NEW PHOTOVOLTAIC PITCHED ROOF MOUNTED SYSTEM - 15.600 KW DC/11.310 KW AC

144 SE PATIENCE PL, LAKE CITY, FL 32025

NEW PV SYSTEM SPECIFICATIONS

SYSTEM SIZE:	DC SIZE: 15.600 KW DC-(STC)
	AC SIZE: 11.310 KW AC
MODULE:	(39) HYUNDAI HIS-S400YH(BK)
INVERTER:	(39) ENPHASE IQ8PLUS-72-M-US

APPLICABLE CODES

ALL WORK SHALL CONFORM TO THE FOLLOWING CODES:
2023 FLORIDA BUILDING CODE (FBC), 8TH ED
2023 FLORIDA RESIDENTIAL CODE (FRC), 8TH ED
2023 FLORIDA FIRE PREVENTION CODE, 8TH ED
2020 NATIONAL ELECTRICAL CODE (NEC)
AS ADOPTED BY COUNTY OF COLUMBIA

DESIGN CRITERIA

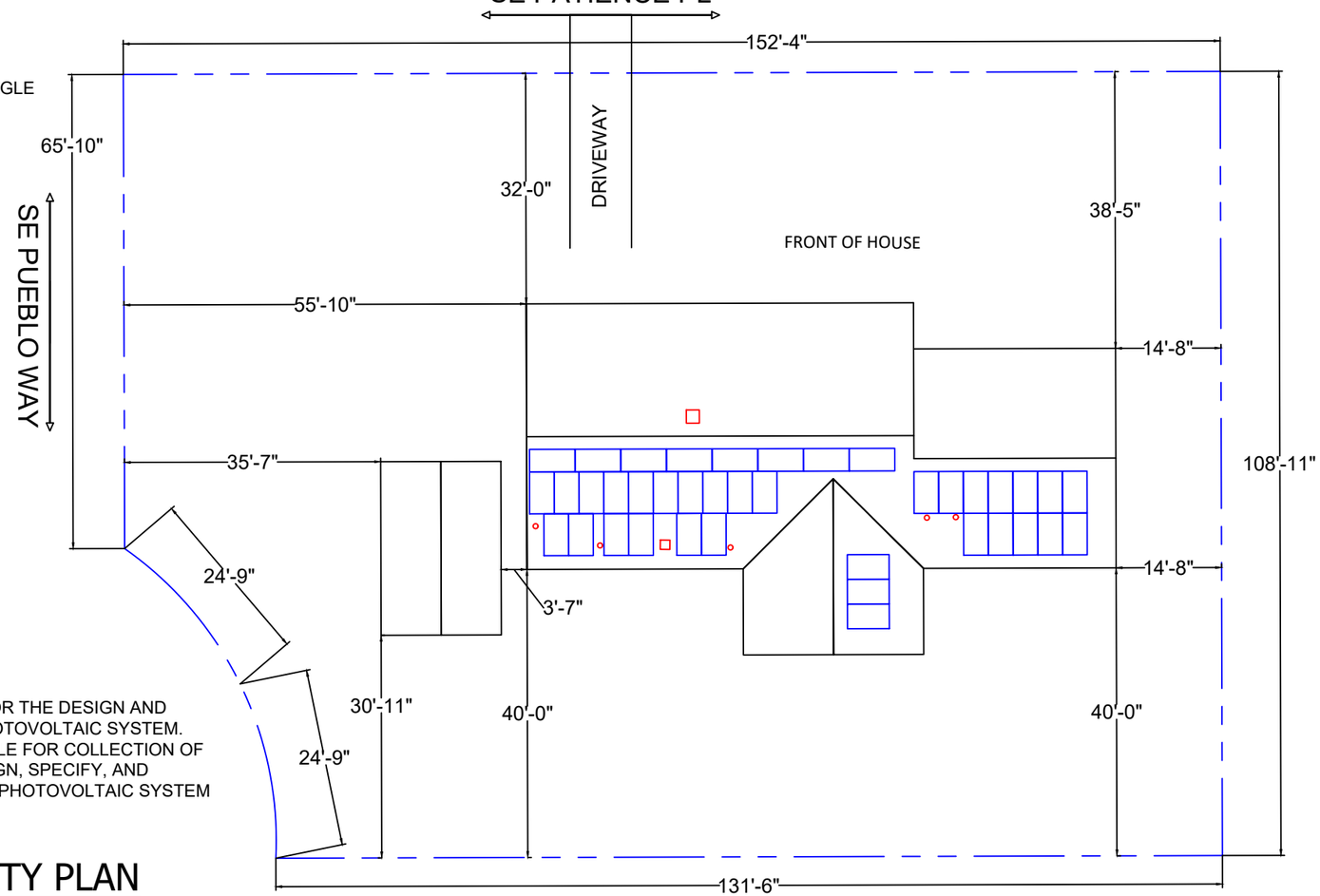
ROOF SURFACE TYPE: COMPOSITE SHINGLE
ROOF FRAMING: 2"X4" TRUSS @ 24" OC
BUILDING STORY: ONE STORY
GROUND SNOW LOAD: 0 PSF
WIND SPEED: 120 MPH
WIND EXPOSURE: C
RISK CATEGORY: II

PROJECT NOTES

1.1.1 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE RELEVANT YEAR OF THE NATIONAL ELECTRIC CODE (NEC), ALL MANUFACTURER'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
1.1.2 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND THE PV SYSTEM MUST BE INSPECTED PRIOR TO OPERATION
1.1.3 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC AND OTHER GOVERNING CODES
1.1.4 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH 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.

SCOPE OF WORK

1.2.1 CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM. THE CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTION OF EXISTING ONSITE CONDITIONS TO DESIGN, SPECIFY, AND INSTALL THE PITCHED ROOF-MOUNTED PHOTOVOLTAIC SYSTEM DETAILED IN THIS DOCUMENT



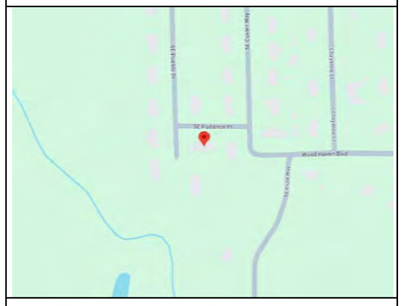
1 PROPERTY PLAN
PV-01
SCALE:1" = 20'-0"

SHEET INDEX

LEGEND

- PROPERTY LINE
- FENCE LINE

VICINITY MAP



SATELLITE MAP

CONTRACTOR

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PHONE - (407)440-2066

Godwin Engineering & Design, LLC
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D. CHAD GODWIN LICENSE No. 81360 STATE OF FLORIDA PROFESSIONAL ENGINEER

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY DONNIE CHAD GODWIN ON THE DATE ADJACENT TO THE SEAL. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

Digitally signed by Donnie Godwin
Date: 2025.06.10 14:56:27 -05'00'

PROJECT NAME & ADDRESS

ISMAEL MORENO
144 SE PATIENCE PL,
LAKE CITY, FL 32025

APN #: 094S1708300094
AHJ: COUNTY OF COLUMBIA
UTILITY: CLAY ELECTRIC COOPERATIVE

SYSTEM DETAILS

15.600 KW DC-(STC) / 11.310 KW AC
(39) HYUNDAI HIS-S400YH(BK)
(39) ENPHASE IQ8PLUS-72-M-US

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

COVER PAGE

DRAWN DATE	6/3/2025
DRAWN BY	PP

SHEET NUMBER

PV-01

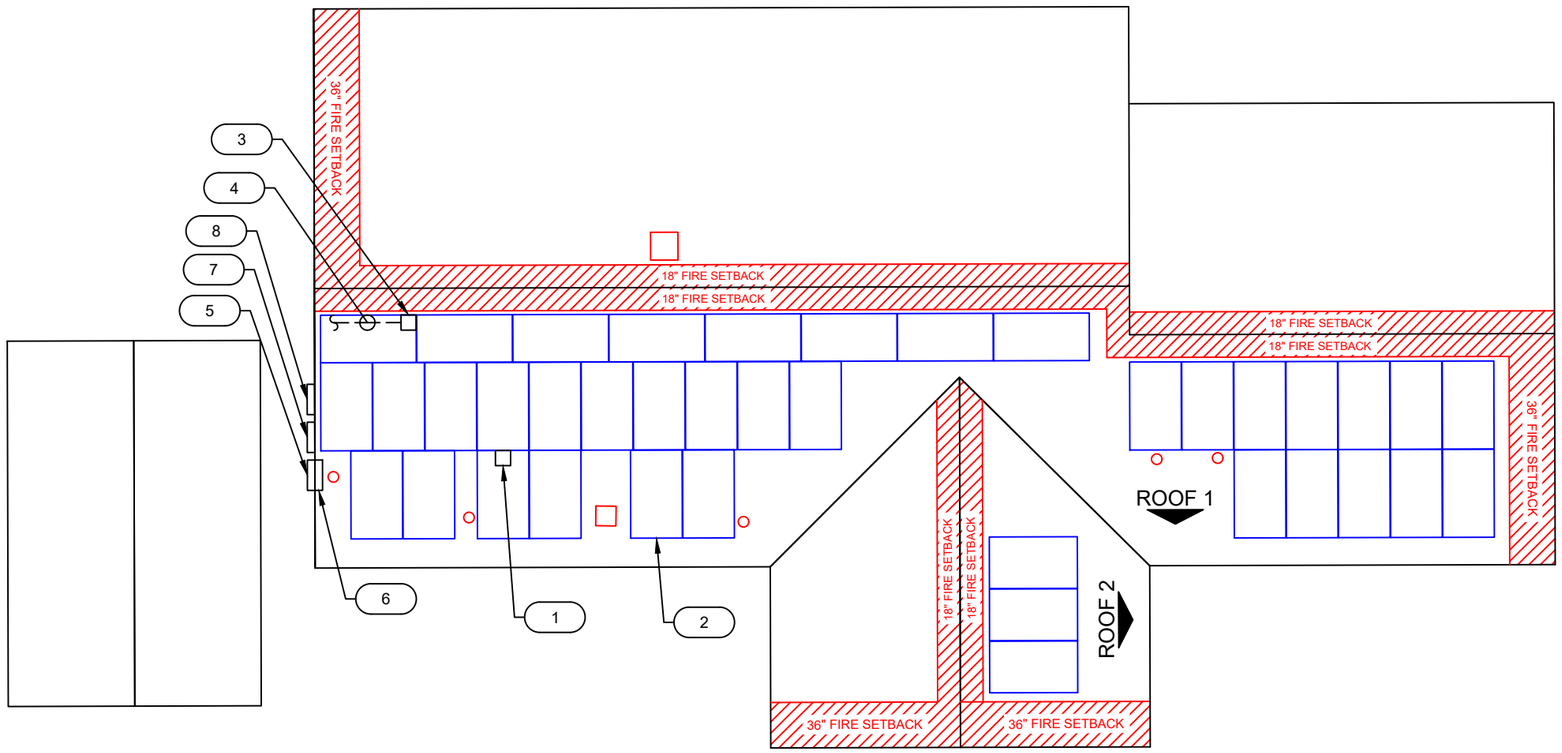
NOTES:

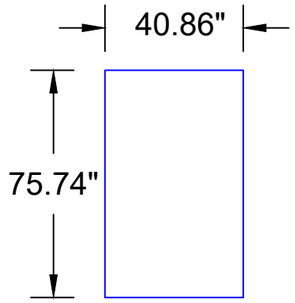
1. ROOF ACCESS POINT SHALL NOT BE LOCATED IN AREAS THAT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

2. STRUCTURES, PATIO COVERS, AND/OR ADDITIONS BUILT WITHOUT PERMITS TO BE RESOLVED BY A SEPARATE PERMIT.

PLAN VIEW TOTAL ROOF AREA:	3419.99 FT²
TOTAL PV ARRAY AREA:	838.16 FT²
TOTAL % OF ROOF COVERED BY PV:	24.51%

FRONT OF HOUSE





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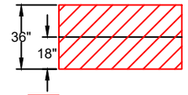
1 PV-02 SITE PLAN

SCALE:1" = 10'-0"

LEGEND



FIRE SETBACKS

= MECHANICAL VENT

= FLUE / PLUMBING VENT

1 MICROINVERTER (1 PER MODULE)

2 PV MODULES

3 JUNCTION BOX; SIZE DETERMINED IN FIELD

4 CONDUIT RUN; SURFACE MOUNTED (ACTUAL CONDUIT RUNS TO BE DETERMINED IN FIELD)

5 UTILITY METER (OVERHEAD SERVICE) METER #: 154589638

6 MAIN SERVICE PANEL

7 AC DISCONNECT

8 ENPHASE IQ COMBINER BOX

ROOF 1	SLOPE	- 23°
	AZIMUTH	- 180°
	MODULE QTY	- 36
	TRUSS	- 2"X4" @ 24" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE
ROOF 2	SLOPE	- 17°
	AZIMUTH	- 90°
	MODULE QTY	- 3
	TRUSS	- 2"X4" @ 24" O.C.
	SURFACE TYPE	- COMPOSITE SHINGLE

CONTRACTOR

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SITE PLAN

DRAWN DATE	6/3/2025
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PV-02

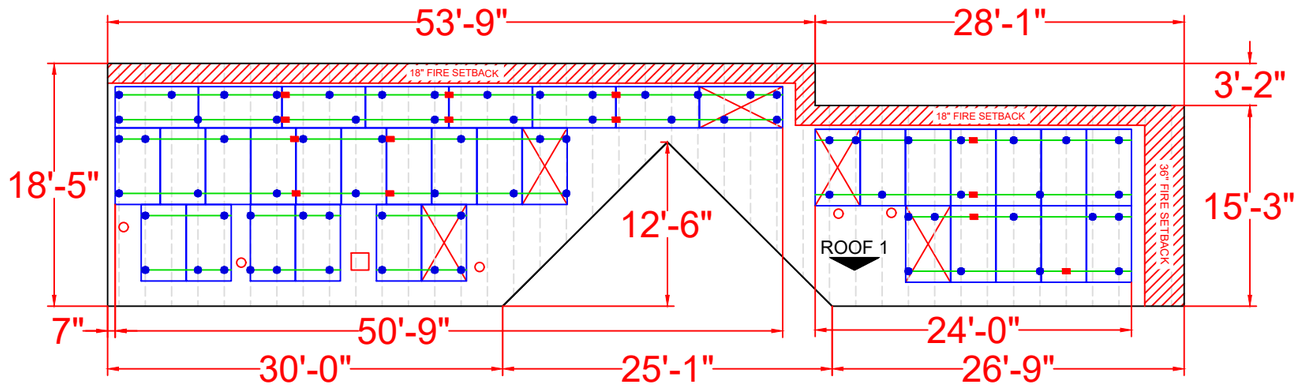
DISTRIBUTED LOAD CALCULATIONS	
MODULE	HYUNDAI HIS-S400YH(BK)
MODULE WEIGHT	46.52 LBS
MODULE DIMENSIONS (L" x W")	75.74" x 40.86"
TOTAL QTY. OF MODULES	39
TOTAL WEIGHT OF MODULES	1814.3 LBS
TYPE OF RACKING	UNIRAC 185RLM1
TYPE OF ATTACHMENT	UNIRAC SHBUTYLM2
DISTRIBUTED WEIGHT OF RACKING	0.5 PSF
TOTAL WEIGHT OF ARRAY	2233.4 LBS
AREA OF MODULE	21.5 SQFT.
TOTAL ARRAY AREA	838.2 SQFT.
DISTRIBUTED LOAD	2.7 PSF

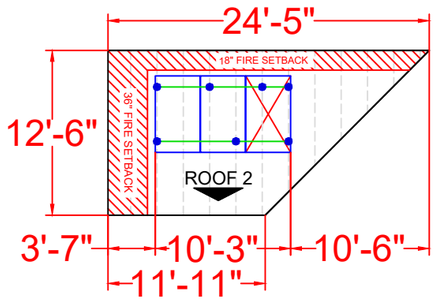
NOTE:

1. CONTRACTOR/INSTALLER TO VERIFY COMPATIBILITY OF ANY BRANDS OR PRODUCTS SUBSTITUTED OR USED AS ALTERNATES WITHIN ANY BRAND-SPECIFIC SYSTEMS. CONTRACTOR SHALL SUPPLY AND PRESENT CERTIFICATES OF COMPATIBILITY TO THE BUILDING OFFICIAL UPON INSPECTION AS NEEDED.
2. REFER TO PV MODULE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR RAIL SPACING SPECIFICATIONS

Rafter Spans	Zone 1	Zone 2	Zone 3
Exposed	48"	48"	24"
Non-Exposed	72"	48"	48"
Max Cantilever	24"	16"	16"

Max Cantilever = Max Span * $(\frac{1}{3})$





Exposed Spacing

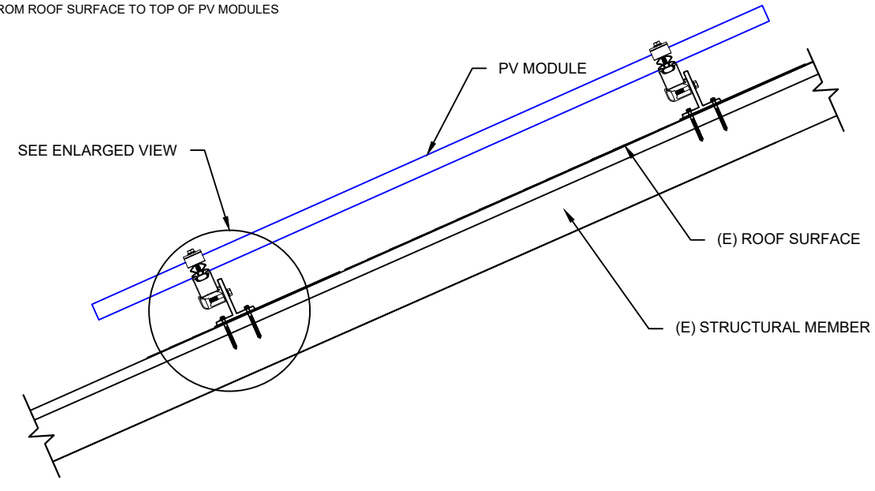
Non-Exposed Spacing

Plans satisfy zones FBC-1510.7.1
Install will be done to Manufacturer Spec

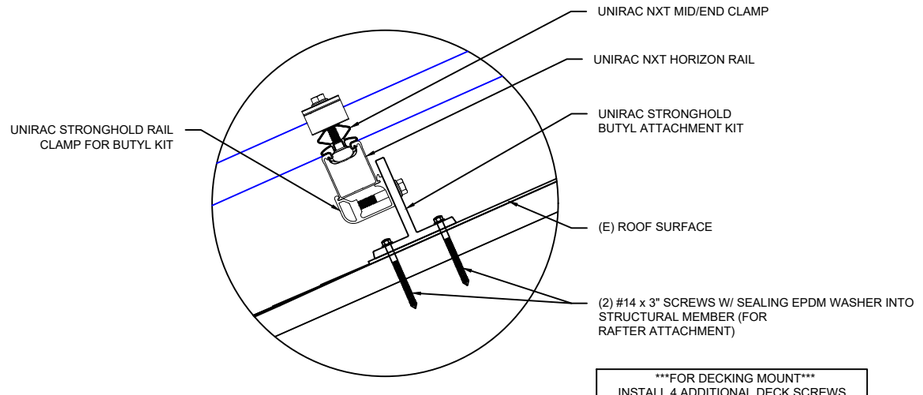
LEGEND

- ATTACHMENT POINTS
- RAIL
- STRUCTURAL MEMBER
- SPLICE BAR

NOTE: 6" MAXIMUM DISTANCE FROM ROOF SURFACE TO TOP OF PV MODULES



2 PV-03 ATTACHMENT DETAIL
Scale: NTS



FOR DECKING MOUNT
INSTALL 4 ADDITIONAL DECK SCREWS (PROVIDED BY UNIRAC) ON THE REMAINING SCREW HOLES ON THE ATTACHMENT

3 PV-03 ENLARGED VIEW
Scale: NTS

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(39) HYUNDAI HIS-S400YH(BK)
(39) ENPHASE IQ8PLUS-72-M-US

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
ATTACHMENT PLAN & DETAILS

DRAWN DATE	6/3/2025
DRAWN BY	PP

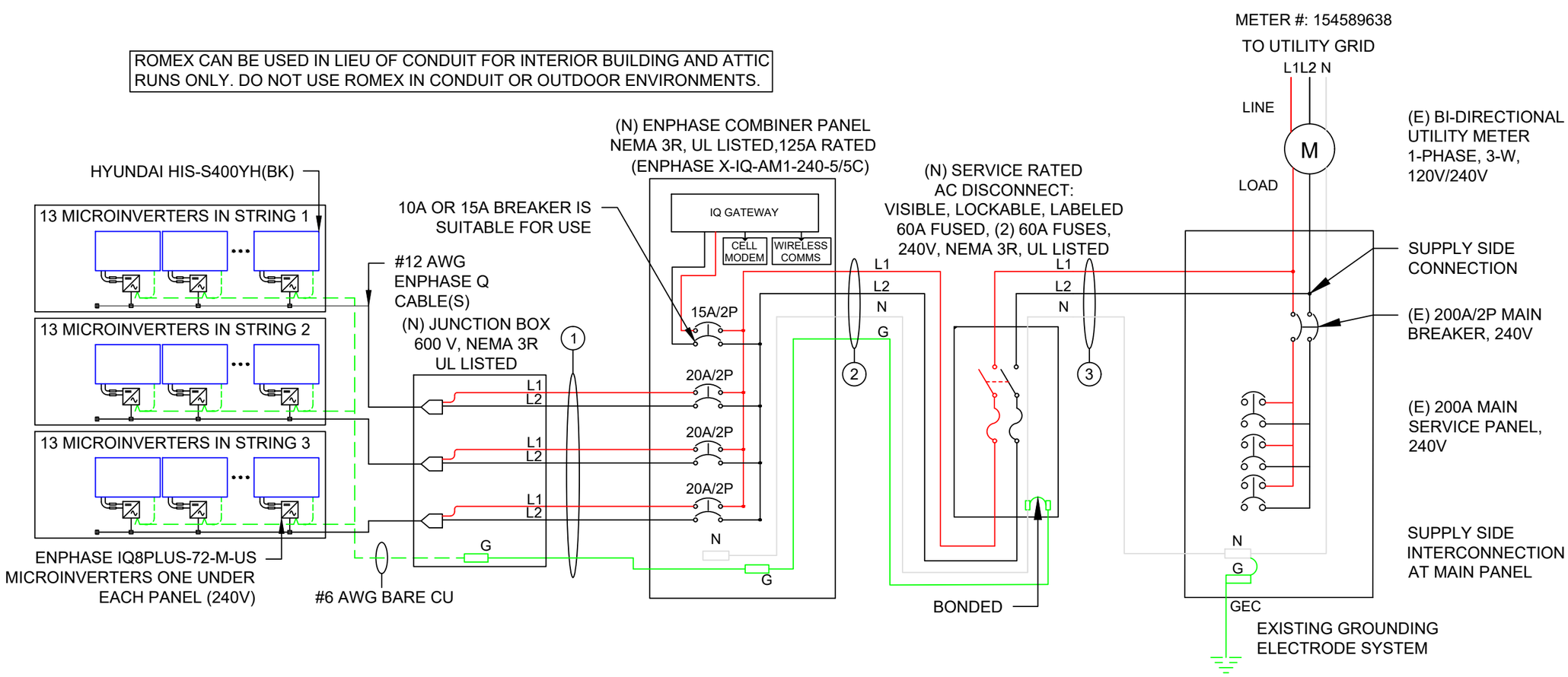
SHEET NUMBER
PV-03

MICROINVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8PLUS-72-M-US
INPUT POWER RANGE	235–440W
MIN/MAX START VOLTAGE	22V/58V
NOMINAL AC VOLTAGE	240V
MAX CONT. OUTPUT CURRENT	1.21A
MAX CONT. OUTPUT POWER	290W
MAX MODULES PER STRING	13 (13 MICROINVERTERS)

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	HYUNDAI HIS-S400YH(BK)
VMP	37.7 V
IMP	10.61 A
VOC	45.3 V
ISC	11.25 A
TEMP. COEFF. VOC	-0.268 %/°C

AMBIENT TEMPERATURE SPECIFICATIONS	
RECORD LOW TEMP	-5
AMBIENT TEMP (HIGH TEMP 2% AVG.)	34
MINIMUM CONDUIT HEIGHT ABOVE ROOF SURFACE	7/8"

ROMEX CAN BE USED IN LIEU OF CONDUIT FOR INTERIOR BUILDING AND ATTIC RUNS ONLY. DO NOT USE ROMEX IN CONDUIT OR OUTDOOR ENVIRONMENTS.



VISIBLE, LOCKABLE & LABELED AC DISCONNECT LOCATED WITHIN 5FT OF THE UTILITY METER

DESCRIPTION	FORMULA	RESULT
PV OVERCURRENT PROTECTION NEC 690.9(B)	TOTAL INVERTER OUTPUT CURRENT x 1.25 = (39 x 1.21)A x 1.25	58.99A (SELECTED OCPD = 60A)

WIRE ID	EXPECTED WIRE TEMP (°C)	TEMP DERATE (90 °C)	QTY OF CURRENT CARRYING CONDUCTORS	CONDUIT FILL DERATE	MINIMUM CONDUIT SIZE (TBD ON SITE)	WIRE GAUGE & TYPE	CONDUCTOR AMPACITY @ 90°C (A)	CONDUCTOR AMPACITY @ 75°C (A)	REQUIRED CIRCUIT CONDUCTOR AMPACITY (A)	ADJUSTED CONDUCTOR AMPACITY @ 90 °C (A)	NEUTRAL CONDUCTOR SIZE & TYPE	GROUND WIRE SIZE & TYPE
1	34	0.96	6	0.8	3/4"	#10 THWN-2	40	35	19.6625	30.72	NONE	#8 THWN-2
2	34	0.96	2	1	3/4"	#6 THWN-2	75	65	58.9875	72	#6 THWN-2	#8 THWN-2
3	34	0.96	2	1	3/4"	#6 THWN-2	75	65	58.9875	72	#6 THWN-2	NONE

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ELECTRICAL DIAGRAM

DRAWN DATE	6/3/2025
DRAWN BY	PP

SHEET NUMBER
PV-04

GENERAL NOTES

SITE NOTES
2.1.1 A LADDER WILL BE IN PLACE FOR INSPECTION IN ACCORDANCE WITH OSHA REGULATIONS.
2.1.2 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
2.1.3 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
2.1.4 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED IN ACCORDANCE WITH SECTION NEC 110
2.1.5 ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING OR STRUCTURE.

EQUIPMENT LOCATIONS
2.2.1 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS IN ACCORDANCE WITH NEC 110.26.
2.2.2 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY 2020 NATIONAL ELECTRICAL CODE (NEC).
2.2.3 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES IN ACCORDANCE WITH NEC 690
2.2.4 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL IN ACCORDANCE WITH NEC APPLICABLE CODES.
2.2.5 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

STRUCTURAL NOTES
2.3.1 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED IN ACCORDANCE WITH THE CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, IN ACCORDANCE WITH RAIL MANUFACTURER'S INSTALLATION PRACTICES.
2.3.2 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.
2.3.3 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.
2.3.4 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER OR PROFESSIONAL ENGINEERING GUIDANCE.
2.3.5 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

WIRING & CONDUIT NOTES
2.4.1 ALL CONDUIT AND WIRE WILL BE LISTED AND APPROVED FOR THEIR PURPOSE. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING.
2.4.2 CONDUCTORS SIZED IN ACCORDANCE WITH THE NEC
2.4.3 AC CONDUCTORS TO BE COLORED OR MARKED PER NEC
2.4.4 LISTED OR LABELED EQUIPMENT SHALL BE INSTALLED AND USED IN ACCORDANCE WITH ANY INSTRUCTIONS INCLUDED IN THE LISTING OR LABELING PER NEC

GROUNDING NOTES
2.5.1 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.
2.5.2 PV EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH NEC 690 AND NEC TABLE 250.122.
2.5.3 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORDANCE WITH NEC 250.
2.5.4 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH NEC 690 AND INVERTER MANUFACTURER'S INSTALLATION PRACTICES
2.5.5 EACH MODULE WILL BE GROUNDED AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.
2.5.6 THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.
2.5.7 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER PER NEC 250
2.5.8 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690 AND NEC 250. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED IN ACCORDANCE WITH NEC 250, NEC 690 AND THE AHJ.
2.5.9 GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690 TO REDUCE FIRE HAZARDS

DISCONNECTION AND OVERCURRENT PROTECTION NOTES
2.6.1 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING ENERGIZED ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS).
2.6.2 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
2.6.3 PV SYSTEM CIRCUITS INSTALLED ON OR IN HABITABLE BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690
2.6.4 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690 AND 240.
2.6.5 INVERTER ON-GRID BRANCHES SHALL BE CONNECTED TO A SINGLE BREAKER OR GROUPED FUSE DISCONNECT(S) IN ACCORDANCE WITH NEC 110.
2.6.6 IF REQUIRED BY THE AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION IN ACCORDANCE WITH NEC 690.11 AND UL1699B.

INTERCONNECTION NOTES
2.7.1 LOAD SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH NEC 705.
2.7.2 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120 PERCENT OF BUSBAR RATING PER NEC 705.
2.7.3 THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD IN ACCORDANCE WITH NEC 705.
2.7.4 AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT PROTECTION DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE MAIN OVERCURRENT PROTECTION DEVICE MAY BE EXCLUDED IN ACCORDANCE WITH NEC 705.
2.7.5 FEEDER TAP INTERCONNECTION (LOAD SIDE) IN ACCORDANCE WITH NEC 705.
2.7.6 SUPPLY SIDE TAP INTERCONNECTION IN ACCORDANCE WITH TO NEC 705 WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.
2.7.7 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING PER NEC 705.

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NOTES

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DRAWN BY	PP

SHEET NUMBER
PV-05

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

LABEL LOCATION: COMBINER PANEL, AC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 706.15(C)(4), NEC 690.13(B)

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL LOCATION: COMBINER PANEL(S), MAIN SERVICE DISCONNECT
PER CODE: NEC 110.27(C), OSHA 1910.145(f)(7)

PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION: DC CONDUIT/RACEWAYS
PER CODE: NEC 690.31(D)(2)

SOLAR PV DC CIRCUIT

LABEL LOCATION: DC CONDUIT/RACEWAYS
PER CODE: NEC 690.31(D)(2)

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT: **47.19** A
NOMINAL OPERATING AC VOLTAGE: 240 V

LABEL LOCATION: AC DISCONNECT/POINT OF INTERCONNECTION
PER CODE: NEC 690.54

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION: MAIN SERVICE DISCONNECT, PRODUCTION/NET METER
PER CODE: NEC 690.59, 705.12(C)

PV SYSTEM

DISCONNECT

LABEL LOCATION: AC DISCONNECT
PER CODE: NEC 690.13(B)

⚠ WARNING

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

LABEL LOCATION: AC DISCONNECT
PER CODE: NEC 705.12(B)(3)(3)

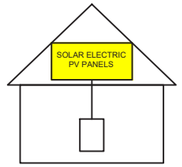
⚠ WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

LABEL LOCATION: POINT OF INTERCONNECTION
PER CODE: 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 LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 690.56(C)

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

LABEL LOCATION: MAIN SERVICE DISCONNECT, UTILITY METER
PER CODE: NEC 690.13(B)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION: RSD INITIATION DEVICE, AC DISCONNECT
PER CODE: NEC 690.56(C)(2)

⚠ CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 705.12(D), NEC 690.59

DO NOT DISCONNECT UNDER LOAD

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 690.15(B) & NEC 690.33(D)(2)

MAXIMUM DC VOLTAGE

OF PV SYSTEM

LABEL LOCATION: DC DISCONNECT/INVERTER/PV DIST. EQUIPMENT
PER CODE: NEC 690.53

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

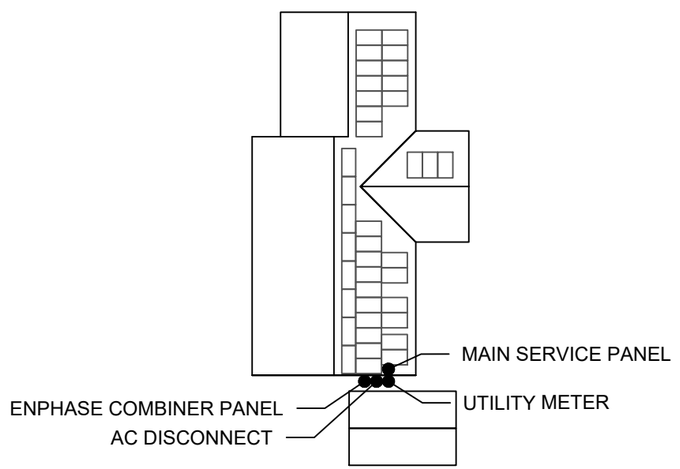
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL LOCATION: DC DISCONNECT
PER CODE: NEC 690.13(B)

CAUTION

MULTIPLE SOURCES OF POWER.
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN:

ADDRESS: 144 SE PATIENCE PL, LAKE CITY, FL 32025



CONTRACTOR

ECO HOME EFFICIENCY GROUP LLC
6236 KINGSPOINTE PARKWAY
SUITE 7, ORLANDO, FL 32819
PHONE - (407)440-2066

Godwin Engineering & Design, LLC
8378 Foxtail Loop Pensacola, FL 32526
D. Chad Godwin, PE Chad@godwineng.com

D. CHAD GODWIN LICENSE NO 81360 STATE OF FLORIDA PROFESSIONAL ENGINEER

PROJECT NAME & ADDRESS
ISMAEL MORENO
144 SE PATIENCE PL,
LAKE CITY, FL 32025

APN #: 094S1708300094
AHJ: COUNTY OF COLUMBIA
UTILITY: CLAY ELECTRIC COOPERATIVE

SYSTEM DETAILS
15.600 KW DC-(STC) / 11.310 KW AC
(39) HYUNDAI HIS-S400YH(BK)
(39) ENPHASE IQ8PLUS-72-M-US

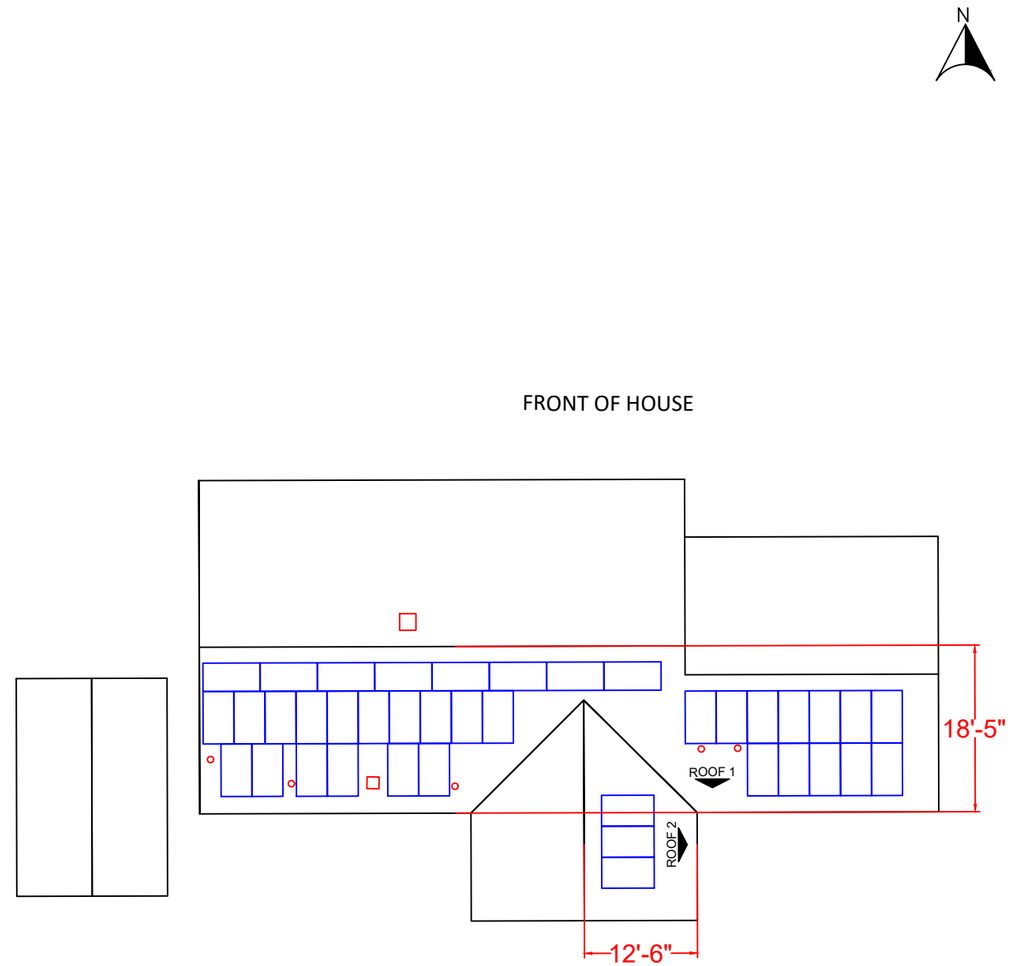
REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
WARNING LABELS

DRAWN DATE	6/3/2025
DRAWN BY	PP

SHEET NUMBER
PV-06



**DIMENSIONS ARE 2D (FLAT)

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REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
INSTALLATION RESOURCE

DRAWN DATE	6/3/2025
DRAWN BY	PP

SHEET NUMBER
PV-07

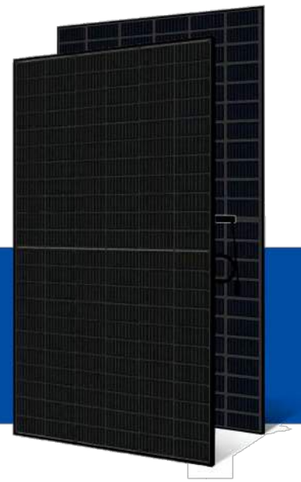
HYUNDAI SOLAR MODULE

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					

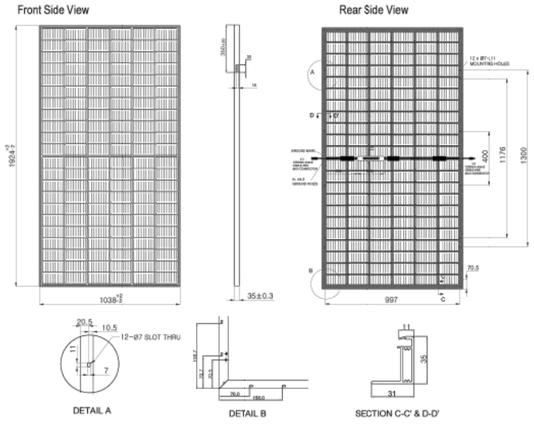
*All data at STC (Measurement tolerances Pmpp ±3%; Isc ; Voc ±3%). Above data may be changed without prior notice.

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)

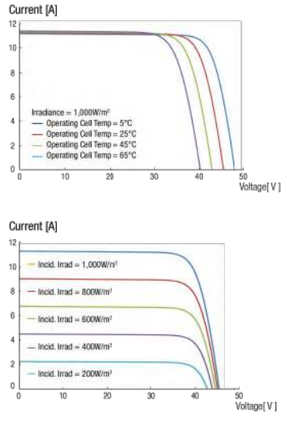


Installation Safety Guide

- 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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SYSTEM DETAILS

15.600 KW DC-(STC) / 11.310 KW AC
(39) HYUNDAI HIS-S400YH(BK)
(39) ENPHASE IQ8PLUS-72-M-US

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE

RESOURCE DOCUMENTS

DRAWN DATE	6/3/2025
DRAWN BY	PP

SHEET NUMBER

R-01

ENPHASE.

NORTH AMERICA | DATA SHEET

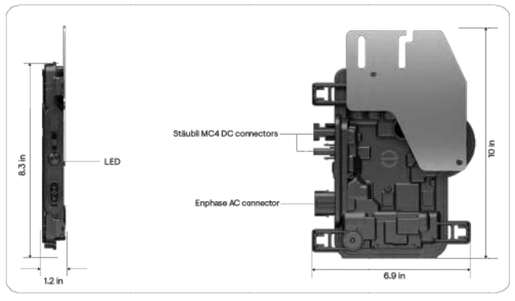
IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters[1,2,3] are the industry's first microgrid-forming[4], software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently.

Enphase 25 year limited warranty

UL CERTIFIED

Key specifications	IQ8-60-M-US	IQ8PLUS-72-M-US
Peak output power	245 VA	300 VA
Nominal grid voltage (L-L)	240 V, split-phase (L-L), 180°	
Nominal frequency	60 Hz	60 Hz
CEC weighted efficiency	97%	97%
Maximum input DC voltage	50 V	60 V
MPPT voltage range	27–37 V	27–45 V
Maximum module I_{SC}	20 A	20 A
Ambient temperature range	−40°C to 60°C (−40°F to 140°F)	



[1] IQ8 Series Microinverters can be added to existing IQ7 systems on the same IQ Gateway only in the following grid-tied configurations: Solar Only or Solar + Battery (IQ Battery 3T/10T and IQ Battery 5P) without backup.
[2] IQ7 Series Microinverters cannot be added to a site with existing IQ8 Series Microinverters on the same gateway. Mixed system of IQ7 and IQ8 will not support IQ8-specific PCS features and grid-forming capabilities.
[3] IQ Microinverters ship with default settings that meet North America's IEEE 1547 interconnection standard requirements. Region-specific adjustments may be requested by an Authority Having Jurisdiction (AHJ) or utility representative, according to the IEEE 1547 interconnection standard. Use an IQ Gateway to make these changes during installation.
[4] Meets UL 1741 only when installed with IQ System Controller 2 or 3.
[5] IQ8 and IQ8+ support split-phase, 240 V installations only.

DSH-00206-4.0-EN-2024-12-10

Simple

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

Reliable

- Produce power even when the grid is down
- More than one million cumulative hours of testing
- Industry-leading limited warranty of up to 25 years
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Compliant with the latest advanced grid support[5]
- 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.)

Input data (DC)	Units	IQ8-60-M-US	IQ8PLUS-72-M-US
Commonly used module pairings[6]	W	235–350	235–440
Module compatibility	–	To meet compatibility, PV modules must be within maximum input DC voltage and maximum module I_{sc}. Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator.	
MPPT voltage range	V	27–37	27–45
Operating range	V	16–48	16–58
Minimum/Maximum start voltage	V	22/48	22/58
Maximum input DC voltage	V	50	60
Maximum continuous input DC current	A	10	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	–	Ungrounded array; no additional DC side protection required; AC side protection requires maximum 20 A per branch circuit.	

Output data (AC)	Units	IQ8-60-M-US	IQ8PLUS-72-M-US
Peak output power	VA	245	300
Maximum continuous output power	VA	240	290
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	
Minimum and Maximum grid voltage[7]	V	211-264	
Maximum continuous output current	A	1.0	1.21
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[8]	–	16	13
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	%	97.7	
CEC weighted efficiency	%	97	
Nighttime power consumption	mW	23	25

Mechanical data	IQ8-60-M-US	IQ8PLUS-72-M-US
Ambient temperature range	−40°C to 60°C (−40°F to 140°F)	

[6] No enforced DC/AC ratio.
[7] Nominal voltage range can be extended beyond nominal if required by the utility.
[8] Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

DSH-00206-4.0-EN-2024-12-10

CONTRACTOR

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APN #: 094S1708300094
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15.600 KW DC-(STC) / 11.310 KW AC
(39) HYUNDAI HIS-S400YH(BK)
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REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
RESOURCE DOCUMENTS

DRAWN DATE	6/3/2025
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SHEET NUMBER
R-02

ENPHASE.

DATA SHEET

X-IQ-AM1-240-5-HDK
X-IQ-AM1-240-5C-HDK
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, IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provide a complete grid-agnostic Enphase Energy System.

IQ Series Microinverters
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) 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

NOM

UL CERTIFIED SAFETY US-CA SÛRETÉ US-CA E341166

5-year limited warranty

*For country-specific warranty information, see the https://enphase.com/installers/resources/warranty page.

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 entries
- Supports up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV branch circuits
- Factory installed hold-down kit
- Bluetooth-based Wi-Fi provisioning for easy Wi-Fi setup

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- 5-year limited warranty
- 2-year labor reimbursement program coverage included for IQ Combiner SKUs[1]
- UL1741 Listed

IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5/ X-IQ-AM1-240-5-HDK)	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-AM1-240-5-HDK includes a factory installed hold-down kit compatible with all the circuit breakers mentioned in the **Accessories and Replacement Parts** section.
IQ Combiner 5C (X-IQ-AM1-240-5C / X-IQ-AM1-240-5C-HDK)	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. IQ-AM1-240-5C-HDK includes a factory installed hold-down kit compatible with all the circuit breakers mentioned in the **Accessories and Replacement Parts** section.
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 Energy System
Busbar	80 A busbar with support for one IQ Gateway breaker and four 20 A breakers for installing IQ Series Microinverters and IQ Battery 5P
IQ Gateway breaker	Circuit breaker, 2-pole, 10 A/15 A
Production CT	Pre-wired 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 the COMMS-KIT-2 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 BR2XX, Siemens Q2XX, and GE/ABB THQL21XX Series circuit breakers (XX represents 10, 15, 20, 30, 40, 50, or 60). Also supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with the 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 the "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 IQ Combiner 5/5C
X-IQ-NA-HD-125A	Hold-down kit compatible with Eaton BR-B Series circuit breakers (with screws). Not required for X-IQ-AM1-240-5-HDK/X-IQ-AM1-240-5C-HDK.
XA-COMMS2-PCBA-5	Replacement COMMS-KIT-2 printed circuit board (PCB) for IQ Combiner 5/5C
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage and frequency	120/240 VAC or 120/208 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, Siemens Q, or GE/ABB THQL 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

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

IQC-5-5C-DSH-00007-6.0-EN-US-2024-09-30

CONTRACTOR

ECOHOME

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REVISIONS

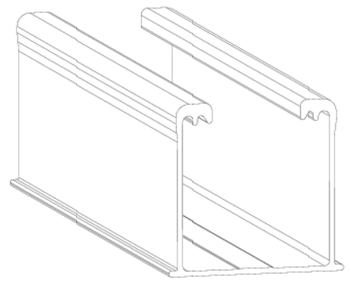
REV	DESCRIPTION	DATE

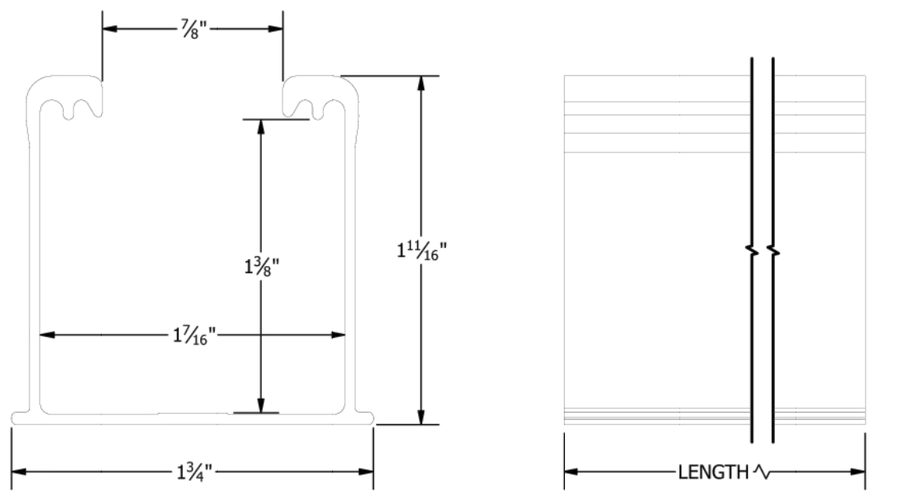
SHEET TITLE
RESOURCE DOCUMENTS

DRAWN DATE	6/3/2025
DRAWN BY	PP

SHEET NUMBER
R-03

PART # TABLE		
P/N	DESCRIPTION	LENGTH
084RLM1	NXT UMOUNT RAIL 84" MILL	84"
084RLD1	NXT UMOUNT RAIL 84" DARK	84"
168RLM1	NXT UMOUNT RAIL 168" MILL	168"
168RLD1	NXT UMOUNT RAIL 168" DARK	168"
208RLM1	NXT UMOUNT RAIL 208" MILL	208"
208RLD1	NXT UMOUNT RAIL 208" DARK	208"
246RLM1	NXT UMOUNT RAIL 246" MILL	246"
246RLD1	NXT UMOUNT RAIL 246" DARK	246"
171RLM1	NXT UMOUNT RAIL 171" MILL	171.50"
171RLD1	NXT UMOUNT RAIL 171" DARK	171.50"
096RLM1	NXT UMOUNT RAIL 96" MILL	96"
096RLD1	NXT UMOUNT RAIL 96" DARK	96"
185RLM1	NXT UMOUNT RAIL 185" MILL	185"
185RLD1	NXT UMOUNT RAIL 185" DARK	185"





UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	NXT UMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	RAIL
REVISION DATE:	2/29/2024

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS
LEGAL NOTICE

NU-P01
SHEET

CONTRACTOR

ECO HOME EFFICIENCY GROUP LLC
6236 KINGSPOINTE PARKWAY
SUITE 7, ORLANDO, FL 32819
PHONE - (407)440-2066

PROJECT NAME & ADDRESS
ISMAEL MORENO
144 SE PATIENCE PL,
LAKE CITY, FL 32025

APN #: 094S1708300094
AHJ: COUNTY OF COLUMBIA
UTILITY: CLAY ELECTRIC COOPERATIVE

SYSTEM DETAILS
15.600 KW DC-(STC) / 11.310 KW AC
(39) HYUNDAI HIS-S400YH(BK)
(39) ENPHASE IQ8PLUS-72-M-US

REVISIONS

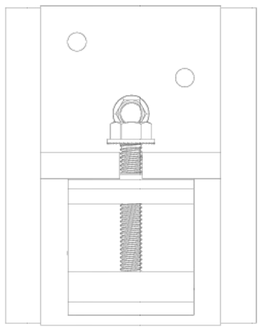
REV	DESCRIPTION	DATE

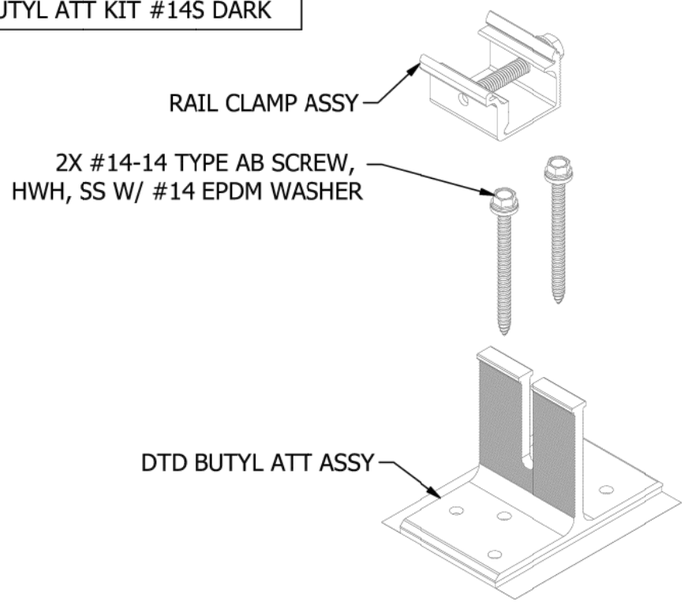
SHEET TITLE
RESOURCE DOCUMENTS

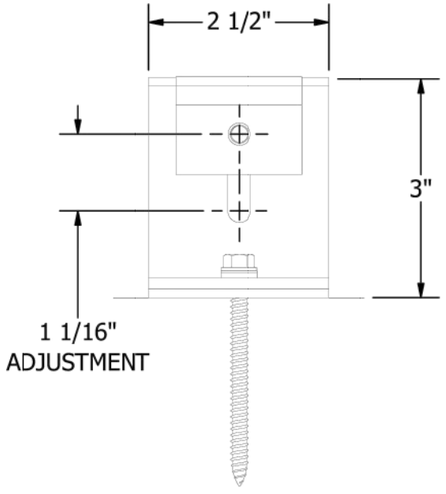
DRAWN DATE	6/3/2025
DRAWN BY	PP

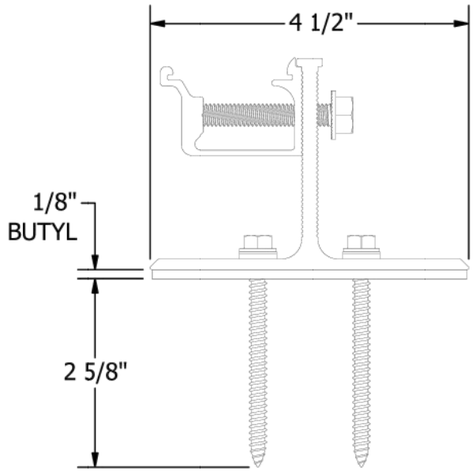
SHEET NUMBER
R-04

PART # TABLE	
P/N	DESCRIPTION
SHBUTYLM2	STRONGHOLD BUTYL ATT KIT #14S MILL
SHBUTYLD2	STRONGHOLD BUTYL ATT KIT #14S DARK









UNIRAC
1411 BROADWAY BLVD. NE
ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

PRODUCT LINE:	NXT UMOUNT
DRAWING TYPE:	PARTS
DESCRIPTION:	SH BUTYL ATTACHMENT
REVISION DATE:	7/14/2023

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS
LEGAL NOTICE

NU-A10-1
SHEET

CONTRACTOR

ECO HOME EFFICIENCY GROUP LLC
6236 KINGSPOINTE PARKWAY
SUITE 7, ORLANDO, FL 32819
PHONE - (407)440-2066

PROJECT NAME & ADDRESS
ISMAEL MORENO
144 SE PATIENCE PL,
LAKE CITY, FL 32025

APN #: 094S1708300094
AHJ: COUNTY OF COLUMBIA
UTILITY: CLAY ELECTRIC COOPERATIVE

SYSTEM DETAILS
15.600 KW DC-(STC) / 11.310 KW AC
(39) HYUNDAI HIS-S400YH(BK)
(39) ENPHASE IQ8PLUS-72-M-US

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
RESOURCE DOCUMENTS

DRAWN DATE	6/3/2025
DRAWN BY	PP

SHEET NUMBER
R-05

GODWIN ENGINEERING AND DESIGN, LLC

8378 Foxtail Loop, Pensacola, FL 32526 | (850)712-4219 | chad@godwineng.com

June 10, 2025

To: Columbia County Building Department
135 NE Hernando Ave
Lake City, FL 32055

Subject: Moreno - Residential PV Roof Mount Installation
144 SE Patience Pl
Lake City, FL 3225

To whom it may concern,

This letter is regarding the proposed installation of a rooftop-mounted Solar PV system on the existing residential structure at the subject address. I have reviewed the attachment plan and have determined that the rooftop-mounted PV system is in compliance with the applicable sections of the following Codes as amended and adopted by the jurisdiction when installed in accordance with the manufacturer's installation instructions:

2023 Florida Building Code 8th Edition, FBC
ASCE 7 Min. Design Loads for Buildings & Other Structures
Design Criteria: Design Wind Speed(Vult) - 120 mph 3sec gust, Exposure Category – C, Risk Category II

The rooftop-mounted photovoltaic panel system has been designed in accordance with FRC R324.4. When roof penetrations are necessary, they shall be flashed and sealed in accordance with the manufacture's installation instructions, R905.17.3. The PV system consist of the modules, railing, and connection hardware. Refer to the specific roof type calculation pages for PV dead loads. The portions of the existing structure covered with solar panels will be adequate for supporting the roof loads per R324.4.1.1.

The securement method of the the PV system is to be mounted parallel to the structure with the site specific railing and attachments according to the designed plans. The site specific wind load calculations for the module and their supports are attached with this document. Fasteners shall be installed to the designated roof member with the proper torque from the manufactures installation instructions.

The design wind pressures for rooftop solar panels located on enclosed or partially enclosed buildings of all heights, with panels parallel to the roof surface with a tolerance of 2° and with a max height above the roof surface, h_2, not exceeding 10 in. A min gap of 0.25 in shall be provided between all panels with the spacing of gaps between panels not exceeding 6.7 ft. in addition the array shall be located at least $2h_2$ from the roof edge, a gable ridge, or a hip ridge.

It is the contractors responsibility to review all drawings for accuracy and notify the EOR of any discrepancies prior to beginning construction. To the best of my knowledge, the plans and specifications comply with the minimum requirements of the latest Florida Building code.

Please see attached documents and contact me should you have any questions.

Sincerely,
D. Chad Godwin, PE 81360
Exp. 02/28/2027

GODWIN ENGINEERING AND DESIGN, LLC

8378 Foxtail Loop, Pensacola, FL 32526 | (850)712-4219 | chad@godwineng.com

Roof Structure Details	
Roof Angle	21° to 27°
Roof Type	Gable
Roof Covering	Asphalt Shingle
Mean Roof Height	15 ft
Roof Truss Spacing	24 in O.C.
Rafter/Truss Size	2 X 4

Moreno - Residential Calculations Sheet - R1

The securement method of the PV system is to be mounted parallel to the Asphalt Shingle roof with the NXT railing and Unirac Stronghold Butyl flashings/attachments. The mounts should be staggered, where possible, to allow distribution of the design loads evenly to the structure. The mounts shall be installed with (2) #14-14 x 3" SS HWH TYPE AB Screws, to Roof Truss

Wind Load Paramaters

Wind Speed (asd)		93	mph	FRC R301.2.1.3	Basic Wind Speed (Ult)	120	mph
Effective Wind Area		21.50	ft^2	26.2	Exposure Cat.	C	B,C, or D
Wind Directionality	K_d	0.85		Table 26.6-1	Elevation	<1000	ft
Topographic factor	K_{zt}	1.00		26.8 or 26.8.2	bldg. least hori. dim (typ.)	360	in
Ground Elevation Factor	K_e	1.00		Table 26.9-1	Roof Height, *h*	15.00	ft
Velocity Exposure Coefficient	K_z	0.85		Table 26.10-1			
Array Edge Factor	γ_E	1.50	*Exposed*	29.4.4			
Array Edge Factor	γ_E	1.00	*Non. Exp*	29.4.4			
Solar Panel Equalization Factor	γ_a	0.67		Fig. 29.4-8(gap = 0.25")			
Velocity Pressure	q_h	18.80	psf	$q_h=0.00256\,K_zK_{zt}K_eV^2$			
Added Safety Factor		1					
Allowable Pullout per mount		907.0	lbs				
0.4h or 0.6h		6.00	ft	Flat - 0.6h, Gab/Hip - 0.4h			
10% of least horizontal dim		3.00	ft	10% of least hor. Dim. Or 0.4h, whichever is smaller, but not less than either 4% of Least hor. Or 3ft. (flat roof - 0.6h)			
Roof Zone Set Back	a	3.00	ft				
	h_2	5	in	Not > 10in(panel height above roof)			
	$2h_2$	10	in	*min distance array shall be from the roof edge, Gable Ridge, or hip ridge			
		0.25	in	min gap between all panels but not > 6.7ft			
	d1	1.00	ft	Horizontal distance orthogonal to panel edge			
	d2	0.25	ft	Horizontal distance from edge of one panel to the nearest edge in the next row			
	0.5*h*	7.50	ft				

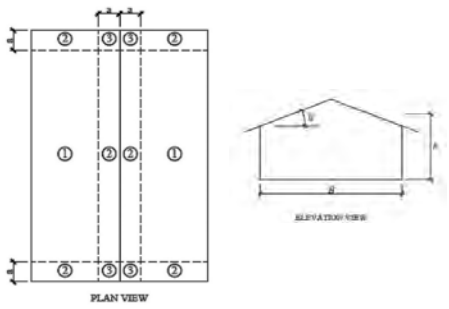
Exposed Module Definition

Exposed factor = 1.5 for uplift loads on panels that are exposed and within a distance of $2h_2$ from an edge of the array. Modules are condidered Exposed if d_1 to the roof edge > 0.5*h* and one of the following applies:

1. d_1 to adjacent array > $2h_2$.
2. d_2 to the next adjacent panel > $2h_2$.

PV Attachment - Results

Exposed	R1 Roof Zones - Gable 21° to 27°		
Non-Exp.	1	2	3
GC_p - Uplift	-1.32	-2.07	-2.5
GC_p - Down	0.53	0.53	0.53
$p=q_hK_d(GC_p)(\gamma_E)(\gamma_a)$ (psf) ASCE 29.4-7	-18.3	-30.3	-36.7
	-16.0	-19.3	-23.6
	16.0	16.0	16.0
	16.0	16.0	16.0
PL(lb) (Portrait Rails) = p * A_{eff}	-347	-574	-696
	-303.0	-365.7	-446.5
PL(lb)(landsc. Rails) = p * A_{eff}	-187.3	-309.9	-375.3
	-163.5	-197.3	-240.9
Mx. Span (in) (Portrait)	72	72	72
	72	72	72
Mx. Span(in) (Landsc.)	72	~~72~~	~~72~~
	72	~~72~~	~~72~~
Cantilever (Portrait) Span * 33%	24	24	24
	24	24	24
Cantilever (Landsc.) Span * 33%	24	24	24
	24	24	24



a = 3ft ; 10% of least hor. Dim. Or 0.4h, whichever is smaller, but not less than either 4% of Least hor. Or 3ft. (flat roof - 0.6h)

B - Horizontal dimension of bldg. normal to wind direction, (ft)

h = Mean roof height, in (ft), except that eave height shall be used for θ ≤ 10°.

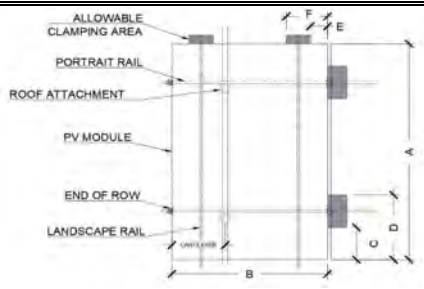
θ = Angle of Plane of roof from horizontal, degrees.

***** Spans with ~~Mark through~~ denote allowable Module pressure rating is exceeded.**

PV Dead Load

QTY of Modules (28 in Portrait, 8 in Landscape)		36	
Module Area		21.50	ft^2
Rail, Clamps, Mounts		1	lb/ft
Total Rail Length		296	ft
Module	W_{mod}	47	lbs
Array	W_{mods}	1675	lbs
Micro/optimizer	W_{mic}	144	lbs
PV Rail	$W_{PV\ rail}$	296	lbs
Total Weight	W_{total}	2114	lbs
Total Area	A_T	773.88	ft^2
Dead Load	D_{PV}	2.73	psf
Weight/attachment		18.1	lbs

HiS-SxxxYH(BK) 385-410 Module Specifications



Fastener Allowable Pullout	A (ft)	B (ft)	C (in)	D (in)	E (in)	F (in)
(2) #14-14 x 3" SS HWH TYPE AB Screws	6.31	3.41	11.54	15.47	9.84	11.81

Diameter	6/25	
S.G.	0.42	
Thread Embedment per	1.55	in
# of Fastener	2	
Pullout Value (Source - FL Product Approval)	907.0	lb_f

Module load ratings (psf)	Ultimate	Allowable(Ult /1.5)	
Load Rating - Snow	113.4	75.6	Portrait
Load Rating - Wind	-113.4	-75.6	
Load Rating - Snow	28.0	18.7	Landscape
Load Rating - Wind	-28.0	-18.7	

GODWIN ENGINEERING AND DESIGN, LLC

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Roof Structure Details	
Roof Angle	8° to 20°
Roof Type	Gable
Roof Covering	Asphalt Shingle
Mean Roof Height	15 ft
Roof Truss Spacing	24 in O.C.
Rafter/Truss Size	2 X 4

Moreno - Residential Calculations Sheet - R2

The securement method of the PV system is to be mounted parallel to the Asphalt Shingle roof with the NXT railing and Unirac Stronghold Butyl flashings/attachments. The mounts should be staggered, where possible, to allow distribution of the design loads evenly to the structure. The mounts shall be installed with (2) #14-14 x 3" SS HWH TYPE AB Screws, to Roof Truss

Wind Load Paramaters

Wind Speed (asd)		93	mph	FRC R301.2.1.3	Basic Wind Speed (Ult)	120	mph
Effective Wind Area		21.50	ft^2	26.2	Exposure Cat.	C	B,C, or D
Wind Directionality	K_d	0.85		Table 26.6-1	Elevation	<1000	ft
Topographic factor	K_{zt}	1.00		26.8 or 26.8.2	bldg. least hori. dim (typ.)	360	in
Ground Elevation Factor	K_e	1.00		Table 26.9-1	Roof Height, *h*	15.00	ft
Velocity Exposure Coefficient	K_z	0.85		Table 26.10-1			
Array Edge Factor	γ_E	1.50	*Exposed*	29.4.4			
Array Edge Factor	γ_E	1.00	*Non. Exp*	29.4.4			
Solar Panel Equalization Factor	γ_a	0.67		Fig. 29.4-8(gap = 0.25")			
Velocity Pressure	q_h	18.80	psf	$q_h=0.00256\,K_zK_{zt}K_eV^2$			
Added Safety Factor		1					
Allowable Pullout per mount		907.0	lbs				
0.4h or 0.6h		6.00	ft	Flat - 0.6h, Gab/Hip - 0.4h			
10% of least horizontal dim		3.00	ft	10% of least hor. Dim. Or 0.4h, whichever is smaller, but not less than either 4% of Least hor. Or 3ft. (flat roof - 0.6h)			
Roof Zone Set Back	a	3.00	ft				
	h_2	5	in	Not > 10in(panel height above roof)			
	$2h_2$	10	in	*min distance array shall be from the roof edge, Gable Ridge, or hip ridge			
		0.25	in	min gap between all panels but not > 6.7ft			
	d1	1.00	ft	Horizontal distance orthogonal to panel edge			
	d2	0.25	ft	Horizontal distance from edge of one panel to the nearest edge in the next row			
	0.5*h*	7.50	ft				

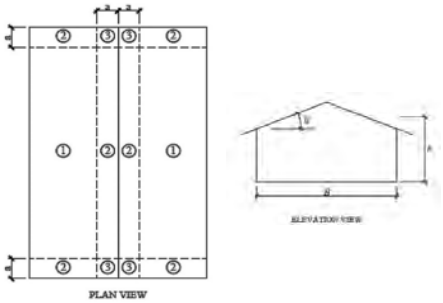
Exposed Module Definition

Exposed factor = 1.5 for uplift loads on panels that are exposed and within a distance of $2h_2$ from an edge of the array. Modules are condidered Exposed if d_1 to the roof edge > 0.5*h* and one of the following applies:

1. d_1 to adjacent array > $2h_2$.
2. d_2 to the next adjacent panel > $2h_2$.

PV Attachment - Results

Exposed	R2 Roof Zones - Gable 8° to 20°		
Non-Exp.	1	2	3
GC_p - Uplift	-1.67	-2.27	-3.00
GC_p - Down	0.53	0.53	0.53
$p=q_hK_d(GC_p)(\gamma_E)(\gamma_a)$ (psf) ASCE 29.4-7	-24.0	-33.6	-45.3
	-16.0	-21.5	-29.3
	16.0	16.0	16.0
	16.0	16.0	16.0
PL(lb) (Portrait Rails) = p * Aeff	-454	-636	-858
	-303.0	-407.2	-555.3
PL(lb)(landsc. Rails) = p * Aeff	-245.1	-343.2	-463.0
	-163.5	-219.7	-299.6
Mx. Span (in) (Portrait)	72	72	72
	72	72	72
Mx Span (Landsc.)	~~72~~	~~72~~	~~72~~
	72	~~72~~	~~72~~
Cantilever (Portrait)	24	24	24
Span * 33%	24	24	24
Cantilever (Landsc.)	24	24	24
Span * 33%	24	24	24



a = 3ft ; 10% of least hor. Dim. Or 0.4h, whichever is smaller, but not less than either 4% of Least hor. Or 3ft. (flat roof - 0.6h)

B - Horizontal dimension of bldg. normal to wind direction, (ft)

h = Mean roof height, in (ft), except that eave height shall be used for θ ≤ 10°.

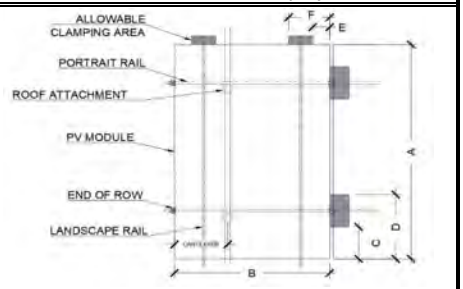
θ = Angle of Plane of roof from horizontal, degrees.

***** Spans with ~~Mark through~~ denote allowable Module pressure rating is exceeded.**

PV Dead Load

QTY of Modules (3 in Portrait,)		3	
Module Area		21.50	ft^2
Rail, Clamps, Mounts		1	lb/ft
Total Rail Length		21	ft
Module	W_{mod}	47	lbs
Array	W_{mods}	140	lbs
Micro/optimizer	W_{mic}	12	lbs
PV Rail	$W_{PV\ rail}$	21	lbs
Total Weight	W_{total}	172	lbs
Total Area	A_T	64.49	ft^2
Dead Load	D_{PV}	2.67	psf
Weight/attachment		19.2	lbs

HiS-SxxxYH(BK) 385-410 Module Specifications



Fastener Allowable Pullout

(2) #14-14 x 3" SS HWH TYPE AB Screws

Diameter		6/25	
S.G.		0.42	
Thread Embedment per		1.55	in
# of Fastener		2	
Pullout Value (Source - FL Product Approval)		907.0	lb_f

A (ft)	B (ft)	C (in)	D (in)	E (in)	F (in)
6.31	3.41	11.54	15.47	9.84	11.81

Module load ratings (psf)

	Ultimate	Allowable(Ult /1.5)	
Load Rating - Snow	113.4	75.6	Portrait
Load Rating - Wind	-113.4	-75.6	
Load Rating - Snow	28.0	18.7	Landscape
Load Rating - Wind	-28.0	-18.7