



Historic Preservation Services

Community Development & Neighborhood Services

281 North College Avenue
P.O. Box 580
Fort Collins, CO 80522.0580

970.416.4250
preservation@fcgov.com
fcgov.com/historicpreservation

REPORT OF ALTERATIONS TO DESIGNATED RESOURCE
Site Number/Address: 637 Remington St.
Laurel School National Register Historic District
ISSUED: July 13, 2020

ATTN: Robert & Lisa Steketee
The Steketee Family Trust
637 Remington St.
Fort Collins, CO 80524

Dear Mr. & Mrs Steketee:

This report is to document proposed alterations to the L.B. Crosby House at 637 Remington Street, pursuant to Fort Collins Municipal Code Chapter 14, [Article IV](#). A copy of this report may be forwarded to the Colorado Office of Archaeology and Historic Preservation.

The alterations include:

- Installation of PV rooftop solar panels on the southwest roof section of the property.

Our staff review of the proposed work finds the alterations do meet the [SOI Standards for Treatment of Historic Properties](#). A summary is provided below:

Applicable Code Standard	Summary of Code Requirement and Analysis (Rehabilitation)	Standard Met (Y/N)
SOI #1	<i>A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships;</i>	Y
SOI #2	<i>The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.</i> Solar panels are being clustered on the rear (west-facing) slope of the roof, and on the south facing roof slope of the rear gable dormer. These will have minimal/no visibility from public rights-of-way and negligible effects on the property as a Craftsman Bungalow that contributes to the Laurel School Historic District.	Y

SOI #3	<p><i>Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.</i></p> <p>Solar panels were not available during the district’s period of significance (c.1873-c.1930) and will be clearly recognizable as a modern feature.</p>	Y
SOI #4	<p><i>Changes to a property that have acquired historic significance in their own right will be retained and preserved.</i></p>	N/A
SOI #5	<p><i>Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.</i></p> <p>The dormer on the rear slope is a common feature on Craftsman-style Bungalows and is being retained.</p>	Y
SOI #6	<p><i>Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.</i></p>	N/A
SOI #7	<p><i>Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.</i></p>	N/A
SOI #8	<p><i>Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.</i></p>	N/A
SOI #9	<p><i>New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.</i></p> <p>The new solar panels are located on a rear-facing roof slope and will have minimal/no visibility from public rights-of-way, allowing the overall property to retain its character as an early-twentieth century Craftsman-style Bungalow in the residential developments in the southeast section of Fort Collins’ original 1873 town plat. The panels are compatible with the overall design of the house due to their low visibility and location on a rear roof slope.</p>	Y
SOI #10	<p><i>New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.</i></p>	N/A

This project is not expected to effect the historic status of the house. It is likely to remain a contributing building in the Laurel School Historic District, listed in the National Register of Historic Places in 1980.

If you have any questions regarding this review, please contact me. I may be reached at jbertolini@fcgov.com, or at (970) 416-4250.

Sincerely,

Jim Bertolini
Historic Preservation Planner



7/7/2020

Brite Street Solar

Subject: Structural Certification for Installation of Residential Solar
re job: Steketee, Robert, 637 REMINGTON ST, FORT COLLINS, CO 80529

Attn.: To Whom It May Concern

A field observation was performed to document the existing framing of the above mentioned address. From the field observation, the existing roof structure was observed as:

ROOF 1: Shingle roofing supported by 2x8 Rafter @ 24 in. OC spacing. The roof is sloped at approximately 15 degrees and has a max beam span of 13 ft between supports.

Design Criteria:

Code: 2018 IBC (ASCE 7-16)

Ult Wind Speed:	125 mph	Ground Snow:	35 psf
Exposure Cat:	B	Min Roof Snow:	30 psf

After review of the field observation report and based on our structural capacity calculations in accordance with applicable building codes, the existing roof framing supporting the proposed solar panel layout has been determined to be:

ROOF 1: adequate to support the imposed loads. Therefore, no structural upgrades are required.

Current Renewables Engineering Inc.
Professional Engineer
info@currentrenewableseng.com



Design Review Application Historic Preservation Division

Fill this form out for all applications regarding designated historic buildings within the city limits of the City of Fort Collins. Review is required for these properties under Chapter 14, [Article IV](#) of the Fort Collins Municipal Code.

Applicant Information

Robert and Lisa Steketee

(970) 581-8576

Applicant's Name	Daytime Phone	Evening Phone
637 Remington St Fort Collins, Colorado 80524		
Mailing Address (for receiving application-related correspondence)	State	Zip Code
rstekete@gmail.com		

Email

Property Information (put N/A if owner is applicant)

N/A

Owner's Name	Daytime Phone	Evening Phone
Mailing Address (for receiving application-related correspondence)	State	Zip Code

Email

Project Description

Please provide an overview of your project. (Details about the work will be added on the next page.)

Roof Mounted 7.04 DC kW Solar PV System consisting of 2 arrays, one at an azimuth of 255° and one at 165°.
These arrays will not be visible from Remington St. Please see attached plan set for full scope of work.

Please See Steketee North Photo

Please See Steketee South Photo

Please See Steketee West Photo

Please See Steketee East Photo

Required Additional information

The following items must be submitted with this completed application. Digital submittals are preferred.

- At least one current photo for each side of each building and structure. Photo files or prints shall be named/labeled with applicant name and elevation. For example, smitheast.jpg, smithwest.jpg, etc. If submitted as prints, photos shall be labeled
- Photos for each feature as described in the section "Detail of Proposed Rehabilitation Work". Photo files or prints shall be named or labeled with applicant name and feature letter. For example, smitha1.jpg, smitha2.jpg, smithb.jpg, smithc.jpg, etc.

Depending on the nature of the project, one or more of the following items may need to be submitted.

- Drawing(s) with dimensions.
- Product specification sheet(s).
- Descriptions of all materials included in the proposed work.
- Color sample(s) or chip(s) of all materials.

Check if partial or full demolition is a part of this project. Partial demolition could include taking off existing rear porches to create space for a new addition or removing an existing wall or demolishing a roof. If you are taking away pieces of the existing building or structure, you are likely undergoing some partial demolition.



Signature of Applicant

07-02-20
Date





Steketee East

Steketee North



Steketee South



Steketee West



Grid-Tied Photovoltaic System

AC Rating: 6.490 kW

DC Rating: 7.040 kW

Steketee, Robert
637 Remington St
Fort Collins, CO 80529

Jurisdiction: City of Fort Collins

Sheet List

Sheet No.	Sheet Title
PV-000	COVER
PV-A01	SITE PLAN
PV-A02	MODULE LAYOUT
PV-A03	DETAILS
PV-A04	MATERIALS
PV-E01	ELECTRICAL DIAGRAM
PV-E02	SYSTEM CALCS
PV-G01	SIGNAGE DATASHEETS

Scope of Work:

BriteStreet Energy shall install a 7.040 kW Grid-tied Photovoltaic ("PV") System totaling (22) Silfab SIL 320 NL Modules with (22) Enphase Energy IQ7+ Micro-Inverter(s). The Modules shall be flush mounted on the asphalt/comp. shingle roof and interconnected via load side tap.

Equipment Specifications:

Module: (22) Silfab SIL 320 NL
Inverter 1: (22) Enphase Energy IQ7+
Racking: Iron Ridge XR100
Attachment Flashing: UniRac FlashLoc

Roof Specifications:

Roof 1: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 255° Array Size: 19 Modules	Roof 2: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 165° Array Size: 3 Modules
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Site Specifications:

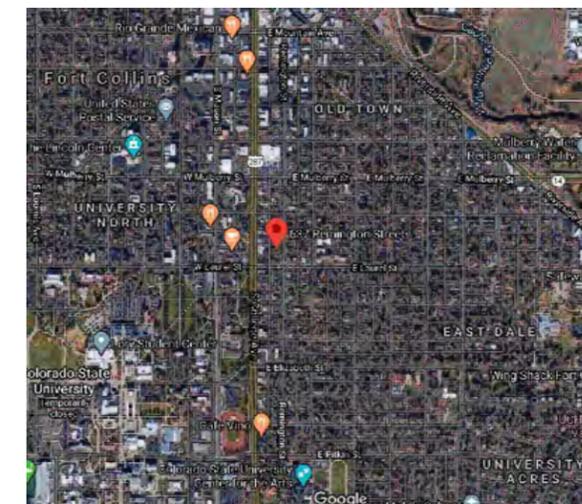
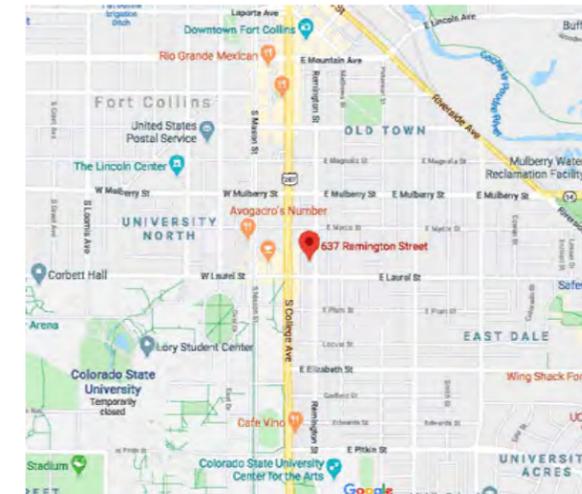
Occupancy: II
Design Wind Speed: 125 MPH
Exposure Category: B
Mean Roof Height: 25 ft
Ground Snow Load: 35 PSF

All Work to be in Compliance with:

2017 National Electrical Code (NEC)
2015 International Residential Code (IRC)
2018 International Building Code (IBC)
2012 International Fire Code (IFC)
2012 Uniform Mechanical Code (UMC)
2012 Uniform Plumbing Code (UPC)
ASCE/ANSI 7-16 Minimum Design Loads for Buildings and Other Structures
As amended and adopted by City of Fort Collins

General Notes:

- System follows any/all Fire Code Setbacks per Ordinances of the City of Fort Collins.
- All projects shall comply with the Ordinances of the City of Fort Collins.
- Construction Hours: 7am-8pm Monday-Friday, 9am-8pm Saturday, No time on Sunday or legal Holidays.
- Product Data Sheets shall be included.
- Rooftop penetrations shall be completed and sealed per code by a licensed contractor.
- No Roof, Plumbing or Mechanical vents shall be covered or floated by, or routed around the Photovoltaic modules, unless specifically allowed by the AHJ, and performed in compliance with applicable codes.
- All Photovoltaic modules shall be tested and listed by a recognized laboratory.
- Certifications shall include UL1703, IEC61646, IEC61730.
- A continuous ground shall be provided for the Array and for all Photovoltaic Equipment.
- DC Wiring shall be run in metal conduit or raceways within enclosed spaces in a building.
- Conduit, Wire systems and Raceways shall be located as close as possible to ridges, hips, and outside walls.
- Conduit between Sub Arrays and to DC Combiners/Disconnects shall be minimized by taking the shortest path, to reduce voltage drop.
- Space Requirements for electrical equipment shall comply with NEC Article 110.
- Modules, Racking, Conduit and other metallic materials and equipment shall be bonded to Ground.
- Equipment grounding shall be sized in accordance with Table 250.122.
- Connectors that are not readily accessible and that are used in the circuits operating at or over 30V AC or DC shall require a tool for opening and are required to be marked "Do not disconnect under load" or "Not for current interrupting", per 690.33 (c) & (e).
- All signage to be placed in accordance with local building code.
- Signs or Directories shall be attached to the electrical equipment or located adjacent to the identified equipment.
- Signs should be of sufficient durability to withstand the environment.
- Any plaques shall be metal or plastic with engraved or machine printed letters, or electro-plating, in a red background with white lettering, a minimum of 3/8" height and all capital letters, and shall be attached with an approved fastening method.
- All inverters, motor generators, Photovoltaic modules, Photovoltaic panels, AC Photovoltaic modules, source circuit combiners, and charge controllers intended for use in a Photovoltaic power system shall be identified and listed for the application per 690.4 (d).
- The discharge of pollutants to any storm drainage system is prohibited. No solid waste, petroleum byproducts, soil particulate, construction waste material or waste water generated on construction site or by construction activities shall be placed, conveyed, or discharged into the street, gutter, or storm drain system.
- Fine stranded cables shall be terminated only with terminals, lugs, devices or connectors that are identified and listed for such use per the 2010 CEC 690.31 (f) and 690.74.
- Smoke and CO Alarms to be retrofitted per CRC R314, R315



**GRID-TIED
PHOTOVOLTAIC SYSTEM**
7.040kW DC @ STC
STEKETEE, ROBERT
637 REMINGTON ST
FORT COLLINS, CO 80529
Project # 10319593

DESIGNER: JF
REVIEWER: BM
VERSION DATE: 5/11/2020

REVISIONS

#	By	Date	Notes
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SCALE: Not to Scale

COVER

PV-000

FOR CONSTRUCTION

Equipment Specifications:

Module: (22) Silfab SIL 320 NL
Inverter 1: (22) Enphase Energy IQ7+
Racking: Iron Ridge XR100
Attachment Flashing: UniRac FlashLoc

Roof Specifications:

Roof 1: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 255° Array Size: 19 Modules	Roof 2: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 165° Array Size: 3 Modules
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(E) Single Family Dwelling
637 REMINGTON ST
(E) Property Line

Equipment on Exterior Wall:

(E) Utility Meter
(E) Main Service Panel - P.O.I. via Load Side Tap
(N) PV AC Disconnect - Fused
(N) PV AC Combiner

(N) PV Array 1:
19 Silfab
SIL 320 NL Modules

(N) PV Array 2:
3 Silfab
SIL 320 NL Modules

(E) Driveway

Remington Street

**GRID-TIED
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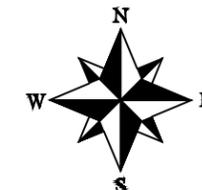
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SCALE: 1" = 15'

SITE PLAN

PV-A01



Notes:

- Roof structures with a slope less than 2:12 do not require access and pathways.
(See City of Fort Collins Roof Mounted Photovoltaic System Residential Installation Standards)
- All exterior conduit on roof and under eaves final locations to be determined during installation

2020-07-02

ANSI F ull Bleed B (11.00 X 17.00 Inches)

10319593

FOR CONSTRUCTION

PV ARRAY 1 - MECHANICAL LOADS

Array Area:	350.0 ft ²	Total Photovoltaic Dead Load:	3.01 psf
Array Weight:	1054.0 lbs	Avg. Dead Load per Anchor:	26.3 lbs
Anchor Qty.:	40		
Design Values by Roof Zone:	Corner	Egde	Interior
Max. Iron Ridge Rail Span:	N/A	N/A	60 in. O.C.
Max. Iron Ridge Rail Cantilever:	N/A	N/A	20 in. O.C.
Adjusted Anchor Span:	N/A	N/A	48 in. O.C.
Downforce Point Load:	N/A	N/A	321.9 lbs
Uplift Point Load:	N/A	N/A	-159.9 lbs
Minimum Anchor Strength:	400 lbs		
Average Safety Factor:	2.50		

Equipment Specifications:

Module: (22) Silfab SIL 320 NL
 Inverter 1: (22) Enphase Energy IQ7+
 Racking: Iron Ridge XR100
 Attachment Flashing: UniRac FlashLoc

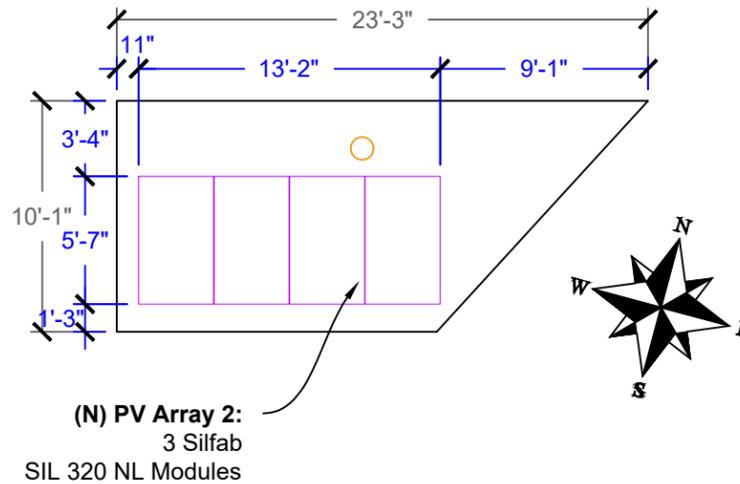
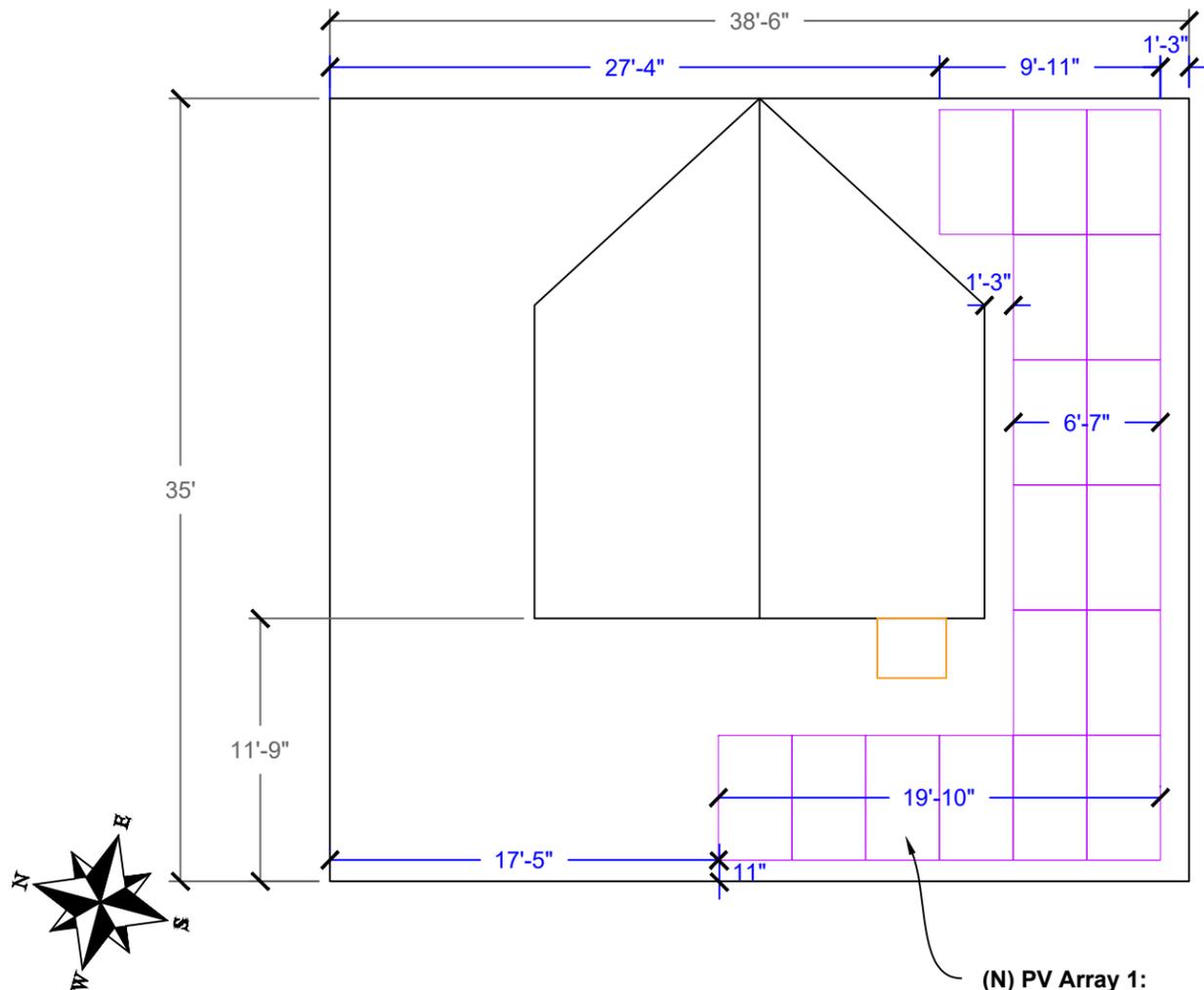
Roof Specifications:

Roof 1:
 Asphalt/Comp. Shingle
 2" x 8" Rafters @ 24" O.C.
 Eave Height: 15 ft
 Pitch: 15° | Azimuth: 255°
 Array Size: 19 Modules

Roof 2:
 Asphalt/Comp. Shingle
 2" x 8" Rafters @ 24" O.C.
 Eave Height: 15 ft
 Pitch: 15° | Azimuth: 165°
 Array Size: 3 Modules

PV ARRAY 2 - MECHANICAL LOADS

Array Area:	55.1 ft ²	Total Photovoltaic Dead Load:	3.45 psf
Array Weight:	190.1 lbs	Avg. Dead Load per Anchor:	19.0 lbs
Anchor Qty.:	10		
Design Values by Roof Zone:	Corner	Egde	Interior
Max. UniRac Rail Span:	N/A	N/A	60 in. O.C.
Max. UniRac Rail Cantilever:	N/A	N/A	20 in. O.C.
Adjusted Anchor Span:	N/A	N/A	48 in. O.C.
Downforce Point Load:	N/A	N/A	334.5 lbs
Uplift Point Load:	N/A	N/A	-162.2 lbs
Minimum Anchor Strength:	400 lbs		
Average Safety Factor:	2.47		



(N) PV Array 1:
 19 Silfab
 SIL 320 NL Modules

(N) PV Array 2:
 3 Silfab
 SIL 320 NL Modules

UniRac SolarMount Mounting Notes:

- Integrated Full System Grounding and Bonding to UL 2703
- Total Quantity of Attachments =50
- Roof Zones are defined by dimension, $a = 3.0$ ft.
- Maximum Allowable Cantilever for Iron Ridge Rail is $\frac{1}{3}$ the Maximum Rail Span
- Racking and Attachment: Iron Ridge XR100 with UniRac FlashLoc attached with 74515 | 5/16X4 SS LAG SCREW HEX HEAD
- All Dimensions shown are to module edges, including 1/4 in. Spacing between Modules required when using the Top Clamp Method.
- The SolarMount Rails will extend 1-1/2 in. beyond the Module Edge in order to support the End Clamps.
- UniRac requires one thermal expansion gap (4 in.) for continuous sections of rail greater than 40' in length
- Array Installed according to the UniRac SolarMount Design & Engineering Guide PUB14NOV03
- Attachment Locations, If shown, are approximate. Final adjustment of attachment location may be necessary depending on field conditions. All attachments are staggered amongst the framing members.

GRID-TIED PHOTOVOLTAIC SYSTEM
7.040kW DC @ STC
 STEKETEE, ROBERT
 637 REMINGTON ST
 FORT COLLINS, CO 80529
 Project # 10319593

DESIGNER: JF
 REVIEWER: BM
 VERSION DATE: 5/11/2020

REVISIONS

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

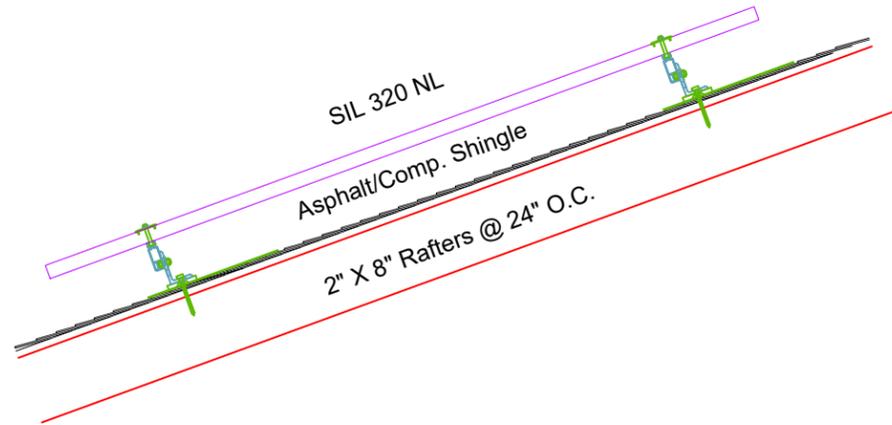
MODULE LAYOUT

PV-A02

2020-07-02

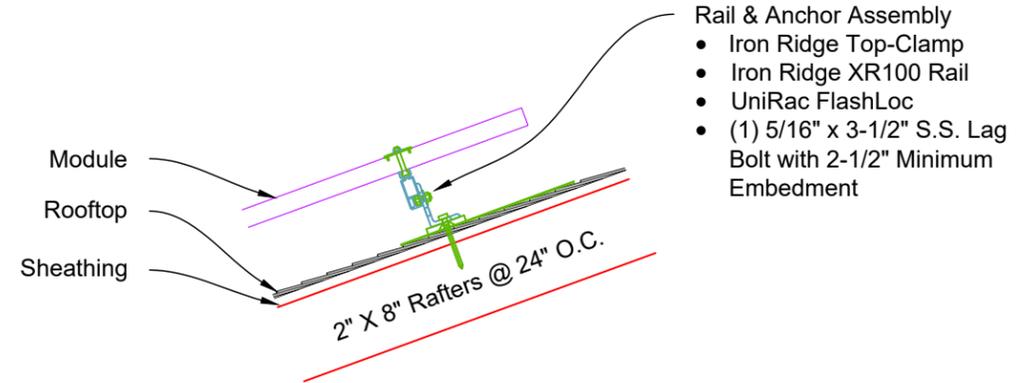
ANSI Full Bleed B (11.00 X 17.00 Inches)

10319593



1 Attachment Profile

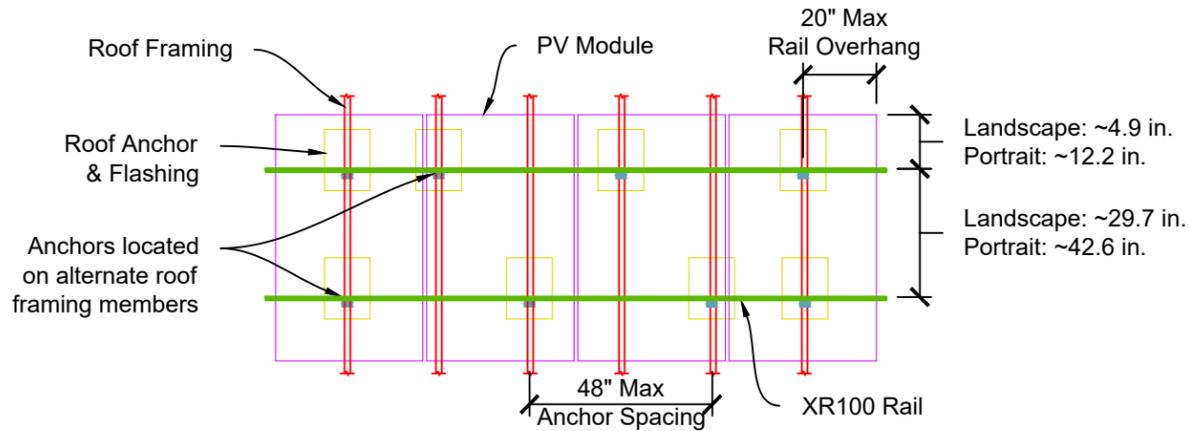
Scale: 3/4" = 1'-0"



2 Attachment Detail

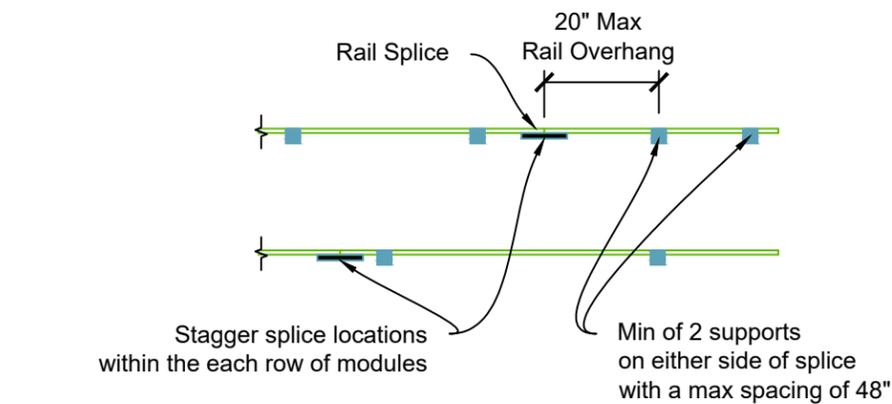
Scale: 1" = 1'-0"

- Rail & Anchor Assembly
- Iron Ridge Top-Clamp
 - Iron Ridge XR100 Rail
 - UniRac FlashLoc
 - (1) 5/16" x 3-1/2" S.S. Lag Bolt with 2-1/2" Minimum Embedment



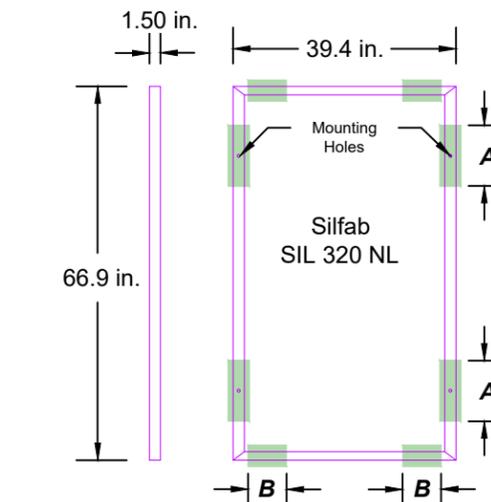
3 Staggered Attachment Detail (Typ.)

Not to Scale



4 Rail Splice Detail

Not to Scale

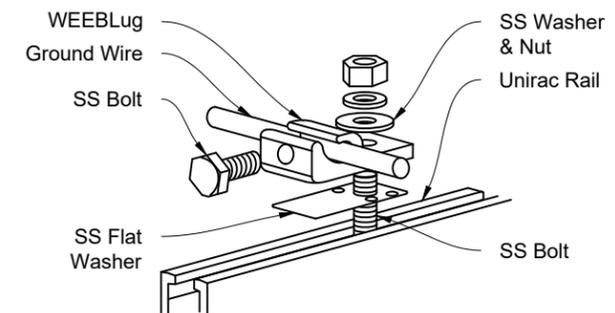


	Distance from Module Corner	
	Minimum	Maximum
Long Side, A	8.1 in.	16.2 in.
Short Side*, B	1.9 in.	7.8 in.

*Top-Clamps may be used on the Short Sides of the Module

5 UL Approved Mounting Locations

Not to Scale



6 Grounding Lug & Rail

Not to Scale

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SCALE: VARIES

DETAILS

PV-A04

FOR CONSTRUCTION

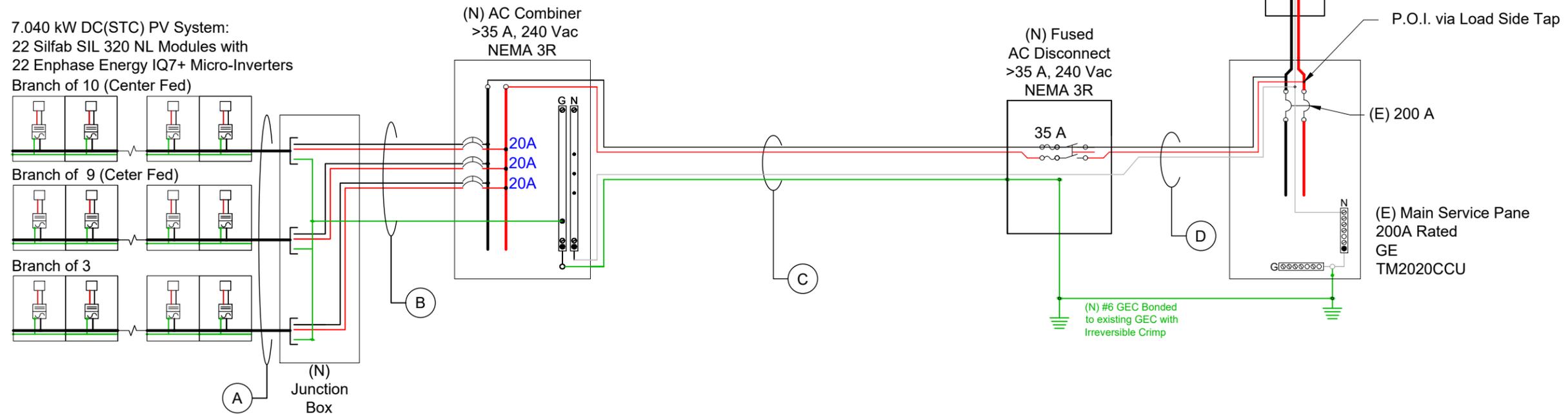
Notes:

1. All conduit to use water-tight expansion fittings.
2. All Rooftop conduit to be a minimum of 1" above the roof surface.
3. PV Connection into Load Center shall be positioned at the opposite end from the Utility Input feeder location. (Where applicable)
4. All equipment to be rated NEMA-3R unless otherwise noted.
5. Lowest expected ambient temperature based on ASHRAE min. mean extreme dry bulb temperature for ASHRAE location most similar to installation.
6. Highest continuous ambient temperature based on ASHRAE highest month 2% dry bulb temperature for ASHRAE location most similar to installation.
7. All conductors to be copper unless noted otherwise.
8. Conductor sizing shall limit Voltage drop to 2% DC & 1.5% AC (2% for Enphase Systems).

WIRE SCHEDULE					WIRE SIZING		VOLTAGE DROP	
Tag	Qty	Conductor Size & Type	Ground Size & Type	Conduit	90°C Derated Ampacity (Allowable Amps x Temp Derate x Fill Derate)	75°C Ampacity	Length	V. Drop
A	3	#10 AWG ENGAGE CABLE	#6 AWG BARE Cu	FREE AIR	40A X 0.76 = 30.40 A	35.00 A	N/A	0.00%
B	6	#10 AWG THWN-2	#8 AWG THWN-2	1" PVC/EMT	40A X 0.76 X 0.8 = 24.32 A	35.00 A	50 Ft	0.50%
C	3	#6 AWG THWN-2	#8 AWG THWN-2	1" PVC	75A X 1 X 1 = 75.00 A	65.00 A	20 Ft	0.22%
D	3	#6 AWG THWN-2	#8 AWG THWN-2	1" PVC	75A X 1 X 1 = 75.00 A	65.00 A	10 Ft	0.11%
							DC	---
							AC	0.83%

SYSTEM LABELING SPECIFICATIONS

Max. DC Voltage (-28 °C): 46.1 V	DC Max. Current: 12.90 A
DC Operating Voltage: 32.9 V	DC Operating Current: 9.74 A
AC Nominal Voltage: 240 V	Max. AC Current: 26.6 A



Rooftop Electrical

Exterior, Utility Meter

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SCALE: Not to Scale

ELECTRICAL DIAGRAM

PV-E01

FOR CONSTRUCTION

MODULE SPECIFICATIONS

Sifab SIL 320 NL	
STC Rating: 320 W	Height: 66.9 in.
PTC Rating: 242 W	Width: 39.4 in.
V _{MP} : 32.9 V	Depth: 1.50 in.
I _{MP} : 9.74 A	Area: 18.3 ft ²
V _{OC} : 40.1 V	Weight: 41.4 lbs
I _{SC} : 10.32 A	Max. Fuse: 20.00 A
Temp. Coeff. (V _{OC}): -0.2800 %/°C	

TEMPERATURES

Ambient Low Temperature: -28 °C
Ambient High Temperature: 30 °C
Temp. Rise for Voltage Calculations: 31 °C
Temp. Rise for Exposed Conduit on Roof: 22 °C

SYSTEM LABELING SPECIFICATIONS

Max. DC Voltage (-28 °C): 46.1 V	DC Max. Current: 12.90 A
DC Operating Voltage: 32.9 V	DC Operating Current: 9.74 A
AC Nominal Voltage: 240 V	Max. AC Current: 26.6 A

INVERTER 1 SPECIFICATIONS

Enphase Energy IQ7+
Nominal V _{AC} : 240 V
Max. W _{DC} : 440 W
Max. W _{AC} : 295 W
Startup Voltage: 22 V
Min. V _{MP} : 16 V
Max. V _{MP} : 60 V
Max. V _{DC} : 60 V
Max. I _{DC} : 15 A
Max. I _{AC} : 1.21 A
CEC Efficiency: 97.0%

INVERTER 1 CURRENTS

DC Max. Current: MODULE I _{sc} x 1.25	10.32A x 1.25 = 12.90 A
DC Operating Current: MODULE I _{mp}	9.74A = 9.74 A
Source Current, I _{DC} : MODULE I _{sc} x 1.25 x 1.25	10.32A x 1.25 x 1.25 = 16.13 A
Output Current, I _{AC} : INVERTER I _{ac} x INVERTER QTY x 1.25	1.21A x 1.25 x 22 = 33.28 A

INVERTER 1 LABELING SPECIFICATIONS

Max. DC Voltage (-28 °C): 46.1 V	DC Max. Current: 12.90 A
DC Operating Voltage: 32.9 V	DC Operating Current: 9.74 A
AC Nominal Voltage: 240 V	Max. AC Current: 26.6 A

INVERTER 1 VOLTAGES

DC Max. Voltage (-28 °C):	MODULE V _{oc} x TEMP DELTA x TEMP COEF V _{oc}	40.1V x 53 x 0.0028 = 46.1 V
DC Operating Voltage:	MODULE V _{mp}	32.88V = 32.9 V

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7.040kW DC @ STC
 STEKETEE, ROBERT
 637 REMINGTON ST
 FORT COLLINS, CO 80529
 Project # 10319593

DESIGNER: JF
 REVIEWER: BM
 VERSION DATE: 5/11/2020

REVISIONS

#	By	Date	Notes
1			
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3			
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5			

SCALE: Not to Scale

ELECTRICAL CALCS

PV-E02

2020-07-02

ANSI F ull Bleed B (11.00 X 17.00 Inches)

10319593

WARNING
PHOTOVOLTAIC POWER SOURCE

NEC Article 690.31(G)(3)(4) | HT#: 596-00206
REFLECTIVE MATERIAL REQUIRED
CONDUIT RACEWAYS EVERY 10 FEET OR LESS

PHOTOVOLTAIC
AC DISCONNECT

NEC Articles 690.15 & 690.13(B) | HT#: 596-00237
AC DISCONNECTS

PHOTOVOLTAIC AC DISCONNECT

MAXIMUM AC OPERATING CURRENT:	26.6 A
NOMINAL OPERATING AC VOLTAGE:	240 V

NEC Articles 690.54 & 690.13(B) | HT#: 596-00239
INVERTER 1 AC DISCONNECT

PHOTOVOLTAIC SYSTEM
EQUIPPED WITH
RAPID SHUTDOWN

NEC Article 690.56(C) | HT#: 596-00474
REFLECTIVE MATERIAL REQUIRED
RAPID SHUTDOWN DISCONNECT, MAIN SERVICE DISCONNECT

CAUTION: SOLAR ELECTRIC
SYSTEM CONNECTED

NEC Articles 690.15 & 690.13(B) | HT#: 558-00613
PRODUCTION / NET METERS, MAIN SERVICE DISCONNECT

DO NOT DISCONNECT
UNDER LOAD

NEC Article 690.33(E)(2) | HT#: 596-00244
BREAKER PANEL

CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

NEC Articles 705.12(D)(3) & 690.64 | HT#: 596-00587
BREAKER PANELS

WARNING
INVERTER OUTPUT CONNECTION. DO NOT
RELOCATE THIS OVERCURRENT DEVICE.

NEC Article 705.12(D)(3)(B) | HT#: 596-00589
BREAKER PANELS

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NEC Articles 705.12(D)(3) & 690.64 | HT#: 596-00495
PRODUCTION / NET METERS, BREAKER PANELS

WARNING
ELECTRICAL SHOCK HAZARD
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED CONDUCTORS
MAY BE UNGROUNDED AND ENERGIZED

NEC Article 690.5(C) | HT#: 596-00498
STRING INVERTERS, PRODUCTION / NET METERS,
BREAKER PANELS

WARNING
TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

NEC Article 110.27(C) | HT#: 596-00499
COMBINER BOXES, EMT ENCLOSURES, BREAKER PANELS,
MAIN SERVICE DISCONNECT

WARNING
ELECTRICAL SHOCK HAZARD
THE DC CONDUCTORS OF THIS
PHOTOVOLTAIC SYSTEM ARE UNGROUNDED
AND MAY BE ENERGIZED

NEC Article 690.35(F) | HT#: 596-00588
REQUIRED FOR UNGROUNDED SYSTEMS
COMBINER BOXES, CONDUIT ENCLOSURES,
DC DISCONNECTS, BREAKER PANELS

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

NEC Article 690.17(E) | HT#: 596-00497
COMBINER BOXES, EMT ENCLOSURES, AC & DC DISCONNECTS,
BREAKER PANELS, MAIN SERVICE DISCONNECT

GRID-TIED
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SIGNAGE

PV-G01



SIL-320 NL



60 Cell Monocrystalline PV Module

INDUSTRY LEADING WARRANTY

All our products include an industry leading 25-year product workmanship and 30-year performance warranty.

35+ YEARS OF SOLAR INNOVATION

Leveraging over 35+ years of worldwide experience in the solar industry, Silfab is dedicated to superior manufacturing processes and innovations such as Bifacial and Back Contact technologies, to ensure our partners have the latest in solar innovation.

NORTH AMERICAN QUALITY

Silfab is the leading automated solar module manufacturer in North America. Utilizing premium quality materials and strict quality control management to deliver the highest efficiency, premium quality PV modules 100% made in North America.



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

BAA / ARRA COMPLIANT

Silfab panels are designed and manufactured to meet Buy American Act Compliance. The US State Department, US Military and FAA have all utilized Silfab panels in their solar installations.

LIGHT AND DURABLE

Engineered to accommodate low load bearing structures up to 5400Pa. The light-weight frame is exclusively designed for wide-ranging racking compatibility and durability.

QUALITY MATTERS

Total automation ensures strict quality controls during the entire manufacturing process at our ISO certified facilities.

DOMESTIC PRODUCTION

Silfab Solar manufactures PV modules in two automated locations within North America. Our 500+ North American team is ready to help our partners win the hearts and minds of customers, providing customer service and product delivery that is direct, efficient and local.

AESTHETICALLY PLEASING

All black sleek design, ideal for high-profile residential or commercial applications.

PID RESISTANT

PID Resistant due to advanced cell technology and material selection. In accordance to IEC 62804-1.

Electrical Specifications		SIL-320 NL mono PERC	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	320	242
Maximum power voltage (Vpmax)	V	32.88	29.59
Maximum power current (Ipmax)	A	9.74	8.18
Open circuit voltage (Voc)	V	40.10	37.09
Short circuit current (Isc)	A	10.32	8.46
Module efficiency	%	18.8	17.8
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/m² • 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.

Temperature Ratings		SIL-320 NL mono PERC	
Temperature Coefficient Isc		0.064 %/°C	
Temperature Coefficient Voc		-0.28 %/°C	
Temperature Coefficient Pmax		-0.36 %/°C	
NOCT (± 2°C)		45 °C	
Operating temperature		-40/+85 °C	

Mechanical Properties and Components		SIL-320 NL mono PERC	
	Metric	Imperial	
Module weight	18.6 kg ±0.2 kg	41 ±0.4 lbs	
Dimensions (H x L x D)	1700 mm x 1000 mm x 38 mm	66.9 in x 39.4 in x 1.5 in	
Maximum surface load (wind/snow)*	4000 Pa rear load / 5400 Pa front load N/m ²	83.5/112.8 lb/ft ²	
Hail impact resistance	Ø 25 mm at 83 km/h	Ø 1 in at 51.6 mph	
Cells	60 - Si mono PERC - 5 busbar 158.75 x 158.75 mm	60 - Si mono PERC - 5 busbar 6.25 x 6.25 Inch	
Glass	3.2 mm high transmittance, tempered, DSM anti-reflective coating	0.126 in high transmittance, tempered, DSM anti-reflective coating	
Cables and connectors (refer to installation manual)	1200 mm, Ø 5.7 mm, MC4 compatible	47.2 in, Ø 0.22 in, MC4 compatible	
Backsheet	High durability, superior hydrolysis resistance, multi-layer dielectric film		
Frame	Anodized Aluminum (Black)		
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)		
Junction Box	UL 3730 Certified, IP67 rated		

Warranties		SIL-320 NL mono PERC	
Module product workmanship warranty		25 years**	
Linear power performance guarantee		30 years	

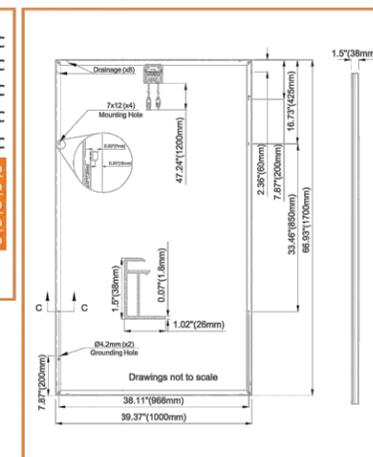
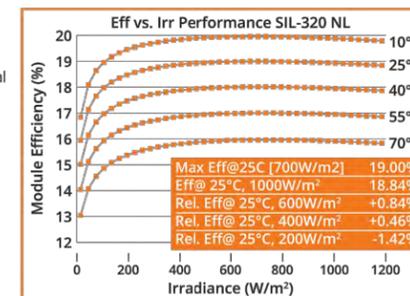
Certifications		SIL-320 NL mono PERC	
Product		ULC ORD C1703, UL 1703, CEC listed, IEC 62716 Ammonia Corrosion; IEC61701:2011 Salt Mist Corrosion Certified, UL Fire Rating: Type 2	
Factory		ISO9001:2015	

- Modules Per Pallet: 26
- Pallets Per Truck: 36
- Modules Per Truck: 936

*▲ 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 www.silfabsolar.com.

Third-party generated pan files from Fraunhofer-Institute for Solar Energy Systems ISE are available for download at: www.silfabsolar.com/downloads



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DATASHEET (1)

SIL-320-NL-20200604 - No reproduction of any kind is allowed. Data and information is subject to modifications without notice. ©Silfab, 2020.

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.



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	18 mA		18 mA	
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	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)	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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DATASHEET (2)



To learn more about Enphase offerings, visit enphase.com





XR100 Bonded Splice

1) Splice, XR100, Mill 12" long

2) Screw, Self Drilling

Property	Value
Material	6000 Series Aluminum
Finish	Mill

Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.0



XR100 Rail

Property	Value
Total Cross-Sectional Area	0.582 in ²
Section Modulus (X-axis)	0.297 in ³
Moment of Inertia (X-axis)	0.390 in ⁴
Moment of Inertia (Y-axis)	0.085 in ⁴
Torsional Constant	0.214 in ³
Polar Moment of Inertia	0.126 in ⁴

APPROVED MATERIALS:
6005-T6, 6005A-T61, 6105-T5, 6N01-T6
(34,000 PSI YIELD STRENGTH MINIMUM)

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-100-132A	XR-100-132B	XR100, Rail 132" (11 Feet)	6000-Series Aluminum	7.50 lbs.
XR-100-168A	XR-100-168B	XR100, Rail 168" (14 Feet)		9.55 lbs.
XR-100-204A	XR-100-204B	XR100, Rail 204" (17 Feet)		11.60 lbs.

v1.1

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DATASHEET (3)

FLASH LOC



FLASHLOC is the ultimate attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast — no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the lag bolt and inject sealant into the base. **FLASHLOC's** patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with lag bolts, sealant, and hardware for maximum convenience. Don't just divert water, **LOC it out!**



PROTECT THE ROOF

Install a high-strength waterproof attachment without lifting, prying or damaging shingles.



LOC OUT WATER

With an outer shield **1** contour-conforming gasket **2** and pressurized sealant chamber **3** the Triple-Loc Seal delivers a 100% waterproof connection.

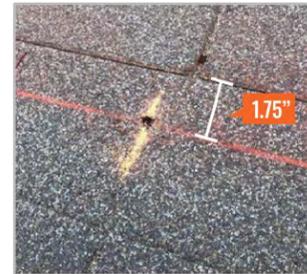


HIGH-SPEED INSTALL

Simply drive lag bolt and inject sealant into the port **4** to create a permanent pressure seal.

FLASH LOC

INSTALLATION GUIDE



PRE-INSTALL

Snap chalk lines for attachment rows. On shingle roofs, snap lines 1-3/4" below upslope edge of shingle course. Locate rafters and mark attachment locations.

At each location, drill a 7/32" pilot hole. Clean roof surface of dirt, debris, snow, and ice, then fill pilot hole with sealant.

NOTE: Space mounts per racking system install specifications. When down pressure is ≥ 34 psf, span may not exceed 2 ft.



STEP 1: SECURE

Place **FLASHLOC** over pilot hole with lag on down-slope side. Align indicator marks on sides of mount with chalk line. Pass included lag bolt and sealing washer through **FLASHLOC** into pilot hole. Drive lag bolt until mount is held firmly in place.

NOTE: The EPDM in the sealing washer will expand beyond the edge of the metal washer when proper torque is applied.



STEP 2: SEAL

Insert tip of UNIRAC provided sealant into port. Inject until sealant exits both vents.

Continue array installation, attaching rails to mounts with provided T-bolts.

NOTE: When **FLASHLOC** is installed over gap between shingle or tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

Use only provided sealant.

GRID-TIED PHOTOVOLTAIC SYSTEM

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DATASHEET (4)

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702



7/7/2020

Brite Street Solar

Subject: Structural Certification for Installation of Residential Solar
re job: Steketee, Robert, 637 REMINGTON ST, FORT COLLINS, CO 80529

Attn.: To Whom It May Concern

A field observation was performed to document the existing framing of the above mentioned address. From the field observation, the existing roof structure was observed as:

ROOF 1: Shingle roofing supported by 2x8 Rafter @ 24 in. OC spacing. The roof is sloped at approximately 15 degrees and has a max beam span of 13 ft between supports.

Design Criteria:

Code: 2018 IBC (ASCE 7-16)

Ult Wind Speed:	125 mph	Ground Snow:	35 psf
Exposure Cat:	B	Min Roof Snow:	30 psf

After review of the field observation report and based on our structural capacity calculations in accordance with applicable building codes, the existing roof framing supporting the proposed solar panel layout has been determined to be:

ROOF 1: adequate to support the imposed loads. Therefore, no structural upgrades are required.

Current Renewables Engineering Inc.
Professional Engineer
info@currentrenewableseng.com

Grid-Tied Photovoltaic System

AC Rating: 6.490 kW

DC Rating: 7.040 kW

Steketee, Robert
637 Remington St
Fort Collins, CO 80529

Jurisdiction: City of Fort Collins

Sheet List

Sheet No.	Sheet Title
PV-000	COVER
PV-A01	SITE PLAN
PV-A02	MODULE LAYOUT
PV-A03	DETAILS
PV-A04	MATERIALS
PV-E01	ELECTRICAL DIAGRAM
PV-E02	SYSTEM CALCS
PV-G01	SIGNAGE DATASHEETS

Scope of Work:

BriteStreet Energy shall install a 7.040 kW Grid-tied Photovoltaic ("PV") System totaling (22) Silfab SIL 320 NL Modules with (22) Enphase Energy IQ7+ Micro-Inverter(s). The Modules shall be flush mounted on the asphalt/comp. shingle roof and interconnected via load side tap.

Equipment Specifications:

Module: (22) Silfab SIL 320 NL
Inverter 1: (22) Enphase Energy IQ7+
Racking: Iron Ridge XR100
Attachment Flashing: UniRac FlashLoc

Roof Specifications:

Roof 1: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 255° Array Size: 19 Modules	Roof 2: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 165° Array Size: 3 Modules
--	---

Site Specifications:

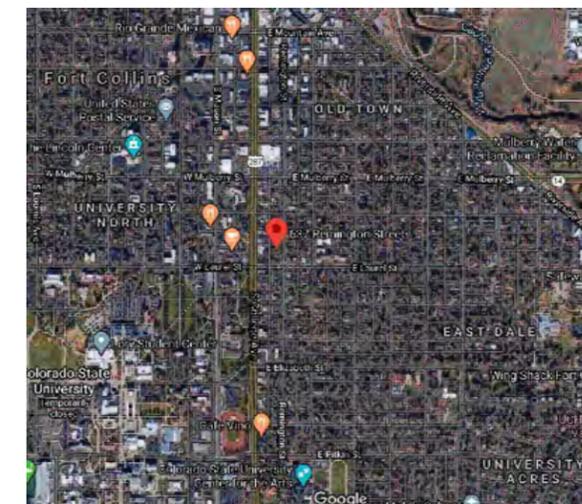
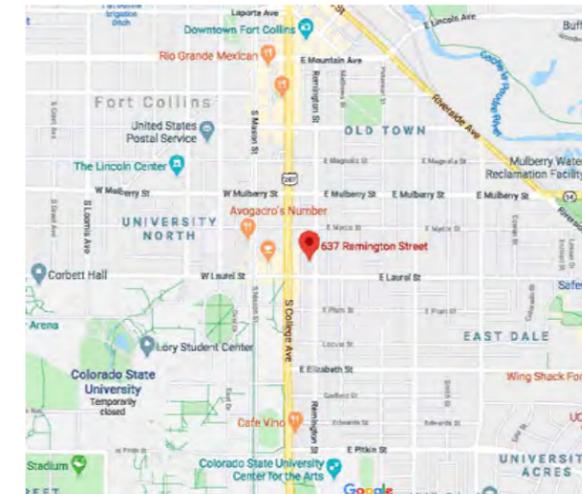
Occupancy: II
Design Wind Speed: 125 MPH
Exposure Category: B
Mean Roof Height: 25 ft
Ground Snow Load: 35 PSF

All Work to be in Compliance with:

2017 National Electrical Code (NEC)
2015 International Residential Code (IRC)
2018 International Building Code (IBC)
2012 International Fire Code (IFC)
2012 Uniform Mechanical Code (UMC)
2012 Uniform Plumbing Code (UPC)
ASCE/ANSI 7-16 Minimum Design Loads for Buildings and Other Structures
As amended and adopted by City of Fort Collins

General Notes:

- System follows any/all Fire Code Setbacks per Ordinances of the City of Fort Collins.
- All projects shall comply with the Ordinances of the City of Fort Collins.
- Construction Hours: 7am-8pm Monday-Friday, 9am-8pm Saturday, No time on Sunday or legal Holidays.
- Product Data Sheets shall be included.
- Rooftop penetrations shall be completed and sealed per code by a licensed contractor.
- No Roof, Plumbing or Mechanical vents shall be covered or floated by, or routed around the Photovoltaic modules, unless specifically allowed by the AHJ, and performed in compliance with applicable codes.
- All Photovoltaic modules shall be tested and listed by a recognized laboratory.
- Certifications shall include UL1703, IEC61646, IEC61730.
- A continuous ground shall be provided for the Array and for all Photovoltaic Equipment.
- DC Wiring shall be run in metal conduit or raceways within enclosed spaces in a building.
- Conduit, Wire systems and Raceways shall be located as close as possible to ridges, hips, and outside walls.
- Conduit between Sub Arrays and to DC Combiners/Disconnects shall be minimized by taking the shortest path, to reduce voltage drop.
- Space Requirements for electrical equipment shall comply with NEC Article 110.
- Modules, Racking, Conduit and other metallic materials and equipment shall be bonded to Ground.
- Equipment grounding shall be sized in accordance with Table 250.122.
- Connectors that are not readily accessible and that are used in the circuits operating at or over 30V AC or DC shall require a tool for opening and are required to be marked "Do not disconnect under load" or "Not for current interrupting", per 690.33 (c) & (e).
- All signage to be placed in accordance with local building code.
- Signs or Directories shall be attached to the electrical equipment or located adjacent to the identified equipment.
- Signs should be of sufficient durability to withstand the environment.
- Any plaques shall be metal or plastic with engraved or machine printed letters, or electro-plating, in a red background with white lettering, a minimum of 3/8" height and all capital letters, and shall be attached with an approved fastening method.
- All inverters, motor generators, Photovoltaic modules, Photovoltaic panels, AC Photovoltaic modules, source circuit combiners, and charge controllers intended for use in a Photovoltaic power system shall be identified and listed for the application per 690.4 (d).
- The discharge of pollutants to any storm drainage system is prohibited. No solid waste, petroleum byproducts, soil particulate, construction waste material or waste water generated on construction site or by construction activities shall be placed, conveyed, or discharged into the street, gutter, or storm drain system.
- Fine stranded cables shall be terminated only with terminals, lugs, devices or connectors that are identified and listed for such use per the 2010 CEC 690.31 (f) and 690.74.
- Smoke and CO Alarms to be retrofitted per CRC R314, R315



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COVER

PV-000

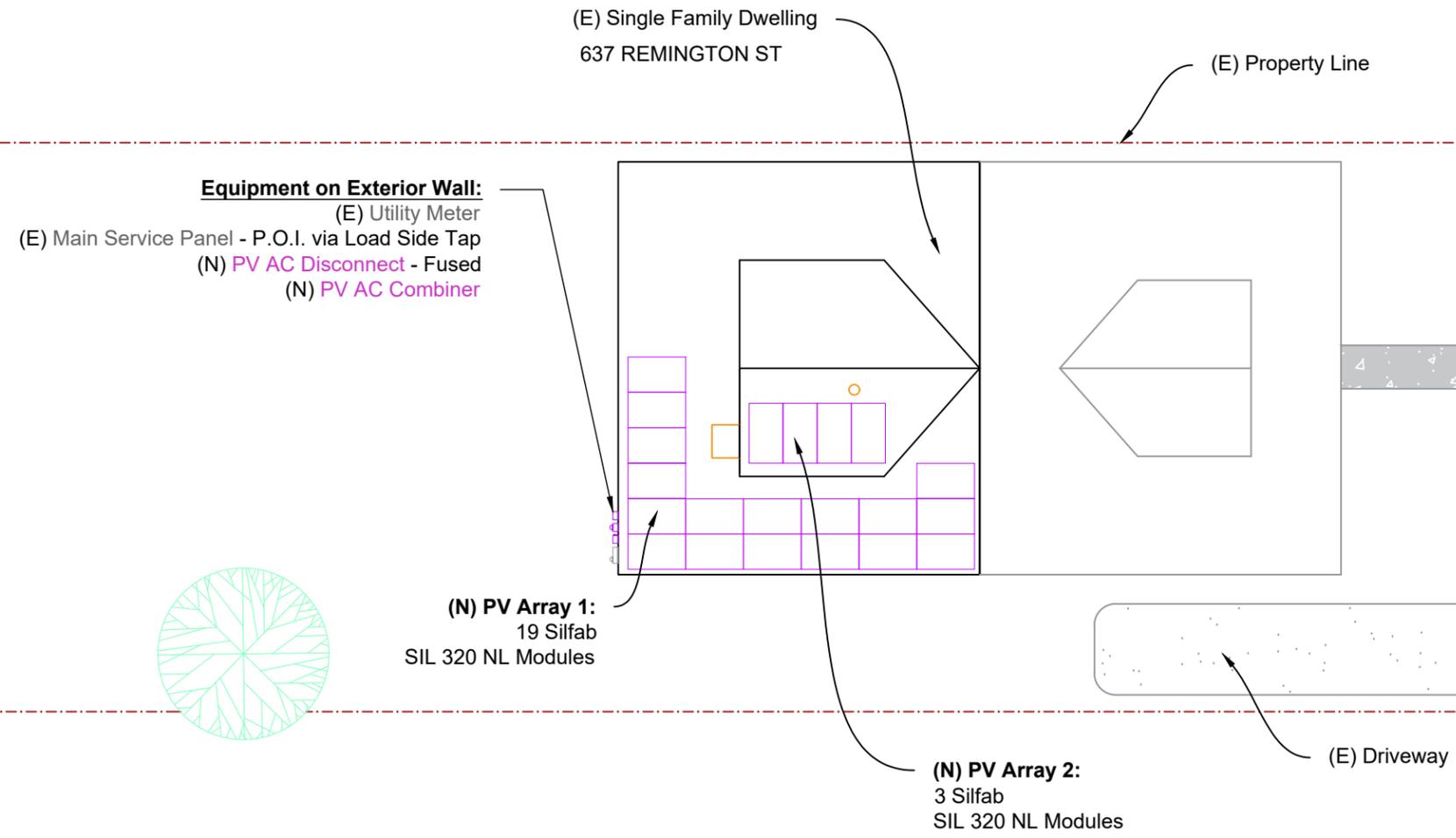
FOR CONSTRUCTION

Equipment Specifications:

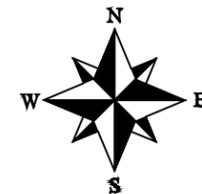
Module: (22) Silfab SIL 320 NL
Inverter 1: (22) Enphase Energy IQ7+
Racking: Iron Ridge XR100
Attachment Flashing: UniRac FlashLoc

Roof Specifications:

Roof 1: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 255° Array Size: 19 Modules	Roof 2: Asphalt/Comp. Shingle 2" x 8" Rafters @ 24" O.C. Eave Height: 15 ft Pitch: 15° Azimuth: 165° Array Size: 3 Modules
--	---



Remington Street



**GRID-TIED
PHOTOVOLTAIC SYSTEM**

7.040kW DC @ STC

STEKETEE, ROBERT
637 REMINGTON ST
FORT COLLINS, CO 80529
Project # 10319593

DESIGNER: JF
REVIEWER: BM
VERSION DATE: 5/11/2020

REVISIONS

#	By	Date	Notes
1			
2			
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SCALE: 1" = 15'

SITE PLAN

PV-A01

Notes:

- Roof structures with a slope less than 2:12 do not require access and pathways.
(See City of Fort Collins Roof Mounted Photovoltaic System Residential Installation Standards)
- All exterior conduit on roof and under eaves final locations to be determined during installation

2020-07-02

ANSI F ull Bleed B (11.00 X 17.00 Inches)

10319593

FOR CONSTRUCTION

PV ARRAY 1 - MECHANICAL LOADS

Array Area:	350.0 ft ²	Total Photovoltaic Dead Load:	3.01 psf
Array Weight:	1054.0 lbs	Avg. Dead Load per Anchor:	26.3 lbs
Anchor Qty.:	40		
Design Values by Roof Zone:	Corner	Egde	Interior
Max. Iron Ridge Rail Span:	N/A	N/A	60 in. O.C.
Max. Iron Ridge Rail Cantilever:	N/A	N/A	20 in. O.C.
Adjusted Anchor Span:	N/A	N/A	48 in. O.C.
Downforce Point Load:	N/A	N/A	321.9 lbs
Uplift Point Load:	N/A	N/A	-159.9 lbs
Minimum Anchor Strength:	400 lbs		
Average Safety Factor:	2.50		

Equipment Specifications:

Module: (22) Silfab SIL 320 NL
 Inverter 1: (22) Enphase Energy IQ7+
 Racking: Iron Ridge XR100
 Attachment Flashing: UniRac FlashLoc

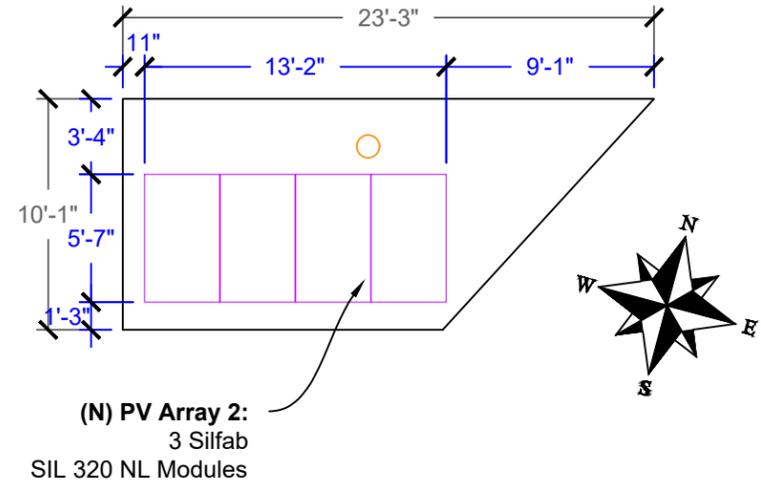
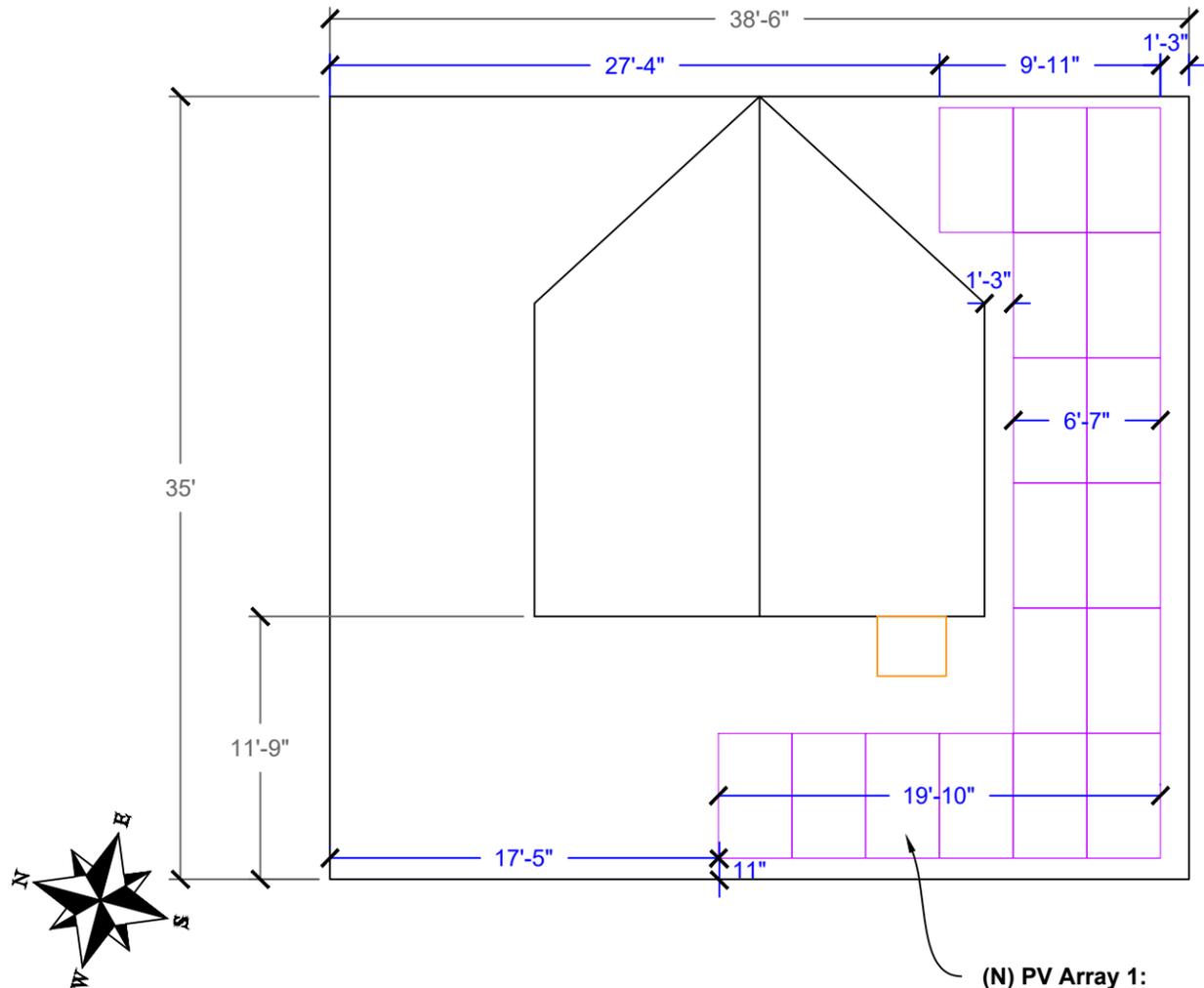
Roof Specifications:

Roof 1:
 Asphalt/Comp. Shingle
 2" x 8" Rafters @ 24" O.C.
 Eave Height: 15 ft
 Pitch: 15° | Azimuth: 255°
 Array Size: 19 Modules

Roof 2:
 Asphalt/Comp. Shingle
 2" x 8" Rafters @ 24" O.C.
 Eave Height: 15 ft
 Pitch: 15° | Azimuth: 165°
 Array Size: 3 Modules

PV ARRAY 2 - MECHANICAL LOADS

Array Area:	55.1 ft ²	Total Photovoltaic Dead Load:	3.45 psf
Array Weight:	190.1 lbs	Avg. Dead Load per Anchor:	19.0 lbs
Anchor Qty.:	10		
Design Values by Roof Zone:	Corner	Egde	Interior
Max. UniRac Rail Span:	N/A	N/A	60 in. O.C.
Max. UniRac Rail Cantilever:	N/A	N/A	20 in. O.C.
Adjusted Anchor Span:	N/A	N/A	48 in. O.C.
Downforce Point Load:	N/A	N/A	334.5 lbs
Uplift Point Load:	N/A	N/A	-162.2 lbs
Minimum Anchor Strength:	400 lbs		
Average Safety Factor:	2.47		



(N) PV Array 1:
 19 Silfab
 SIL 320 NL Modules

(N) PV Array 2:
 3 Silfab
 SIL 320 NL Modules

UniRac SolarMount Mounting Notes:

- Integrated Full System Grounding and Bonding to UL 2703
- Total Quantity of Attachments =50
- Roof Zones are defined by dimension, $a = 3.0$ ft.
- Maximum Allowable Cantilever for Iron Ridge Rail is $\frac{1}{3}$ the Maximum Rail Span
- Racking and Attachment: Iron Ridge XR100 with UniRac FlashLoc attached with 74515 | 5/16X4 SS LAG SCREW HEX HEAD
- All Dimensions shown are to module edges, including 1/4 in. Spacing between Modules required when using the Top Clamp Method.
- The SolarMount Rails will extend 1-1/2 in. beyond the Module Edge in order to support the End Clamps.
- UniRac requires one thermal expansion gap (4 in.) for continuous sections of rail greater than 40' in length
- Array Installed according to the UniRac SolarMount Design & Engineering Guide PUB14NOV03
- Attachment Locations, If shown, are approximate. Final adjustment of attachment location may be necessary depending on field conditions. All attachments are staggered amongst the framing members.

GRID-TIED PHOTOVOLTAIC SYSTEM
7.040kW DC @ STC
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 REVIEWER: BM
 VERSION DATE: 5/11/2020

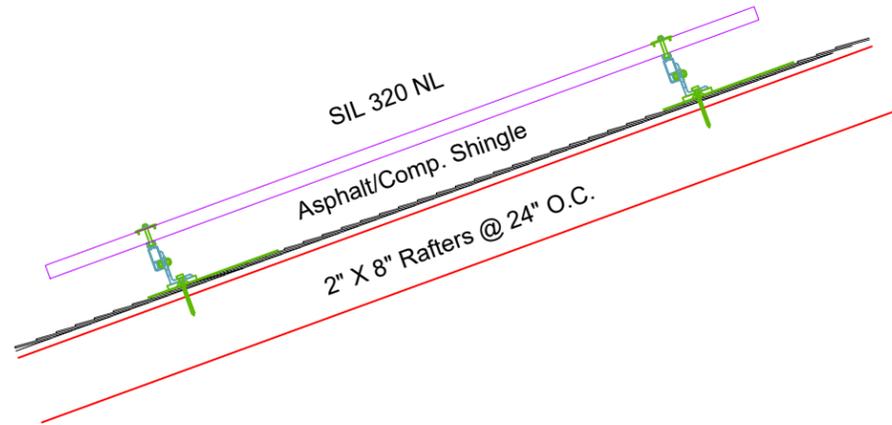
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SCALE: 1/8" = 1'-0"

MODULE LAYOUT

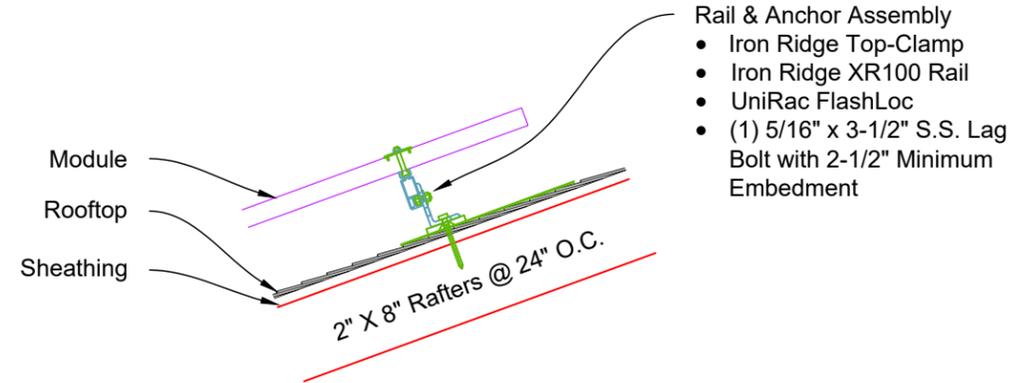
PV-A02

ANSI Full Bleed B (11.00 X 17.00 Inches) 10319593 2020-07-02



1 Attachment Profile

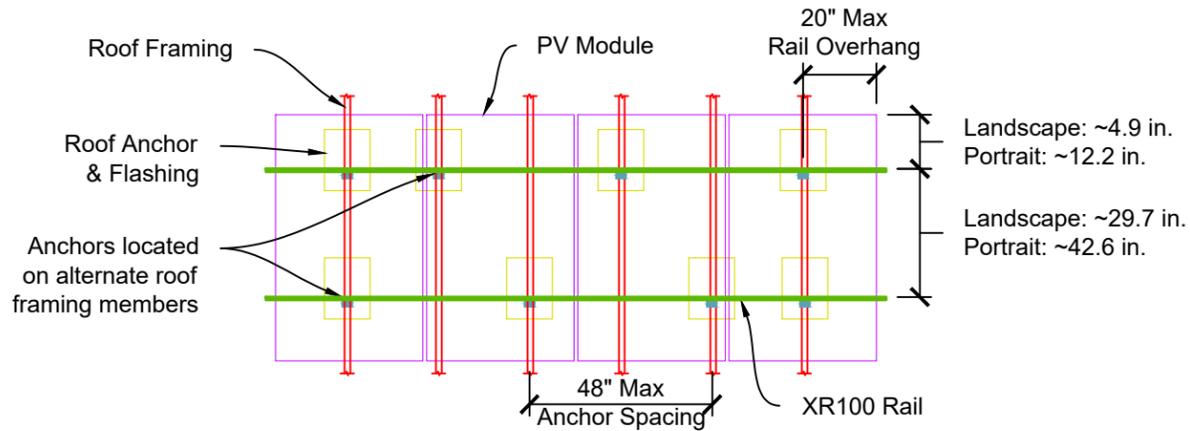
Scale: 3/4" = 1'-0"



2 Attachment Detail

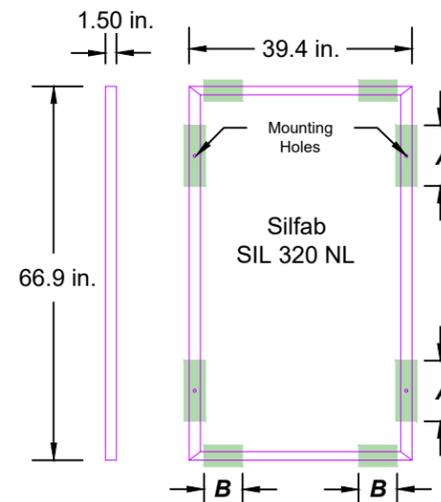
Scale: 1" = 1'-0"

- Rail & Anchor Assembly
- Iron Ridge Top-Clamp
 - Iron Ridge XR100 Rail
 - UniRac FlashLoc
 - (1) 5/16" x 3-1/2" S.S. Lag Bolt with 2-1/2" Minimum Embedment



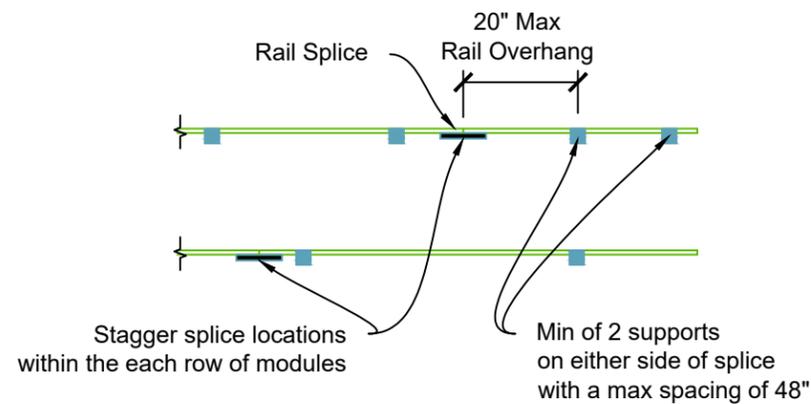
3 Staggered Attachment Detail (Typ.)

Not to Scale



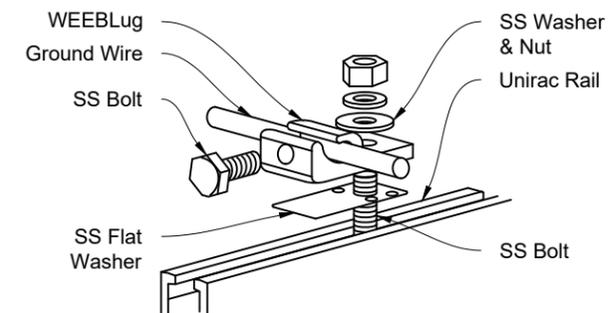
	Distance from Module Corner	
	Minimum	Maximum
Long Side, A	8.1 in.	16.2 in.
Short Side*, B	1.9 in.	7.8 in.

*Top-Clamps may be used on the Short Sides of the Module



4 Rail Splice Detail

Not to Scale



6 Grounding Lug & Rail

Not to Scale

5 UL Approved Mounting Locations

Not to Scale

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SCALE: VARIES

DETAILS

PV-A04

FOR CONSTRUCTION

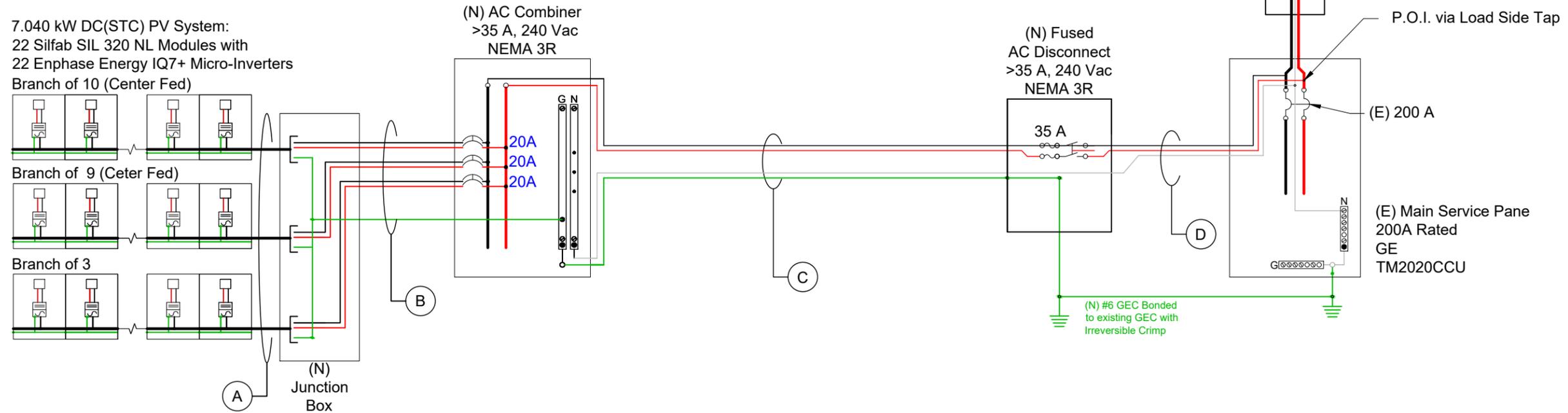
Notes:

1. All conduit to use water-tight expansion fittings.
2. All Rooftop conduit to be a minimum of 1" above the roof surface.
3. PV Connection into Load Center shall be positioned at the opposite end from the Utility Input feeder location. (Where applicable)
4. All equipment to be rated NEMA-3R unless otherwise noted.
5. Lowest expected ambient temperature based on ASHRAE min. mean extreme dry bulb temperature for ASHRAE location most similar to installation.
6. Highest continuous ambient temperature based on ASHRAE highest month 2% dry bulb temperature for ASHRAE location most similar to installation.
7. All conductors to be copper unless noted otherwise.
8. Conductor sizing shall limit Voltage drop to 2% DC & 1.5% AC (2% for Enphase Systems).

WIRE SCHEDULE					WIRE SIZING		VOLTAGE DROP	
Tag	Qty	Conductor Size & Type	Ground Size & Type	Conduit	90°C Derated Ampacity (Allowable Amps x Temp Derate x Fill Derate)	75°C Ampacity	Length	V. Drop
A	3	#10 AWG ENGAGE CABLE	#6 AWG BARE Cu	FREE AIR	40A X 0.76 = 30.40 A	35.00 A	N/A	0.00%
B	6	#10 AWG THWN-2	#8 AWG THWN-2	1" PVC/EMT	40A X 0.76 X 0.8 = 24.32 A	35.00 A	50 Ft	0.50%
C	3	#6 AWG THWN-2	#8 AWG THWN-2	1" PVC	75A X 1 X 1 = 75.00 A	65.00 A	20 Ft	0.22%
D	3	#6 AWG THWN-2	#8 AWG THWN-2	1" PVC	75A X 1 X 1 = 75.00 A	65.00 A	10 Ft	0.11%
							DC	---
							AC	0.83%

SYSTEM LABELING SPECIFICATIONS

Max. DC Voltage (-28 °C): 46.1 V	DC Max. Current: 12.90 A
DC Operating Voltage: 32.9 V	DC Operating Current: 9.74 A
AC Nominal Voltage: 240 V	Max. AC Current: 26.6 A



Rooftop Electrical

Exterior, Utility Meter

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SCALE: Not to Scale

ELECTRICAL DIAGRAM

PV-E01

FOR CONSTRUCTION

MODULE SPECIFICATIONS

Sifab SIL 320 NL	
STC Rating: 320 W	Height: 66.9 in.
PTC Rating: 242 W	Width: 39.4 in.
V _{MP} : 32.9 V	Depth: 1.50 in.
I _{MP} : 9.74 A	Area: 18.3 ft ²
V _{OC} : 40.1 V	Weight: 41.4 lbs
I _{SC} : 10.32 A	Max. Fuse: 20.00 A
Temp. Coeff. (V _{OC}): -0.2800 %/°C	

TEMPERATURES

Ambient Low Temperature: -28 °C
Ambient High Temperature: 30 °C
Temp. Rise for Voltage Calculations: 31 °C
Temp. Rise for Exposed Conduit on Roof: 22 °C

SYSTEM LABELING SPECIFICATIONS

Max. DC Voltage (-28 °C): 46.1 V	DC Max. Current: 12.90 A
DC Operating Voltage: 32.9 V	DC Operating Current: 9.74 A
AC Nominal Voltage: 240 V	Max. AC Current: 26.6 A

INVERTER 1 SPECIFICATIONS

Enphase Energy IQ7+
Nominal V _{AC} : 240 V
Max. W _{DC} : 440 W
Max. W _{AC} : 295 W
Startup Voltage: 22 V
Min. V _{MP} : 16 V
Max. V _{MP} : 60 V
Max. V _{DC} : 60 V
Max. I _{DC} : 15 A
Max. I _{AC} : 1.21 A
CEC Efficiency: 97.0%

INVERTER 1 CURRENTS

DC Max. Current: MODULE I _{sc} x 1.25	10.32A x 1.25 = 12.90 A
DC Operating Current: MODULE I _{mp}	9.74A = 9.74 A
Source Current, I _{DC} : MODULE I _{sc} x 1.25 x 1.25	10.32A x 1.25 x 1.25 = 16.13 A
Output Current, I _{AC} : INVERTER I _{ac} x INVERTER QTY x 1.25	1.21A x 1.25 x 22 = 33.28 A

INVERTER 1 LABELING SPECIFICATIONS

Max. DC Voltage (-28 °C): 46.1 V	DC Max. Current: 12.90 A
DC Operating Voltage: 32.9 V	DC Operating Current: 9.74 A
AC Nominal Voltage: 240 V	Max. AC Current: 26.6 A

INVERTER 1 VOLTAGES

DC Max. Voltage (-28 °C):	MODULE V _{oc} x TEMP DELTA x TEMP COEF V _{oc}	40.1V x 53 x 0.0028 = 46.1 V
DC Operating Voltage:	MODULE V _{mp}	32.88V = 32.9 V

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SCALE: Not to Scale

ELECTRICAL CALCS

PV-E02

2020-07-02

ANSI F ull Bleed B (11.00 X 17.00 Inches)

10319593

WARNING
PHOTOVOLTAIC POWER SOURCE

NEC Article 690.31(G)(3)(4) | HT#: 596-00206
REFLECTIVE MATERIAL REQUIRED
CONDUIT RACEWAYS EVERY 10 FEET OR LESS

PHOTOVOLTAIC
AC DISCONNECT

NEC Articles 690.15 & 690.13(B) | HT#: 596-00237
AC DISCONNECTS

PHOTOVOLTAIC AC DISCONNECT

MAXIMUM AC OPERATING CURRENT:	26.6 A
NOMINAL OPERATING AC VOLTAGE:	240 V

NEC Articles 690.54 & 690.13(B) | HT#: 596-00239
INVERTER 1 AC DISCONNECT

PHOTOVOLTAIC SYSTEM
EQUIPPED WITH
RAPID SHUTDOWN

NEC Article 690.56(C) | HT#: 596-00474
REFLECTIVE MATERIAL REQUIRED
RAPID SHUTDOWN DISCONNECT, MAIN SERVICE DISCONNECT

CAUTION: SOLAR ELECTRIC
SYSTEM CONNECTED

NEC Articles 690.15 & 690.13(B) | HT#: 558-00613
PRODUCTION / NET METERS, MAIN SERVICE DISCONNECT

DO NOT DISCONNECT
UNDER LOAD

NEC Article 690.33(E)(2) | HT#: 596-00244
BREAKER PANEL

CAUTION
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

NEC Articles 705.12(D)(3) & 690.64 | HT#: 596-00587
BREAKER PANELS

WARNING
INVERTER OUTPUT CONNECTION. DO NOT
RELOCATE THIS OVERCURRENT DEVICE.

NEC Article 705.12(D)(3)(B) | HT#: 596-00589
BREAKER PANELS

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NEC Articles 705.12(D)(3) & 690.64 | HT#: 596-00495
PRODUCTION / NET METERS, BREAKER PANELS

WARNING
ELECTRICAL SHOCK HAZARD
IF A GROUND FAULT IS INDICATED
NORMALLY GROUNDED CONDUCTORS
MAY BE UNGROUNDED AND ENERGIZED

NEC Article 690.5(C) | HT#: 596-00498
STRING INVERTERS, PRODUCTION / NET METERS,
BREAKER PANELS

WARNING
TURN OFF PHOTOVOLTAIC
AC DISCONNECT PRIOR TO
WORKING INSIDE PANEL

NEC Article 110.27(C) | HT#: 596-00499
COMBINER BOXES, EMT ENCLOSURES, BREAKER PANELS,
MAIN SERVICE DISCONNECT

WARNING
ELECTRICAL SHOCK HAZARD
THE DC CONDUCTORS OF THIS
PHOTOVOLTAIC SYSTEM ARE UNGROUNDED
AND MAY BE ENERGIZED

NEC Article 690.35(F) | HT#: 596-00588
REQUIRED FOR UNGROUNDED SYSTEMS
COMBINER BOXES, CONDUIT ENCLOSURES,
DC DISCONNECTS, BREAKER PANELS

WARNING
ELECTRICAL SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND
LOAD SIDES MAY BE ENERGIZED
IN THE OPEN POSITION

NEC Article 690.17(E) | HT#: 596-00497
COMBINER BOXES, EMT ENCLOSURES, AC & DC DISCONNECTS,
BREAKER PANELS, MAIN SERVICE DISCONNECT

GRID-TIED
PHOTOVOLTAIC SYSTEM
7.040kW DC @ STC
STEKETEE, ROBERT
637 REMINGTON ST
FORT COLLINS, CO 80529
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SCALE: Not to Scale

SIGNAGE

PV-G01



SIL-320 NL



60 Cell Monocrystalline PV Module

INDUSTRY LEADING WARRANTY

All our products include an industry leading 25-year product workmanship and 30-year performance warranty.

35+ YEARS OF SOLAR INNOVATION

Leveraging over 35+ years of worldwide experience in the solar industry, Silfab is dedicated to superior manufacturing processes and innovations such as Bifacial and Back Contact technologies, to ensure our partners have the latest in solar innovation.

NORTH AMERICAN QUALITY

Silfab is the leading automated solar module manufacturer in North America. Utilizing premium quality materials and strict quality control management to deliver the highest efficiency, premium quality PV modules 100% made in North America.



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

BAA / ARRA COMPLIANT

Silfab panels are designed and manufactured to meet Buy American Act Compliance. The US State Department, US Military and FAA have all utilized Silfab panels in their solar installations.

LIGHT AND DURABLE

Engineered to accommodate low load bearing structures up to 5400Pa. The light-weight frame is exclusively designed for wide-ranging racking compatibility and durability.

QUALITY MATTERS

Total automation ensures strict quality controls during the entire manufacturing process at our ISO certified facilities.

DOMESTIC PRODUCTION

Silfab Solar manufactures PV modules in two automated locations within North America. Our 500+ North American team is ready to help our partners win the hearts and minds of customers, providing customer service and product delivery that is direct, efficient and local.

AESTHETICALLY PLEASING

All black sleek design, ideal for high-profile residential or commercial applications.

PID RESISTANT

PID Resistant due to advanced cell technology and material selection. In accordance to IEC 62804-1.

Electrical Specifications		SIL-320 NL mono PERC	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	320	242
Maximum power voltage (Vpmax)	V	32.88	29.59
Maximum power current (Ipmax)	A	9.74	8.18
Open circuit voltage (Voc)	V	40.10	37.09
Short circuit current (Isc)	A	10.32	8.46
Module efficiency	%	18.8	17.8
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/m² • 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.

Temperature Ratings		SIL-320 NL mono PERC	
Temperature Coefficient Isc		0.064 %/°C	
Temperature Coefficient Voc		-0.28 %/°C	
Temperature Coefficient Pmax		-0.36 %/°C	
NOCT (± 2°C)		45 °C	
Operating temperature		-40/+85 °C	

Mechanical Properties and Components		SIL-320 NL mono PERC	
	Metric	Imperial	
Module weight	18.6 kg ±0.2 kg	41 ±0.4 lbs	
Dimensions (H x L x D)	1700 mm x 1000 mm x 38 mm	66.9 in x 39.4 in x 1.5 in	
Maximum surface load (wind/snow)*	4000 Pa rear load / 5400 Pa front load N/m ²	83.5/112.8 lb/ft ²	
Hail impact resistance	Ø 25 mm at 83 km/h	Ø 1 in at 51.6 mph	
Cells	60 - Si mono PERC - 5 busbar 158.75 x 158.75 mm	60 - Si mono PERC - 5 busbar 6.25 x 6.25 Inch	
Glass	3.2 mm high transmittance, tempered, DSM anti-reflective coating	0.126 in high transmittance, tempered, DSM anti-reflective coating	
Cables and connectors (refer to installation manual)	1200 mm, Ø 5.7 mm, MC4 compatible	47.2 in, Ø 0.22 in, MC4 compatible	
Backsheet	High durability, superior hydrolysis resistance, multi-layer dielectric film		
Frame	Anodized Aluminum (Black)		
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)		
Junction Box	UL 3730 Certified, IP67 rated		

Warranties		SIL-320 NL mono PERC	
Module product workmanship warranty		25 years**	
Linear power performance guarantee		30 years	

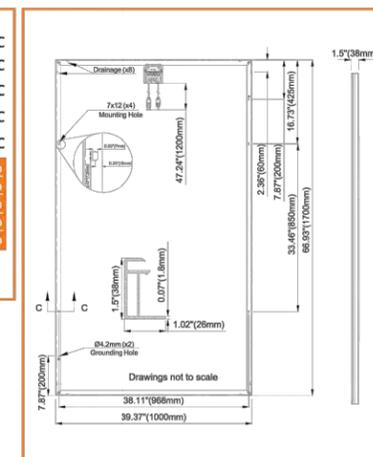
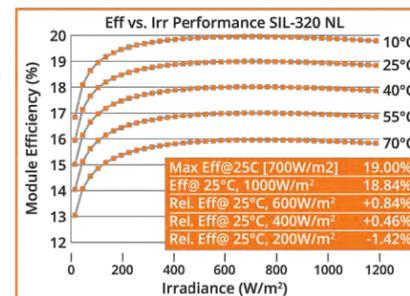
Certifications		SIL-320 NL mono PERC	
Product		ULC ORD C1703, UL 1703, CEC listed, IEC 62716 Ammonia Corrosion; IEC61701:2011 Salt Mist Corrosion Certified, UL Fire Rating: Type 2	
Factory		ISO9001:2015	

- Modules Per Pallet: 26
- Pallets Per Truck: 36
- Modules Per Truck: 936

*▲ 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 www.silfabsolar.com.

Third-party generated pan files from Fraunhofer-Institute for Solar Energy Systems ISE are available for download at: www.silfabsolar.com/downloads



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SCALE: Not to Scale

DATASHEET (1)

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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.



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	18 mA		18 mA	
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	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)	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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GRID-TIED PHOTOVOLTAIC SYSTEM
7.040kW DC @ STC
 STEKETEE, ROBERT
 637 REMINGTON ST
 FORT COLLINS, CO 80529
 Project # 10319593

DESIGNER: JF
 REVIEWER: BM
 VERSION DATE: 5/11/2020

REVISIONS

#	By	Date	Notes
1			
2			
3			
4			
5			

SCALE: Not to Scale

DATASHEET (2)



To learn more about Enphase offerings, visit enphase.com





XR100 Bonded Splice

1) Splice, XR100, Mill 12" long

Property	Value
Material	6000 Series Aluminum
Finish	Mill

2) Screw, Self Drilling

Property	Value
Material	300 Series Stainless Steel
Finish	Clear

v1.0



XR100 Rail

Property	Value
Total Cross-Sectional Area	0.582 in ²
Section Modulus (X-axis)	0.297 in ³
Moment of Inertia (X-axis)	0.390 in ⁴
Moment of Inertia (Y-axis)	0.085 in ⁴
Torsional Constant	0.214 in ³
Polar Moment of Inertia	0.126 in ⁴

APPROVED MATERIALS:
6005-T6, 6005A-T61, 6105-T5, 6N01-T6
(34,000 PSI YIELD STRENGTH MINIMUM)

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-100-132A	XR-100-132B	XR100, Rail 132" (11 Feet)	6000-Series Aluminum	7.50 lbs.
XR-100-168A	XR-100-168B	XR100, Rail 168" (14 Feet)		9.55 lbs.
XR-100-204A	XR-100-204B	XR100, Rail 204" (17 Feet)		11.60 lbs.

v1.1

GRID-TIED PHOTOVOLTAIC SYSTEM
7.040kW DC @ STC
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DATASHEET (3)

FLASH LOC



FLASHLOC is the ultimate attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast — no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the lag bolt and inject sealant into the base. **FLASHLOC's** patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with lag bolts, sealant, and hardware for maximum convenience. Don't just divert water, **LOC it out!**



PROTECT THE ROOF

Install a high-strength waterproof attachment without lifting, prying or damaging shingles.



LOC OUT WATER

With an outer shield **1** contour-conforming gasket **2** and pressurized sealant chamber **3** the Triple-Loc Seal delivers a 100% waterproof connection.

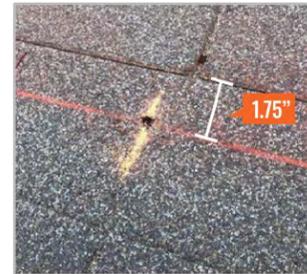


HIGH-SPEED INSTALL

Simply drive lag bolt and inject sealant into the port **4** to create a permanent pressure seal.

FLASH LOC

INSTALLATION GUIDE



PRE-INSTALL

Snap chalk lines for attachment rows. On shingle roofs, snap lines 1-3/4" below upslope edge of shingle course. Locate rafters and mark attachment locations.

At each location, drill a 7/32" pilot hole. Clean roof surface of dirt, debris, snow, and ice, then fill pilot hole with sealant.

NOTE: Space mounts per racking system install specifications. When down pressure is ≥ 34 psf, span may not exceed 2 ft.



STEP 1: SECURE

Place **FLASHLOC** over pilot hole with lag on down-slope side. Align indicator marks on sides of mount with chalk line. Pass included lag bolt and sealing washer through **FLASHLOC** into pilot hole. Drive lag bolt until mount is held firmly in place.

NOTE: The EPDM in the sealing washer will expand beyond the edge of the metal washer when proper torque is applied.



STEP 2: SEAL

Insert tip of UNIRAC provided sealant into port. Inject until sealant exits both vents.

Continue array installation, attaching rails to mounts with provided T-bolts.

NOTE: When **FLASHLOC** is installed over gap between shingle or tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

Use only provided sealant.

GRID-TIED PHOTOVOLTAIC SYSTEM

7.040kW DC @ STC

STEKETEE, ROBERT
637 REMINGTON ST
FORT COLLINS, CO 80529
Project # 10319593

DESIGNER: JF
REVIEWER: BM
VERSION DATE: 5/11/2020

REVISIONS

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1			
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4			
5			

SCALE: Not to Scale

DATASHEET (4)

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

FASTER INSTALLATION. 25-YEAR WARRANTY.

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