



Scott E. Wyssling, PE
Coleman D. Larsen, SE, PE
Gregory T. Elvestad, PE

76 North Meadowbrook Drive
Alpine, UT 84004
office (201) 874-3483
swyssling@wysslingconsulting.com

September 14, 2023

Current Insight
2852 W. Amini Way
South Jordan, UT 84095

Re: Engineering Services
Ewing Residence
40 Wendywood Drive, Angier NC
7.505 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing: Prefabricated wood trusses at 24" on center. All truss members are constructed of 2x4 dimensional lumber.

Roof Material: Composite Asphalt Shingles

Roof Slope: 22 degrees

Attic Access: Accessible

Foundation: Permanent

C. Loading Criteria Used

- **Dead Load**
 - Existing Roofing and framing = 7 psf
 - New Solar Panels and Racking = 3 psf
 - TOTAL = 10 PSF
- **Live Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 15 psf
- **Wind Load** based on ASCE 7-10
 - Ultimate Wind Speed = 119 mph (based on Risk Category II)
 - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2018 North Carolina Residential Code, including provisions allowing existing structures to not require strengthening if the new loads do not exceed existing design loads by 105% for gravity elements and 110% for seismic elements. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

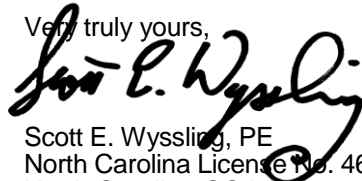
D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent Ironridge installation manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. The maximum allowable withdrawal force for a $5/16$ " lag screw is 229 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on a minimum penetration depth of $2\frac{1}{2}$ ", the allowable capacity per connection is greater than the design withdrawal force (demand). Considering the variable factors for the existing roof framing and installation tolerances, the connection using one $5/16$ " diameter lag screw with a minimum of $2\frac{1}{2}$ " embedment will be adequate and will include a sufficient factor of safety.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 48" on center.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2018 North Carolina Residential Code, current industry standards, and is based on information supplied to us at the time of this report.

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Very truly yours,



Scott E. Wyssling, PE
North Carolina License No. 46546
North Carolina COA P-2308



Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 9/14/2023

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MATTHEW EWING RESIDENCE

NEW PHOTOVOLTAIC ROOF MOUNT SYSTEM

PROJECT - 7.505 kW DC / 6.631 kW AC

SHEET #	SHEET NAME
T-1	COVER SHEET
T-2	PLAN NOTES
PV-1	SITE PLAN LAYOUT
PV-2	ATTACHMENT DETAILS
PV-3	MOUNTING DETAILS
E-1	ELECTRICAL DIAGRAM
E-2	WARNING LABELS
S-1	SPEC SHEET
S-2	SPEC SHEET
S-3	SPEC SHEET
S-4	SPEC SHEET
S-5	SPEC SHEET



PROJECT INFORMATION

PROPERTY OWNER
NAME: MATTHEW EWING

CONTRACTOR
NAME: BYLD

DESIGN SPECIFICATIONS
OCCUPANCY: R-3
CONSTRUCTION TYPE: SINGLE FAMILY RESIDENCE
ZONING: RESIDENTIAL
WIND EXPOSURE: C
AHJ: HARNETT COUNTY
UTILITY: DUKE ENERGY PROGRESS

APPLICABLE CODES & STANDARDS
NORTH CAROLINA RESIDENTIAL CODE 2018 (NCRC 2018)
NORTH CAROLINA BUILDING CODE 2018 (NCBC 2018)
NORTH CAROLINA FIRE CODE 2018 (NCFC 2018)
NATIONAL ELECTRICAL CODE, NEC 2020 CODE BOOK, NFPA 70

TYPE OF INTERCONNECTION: BACKFEED BREAKER IN THE MSP

SCOPE OF WORK
TYPE OF SYSTEM: ROOF MOUNT

SYSTEM SIZE:
STC: 19 X 395W = 7.505kW
PTC: 19 X 371.9W = 7.066kW
(19) TRINA SOLAR TSM-395 DE09.05(395W) [BLK] MODULE
(19) ENPHASE IQ8A-72-2-US MICROINVERTERS
(1) 60A KNIFE AC DISCONNECT
(1) 125A ENPHASE IQ COMBINER 4/4C BOX

MSP UPGRADE: NO
MAIN BREAKER DERATE: NO

RACKING & MOUNTING

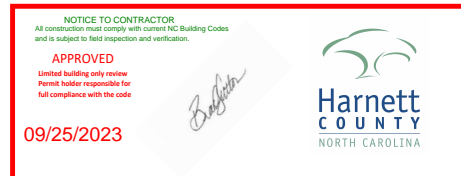
PV ATTACHMENT TYPE: IRONRIDGE FLASHVUE FOR COMP SHINGLE ROOF

RACKING TYPE: IRONRIDGE XR10 RAIL - ROOF MOUNT RACKING HARDWARE



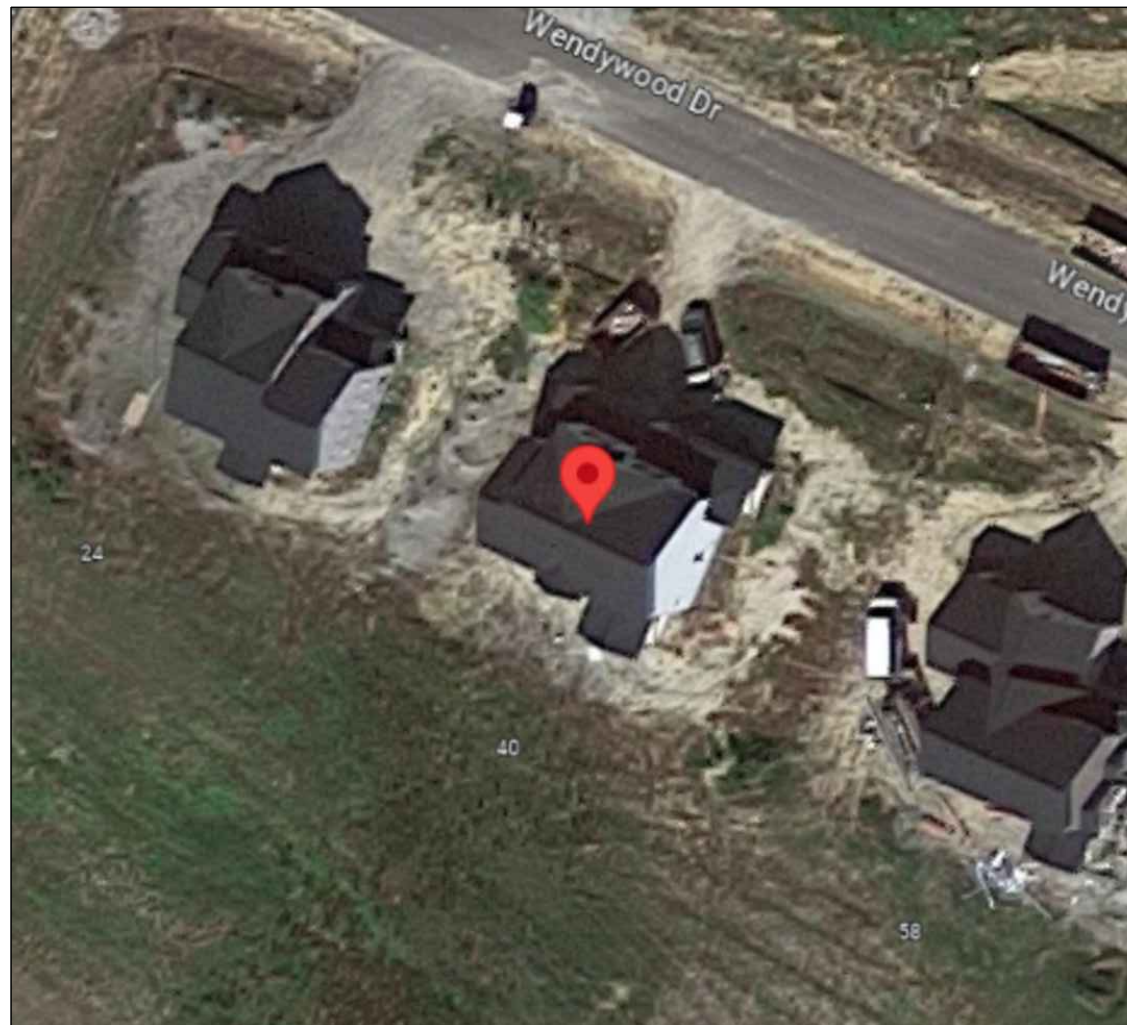
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COORDINATES:
35.4499146, -78.7117967

AERIAL VIEW



CONTRACTOR

BYLD

ADDRESS: 1213W MOOREHEAD ST,
STE 500 CHARLOTTE,
NC 28208
LICENSE #:

DESIGNER: OAH

MATTHEW EWING
RESIDENCE

40 WENDYWOOD DR,
ANGIER
NC 27501

APN: 0681588704
DATE: 9/13/2023

DESIGN BY

Complete Solar
A Brighter Way.

SHEET
T1
COVER SHEET



CONTRACTOR

BYLD
ADDRESS: 1213W
MOOREHEAD ST,
STE 500 CHARLOTTE,
NC 28208
LICENSE #:

DESIGNER: OAH

MATTHEW EWING
RESIDENCE
40 WENDYWOOD DR,
ANGIER
NC 27501

APN: 0681588704
DATE: 9/13/2023

DESIGN BY



SHEET
T-2
PLAN NOTES

1.1. PROJECT NOTES:

- 1.2. THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
- 1.3. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
- 1.4. GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICROINVERTER IN ACCORDANCE WITH NEC 690.5(A)
- 1.5. 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 690.4 & NEC 690.60: PV MODULES: UL 1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY
- 1.6. MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
- 1.7. ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
- 1.8. 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.

1.9. SCOPE OF WORK:

- 1.10. PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT.

1.11. WORK INCLUDES:

- 1.12. PV ROOF ATTACHMENTS - IRONRIDGE FLASHVUE FOR COMP SHINGLE ROOF.
- 1.13. PV RACKING SYSTEM INSTALLATION - IRONRIDGE XR10 RAIL ROOF MOUNT RACKING HARDWARE
- 1.14. PV MODULE AND INVERTER INSTALLATION - TRINA SOLAR TSM-395 DE09.05(395W) [BLK] MODULES / ENPHASE IQ8A-72-2-US MICROINVERTERS.
- 1.15. PV EQUIPMENT GROUNDING
- 1.16. PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
- 1.17. PV LOAD CENTERS (IF INCLUDED)
- 1.18. PV METERING/MONITORING (IF INCLUDED)
- 1.19. PV DISCONNECTS
- 1.20. PV GROUNDING ELECTRODE & BONDING TO (E) GEC
- 1.21. PV FINAL COMMISSIONING
- 1.22. (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
- 1.23. SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

1.24. SITE NOTES:

- 1.25. A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- 1.26. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
- 1.27. THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- 1.28. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.
- 1.29. 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.

1.30. EQUIPMENT LOCATIONS:

- 1.31. ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.
- 1.32. WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31 (A),(C) AND NEC TABLES 310.15 (B)(2)(A) AND 310.15 (B)(3)(C)
- 1.33. JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.
- 1.34. ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.
- 1.35. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
- 1.36. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

1.37. STRUCTURAL NOTES:

- 1.38. RACKING SYSTEM
- 1.39. PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND
- 1.40. A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAY/SUBARRAY, ACCORDING TO RAIL MANUFACTURER'S INSTRUCTIONS.
- 1.41. JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED SEALED PER LOCAL REQUIREMENTS.
- 1.42. ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED WITH APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.
- 1.43. ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.
- 1.44. WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

1.45. WIRING & CONDUIT NOTES:

- 1.46. 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.
- 1.47. CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.
- 1.48. VOLTAGE DROP LIMITED TO 1.5%.
- 1.49. DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY WITH SUITABLE WIRING CLIPS.
- 1.50. AC CONDUCTORS COLORED OR MARKED AS FOLLOWS: PHASE A OR L1- BLACK PHASE B OR L2- RED, OR OTHER CONVENTION IF THREE PHASE PHASE C OR L3- BLUE, YELLOW, ORANGE**, OR OTHER CONVENTION NEUTRAL- WHITE OR GREY IN 4-WIRE DELTA CONNECTED SYSTEMS THE PHASE WITH HIGHER VOLTAGE TO BE MARKED ORANGE [NEC 110.15

1.51. GROUNDING NOTES:

- 1.52. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.
- 1.53. PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.
- 1.54. METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).
- 1.55. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTURER'S INSTRUCTIONS.

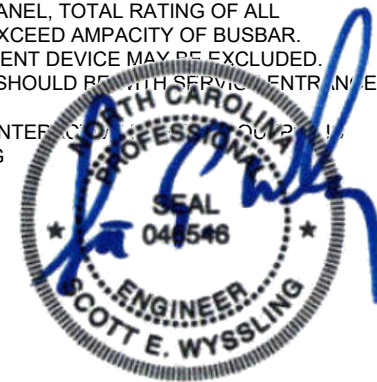
- 1.56. EACH MODULE WILL BE GROUNDED USING WEEB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEEBS ARE NOT USED, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS' INSTALLATION REQUIREMENTS.
- 1.57. THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.
- 1.58. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [2022 CEC 250.119]
- 1.59. THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH CEC 690.47 AND CEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO CEC 250, CEC 690.47 AND AHJ.
- 1.60. GROUND-FAULT DETECTION SHALL COMPLY WITH CEC 690.41 IN GENERAL AND CEC 690.41 (A)(1) SPECIFICALLY.

1.61. DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:

- 1.62. 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).
- 1.63. DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
- 1.64. RAPID SHUTDOWN OF ENERGIZED CONDUCTORS BEYOND 1 FT OF PV ARRAY OR 5 FT INSIDE A BUILDING WITHIN 10 SECONDS. CONTROLLED CONDUCTORS ≤30V AND ≤240VA [CEC 690.12(B)]. LOCATION OF LABEL ACCORDING TO AHJ
- 1.65. ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO CEC 690.8, 690.9, AND 240.
- 1.66. EQUIPMENT THAT IS LISTED, LABELED, OR BOTH SHALL BE INSTALLED AND USED IN ACCORDANCE WITH ANY INSTRUCTIONS INCLUDED IN THE LISTING OR LABELING. CEC 110.3(B).
- 1.67. IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO CEC 690.11 AND UL1699B.

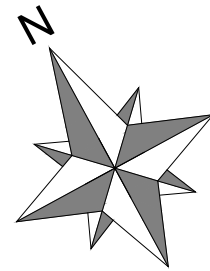
1.68. ELECTRICAL INTERCONNECTION NOTES:

- 1.69. THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS INPUT MAY NOT EXCEED 120% OF BUSBAR RATING.
- 1.70. WHEN SUM OF THE PV SOURCES EQUALS >100% OF BUSBAR RATING, PV DEDICATED BACKFEED BREAKERS MUST BE LOCATED OPPOSITE END OF THE BUS FROM THE UTILITY SOURCE OCPD.
- 1.71. AT MULTIPLE PV OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED.
- 1.72. SUPPLY SIDE TAP INTERCONNECTION SHOULD BE WITH SERVICE ENTRANCE CONDUCTORS.
- 1.73. BACKFEEDING BREAKER FOR UTILITY-INTERCONNECTED SYSTEMS SHALL BE EXEMPT FROM ADDITIONAL FASTENING



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PV SYSTEM SIZE:
7.505 kW DC

PV INTERCONNECTION POINT.
LOCATION OF MAIN SERVICE PANEL MOUNTED ON INTERIOR
WALL & METER MAIN COMBO, AC DISCONNECT & COMBINER
BOX MOUNTED ON EXTERIOR WALL OF A SINGLE FAMILY
RESIDENCE.

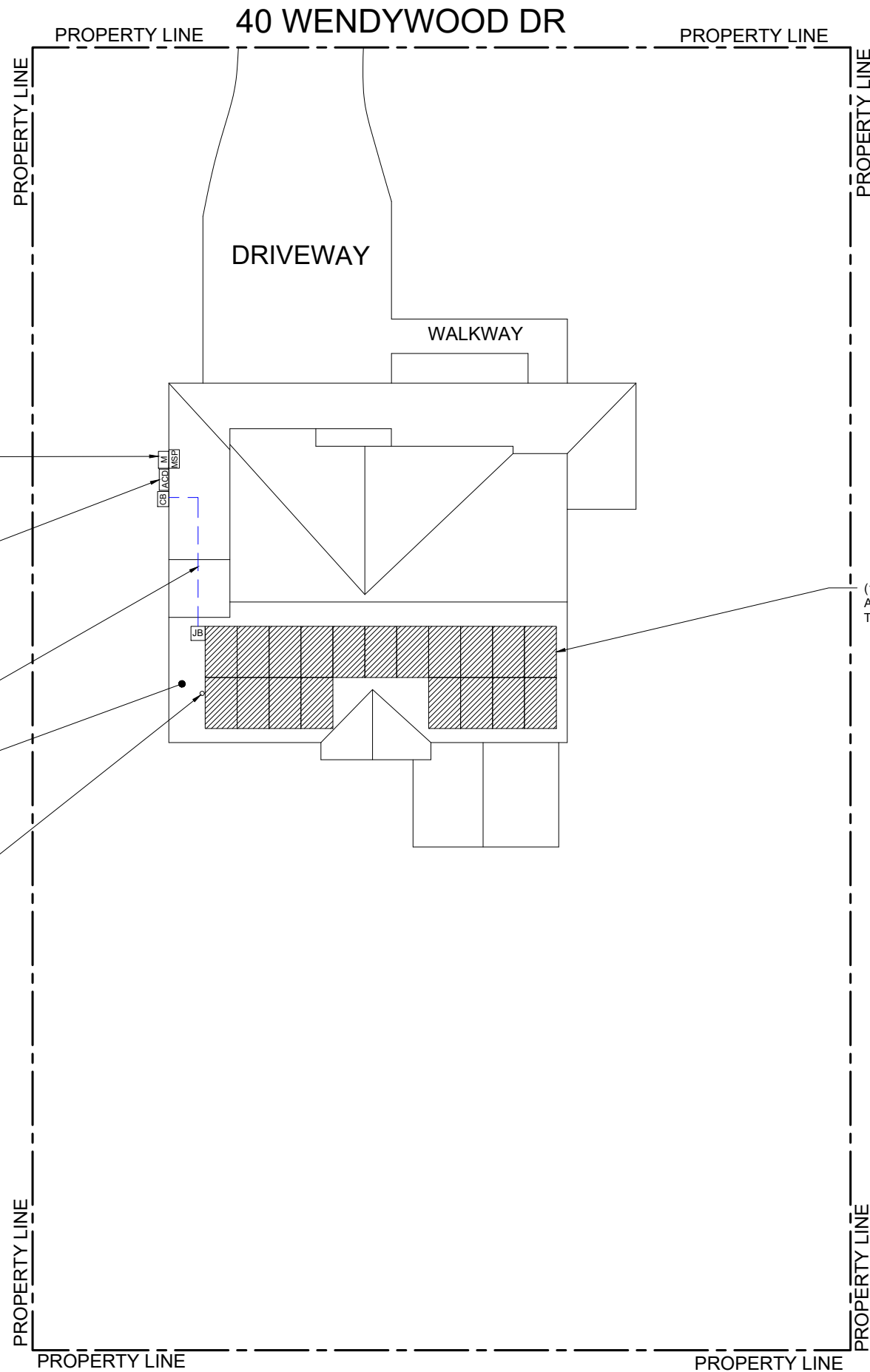
LOCATION OF "RAPID SHUTDOWN"
AC DISCONNECT NEC 690.12

(N) CONDUIT RUN

Roof Section 1
Roof Azimuth: 205°
Roof Tilt: 22°

ROOF OBSTRUCTIONS

LEGEND	
	NEW SOLAR PANELS
	METER MAIN COMBO
	AC DISCONNECT
	COMBINER BOX
	MAIN SERVICE PANEL



(19) TRINA SOLAR TSM-395 DE09.05(395W) [BLK] WITH
AN (19) ENPHASE IQ8A-72-2-US MICRO-INVERTERS MOUNTED TO
THE BACK OF EVERY MODULES MOUNTED ON COMP SHINGLE ROOF

CONSTRUCTION NOTES

1. SOLAR PHOTOVOLTAIC SYSTEM TO BE INSTALLED ON RESIDENTIAL STRUCTURE.
2. THIS PROJECT HAS BEEN DESIGNED IN COMPLIANCE WITH THE IBC TO WITHSTAND A BASIC WIND EXPOSURE B.
3. THE ROOF MEMBERS ARE 2"X4" TRUSSES AT 24" ON CENTER. CONNECTION TO STRUCTURE SHALL NOT BE WITHIN 11" OF NAILING PLATES.
4. THE SOLAR PHOTOVOLTAIC INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
5. ALL CONDUCTORS AND CONDUITS MOUNTED ON ROOF SHALL BE MINIMUM 7/8" ABOVE ROOF SURFACE (INCLUDING CABLES UNDERNEATH MODULES AND RACKING).
6. ROOF ACCESS POINTS SHALL BE PROVIDED PER THE IFC & IRC
 - 6.1. LOCATED IN AREAS NOT REQUIRING PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS DOORS OR WINDOWS.
 - 6.2. LOCATED AT STRONG POINTS OF CONSTRUCTION IN LOCATIONS WHERE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS: TREES, WIRES, OR SIGNS.



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PV SYSTEM SITE PLAN

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

BYLD BETTER

CONTRACTOR

BYLD
ADDRESS: 1213W MOOREHEAD ST, STE 500 CHARLOTTE, NC 28208
LICENSE #:

DESIGNER: OAH

MATTHEW EWING RESIDENCE

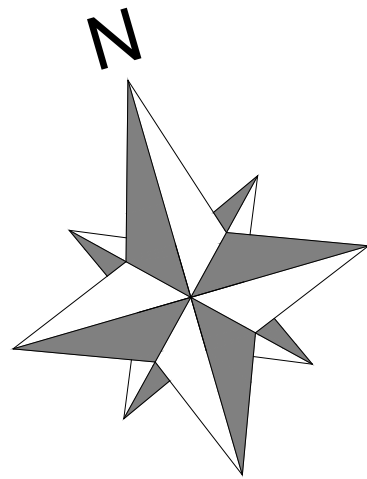
40 WENDYWOOD DR,
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APN: 0681588704
DATE: 9/13/2023

DESIGN BY

CompleteSolar
A Brighter Way.

SHEET
PV-1
SITE PLAN LAYOUT

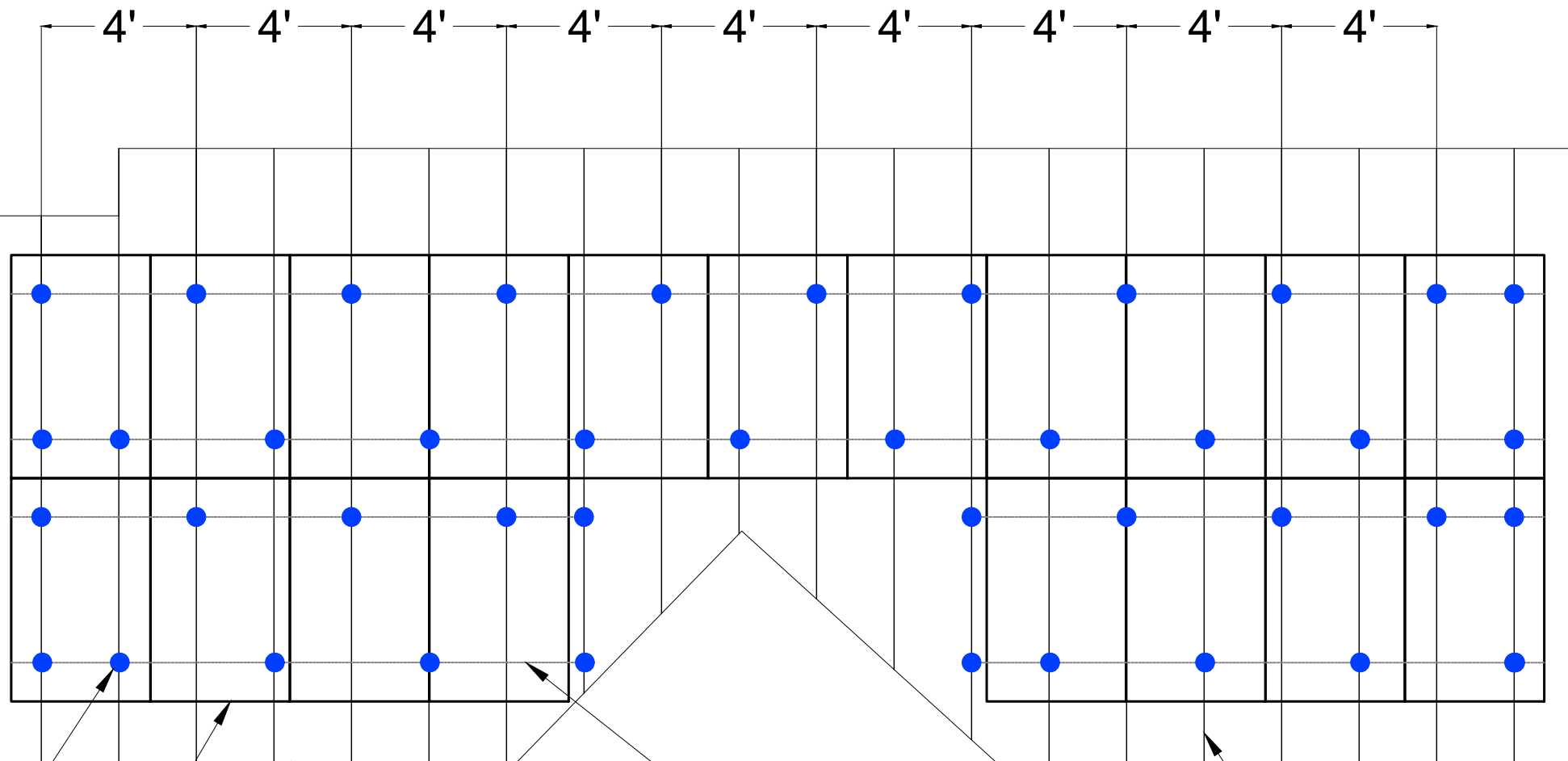


Roof Section 1
 Roof Azimuth: 205°
 Roof Tilt: 22°



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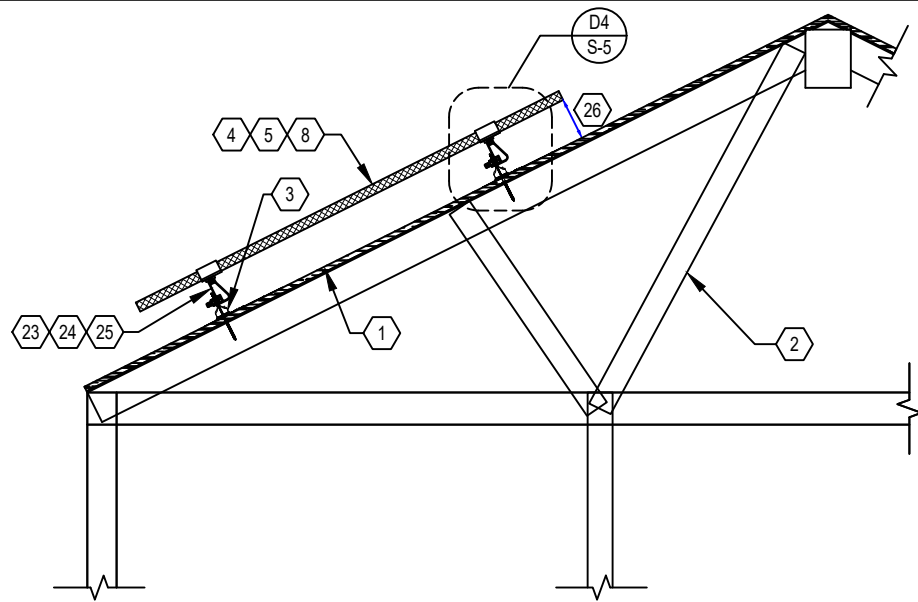
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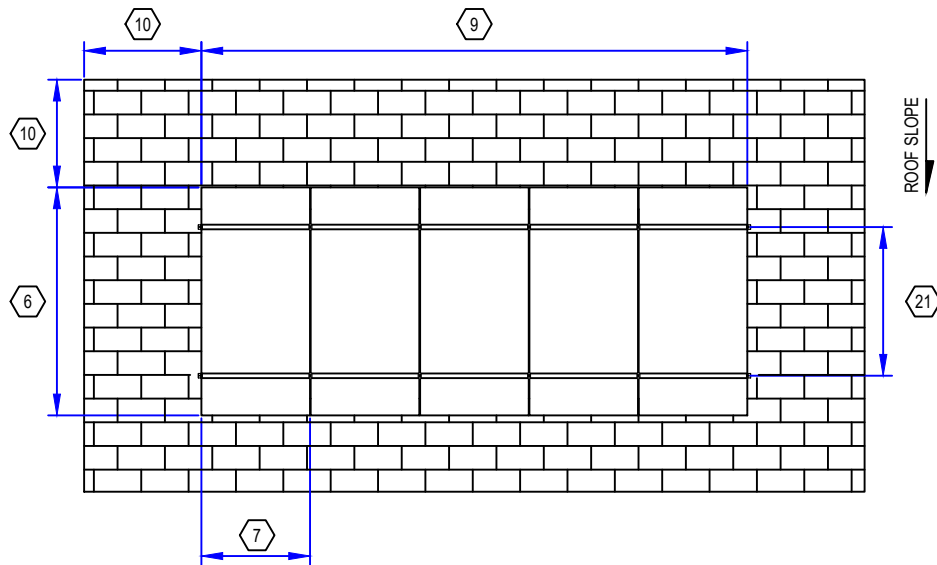
SHEET PV-2
 ATTACHMENT DETAILS

PV SYSTEM MOUNTING DETAILS

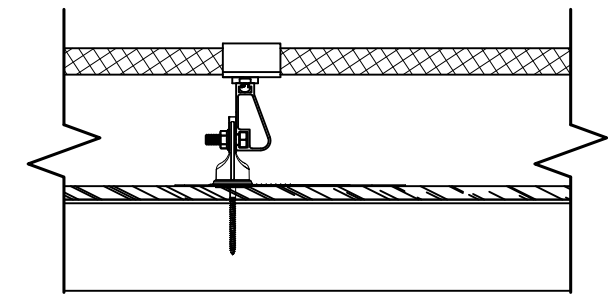
SCALE: 1/4" = 1'-0"



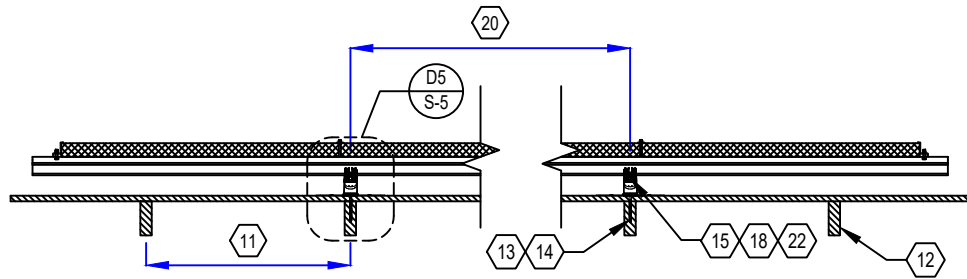
D1 RACKING DETAIL (TRANSVERSE)
NOT TO SCALE



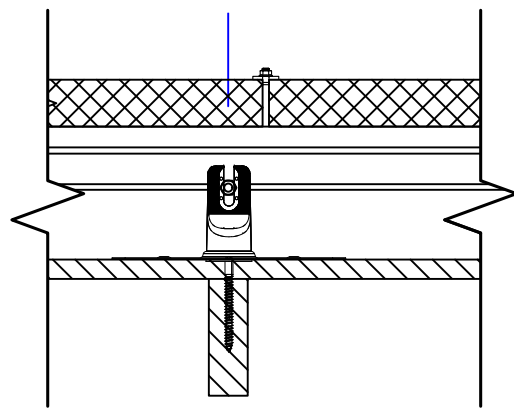
D3 RACKING DETAIL (TOP)
NOT TO SCALE



D4 DETAIL (TRANSVERSE)
NOT TO SCALE



D2 RACKING DETAIL (LONGITUDINAL)
NOT TO SCALE



D5 DETAIL (LONGITUDINAL)
NOT TO SCALE



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1. ROOF MATERIAL: COMP SHINGLE
2. ROOF STRUCTURE: TRUSSES
3. ATTACHMENT TYPE: IRONRIDGE FLASHVUE
4. MODULE MANUFACTURER: TRINA SOLAR
5. MODULE MODEL: TSM-395 DE09.05(395W) [BLK]
6. MODULE LENGTH: 69.05"
7. MODULE WIDTH: 43.14"
8. MODULE WEIGHT: 46.29 LBS.
9. SEE SHEET S-1 FOR DIMENSION(S)
10. MIN. FIRE OFFSET
11. TRUSSES SPACING: 24" O.C.
12. TRUSSES SIZE: 2"X4" NOMINAL
13. LAG BOLT DIAMETER: 5/16 IN.
14. LAG BOLT EMBEDMENT: 2.5 IN.
15. TOTAL # OF ATTACHMENTS: 42
16. TOTAL AREA: 393.04 SQ. FT.
17. TOTAL WEIGHT: 879.51 LBS.
18. WEIGHT PER ATTACHMENT: 20.94 LBS.
19. DISTRIBUTED LOAD: 2.24 PSF
20. MAX. HORIZONTAL STANDOFF: 48 IN.
21. MAX. VERTICAL STANDOFF:
LANDSCAPE: 26 IN., PORTRAIT: 43 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER AND MODEL
(OR EQUIV.): IRONRIDGE XR10 RAIL
24. RAIL WEIGHT: 0.436 PLF.
25. MAX. TRUSSES SPAN: 12 FT.
26. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.

BYLD BETTER

CONTRACTOR

BYLD
ADDRESS: 1213W MOOREHEAD ST, STE 500 CHARLOTTE, NC 28208
LICENSE #:

DESIGNER: OAH

MATTHEW EWING RESIDENCE

40 WENDYWOOD DR,
ANGIER
NC 27501

APN: 0681588704
DATE: 9/13/2023

DESIGN BY

CompleteSolar
A Brighter Way.

SHEET
PV-3
MOUNTING DETAILS

PV Module Ratings @ STC	
Module Make/Model	TRINA SOLAR TSM-395 DE09.05(395W) [BLK]
Max Power-Point Current (Imp)	11.62A
Max Power-Point Voltage (Vmp)	34.0V
Open-Circuit Voltage (Voc)	41.0V
Short-Circuit Current (Isc)	12.21A
Max Series Fuse (OCPD)	20A
Nominal Maximum Power at STC (Pmax)	395W
Maximum System Voltage	1500V
Voc Temperature Coefficient	-0.25 %/°C

SYSTEM SUMMARY		
	BRANCH #1	BRANCH #2
INVERTERS PER BRANCH	10	9
MAX CONTINUOUS OUTPUT CURRENT	14.50A	13.05A
MAX CONTINUOUS OUTPUT POWER	3490W	3141W
ARRAY STC POWER	7505W	
ARRAY PTC POWER	7066.1W	
MAX CONTINUOUS OUTPUT CURRENT	27.55A	
MAX CONTINUOUS OUTPUT POWER	6631W	
DERATED (CEC) AC POWER	6854.12W	

Inverter Ratings	
Inverter Make/Model	ENPHASE IQ8A-72-2-US
Max DC Volt Rating	60V
Max. Continuous Output Power	349W
Max Nominal Voltage	240V
Max Continuous Output Current	1.45A
Max OCPD Rating	20A



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APN: 0681588704 DATE: 9/13/2023

DESIGN BY



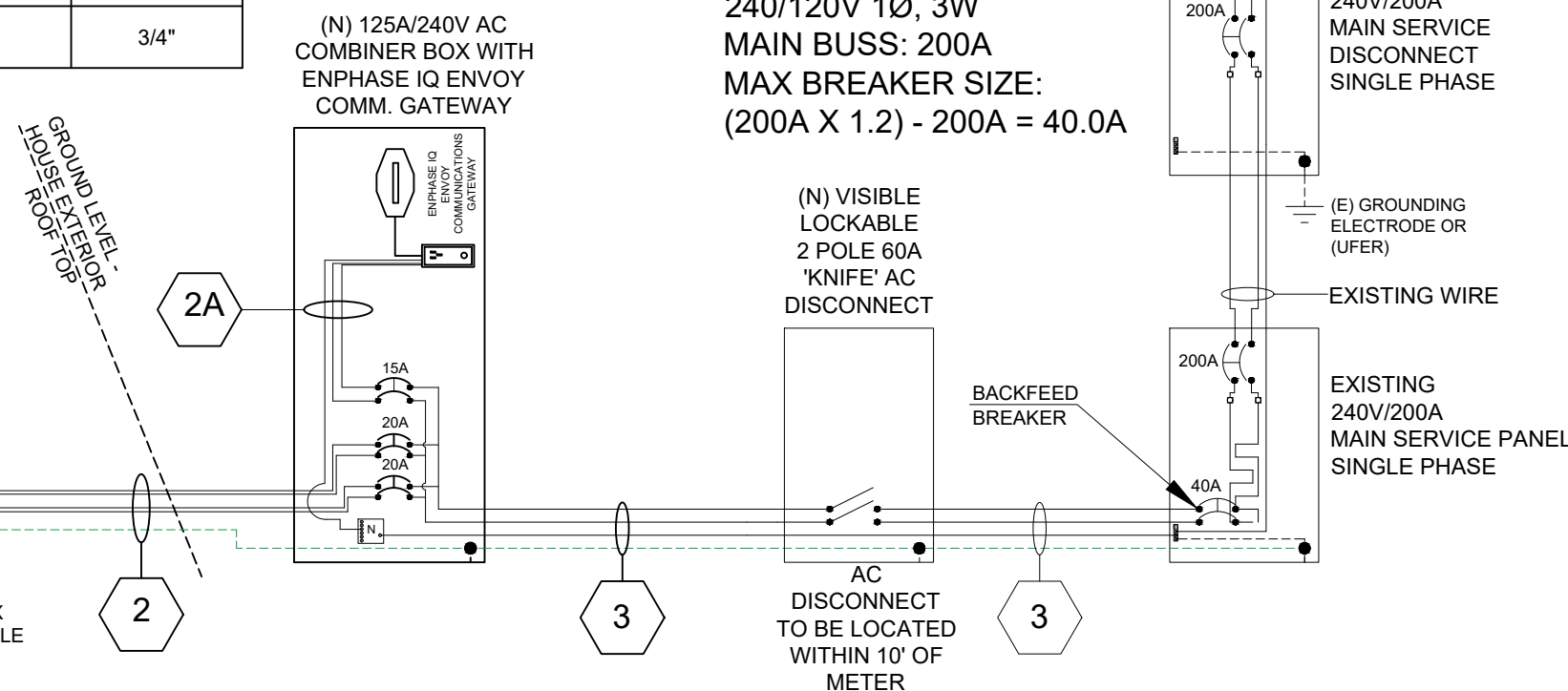
SHEET E-1 ELECTRICAL DIAGRAM

DESIGN TEMPERATURES

ASHRAE EXTREME LOW	-10°C
ASHRAE 2% HIGH	35°C

METER # 343678595

POINT OF DELIVERY AND INTERCONNECTION

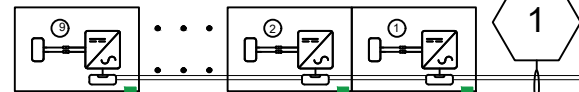


Conduit and Conductor Schedule

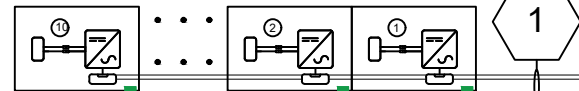
Tag	Description	Wire Gauge	# of Conductors	Conduit Type	Conduit Size
1	Enphase Q cable - THWN-2	10 AWG	2	N/A - Free Air	N/A - Free Air
1	Bare Copper Ground (EGC/GEC)	6 AWG	1	N/A - Free Air	N/A - Free Air
2	THWN-2	10 AWG	4	EMT	3/4"
2	THWN-2 - Ground	10 AWG	1	EMT	3/4"
2A	THWN-2	10 AWG	3	N/A - Free Air	N/A - Free Air
3	THWN-2	8 AWG	3	EMT	3/4"
3	THWN-2 - Ground	10 AWG	1	EMT	3/4"

(N) 19 TRINA SOLAR TSM-395 DE09.05(395W) [BLK] MODULES WITH AN ENPHASE IQ8A-72-2-US MICRO-INVERTER ATTACHED TO THE BACK OF EVERY MODULE.

PV CIRCUIT 2: 9 MODULES/PARALLEL



PV CIRCUIT 1: 10 MODULES/PARALLEL



NOTE: IN BETWEEN EACH ARRAY THE EMT IS USED AS THE GROUNDING / BONDING, GROUND CLAMPS ARE AT EACH END OF THE EMT CONDUIT WITH THE WIRE THEN FREE AIR'D TO THE GROUND CLAMP ON THE RACKING RAIL

(N) JUNCTION BOX WITH IRREVERSIBLE GROUND SPLICE

GROUND LEVEL - HOUSE EXTERIOR ROOF TOP

⚠ WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
INVERTER(S), AC DISCONNECT(S), AC COMBINER PANEL (IF APPLICABLE).
PER CODE(S): NEC : 690.13(B), NEC 2014: 690.17(E), NEC : 690.17(4)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
UTILITY SERVICE ENTRANCE/METER, INVERTER/DC DISCONNECT IF REQUIRED BY LOCAL AHJ, OR OTHER LOCATIONS AS REQUIRED BY LOCAL AHJ.
PER CODE(S): NEC : 690.56(C)(3), NEC : 690.12, NEC 690.56, IFC 2012: 605.11.1, IFC 2018: 1204.5.3

⚠ WARNING
POWER SOURCE OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
ADJACENT TO PV BREAKER (IF APPLICABLE).
PER CODE(S): NEC : 705.12(B)(3)(2), NEC : 705.12(B)(2)(3)(b), NEC : 705.12(D)(2)(3)(b)

⚠ 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 LOCATION:
AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.
PER CODE(S): NEC : 690.54, NEC 2014: 690.54, NEC 2011: 690.54

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

LABEL LOCATION: PV SYSTEM DISCONNECT
PER CODE(S): NEC 690.13(B)

⚠ WARNING
DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

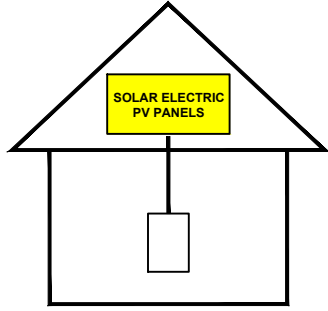
LABEL LOCATION:
MAIN SERVICE PANEL (IF APPLICABLE).
PER CODE(S): NEC : 705.12(C) & 690.59

PHOTOVOLTAIC AC DISCONNECT
MAXIMUM AC OPERATING CURRENT: 27.55 AMPS
NOMINAL OPERATING AC VOLTAGE: 240.0 VAC

LABEL LOCATION:
AC DISCONNECT(S), PHOTOVOLTAIC SYSTEM POINT OF INTERCONNECTION.
PER CODE(S): NEC: 690.54

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

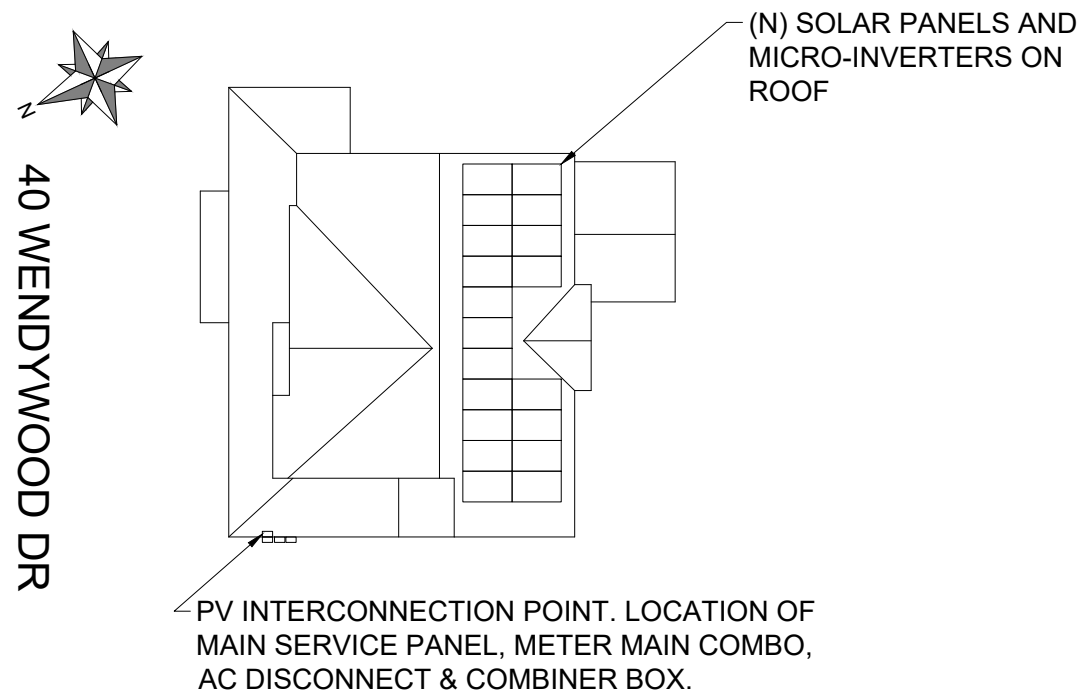
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY.



LABEL LOCATION:
ON OR NO MORE THAT 3 M (10 FT) FROM THE SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED.
PER CODE(S): NEC : 690.56(C)(1)(a)

CAUTION:

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS AS SHOWN



PERMANENT SIGNAGE NOTES:

1. NOT ALL PLACARDS SHOWN MAY BE REQUIRED BY LOCAL AHJ. CONTRACTOR TO VERIFY PLACARD REQUIREMENTS WITH LOCAL AHJ BEFORE INSTALLATION.
2. ALL PLAQUES AND SIGNAGE REQUIRED BY THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE
3. ALTERNATE POWER SOURCE PLACARD SHALL BE METALLIC OR PLASTIC, ENGRAVED OR MACHINE PRINTED LETTERS IN A CONTRASTING COLOR TO THE PLAQUE. THIS PLAQUE WILL BE ATTCHED BY POP RIVETS OR SCREWS OR OTHER APPROVED METHOD.
4. DIRECTORY PLACARD MARKING CONTENT AND FORMAT: RED BACKGROUND, WHITE LETTERING, MINIMUM 3/8" LETTER HIEGHT, ALL CAPITAL LETTERS, ARIAL OR SIMILAR FONT, NON BOLD, REFLECTIVE WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT.



CONTRACTOR

BYLD

ADDRESS: 1213W MOOREHEAD ST,
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NC 28208
LICENSE #:

DESIGNER: OAH

MATTHEW EWING RESIDENCE

40 WENDYWOOD DR,
ANGIER
NC 27501

APN: 0681588704
DATE: 9/13/2023

DESIGN BY



SHEET
E-2
WARNING LABELS

Vertex S

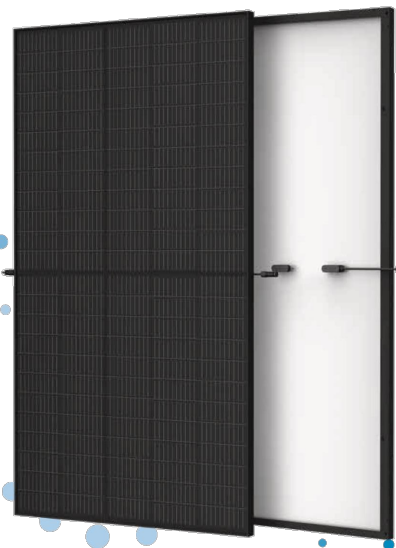
BACKSHEET MONOCRYSTALLINE MODULE

PRODUCT: TSM-DE09.05
POWER RANGE: 380-395 W

395 W+
MAXIMUM POWER OUTPUT

0/+5 W
POSITIVE POWER TOLERANCE

20.5 %
MAXIMUM EFFICIENCY



Outstanding Visual Appearance

- Designed with aesthetics in mind
- Ultra-thin, virtually invisible busbars
- Excellent cell color control by machine selection

Small in size, big on power

- Generates up to 395 W, 20.5 % module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping, lower series resistance, improved current collection and enhanced reliability
- Excellent low light performance (IAM) with cell process and module material optimization

Universal solution for residential and C&I rooftops

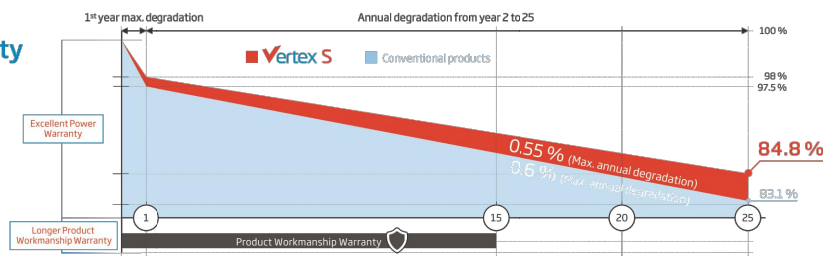
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling. Optimized transportation cost
- Reduces installation cost with higher power bin and efficiency
- Flexible installation solutions for system deployment

High Reliability

- 6,000 Pa snow load (test load)
- 4,000 Pa wind load (test load)

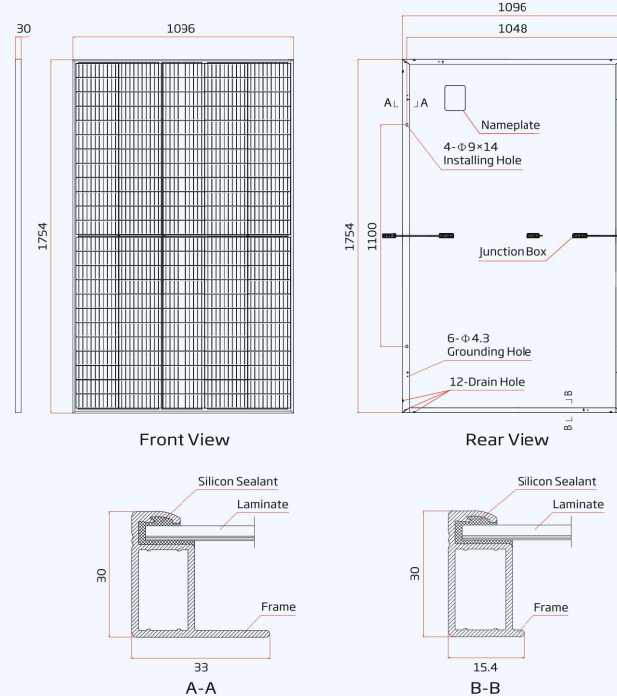
Extended Vertex S Warranty

- 2% 1st year max. degradation
- 0.55% Max. annual degradation from year 2 to 25
- 15 Years Product Workmanship Warranty

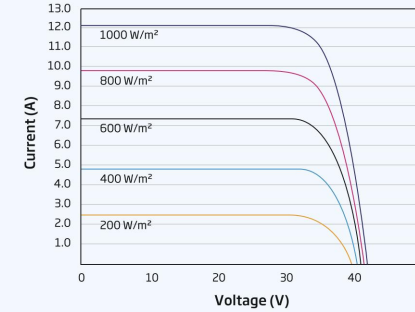


Vertex S

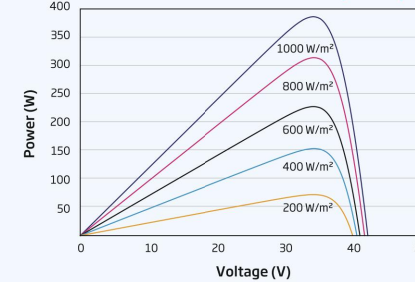
DIMENSIONS OF PV MODULE (mm)



I-V CURVES OF PV MODULE (390 W)



P-V CURVES OF PV MODULE (390 W)



ELECTRICAL DATA (STC)	TSM-380 DE09.05	TSM-385 DE09.05	TSM-390 DE09.05	TSM-395 DE09.05
Peak Power Watts-P _{MAX} (Wp)*	380	385	390	395
Power Tolerance-P _{MAX} (W)	0/+5	0/+5	0/+5	0/+5
Maximum Power Voltage-V _{MPP} (V)	33.4	33.6	33.8	34.0
Maximum Power Current-I _{MPP} (A)	11.38	11.46	11.54	11.62
Open Circuit Voltage-V _{OC} (V)	40.4	40.6	40.8	41.0
Short Circuit Current-I _{SC} (A)	12.00	12.07	12.14	12.21
Module Efficiency η _m (%)	19.8	20.0	20.3	20.5

STC: Irradiance 1000 W/m², Cell Temperature 25 °C, Air Mass AM1.5 *Measuring tolerance: ±3%

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	120 cells
Module Dimensions	1754×1096×30 mm
Weight	21.0 kg
Glass	3.2 mm, High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	EVA/POE
Backsheet	Black-White
Frame	30 mm Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0 mm² Landscape: 1100/1100 mm Portrait: 280/280 mm*
Connector	TS4/MC4 EV02*

*Special order only

ELECTRICAL DATA (NOCT)	TSM-380 DE09.05	TSM-385 DE09.05	TSM-390 DE09.05	TSM-395 DE09.05
Maximum Power-P _{MAX} (Wp)	286	290	294	298
Maximum Power Voltage-V _{MPP} (V)	31.4	31.6	31.8	31.9
Maximum Power Current-I _{MPP} (A)	9.12	9.18	9.24	9.32
Open Circuit Voltage-V _{OC} (V)	38.0	38.2	38.4	38.6
Short Circuit Current-I _{SC} (A)	9.67	9.73	9.78	9.84

NOCT: Irradiance at 800 W/m², Ambient Temperature 20 °C, Wind Speed 1 m/s.

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43 °C (±2 K)
Temperature Coefficient of P _{MAX}	-0.34 %/K
Temperature Coefficient of V _{OC}	-0.25 %/K
Temperature Coefficient of I _{SC}	0.04 %/K

MAXIMUM RATINGS

Operational Temperature	-40 to +85 °C
Maximum System Voltage	1500 V DC (IEC)
Max Series Fuse Rating	20 A

WARRANTY

- 15 Year product workmanship warranty
- 25 Year power warranty
- 2% First year degradation
- 0.55% Annual power degradation

(Please refer to the applicable limited warranty for details)

PACKAGING CONFIGURATION

Modules per box	36 pieces
Modules per 40' container	936 pieces

Comprehensive Product and System Certificates



Trinasolar

Trinasolar

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

BYLD BETTER

CONTRACTOR

BYLD

ADDRESS: 1213W
MOOREHEAD ST,
STE 500 CHARLOTTE,
NC 28208
LICENSE #:

DESIGNER: OAH

MATTHEW EWING
RESIDENCE

40 WENDYWOOD DR,
ANGIER
NC 27501

APN: 0681588704
DATE: 9/13/2023

DESIGN BY

Complete Solar
A Brighter Way.

SHEET
S-1
SPEC SHEET



IQ8 Series 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 in advanced 55nm 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 Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.



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 IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.



IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

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IQ8SE-DS-0001-01-EN-US-2022-03-17

Easy to install

- Lightweight and compact with plug-n-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) requirements

* Only when installed with IQ System Controller 2, meets UL 1741. IQ8H-208V operates only in grid-tied mode.
 ** IQ8 Series Microinverters supports split phase, 240V. IQ8H-208 supports split phase, 208V only.

IQ8 Series Microinverters

INPUT DATA [DC]		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US ¹
Commonly used module pairings ²	W	235 – 350	235 – 440	260 – 460	295 – 500	320 – 540+	295 – 500+
Module compatibility		60-cell/120 half-cell		60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell			
MPPT voltage range	V	27 – 37	29 – 45	33 – 45	36 – 45	38 – 45	38 – 45
Operating range	V	25 – 48			25 – 58		
Min/max start voltage	V	30 / 48			30 / 58		
Max input DC voltage	V	50			60		
Max DC current ³ [module Isc]	A				15		
Overvoltage class DC port					II		
DC port backfeed current	mA				0		
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit					
OUTPUT DATA [AC]		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US ¹
Peak output power	VA	245	300	330	366	384	366
Max continuous output power	VA	240	290	325	349	380	360
Nominal (L-L) voltage/range ⁴	V			240 / 211 – 264			208 / 183 – 250
Max continuous output current	A	1.0	1.21	1.35	1.45	1.58	1.73
Nominal frequency	Hz			60			
Extended frequency range	Hz			50 – 68			
AC short circuit fault current over 3 cycles	Arms			2			4.4
Max units per 20 A (L-L) branch circuit ⁵		16	13	11	11	10	9
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	%	97.5	97.6	97.6	97.6	97.6	97.4
CEC weighted efficiency	%	97	97	97	97.5	97	97
Night-time 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		MC4					
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")					
Weight		1.08 kg (2.38 lbs)					
Cooling		Natural convection – no fans					
Approved for wet locations		Yes					
Pollution degree		PD3					
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure					
Environ. category / UV exposure rating		NEMA Type 6 / outdoor					
COMPLIANCE							
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEE1547, 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 Shut Down 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.					

(1) The IQ8H-208 variant will be operating in grid-tied mode only at 208V AC. (2) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility> (3) Maximum continuous input DC current is 10.6A (4) Nominal voltage range can be extended beyond nominal if required by the utility. (5) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SE-DS-0001-01-EN-US-2022-03-17

BYLD BETTER

CONTRACTOR

BYLD

ADDRESS: 1213W
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 LICENSE #:

DESIGNER: OAH

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 RESIDENCE

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APN: 0681588704
 DATE: 9/13/2023

DESIGN BY

Complete Solar
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SHEET
 S-2
 SPEC SHEET

Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4
X-IQ-AM1-240-4C



The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed

Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), 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.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS (not included, order separately)	
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 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° 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.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

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CONTRACTOR

BYLD

ADDRESS: 1213W
MOOREHEAD ST,
STE 500 CHARLOTTE,
NC 28208
LICENSE #:

DESIGNER: OAH

MATTHEW EWING
RESIDENCE

40 WENDYWOOD DR,
ANGIER
NC 27501

APN: 0681588704
DATE: 9/13/2023

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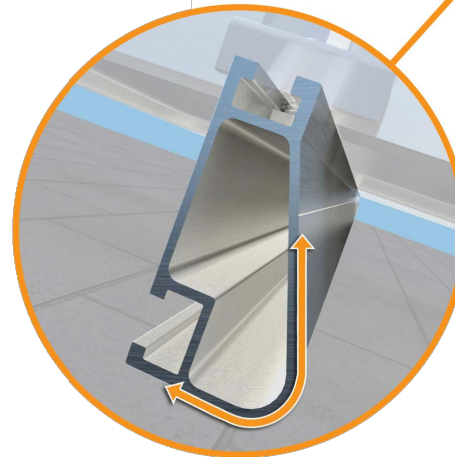
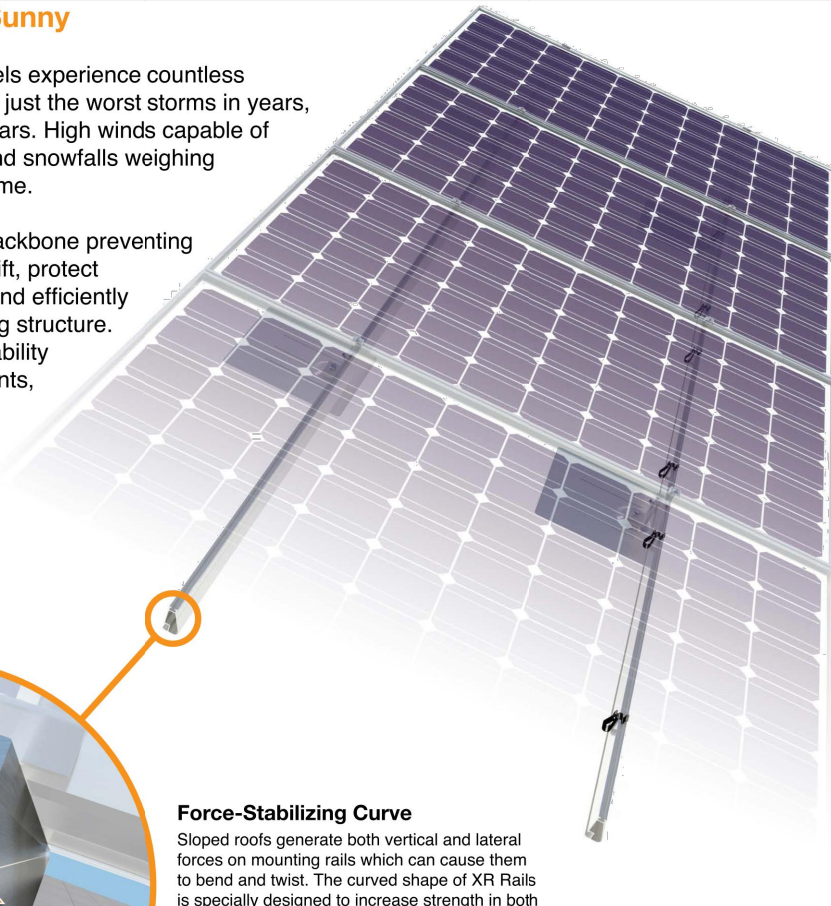
Tech Brief

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

Tech Brief

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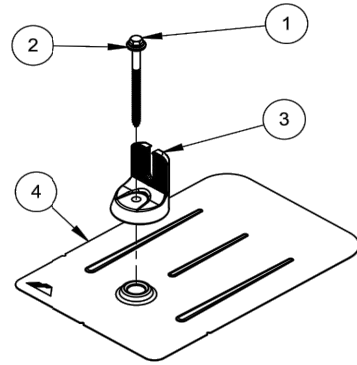
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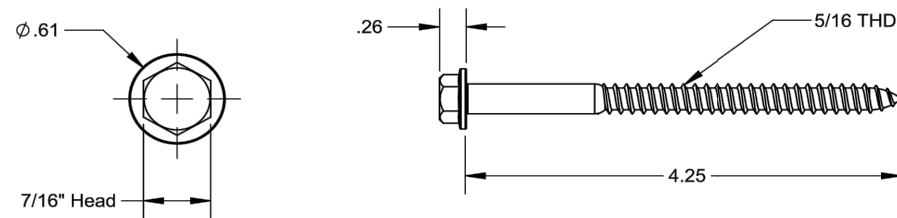


ITEM NO	DESCRIPTION	QTY IN KIT
1	BOLT, LAG 5/16 X 4.25"	1
2	WASHER, EPDM BACKED	1
3	FM FLASHING, MILL OR BLACK	1
4	GRIP CAP, MILL OR BLACK	1

FLASHVUE

PART NUMBER	DESCRIPTION
FV-01-M1	FLASHING, FLASHFOOT, MILL
FV-01-B1	FLASHING, FLASHFOOT, BLACK

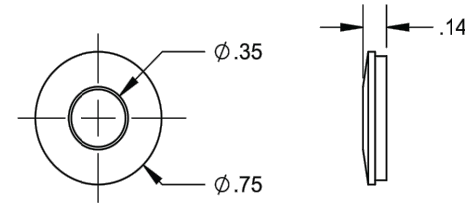
1) BOLT, LAG 5/16 x 4.25"



Property	Value
Material	300 Series Stainless Steel
Finish	Clear

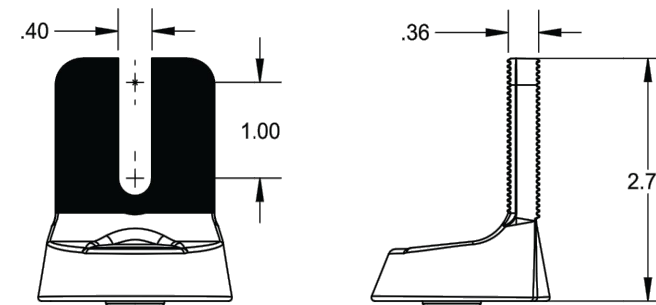
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2) Washer, EPDM Backed



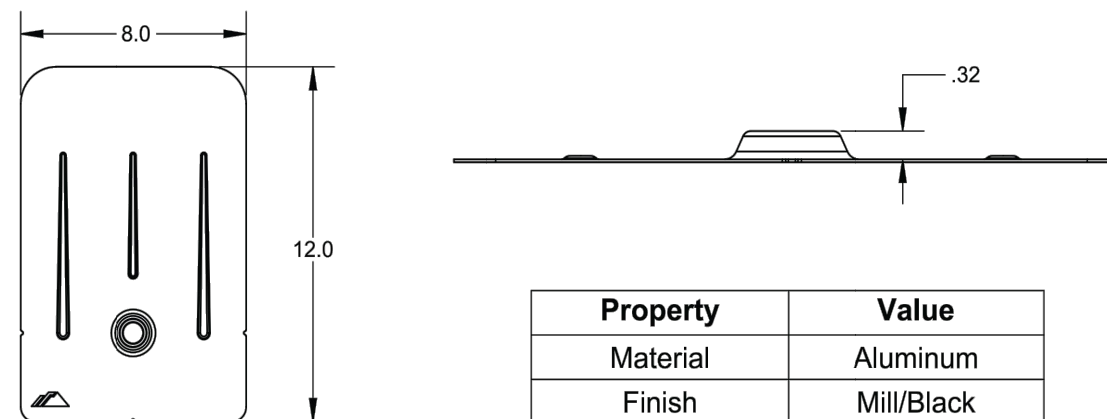
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

3) Grip Cap



Property	Value
Material	Aluminum
Finish	Mill/Black

4) FM Flashing



Property	Value
Material	Aluminum
Finish	Mill/Black

v1.0

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