WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
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

March 26, 2025

Suntria
2141 E Broadway Road
Suite 202
Tempe, AZ 85282

Re: Engineering Services
Ko Residence
2826 SW Hearthstone Place, Lee's Summit MO
8.400 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:	2x6 dimensional lumber at 16" on center
Roof Material:	Composite Asphalt Shingles
Roof Slopes:	20 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** = 20 psf
- **Wind Load** based on ASCE 7-16
  - Ultimate Wind Speed = 109 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 IRC. 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 K2 Systems 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 #14 lag screw is 194 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on two screws with a minimum penetration depth of 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 two # 14 lag screws with a minimum of 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 IRC, current industry standards and practice, 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
Missouri License No. 2019011786
Missouri COA #2020037943

STATE OF MISSOURI
SCOTT E WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Missouri COA # 2020037943

Signed 3/26/2025

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
04/01/2025 10:43:27

NEW PHOTOVOLTAIC SYSTEM 8.400 KW DC
2826 SW HEARTHSTONE PL, LEE'S SUMMIT, MO 64082

GENERAL NOTES

1.1.1 PROJECT NOTES:

1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE (NEC) ARTICLE 690, ALL MANUFACTURER'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 ACCCESSORY
1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATEDD 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 RESISTANCE. 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 RACKING SYSTEM INSTALLATION - K2 CROSSRAIL
1.3.3 PV MODULE AND INVERTER INSTALLATION - SILFAB SOLAR SIL-420BG (420W) PV MODULES / ENPHASE IQ8PLUS-72-M-US MICROINVERTERS [240V]
1.3.4 PV EQUIPMENT ROOF MOUNT
1.3.5 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
1.3.6 PV LOAD CENTERS (IF INCLUDED)
1.3.7 PV METERING/MONITORING (IF INCLUDED)
1.3.8 PV DISCONNECTS
1.3.9 PV GROUNDING ELECTRODE & BONDING TO (E) GEC
1.3.10 PV FINAL COMMISSIONING
1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE

PROJECT INFORMATION

OWNER

NAME: EUN KO

SCOPE OF WORK

SYSTEM SIZE: DC SIZE : 8.400 KW DC
AC SIZE : 5.800 KW AC
(N) (20) SILFAB SOLAR SIL-420BG (420W) PV MODULES
(N) (20) ENPHASE IQ8PLUS-72-M-US MICROINVERTERS [240V]
(N) (1) ENPHASE X-IQ-AM1-240-5C COMBINER BOX

K2 SPLICEFOOT XL MOUNTS WITH K2 CROSSRAIL RAILS

ATTACHMENT TYPE: RAFTER MOUNT
MSP UPGRADE: NO
METER UPGRADE: NO

AUTHORITIES HAVING JURISDICTION
BUILDING: LEE'S SUMMIT CITY (MO)
ZONING: LEE'S SUMMIT CITY (MO)
UTILITY: EVERGY MISSOURI WEST
APN: 999999

DESIGN SPECIFICATION

OCCUPANCY:	II
CONSTRUCTION:	SFR
ZONING:	RESIDENTIAL
GROUND SNOW LOAD:	20 psf
WIND EXPOSURE:	C
WIND SPEED:	109 mph

APPLICABLE CODES & STANDARDS

BUILDING:	IBC 2018	IRC 2018
ELECTRICAL:	NEC 2017	
FIRE:	IFC 2018	

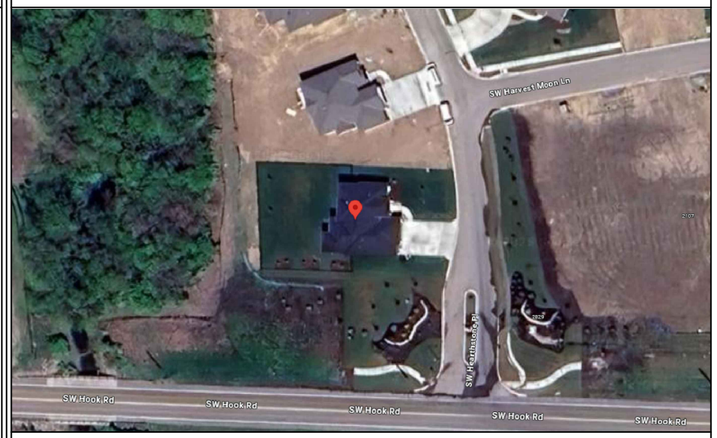
STATE OF MISSOURI
SCOTT E WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Missouri COA # 2020037943
Signed 3/26/2025

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
04/01/2025 10:43:27

Andrea Sessler
Digitally signed by Andrea Sessler
DN: CN=Andrea Sessler, OU=Development, OU=LS Users, DC=COLS, DC=LOC
Date: 2025.04.01 10:43:44-05'00'

SATELLITE VIEW



VICINITY MAP

SHEET INDEX

SUNTRIA™
2141 E BROADWAY RD SUITE 202,
TEMPE, AZ 85282
855-248-884

PROJECT NAME & ADDRESS
EUN KO
SUN11340
2826 SW HEARTHSTONE PL,
LEE'S SUMMIT, MO 64082
METER NO: 25121676

AHJ STAMP

SYSTEM SIZE
(N) 8.400 KW DC
(N) 5.800 KW AC

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
COVER PAGE

DRAWN DATE	03/25/2025
DRAWN BY	JBN
REVIEWED BY	-

SHEET TITLE
PV - 0

NOTES:

1. ALL CONSTRUCTION / INSTALLATION IS TO COMPLY WITH THE FOLLOWING: ALL DIMENSIONS ARE APPROXIMATE.

2. ROOF VENTS, SKYLIGHTS, WILL NOT BE COVERED UPON PV INSTALLATION.

3. AC DISCONNECT IS LOCATED WITHIN 10FT FROM THE UTILITY METER.

PV MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	SILFAB SOLAR SIL-420BG (420W) PV MODULES
VMP	38.51 V
IMP	10.91 A
VOC	46.36 V
ISC	11.4 A
PV MODULE QUANTITY	20

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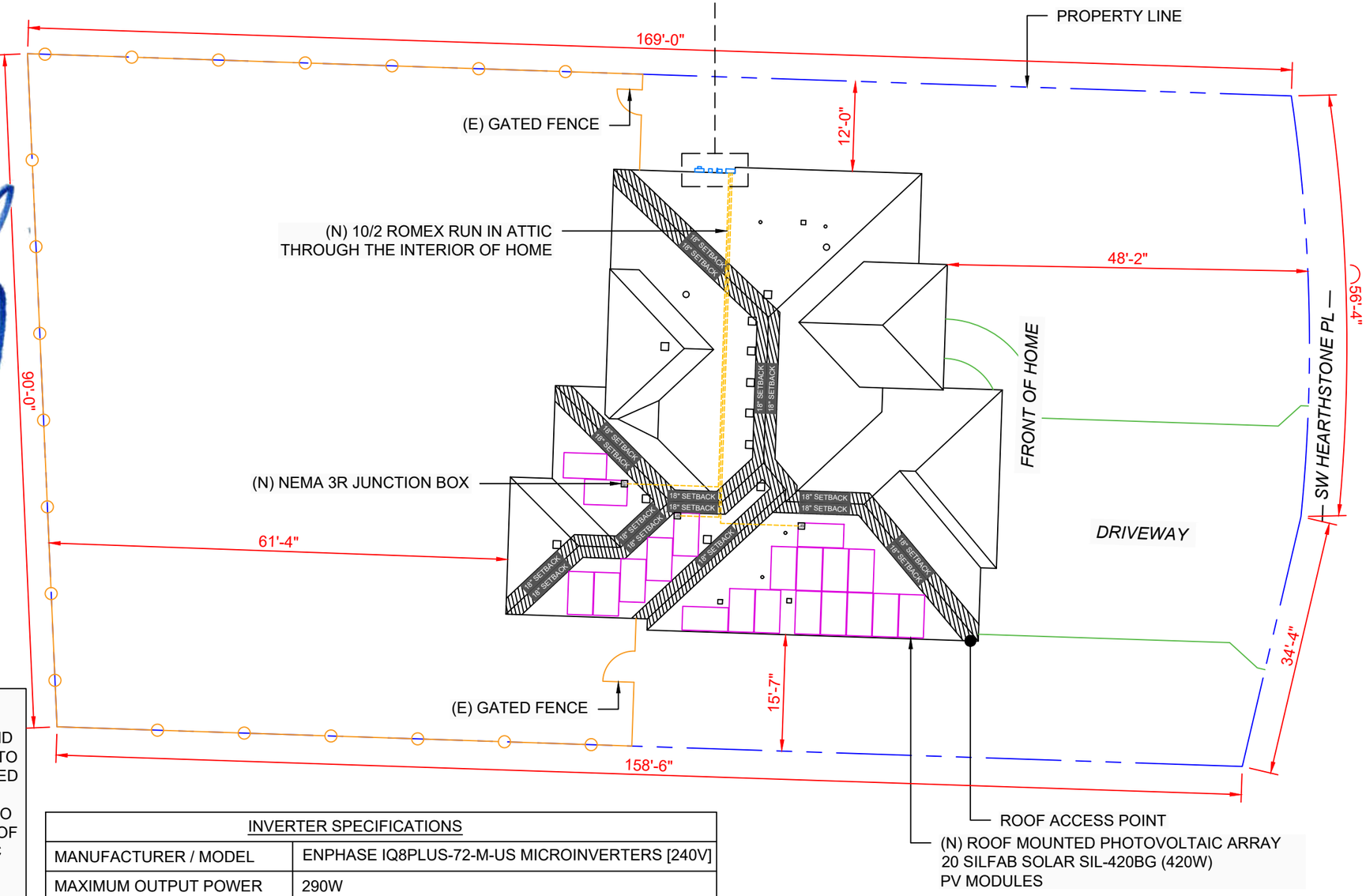
(E) METER MAIN COMBO
(N) PRODUCTION METER
(N) VISIBLE LOCKABLE AND LABELED UTILITY AC DISCONNECT SWITCH
(N) AC COMBINER PANEL

BLOW-UP DETAIL

N

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



NOTES:
1. LOCATION OF JUNCTION BOX(ES), AC DISCONNECT(S), AC COMBINER PANEL(S), AND OTHER ELECTRICAL EQUIPMENT RELEVANT TO PV INSTALLATION SUBJECT TO CHANGE BASED ON SITE CONDITIONS.
2. SETBACKS AT RIDGES CAN BE REDUCED TO 18 INCHES IF TOTAL PV AREA IS WITHIN 33% OF TOTAL ROOF AREA IN COMPLIANCE WITH IBC 2018:
TOTAL ROOF AREA = 3288 SQFT
TOTAL PV AREA = 20(73.4" X 40.5")/(144 IN^2)
= 412.80 SQFT
(412.80 SQFT/3288 SQFT)100 = 12.55%
TOTAL PV AREA POPULATES 12.55% OF TOTAL ROOF AREA

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL	ENPHASE IQ8PLUS-72-M-US MICROINVERTERS [240V]
MAXIMUM OUTPUT POWER	290W
NOMINAL VOLTAGE	240V
NOMINAL OUTPUT CURRENT	1.21A
INVERTER QUANTITY	20

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855-248-884

PROJECT NAME & ADDRESS
EUN KO
SUN11340
2826 SW HEARTHSTONE PL,
LEE'S SUMMIT, MO 64082
METER NO: 25121676

AHJ STAMP

SYSTEM SIZE
(N) 8.400 KW DC
(N) 5.800 KW AC

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
SITE PLAN

DRAWN DATE	03/25/2025
DRAWN BY	JBN
REVIEWED BY	-

SHEET TITLE
PV-1

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
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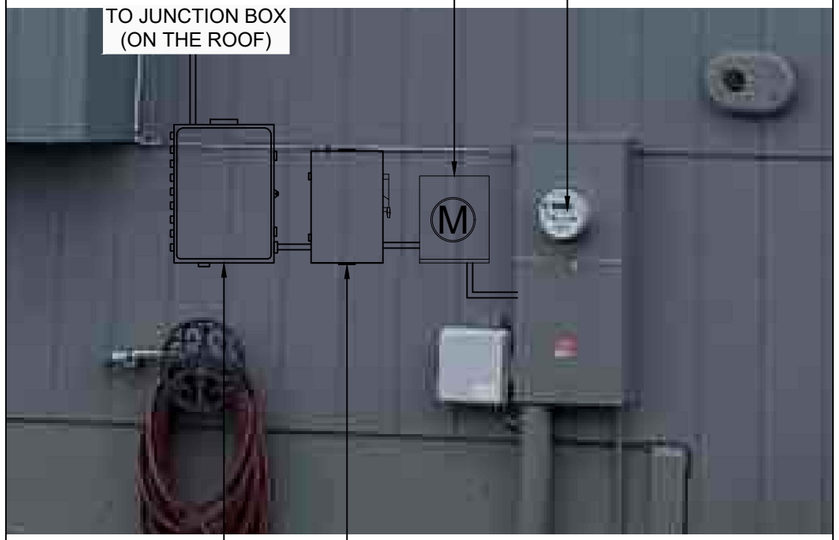

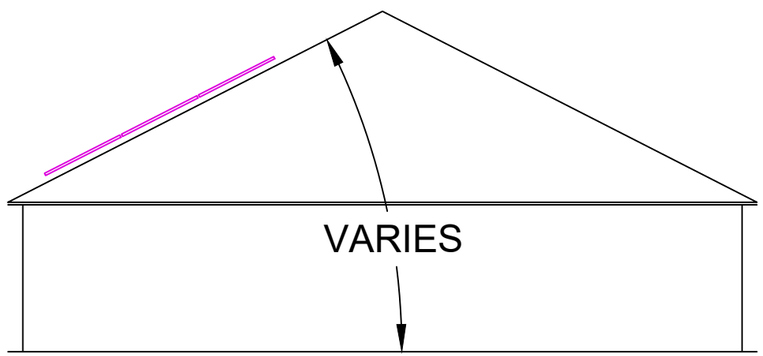

EQUIPMENT ELEVATION

NOT TO SCALE

① STRING OF 10 MODULES

② STRING OF 10 MODULES

ROOF SECTION(S)			
	MODULE	TILT	AZIMUTH
ROOF 1	13	20°	182°
ROOF 2	5	20°	182°
ROOF 3	2	20°	272°

STATE OF MISSOURI
SCOTT E WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

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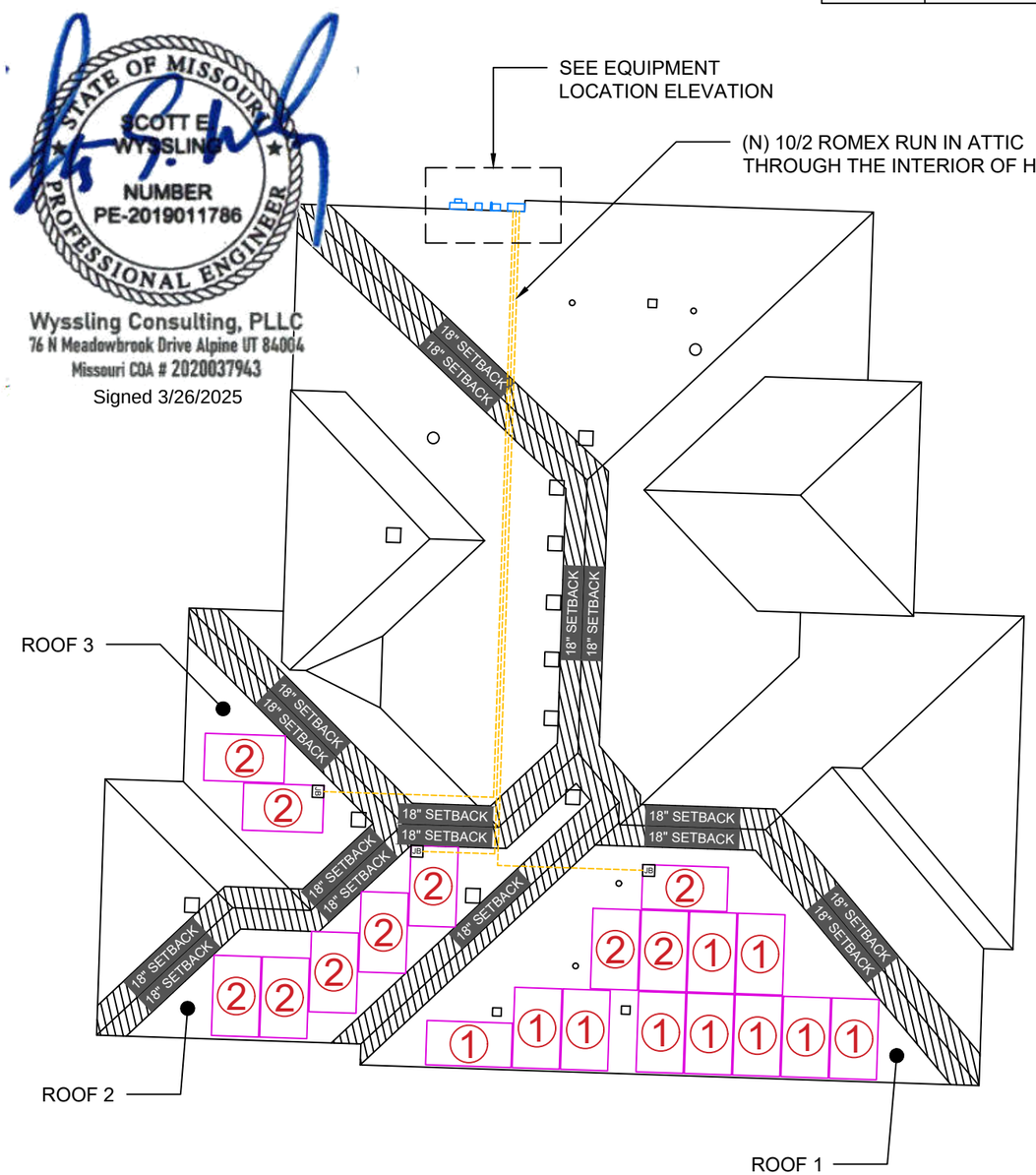
76 N Meadowbrook Drive Alpine UT 84004
Missouri COA # 2020037943
Signed 3/26/2025



1 ELECTRICAL PLAN

SCALE: 3/32" = 1'-0"

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TEMPE, AZ 85282
855-248-884

PROJECT NAME & ADDRESS
EUN KO
SUN11340
2826 SW HEARTHSTONE PL,
LEE'S SUMMIT, MO 64082
METER NO: 25121676

AHJ STAMP

SYSTEM SIZE
(N) 8.400 KW DC
(N) 5.800 KW AC

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
ELECTRICAL PLAN

DRAWN DATE	03/25/2025
DRAWN BY	JBN
REVIEWED BY	-

SHEET TITLE
PV-2

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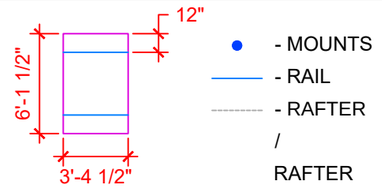
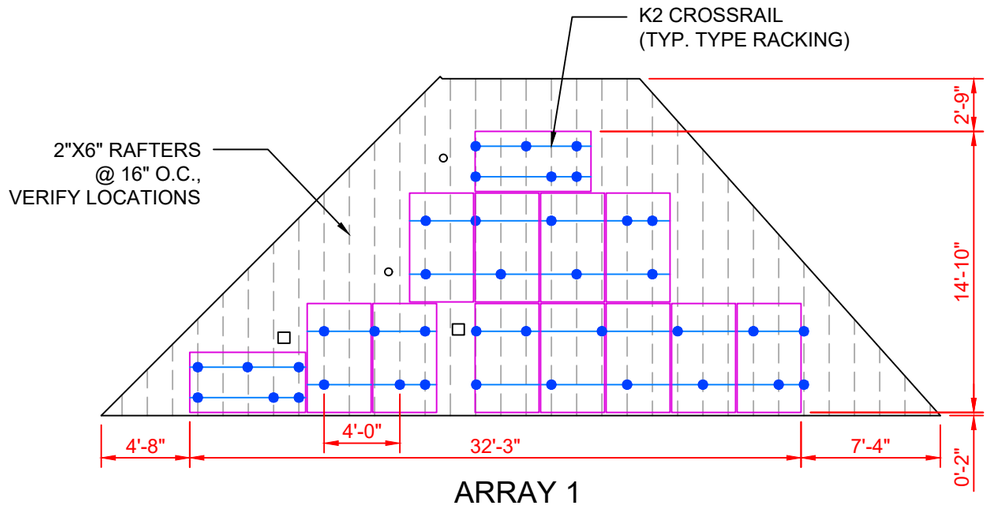
MEETS OR EXCEEDS IBC IRC CONSTRUCTION STANDARDS LOAD CALCULATIONS

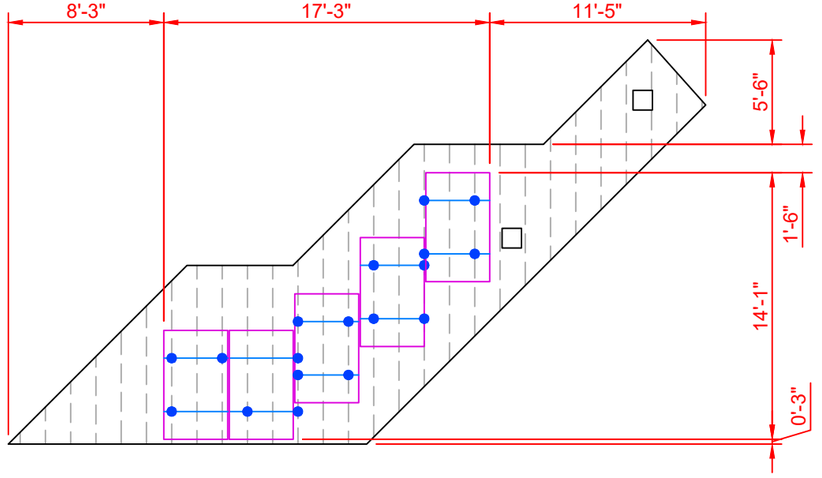
MODULE T YPE, DIMENSIONS & WEIGHT:

NUMBER OF PANELS IN ARRAY = 20 MODULES
MODULE TYPE = SILFAB SOLAR SIL-420BG PV MODULES
NUMBER OF CONNECTIONS TO ROOF = 65
WEIGHT OF INDIVIDUAL PANEL = 45.8 LBS / 20.77 KG
MOUNTING SYSTEM WEIGHT: 1.5 LBS PER MODULE
TOTAL WEIGHT OF ARRAY: 916.00 LBS
WEIGHT AT EACH CONNECTION: 916.00 LBS / 65 = 14.09 LBS
SOLAR PANEL AREA = 73.4" X 40.5" = 20.64 SQFT
TOTAL ARRAY AREA = 20X20.64 = 412.80 SQFT
DISTRIBUTED LOAD = 916.00/412.80 = 2.22 PSF

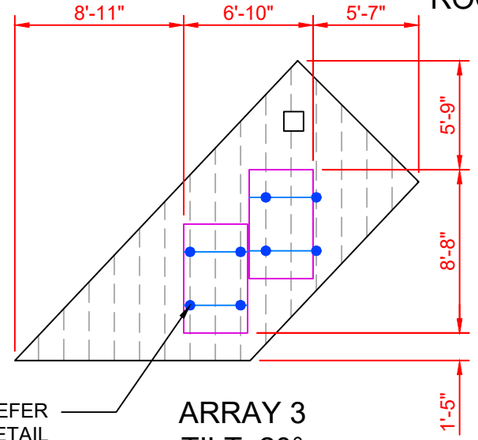




ARRAY 1
TILT: 20°
AZIMUTH: 182°
ROOF MATERIAL: COMP SHINGLE



ARRAY 2
TILT: 20°
AZIMUTH: 182°
ROOF MATERIAL: COMP SHINGLE



ARRAY 3
TILT: 20°
AZIMUTH: 272°
ROOF MATERIAL: COMP SHINGLE

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1 ATTACHMENT PLAN
SCALE: 1/8" = 1'-0"

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PROJECT NAME & ADDRESS
EUN KO
SUN11340
2826 SW HEARTHSTONE PL,
LEE'S SUMMIT, MO 64082
METER NO: 25121676

AHJ STAMP

SYSTEM SIZE
(N) 8.400 KW DC
(N) 5.800 KW AC

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
ATTACHMENT PLAN

DRAWN DATE	03/25/2025
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REVIEWED BY	-

SHEET NO: PV - 3

RELEASE FOR CONSTRUCTION
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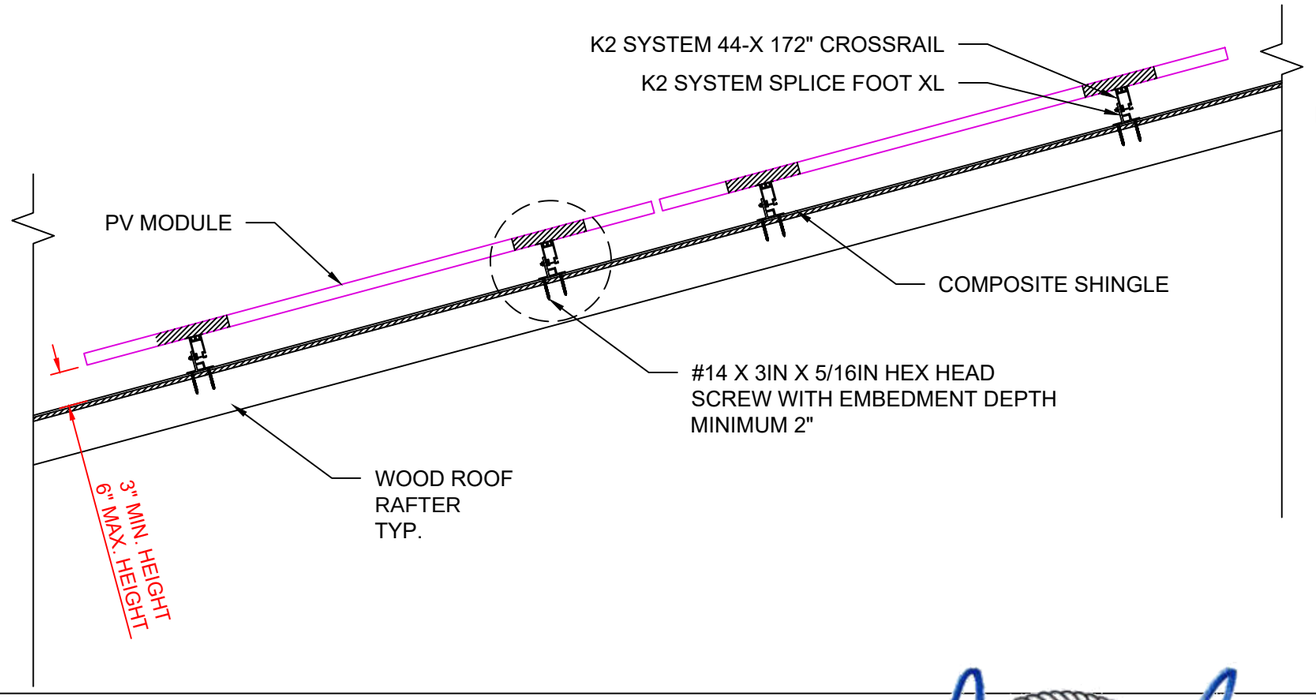

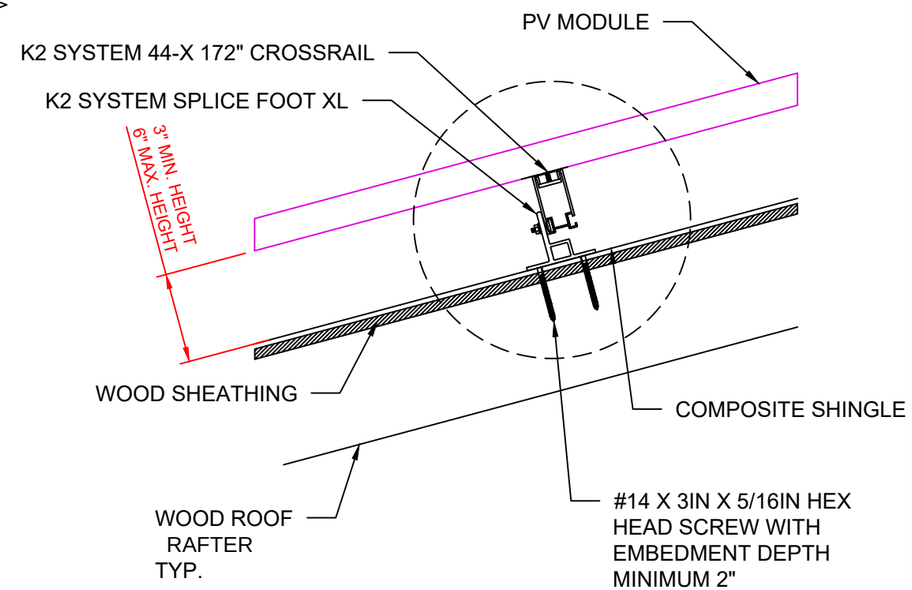

STATE OF MISSOURI
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NUMBER PE-2019011786
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1 STAND OFF DETAILS
NOT TO SCALE

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SYSTEM SIZE
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(N) 5.800 KW AC

REVISIONS	REV	DESCRIPTION	DATE

SHEET TITLE
STANDOFF DETAILS

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SHEET TITLE
PV-4

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
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"ALL EXPOSED PV ROOFTOP CONDUCTORS THAT ARE NOT LOCATED UNDER THE ARRAY MODULES, SHALL INCLUDE LISTED JUNCTION BOXES AT BOTH ENDS OF THE RACEWAY TO TRANSITION FROM EXPOSED CONDUCTORS TO THE LISTED RACEWAYS."

PHOTOVOLTAIC INSTALLATION ELECTRICAL DIAGRAM
RATED 8,400 DC WATTS UNDER (STC)

(2) BRANCHED CIRCUITS OF 10 MODULES

ADDITIONAL NOTES:
MARKING IS REQUIRED ON ALL INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, AND JUNCTION BOXES TO ALERT THE FIRE SERVICE TO AVOID CUTTING THEM. MARKING SHOULD BE PLACED ON ALL INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES, AND CABLE ASSEMBLIES, AT A MINIMUM OF EVERY 10 FEET, AT TURNS AND ABOVE AND OR BELOW PENETRATIONS AND ALL DC COMBINER AND JUNCTION BOXES

WIRE / CONDUIT SCHEDULE			
TAG	CONDUCTOR DETAILS	GROUND DETAILS	CONDUIT SIZE
1	(2) #12 Q-CABLE CU	(1) #6 AWG BARE CU	FREE AIR
2	(2) #10/2 ROMEX IN ATTIC (4) #10 AWG THWN-2, CU ON EXTERIOR	(1) #6 AWG THWN-2, CU	3/4" EMT OR PVC
3	(3) #6 AWG THWN-2, CU	(1) #6 AWG THWN-2, CU	3/4" EMT OR PVC

PV MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	SILFAB SOLAR SIL-420BG (420W) PV MODULES
VMP	38.51 V
IMP	10.91 A
VOC	46.36 V
ISC	11.4 A
PV MODULE QUANTITY	20

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL	ENPHASE IQ8PLUS-72-M-US MICROINVERTERS [240V]
MAXIMUM OUTPUT POWER	290W
NOMINAL VOLTAGE	240V
NOMINAL OUTPUT CURRENT	1.21A
INVERTER QUANTITY	20

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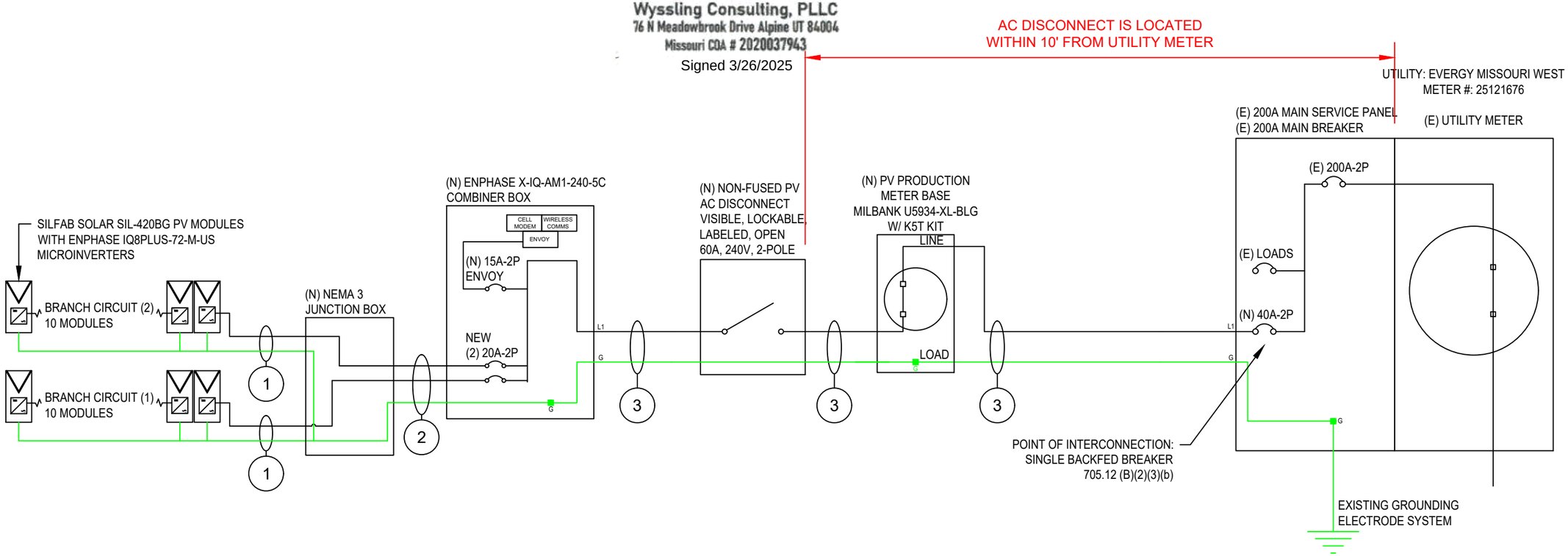

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2141 E BROADWAY RD SUITE 202,
TEMPE, AZ 85282
855-248-884

PROJECT NAME & ADDRESS
EUN KO
SUN11340
2826 SW HEARTHSTONE PL,
LEE'S SUMMIT, MO 64082
METER NO: 25121676

AHJ STAMP

SYSTEM SIZE
(N) 8.400 KW DC
(N) 5.800 KW AC

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
ONE LINE DIAGRAM

DRAWN DATE	03/25/2025
DRAWN BY	JBN
REVIEWED BY	-

SHEET TITLE
PV - 5

RELEASE FOR CONSTRUCTION
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DEVELOPMENT SERVICES
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"ALL EXPOSED PV ROOFTOP CONDUCTORS THAT ARE NOT LOCATED UNDER THE ARRAY MODULES, SHALL INCLUDE LISTED JUNCTION BOXES AT BOTH ENDS OF THE RACEWAY TO TRANSITION FROM EXPOSED CONDUCTORS TO THE LISTED RACEWAYS."

PHOTOVOLTAIC INSTALLATION ELECTRICAL DIAGRAM
RATED 8,400 DC WATTS UNDER (STC)

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NOMINAL OUTPUT CURRENT	1.21A
INVERTER QUANTITY	20

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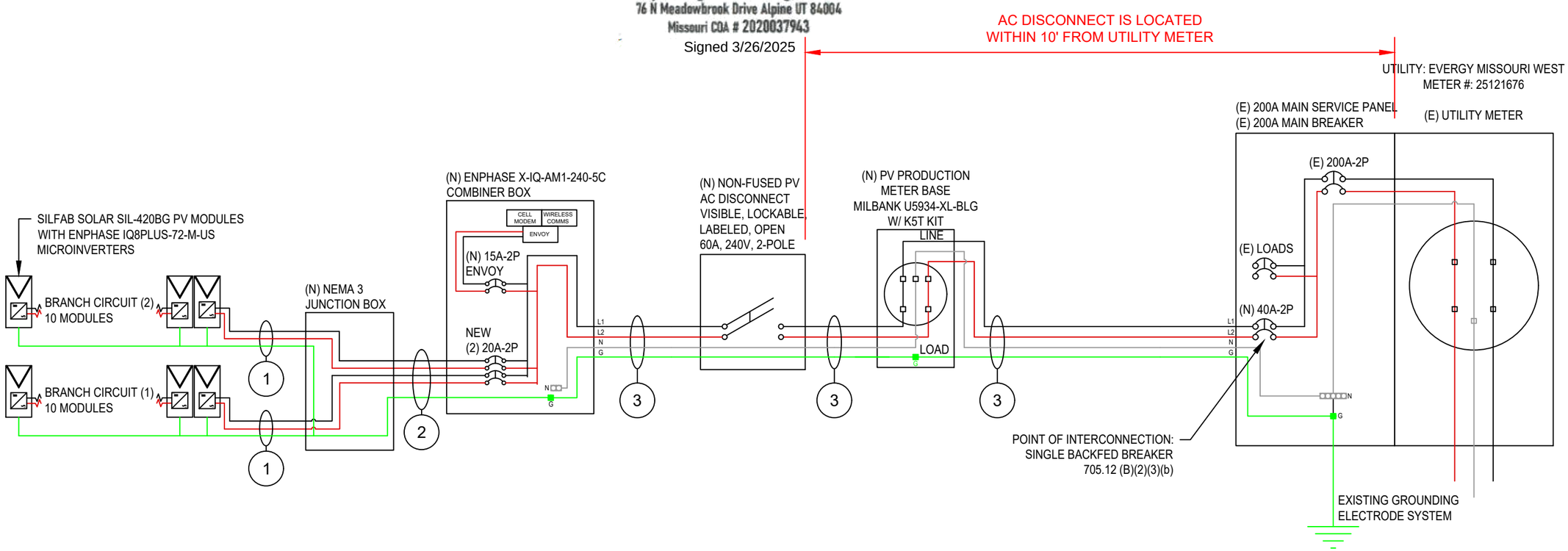
Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Missouri COA # 2020037943
Signed 3/26/2025



SUNTRIA™
2141 E BROADWAY RD SUITE 202,
TEMPE, AZ 85282
855-248-884

PROJECT NAME & ADDRESS
EUN KO
SUN11340
2826 SW HEARTHSTONE PL,
LEE'S SUMMIT, MO 64082
METER NO: 25121676

AHJ STAMP

SYSTEM SIZE
(N) 8.400 KW DC
(N) 5.800 KW AC

REVISIONS

REV	DESCRIPTION	DATE

SHEET TITLE
THREE LINE DIAGRAM

DRAWN DATE	03/25/2025
DRAWN BY	JBN
REVIEWED BY	-

SHEET TITLE
PV - 6

RELEASE FOR CONSTRUCTION
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SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	SILFAB SOLAR SIL-420BG (420W) PV MODULES
VMP	38.51 V
IMP	10.91 A
VOC	46.36 V
ISC	11.4 A
DIMENSION	73.4" L X 40.5"W X 1.4" D

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL	ENPHASE IQ8PLUS-72-M-US MICROINVERTERS [240V]
MAXIMUM OUTPUT POWER	290 W
NOMINAL VOLTAGE	240 A
NOMINAL OUTPUT CURRENT	1.21 A
INVERTER QUANTITY	20

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-20°
AMBIENT TEMP (HIGH TEMP 2%)	35°
CONDUCTOR HEIGHT	0.5"
CONDUCTOR TEMPERATURE RATE	90°

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

MICROINVERTER CALCULATIONS

1. CURRENT CARRYING CONDUCTOR

(A) BEFORE IQ COMBINER PANEL

AMBIENT TEMPERATURE - (35)°C ...NEC 310.15(B)(2)
TEMPERATURE DERATE FACTOR - 0.96 ...NEC 310.15(B)(1)
GROUPING FACTOR - 0.8 ...NEC 310.15(C)(1)

CONDUCTOR AMPACITY
= (INVERTER O/P CURRENT) x 1.25 / A.T.F / G.F ...NEC 690.8(B)
=[(10x1.21) x 1.25] / [0.96 / 0.8]
=19.69 A
SELECTED CONDUCTOR - #10 THWN-2 ...NEC 310.16

(B) AFTER IQ COMBINER PANEL

AMBIENT TEMPERATURE - (35)°C ...NEC 310.15(B)(2)
TEMPERATURE DERATE FACTOR - 0.96 ...NEC 310.15(B)(1)
GROUPING FACTOR - 1 ...NEC 310.15(C)(1)

CONDUCTOR AMPACITY
= (INVERTER O/P CURRENT) x 1.25 / A.T.F / G.F ...NEC 690.8(B)
=[(20x1.21) x 1.25] / [0.96]
=31.51 A
SELECTED CONDUCTOR - #8 AWG THWN-2 ...NEC 310.16

2. PV OVERCURRENT PROTECTION ...NEC 690.9(B)

= TOTAL INVERTER O/P CURRENT x 1.25
= (20 x 1.21) x 1.25 = 30.25 A
SELECTED OCPD = 40 A ...NEC 240.6

STATE OF MISSOURI
SCOTT E WYSSLING
NUMBER PE-2019011786
PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Missouri COA # 2020037943
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AHJ STAMP

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REV	DESCRIPTION	DATE

SHEET TITLE
ELECTRICAL CALCULATIONS

DRAWN DATE	03/25/2025
DRAWN BY	JBN
REVIEWED BY	-

SHEET TITLE
PV-7

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ALL LABELS TO BE ENGRAVED AND MECHANICALLY BONDED UNLESS OTHERWISE STATED

LABEL LOCATION : COMBINER BOX / CIRCUITS / CONDUIT COMBINER BOX / ENCLOSURES / EMT ENCLOSURES

⚠ WARNING

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

NEC 705.20(7) & NEC 690.13(B)

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

NEC 110.27(C) & OSHA 1910.145(f)(7)

LABEL LOCATION : BUILDING / STRUCTURE

THIS EQUIPMENT SUITABLE FOR ATTACHMENT TO FLOATING STRUCTURES, OR ATTACHED TO STRUCTURES FLOATING ON BODIES OF WATER.

NEC 690.4(G)

LABEL LOCATION : MAIN SERVICE DISCONNECT / UTILITY METER

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

NEC 690.13(B)

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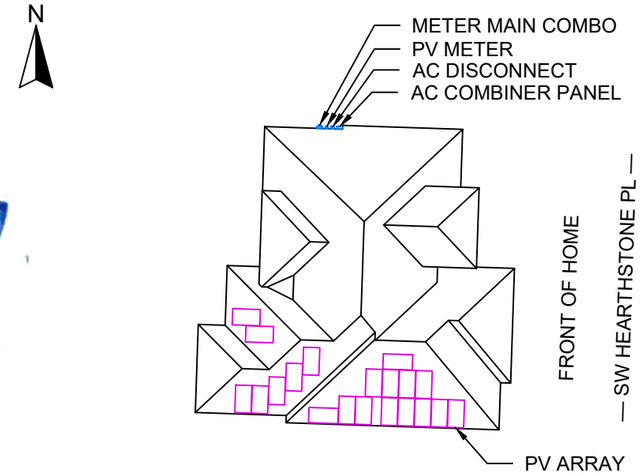
Signed 3/26/2025

CAUTION

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



2826 SW HEARTHSTONE PL, LEE'S SUMMIT, MO 64082

LABEL LOCATION: MAIN SERVICE PANEL [NEC 705.10 & 690.56(A)(B)]

LABEL LOCATION : EMT / CONDUIT RACEWAYS

PHOTOVOLTAIC POWER SOURCE

NEC 690.31(D)(2)

DO NOT DISCONNECT UNDER LOAD

NEC 690.15(B) & NEC 690.33(D)(2)

LABEL LOCATION : AC DISCONNECT / BREAKER / POINTS OF CONNECTION

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

NEC 705.20(7) & NEC 690.13(B)

⚠ WARNING

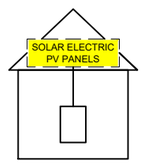
ELECTRICAL SHOCK HAZARD

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

NEC 705.12(B)(3)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



IFC 605.11.3.1(1) & 690.12(D)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NEC 690.12(D)(2)

⚠ CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

INTERACTIVE PHOTOVOLTAIC POWER FLOWING THROUGH THIS PANEL

AC OPERATING CURRENT 24.2 AAC
AC OPERATING VOLTAGE 240 VAC

LABEL LOCATION : MAIN SERVICE DISCONNECT

⚠ WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 705.12(B)(2)

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

NEC 705.20(7) & NEC 690.13(B)

⚠ WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

NEC 705.82 & NEC 710.15(C)

⚠ WARNING

SINGLE 120-VOLT SUPPLY
DO NOT CONNECT MULTIWIRE BRANCH CIRCUITS

NEC 705.82 & NEC 710.15(C)

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NEC 705.30(C) & NEC 690.59

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LEE'S SUMMIT, MO 64082
METER NO: 25121676

AHJ STAMP

SYSTEM SIZE
(N) 8.400 KW DC
(N) 5.800 KW AC

REVISIONS	DATE	DESCRIPTION	REV

SHEET TITLE
WARNING LABELS

DRAWN DATE	03/25/2025
DRAWN BY	JBN
REVIEWED BY	-

SHEET TITLE
PV - 8

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BOM			
Job Number	SUN11340		MO
Job Name	EUN KO		
System Size	8.400 KW DC		
Item	**Manufacturer**	**Part Number**	**Quantity**
Inverter	Enphase	IQ8PLUS-72-M-US microinverter, compatible with 72-cell PV Modules, 240v, 300VA peak power	20
Panels	Silfab Solar	SIL-420BG (420W) PV MODULES	20
MicroInverters Mounts	K2	4000629-H MicroInverters Mounts	20
Racking Rails	K2	4000819-US Cross Rail 44-X 172", Mill	10
Splice Plate	K2	4000051-T Tool-Less Rail Connector	2
Mounting	K2	XL- 4000165 Rail Splice Foot XL	65
Endclamp	K2	4000145-US End Clamp	44
Midclamp	K2	4000145-US Mid Clamp	18
Ground Lug	K2	4000006-H Ground Lug, 13mm Hex Set	11
Junction Box	EZ Solar	JB 1.2 PV Rooftop Junction Box	3
Disconnect A/C Non-Fused	Siemens	LNF222RL 60A 240V SFTY SW	1
Disconnect A/C Fused	Siemens	GF222NR 60A 240V SFTY SW	0
Fuses	Bussman/Eaton	FRN-R-40 40A Fuses	0
Breaker	Cutler Hammer	BR220 20A 2P Breaker	2
Breaker	SIEMNENS	40A 2P Breaker	1
AC Combiner	Enphase	X-IQ-AM1-240-5/5C 125A Combiner box Includes Cellmodem (CELLMODEM-M1-06-SP-05)	1
Monitoring	Enphase	CELLMODEM-M1 M ENPHASE MOBILE CONNECT LTE CAT M1 CELL MODEM, 5YR	0
CT	Enphase	CTs	0
Q-Cable	Enphase	Q-12-10-240 CABLE PORTRAIT	22
Q-Cable	Enphase	Q-12-10-240 CABLE LANDSCAPE	6
Tap Connector	Ilsco	IPC406 Insulation Piercing Tap	0
Strain Reliefs	Heyco	M3234GBR-SM	3
Incidentals / Extras			
PV METER	MILBANK U5934-XL-BLG W/ K5T KIT		1

SILFAB ELITE

SIL - 420 BG

SILFAB SOLAR®

NOT JUST ANOTHER SOLAR PANEL.

Silfab Elite

Back-contact technology with an innovative conductive backsheet and integrated cell design delivers the highest performance, durability and beautiful aesthetics.

Manufactured exclusively in the United States.

PV MODULE INDEX REPORT 2023 HIGH ACHIEVEMENT IN PERFORMANCE RETC

SILFABSOLAR.COM

CE Intertek Intertek IEC Fraunhofer ISE CHUBB

* Chubb provides error and omission insurance to Silfab Solar Inc.

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ELECTRICAL SPECIFICATIONS		420	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	420	313
Maximum power voltage (Vpmax)	V	38.51	35.89
Maximum power current (Ipmax)	A	10.91	8.73
Open circuit voltage (Voc)	V	46.36	43.45
Short circuit current (Isc)	A	11.4	9.18
Module efficiency	%	21.9%	20.4%
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	20	
Power Tolerance	Wp	0 to +10	

Measurement conditions: STC 1000 W/m2 • AM 1.5 • Temperature 25 °C • NOCT 800 W/m^2 • AM 1.5 • Measurement uncertainty ≤ 3%
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10W.

MECHANICAL PROPERTIES / COMPONENTS	METRIC	IMPERIAL
Module weight	20.8±0.2	45.8±0.4 lbs
Dimensions (H x L x D)	1864 mm x 1029 mm x 35 mm	73.4 in x 40.5 in x 1.4 in
Maximum surface load (wind/snow)*	5400 Pa rear load / 5400 Pa front load	112.8 lb/ft² rear load / 112.8 lb/ft² front load
Hail impact resistance	ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells	66 high-efficiency mono-PERC MWT c-Si cells 166 x 166 mm	66 high-efficiency mono-PERC MWT c-Si cells 6.53 x 6.53 in
Glass	3.2 mm high transmittance, tempered, anti-reflective coating	0.126 in high transmittance, tempered, anti-reflective coating
Cables and connectors (refer to installation manual)	1200 mm ø 5.7 mm, MC4 from Staubli	47.2 in, ø 0.22 (12AWG), MC4 from Staubli
Backsheet	Multilayer, integrated insulation film and electrically conductive backsheet, superior hydrolysis and UV resistance, fluorine-free PV backsheet	
Frame	Anodized Aluminum (Black)	
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP67 rated	

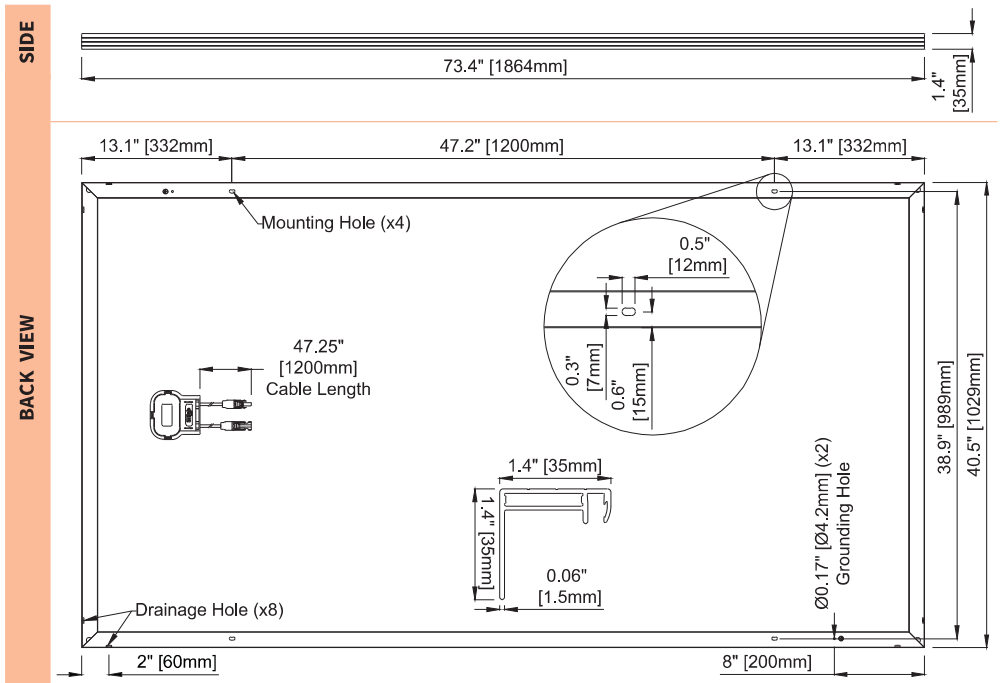
TEMPERATURE RATINGS	
Temperature Coefficient Isc	+0.046 %/°C
Temperature Coefficient Voc	-0.279 %/°C
Temperature Coefficient Pmax	-0.377 %/°C
NOCT (± 2°C)	43.5 °C
Operating temperature	-40/+85 °C

WARRANTIES	
Module product workmanship warranty	25 years**
Linear power performance guarantee	30 years
	≥ 98% end 1st yr ≥ 94.7% end 12th yr ≥ 90.8% end 25th yr ≥ 89.3% end 30th yr

CERTIFICATIONS	
Product	UL 61215-1:2017 Ed.1, UL 61215-2:2017 Ed.1, UL 61730-1:2017 Ed.1, UL 61730-2:2017 Ed.1, CSA C22.2#61730-1:2019 Ed.2, CSA C22.2#61730-2:2019 Ed.2, IEC 61215-1:2016 Ed.1, IEC 61215-2:2016 Ed.1, IEC 61730-1:2016 Ed.2, IEC 61730-2:2016 Ed.2, IEC 61701:2020 (Salt Mist Corrosion), IEC 62716:2013 (Ammonia Corrosion), CEC Listing, UL Fire Rating: Type 1
Factory	ISO9001:2015

SHIPPING SPECS	
Modules Per Pallet:	27 or 27 (California)
Pallets Per Truck	31 or 30 (California)
Modules Per Truck	837 or 810 (California)

* ⚠ Warning. Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.
** 12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at silfabsolar.com.
PAN files generated from 3rd party performance data are available for download at: silfabsolar.com/downloads.



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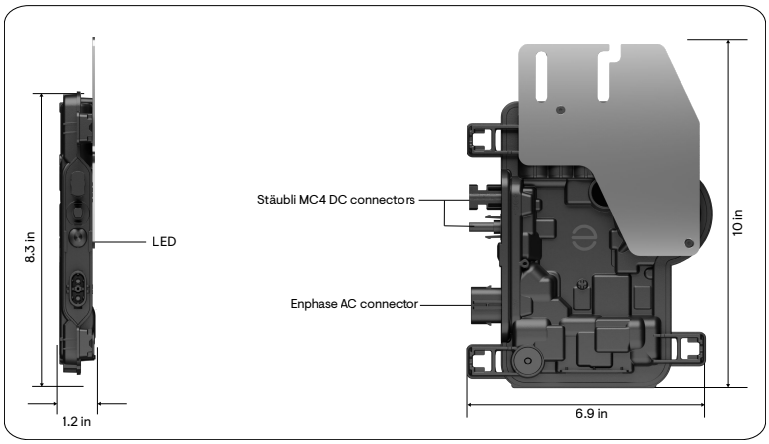
IQ8 and IQ8+ Microinverters

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

Enphase 25 year limited warranty

UL CERTIFIED

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



Simple

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

Reliable

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

Microgrid-forming

- Compliant with the latest advanced grid support[5]
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB 3rd Ed.)

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

DSH-00206-4-US-EN-2024-12-09

Input data (DC)	Units	IQ8-60-M-US	IQ8PLUS-72-M-US
Commonly used module pairings[6]	W	235–350	235–440
Module compatibility	—	To meet compatibility, PV modules must be within maximum input DC voltage and maximum module I_{sc}. Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator.	
MPPT voltage range	V	27–37	27–45
Operating range	V	16–48	16–58
Minimum/Maximum start voltage	V	22/48	22/58
Maximum input DC voltage	V	50	60
Maximum continuous input DC current	A	10	12
Maximum input DC short-circuit current	A	25	
Maximum module I_{sc}	A	20	
Overvoltage class DC port	—	II	
DC port backfeed current	mA	0	
PV array configuration	—	Ungrounded array; no additional DC side protection required; AC side protection requires maximum 20 A per branch circuit.	

Output data (AC)	Units	IQ8-60-M-US	IQ8PLUS-72-M-US
Peak output power	VA	245	300
Maximum continuous output power	VA	240	290
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	
Minimum and Maximum grid voltage[7]	V	211-264	
Maximum continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	47–68	
AC short-circuit fault current over three cycles	Arms	2	
Maximum units per 20 A (L-L) branch circuit[8]	—	16	13
Total harmonic distortion	%	<5	
Overvoltage class AC port	—	III	
AC port backfeed current	mA	30	
Power factor setting	—	1.0	
Grid-tied power factor (adjustable)	—	0.85 leading ... 0.85 lagging	
Peak efficiency	%	97.7	
CEC weighted efficiency	%	97	
Nighttime power consumption	mW	23	25

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

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

Mechanical data	IQ8-60-M-US	IQ8PLUS-72-M-US
Relative humidity range	4% to 100% (condensing)	
DC connector type	Stäubli MC4	
Dimensions (H × W × D)	212 mm (8.3 in) × 175 mm (6.9 in) × 30.2 mm (1.2 in)	
Weight	1.1 kg (2.43 lb)	
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	

Compliance	IQ8-60-M-US	IQ8PLUS-72-M-US
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3rd Ed.), FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01. This product is UL Listed as PV rapid shutdown equipment and conforms with NEC 2014, NEC 2017, NEC 2020, and NEC 2023 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV systems, for AC and DC conductors, when installed according to the manufacturer's instructions.	

Components of the Enphase Energy System

IQ Battery

All-in-one AC-coupled storage solution that integrates seamlessly with your solar energy system, providing reliable backup power and intelligent energy management for maximum performance and energy savings.

IQ System Controller

The IQ System Controller connects the home to the grid power, IQ Batteries, generator and solar PV with microinverters.

IQ Combiner/IQ Gateway

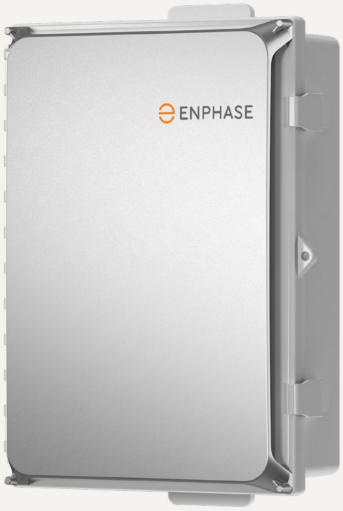
The IQ Combiner/IQ Gateway is a device that performs energy management, provides internet connectivity, and integrates with the IQ Series Microinverters to provide complete control and insights into the Enphase Energy System.

IQ Cable

The IQ Cable is a continuous-length 12-AWG cable with pre-installed connectors for IQ Microinverters that support faster, simpler, and more reliable installations. The cable is handled like standard outdoor-rated electrical wire, allowing it to be cut, spliced, and extended as needed.

ENPHASE

DATASHEET



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

IQ Combiner 5/5C

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

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

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

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

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

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

Enphase 5 year limited warranty
5-year limited warranty

UL LISTED

Smart

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

Easy to install

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

Reliable

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

IQ Combiner 5/5C

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

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

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

Accessories

Enphase Mobile Connect

4G-based LTE-M1 cellular modem with a 5-year data plan
(CELLMODEM-M1-06-SP-05 for Sprint and CELLMODEM-M1-06-AT-05 for AT&T)

Circuit breakers

BRK-10A-2-240V Circuit breaker, 2-pole, 10 A, Eaton BR210
BRK-15A-2-240V Circuit breaker, 2-pole, 15 A, Eaton BR215
BRK-20A-2P-240V Circuit breaker, 2-pole, 20 A, Eaton BR220
BRK-15A-2P-240V-B Circuit breaker, 2-pole, 15 A, Eaton BR215B with hold-down kit support
BRK-20A-2P-240V-B Circuit breaker, 2-pole, 20 A, Eaton BR220B with hold-down kit support

CT-200-SOLID

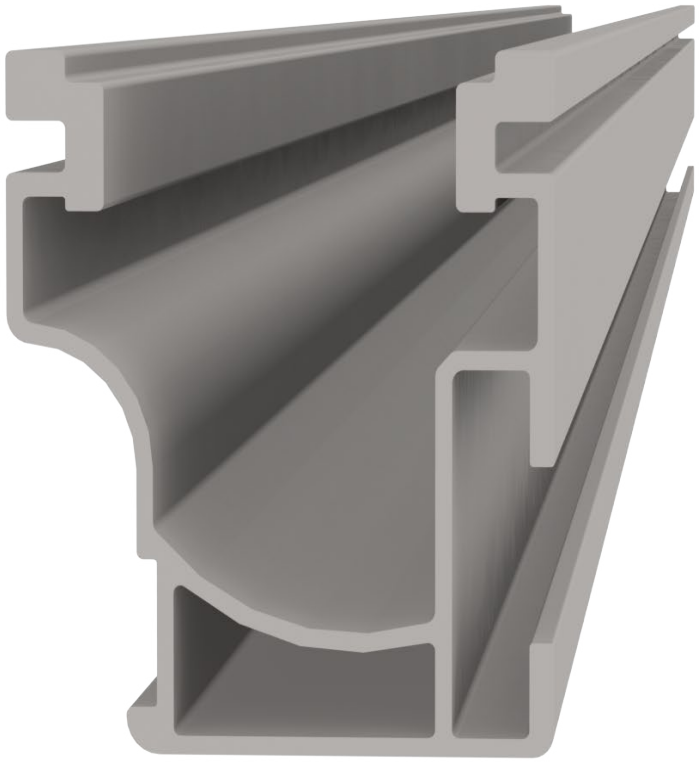
200 A revenue grade solid core Production CT with <0.5% error rate (replacement SKU)

CT-200-CLAMP

200 A clamp-style consumption and battery metering CT with <2.5% error rate (replacement SKU)

CrossRail 44-X Max

DATA SHEET



Part Number	Description
4000819	CrossRail 44-X Max 172'', Mill
4000819-US	CrossRail 44-X Max 172'', Mill, DC
4000820	CrossRail 44-X Max 172'', Dark
4000820-US	CrossRail 44-X Max 172'', Dark, DC
4000919	CrossRail 44-X Max 185'', Mill
4000920	CrossRail 44-X Max 185'', Dark

TECHNICAL DATA

	CrossRail 44-X Max
Material	Series 6000 Aluminum
Flexibility	Modular construction, suitable for any system size, height adjustable
Weight	0.50lbs/ft (0.746kg/m)
Finish	Mill or Dark
Certifications	UL 2703, ASCE 7-16, Class A Fire Rating
Warranty	25 years

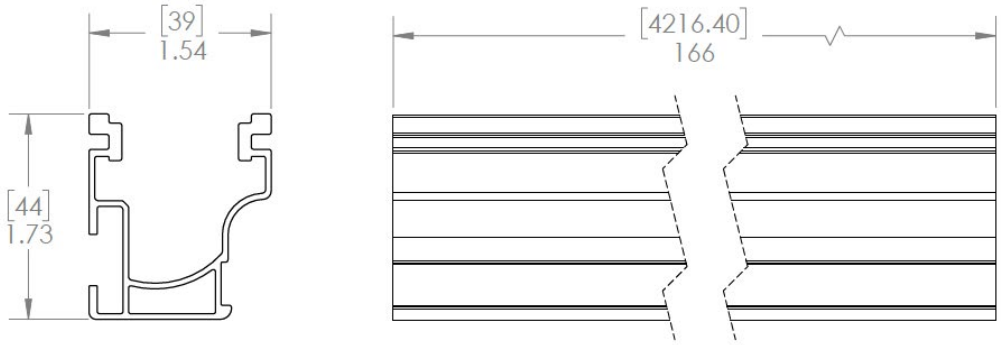
CROSS-SECTIONAL PROPERTIES

	CrossRail 44-X Max
Sx	0.175 in^3 (2.861 cm^3)
Sy	0.147 in^3 (2.410 cm^3)
A (Section X)	0.428 in^2 (2.763 cm^2)

LOAD		RAIL SPAN								
SNOW (psf)	WIND (mph)	32"	4'	64"	6'	80"	8'	112"	10'	12'
0	120									
0	140									
0	160									
10	120									
10	140									
10	160									
20	140									
20	160									
30	160									
40	160									
80	160									
100	160									

44X/MAX 48X 48XL CR80

Measurements: [mm] inches



Notes:

- Structural values and spand diagrams determined in accordance with the Aluminum Design Manual and ASCE 7-16
- System evaluated under UL2703

Connecting Strength

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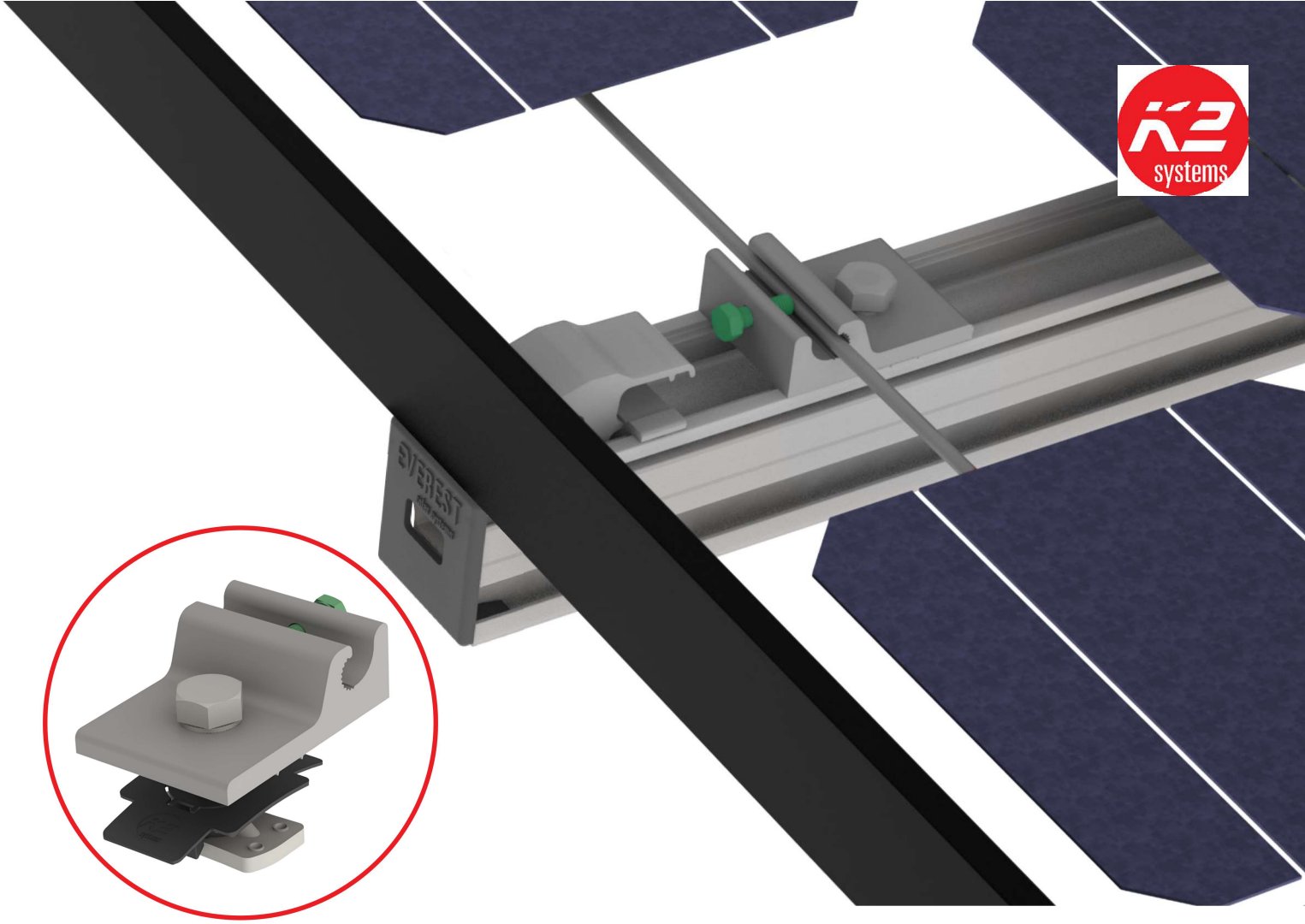


K2 Ground Lug

PRODUCT SHEET

Part Number	Description
4000006-H	K2 Ground Lug, 13mm Hex Set

- Top mount configuration
- No copper wire bending makes for simple installation
- MK3 technology provides highest rail engagement
- UL 2703 Listed
- Compatible with 8AWG and 6AWG solid copper wire
- Works with all CrossRail profiles.

Splice Foot XL #14 Kit

DATA SHEET

PRODUCT FEATURES

/ All-in-one mount and splice foot

/ K2 EverSeal technology

/ Available in mill and dark

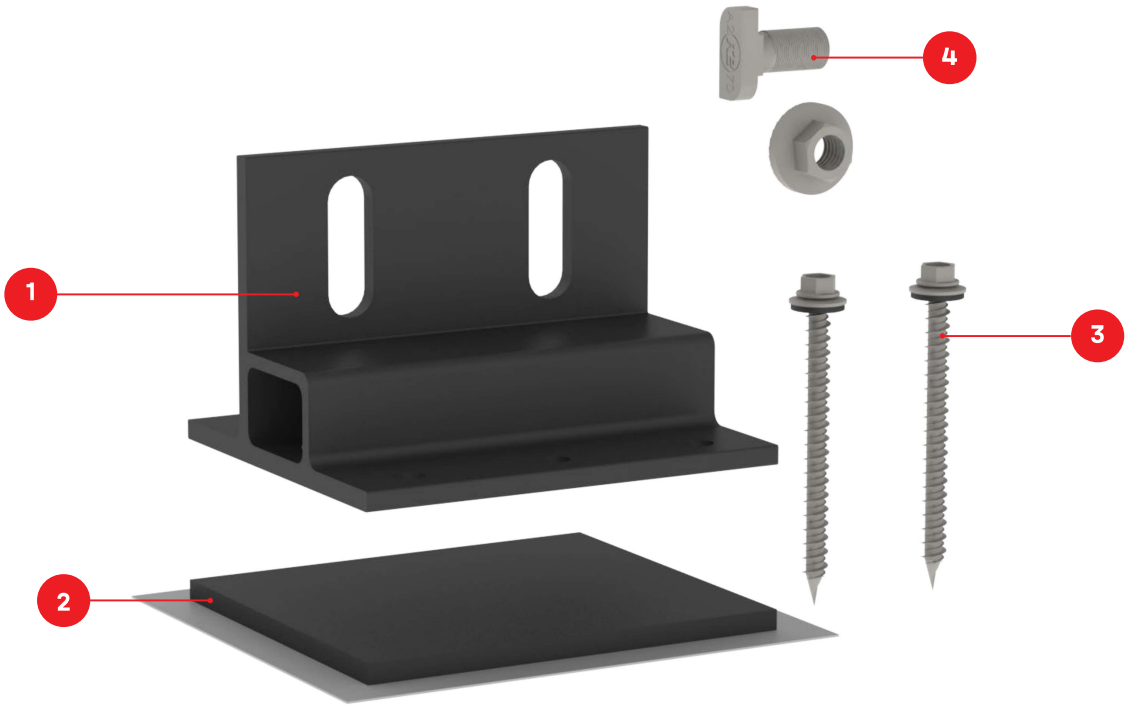
/ 30+ years of proven water sealing technology on asphalt

/ Optimized for CrossRail systems and components

/ No L-Foot needed

/ T-Bolt hardware included

TECHNICAL DATA



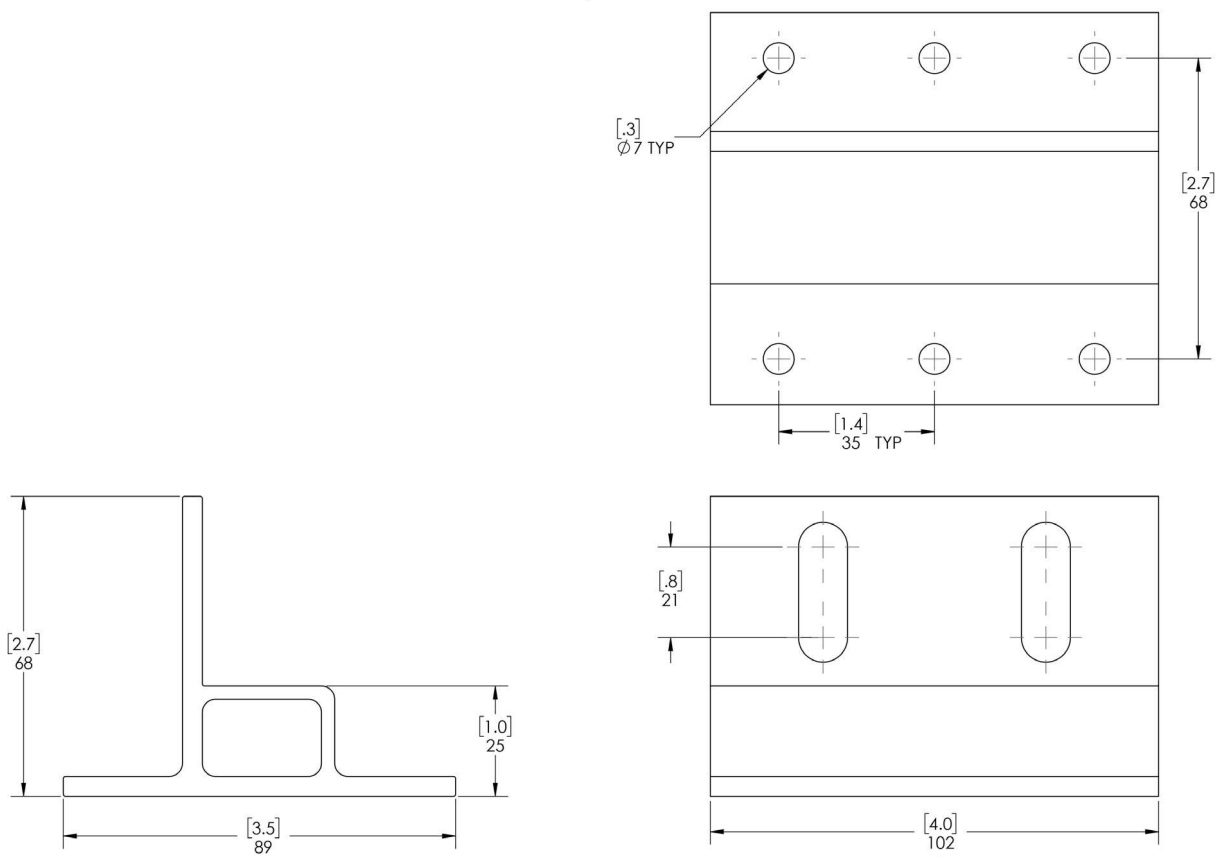
Splice Foot XL

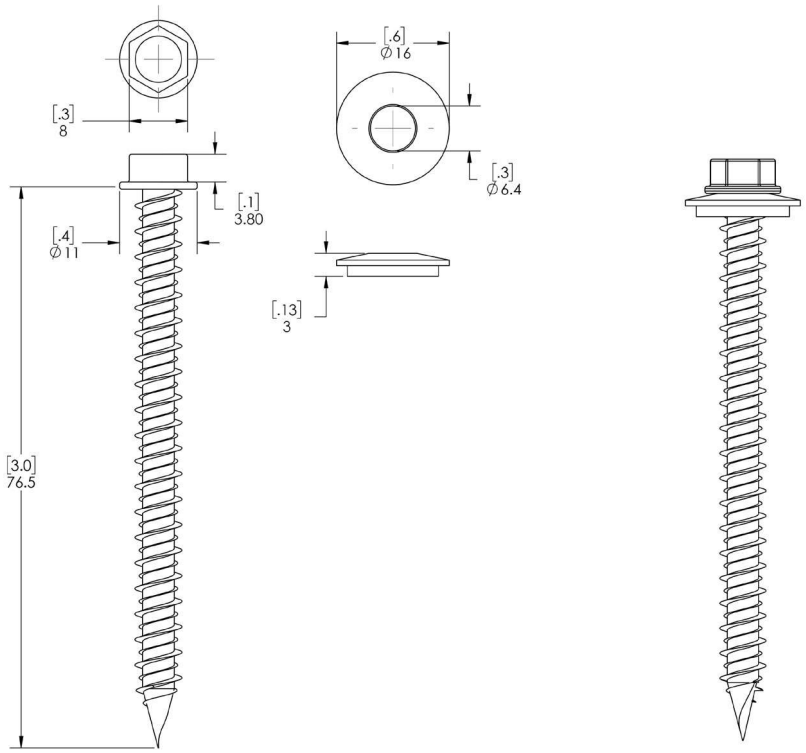
Item Number	Description	Part Number
1	Splice Foot XL	4000165 | Splice Foot XL #14 Kit, Dark 4000300 | Splice Foot XL #14 Kit, Mill
2	K2 EverSeal	
3	#14 × 3in x 5/16in Hex Head Screw	
4	T-Bolt & Hex Nut Set	

	Splice Foot XL
Roof Type	Composition shingle, EPDM, TPO, Bitumen, Asphalt
Material	Aluminum with stainless steel hardware
Finish	Mill
Roof Connection	#14 × 3in x 5/16in Hex Head Screw
Code Compliance	UL 2703
Compatibility	CrossRail 44-X, 48-X, 48-XL, 80

TECHNICAL DATA

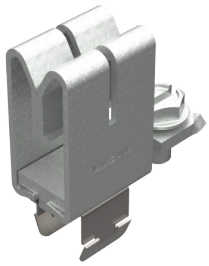
Units: [in] mm





MILBANK®
ENERGY AT WORK

K5T



Catalog Number	K5T
Marketing Product Description	Fifth Terminal Use With 40 Block Square Hole
UPC	784572212565
Length (IN)	0.545
Width (IN)	1.347
Height (IN)	1.575
Weight (LB)	0.08
Brand Name	Milbank
Type	Fifth Terminal Kit
Special Features	3 OClock Position;9 OClock Position
Application	Metering Accessory
Connection	10-32 Screw
Wire Size	No Wire Required
Terminal Size	.545L x 1.347W x 1.575H
Voltage Rating	600 Volts Alternating Current
Material	Copper
Mounting	Plug In

MILBANK®
ENERGY AT WORK

U5934-XL-BLG

Catalog Number	U5934-XL-BLG
Marketing Product Description	4 Terminal Ringless Small Closing Plate 7-8 In Barrel Lock Ground With Bracket Provision
UPC	784572592278
Length (IN)	3.61
Width (IN)	8
Height (IN)	11.5
Brand Name	Milbank
Type	Ringless Meter Socket
Application	Meter Socket
Standard	UL Listed;Type 3R
Voltage Rating	600 Volts Alternating Current
Amperage Rating	100 Continuous Ampere
Phase	1 Phase
Frequency Rating	60 Hertz
Size	3.61L x 8W x 11.5H
Number Of Cutouts	0
Cutout Size	No Main Breaker
Cable Entry	Overhead or Underground
Terminal	Single Mechanical
Insulation	Glass Polyester
Mounting	Surface Mount

Enclosure	G90 Galvanized Steel with Powder Coat Finish
Jaw Quantity	4 Terminal
Bypass Type	No Bypass
Number of Meter Positions	1 Position
Equipment Ground	Ground Bar
Hub Opening	Small Closing Plate
Line Side Wire Range	12 - 1/0 AWG
Load Side Wire Range	12 - 1/0 AWG
Number Of Receptacles	0