC CODE,NFPA 70 (NEC)
AMENDED 2019 RESIDENTIAL CODE OF OHIO
2024 OHIO BUILDING CODE (2021 IBC)
2024 OHIO MECHANICAL CODE (2021 IMC)
2024 OHIO PLUMBING CODE (2021 IPC)
2024 OHIO EXISTING BUILDING CODE
2024 OHIO FIRE CODE (2021 IFC)

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

STATE OF OHIO
Richard Pantel
PE.84238
PROFESSIONAL ENGINEER
REGISTERED
Date:

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
08/08/2024

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR, HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
COVER SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
G001

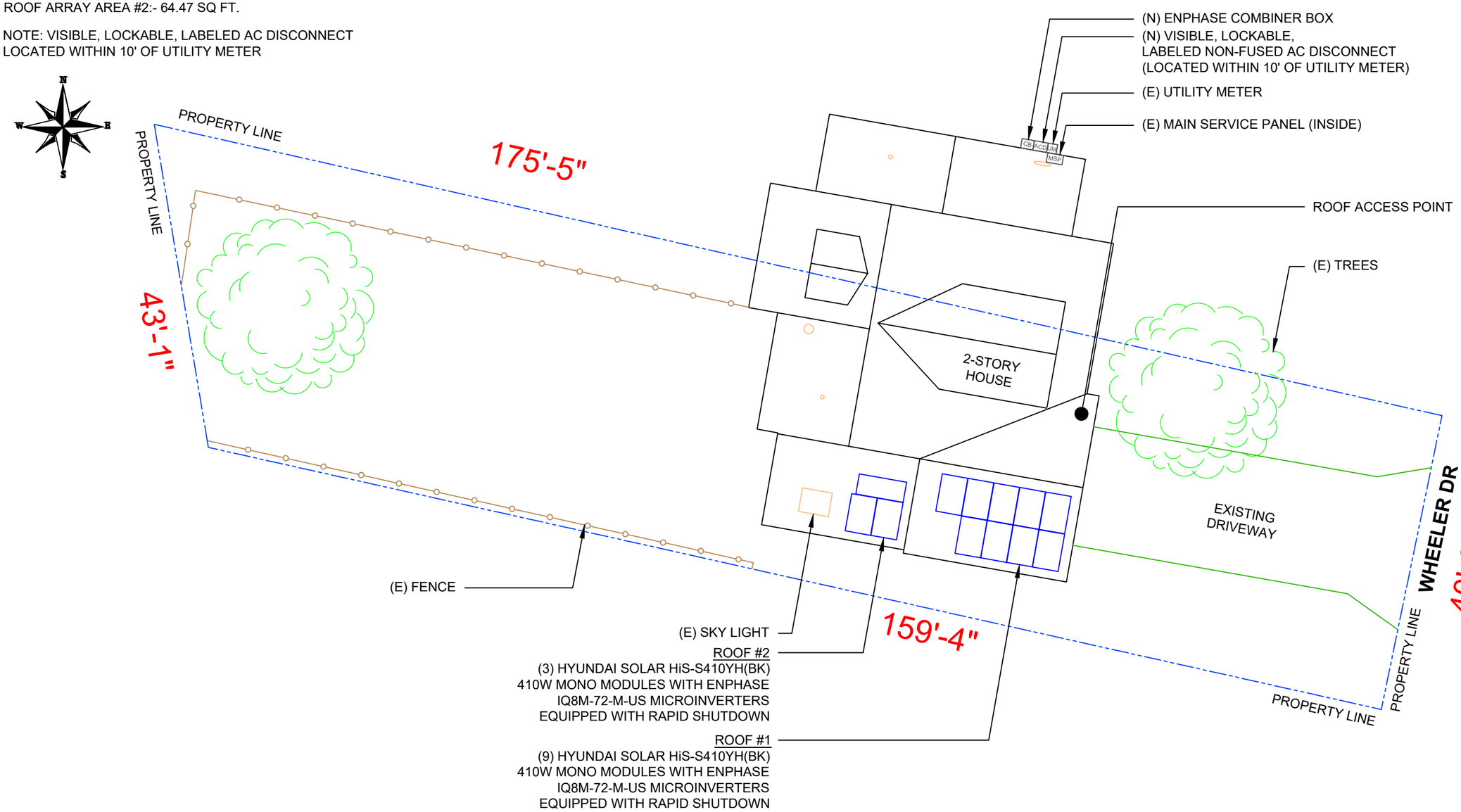
PROJECT DESCRIPTION:

12 X HYUNDAI SOLAR HiS-S410YH(BK) 410W MONO MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 12 x 410 = 4.920KW DC
AC SYSTEM SIZE: 12 x 325 = 3.900KW AC

EQUIPMENT SUMMARY
12 HYUNDAI SOLAR HiS-S410YH(BK) 410W MONO MODULES
12 ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN

ROOF ARRAY AREA #1:- 193.41 SQ FT.
ROOF ARRAY AREA #2:- 64.47 SQ FT.

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT LOCATED WITHIN 10' OF UTILITY METER



1 SITE PLAN
E001 SCALE: 1/14" = 1'-0"

sunergy

SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

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Date:

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PROJECT NAME & ADDRESS

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1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
SITE PLAN

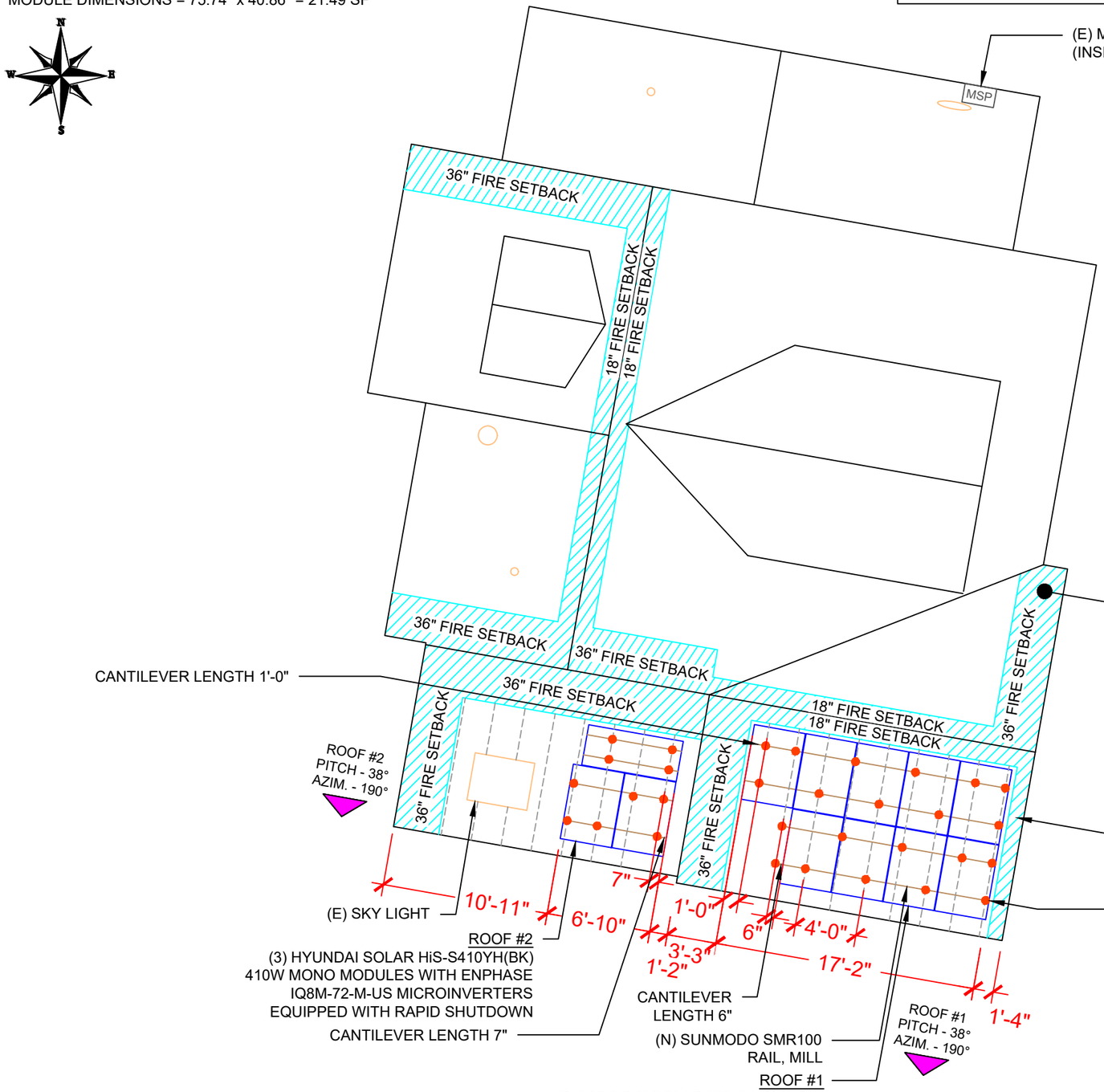
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E001

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 12 MODULES
MODULE TYPE = HYUNDAI SOLAR HiS-S410YH(BK) 410W MONO MODULES
MODULE WEIGHT = 46.51 LBS / 21.1KG.
MODULE DIMENSIONS = 75.74" x 40.86" = 21.49 SF

ACTUAL MAXIMUM CANTILEVER ALLOWED = L/3,
WHERE L IS THE ATTACHMENT SPACING
ATTACHMENT SPACING, L = 48"
ACTUAL MAXIMUM CANTILEVER ALLOWED = 48/3
ACTUAL MAXIMUM CANTILEVER ALLOWED = 16",i.e, 1'-4"

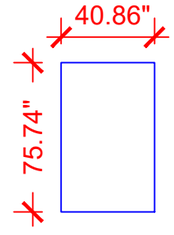


ROOF DESCRIPTION

ROOF TYPE				ASPHALT SHINGLE	
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	TRUSS SIZE	TRUSS SPACING
#1	9	38°	190°	2"X4"	24"
#2	3	38°	190°	2"X4"	24"

ARRAY AREA & ROOF AREA CALC'S

TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
257.88	2281.95	11



HYUNDAI SOLAR
HiS-S410YH(BK)
410W MODULES

LEGEND

MSP - MAIN SERVICE PANEL
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- TRUSS

1 ROOF PLAN AND MODULES
S001
SCALE: 1/8" = 1'-0"

sunergy

SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS

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08/08/2024

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR, HURON, OH 44839

DRAWN BY
ESR

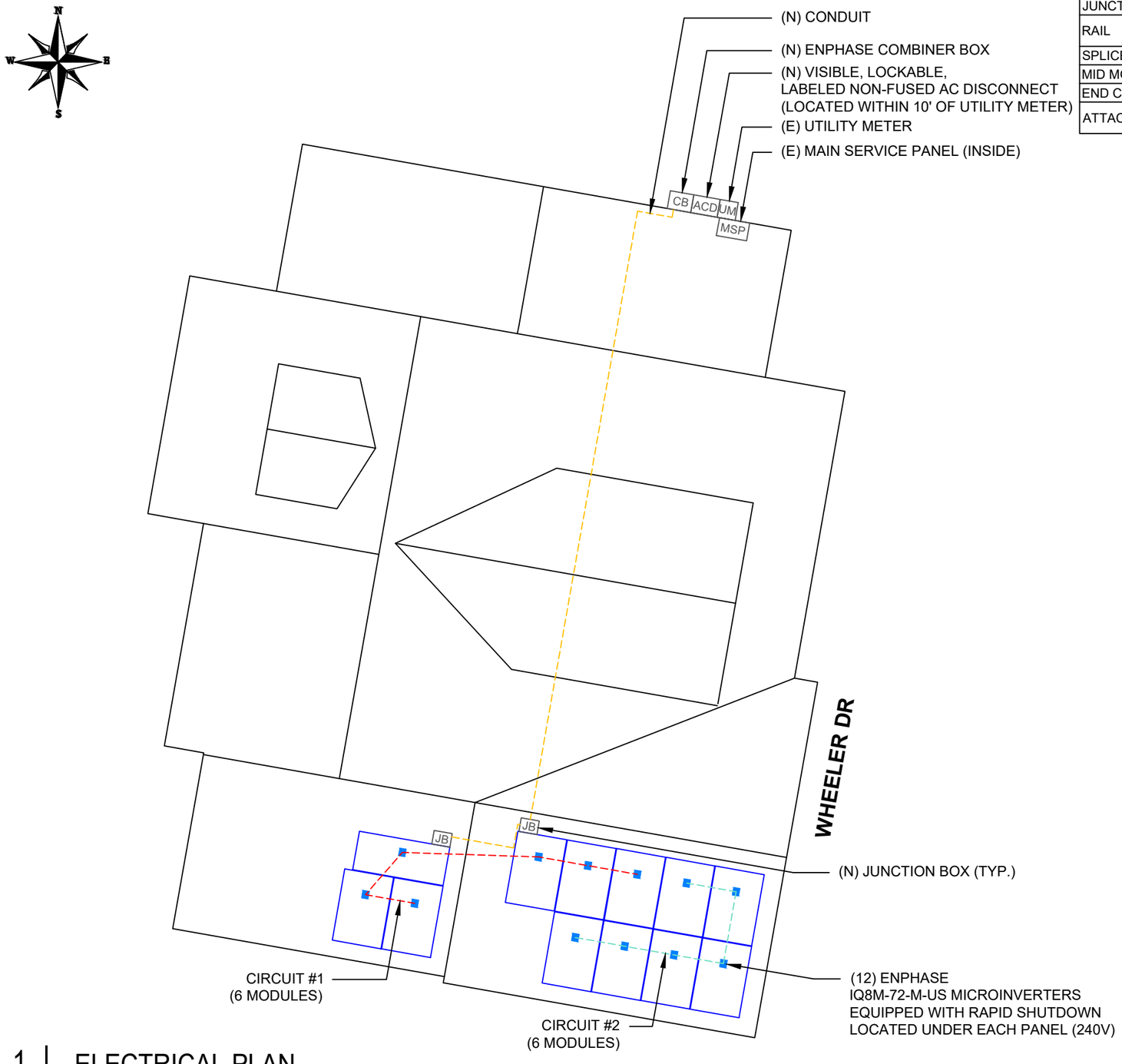
SHEET NAME
ROOF PLAN AND MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S001

CIRCUIT LEGENDS
CIRCUIT #1
CIRCUIT #2

NOTE : CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOF



1 ELECTRICAL PLAN
E002 SCALE: 1/8" = 1'-0"

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	12	HYUNDAI SOLAR HiS-S410YH(BK) 410W MODULE
MICRO INVERTERS	12	ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN
JUNCTION BOX	2	JUNCTION BOXES
RAIL	9	SUNMODO SMR100 RAIL, MILL
SPLICES	4	SPLICES
MID MODULE CLAMPS	16	MID MODULE CLAMPS
END CLAMPS	16	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	31	SUNMODO NANOMOUNT L-FOOT ATTACHMENTS

LEGEND

CB	- COMBINER BOX	JB	- JUNCTION BOX
ACD	- AC DISCONNECT	○ □	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
UM	- UTILITY METER	●	- ROOF ATTACHMENT
MSP	- MAIN SERVICE PANEL	— —	- TRUSS
		- - - -	- CONDUIT

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
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STATE OF OHIO
Richard Pantel
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Date:

Reviewed and approved
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OH Lic. No. PE.84238
08/08/2024

PROJECT NAME & ADDRESS

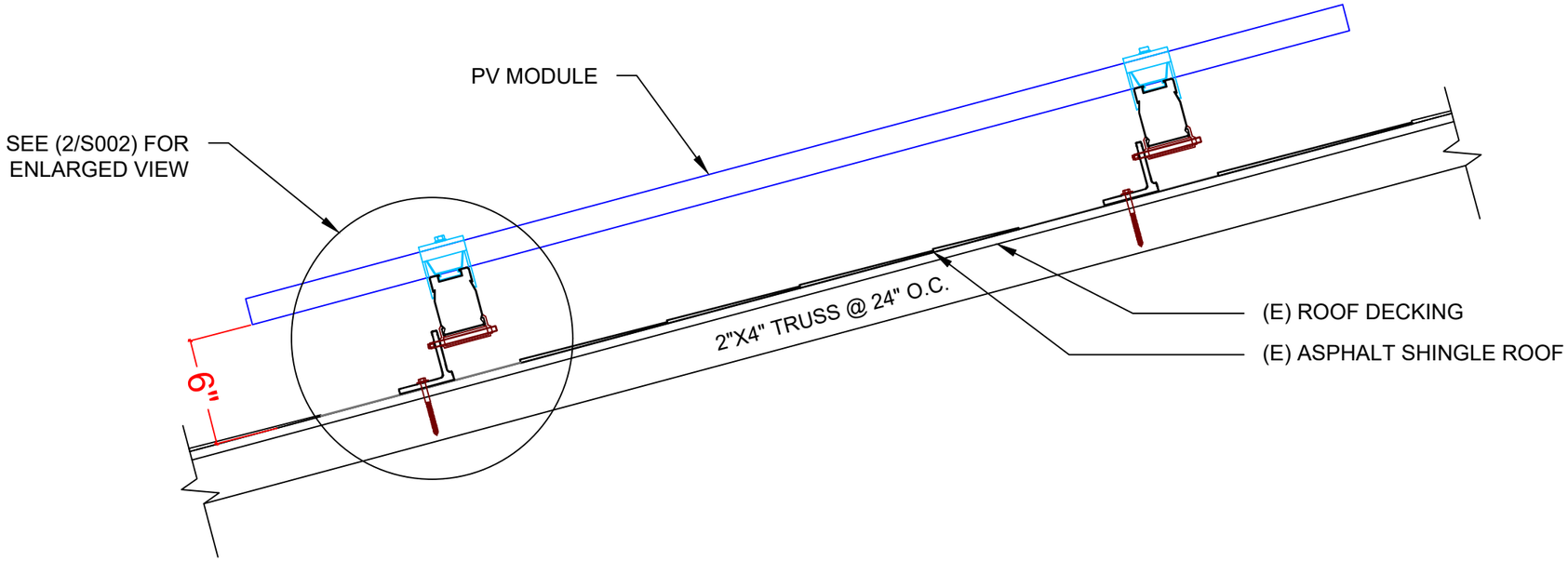
TREMELLING RESIDENCE
1249 WHEELER DR, HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
ELECTRICAL PLAN

SHEET SIZE
ANSI B
11" X 17"

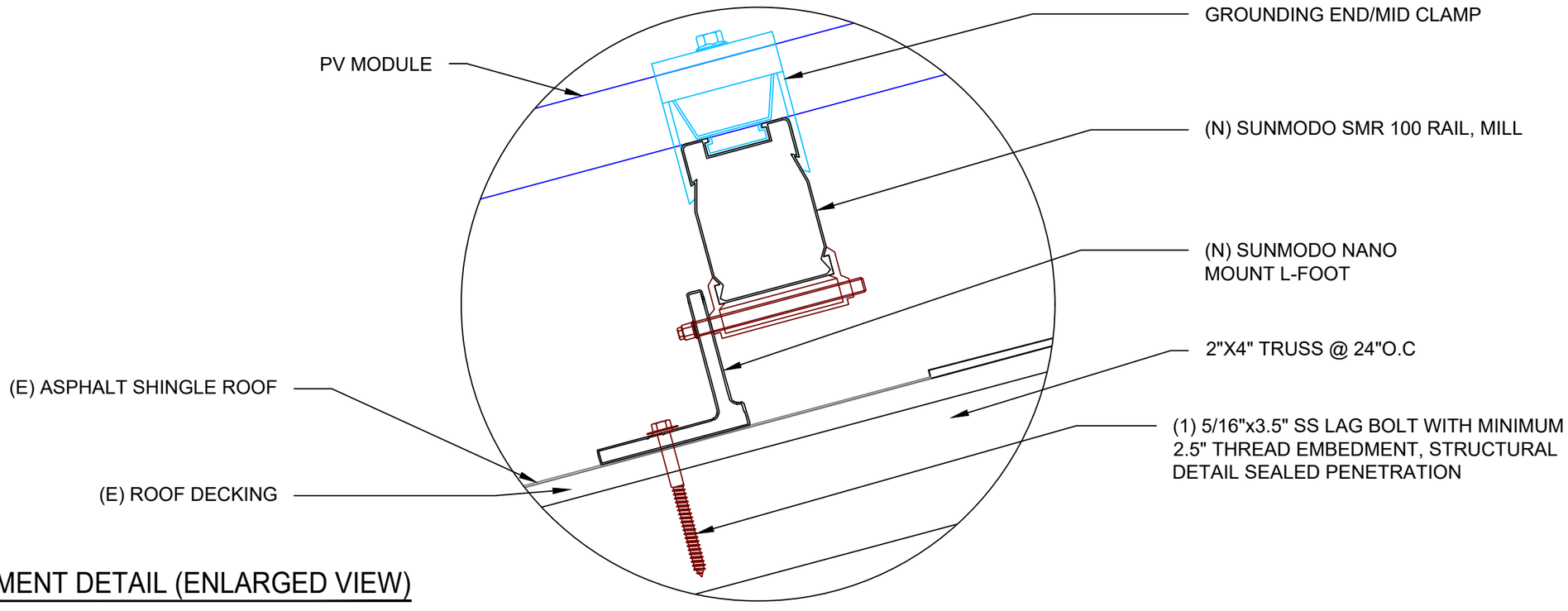
SHEET NUMBER
E002



1 | ATTACHMENT DETAIL (SIDE VIEW)

S002

SCALE: N.T.S.



2 | ATTACHMENT DETAIL (ENLARGED VIEW)

S002

SCALE: N.T.S.

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

STATE OF OHIO
Richard Pantel
PE.84238
PROFESSIONAL ENGINEER
REGISTERED
Date:

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
08/08/2024

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE

1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
STRUCTURAL DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S002

DC SYSTEM SIZE: 12 x 410 = 4.920KW DC
AC SYSTEM SIZE: 12 x 325 = 3.900KW AC

(12) HYUNDAI SOLAR HiS-S410YH(BK) 410W MONO MODULES
WITH (12) ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN
LOCATED UNDER EACH PANEL (240V)

(2) BRANCH CIRCUITS OF 06 MODULES ARE CONNECTED IN PARALLEL

OCPD CALCULATIONS:
NEC 690.9(B)
(12 IQ8M) * 1.35A * 1.25 = 20.25A

BACKFEED BREAKER CALCULATION (120% RULE):
(MAIN BUS X 1.2 - MAIN BREAKER) >= (INVERTER CURRENT*1.25)
(200A X 1.2 - 200A) >= (20.25A)
(40A) >= (20.25A) HENCE OK

	QTY	CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
1	(4)	CU#12AWG -	ENPHASE ENGAGE CABLE (L1 & L2 NO NEUTRAL)	N/A	N/A
	(1)	CU #6AWG -	BARE COPPER IN FREE AIR		
2	(4)	CU#10AWG -	THWN-2 L1 &L2 #12/2 ROMEX IN ATTIC	ENT OR LFMC IN ATTIC	3/4"
	(1)	CU #10AWG -	CU,THWN-2 GND		
3	(2)	CU #10AWG -	THWN-2 OR THHN L1 &L2	EMT, LFMC OR PVC	3/4"
	(1)	CU #10AWG -	CU,THWN-2 OR THHN N		
	(1)	CU #10AWG -	CU,THWN-2 OR THHN GND		
4	(2)	CU #10AWG -	THWN-2 OR THHN L1 &L2	EMT, LFMC OR PVC	3/4"
	(1)	CU #10AWG -	CU,THWN-2 OR THHN N		
	(1)	CU #10AWG -	CU,THWN-2 OR THHN GND		

NOTE : "CONDUIT SIZE IS MINIMUM REQUIRED PER NEC300.17. CONTRACTOR MAY UPSIZE AS NEEDED".

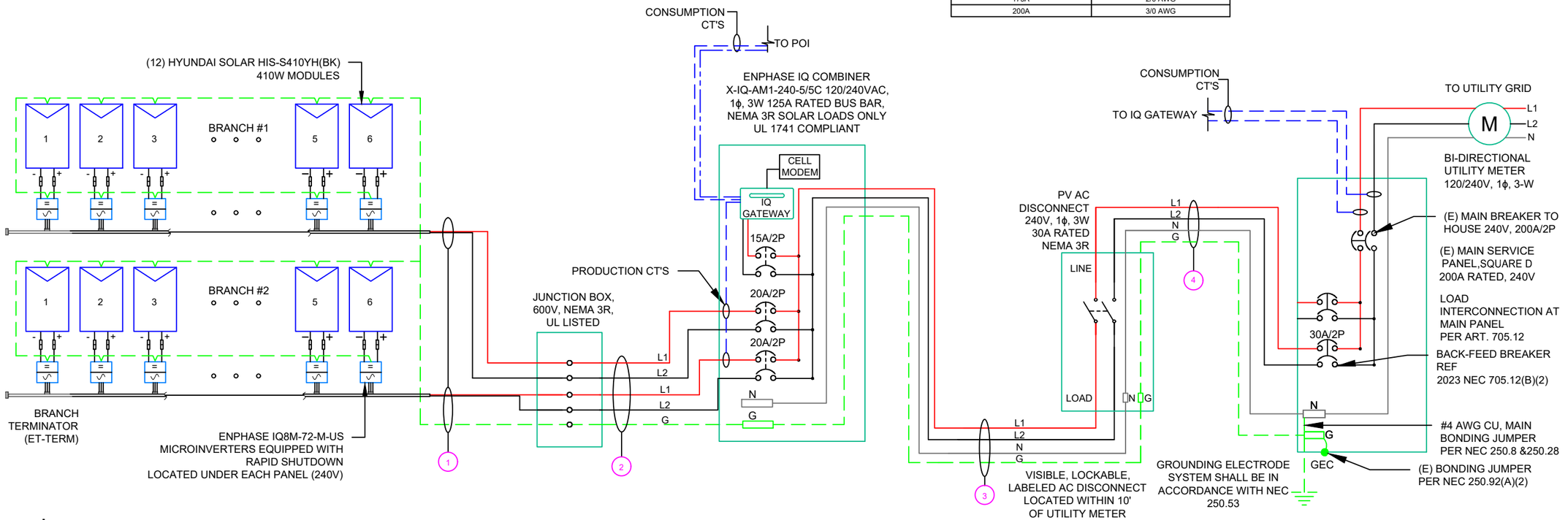
INTERCONNECTION NOTES:
1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

DISCONNECT NOTES:
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

RACKING NOTE:
1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

GROUNDING & GENERAL NOTES:
1. GROUNDING ELECTRODES AND GROUNDING ELECTRODE CONDUCTORS. ADDITIONAL GROUNDING ELECTRODES SHALL BE PERMITTED TO BE INSTALLED IN ACCORDANCE WITH 250.52 AND 250.54.GROUNDING ELECTRODES SHALL BE PERMITTED TO BE CONNECTED DIRECTLY TO THE PV MODULE FRAME(S) OR SUPPORT STRUCTURE PER [NEC 690.47(B)]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOXES DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. ALL NEW SERVICE INSTALLATIONS AND REPLACEMENTS REQUIRE A SURGE-PROTECTIVE DEVICE (SPD) IN ACCORDANCE WITH [NEC 230.67]. THE SPD SHALL BE TYPE 1 OR TYPE 2 AND IS REQUIRED TO BE AN INTEGRAL PART OF THE SERVICE EQUIPMENT OR LOCATED IMMEDIATELY ADJACENT THERETO.

OCPD CONDUCTOR SIZE	
BREAKER/FUSE SIZE	WIRE GAUGE SIZE (75°C,COPPER)
20A	10 AWG
25A	10 AWG
30A	10 AWG
35A	8 AWG
40A	8 AWG
45A	8 AWG
50A	8 AWG
60A	6 AWG
70A	4 AWG
80A	4 AWG
90A	3 AWG
100A	3 AWG
110A	2 AWG
125A	1 AWG
150A	1/0 AWG
175A	2/0 AWG
200A	3/0 AWG



1 ELECTRICAL LINE DIAGRAM

E003 SCALE: NTS

SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

STATE OF OHIO
Richard Pantel
PE.84238
PROFESSIONAL ENGINEER
REGISTERED
Date:

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
08/08/2024

PROJECT NAME & ADDRESS
TREMELLING RESIDENCE
1249 WHEELER DR, HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E003

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8M-72-M-US MICROINVERTERS EQUIPPED WITH RAPID SHUTDOWN
MIN/MAX DC VOLT RATING	22V MIN/ 58V MAX
MAX INPUT POWER	260W-460W
NOMINAL AC VOLTAGE RATING	240V/ 211-264V
MAX AC CURRENT	1.35A
MAX MODULES PER CIRCUIT	11 (SINGLE PHASE)
MAX OUTPUT POWER	325 VA

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HYUNDAI SOLAR HIS-S410YH(BK) 410W MODULE
VMP	38.1V
IMP	10.76A
VOC	45.9V
ISC	11.40A
TEMP. COEFF. VOC	-0.26%/°C
MODULE DIMENSION	75.74"L x 40.86"W x 1.37"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-19°
AMBIENT TEMP (HIGH TEMP 2%)	35°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.26%/°C

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

AC CALCULATIONS

CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C AMPACITY DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
CIRCUIT 1	JUNCTION BOX	240	8.10	10.13	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	35	2	30	0.96	1	28.8	PASS			0.16	N/A	#N/A
CIRCUIT 2	JUNCTION BOX	240	8.10	10.13	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	35	2	30	0.96	1	28.8	PASS			0.20	N/A	#N/A
JUNCTION BOX	COMBINER BOX	240	8.10	10.13	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	35	4	40	0.96	0.8	30.72	PASS	30	1.24	0.251	3/4" ENT	19.79362
COMBINER BOX	AC DISCONNECT	240	16.20	20.25	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	35	2	40	0.96	1	38.4	PASS	5	1.24	0.084	3/4" EMT	15.8349
AC DISCONNECT	POI	240	16.20	20.25	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	35	2	40	0.96	1	38.4	PASS	5	1.24	0.084	3/4" EMT	15.8349

Circuit 1 Voltage Drop	0.579
Circuit 2 Voltage Drop	0.619

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3. WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.
11. CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOF .....NEC 310.15(B)(3)(C)

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SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

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Richard Pantel
PE.84238
PROFESSIONAL ENGINEER
REGISTERED
Date:

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
08/08/2024

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
WIRING CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E004

CAUTION:
AUTHORIZED SOLAR PERSONNEL ONLY!

LABEL-1:
LABEL LOCATION:
AC DISCONNECT

⚠ WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL- 2:
LABEL LOCATION:
AC DISCONNECT
COMBINER
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
CODE REF: NEC 690.13(B)

⚠WARNING **DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

LABEL- 3:
LABEL LOCATION:
UTILITY METER
MAIN SERVICE PANEL
SUBPANEL
CODE REF: NEC 705.12(C) & NEC 690.59

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL- 4:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
MAIN SERVICE DISCONNECT
COMBINER
CODE REF: NEC 110.27(C) & OSHA 1910.145 (f) (7)

SUNERGY SOLAR LLC
EMERGENCY CONTACT
(727) 375-9375

LABEL- 5:
LABEL LOCATION:
MAIN SERVICE DISCONNECT
CODE REF: NFPA 1 (11.12.2.1.5)

⚠ WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL- 6:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

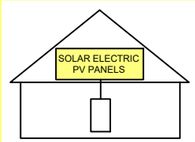
⚠ WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

LABEL- 7:
LABEL LOCATION:
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)
SUBPANEL (ONLY IF SOLAR IS BACK-FED)
CODE REF: NEC 705.12(B)(3)(2)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL- 8:
LABEL LOCATION:
AC DISCONNECT
CODE REF:NEC 690.56(C)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL- 9:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.56(C)(2)

PHOTOVOLTAIC

AC DISCONNECT

LABEL- 10:
LABEL LOCATION:
AC DISCONNECT
CODE REF: NEC 690.13(B)

PHOTOVOLTAIC AC DISCONNECT

NOMINAL OPERATING AC VOLATGE	240 V
RATED AC OUTPUT CURRENT	16.20 A

LABEL- 11:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
AC DISCONNECT
CODE REF: NEC 690.54

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

LABEL- 12:
LABEL LOCATION:
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)
CODE REF: NEC 690.13(B)

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SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

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Richard Pantel
PE.84238
PROFESSIONAL ENGINEER
REGISTERED
Date:

Reviewed and approved
Richard Pantel, P.E.
OH Lic. No. PE.84238
08/08/2024

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR, HURON, OH 44839

DRAWN BY
ESR

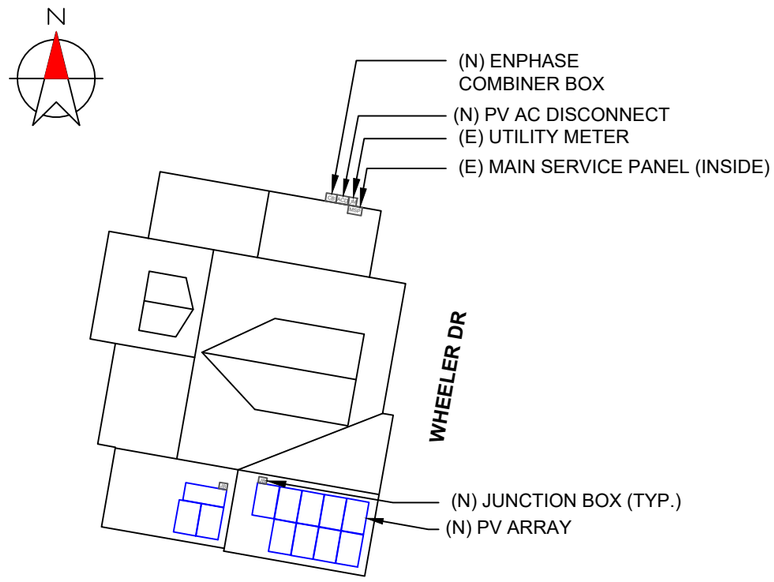
SHEET NAME
LABELS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E005

CAUTION:

MULTIPLE SOURCES OF POWER



1249 WHEELER DR, HURON, OH 44839

DIRECTORY

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(A)&(B), [NEC 705.10])

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2023 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

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Date:

Reviewed and approved
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OH Lic. No. PE.84238
08/08/2024

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR, HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
PLACARD

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E006

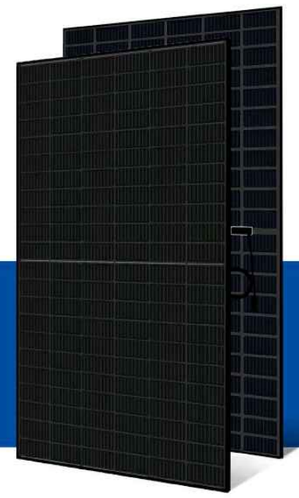
HYUNDAI SOLAR MODULE

25 YR WARRANTY Product & Performance

YH SERIES

Dual Black Max

HiS-S385YH(BK) HiS-S390YH(BK) HiS-S395YH(BK)
HiS-S400YH(BK) HiS-S405YH(BK) HiS-S410YH(BK)



Bifacial Cells 132

More Power Generation In Low Light

UL 1,500V IEC 1,500V Saves BOS Costs

All black Module For Sleek Design (Black Meshed T-Back sheet)

Maximized Power Generation

Increased total power output through capturing light from both the front and back of Bifacial solar modules. Back side power gain up to 25% of the front output depending on PV system design.

Half-Cut & Multi-Wire Technology

9 Wires

Improved current flow with half-cut technology and 9 thin wiring technology allows high module efficiency of up to 20.5%. It also reduces power generation loss due to micro-cracks.

Anti-LID / PID

Both LID(Light Induced Degradation) and PID(Potential Induced Degradation) are significantly reduced to ensure higher actual yield during lifetime.

Mechanical Strength

Tempered glass and reinforced frame design withstand rigorous weather conditions such as heavy snow(5,400Pa) and strong wind(4,000Pa).

UL / VDE Test Labs

Hyundai's R&D center is an accredited test laboratory of both UL and VDE.

Reliable Warranty

HYUNDAI

Global brand with powerful financial strength provide reliable 25-year warranty.

Hyundai's Warranty Provisions

25 YEARS
- 25-Year Product Warranty
  - Materials and workmanship

25 YEARS
- 25-Year Performance Warranty
  - Initial year : 98.0%
  - Linear warranty after second year: with 0.54%p annual degradation, 85.0% is guaranteed up to 25 years

About Hyundai Energy Solutions

Established in 1972, Hyundai Heavy Industries Group is one of the most trusted names in the heavy industries sector and is a Fortune 500 company. As a global leader and innovator, Hyundai Heavy Industries is committed to building a future growth engine by developing and investing heavily in the field of renewable energy.

As a core energy business entity of HHI, Hyundai Energy Solutions has strong pride in providing high-quality PV products to more than 3,000 customers worldwide.

Certification

US LISTED

- UL61730 certified by UL, Type 1(for Fire Class A)

Printed Date : 03/2022(final)

www.hyundai-es.co.kr

HYUNDAI ENERGY SOLUTIONS

Electrical Characteristics

		Mono-Crystalline Type(HiS-S____YH(BK))					
		385	390	395	400	405	410
Nominal Output (Pmpp)	W	385	390	395	400	405	410
Open Circuit Voltage (Voc)	V	44.5	44.8	45.0	45.3	45.6	45.9
Short Circuit Current (Isc)	A	11.04	11.11	11.18	11.25	11.33	11.40
Voltage at Pmax (Vmpp)	V	37.1	37.3	37.5	37.7	37.9	38.1
Current at Pmax (Impp)	A	10.40	10.47	10.54	10.61	10.69	10.76
Module Efficiency	%	19.3	19.5	19.8	20.0	20.3	20.5
Cell Type	-	Mono crystalline, 9busbar					
Maximum System Voltage	V	1,500					
Temperature Coefficient of Pmax	%/K	-0.347					
Temperature Coefficient of Voc	%/K	-0.268					
Temperature Coefficient of Isc	%/K	+0.032					

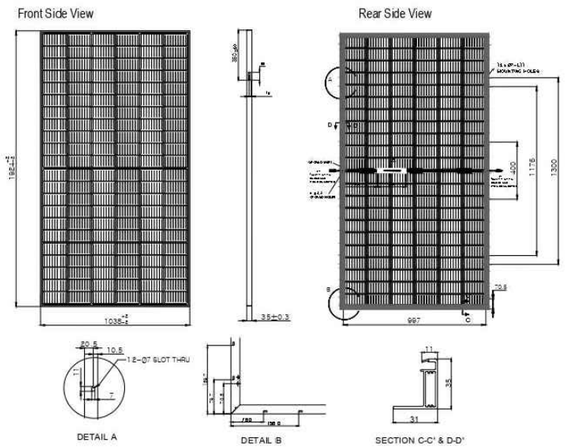
*All data at STC (Measurement tolerances Pmpp ±3%; Isc ; Voc ±3%). Above data may be changed without prior notice.

Additional Power Gain from rear side		385	390	395	400	405	410
5%	W	399	404	410	415	425	431
15%	W	437	443	449	454	466	472
25%	W	475	482	488	494	506	513

Mechanical Characteristics

Dimensions	1,038 mm (W) x 1,924 mm (L) x 35 mm(H)
Weight	Approx. 21.1 kg
Solar Cells	132 half cut bifacial cells (2 parallel x 66 half cells in series)
Output Cables	Cable : 1,200mm / 4mm² Connector : MC4 genuine connector
Junction Box	IP68, weatherproof, IEC certified (UL listed)
Bypass Diodes	3 bypass diodes to prevent power decrease by partial shade
Construction	Front : 3.2mm, High Transmission, AR Coated Tempered Glass Encapsulant : EVA I Back Sheet : Black Meshed Transparent Backsheet
Frame	Anodized aluminum alloy type 6063

Module Diagram (unit : mm)

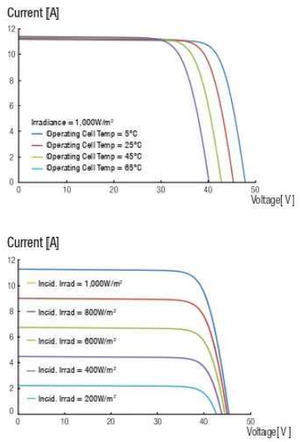


Installation Safety Guide

- Only qualified personnel should install or perform maintenance.
- Be aware of dangerous high DC voltage.
- Do not damage or scratch the rear surface of the module.
- Do not handle or install modules when they are wet.

Nominal Operating Cell Temperature	45.5°C ± 2
Operating Temperature	-40°C ~ +85°C
Maximum System Voltage	DC 1,500V
Maximum Reverse Current	20A
Maximum Test Load	Front 5,400 Pa (113psf) Rear 4,000 Pa (84psf)

I-V Curves



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HYUNDAI ENERGY SOLUTIONS

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
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PROJECT NAME & ADDRESS

TREMELLING RESIDENCE

1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
MODULE DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD001

ENPHASE.

DATA SHEET

IQ8M and IQ8A Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC), which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built using advanced 55 nm technology with high-speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.

Connect PV modules quickly and easily to the IQ8 Series Microinverters that have integrated MC4 connectors.

UL CERTIFIED SAFETY

IQ8 Series Microinverters are UL Listed as PV rapid shutdown equipment and conform with various regulations when installed according to manufacturer's instructions.

* Meets UL 1741 only when installed with IQ System Controller 2.
** IQ8M and IQ8A support split-phase, 240 V installations only.

Easy to install

- Lightweight and compact with plug-and-play connectors
- Power line communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB 3rd Ed.)

Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc) in the same system.

IQ8M and IQ8A Microinverters

INPUT DATA (DC)	UNITS	IQ8M-72-M-US	IQ8A-72-M-US
Commonly used module pairings[1]	W	260–460	295–500
Module compatibility		To meet compatibility, PV modules must be within maximum input DC voltage and maximum module I_{sc} listed below. Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator	
MPPT voltage range	V	30–45	32–45
Operating range	V	16–58	
Minimum/Maximum start voltage	V	22/58	
Maximum input DC voltage	V	60	
Maximum continuous input DC current	A	12	
Maximum input DC short-circuit current	A	25	
Maximum module I_{sc}	A	20	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1 x 1 ungrounded array; no additional DC side protection required; AC side protection requires max 20 A per branch circuit	
OUTPUT DATA (AC)	**UNITS**	**IQ8M-72-M-US**	**IQ8A-72-M-US**
Peak output power	VA	330	366
Maximum continuous output power	VA	325	349
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	
Minimum and Maximum grid voltage[2]	V	211-264	
Maximum continuous output current	A	1.35	1.45
Nominal frequency	Hz	60	
Extended frequency range	Hz	47-68	
AC short circuit fault current over three cycles	Arms	2	
Maximum units per 20 A (L-L) branch circuit[3]		11	
Total harmonic distortion	%	<5	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading–0.85 lagging	
Peak efficiency	%	97.8	97.7
CEC weighted efficiency	%	97.5	97
Nighttime power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to 60°C (-40°F to 140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		Stäubli MC4	
Dimensions (H x W x D)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.1 kg (2.43 lbs)	
Cooling		Natural convection–no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion-resistant polymeric enclosure	
Environmental category/UV exposure rating		NEMA Type 6/outdoor	

(1) No enforced DC/AC ratio.
(2) Nominal voltage range can be extended beyond nominal if required by the utility.
(3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8M and IQ8A Microinverters

COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3rd Ed.), FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV rapid shutdown equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE

1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
MICROINVERTER DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD002

ENPHASE.

DATASHEET

X-IQ-AM1-240-5
X-IQ-AM1-240-5C

IQ Combiner 5/5C

The IQ Combiner 5/5C consolidates interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications. IQ Combiner 5/5C uses wired control communication and is compatible with IQ System Controller 3/3G and IQ Battery 5P.

The IQ Combiner 5/5C, along with IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provides you with a complete grid-agnostic Enphase Energy System.

IQ Series Microinverters
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) dramatically simplify the installation process

IQ System Controller 3/3G
Provides microgrid interconnection device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power

IQ Battery 5P
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT Microinverters

IQ Load Controller
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life

Enphase 5 year limited warranty
5-year limited warranty

UL LISTED

Smart
- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect (CELLMODEM-M1-06-SP-05), only with IQ Combiner 5C
- Supports flexible networking: Wi-Fi, Ethernet, or cellular
- Provides production metering (revenue grade) and consumption monitoring

Easy to install
- Mounts to one stud with centered brackets
- Supports bottom, back, and side conduit entry
- Supports up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV branch circuits
- Bluetooth based Wi-Fi provisioning for easy Wi-Fi setup

Reliable
- Durable NRTL-certified NEMA type 3R enclosure
- 5-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKUs
- UL1741 listed

IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5)	IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (± 2.5%) and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat
IQ Combiner 5C (X-IQ-AM1-240-5C)	IQ Combiner 5C with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (±2.5%) and IQ Battery monitoring (±2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05)[1]. Includes a silver solar shield to deflect heat
WHAT'S IN THE BOX	
IQ Gateway printed circuit board	IQ Gateway is the platform for total energy management for comprehensive, remote maintenance and management of the Enphase IQ System
Busbar	125A busbar with support for 1 x IQ Gateway breaker and 4 x 20A breaker for installing IQ Series Microinverters and IQ Battery 5P
IQ Gateway breaker	Circuit breaker, 2-pole, 10 A/15 A
Production CT	Prewired revenue-grade solid core CT, accurate up to 0.5%
Consumption CT	Two consumption metering clamp CTs, shipped with the box, accurate up to 2.5%
IQ Battery CT	One battery metering clamp CT, shipped with the box, accurate up to 2.5%
CTRL board	Control board for wired communication with IQ System Controller 3/3G and the IQ Battery 5P
Enphase Mobile Connect (only with IQ Combiner 5C)	4G-based LTE-M1 cellular modem (CELLMODEM-M1-06-SP-05) with a 5-year T-Mobile data plan
Accessories kit	Spare control headers for CTRL board
ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
CELLMODEM-M1-06-SP-05	4G-based LTE-M1 cellular modem with a 5-year T-Mobile data plan
CELLMODEM-M1-06-AT-05	4G-based LTE-M1 cellular modem with a 5-year AT&T data plan
Circuit breakers (off-the-shelf)	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers Supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with hold-down kit
Circuit breakers (provided by Enphase)	BRK-10A-2-240V, BRK-15A-2-240V, BRK-20A-2P-240V, BRK-15A-2P-240V-B, and BRK-20A-2P-240V-B (More details in "Accessories" section)
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 5/5C
XA-ENV2-PCBA-5	IQ Gateway replacement printed circuit board (PCB) for Combiner 5/5C
X-IQ-NA-HD-125A	Hold-down kit compatible with Eaton BR-B series circuit breakers (with screws)
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage	120/240 VAC, 60 Hz
Busbar rating	125 A
Fault current rating	10 kAIC
Maximum continuous current rating (input from PV/storage)	64 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series distributed generation (DG) breakers only (not included)
Maximum total branch circuit breaker rating (input)	80 A of distributed generation/95 A with IQ Gateway breaker included
IQ Gateway breaker	10 A or 15 A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-CLAMP)	A pair of 200 A clamp-style current transformers is included with the box
IQ Battery metering CT	200 A clamp-style current transformer for IQ Battery metering, included with the box

[1] A plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.)

IQC-5-5C-DSH-00007-2.0-EN-US-2023-09-27

MECHANICAL DATA	
Dimensions (WxHxD)	37.5 cm x 49.5 cm x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40°C to 46°C (-40°F to 115°F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors • Always follow local code requirements for conductor sizing
Communication (In-premise connectivity)	Built-in CTRL board for wired communication with IQ Battery 5P and IQ System Controller 3/3G. Integrated Power Line Communication for IQ Series Microinverters
Altitude	Up to 2,600 meters (8,530 feet)
COMMUNICATION INTERFACES	
Integrated Wi-Fi	802.11b/g/n (dual band 2.4 GHz/5 GHz), for connecting the Enphase cloud via the Internet
Wi-Fi range (recommended)	10 m
Bluetooth	BLE4.2, 10 m range to configure Wi-Fi SSID
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included), for connecting to the Enphase Cloud via the Internet
Mobile Connect	CELLMODEM-M1-06-SP-05 or CELLMODEM-M1-06-AT-05 (included with IQ Combiner 5C)
Digital I/O	Digital input/output for grid operator control
USB 2.0	For Mobile Connect
Access point (AP) mode	For connection between the IQ Gateway and a mobile device running the Enphase Installer App
Metering ports	Up to two Consumption CTs, one IQ Battery CT, and one Production CT
Power line communication	90–110 kHz
Web API	Refer to https://developer-v4.enphase.com
Local API	Refer to guide for local API
COMPLIANCE	
IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003
IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1, IEEE 1547: 2018 (UL 1741-SB, 3rd Ed.) IEEE 2030.5/CSIP Compliant Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
COMPATIBILITY	
IQ System Controller 3/3G	SC200D111C240US01, SC200G111C240US01
IQ Battery 5P	IQBATTERY-5P-1P-NA
Microinverter	IQ6, IQ7, and IQ8 Series Microinverters

IQC-5-5C-DSH-00007-2.0-EN-US-2023-09-27

sunergy

SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR, HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
COMBINER BOX DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD003

Damaging roof shingles used to be one of a solar installers' worst challenges.

Now, the easy, affordable solution is NanoMount®, SunModo's patented solar mounting innovation.

The mount eliminates the need for lifting shingles and dramatically reduces the installation time.

The NanoMount® Advantage

- ✓ The fastest roof attachment in solar.
- ✓ Versatile mounting options including direct-to-decking.
- ✓ Eliminates the need to lift shingles and prevents damage to shingles.
- ✓ High-Velocity Hurricane Zone Approved - Passed TAS 100 (a) Wind-Driven Rain Test.
- ✓ All materials are compatible with asphalt shingles and single-ply roof membranes.

Key Features of NanoMount®

SUNMODO

5 levels of protection against water penetration

Technical Data

Application	Residential roof coverings, commercial single-ply roof membranes
Material	High grade aluminum, 304 stainless steel hardware
Finish	Black powder coating
Roof Attachment	Rafter and decking
Structural integrity	IBC and IRC Compliant
Warranty	25 years

SunModo, Corp. Vancouver, WA., USA • www.sunmodo.com • 360.844.0048 • info@sunmodo.com

sunergy

SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
ATTACHMENT DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD004

SunModo introduces the SMR Pitched Roof System, the best value pitched roof mounting system on the market.

With fast and easy Pop-On Clamps and L-Foot adaptors, professional installers can mount, adjust, and secure PV panels with a single tool.

Whether rafter or deck, portrait or landscape, the SMR System is the ideal solution for your solar installation. Save money on materials and installation time.

The SMR System Advantage

- ✓ The best value, best performing rail system on the market
- ✓ Lag-to-Panel single tool installation
- ✓ Pop-On universal clamps make installation fast, reliable and flexible
- ✓ A full range of roof attachments to meet every need
- ✓ Fastest install and lowest cost

Key Features of the SMR System

SUNMODO
LEADING by DESIGN

SMR 100 Rail
4' span or more up to 90 psf snow load or 190 mph winds

The SMR System represents a huge leap in racking technology.

Optimized design makes the SMR Rails not only the lightest but also the strongest rails on the market. One tool assembly and Pop-On technology allow fast and worry-free installation.

The cost and performance cannot be beaten.

Clamps & Grounding

Mid Clamp
The Bonding Pop-On Universal Mid Clamps accommodate PV module frame heights ranging from 30mm to 48mm. The fastest installing Mid Clamps on the market.

L Foot Adaptor
Fast and easy Pop-On L-Foot Adaptor speeds installation and eliminates old-fashioned T-Bolts. Install fast with full confidence in every attachment.

End Clamp
End Clamps are adjustable for different module frame heights and provide fast and secure attachment of modules.

Rail Splice
Structural bonding splice with fast and easy single bolt installation

Wire Management Clip
The clip attaches to the channel on the SMR rail to provide a neat and effective solution for PV wire management.

Grounding Lug
The Lug provides proper grounding of the PV System

Technical Data

Application	Pitched Roof
Roof Type	Composition shingle, Metal and Tile
Material	High grade aluminum and 304 stainless steel hardware
PV Modules	Compatible with all common module types
Module Orientation	Portrait and landscape
Roof Attachment	Rafter and decking
Structural Integrity	IBC compliant, stamped engineering letters available
Certificate	UL 2703 listed by ETL
Warranty	25 years

SunModo, Corp. Vancouver, WA., USA • www.sunmodo.com • 360.844.0048 • info@sunmodo.com

sunergy

SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

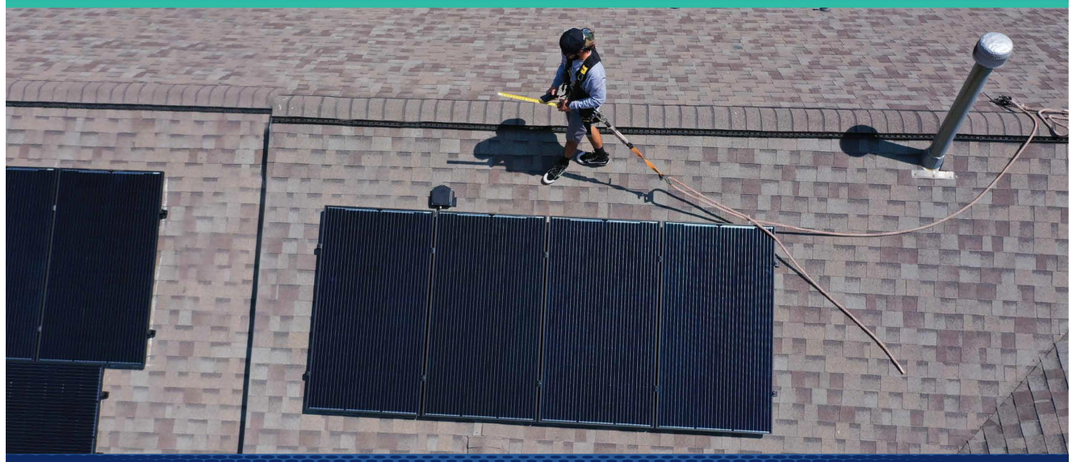
SHEET NAME
RACKING DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD005

EZ SOLAR
making solar simple.

JB-1.2



THE ULTIMATE ROOFTOP JUNCTION BOX

EZ Solar believes innovation is key to making Solar Simple! The most revolutionary junction box on the market just got better! Designed with the installer in mind, the **JB-1.2** makes installation fast and easy!

SIMPLE TO INSTALL

- Minimal Shingle Cutting
- Enter Through 3 Sidewalls
- Wider and Taller Sidewalls

HIGH QUALITY

- Made from advanced durable polycarbonate + superior components, UL1741, Nema 3R, CSA C22.2 No. 290
- 3 patented layers of water protection
- 2 Weep Holes for breathability

LOWER PRICE

- We believe that EVERYONE should have access to affordable renewable energy
- With the same great features as the JB-1, the JB-1.2 is now available with updates to make installation even easier.

MADE IN USA

Intertek 5019942

ezsolarproducts.com | info@ezsolarproducts.com | 385.202.4150

making solar simple.

EZ SOLAR
making solar simple.

JB-1.2, JB-1.XL
Specification Sheet
PV Junction Box for Composition/Asphalt Shingle Roofs

A. System Specifications and Ratings

- Maximum Voltage: 1,000 Volts
- Maximum Current: **JB-1.2:** 80 Amps; **JB-1.XL:** 120 Amps
- Allowable Wire: 14 AWG – 6 AWG
- Spacing: Please maintain a spacing of at least ½" between uninsulated live parts and fittings for conduit, armored cable, and uninsulated live parts of opposite polarity.
- Enclosure Rating: Type 3R
- Roof Slope Range: 2.5 – 12:12
- Max Side Wall Fitting Size: 1"
- Max Floor Pass-Through Fitting Size: 1"
- Ambient Operating Conditions: (-35°C) - (+75°C)
- Compliance:
  - **JB-1.2:** UL1741, CSA C22.2 No. 290; **JB-1.XL:** UL1741, CSA C22.2 No. 290
  - Approved wire connectors: must conform to UL1741, CSA C22.2 No. 290
- System Marking: **Interek Symbol and File #5019942**
- Periodic Re-inspections: If re-inspections yield loose components, loose fasteners, or any corrosion between components, components that are found to be affected are to be replaced immediately.

Intertek 5019942

Table 1: Typical Wire Size, Torque Loads and Ratings

	1 Conductor	2 Conductor	Torque				
			Type	NM	Inch Lbs	Voltage	Current
ABB ZS6 terminal block	10-24 awg	16-24 awg	Sol/Str	0.5-0.7	6.2-8.85	600V	30 amp
ABB ZS10 terminal block	6-24 awg	12-20 awg	Sol/Str	1.0-1.6	8.85-14.16	600V	40 amp
ABB ZS16 terminal block	4-24 awg	10-20 awg	Sol/Str	1.6-2.4	14.6-21.24	600V	60 amp
ABB M6/8 terminal block	8-22 awg		Sol/Str	.08-1	8.85	600V	50 amp
Ideal 452 Red WING-NUT Wire Connector	8-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal 451 Yellow WING-NUT Wire Connector	10-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal, In-Sure Push-In Connector Part #39	10-14 awg		Sol/Str	Self-Torque	Self-Torque	600V	
WAGO, 2204-1201	10-20 awg	16-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
WAGO, 221-612	10-20 awg	10-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
Dottie DRC75	6-12 awg		Sol/Str	Snap-In	Snap-In		
ESP NG-53	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
ESP NG-717	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
Brumall 4-5,3	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		

Table 2: Minimum wire-bending space for conductors through a wall opposite terminals in mm (inches)

Wire size, AWG or kcmil (mm2)	Wires per terminal (pole) 1 mm (inch)	2 mm (inch)	3 mm (inch)	4 or More mm (inch)
14-10 (2.1-5.3)	Not Specified	-	-	-
8 (8.4)	38.1 (1-1/2)	-	-	-
6 (13.3)	50.8 (2)	-	-	-

sunergy

SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	07/23/2024	
REVISION	08/08/2024	A

PROJECT NAME & ADDRESS

TREMELLING RESIDENCE
1249 WHEELER DR,
HURON, OH 44839

DRAWN BY
ESR

SHEET NAME
JUNCTION BOX DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD006

iRooFA™

Instant Roof Framing Analysis

www.iroofa.solar

tel: 540.313.5317 - email: info@iRooFA.solar

STRUCTURAL ANALYSIS

for the

ROOFTOP PV SOLAR INSTALLATION

Project: James Tremelling, 1249 Wheeler Dr, Huron, OH 44839

Prepared for:

Sunergy

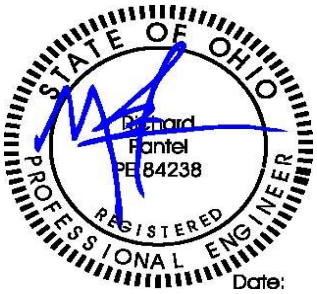
7625 Little Rd Ste 200a - New Port Richey, FL 34654

Calculation Report Index

Project Number: 66.408239.2, Rev. 0

Report Date: 07/23/2024

Report Prepared by:



Richard Pantel, P.E.

OH License No. PE.84238

Sealed 07/23/2024

V240625
ID.L1W7

Loading Summary

Exposure and Occupancy Categories		
B		*Exposure Category (ASCE 7-16 Table 26.7.3, Page 266)*
II		*Building Use Occupancy / Risk Category (ASCE 7-16 Table 1.5-1, Page 4)*

Wind Loading:			
v	115	*mph*	*Over-ridden per client request. Original data from Municipality provided wind / snow loadings.*
qz	20.14	*psf*	*Velocity qz, calculated at height z [ASD]*

Snow Loading			
pg	36.85	*psf*	*Ground Snow Load pg (Over-ridden per client request. Original data from Municipality provided wind / snow loadings.)*
Total Snow Load			
ps	23.22	*psf*	*Effective snow load on roof and modules*

Module Data			
HYUNDAI ENERGY SOLUTIONS CO.: HiS-S410YH(BK)			
Dimensions	*mm*	*ft*	*in*
Length	1,924	6.31	75.75
Width	1,038	3.41	40.87
Area (m^2, ft^2)	2.0	21.50	
Weight	kg	lb	
Module	21.10	46.52	

Roof Panel (Cladding) Loading Summary		Module Loading Summary			
Support Point Loads		*Upward*	*Upward*	*Upward*	*Downward*
Roof Zones		1,2e,2r	2n,3r	3e	All
Net load per module	*lb*	-74	-100	-139	327

Positive values indicate net downward force

Primary Stanchion: Sunmodo NanoMount w/1 bolt

Stanchion Fastener Pull-out and Spacing Calculations					
Framing spacing			*ft*	2.00	
Rails / Module			*ea*	2	
Max proposed stanchion span			*ft*	4.00	
# fasteners per stanchion				1	
Bolt thread embedment depth			*in*	2.5	
Safety Factor				1.10	
Pull-out for 5/16 threaded fasteners			*lb/in*	220	
Factored max fastener uplift capacity			*lb*	499	
Fastener details	*Material*	Stainless	*Size*	5/16	*Predrill hole 0.16" dia or use self tapping*
Max stanchion uplift capacity			*lb*	245	
Max support point uplift capacity			*lb*	245	

Roof Zones		*1,2e,2r*	*2n,3r*	*3e*
Net lift per module	*lb*	74	100	139
Min tot bolt thread embedment depth rq'd	*in*	0.76	1.02	1.42
Net uplift pressure 7. 0.60D - 0.6W	*psf*	-5.90	-7.95	-10.99
Allowable lift area / support point	*sf*	41.53	30.83	22.30
Max rail span per framing spacing	*ft*	4.00	4.00	4.00
Landscape Modules				
Length along rafter	*ft*	3.41		
Lift calc'ed max stanchion EW spacing	*ft*	> 6	> 6	> 6
Max stanchion EW spacing	*ft*	4.00	4.00	4.00
Maximum module area / support point	*sf*	6.81	6.81	6.81
Factored lift per support point	*lb*	-40	-54	-75
Portrait Modules				
Length along rafter	*ft*	6.31		
Lift calc'ed max stanchion EW spacing	*ft*	> 6	> 6	6.00
Max stanchion EW spacing	*ft*	4.00	4.00	4.00
Maximum module area / support point	*sf*	12.62	12.62	12.62
Factored lift per support point	*lb*	-74	-100	-139

Stanchion support threaded fastener sizes are indicated in the Module Loading Summary table above. Lift forces were determined from GCp and other coefficients contained in the ASCE nomographs

Conclusions

We were asked to review the roof of James Tremelling, located at 1249 Wheeler Dr, Huron, OH, by Sunergy, to determine its suitability to support a PV solar system installation.

The referenced building's roof structure was field measured by Sunergy. The attached framing analyses reflect the results of those field measurements combined with the PV solar module locations shown on the PV solar roof layout design prepared by Sunergy. Loads are calculated to combine the existing building and environmental loads with the proposed new PV array loads.

The Sunmodo SMR 100 racking and Sunmodo NanoMount w/1 bolt stanchions were selected for this project by Sunergy. The racking and support stanchions shall be placed as shown on their plans, dated 07/23/2024, and shall be fastened to the roof framing using fastener sizes indicated in this report. Rack support spacing shall be no more than that shown above. Note that support points for alternating rows shall share the same truss. Intermediate rows shall move the support points laterally to the next truss.

Google Location Map

Framing Summary

	Ex. Framing	Total Ex DL
MP 1: Truss @ 24" OC	0.79 psf	5.94 psf
MP 2: Truss @ 24" OC	0.79 psf	5.94 psf

** Wood species used in these calculations assumes spruce, pine or fir, #2 grade.*

Based upon the attached calculations, the existing roofs' framing systems are capable of supporting the additional loading for the proposed PV solar system along with the existing building and environmental loads. No supplemental roof framing structural supports are required. Minimum required anchorage fastening is described above.

Wood fastener notes: 1) Fastener threads must be embedded in the side grain of a roof support structural member or other structural member integrated into the building's structure. 2) Fastener must be located in the middle third of the structural member. 3) Install fasteners with head and where required, washer, flush to material surface (no gap). Do not over-torque.

References and Codes:

1) *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures*
2) *2021 IBC*
3) *2024 Ohio Building Code / 2019 Ohio Residential Code*
4) *American Wood Council, NDS 2018,Table 12.2A, 12.3.3A.*
5) *American Wood Council, Wood Structural Design, 1992, Figure 6.*

Geometric Data			
Θ	*deg.*	38.00	*Angle of roof plane from horizontal, in degrees*
ω	*deg.*	0.00	*Angle the solar panel makes with the roof surface*
L	*ft.*	21.75	*Length of roof plane, in feet (meters)*
W	*ft.*	15.00	*Plan view width of roof plane, in feet (meters)*
h	*ft.*	25.00	*Average height of roof above grade, in feet (meters)*

Roof Wind Zone Width			
	use, a =	3.00	*ft*

Wind Velocity Pressure, q_z evaluated at the height z						
q_z=	20.14	*psf*	*Vasd* q_z=	12.34	*psf*	Basic wind pressure
V=	115	mph				

Framing Data		
Wood type	US Spruce	
Wood source, moisture content	White 0.12%	
# Framing Members / Support		1
Rafter / Truss OC	*in*	24.00
Member Total Length	*ft*	15.00

2	# Rafters / Rack Support Width
4.00	Rack Support Spacing (ft)
48	Max. Rack Support Spacing (in)
2	Max # of mod's / Truss top chord

Member Properties		**Member**
Name		(1) 2x4
Repetitive Member Factor (Cr)		1.15

** Mem properties based upon field measurements*

Truss top chord

Module Physical Data			
Weight	kg	lb	psf load
Module	21.10	46.52	2.16
4 Stanchions	1.81	4.0	0.19

Existing Dead Loads	*Units*	*Value*	*Description*
Roof Deck & Surface	*psf*	5.15	*Truss members' self weight added to FEA analysis*

Rack Support Spacing and Loading				
Across rafters	*ft*	4.0		
Along rafter slope	*ft*	6.3		
Area / support point	*sf*	12.6		
Uphill gap between modules	*in*	1.0	0.08	*ft*

Member Total Length	*ft*	15.00	
Maximum member free span	*ft*	15.00	Truss top chord span

ASCE 7-16 **Method for Calculating Uplift on PV Modules**

Notation
Lp = Panel chord length.
p = uplift wind pressure
γa = Solar panel pressure equalization factor, defined in Fig. 29.4-8.
γE = Array edge factor as defined in Section 29.4.4.
θ = Angle of plane of roof from horizontal, in degrees.

29.4.4 Rooftop Solar Panels Parallel to the Roof Surface on Buildings of All Heights and Roof Slopes.

Θ >= 7 deg TRUE

Min.d1: Exposed	**FALSE**
Max.d1: Exposed	**TRUE**
1.5(Lp) =	5.11
γE =	1.5
γa =	0.67

Use EXPOSED for uplift calculations

$p = qh(GCp)(\gamma_E)(\gamma_a)$ (lb/ft2) (29.4-7)

Zones	1,2e,2r	2n,3r	3e
GCp	-1.47	-1.74	-2.15
p, Windload (psf)	-18.12	-21.53	-26.59

Downward, Zones All Zones
GCp 0.77

ASCE 7-16 Chapter 2 Combinations of Loads, Table 2.4, Page 8 (in psf)				
Zones	1,2e,2r	2n,3r	3e	All Zones
2.2 SYMBOLS AND NOTATION	*Module Upward*	*Module Upward*	*Module Upward*	*Downward*
D = dead load of PV Module + Stanchion	2.35	2.35	2.35	2.35
S = snow load	23.22	23.22	23.22	23.22
W = wind load = (Vu Windload) = (Vasd Windload / 0.6)	-18.12	-21.53	-26.59	9.46

2.4 Combining Nominal Loads Using Allowable Stress Design (in psf)				
2.4.1 Basic Combinations. Loads listed herein shall be considered to act in the following combinations; whichever produces the most unfavorable effect in the building, foundation, or structural member being considered. Effects of one or more loads not acting shall be considered.				
Combination Formulae	*Upward*	*Upward*	*Upward*	*Downward*
Use this loading combination for DOWNWARD for Proposed PV Dead Load				
6. D + 0.75L - 0.75(0.60W) + 0.75(Lr or S or R)	25.57	25.57	25.57	29.82
Module Support point load (lb)	323	323	323	377
Cr Factored Module Support point load (lb)	281	281	281	327

Use this loading combination for UPWARD for Proposed PV Dead Load				
7. 0.60D - 0.6W	-5.90	-7.95	-10.99	8.29
Module Support point load (lb)	-74	-100	-139	105

DOWNWARD

Presume loading directly over member.

Combined Dead and Wind Pressure Downward Loading					
	Truss top chord span				
PV Module Row	Point load loc's from Left support	Point Load #'s	Module Support Point Load	Comment	Module Orientation
	ft from left		*lb*		
1	1.17		327		Portrait
1	7.48			Support placed on adjoining truss	Portrait
2	7.57			Support placed on adjoining truss	Portrait
2	13.88		327		Portrait

Truss Data and Loading for MP 1

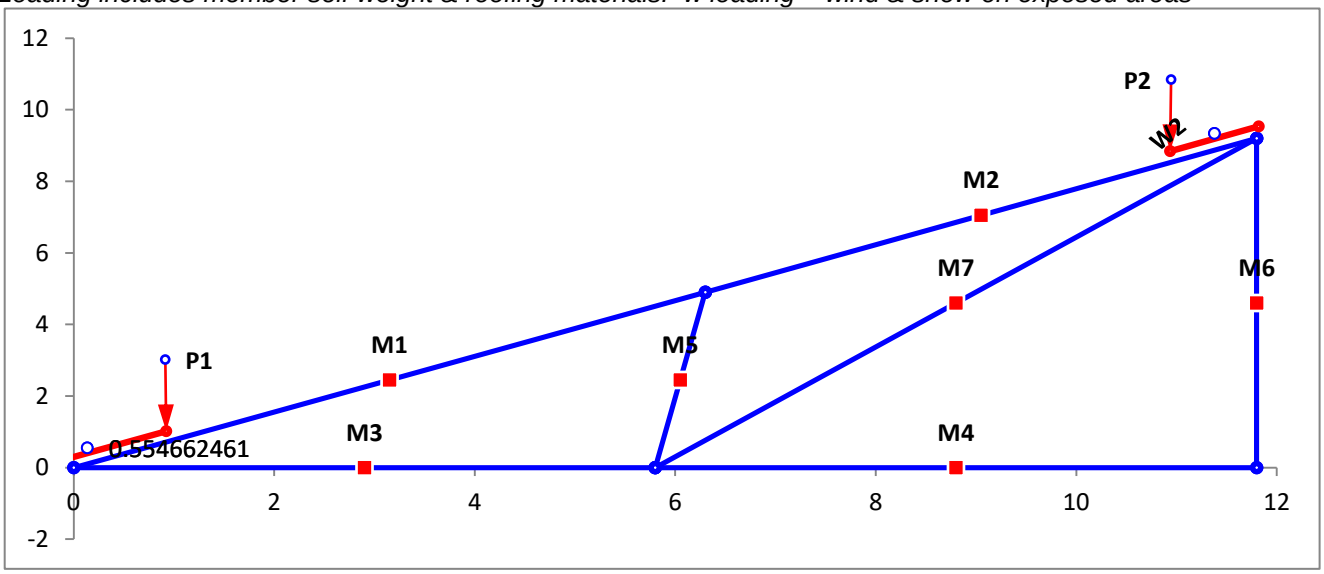
Roof slope (degrees)	38.00
Top ridge height above floor plane	9.23

	Length of roof plane	15.00
	Length of floor plane	11.83

Truss Segments

Roof Plane		*Floor Plane*		*Diagonals*		*Diagonals*	
Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*
1	2x4	3	2x4	5	2x4	7	2x4
2	2x4	4	2x4	6	2x4		

** Loading includes member self weight & roofing materials. w loading = wind & snow on exposed areas*



Geometric Data			
Θ	*deg.*	38.00	*Angle of roof plane from horizontal, in degrees*
ω	*deg.*	0.00	*Angle the solar panel makes with the roof surface*
L	*ft.*	18.92	*Length of roof plane, in feet (meters)*
W	*ft.*	15.00	*Plan view width of roof plane, in feet (meters)*
h	*ft.*	15.00	*Average height of roof above grade, in feet (meters)*

Roof Wind Zone Width			
	use, a =	3.00	*ft*

Wind Velocity Pressure, q_z evaluated at the height z						
q_z=	20.14	*psf*	*Vasd* q_z=	12.34	*psf*	Basic wind pressure
V=	115	mph				

Framing Data		
Wood type	US Spruce	
Wood source, moisture content	White 0.12%	
# Framing Members / Support		1
Rafter / Truss OC	*in*	24.00
Member Total Length	*ft*	15.00

2	# Rafters / Rack Support Width
4.00	Rack Support Spacing (ft)
48	Max. Rack Support Spacing (in)
2	Max # of mod's / Truss top chord

Member Properties		**Member**
Name		(1) 2x4
Repetitive Member Factor (Cr)		1.15

** Mem properties based upon field measurements*

Truss top chord

Module Physical Data			
Weight	kg	lb	psf load
Module	21.10	46.52	2.16
4 Stanchions	1.81	4.0	0.19

Existing Dead Loads	*Units*	*Value*	*Description*
Roof Deck & Surface	*psf*	5.15	*Truss members' self weight added to FEA analysis*

Rack Support Spacing and Loading				
Across rafters	*ft*	4.0		
Along rafter slope	*ft*	6.3		
Area / support point	*sf*	12.6		
Uphill gap between modules	*in*	1.0	0.08	*ft*

Member Total Length	*ft*	15.00	
Maximum member free span	*ft*	15.00	Truss top chord span

ASCE 7-16 **Method for Calculating Uplift on PV Modules**

Notation
Lp = Panel chord length.
p = uplift wind pressure
γa = Solar panel pressure equalization factor, defined in Fig. 29.4-8.
γE = Array edge factor as defined in Section 29.4.4.
θ = Angle of plane of roof from horizontal, in degrees.

29.4.4 Rooftop Solar Panels Parallel to the Roof Surface on Buildings of All Heights and Roof Slopes.

Θ >= 7 deg TRUE

Min.d1: Exposed	**FALSE**
Max.d1: Exposed	**TRUE**
1.5(Lp) =	5.11
γE =	1.5
γa =	0.67

Use EXPOSED for uplift calculations

$p = qh(GCp)(\gamma_E)(\gamma_a)$ (lb/ft2) (29.4-7)

Zones	1,2e,2r	2n,3r	3e
GCp	-1.47	-1.74	-2.15
p, Windload (psf)	-18.12	-21.53	-26.59

Downward, Zones All Zones
GCp 0.77

ASCE 7-16 Chapter 2 Combinations of Loads, Table 2.4, Page 8 (in psf)				
Zones	1,2e,2r	2n,3r	3e	All Zones
2.2 SYMBOLS AND NOTATION	*Module Upward*	*Module Upward*	*Module Upward*	*Downward*
D = dead load of PV Module + Stanchion	2.35	2.35	2.35	2.35
S = snow load	23.22	23.22	23.22	23.22
W = wind load = (Vu Windload) = (Vasd Windload / 0.6)	-18.12	-21.53	-26.59	9.46

2.4 Combining Nominal Loads Using Allowable Stress Design (in psf)				
2.4.1 Basic Combinations. Loads listed herein shall be considered to act in the following combinations; whichever produces the most unfavorable effect in the building, foundation, or structural member being considered. Effects of one or more loads not acting shall be considered.				
Combination Formulae	*Upward*	*Upward*	*Upward*	*Downward*
Use this loading combination for DOWNWARD for Proposed PV Dead Load				
6. D + 0.75L - 0.75(0.60W) + 0.75(Lr or S or R)	25.57	25.57	25.57	29.82
Module Support point load (lb)	323	323	323	377
Cr Factored Module Support point load (lb)	281	281	281	327

Use this loading combination for UPWARD for Proposed PV Dead Load				
7. 0.60D - 0.6W	-5.90	-7.95	-10.99	8.29
Module Support point load (lb)	-74	-100	-139	105

DOWNWARD

Presume loading directly over member.

Combined Dead and Wind Pressure Downward Loading					
	Truss top chord span				
PV Module Row	Point load loc's from Left support	Point Load #'s	Module Support Point Load	Comment	Module Orientation
	ft from left		*lb*		
1	0.84		327		Portrait
1	7.15			Support placed on adjoining truss	Portrait
2	7.24			Support placed on adjoining truss	Landscape
2	10.64		327		Landscape

Truss Data and Loading for MP 2

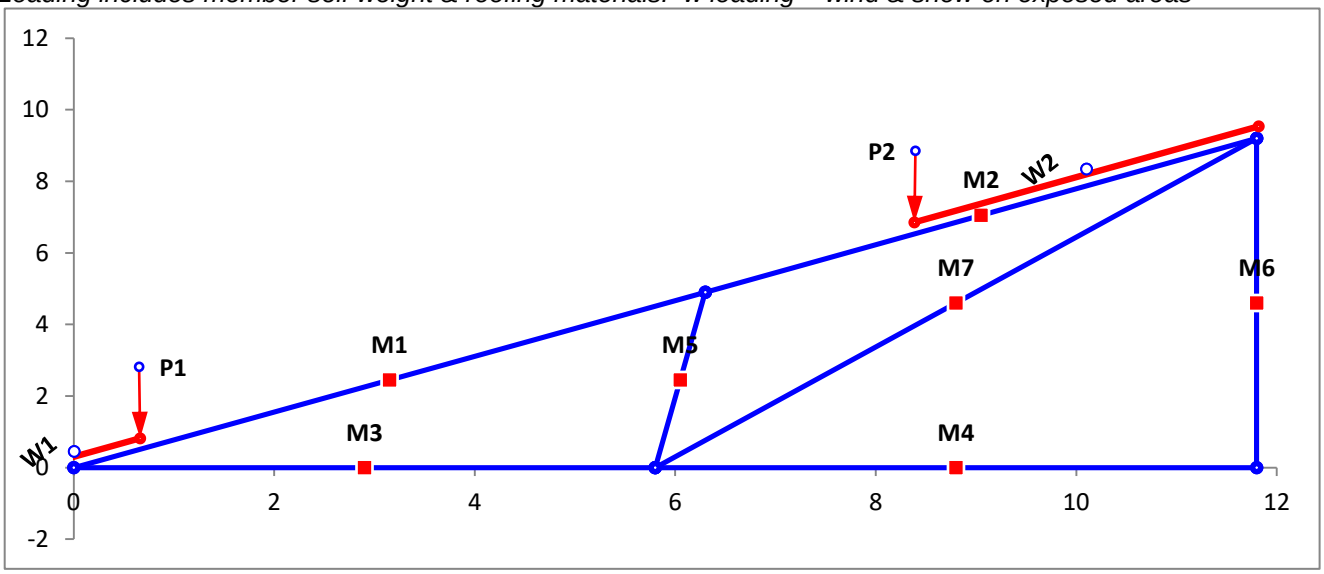
Roof slope (degrees)	38.00
Top ridge height above floor plane	9.23

	Length of roof plane	15.00
	Length of floor plane	11.83

Truss Segments

Roof Plane		*Floor Plane*		*Diagonals*		*Diagonals*	
Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*	Mem #	*Mem Type*
1	2x4	3	2x4	5	2x4	7	2x4
2	2x4	4	2x4	6	2x4		

** Loading includes member self weight & roofing materials. w loading = wind & snow on exposed areas*



Snow Loading Analysis

where:

		Fully Exposed	Exposure category
Ce	=	0.9	Exposure Factor, Ce (ASCE 7-16 Table 7.3-1, Page 58)
Ct	=	1.0	Thermal Factor, Ct (ASCE 7-16 Table 7.3-2, Page 58)
Is	=	1.0	Snow Importance Factor, Is (ASCE 7-16 Table 1.5-2, Page 5)
p_g	=	36.85	Ground Snow Load pg (Over-ridden per client request. Original data from Municipality
p_f	=	**0.7CeCtIsPg**	Flat Roof Snow Load, pf (ASCE 7-16 Table 7.3-1, Page 58)
p_f	=	**23.22**	psf
			but where Pf is not less than the following:
			Minimum Snow Load pm (ASCE 7-16 Table 7.3.4, Page 53)
p_m	=	**20**	psf. When Pg > 20 psf, then use Pf = 20 psf x Is
p_f	=	**23.22**	psf. Resultant Snow pressure to be used with Roof slope factor below
p_s	=	$C_s p_f$	Sloped Roof Snow Load ps (ASCE 7-16 Table 7.4, Page 54)
			Roof Type Warm Roofs

Roof slope factor Cs for Warm Roofs, where Ct = 1.0

Roof surface condition = Slippery Roof

C_s	=	1.00	Roof Slope Factor, Cs (ASCE 7-16 Table 7-2a, Page 59)

Total Snow Load

p_s	=	**23.22 psf**	Roof snow load

FEA Calculation Results for Roof Plane MP 1 for Sunergy Client JAMES TREMELLING

IDSPL - 2D Frame Analysis of a 2D frame subject to distributed loads, point loads and moments

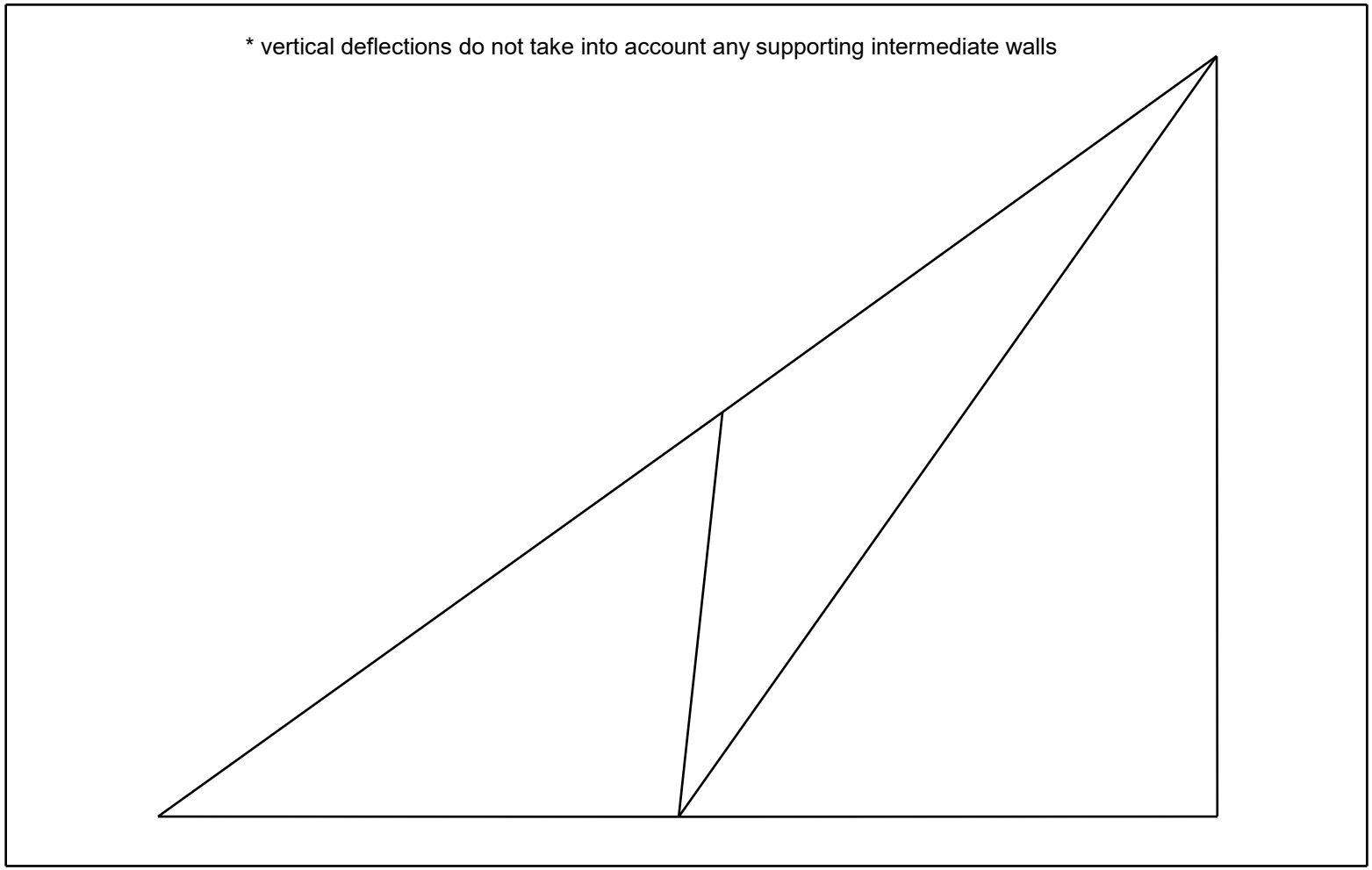
Equilibrium check	FX	FY	0.00011
Total applied forces	0.00	1915	
Total output reactions	0.00	-1915	
Output error	6.74E-13	-7.50E-12	

	Shear	Mom	Ax		
Max (psi)	7	53	702		
Allowable (psi)	115	950	5,610	Maximum Deflections	
# of segments/beam		1		-4.48E-03	-4.36E-03

** vertical deflections do not take into account any supporting intermediate walls*

Node Results			Beam End Results			
Direction	Deflection	Reaction	Beam	Shear	Axial	BM
DX1	0.00E+00	0	1-1	-1438	-1409	2942
DY1	0.00E+00	-502	1-2	-1083	-1685	-6881
RZ1	6.31E-04	0	2-1	-7796	-326	-14859
DX2	-4.46E-03	0	2-2	-6816	-1092	-68058
DY2	4.36E-03	0	3-1	-232	1995	-2942
RZ2	2.62E-04	0	3-2	-150	1995	-4439
DX3	-1.59E-03	0	4-1	873	3579	-5016
DY3	3.27E-04	0	4-2	873	3579	221
RZ3	3.86E-03	0	5-1	-3671	5795	10099
DX4	7.84E-04	0	5-2	-3669	5778	-7978
DY4	1.88E-03	0	6-1	3579	541	221
RZ4	1.21E-04	0	6-2	3579	489	33148
DX5	2.24E-03	0	7-1	4033	-3476	-9522
DY5	0.00E+00	-1414	7-2	4072	-3536	34910
RZ5	-2.65E-04	0				

Beam	X	Shear	Mom	Axial	DX	DY	RZ
1	0.00	-1438	2942	-1409	0.00E+00	0.00E+00	6.31E-04
1	7.98	-1141	-6529	-1640	-4.48E-03	-4.35E-03	9.61E-05
2	0.00	-7796	-14859	-326	-4.46E-03	-4.36E-03	2.62E-04
2	6.98	-7183	-58189	-805	-2.00E-03	-5.39E-06	-1.49E-02
3	0.00	-232	-2942	1995	0.00E+00	0.00E+00	6.31E-04
3	5.80	-202	-4118	1995	7.84E-04	-1.88E-03	9.30E-05
4	0.00	873	-5016	3579	7.84E-04	-1.88E-03	1.21E-04
4	6.00	873	221	3579	2.24E-03	0.00E+00	-1.01E-04
5	0.00	-3671	10099	5795	7.84E-04	-1.88E-03	1.21E-04
5	4.93	-3669	-7978	5783	-4.46E-03	-4.36E-03	-1.41E-04
6	0.00	3579	221	541	2.24E-03	0.00E+00	-2.65E-04
6	9.20	3579	33148	498	-1.59E-03	-3.27E-04	3.85E-03
7	0.00	4033	-9522	-3476	7.84E-04	-1.88E-03	1.21E-04
7	10.98	4067	34913	-3527	-1.59E-03	-3.27E-04	4.03E-03



Scaled 2X Deflected Truss Plot
Roof Plane MP 1 for Sunergy Client JAMES TREMELLING

FEA Calculation Results for Roof Plane MP 2 for Sunergy Client JAMES TREMELLING

IDSPL - 2D Frame Analysis of a 2D frame subject to distributed loads, point loads and moments

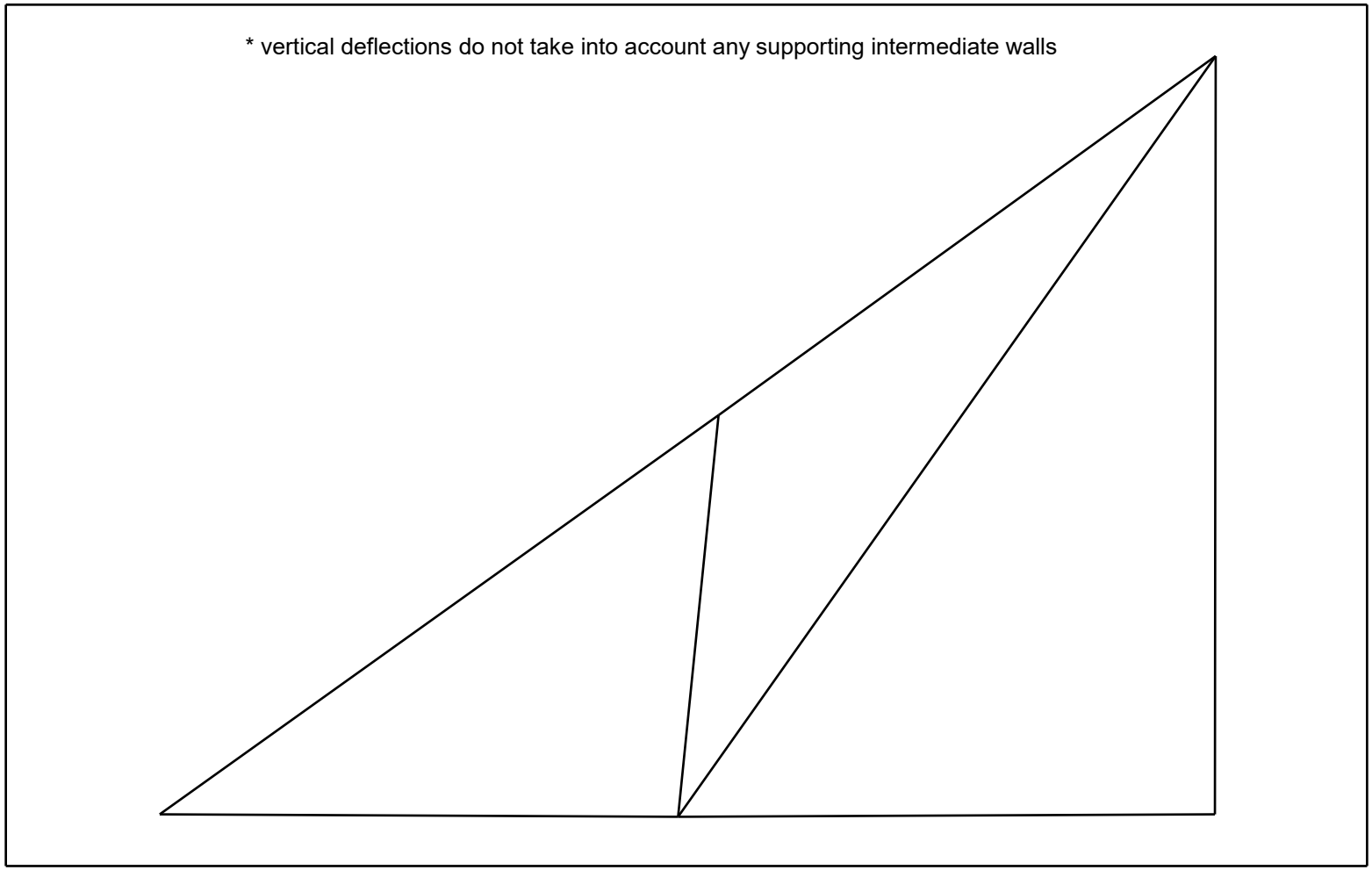
Equilibrium check	FX	FY	0.00012
Total applied forces	0.00	1711	
Total output reactions	0.00	-1711	
Output error	1.27E-11	-3.18E-11	

	Shear	Mom	Ax		
Max (psi)	20	113	3,399		
Allowable (psi)	115	950	5,610	Maximum Deflections	
# of segments/beam	1			-2.33E-02	-2.73E-02

** vertical deflections do not take into account any supporting intermediate walls*

Node Results				Beam End Results		
Direction	Deflection	Reaction	Beam	Shear	Axial	BM
DX1	0.00E+00	0	1-1	319	-2935	10065
DY1	0.00E+00	-245	1-2	674	-3211	14351
RZ1	3.42E-03	0	2-1	-24081	11478	37754
DX2	-2.33E-02	0	2-2	-23262	10837	-132253
DY2	2.73E-02	0	3-1	-2299	2121	-10065
RZ2	6.10E-03	0	3-2	-2217	2121	-23550
DX3	7.78E-03	0	4-1	7166	6076	-39483
DY3	-3.56E-03	0	4-2	7166	6076	3511
RZ3	5.74E-03	0	5-1	-6550	28041	55660
DX4	8.33E-04	0	5-2	-6548	28024	23403
DY4	1.54E-02	0	6-1	6076	-5700	3511
RZ4	8.68E-04	0	6-2	6076	-5751	59413
DX5	3.30E-03	0	7-1	10237	-16221	-39727
DY5	0.00E+00	-1466	7-2	10276	-16280	72840
RZ5	-2.03E-03	0				

Beam	X	Shear	Mom	Axial	DX	DY	RZ
1	0.00	319	10065	-2935	0.00E+00	0.00E+00	3.42E-03
1	7.98	616	14704	-3166	-2.33E-02	-2.72E-02	5.76E-03
2	0.00	-24081	37754	11478	-2.33E-02	-2.73E-02	6.10E-03
2	6.98	-23593	-123098	11096	7.40E-03	3.86E-03	-2.31E-02
3	0.00	-2299	-10065	2121	0.00E+00	0.00E+00	3.42E-03
3	5.80	-2269	-23228	2121	8.33E-04	-1.54E-02	1.08E-03
4	0.00	7166	-39483	6076	8.33E-04	-1.54E-02	8.68E-04
4	6.00	7166	3511	6076	3.30E-03	0.00E+00	-7.40E-04
5	0.00	-6550	55660	28041	8.33E-04	-1.54E-02	8.68E-04
5	4.93	-6548	23403	28028	-2.33E-02	-2.73E-02	3.88E-03
6	0.00	6076	3511	-5700	3.30E-03	0.00E+00	-2.03E-03
6	9.20	6076	59413	-5742	7.78E-03	3.56E-03	5.67E-03
7	0.00	10237	-39727	-16221	8.33E-04	-1.54E-02	8.68E-04
7	10.98	10270	72843	-16272	7.78E-03	3.56E-03	6.45E-03



Scaled 2X Deflected Truss Plot
Roof Plane MP 2 for Sunergy Client JAMES TREMELLING

TO: Chairman Boyle and Members of the Planning Commission and Design Review Board
FROM: Christine Gibboney, Administrative Assistant
RE: RHI Magnesita -730 River Road. Wall Signage & Exterior Color Change. (Formerly known as Seven Lakeway Refractories LLC)
DATE: September 5, 2024

Current Zoning District: I-2 **Parcel No.: 42-00811.000**

Existing Land Use: Manufacturing **Property Size: +/- 1.943**

Traffic Considerations: N/A

Project Description- New Signage & Exterior Color Change
The applicant is seeking design approval for one (1) wall sign on the front of the main building and the repainting of exterior colors on buildings. You may recall, earlier this year a request for existing signage changes and changes to the exterior color of one of the existing buildings was approved when ownership of the company had changed affecting existing logos.

Staff Analysis/Recommendation:
The applicant's original application included a total of 3 wall signs which were all individually compliant with size regulations, but were not compliant relative to the location/number of signs pursuant to the code. Staff advised the applicant of this with the option to revise the application. The applicant advised they would be removing the two additional wall signs from the application.

As proposed, a new 60sq.ft. lighted logo wall sign would be installed on the northwest corner of the main building facing the road. The size and location of the sign is compliant with both Chapter 1129- Appendix A for size, and Section 1129.05 for regulations.

The applicant is also proposing to repaint the exterior the buildings; repainting the front office structure blue, and the metal buildings in gray with blue trim and doors, in keeping with the blue and gray color palette.

Applicable Code Sections

1129.05 SIGN REGULATIONS. Permitted signs must adhere to the regulations outlined below:
(a) Wall Signs All such signs are subject to the following limitations:
(1) Wall signs placed in the vertical space between windows may not exceed in height more than two-thirds (2/3) of the distance between the top of a window and the sill of any above windows, or major architectural details related thereto.
(2) Wall signs shall not extend above the roof line.
(3) A sign may not cover or interrupt major architectural features.

(4) Rear and side entrances. There may be an additional sign not more than fifteen (15) square feet attached to the building at a public entrance not fronting on a street that opens from a parking lot or having access from a parking lot used by the public.

1129.03 COMPUTATIONS. The following principles shall control the computation of sign area and sign height.
(a) Determining Building Frontage and Building Unit. The building frontage shall be the length of the building which faces the principal street. In the event that due to the unique nature of the site, building, or parcel, the principal entrance to the uses therein is located on any side of a building that is not adjacent to the principal street, one (1) additional sign is permitted to clearly delineate the location of the entrance.
(1) In the case of an irregular wall surface, a straight line extended along such wall surface shall be used to measure the length.
(2) Only one (1) exterior wall of any business shall be considered its frontage. If the building is located on a corner lot, only one side of the building shall be used to calculate frontage. In this instance, it shall be the Planning Commission's discretion as to which side of the building is considered to front a principal street.
(3) For multi-tenant buildings, the portion of a building which is owned or leased by a single tenant shall be considered a building unit.
(4) The length of a building unit is that portion of the building so occupied by a single activity and calculated in the same manner as the building frontage.

Staff is in support of the design plans as presented and would recommend approval.

Attachments:
- Application & Design Elevations

Planning Commission (PC)

Commercial Site Plan Application/Design Approval-
Exterior/Design-Signage Only

DATE: 8-14-24

Property Owner

Name: Same As Applicant

Address: 730 River Rd Huron, Oh

Phone: 216-342-8607

Email: _____

Applicant

Name: Frank Mikes

Company/Business Name: RHI Magnesia

Mailing Address: 730 River Rd Huron, Oh

Phone: 216-342-8607

Email: frank.mikes@rhimagnesia.com

Location and Description of Project

Address: 730 River Rd County Parcel #: 42-00 891.000

Existing Use: _____ Acreage/Area of Site: _____

Proposed Use: _____ Lot # (if applicable): _____

Estimated Value of Project: 50,000 Total SF: _____

☐ New Construction ☐ Demolition

☐ Addition to Existing Structure ☒ Other: Sign / paint

ZONING & FLOOD ZONE DISTRICTS

Zoning District: ____ (R-1 R-1A R-2 R-3 B-1 B-2 B-3 I-1 I-2 P-1 MU)

Flood Zone: ____ (A AE AO AH X-SHADED X)

Description of Project: 10'6 Sign front of building and rear building 9'x4.5' sign on rear building, paint older buildings ash gray to match new 10,000 sq. ft building on the west of the property.

SECTION 3. DESIGN APPROVAL (COMMERCIAL SIGNAGE ONLY) * The application fee of $50.00 and complete plans to include the following information must be included with this application and provided in a PDF format.

___Signage Site Plan with all setback dimensions
___Rendering(s) of all signs with detail of dimensions, construction materials, graphics, illumination

	Sign Type (circle)			Dimensions							
Sign #1:	(Wall)	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy		10	X	6	=	60	sq. ft.		ft.
X Sign #2:	Sign Type (circle)			Dimensions							
	(Wall)	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy		10	X	6	=	60	sq. ft.		ft.
X Sign #3:	Sign Type (circle)			Dimensions							
	(Wall)	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy		9	X	4.5	=	40.5	sq. ft.		ft.
Sign #4:	Sign Type (circle)			Dimensions							
	Wall	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy			X		=		sq. ft.		ft.

REMOVED

REMOVED

PLEASE NOTE: Upon approval from the Planning Commission, your project may require Engineering Plan review and Storm Water/Erosion Control Plan review, associated fees will apply. Zoning and/or Building Permits may be required, associated permit fees will apply. All Contractors on your project must be registered with the City. Contact the Planning and Zoning Department with any questions: 419-433-5000 ext. 1302.

___ I hereby certify that I am the owner of record of the named property or that the proposed work is authorized by the owner of record and/or I have been authorized to make this application as an authorized agent, and we agree to conform to all applicable laws, regulations, and ordinances. All information contained within this application and supplemental materials is true and accurate to the best of my knowledge and belief.

Applicant Signature: _____ Date: 8-14-24

Owner Signature: _____ Date: _____

For Departmental Use Only:

Date of Submission: 8/14/24 Application Fee: 150.00 W PC Meeting Date: 9-18-24

SECTION 1. SITE PLAN APPROVAL *The application fee of $150.00 and a complete site plan with following information must be included with this application and provided in a PDF format:

____ Legal Survey or Plat
____ Dimensions of the Lot/Property Lines
____ Size and Location of the Existing Structure (if applicable)
____ Size and Location of the Proposed Structure
____ Front, Rear, and Side Setbacks of Existing Structure (if applicable)
____ Front, Rear, and Side Setbacks of Proposed Structure
____ Height of the Proposed Structure
____ Location of Sidewalks, Driveways, Drive Aisles, Parking Areas (with markings),
____ Fire Lanes Location of all utility connections and infrastructure
____ Plan for any curb cut/apron connection to public street

***A complete drainage plan must be included for projects that result in grading, paving, site modification, or new construction.**

SECTION 2. DESIGN APPROVAL (EXTERIOR, LANDSCAPING, LIGHTING, SIGNAGE) *
The application fee of $150.00 and complete plans to include the following information must be included with this application and provided in a PDF format.

☐ Photographs of Existing Conditions
☐ Elevations of Proposed Modifications
☐ Paint or Color Samples
☐ Exterior Building Material Samples
☐ Landscape Plan
☐ Exterior Lighting Plan
☐ Commercial Signage- Site Plan, Colored Elevations, Description of sign materials, Illumination specifications. Complete the table below:

	Sign Type (circle)			Dimensions							
Sign #1:	Wall	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy			X		=		sq. ft.		ft.
	Sign Type (circle)			**Dimensions**							
Sign #2:	Wall	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy			X		=		sq. ft.		ft.
	Sign Type (circle)			**Dimensions**							
Sign #3:	Wall	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy			X		=		sq. ft.		ft.
	Sign Type (circle)			**Dimensions**							
Sign #4:	Wall	Window	Other:	Height		Width		Display Area		Height (if ground)	
	Ground	Changeable Copy			X		=		sq. ft.		ft.

Preference: Add a lighted logo sign
Alternative: add a 3D/standoff sign without lighting

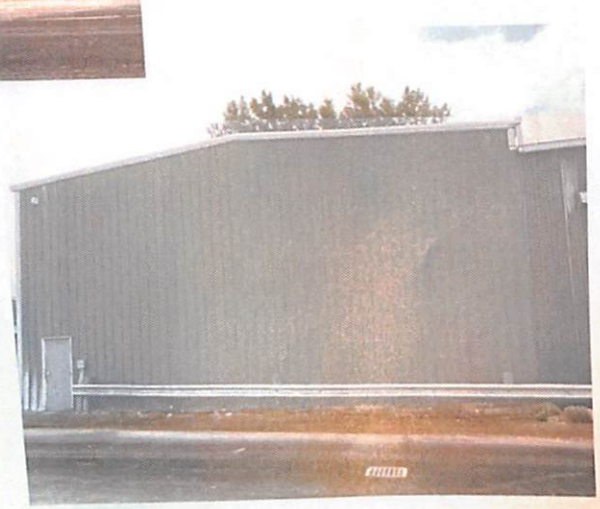
Paint the outside of the trailer RHIM blue, replace the awning

Replace all of the blinds - use either bamboo/wood-type horizontal blinds or vertical blinds

Paint the tuyere building gray - all one shade, do not have the squares that are currently white stay white

Repaint the guard rails - yellow - currently scuffed

Doors and trim should be RHIM Blue



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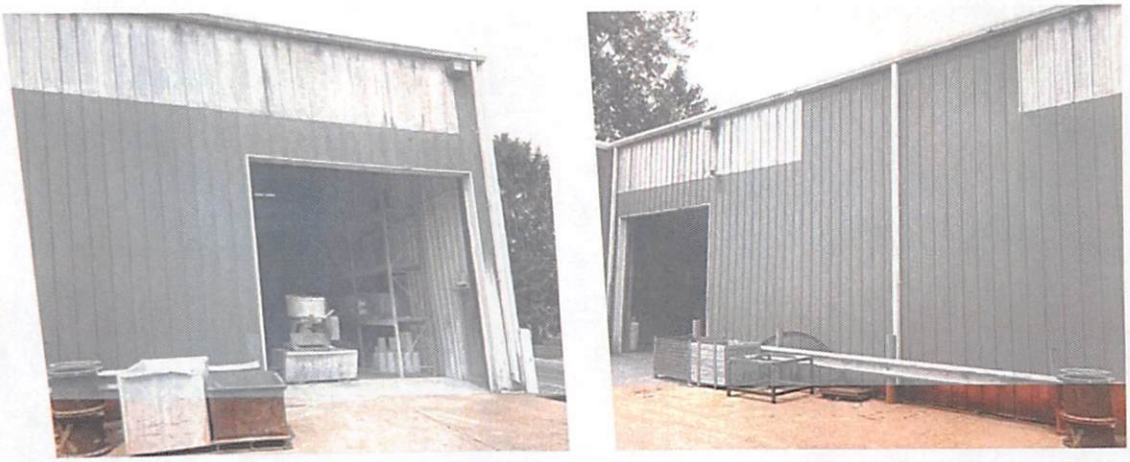

We should add directional signs throughout the site to help truck drivers navigate

REMOVED FROM THE APPLICATION