1.1.1 **PROJECT NOTES:**

1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC 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.

1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION

1.1.4 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS INTEGRATED WITH THE MICROINVERTER IN ACCORDANCE WITH NEC 690.41(B)

1.1.5 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:
PV MODULES: UL1703, 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

1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.

1.1.7 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].

1.1.8 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.

1.2.1 **SCOPE OF WORK:**

1.2.2 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.

1.3.1 **WORK INCLUDES:**

1.3.2 PV ROOF ATTACHMENTS - S!5 S-5-V CLAMPS WITH L-FOOT

1.3.3 PV RACKING SYSTEM INSTALLATION - IRONRIDGE XR-100

1.3.4 PV MODULE AND INVERTER INSTALLATION - LG ELECTRONICS LG415N2W-L5 / ENPHASE IQ7PLUS-72-2-US

1.3.5 PV EQUIPMENT GROUNDING

1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX

1.3.7 PV LOAD CENTERS (IF INCLUDED)

1.3.8 PV METERING/MONITORING (IF INCLUDED)

1.3.9 PV DISCONNECTS

1.3.10 PV GROUNDING ELECTRODE & BONDING TO (E) GEC

1.3.11 PV FINAL COMMISSIONING

1.3.12 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV

1.3.13 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SCOPE OF WORK

SYSTEM SIZE:	STC: 21 X 415W = 8.715KW PTC: 21 X 386W = 8.106KW (21) LG ELECTRONICS LG415N2W-L5 (21) ENPHASE IQ7PLUS-72-2-US
ATTACHMENT TYPE:	S!5 S-5-V CLAMPS WITH L-FOOT
MSP UPGRADE:	NO

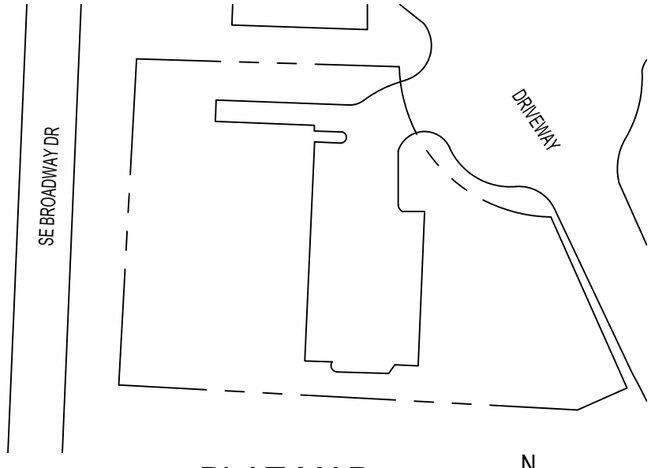
NEW PV SYSTEM: 8.715 kWp

HIGDON RESIDENCE

1450 SE BROADWAY DR
LEES SUMMIT, MO 64081
ASSESSOR'S #: 61720124600000000

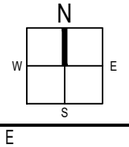
01 AERIAL PHOTO

SCALE: NOT TO SCALE



02 PLAT MAP

SCALE: NOT TO SCALE



SHEET LIST TABLE

SHEET NUMBER	SHEET TITLE
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R-003	RESOURCE DOCUMENT
R-004	RESOURCE DOCUMENT
R-005	RESOURCE DOCUMENT
R-006	RESOURCE DOCUMENT
R-007	RESOURCE DOCUMENT

PROJECT INFORMATION

OWNER
NAME: KEVIN HIGDON

PROJECT MANAGER
NAME: JUSTIN CASTLEMAN
PHONE: 816-406-8180

CONTRACTOR
NAME: THE SOLAR GUYS
PHONE: 816-708-5556

AUTHORITIES HAVING JURISDICTION
BUILDING: JACKSON COUNTY
ZONING: JACKSON COUNTY
UTILITY: KCPL-M

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL GRID-TIED
GROUND SNOW LOAD: 20 PSF
WIND EXPOSURE: B
WIND SPEED: 115 MPH

APPLICABLE CODES & STANDARDS
BUILDING: IBC 2018, IRC 2018
ELECTRICAL: NEC 2017
FIRE: IFC 2018

CONTRACTOR

THE SOLAR GUYS

PHONE: 816-708-5556
ADDRESS: 6114 MO-9 SUITE C1
PARKVILLE, MO 64152

LIC. NO.:
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 8.715 kWp

HIGDON RESIDENCE

1450 SE BROADWAY DR
LEES SUMMIT, MO 64081
APN: 61720124600000000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

COVER PAGE

DATE: 11.24.2020

DESIGN BY: A.G.

CHECKED BY: M.M.

REVISIONS

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(SHEET 1)

2.1.1 **SITE NOTES:**

2.1.2 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.

2.1.3 THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.

2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.

2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.

2.1.6 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.

2.2.1 **EQUIPMENT LOCATIONS:**

2.2.2 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.

2.2.3 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).

2.2.4 JUNCTION AND PULL BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.

2.2.5 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.

2.2.6 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.

2.2.7 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3.1 **STRUCTURAL NOTES:**

2.3.2 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO 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, ACCORDING TO RAI MANUFACTURER'S INSTRUCTIONS.

2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS. IF ROOF-PENETRATING TYPE, IT SHALL BE FLASHED & SEALED PER LOCAL REQUIREMENTS.

2.3.4 ROOFTOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALED W/ APPROVED CHEMICAL SEALANT PER CODE BY A LICENSED CONTRACTOR.

2.3.5 ALL PV RELATED ROOF ATTACHMENTS TO BE SPACED NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.

2.3.6 WHEN POSSIBLE, ALL PV RELATED RACKING ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4.1 **WIRING & CONDUIT NOTES:**

2.4.2 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.

2.4.3 CONDUCTORS SIZED ACCORDING TO NEC 690.8, NEC 690.7.

2.4.4 VOLTAGE DROP LIMITED TO 1.5%.

2.4.5 DC WIRING LIMITED TO MODULE FOOTPRINT. MICROINVERTER WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.

2.4.6 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].

4.5.1 **GROUNDING NOTES:**

2.5.2 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USE.

2.5.3 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.

2.5.4 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURES CONSIDERED GROUNDED IN ACCORD WITH 250.134 AND 250.136(A).

2.5.5 EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45 AND MICROINVERTER MANUFACTURERS' INSTRUCTIONS.

2.5.6 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.

2.5.7 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.

2.5.8 GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLORED GREEN OR MARKED GREEN IF #4 AWG OR LARGER [NEC 250.119]

2.5.9 THE GROUNDING ELECTRODE SYSTEM COMPLIES WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, A GROUNDING ELECTRODE SYSTEM PROVIDED ACCORDING TO NEC 250, NEC 690.47 AND AHJ.

2.5.10 GROUND-FAULT DETECTION SHALL COMPLY WITH NEC 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS

2.6.1 **DISCONNECTION AND OVER-CURRENT PROTECTION NOTES:**

2.6.2 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).

2.6.3 DISCONNECTS TO BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH

2.6.4 PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS IN ACCORDANCE WITH 690.12(A) THROUGH (D).

2.6.5 ALL OCPD RATINGS AND TYPES SPECIFIED ACCORDING TO NEC 690.8, 690.9, AND 240.

2.6.6 MICROINVERTER BRANCHES CONNECTED TO A SINGLE BREAKER OR GROUPED FUSES IN ACCORDANCE WITH NEC 110.3(B).

2.6.7 IF REQUIRED BY AHJ, SYSTEM WILL INCLUDE ARC-FAULT CIRCUIT PROTECTION ACCORDING TO NEC 690.11 AND UL1699B.

2.7.1 **INTERCONNECTION NOTES:**

2.7.2 LOAD-SIDE INTERCONNECTION SHALL BE IN ACCORDANCE WITH [NEC 705.12 (B)]

2.7.3 THE SUM OF THE UTILITY OCPD AND INVERTER CONTINUOUS OUTPUT MAY NOT EXCEED 120% OF BUSBAR RATING [NEC 705.12(D)(2)(3)].

2.7.4 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 [NEC 705.12(B)(2)(3)].

2.7.5 AT MULTIPLE ELECTRIC POWER SOURCES OUTPUT COMBINER PANEL, TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACITY OF BUSBAR. HOWEVER, THE COMBINED OVERCURRENT DEVICE MAY BE EXCLUDED ACCORDING TO NEC 705.12 (B)(2)(3)(C).

2.7.6 FEEDER TAP INTERCONNECTION (LOAD SIDE) ACCORDING TO NEC 705.12 (B)(2)(1)

2.7.7 SUPPLY SIDE TAP INTERCONNECTION ACCORDING TO NEC 705.12 (A) WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH NEC 230.42

2.7.8 BACKFEEDING BREAKER FOR ELECTRIC POWER SOURCES OUTPUT IS EXEMPT FROM ADDITIONAL FASTENING [NEC 705.12 (B)(5)].

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LIC. NO.:
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 8.715 kWp

HIGDON RESIDENCE

1450 SE BROADWAY DR
LEES SUMMIT, MO 64081
APN: 61720124600000000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

NOTES

DATE: 11.24.2020

DESIGN BY: A.G.

CHECKED BY: M.M.

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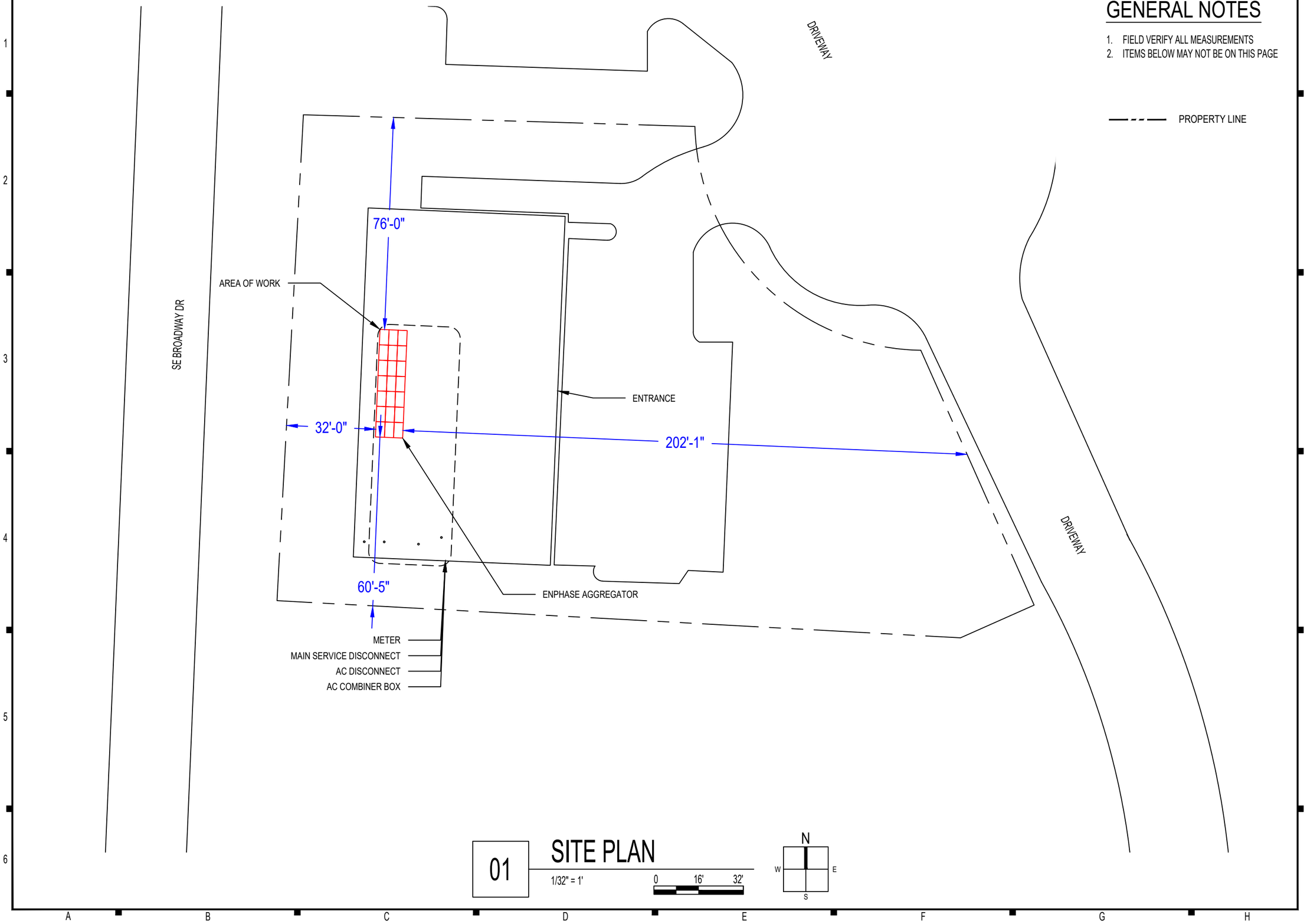
(SHEET 2)



GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

PROPERTY LINE

01 SITE PLAN

1/32" = 1'

0 16' 32'

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SITE PLAN

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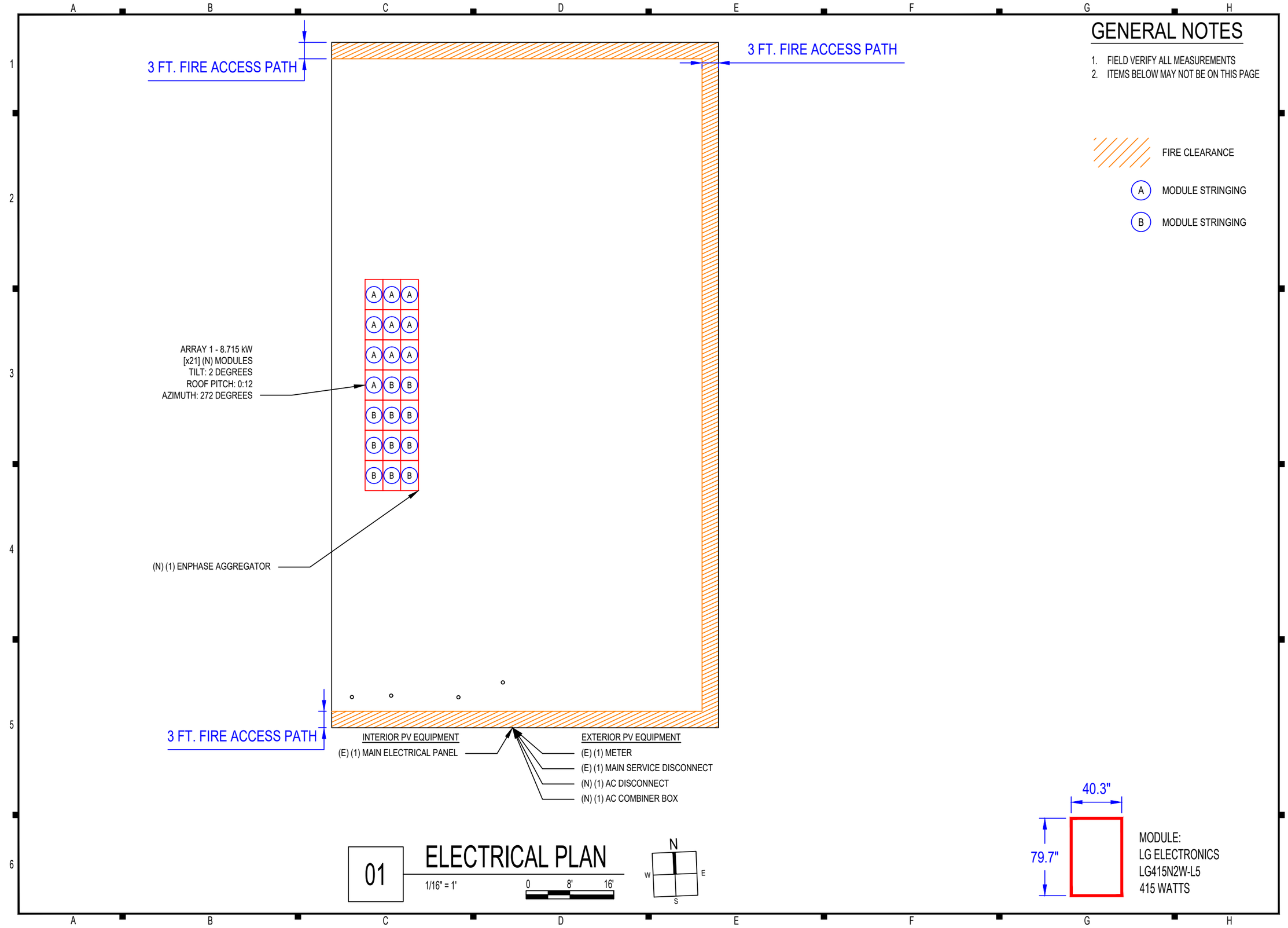

GENERAL NOTES

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FIRE CLEARANCE

(A) MODULE STRINGING

(B) MODULE STRINGING

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PARKVILLE, MO 64152

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ELECTRICAL PLAN

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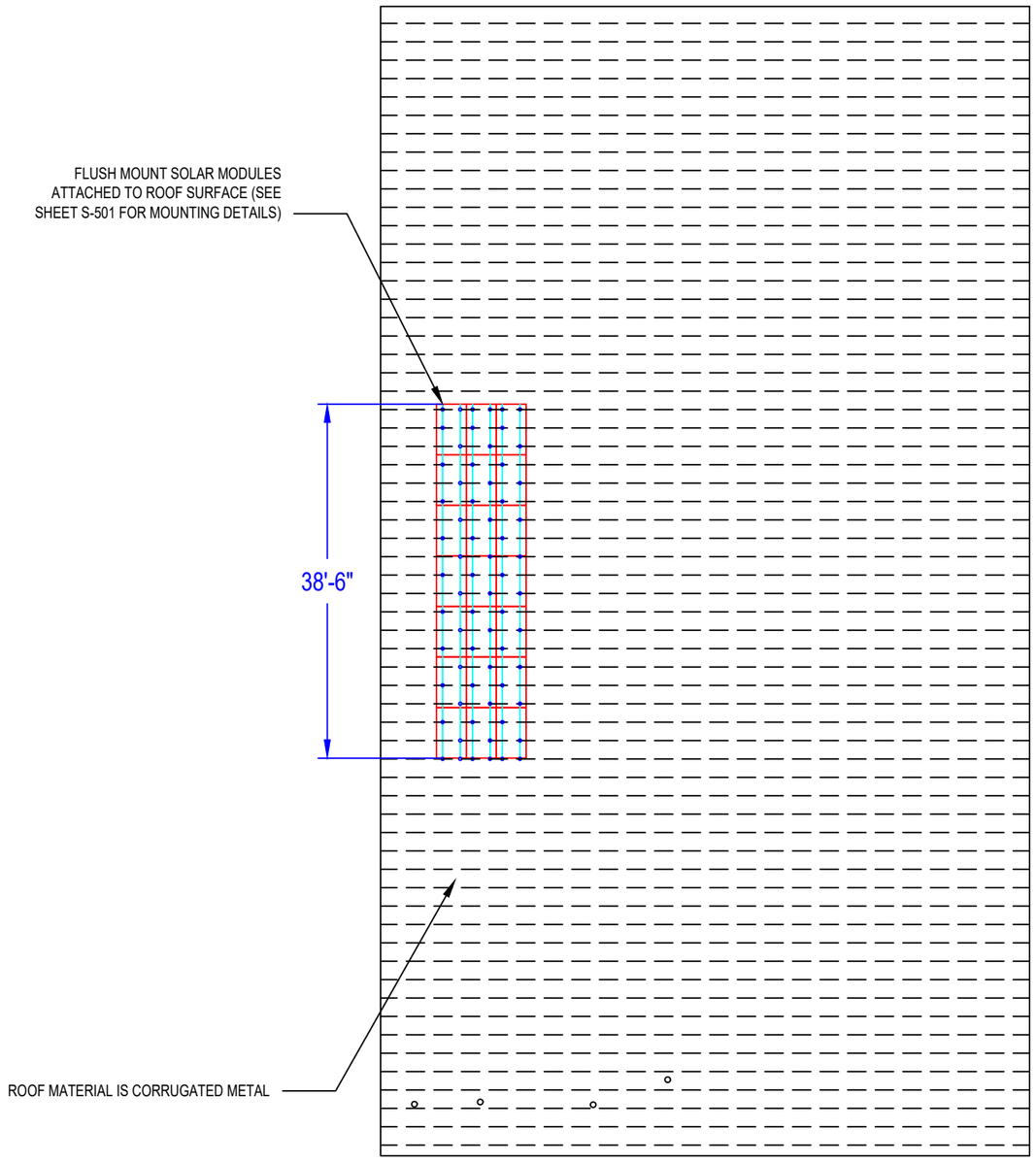

GENERAL NOTES

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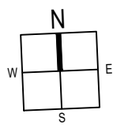
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

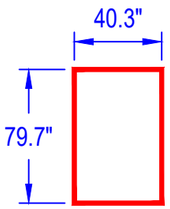
-------- METAL RIBS

01 SOLAR ATTACHMENT PLAN

1/16" = 1'

0 8' 16'





MODULE:
LG ELECTRONICS
LG415N2W-L5
415 WATTS

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THE SOLAR GUYS

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SOLAR ATTACHMENT PLAN

DATE: 11.24.2020
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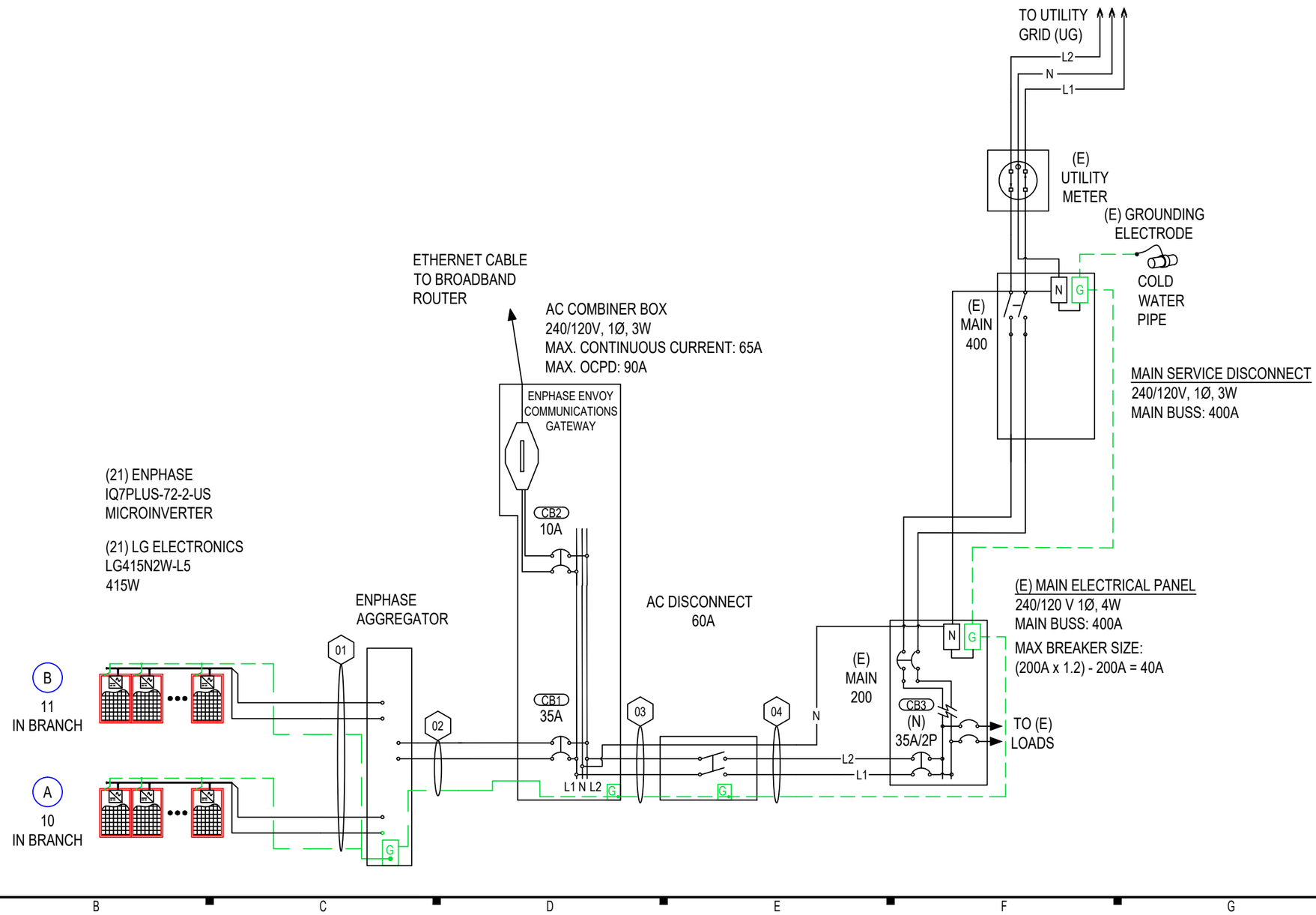
CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT	CURRENT-CARRYING CONDUCTORS IN CONDUIT	OCPD	EGC	TEMP. CORR. FACTOR	CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERMINAL
01	1	10 AWG THWN-2, COPPER	0.5" DIA EMT	4	N/A	8 AWG THWN-2, COPPER	0.91 (36.2 °C)	0.8	13.31A	16.64A	40A	29.12A	75°C	35A
02	1	8 AWG THWN-2, COPPER	0.75" DIA EMT	2	35A	8 AWG THWN-2, COPPER	0.91 (36.2 °C)	1	25.41A	31.76A	55A	50.05A	75°C	50A
03	1	8 AWG THWN-2, COPPER	0.75" DIA EMT	2	N/A	8 AWG THWN-2, COPPER	0.91 (36.2 °C)	1	25.41A	31.76A	55A	50.05A	75°C	50A
04	1	8 AWG THWN-2, COPPER	0.75" DIA EMT	2	35A	8 AWG THWN-2, COPPER	0.91 (36.2 °C)	1	25.41A	31.76A	55A	50.05A	75°C	50A



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LINE DIAGRAM

DATE: 11.24.2020
DESIGN BY: A.G.
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(SHEET 6)

SYSTEM SUMMARY		
	BRANCH #1	BRANCH #2
INVERTERS PER BRANCH	10	11
MAX AC CURRENT	12.1A	13.31A
MAX AC OUTPUT POWER	2,950W	3,245W
ARRAY STC POWER	8,715W	
ARRAY PTC POWER	8,106W	
MAX AC CURRENT	25.41A	
MAX AC POWER	6,195W	
DERATED (CEC) AC POWER	6,195W	

MODULES										
REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-21	21	LG ELECTRONICS LG415N2W-L5	415W	386W	10.59A	9.94A	49.6V	41.8V	-0.129V/°C (-0.26%/°C)	20A

INVERTERS										
REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	OCPD RATING	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1-21	21	ENPHASE IQ7PLUS-72-2-US	240V	FLOATING	20A	290W	1.21A	15A	60V	97.0%

DISCONNECTS				
REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	EATON DG222URB OR EQUIV.	60A	240VAC

OCPDS			
REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1,3	2	35A	240VAC
CB2	1	10A	240VAC

ASHRAE EXTREME LOW	-22.6°C (-8.7°F), SOURCE: CHARLES B WHEELER D (39.12°; -94.59°)
ASHRAE 2% HIGH	36.2°C (97.2°F), SOURCE: CHARLES B WHEELER D (39.12°; -94.59°)

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DESIGN TABLES

DATE: 11.24.2020

DESIGN BY: A.G.

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E-602.00
(SHEET 7)

LABELING NOTES
1.1 LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535
1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

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

LABEL 1
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (2" X 4").
[NEC 690.13].

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

LABEL 2
AT POINT OF INTERCONNECTION OVERCURRENT DEVICE (2" X 4").
[NEC 705.12(B)(2)(3)(B)].

PHOTOVOLTAIC SYSTEM AC DISCONNECT ⚠ ⚠
RATED AC OUTPUT CURRENT 25.41 A
NOMINAL OPERATING AC VOLTAGE 240 V

LABEL 3
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS (4" X 2").
[NEC 690.54]

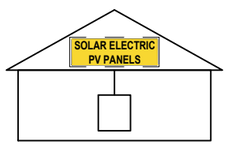
PHOTOVOLTAIC SOLAR AC DISCONNECT

LABEL 4
AT EACH AC DISCONNECTING MEANS (4" X 1").
[NEC 690.13(B)].

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 5
AT RAPID SHUTDOWN DISCONNECT SWITCH (5 1/4" X 2").
[NEC 690.56(C)(3)].

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN



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

LABEL 6
AT RAPID SHUTDOWN SYSTEM (3 3/4" X 5 1/4"). [NEC 690.56(C)(1)(A)].

⚠ WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL 7
AT POINT OF INTERCONNECTION (2 3/4" X 1 5/8").
[NEC 705.12(B)(3)]

⚠ WARNING
SOLAR ELECTRIC CIRCUIT BREAKER IS BACKFED

LABEL 8
AT POINT OF INTERCONNECTION (2" X 1").
[NEC 705.12(B)(3)]

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED
PHOTOVOLTAIC SYSTEM DISCONNECT LOCATED SOUTH SIDE OF THE HOUSE

DIRECTORY
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION (5 3/4" X 1 1/8").
[NEC 690.56(B)]

WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS.
PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS
[NEC 690.4(D),(E)]

WARNING: PHOTOVOLTAIC POWER SOURCE

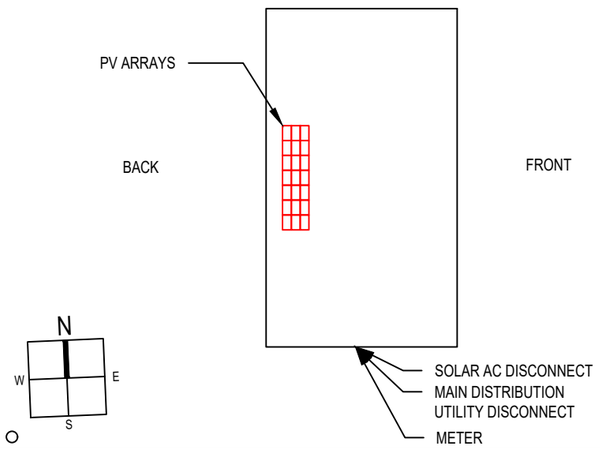
LABEL 9
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS (5 3/4" X 1 1/8").
[NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

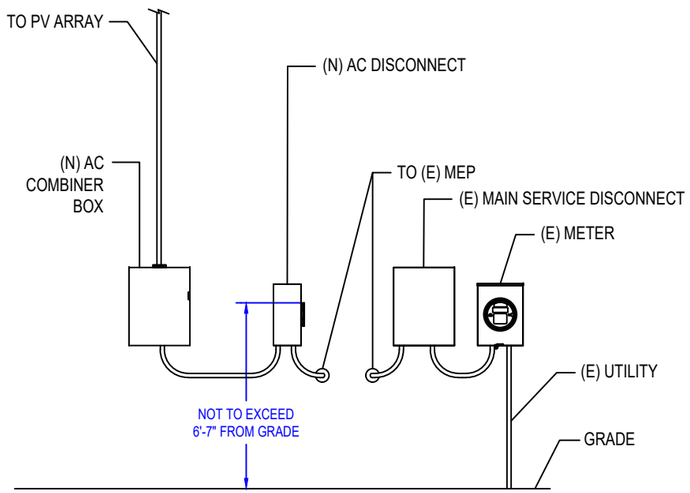
⚠ CAUTION
SOLAR ELECTRIC SYSTEM CONNECTED

LABEL 10
AT UTILITY METER (5 3/4" X 1 1/8")
[NEC 690.56(B)]

!CAUTION!

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:





01 EQUIPMENT ELEVATION
SCALE: NOT TO SCALE

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ADDRESS: 6114 MO-9 SUITE C1
PARKVILLE, MO 64152

LIC. NO.:
HIC. NO.:
ELE. NO.:

NEW PV SYSTEM: 8.715 kWp

HIGDON RESIDENCE

1450 SE BROADWAY DR
LEES SUMMIT, MO 64081
APN: 61720124600000000

ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

DATE: 11.24.2020
DESIGN BY: A.G.
CHECKED BY: M.M.

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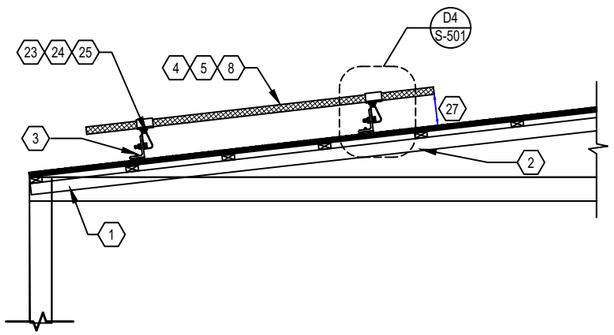
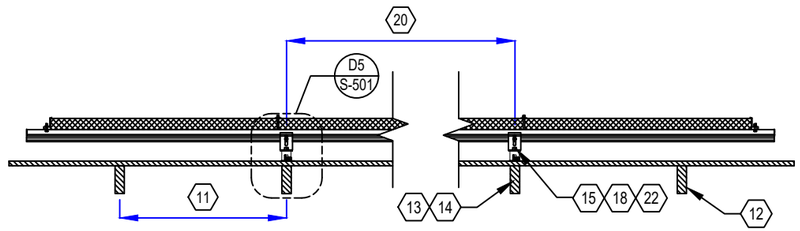
(SHEET 8)



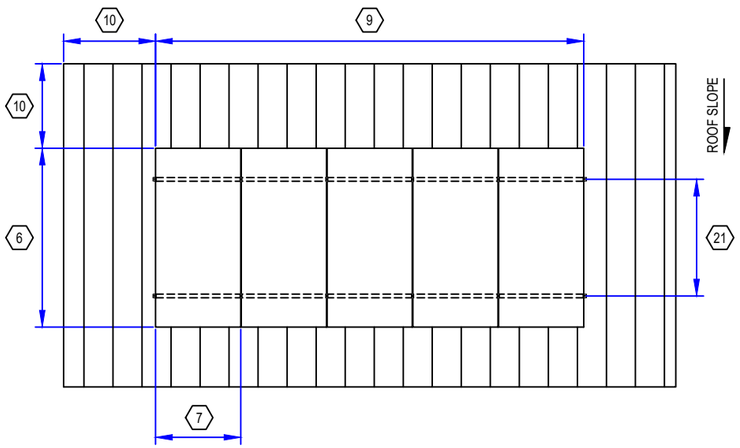
D1 RACKING DETAIL (TRANSVERSE)

SCALE: NOT TO SCALE



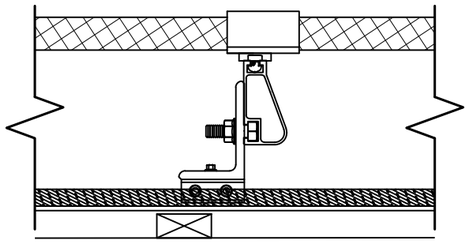
D2 RACKING DETAIL (LONGITUDINAL)

SCALE: NOT TO SCALE



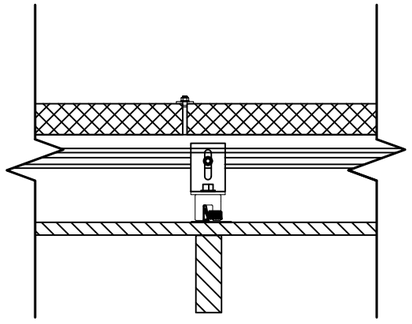
D3 RACKING DETAIL (TOP)

SCALE: NOT TO SCALE



D4 DETAIL (TRANSVERSE)

SCALE: NOT TO SCALE



D5 DETAIL (LONGITUDINAL)

SCALE: NOT TO SCALE

GENERAL NOTES

1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

SHEET KEYNOTES

1. ROOF MATERIAL: CORRUGATED METAL
2. ROOF STRUCTURE: PURLINS
3. ATTACHMENT TYPE: S!5 S-5-V CLAMPS WITH L-FOOT
4. MODULE MANUFACTURER: LG ELECTRONICS
5. MODULE MODEL: LG415N2W-L5
6. MODULE LENGTH: 79.7 IN.
7. MODULE WIDTH: 40.3 IN.
8. MODULE WEIGHT: 47.4 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: 3 FT. FROM RIDGE/RAKE, 18 IN. FROM HIPS/
11. PURLINS SPACING: N/A
12. PURLINS SIZE: N/A
13. LAG BOLT DIAMETER: BOLT/SCREW SUPPLIED WITH RACKING
14. LAG BOLT EMBEDMENT: PER RACKING MFG SPECIFICATIONS
15. TOTAL # OF ATTACHMENTS: 66
16. TOTAL AREA: 468.4 SQ. FT.
17. TOTAL WEIGHT: 1235.07 LBS.
18. WEIGHT PER ATTACHMENT: 18.71 LBS.
19. DISTRIBUTED LOAD: 2.64 PSF.
20. MAX. HORIZONTAL STANDOFF: 48 IN.
21. MAX. VERTICAL STANDOFF:
    LANDSCAPE: 21 IN., PORTRAIT: 40 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIV.): IRONRIDGE
24. RAIL MODEL (OR EQUIVALENT): XR-100
25. RAIL WEIGHT: 0.68 PLF.
26. MAX. PURLINS SPAN: N/A FT.
27. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.

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APN: 61720124600000000

ENGINEER OF RECORD

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ASSEMBLY DETAILS

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DESIGN BY: A.G.
CHECKED BY: M.M.

REVISIONS

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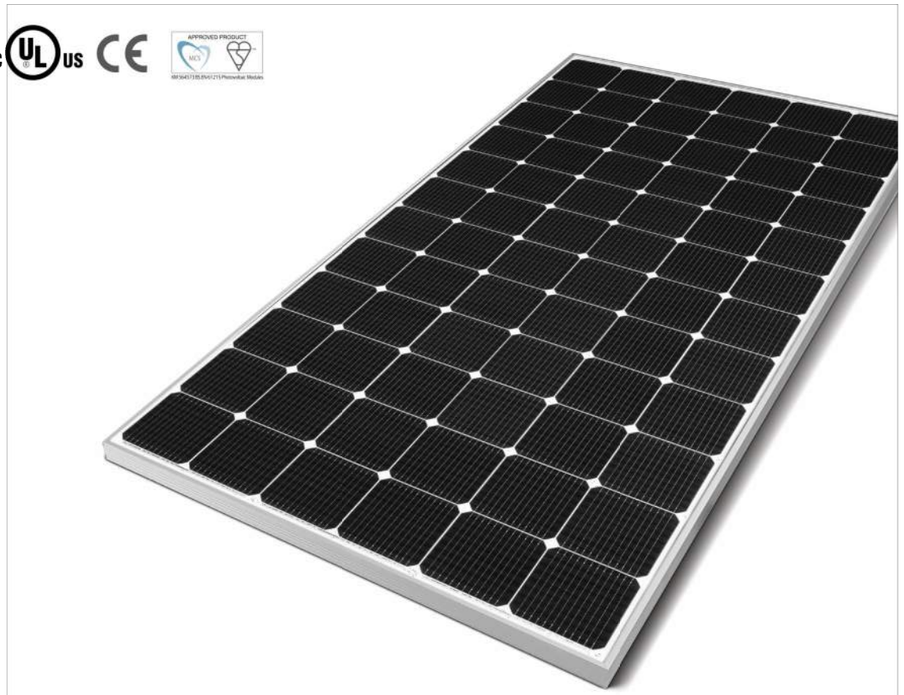
(SHEET 9)

LG NeON®2

72

425W | 420W | 415W | 410W

The LG NeON® 2 is LG's best selling solar module, and is one of the powerful and versatile modules on the market today.



Feature

Enhanced Performance Warranty

LG NeON® 2 has an enhanced performance warranty. After 25 years, LG NeON® 2 is guaranteed to perform at minimum 90.1% of initial performance.

Enhanced Product warranty

Because of the high quality of LG solar panels, LG provides 25 years product warranty to customers.

About LG Electronics

LG Electronics is a global big player, committed to expanding its operations with the solar market. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first MonoX® series to the market, which is now available in 32 countries. The NeON® (previous. MonoX® NeON), NeON®2, NeON®2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2016, which demonstrates LG Solar's lead, innovation and commitment to the industry.

LG NeON®2

LG425N2W-L5 I LG420N2W-L5 I LG415N2W-L5 I LG410N2W-L5

General Data

Cell Properties(Material / Type)	Monocrystalline / N-type
Cell Maker	LG
Cell Configuration	72 Cells (6 x 12)
Number of Busbars	12EA
Module Dimensions (L x W x H)	2,024mm x 1,024mm x 40 mm
Weight	21.5 kg
Glass(Thickness / Material)	2.8mm / Tempered Glass with AR Coating
Backsheet(Color)	White
Frame(Material)	Anodized Aluminium
Junction Box(Protection Degree)	IP 68 with 3 Bypass Diodes
Cables(Length)	1,200 mm x 2EA
Connector(Type / Maker)	MC4 / MC4 Compatible

Certifications and Warranty

Certifications	IEC 61215-1/-1-1/2:2016, IEC 61730-1/2:2016, UL 61730-1/-2:2017
	ISO 9001, ISO 14001, ISO 50001
	OHSAS 18001
Salt Mist Corrosion Test	IEC 61701 : 2011 Severity 6
Ammonia Corrosion Test	IEC 62716 : 2013
Module Fire Performance	Type 1 (UL 61730)
Fire Rating	Class C (UL 790)
Solar Module Product Warranty	25 Years
Solar Module Output Warranty	Linear Warranty*

* First year : 98%, After 1st year : 0.33% annual degradation, 90.1% at 25years

Temperature Characteristics

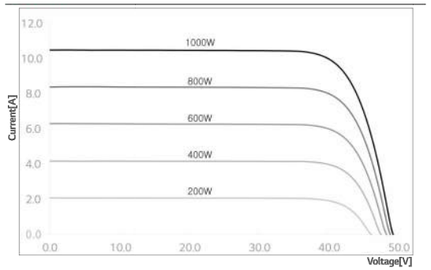
NMOT*	[°C]	42 ± 3
Pmax	[%/°C]	-0.35
Voc	[%/°C]	-0.26
Isc	[%/°C]	0.025

* NMOT (Nominal Module Operating Temperature): Irradiance 800 W/m², Ambient temperature 20 °C, Wind speed 1 m/s, Spectrum AM 1.5

Electrical Properties (NMOT)

Model		LG425N2W-L5	LG420N2W-L5	LG415N2W-L5	LG410N2W-L5
Maximum Power (Pmax)	[W]	319	315	312	308
MPP Voltage (Vmpp)	[V]	39.9	39.6	39.3	38.9
MPP Current (Impp)	[A]	7.99	7.96	7.93	7.91
Open Circuit Voltage (Voc)	[V]	47.0	46.9	46.8	46.7
Short Circuit Current (Isc)	[A]	8.57	8.54	8.51	8.48

I-V Curves



Electrical Properties (STC*)

Model		LG425N2W-L5	LG420N2W-L5	LG415N2W-L5	LG410N2W-L5
Maximum Power (Pmax)	[W]	425	420	415	410
MPP Voltage (Vmpp)	[V]	42.5	42.1	41.8	41.4
MPP Current (Impp)	[A]	10.01	9.98	9.94	9.91
Open Circuit Voltage (Voc, ±5%)	[V]	49.8	49.7	49.6	49.5
Short Circuit Current (Isc, ±5%)	[A]	10.67	10.63	10.59	10.55
Module Efficiency	[%]	20.5	20.3	20.0	19.8
Power Tolerance	[%]	0 ~ +3			

* STC (Standard Test Condition): Irradiance 1000 W/m², Cell temperature 25 °C, AM 1.5

** Measure Tolerance of Pmax : ±3%

Operating Conditions

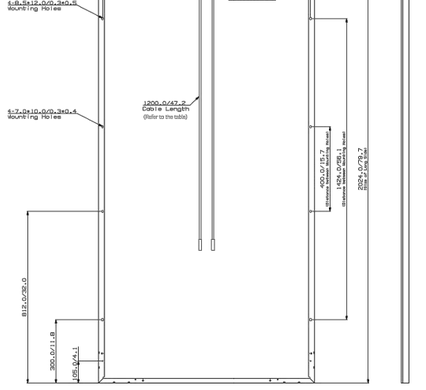
Operating Temperature	[°C]	-40 ~ +90
Maximum System Voltage	[V]	1,500(UL), 1000(IEC)
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load (Front)	[Pa / psf]	5,400 / 113
Mechanical Test Load (Rear)	[Pa / psf]	3,000 / 63

※ Mechanical Test Load 5,400Pa / 3,000Pa based on IEC 61215-2 : 2016
(Test Load = Design Load x Safety Factor(1.5))

Packaging Configuration

Number of Modules per Pallet	[EA]	25
Number of Modules per 40ft HQ Container	[EA]	550
Packaging Box Dimensions (L x W x H)	[mm]	2,080 x 1,120 x 1,226
Packaging Box Gross Weight	[kg]	551

Dimensions (mm / inch)



LG Electronics Inc.
Energy Business Division
LG Twin Towers, 128 Yeoui-daero, Yeongdeungpo-gu, Seoul
07336, Korea
www.lg-solar.com

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NEW PV SYSTEM: 8.715 kWp

HIGDON RESIDENCE

1450 SE BROADWAY DR
LEES SUMMIT, MO 64081
APN: 61720124600000000

ENGINEER OF RECORD

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DESIGN BY: A.G.

CHECKED BY: M.M.

REVISIONS

R-001.00

(SHEET 10)

Data Sheet
Enphase Microinverters
Region: AMERICAS

Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell modules.

To learn more about Enphase offerings, visit **enphase.com**

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Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	**IQ 7 Microinverter**		**IQ 7+ Microinverter**	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US)	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, 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 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit **enphase.com**

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2019-3-26

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(SHEET 11)

ONLINE CERTIFICATIONS DIRECTORY

QIJW.E341165
Photovoltaic Rapid Shutdown System Equipment

Page Bottom

Photovoltaic Rapid Shutdown System Equipment

See General Information for Photovoltaic Rapid Shutdown System Equipment

ENPHASE ENERGY INC E341165
1420 N McDowell Blvd
Petaluma, CA 94954-6515 USA

Cat. No.	Function	Ratings
Photovoltaic rapid shutdown system equipment		
M190-60, -72	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 190W
M210-84	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 210 W
M215-60	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 215W
M250-60, -72	Inverter/AC Attenuator	Input: 16-48VDC Output: 120/208 or 120/240, 250W
S230-60-LL-X-US	Inverter/AC Attenuator	Input: 22-48VDC Output: 208 or 240, 220W
S280-60-LL-X-US	Inverter/AC Attenuator	Input: 22-48VDC Output: 208 or 240, 270W
IQ6PLUS-72-X-US*(a)(b) IQ6PLUS-72-ACM*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 280W
IQ6-60-X-US*(a)(b) IQ6-60-ACM-US*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 230W
IQ7PLUS-72-X-US*(a)(b) IQ7PLUS-72-ACM*(b)	Inverter/AC Attenuator	Input: 16-62VDC Output: 208 or 240, 290W
IQ7-60-X-US*(a)(b) IQ7-60-ACM-US*(b)	Inverter/AC Attenuator	Input: 16-48VDC Output: 208 or 240, 240W

(a) - Where X may be 2 or 5

(b) - Where * may be any combination of letters or numbers or hypen or none

Last Updated on 2017-12-28

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(SHEET 12)

Data Sheet
Enphase Q Cable Accessories

Enphase Q Aggregator and Q Cable Accessories

The **Enphase Q Aggregator™** and **Enphase Q Cable™** are part of the sixth generation Enphase IQ System™. These accessories provide simplicity, reliability, and faster installation times.

Enphase Q Aggregator

- Reduces electrical labor and eliminates wire nuts for safer, faster installations
- Aggregates up to three fully populated 20A branch circuits
- Supports solar arrays of up to 11.5 kW with a single rooftop aggregator

Enphase Q Cable

- Two-wire, double-insulated Enphase Q Cable is 50% lighter than the previous generation Enphase cable
- New cable numbering and plug and play connectors speed up installation and simplify wire management
- Link connectors eliminate cable waste

Field-Wireable Connectors

- Easily connect Q cables on the roof without complex wiring
- Make connections from any open connector and center feed any section of cable within branch limits
- Available in male and female connector types

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE.

Enphase Q Cable Accessories

Q AGGREGATOR SPECIFICATIONS	
Model number	Q-BA-3-1P-60
Dimensions	190 mm (W) x 227 mm (D) x 80 mm (H) (7.5 in (W) x 9 in (D) x 3.2 in (H))
Enclosure rating	NEMA3 (up to 45° from horizontal)
Temperature range	-40° C to +55° C (-40° F to +122° F)
Compliance	UL1703, EN62109, UL6703A
Q CABLE SPECIFICATIONS	
Voltage rating	600V (connector rating 250 V)
Cable temperature rating	90° C (194° F)
Certification	UL3003, DG cable
Flame test rating	FT4
Compliance	RoHS, OIL RES I, CE, UV resistant, combined UL for Canada and United States
Cable insulator rating	THHN/THWN-2 dry/wet

Q CABLE TYPES / ORDERING OPTIONS

Model Number	Max Nominal Voltage	Connector Spacing	PV Module Orientation	Connector Count per Box
Q-12-10-240	250 VAC	1.3 m (4.2 ft)	Portrait	240
Q-12-17-240	250 VAC	2.0 m (6.5 ft)	Landscape (60-cell)	240
Q-12-20-200	250 VAC	2.3 m (7.5 ft)	Landscape (72-cell)	200

ENPHASE Q CABLE ACCESSORIES

Name	Model Number	Description
Enphase Q Aggregator	Q-BA-3-1P-60	Combines up to three microinverter branches into one home run.
Field-wireable connector (male)	Q-CONN-10M	Make connections from any Q Aggregator open connector
Field-wireable connector (female)	Q-CONN-10F	Make connections from any Q Cable open connector
Cable Clip	Q-CLIP-100	Used to fasten cabling to the racking or to secure looped cabling
Disconnect tool	Q-DISC-10	Disconnect tool for Q Cable connectors, DC connectors, and AC module mount
Q Aggregator sealing caps (male)	Q-BA-CAP-10	Sealing cap for unused aggregator connections
Q Cable sealing caps (female)	Q-SEAL-10	One needed to cover each unused connector on the cabling
Terminator	Q-TERM-10	Terminator cap for unused cable ends
Replacement DC Adaptor (MC4)	Q-DCC-2	DC adaptor to MC4 (max voltage 100 VDC)
Replacement DC Adaptor (UTX)	Q-DCC-5	DC adaptor to UTX (max voltage 100 VDC)

TERMINATOR
Terminator cap for unused cable ends, sold in packs of ten (Q-TERM-10)

SEALING CAPS
Sealing caps for unused aggregator and cable connections (Q-BA-CAP-10 and Q-SEAL-10)

DISCONNECT TOOL
Plan to use at least one per installation, sold in packs of ten (Q-DISC-10)

CABLE CLIP
Used to fasten cabling to the racking or to secure looped cabling, sold in packs of ten (Q-CLIP-100)

To learn more about Enphase offerings, visit **enphase.com**

2017-04-05

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ELE. NO.:

NEW PV SYSTEM: 8.715 kWp

HIGDON RESIDENCE

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LEES SUMMIT, MO 64081
APN: 61720124600000000

ENGINEER OF RECORD

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RESOURCE DOCUMENT

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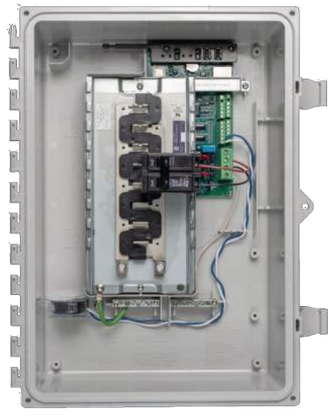
(SHEET 13)

Data Sheet
Enphase Networking

Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3**™ with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV 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 Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

Simple

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

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- UL listed

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE.

Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV **production** metering (ANSI C12.20 +/- 0.5%) and optional* **consumption** monitoring (+/- 2.5%).
ACCESSORIES and **REPLACEMENT PARTS** (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan)	Plug and play industrial grade cellular modem with data plan 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.)
Consumption Monitoring* CT CT-200-SPLIT * Consumption monitoring is required for Enphase Storage Systems	Split core current transformers enable whole home **consumption** metering (+/- 2.5%).
Wireless USB adapter COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows redundant wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	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
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 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. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" 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
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included)
COMPLIANCE	
Compliance, 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)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit **enphase.com**

2019-11-04

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(SHEET 14)

Tech Brief

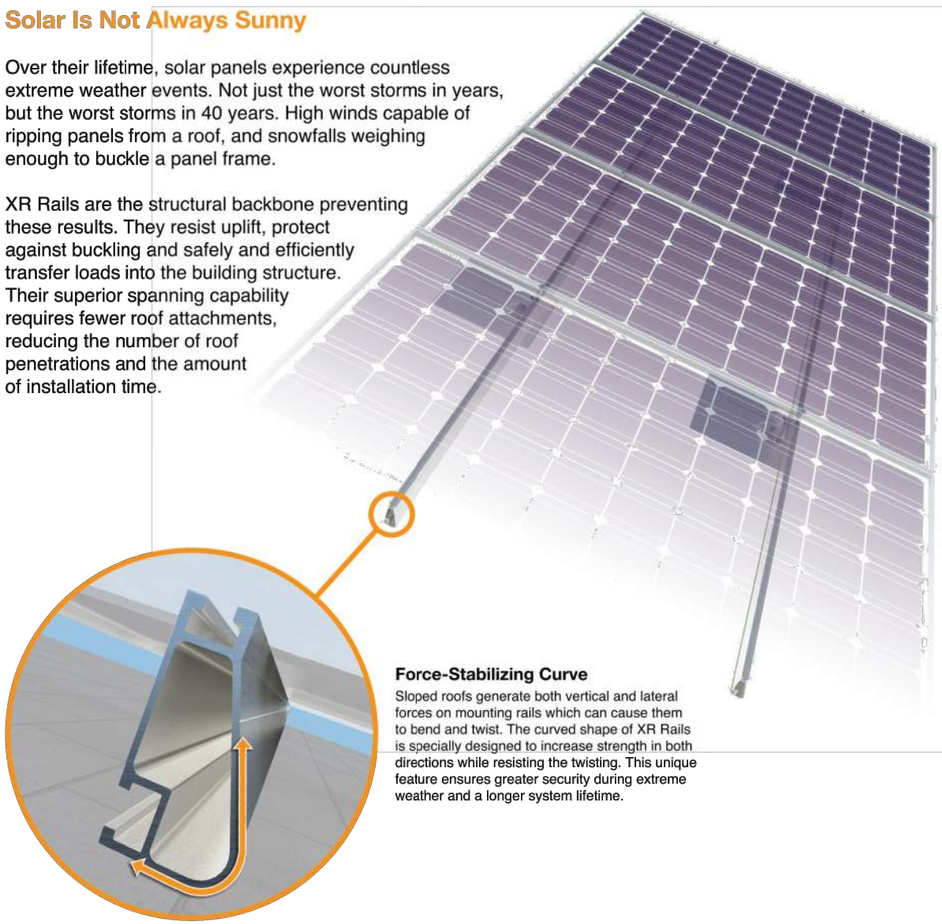
IRONRIDGE

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 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

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 spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black 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 10 feet.

- 10' 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 up to 12 feet for commercial applications.

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

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

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

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

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S-5!®

The Right Way!

S-5-V Clamp

The S-5-V clamp is a versatile clamp that fits vertical-folded seam profiles manufactured in North America—including most structural and architectural profiles.

Its simple design and generous dimensioning are what make the S-5-V clamp so versatile for use with the S-5!® snow retention products, such as ColorGard®, as well as with other heavy-duty applications.

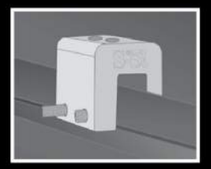
Installation is as simple as setting the patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the stainless steel bolt provided with the product. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-V Mini Clamp

The S-5-V Mini is a bit shorter than the S-5-V and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*

*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard® snow retention systems.

1



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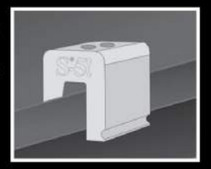

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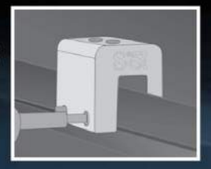


S-5-V and S-5-V Mini

The right way to attach almost anything to metal roofs!

The S-5-V clamp is a versatile clamp, fitting most of the vertical standing seam profiles in North America.

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

MADE IN THE USA

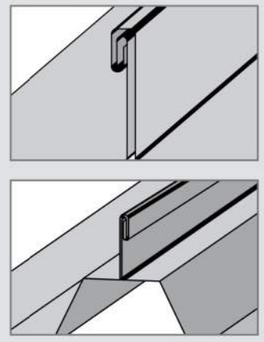
S-5!®
The Right Way!

The strength of the S-5-V clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving the roof manufacturer's warranty intact.

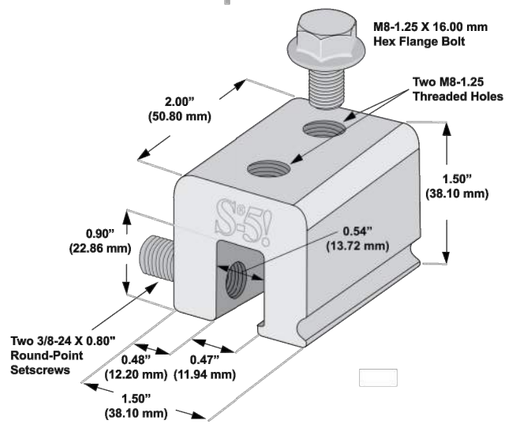
The **S-5-V and S-5-V Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-V is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit **www.S-5.com** for more information including CAD details, metallurgical compatibilities, and specifications.

The S-5-V clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

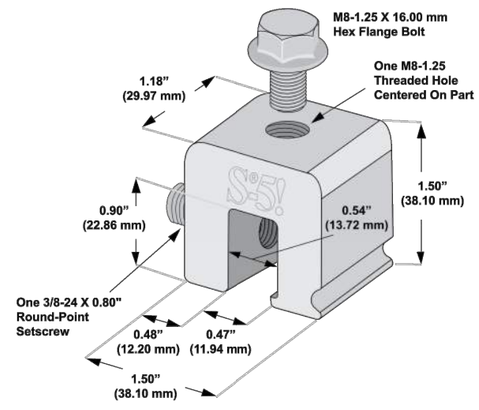
Example Profiles



S-5-V Clamp



S-5-V Mini Clamp



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

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. Consult the S-5! website at www.S-5.com for published data regarding installation instructions and holding strength.

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