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: 713 Mathews St.
Laurel School National Register Historic District
ISSUED: May 25, 2022

Marc & Lydia Baldwin
713 Mathews St.
Fort Collins, CO 80524

Dear Property Owners:

This report is to document proposed alterations to the E. Sterdensticker Residence at 713 Mathews 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:

1. In-kind roof replacement (asphalt shingle)
2. Rooftop solar panels on rear roof near southwest corner

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	*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;* **The property will remain in residential use.**	**Y**
SOI #2	*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.* **The Sterdensticker property at 713 Mathews Street was constructed in 1922 by builder Charles M. Kibban as a seven room pressed brick bungalow, 30 ft x 52 ft, one story with a ¾ basement, concrete foundation, and furnace heat.**	**Y**

	  *Left: 713 Mathews in 1948, County Assessor, FCMOD, https://fchc.contentdm.oclc.org/digital/collection/ph/id/12719/rec/1; Right: same, 1979, https://fchc.contentdm.oclc.org/digital/collection/ph/id/12720/rec/2* **The residence's character-defining features include the wide, side-gabled roof with dominant, centered gable-roof dormer on the façade clad in decorative square shingling, with decorative exposed beams and purlins throughout the building, as well as rafter tails. The home includes multi-colored pressed blonde brick with brown highlights including soldier courses and a band around the foundation. The front entry includes a brick stoop with half-height pilasters, and a now-enclosed front porch anchored by brick piers on both ends, enclosed with multi-light windows. Other defining features include the wood, multi-light windows throughout, including three-over-one Craftsman-style windows along many side elevations.** **The solar installation will be on the rear extension of the property, within minimal to no visibility from Mathews Street. As a result, it meets this Standard.**	
SOI #3	*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.* **Solar panels do not date from the Laurel School Historic District's period of significance (approximately 1880-1940) and is clearly recognized as a new feature.**	**Y**
SOI #4	*Changes to a property that have acquired historic significance in their own right will be retained and preserved.* **The property has the following record of alterations since its 1922 construction:** - **1932 – reshingled dwelling (probably roof, possibly dormer)** - **1935 – front porch glassed in** - **1994 – basement finished** - **2002 – reroof** - **2003 – addition to garage (8x20)**	**N/A**

SOI #5	*Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.* **The solar panels and associated equipment will be placed at the rear of the main residence over replacement asphalt shingle roofing. No historic features are expected to be affected by the installation or related electrical equipment.**	**Y**
SOI #6	*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.*	**N/A**
SOI #7	*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.*	**N/A**
SOI #8	*Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.*	**N/A**
SOI #9	*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.* **The solar panels are located on a rear, south-facing elevation with minimal to no visibility from Mathews Street. They are being installed over asphalt shingle roofing and will not disrupt or obscure any character-defining historic features.**	**Y**
SOI #10	*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.* **Solar panels are generally reversible.**	**Y**

This property is expected to remain contributing to the Laurel School Historic District after this project is completed, and should remain eligible for the Colorado Historic Tax Credit program.

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
Senior Historic Preservation Planner

Images from owner

BALDWIN RESIDENCE

UTILITY CONTACT: LYDIA BALDWIN
713 MATHEWS ST
FORT COLLINS, CO 80524

$3.16kW_{DC}$, $2.79kW_{AC}$
ROOF MOUNTED PHOTOVOLTAIC SYSTEM

PHOTOVOLTAIC SYSTEM DETAILS
- MODULES = LG LG395QIC-A6 395W (8 PCS)
- INVERTER = ENPHASE IQ7A-72-2-US (8 PCS)
- RACKING SYSTEM = IRONRIDGE XRI00 W/ FLASHFOOT2
- DATA ACQUISITION = ENPHASE IQ ENVOY

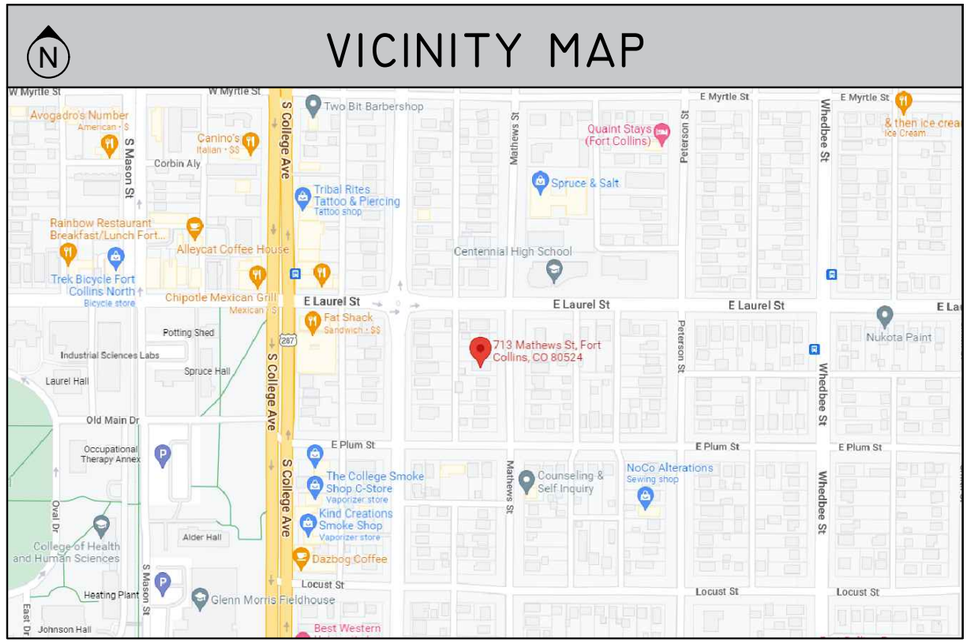
AUTHORITY HAVING JURISDICTION
- BUILDING AUTHORITY = CITY OF FORT COLLINS
- CODE REFERENCE = 2020 NEC
- ELECTRICAL UTILITY COMPANY = FORT COLLINS UTILITY

DESIGN CRITERIA
- DESIGN WIND LOAD = 140MPH
- DESIGN ROOF SNOW LOAD = 30PSF
- EXPOSURE CATEGORY = B
- HIGH TEMP (ASHRAE 2% HIGH) = 34°C
- LOW TEMP (ASHRAE EXTREME LOW) = -25°C
- ROOF TYPE = ASPHALT SHINGLE

SHEET INDEX

SITE MAP

VICINITY MAP



namasté SOLAR
6707 Winchester Circle, Boulder, CO 80301
888 Federal Blvd, Denver, CO 80204
www.NamasteSolar.com • 303.447.0300

BALDWIN RESIDENCE
UTILITY CONTACT:LYDIA BALDWIN
713 MATHEWS ST
FORT COLLINS, CO 80524

SOLAR INDIVIDUAL PERMIT PACKAGE

SYSTEM DETAILS: $3.16kW_{DC}$, $2.79kW_{AC}$
- 8 LG LG395QIC-A6 MODULES
- 8 ENPHASE IQ7A-72-2-US INVERTERS

CONTACT: DAVIS FOGERTY
- DAVIS.FOGERTY@NAMASTESOLAR.COM
- (303) 447-0300

DRAFTER: HARRISON ORY

VERSION 1 PUBLISHED 2022.04.29

GENERAL INFO

NOT TO SCALE

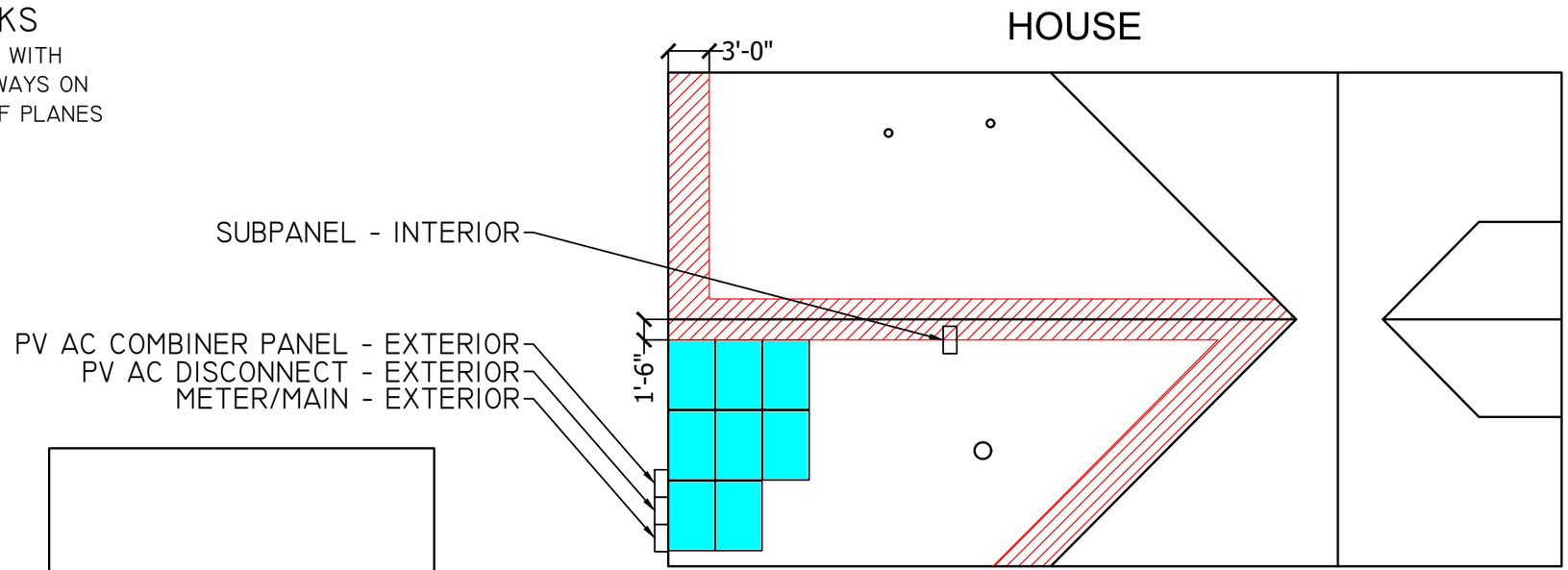
PV-G.0

ROOF CONSTRUCTION

- ROOF TYPE = ASPHALT SHINGLE
- PV ARRAY = 156 SQUARE FEET
- MAX ATTACHMENT SPAN = 48"
- MAX CANTILEVER = 19.2"
- ATTACHMENTS SHALL BE STAGGERED SO THE LOAD IS DISTRIBUTED EVENLY TO RAFTERS UNDERNEATH THE ARRAY

FIRE SETBACKS

- 18" FROM RIDGE WITH TWO 36" PATHWAYS ON SEPARATE ROOF PLANES



ARRAY INFORMATION	
MOD QTY	8
TILT	28°
AZIMUTH	180°

STRING CONFIGURATION	
STRINGS	QTY
STRING 1	8

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BALDWIN RESIDENCE
UTILITY CONTACT: LYDIA BALDWIN
713 MATHEWS ST
FORT COLLINS, CO 80524

SOLAR INDIVIDUAL PERMIT PACKAGE

SYSTEM DETAILS: 3.16kW$_{DC}$, 2.79kW$_{AC}$
- 8 LG LG395QIC-A6 MODULES
- 8 ENPHASE IQ7A-72-2-US INVERTERS

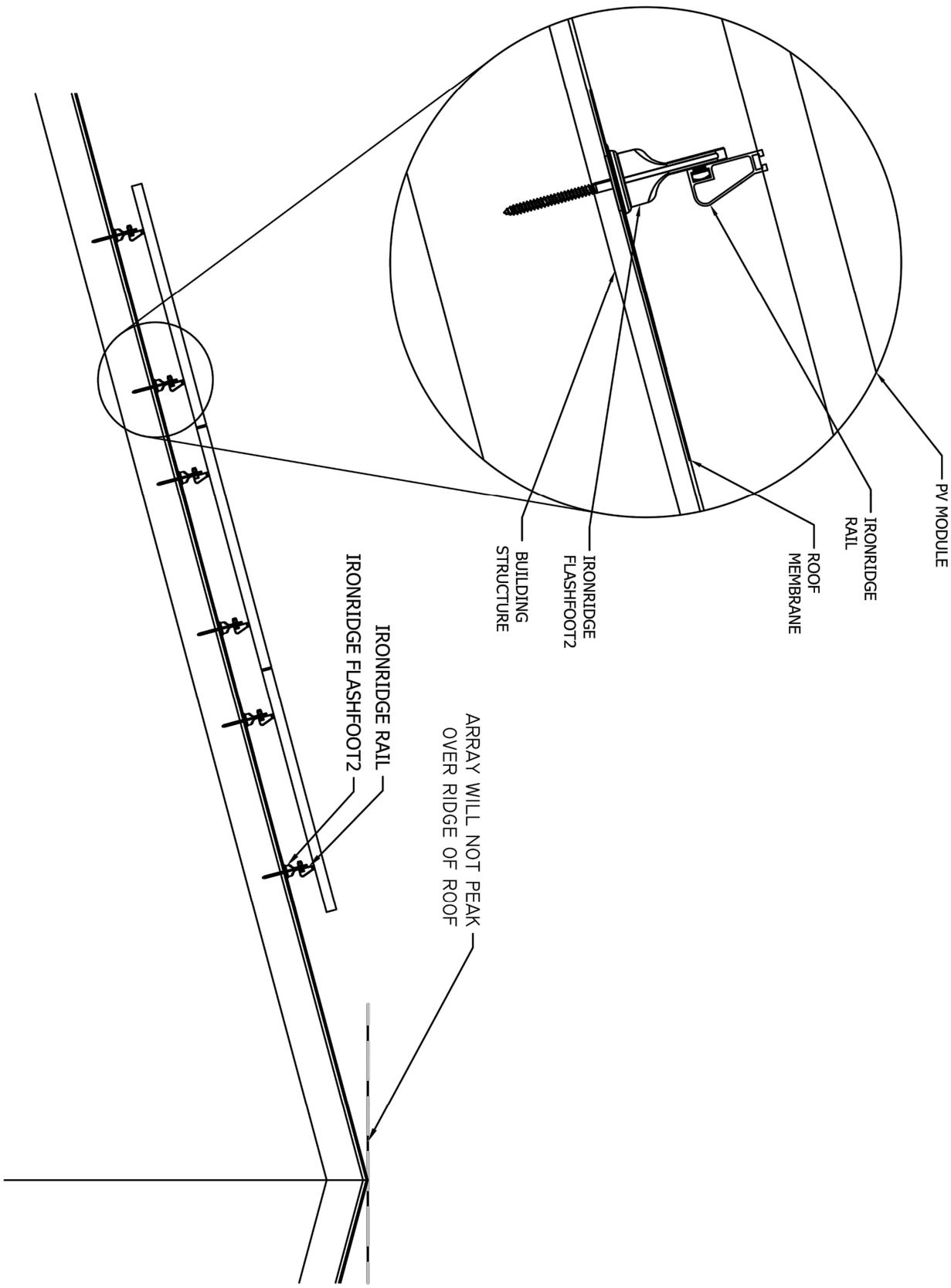
CONTACT: DAVIS FOGERTY
- DAVIS.FOGERTY@NAMASTESOLAR.COM
- (303) 447-0300

DRAFTER: HARRISON ORY
VERSION 1 PUBLISHED 2022.04.29

ARRAY LAYOUT

3/32" = 1'-0"

PV-A.1



ATTACHMENT DETAILS

NOT TO SCALE

PV-A.2

SYSTEM DETAILS: 3.16kW$_{DC}$, 2.79kW$_{AC}$
- 8 LG LG395QIC-A6 MODULES
- 8 ENPHASE IQ7A-72-2-US INVERTERS

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BALDWIN RESIDENCE

UTILITY CONTACT:LYDIA BALDWIN

713 MATHEWS ST

FORT COLLINS, CO 80524

SOLAR INDIVIDUAL PERMIT PACKAGE

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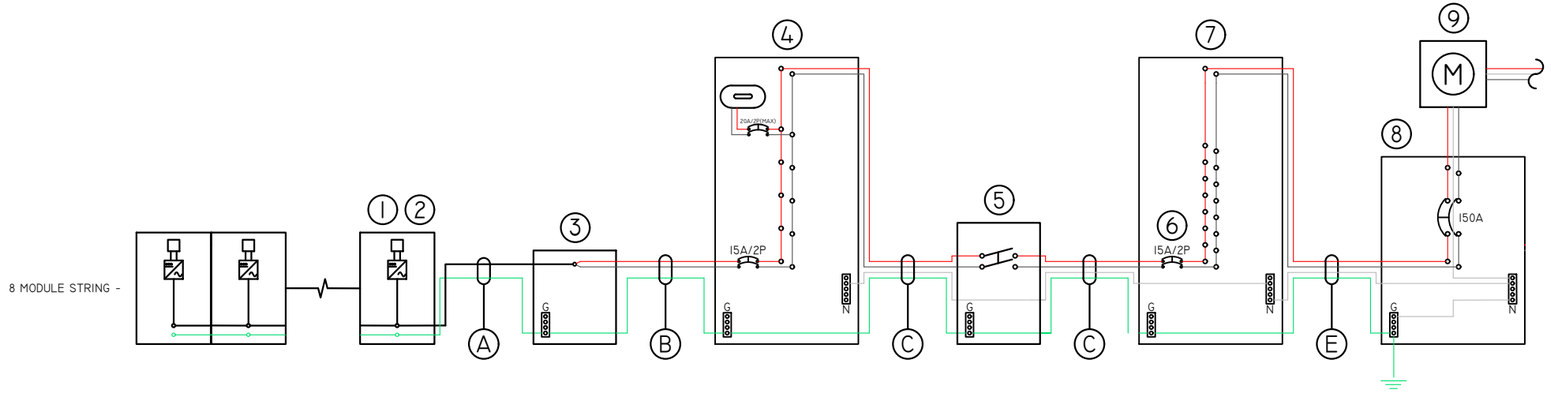
ELECTRICAL EQUIPMENT SCHEDULE		
KEY	QTY	NOTES
1	8	(N) LG LG395QIC-A6 PV MODULE, FLUSH MOUNTED TO ROOF
2	8	(N) ENPHASE IQ7A-72-2-US MICROINVERTER, MOUNTED TO RACKING
3	1	(N) PV ROOF JUNCTION BOX (NEMA 3R), MOUNTED TO ROOF UNDERNEATH ARRAY
4	1	(N) ENPHASE IQ COMBINER 3C-ES, 125A BUS, MLO, 240V IX15A/2P PV BREAKERS & IX20A/2P(MAX) MONITORING BREAKER
5	1	(N) PV AC DISCONNECT (NEMA 3R), 30A, 240V (LOCKABLE W/ VISIBLE OPEN)
6	1	(N) IX15A/2P PV BREAKER (LOCATED ON OPPOSITE END OF BUSBAR FROM MAIN BREAKER IN MAIN SERVICE PANEL)
7	1	(E) SUBPANEL, 150A BUS, MLO, 240V
8	1	(E) MAIN SERVICE DISCONNECT, 150A MAIN, 240V
9	1	(E) UTILITY METER, 200A, 240V

GENERAL
1. (N) NEW & (E) EXISTING
2. PLACARDING AS REQUIRED PER NEC 690.13, 690.15, 690.31, 690.51, 690.53, 690.54, 690.56, 705.10, 705.12
3. PLACARD AT METER INDICATING "PHOTOVOLTAIC SYSTEM CONNECTED"
4. SERVICE DISCONNECTS SHALL BE GROUPED AND/OR MARKED WITH LOCATION DESCRIPTION(S)
5. GEC SHALL BE CONTINUOUS PER 250.64(C)

CONDUCTOR SCHEDULE			
KEY	QTY	CONDUCTORS	CONDUIT
A	1	#12 CU (2 WIRE ENPHASE Q CABLE)	FREE AIR OR EMT
	1	#10 CU EGC (THHN/THWN2)	
B	2	#12 CU (THHN/THWN2)	1/2" (OR LARGER) FMC/EMT
	1	#12 CU EGC (THHN/THWN2)	
C	3	#12 CU (THHN/THWN2)	1/2" (OR LARGER) FMC/EMT
	1	#12 CU EGC (THHN/THWN2)	
E	EXISTING		



PV INTERCONNECTION: BREAKER IN MAIN SERVICE PANEL

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BALDWIN RESIDENCE

UTILITY CONTACT:LYDIA BALDWIN

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- 8 LG LG395QIC-A6 MODULES
- 8 ENPHASE IQ7A-72-2-US INVERTERS

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- DAVIS.FOGERTY@NAMASTESOLAR.COM
- (303) 447-0300

DRAFTER: HARRISON ORY
VERSION 1 PUBLISHED 2022.04.29

LINE DIAGRAM

NOT TO SCALE

PV-E.1

LG LG395QIC-A6 MODULE SPECIFICATIONS & CALCULATIONS			
ITEM	NOTE / CALC	UNIT	INSTALLED DETAIL
LOCATION			FORT COLLINS, CO 80524
AMBIENT HIGH TEMPERATURE (TMAX)	ASHRAE 2%	°C	34
AMBIENT LOW TEMPERATURE (TMIN)	ASHRAE EXTREME MIN	°C	-25
MODULE TEST TEMPERATURE (TTEST)	MODULE SPEC	°C	25
DELTA LOW TEMPERATURE (TD)	TMIN - TTEST	°C	-50
MODULE POWER STC (P)	MODULE SPEC	WATTS (W)	395
MODULE OPERATING VOLTAGE (VMP)	MODULE SPEC	VOLTS (V)	37.00
MODULE OPEN-CIRCUIT VOLTAGE (VOC)	MODULE SPEC	VOLTS (V)	43.60
MODULE COEFFICIENT, VOLT/TEMP (COEFF)	MODULE SPEC	(%/°C) / 100	-0.0024
MODULE OPERATING CURRENT (IMP)	MODULE SPEC	AMPS (A)	10.69
MODULE SHORT-CIRCUIT CURRENT (ISC)	MODULE SPEC	AMPS (A)	11.29
MODULE MAX VOLTAGE (VMAXMOD)	(VOC + VOC(TD*COEFF))	VOLTS (DC)	48.83
MODULE MAX CURRENT (IMAX)	(ISC * 1.25)	AMPS (DC)	14.11
MIN AMPACITY REQUIRED PER NEC	(IMAX * 1.25)	AMPS (DC)	17.64

ENPHASE IQ7A-72-2-US INVERTER SPECIFICATIONS & CALCULATIONS			
ITEM	NOTE / CALC	UNIT	INSTALLED DETAIL
INVERTER MAX POWER (WAC MAX)	INVERTER SPEC	WATTS (AC)	349
INVERTER INPUT VOLTAGE (VDC MAX)	INVERTER SPEC	VOLTS (DC)	58
INVERTER OUTPUT VOLTAGE (VAC NOM)	INVERTER SPEC	VOLTS (AC)	240
INVERTER OUTPUT FREQUENCY	INVERTER SPEC	HERTZ	60
INVERTER OUTPUT CURRENT (IAC)	INVERTER SPEC	AMPS (AC)	1.45
INVERTER PHASE	INVERTER SPEC	PHASE	1
COMPLIANCE	INVERTER SPEC		UL1741/IEEE1547
INVERTER GROUNDING	INVERTER SPEC		ISOLATED
INVERTER QUANTITY MAX PER BRANCH CIRCUIT	INVQTY,BC	QUANTITY	8
MAX BRANCH CIRCUIT OUTPUT (IMAXBC)	(IAC*INVQTY,BC)	AMPS (AC)	11.60
INVERTER QUANTITY TOTAL	INVQTY	QUANTITY	8
MAX OUTPUT CURRENT (IMAXAC)	(IAC*INVQTY*1.25)	AMPS (AC)	14.50

CONDUCTOR SIZING CALCULATIONS										
KEY	SIZE	CU/AL	INSULATION	CALC. TYPE	AMPACITY (A) W/O DERATES	TEMP. DERATE	FILL DERATE	RESULT (A)	REQ'D (A)	OCPD
A	#12	CU	ENPHASE Q CABLE	COU	30	0.96	1.00	28.80	11.60	
				TERM	25			25	14.50	
B	#12	CU	THHN/THWN2	COU	30	0.96	1.00	28.80	11.60	
				TERM	25			25	14.50	
C	#12	CU	THHN/THWN2	COU	30	0.96	1.00	28.80	11.60	
				TERM	25			25	14.50	15A

1. CONDITION OF USE (COU): (AMPACITY * TEMP. DERATE * FILL DERATE) VS. REQ'D (IMAX)
2. TERMINALS (TERM): AMPACITY AT TERMINALS. VS. REQ'D, (IMAX * 1.25)
3. ALL WIRES SIZED #10 OR LESS ARE IN COMPLIANCE WITH 2020 NEC 240.4(D).
4. FEEDER CONDUCTORS CAN BE SIZED IN ACCORDANCE WITH 2020 NEC 310.12(B) IF SUPPLYING THE ENTIRE LOAD ASSOCIATED WITH THE DWELLING.

INTERCONNECTION CALCULATIONS SUBPANEL		
ITEM	UNIT	PANEL
BUS RATING	AMPS	150
MAIN DISCONNECT	AMPS	150
ALLOWED PV PER NEC	AMPS	30
PV OCPD USED	AMPS	15*

*BACKFED BREAKER PER 2020 NEC 705.12(B)(3)(2)

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BALDWIN RESIDENCE
UTILITY CONTACT:LYDIA BALDWIN
713 MATHEWS ST
FORT COLLINS, CO 80524

SOLAR INDIVIDUAL PERMIT PACKAGE

SYSTEM DETAILS: 3.16kW$_{DC}$, 2.79kW$_{AC}$
- 8 LG LG395QIC-A6 MODULES
- 8 ENPHASE IQ7A-72-2-US INVERTERS

CONTACT: DAVIS FOGERTY
- DAVIS.FOGERTY@NAMASTESOLAR.COM
- (303) 447-0300

DRAFTER: HARRISON ORY
VERSION 1 PUBLISHED 2022.04.29

ELECTRICAL CALCS
NOT TO SCALE
PV-E.2

PHOTOVOLTAIC

AC DISCONNECT

NEC 690.13(B):
(1) LOCATED AT AC DISCONNECT

PHOTOVOLTAIC
SYSTEM CONNECTED

NEC 690.54:
(1) LOCATED AT MAIN BILLING METER

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT: 11.60A

NOMINAL OPERATING AC VOLTAGE: 240V

NEC 690.54:
(1) LOCATED AT AC DISCONNECT

PANEL FED BY
PV AND UTILITY

NEC 705.12(C):
(2) LOCATED AT MAIN AC PANEL & ANY SUBPANEL

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

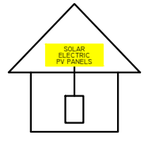
NEC 690.56(C)(2):
(1) LOCATED AT AC DISCONNECT

PV COMBINER PANEL
DO NOT ADD LOADS

(1) LOCATED AT PV AC COMBINER PANEL

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



NEC 690.56(C):
(1) LOCATED AT RAPID SHUTDOWN SERVICE DISCONNECT

⚠ WARNING
POWER SOURCE
OUTPUT CONNECTION
DO NOT RELOCATE

NEC 705.12(B)(3)(2):
(1) LOCATED AT PV BREAKER

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

NEC 705.12(B)(3)(3):
(1) LOCATED AT PV AC COMBINER PANEL OR PROTECTED LOADS PANEL

ALL PLACARDING TO COMPLY WITH THE 2020 NATIONAL ELECTRICAL CODE

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VERSION 1 PUBLISHED 2022.04.29

PLACARDS
NOT TO SCALE
PV-P.1

Domus Structural Engineering, LLC
P.O. Box 6986
Broomfield, CO 80021
530-864-7055
Domusstructural@gmail.com

May 17, 2022

To: Namastè Solar
6707 Winchester Circle, Suite 700
Boulder, CO. 80301

Subject: Certification Letter
Baldwin Residence
713 Mathews Ct
Fort Collins, CO. 80524

To Whom It May Concern,

A jobsite observation of the condition of the existing framing system was performed by an audit team of Namastè Solar as a request from Domus Structural Engineering. All review is based on these observations and the design criteria listed below and only deemed valid if provided information is true and accurate.

On the above referenced project, the roof structural framing has been reviewed for additional loading due to the installation of the solar PV addition to the roof. The structural review only applies to the section of the roof that is directly supporting the solar PV system and its supporting elements. The observed roof framing is described below. If field conditions differ, contractor to notify engineer prior to starting construction.

The roof structure of (Roof 1) consists of composition shingle on roof plywood and skip sheathing that is supported by 2x6 rafters @ 24"o.c. with ceiling joists acting as rafter ties. The rafters have a max projected horizontal span of 9'-0", with a slope of 27 degrees. The rafters are connected at the ridge to a ridge board and are supported at the eave by a load bearing wall.

The existing roof framing system of (Roof 1) is judged to be adequate to withstand the loading imposed by the installation of the solar panels. No reinforcement is necessary.

The spacing of the solar standoffs should be kept at 48" o.c. for landscape and 48" o.c. for portrait orientation, with a staggered pattern to ensure proper distribution of loads.

The scope of this report is strictly limited to an evaluation of the fastener attachment, underlying framing and supporting structure only. The attachment's to the existing structure are required to be in a staggered pattern to ensure proper distribution of loading. All panels, racking and hardware shall be installed per manufacturer specifications and within specified design limitations. All waterproofing shall be provided by the manufacturer. Domus Structural Engineering assumes no responsibility for misuse or improper installation of the solar PV panels or racking.

Note: Seismic check is not required since Ss<.4g and Seismic Design Category (SDC) < B

Design Criteria:

- Applicable Codes = 2021 IBC/IRC, ASCE 7-16
- Roof Dead Load = 9 psf (Roof 1)
- Roof Live Load = 20 psf
- Wind Speed = 140 mph (Vult), Exposure B
- Roof Snow Load = 30 psf
- Attachment: Zilla XL w/ (8) 1/4" Wood Screws directly into sheathing below, at spacing shown above.

Please contact me with any further questions or concerns regarding this project.

Sincerely,

John Calvert, P.E.
Project Engineer

Domus Structural Engineering, LLC
P.O. Box 6986
Broomfield, CO 80021
530-864-7055
Domusstructural@gmail.com

Gravity Loading

Roof Snow Load Calculations		
p_g = Ground Snow Load =	30 psf	
$p_f = 0.7\ C_e\ C_t\ I\ p_g$		(ASCE7 - Eq 7-1)
C_e = Exposure Factor =	1	(ASCE7 - Table 7-2)
C_t = Thermal Factor =	1	(ASCE7 - Table 7-3)
I = Importance Factor =	1	
p_f = Flat Roof Snow Load =	30.0 psf	
$p_s = C_s p_f$		(ASCE7 - Eq 7-2)
Cs = Slope Factor =	1	
p_s = Sloped Roof Snow Load =	30.0 psf	

PV Dead Load = 3 psf (Per Namaste Solar)	
DL Adjusted to 27 Degree Slope	3.37 psf

PV System Weight	
Weight of PV System (Per Namaste Solar)	3.0 psf
X Standoff Spacing =	4.00 ft
Y Standoff Spacing =	3.04 ft
Standoff Tributary Area =	12.17 sft
Point Loads of Standoffs	37 lb

Note: PV standoffs are staggered to ensure proper distribution of loading

Roof Live Load = 20 psf

Note: Roof live load is removed in area's covered by PV array.

Roof Dead Load (Roof 1)		
Composition Shingle	4.00	
Roof Plywood and Skip Sheathing	3.50	
2x6 Rafters @ 24"o.c.	1.15	
Vaulted Ceiling	0.00	(Ceiling Not Vaulted)
Miscellaneous	0.35	
Total Roof DL (Roof 1)	9.0 psf	
DL Adjusted to 27 Degree Slope	10.1 psf	

DOMUS STRUCTURAL ENGINEERING, LLC

Domus Structural Engineering, LLC
P.O. Box 6986
Broomfield, CO 80021
530-864-7055
Domusstructural@gmail.com

Wind Calculations
Per ASCE 7-16 Components and Cladding

Input Variables	
Wind Speed	140 mph
Exposure Category	B
Roof Shape	Gable Roof
Roof Slope	27 degrees
Mean Roof Height	20 ft
Effective Wind Area	21.3 ft
Ground Elevation	0 ft

Design Wind Pressure Calculations		
qh = 0.00256 * Kz * Kzt * Kd * Ke * V^2		(Eq. 26.10-1)
Kz (Exposure Coefficient) =	0.62	(Table 30.3-1)
Kzt (topographic factor) =	1.00	(Fig. 26.8-1)
Kd (Wind Directionality Factor) =	0.85	(Table 26.6-1)
Ke (Ground Elevation Factor) =	1.00	
V (Design Wind Speed) =	140 mph	(Fig. 26.5-1A)
Risk Category =	II	(Table 1.5-1)
qh =	26.61	

Standoff Uplift Calculations-Portrait	Zone 1	Zone 2	Zone 3	Positive	
y_a =	0.77	0.77	0.80	0.77	
GCp =	-1.50	-2.41	-3.10	0.52	(Fig. 30.3)
Uplift Pressure =	-30.8 psf	-49.4 psf	-65.9 psf	10.6 psf	(Eq. 29.4-7)
ASD Uplift Pressure =	-18.5 psf	-29.6 psf	-39.5 psf	9.6 psf	
X Standoff Spacing =	4.00	4.00	2.67		
Y Standoff Spacing =	3.04	3.04166667	3.04166667		
Tributary Area =	12.17	12.17	8.11		
Dead Load on attachment =	37 lb	37 lb	24 lb		
Footing Uplift (0.6D+0.6W) =	-203 lb	-339 lb	-306 lb		

Standoff Uplift Calculations-Landscape	Zone 1	Zone 2	Zone 3	Positive	
y_a =	0.80	0.80	0.80	0.80	
GCp =	-1.50	-2.50	-3.49	0.70	(Fig. 30.3)
Uplift Pressure =	-31.9 psf	-53.2 psf	-74.3 psf	14.9 psf	(Eq. 29.4-7)
ASD Uplift Pressure (0.6W)=	-19.2 psf	-31.9 psf	-44.6 psf	9.6 psf	
X Standoff Spacing =	4.00	4.00	2.67		
Y Standoff Spacing =	1.75	1.75	1.75		
Tributary Area =	7.00	7.00	4.67		
Dead Load on attachment =	21.00	21.00	14.00		
Footing Uplift (0.6D+0.6W) =	-122 lb	-211 lb	-200 lb		

Standoff Uplift Check	
Maximum Design Uplift =	-339 lb
Standoff Uplift Capacity =	400 lb
400 lb capacity > 339 lb demand	Therefore, OK

Fastener Capacity Check	
Fastener =	8 - 1/4" Wood Screws
Number of Fasteners =	8
Embedment Depth =	0.5
Pullout Capacity Per Screw =	177 lb
Fastener Capacity =	1416 lb
w/ F.S. of 4 & DOL of 1.6=	566 lb
566.4 lb capacity > 339 lb demand	Therefore, OK

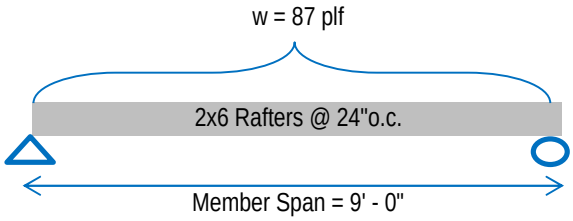
Domus Structural Engineering, LLC
P.O. Box 6986
Broomfield, CO 80021
530-864-7055
Domusstructural@gmail.com

Framing Check

(Roof 1) PASS

Dead Load	10.1 psf
PV Load	3.4 psf
Snow Load	30.0 psf

Governing Load Combo = DL + SL
Total Load 43.5 psf



Member Properties

Member Size	S (in^3)	I (in^4)	Lumber Sp/Gr	Member Spacing
2x6	7.56	20.80	DF#2	@ 24"o.c.

Check Bending Stress

Fb (psi) =	f'b	x	Cd	x	Cf	x	Cr	(NDS Table 4.3.1)
	900	x	1.15	x	1.3	x	1.15	

Allowed Bending Stress = 1547.3 psi

Maximum Moment = (wL^2) / 8
= 880.2253 ft#
= 10562.7 in#

Actual Bending Stress = (Maximum Moment) / S
= 1396.8 psi

Allowed > Actual -- 90.3% Stressed -- Therefore, OK

Check Deflection

Allowed Deflection (Total Load) = L/180 (E = 1600000 psi Per NDS)
= 0.6 in
Deflection Criteria Based on = Continuous Span
Actual Deflection (Total Load) = (w*L^4) / (185*E*I)
= 0.161 in
= L/671 > L/180 Therefore OK

Allowed Deflection (Live Load) = L/240
0.45 in
Actual Deflection (Live Load) = (w*L^4) / (185*E*I)
0.111 in
L/973 > L/240 Therefore OK

Check Shear

Member Area = 8.3 in^2 Fv (psi) = 180 psi (NDS Table 4A)
Allowed Shear = Fv * A = 1485 lb Max Shear (V) = w * L / 2 = 391 lb

Allowed > Actual -- 26.4% Stressed -- Therefore, OK

LG NeON®R

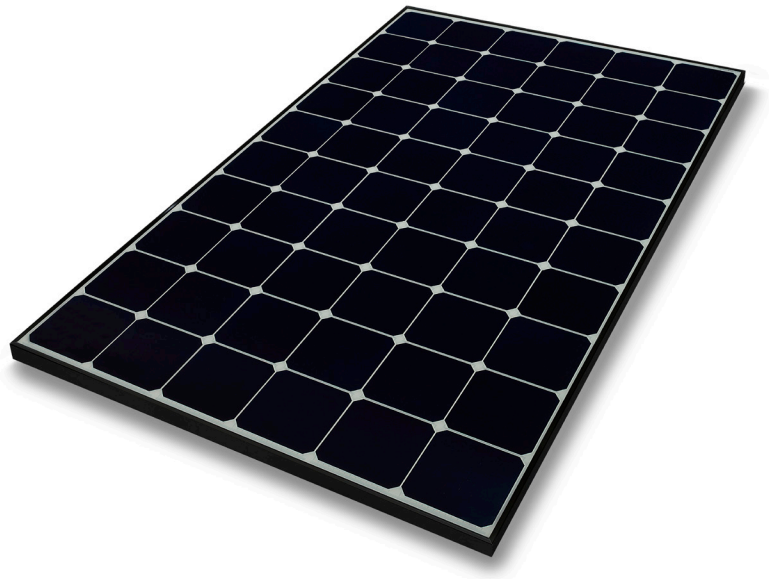
LG395Q1C-A6 Preliminary

60

395W

LG NeON® R is powerful solar module that provides world-class performance. A new cell structure that eliminates electrodes on the front maximizes the utilization of light and enhances reliability.

LG NeON® R is a result of LG's efforts to increase customer's values beyond efficiency. LG NeON® R features enhanced durability, performance under real-world conditions, an enhanced warranty and aesthetic design suitable for roofs.



25 YEAR PRODUCT • PERFORMANCE • LABOR WARRANTY

Features

Roof Aesthetics

LG NeON® R has been designed with aesthetics in mind: the lack of any electrodes on the front creates an improved, modern aesthetic.

25-Year Limited Product Warranty

The NeON® R is covered by a 25-year limited product warranty. In addition, up to $450 of labor costs will be covered in the rare case that a module needs to be repaired or replaced.

Enhanced Performance Warranty

The LG NeON® R has an enhanced performance warranty. After 25 years, LG NeON® R is guaranteed at least 92.5% of initial performance.

More generation per square meter

The LG NeON® R has been designed to significantly enhance its output, making it efficient even in limited space.

When you go solar, ask for the brand you can trust: LG Solar

About LG Electronics USA, Inc.

LG Electronics is a global leader in electronic products in the clean energy markets by offering solar PV panels and energy storage systems. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first MonoX® series to the market, which is now available in 32 countries. The NeON® (previous MonoX® NeON), NeON®2, NeON®2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2016, which demonstrates LG's leadership and innovation in the solar industry.

LG Life's Good

LG NeON®R

Preliminary

LG395Q1C-A6

General Data

Cell Properties (Material/Type)	Monocrystalline / N-type
Cell Maker	LG
Cell Configuration	60 Cells (6 x 10)
Module Dimensions (L x W x H)	1,740mm x 1,042mm x 40mm
Weight	18.5 kg
Glass (Material)	Tempered Glass with AR Coating
Backsheet (Color)	White
Frame (Material)	Anodized Aluminium
Junction Box (Protection Degree)	IP 68 with 3 Bypass Diodes
Cables (Length)	1,250mm x 2EA
Connector (Type/Maker)	MC 4 / MC

Certifications and Warranty

Certifications**	IEC 61215-1/-1-1/2 : 2016, IEC 61730-1/2: 2016, UL 61730-1 : 2017, UL 61730-2 : 2017
	ISO 9001, ISO 14001, ISO 50001
	OHSAS 18001
Salt Mist Corrosion Test	IEC 61701:2012 Severity 6
Ammonia Corrosion Test	IEC 62716 : 2013
Module Fire Performance	Type 1 (UL 61730)
Fire Rating	Class C (UL 790, ULC / ORD C 1703)
Solar Module Product Warranty	25 Years
Solar Module Output Warranty	Linear Warranty*

*Improved: 1st year 98.5%, from 2-24th year: -0.25%/year down, 92.5% at year 25
**In Progress

Temperature Characteristics

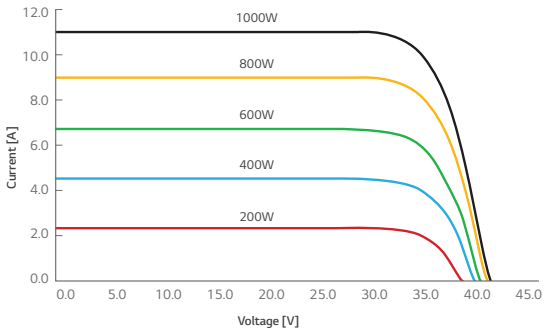
NMOT*	[°C]	44 ± 3
Pmax	[%/°C]	-0.29
Voc	[%/°C]	-0.24
Isc	[%/°C]	0.04

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

Electrical Properties (NMOT)

Model		LG395Q1C-A6
Maximum Power (Pmax)	[W]	299
MPP Voltage (Vmpp)	[V]	34.9
MPP Current (Impp)	[A]	8.57
Open Circuit Voltage (Voc)	[V]	41.6
Short Circuit Current (Isc)	[A]	9.10

I-V Curves



Electrical Properties (STC*)

Model		LG395Q1C-A6
Maximum Power (Pmax)	[W]	395
MPP Voltage (Vmpp)	[V]	37.0
MPP Current (Impp)	[A]	10.69
Open Circuit Voltage (Voc, ± 5%)	[V]	43.6
Short Circuit Current (Isc, ± 5%)	[A]	11.29
Module Efficiency	[%]	21.8
Power Tolerance	[%]	0 ~ +3

*STC (Standard Test Condition): Irradiance 1000 W/m², Cell temperature 25°C, AM 1.5
Measure Tolerance: ± 3%

Operating Conditions

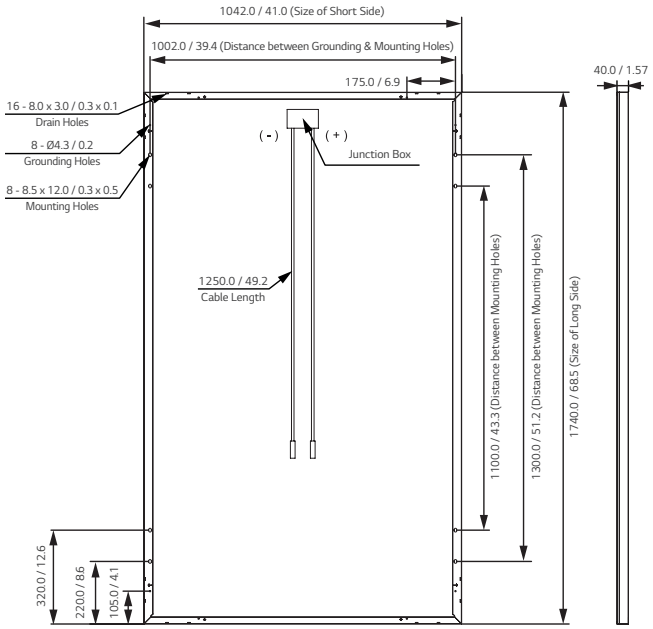
Operating Temperature*	[°C]	-40 ~+85
Maximum System Voltage	[V]	1,000
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load** (Front)	[Pa/psf]	5,400
Mechanical Test Load** (Rear)	[Pa/psf]	4,000

*The operating ambient temperature of these devices may exceed 40°C at full load for all wire sizes if is determined suitable in the field use application.
**Based on IEC 61215-2 : 2016 (Test Load = Design Load x Safety Factor (1.5))

Packaging Configuration

Number of Modules per Pallet	[EA]	25
Number of Modules per 40' Container	[EA]	650
Number of Modules per 53' Container	[EA]	850
Packaging Box Dimensions (L x W x H)	[mm]	1,790 x 1,120 x 1,227
Packaging Box Dimensions (L x W x H)	[in]	70.5 x 44.1 x 48.3
Packaging Box Gross Weight	[kg]	498
Packaging Box Gross Weight	[lb]	1,098

Dimensions (mm/inch)



LG Life's Good

LG Electronics USA, Inc.
Solar Business Division
2000 Millbrook Drive
Lincolnshire, IL 60069

www.lg-solar.com

Product specifications are subject to change without notice.
LG395Q1C-A6.pdf
120720

Enphase IQ 7A Microinverter

The high-powered smart grid-ready **Enphase IQ 7A Micro**™ dramatically simplifies the installation process while achieving the highest system efficiency for systems with 60-cell and 72-cell modules.

Part of the Enphase IQ System, the IQ 7A Micro integrates with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The 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.

High Power

- Peak output power 366 VA @ 240 VAC and 295 VA @ 208 VAC

Easy to Install

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

Efficient and Reliable

- Optimized for high powered 60-cell and 72-cell modules
- Highest CEC efficiency of 97%
- 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
- Envoy and Internet connection required
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

UL CERTIFIED SAFETY

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

ENPHASE

Enphase IQ 7A Microinverter

INPUT (DC)	IQ7A-72-2-US	
Commonly used module pairings[1]	295 W–460 W +	
Module compatibility	60-cell, 66-cell, and 72-cell PV modules	
Maximum input DC voltage	58 V	
Power point tracking voltage range[2]	18 V–58 V	
Min/Max start voltage	33 V / 58 V	
Max DC short circuit current (module Isc)[3]	15 A	
Overvoltage class DC port	II	
DC port backfeed current	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 (AC)	**@ 240 VAC**	**@ 208 VAC**
Peak output power	366 VA	295 VA
Maximum continuous output power	349 VA	290 VA
Nominal (L-L) voltage/range[4]	240 V / 211–264 V	208 V / 183–229 V
Maximum continuous output current	1.45 A (240 VAC)	1.39 A (208 VAC)
Nominal frequency	60 Hz	
Extended frequency range	47–68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[5]	11 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III	
AC port backfeed current	18 mA	
Power factor setting	1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging	
EFFICIENCY	**@240 VAC**	**@208 VAC**
CEC weighted efficiency	97.0 %	96.5%
MECHANICAL		
Ambient temperature range	-40°C to +60°C	
Relative humidity range	4% to 100% (condensing)	
Connector type: DC (IQ7A-72-2-US)	MC4	
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 Compatible with 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. CEC peak power tracking voltage range is 38 V to 43 V.
3. Maximum continuous input DC current is 10.2A.
4. Voltage range can be extended beyond nominal if required by the utility.
5. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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

2020-06-16

ENPHASE.

28357 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

Attn: Corey Geiger, COO, IronRidge Inc.
Date: October 10th, 2019

Re: Structural Certification and Span Tables for IronRidge Flush Mount System

This letter addresses the structural performance and code compliance of IronRidge's Flush Mount System. The contents of the letter shall be read in its entirety before applying to any project design. The Flush Mount System is a proprietary rooftop mounting system used to support photovoltaic (PV) modules installed in portrait or landscape orientation and set parallel to the underlying roof surface. PV modules are supported by extruded aluminum XR Rails and secured to the rails with IronRidge mounting clamps. The XR Rails are side mounted to a selected roof attachment with 3/8" stainless steel bonding hardware and then attached directly to the roof structure or to a stanchion that is fastened to the underlying roof structure. Assembly details of a typical Flush Mount installation and its core components are shown in Exhibit EX-0015.

The IronRidge Flush Mount System is designed and certified to the structural requirements of the reference standards listed below, for the load conditions and configurations tabulated in the attached span tables.

- ASCE/SEI 7-16 Minimum Design Loads for Buildings and Other Structures (ASCE 7-16)
- 2018 International Building Code (IBC-2018)
- 2015 Aluminum Design Manual (ADM-2015)

The tables included in this letter provide the maximum allowable spans of XR Rails in the Flush Mount System for the respective loads and configurations listed, covering wind exposure categories B, C, & D, roof zones provided in ASCE 7-16 for gable & hip roof profiles, and roof slopes of 8° to 45°. The tabulated spans are applicable when the following conditions are met:

1. *Span* is the distance between two adjacent roof attachment points (measured at the center of the attachment fastener)

2. The underlying roof pitch, measured between the roof surface and horizontal plane, is 45º or less.

3. The *mean roof height*, defined as the average of the roof eave height and the roof ridge height measured from grade, does not exceed 30 feet.

4. A clearance from the underside of the array to the roof surface of 2" minimum shall be provided and the height of the array, the distance from the module top surface to the roof surface (defined as h_2), shall not exceed 10".

5. Module length and area shall not exceed the maximum values listed on the respective span tables.

6. All Flush Mount components shall be installed in a professional workmanlike manner per IronRidge's *Flush Mount Installation Manual* and other applicable standards for the general roof construction practice.

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1-800-227-9523
IronRidge.com

The parameters and adjustments allowed in the span tables are defined as the following:

1. The Flush Mount System is designed as a Risk Category II structure as defined by ASCE 7-16 Table 1.5-1.

2. Wind speed shall conform to ASCE 7-16 Fig. 26.5-1B (for Risk Category II) and applicable state & local county/city amendments to the IBC. No special wind topographic features are included and both topographic coefficient (K_{zt}) and wind ground elevation factor (K_e) are taken as 1.0.

3. Snow load used in the span tables is the *ground snow* and shall conform to ASCE 7-16 Fig. 7.2-1 and applicable state & local county/city amendments to the IBC. If the local jurisdiction specified snow load is in the format of a *flat roof snow*, it shall first be converted to a *ground snow* following the local building code/amendment before the application of the attached span table. No special snow conditions are considered including unbalanced, drifting, sliding, retention, or ponding snow. No rain-on-snow surcharge load is considered. The span tables do not apply to buildings which are intentionally kept below freezing, kept just above freezing, or unheated.

4. The span tables reflect the ASCE 7 prescribed earthquake loads with the maximum magnitudes being:

   (a) For ground snow no greater than 42psf: $S_s \leq 2.0g$ for Site Class A, B, C, D.
   (b) For ground snow greater than 65psf: $S_s \leq 1.0g$ for Site Class A, B, C, D.
   (c) For ground snow between 42 and 65psf: $S_s \leq 1.5g$ for Site Class A, B, C, D.

5. Roof zones are defined by ASCE 7-16 Figure 30.3-2A to Figure 30.3-2I and are organized into three *groups* in which the zones share the same External Pressure Coefficients (GC_p). Roof zones comprising each *group* along with each roof zone's size and location are depicted in Figures 2 and 3 below each span table.

6. Allowable span length in the charts may be multiplied by a factor of 1.08 if the rails are continuous over a minimum of three spans.

7. The maximum rail cantilever length, measured from the rail end to the nearest attachment point, shall be the lesser of the following two conditions: 40% of the allowable span provided for the respective load & configuration condition from the span tables, or 36".

8. No rail splices are allowed in the cantilever, outer 2/3 of end spans, or middle 1/3 of interior spans.

9. Shaded cells of the included UFO Application Table indicate conditions in which UFO Mid Clamp connection capacity is exceeded. If such conditions are encountered contact support@ironridge.com.

10. Systems using CAMO module clamps shall be installed with the following guidance:
    a) For single module installations (orphan modules) using modules with a length greater than 67.5", CAMO clamps shall not be installed in regions that experience ground snow loads of 70psf and greater. Such scenarios are shown by asterisks in the applicable span tables.
    b) CAMO will function within a module's design load ratings. Be sure the specific module being used with CAMO meets the dimensional requirements shown in the figure below and that the module selected is suitable for the environmental conditions of a particular project.

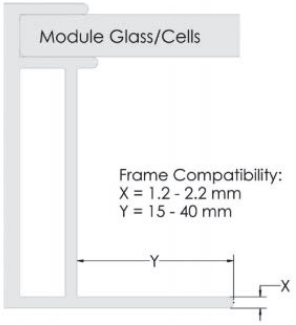

Figure 1: CAMO Module Frame Dimensional Requirements

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1-800-227-9523
IronRidge.com

Tabulated span values provided in this letter must be adjusted under the following scenarios:

1. Exposed Module conditions:

A module is defined as *Exposed* (per Section 29.4.4 of ASCE 7-16) if the distance from any of its free edges (an edge with no connectivity to other modules) to its facing roof edge (such as eave, ridge, rake, or hip) is greater than 0.5*h* (*h* is ASCE defined building height) AND if the distance from its free edge to any other adjacent array or panel is greater than 4 ft.

The allowable spans and cantilever of rails within *Exposed Module* areas shall be adjusted according to the following rules:

(a) For a project site with wind speed less than or equal to 140 mph, the adjusted allowable span shall be determined by using an increased wind speed (*Equivalent Wind Speed)* from the attached span tables with no changes to other design parameters. The *Equivalent Wind Speed* for *Exposed Modules* is shown in Table 1 below.

Actual Site Wind Speed (mph)	90	95	100	105	110	120	130	140
Equivalent Wind Speed for Exposed Modules (mph)	110	115	125	130	135	150	160	170

Table 1: Exposed Module Equivalent Wind Speeds

(b) If the site wind speed is greater than 140 mph, the adjusted allowable span shall be the lesser of the following two: 57% of the span value determined by site wind speed and zero snow, and the span value determined by the site wind speed and site ground snow.

2. Edge Module conditions:

A module is defined as an *Edge Module* when its distance to a perimeter roof edge (such as eave, ridge, rake, or hip) is less than $2h_2$ (h_2 = offset distance from the module top surface to the roof surface).

The allowable spans and cantilever of rails within *Edge Module* areas shall be adjusted according to the following rules:

(a) The span adjustment shall only be applied to the rails directly under the modules which are in contact with the perimeter $2h_2$ areas along the roof edge. Additionally, if the roof edge is the eave or ridge, only the rails nearest to that roof edge shall be considered for span adjustment.

(b) For a project site with the wind speed not exceeding 130 mph, the adjusted allowable span shall be determined by using an increased wind speed (*Equivalent Wind Speed*) onto the attached span tables while other design parameters remain the same. The *Equivalent Wind Speed* is tabulated below.

Actual Site Wind Speed (mph)	90	95	100	105	110	120	130
Equivalent Wind Speed for Edge Modules (mph)	120	125	135	140	145	160	175

Table 2: Edge Module Equivalent Wind Speeds

(c) If the site wind speed is greater than 130 mph, the adjusted allowable span shall be the lesser of the following two: 46% of the span value determined by site wind speed and zero ground snow, and the span value determined by the site wind speed and site ground snow.

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The span tables provided in this letter are certified based on the structural performance of IronRidge XR Rails only with no consideration of the structural adequacy of the chosen roof attachments, PV modules, or the underlying roof supporting members. It is the responsibility of the installer or system designer to verify the structural capacity and adequacy of the aforementioned system components in regards to the applied or resultant loads of any chosen array configuration.

Date Sealed:

Sincerely,

Gang Xuan, PE

Senior Structural Engineer

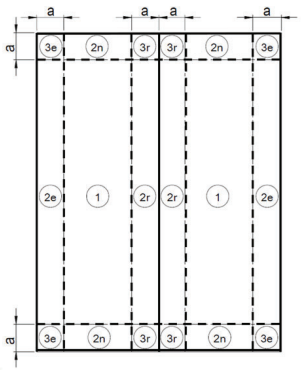
Rail: XR100	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 67.5" (60 cell typ.), Max Module SF: 21 SF Exposure B																																						
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf			80 psf			90 psf			100 psf			110 psf			120 psf		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	130	130	130	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
95 mph	0-7	130	130	130	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
100 mph	0-7	130	130	126	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
105 mph	8-20	130	129	118	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	129	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	126	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
110 mph	8-20	130	124	112	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	129	126	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	124	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
115 mph	8-20	130	118	105	110	110	105	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	127	119	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	115	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
120 mph	8-20	130	111	99	110	110	99	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	121	113	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	126	113	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
130 mph	8-20	125	100	89	110	100	89	92	92	89	91	91	89	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	109	101	105	105	101	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	126	116	103	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
140 mph	8-20	111	91	81	110	91	81	92	91	81	91	91	81	82	82	81	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	124	99	92	105	99	92	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	118	107	96	103	103	96	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
150 mph	8-20	99	83	74	99	83	74	92	83	74	91	83	74	82	82	74	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	114	91	84	105	91	84	89	89	84	87	87	84	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	109	99	87	103	99	87	88	88	87	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
160 mph	8-20	88	76	68	88	76	68	88	76	68	88	76	68	82	76	68	74	73	68	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	105	84	77	105	84	77	89	84	77	87	84	77	81	81	77	76	76	74	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	101	92	81	101	92	81	88	88	81	87	87	81	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
170 mph	8-20	82	72	64	82	72	64	82	72	64	82	72	64	82	72	64	74	72	64	68	68	64	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	98	78	72	98	78	72	89	78	72	87	78	72	81	78	72	76	76	72	72	72	69	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	96	86	76	96	86	76	88	86	76	87	86	76	80	80	76	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
175 mph	8-20	80	68	60	80	68	60	80	68	60	80	68	60	80	68	60	74	68	60	68	68	60	64	64	60	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	93	75	68	93	75	68	89	75	68	87	75	68	81	75	68	76	75	68	72	72	68	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	91	83	73	91	83	73	88	83	73	87	83	73	80	80	73	75	75	73	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
180 mph	8-20	77	65	57	77	65	57	77	65	57	77	65	57	77	65	57	74	65	57	68	65	57	64	64	57	60	60	57	57	57	56	54	54	54	51	51	51	49	49	49
	21-27	90	72	66	90	72	66	89	72	66	87	72	66	81	72	66	76	72	66	72	72	66	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	88	80	72	88	80	72	88	80	72	87	80	72	80	80	72	75	75	72	72	72	72	68	68	67	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53

= min 72" span = min 64" span = min 48" span

REV 9/30/2019

Grouping of ASCE 7-16 Roof Zones (Gable)

Roof Slope	8° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1 2e	2n 2r 3e	3r	1 2e 2r	2n 3r	3e



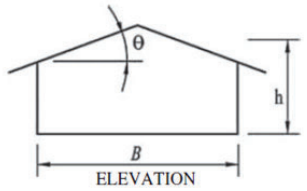


Figure 2: ASCE roof zone locations for gable roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

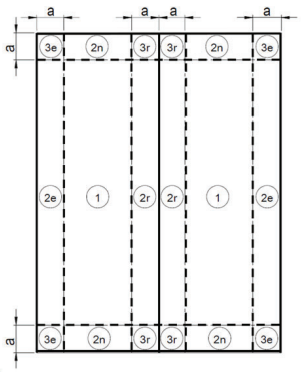
Rail: XR100	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 67.5" (60 cell typ.), Max Module SF: 21 SF Exposure C																																						
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf			80 psf			90 psf			100 psf			110 psf			120 psf		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	130	128	118	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
95 mph	0-7	130	122	109	110	110	109	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	125	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	122	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
100 mph	0-7	130	114	102	110	110	102	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	124	117	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	115	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
105 mph	8-20	130	108	96	110	108	96	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	117	109	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	122	109	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
110 mph	8-20	125	101	90	110	101	90	92	92	90	91	91	90	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	110	103	105	105	103	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	116	104	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
115 mph	8-20	118	96	84	110	96	84	92	92	84	91	91	84	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	129	104	96	105	104	96	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	124	111	99	103	103	99	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
120 mph	8-20	111	90	80	110	90	80	92	90	80	91	90	80	82	82	80	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	123	99	91	105	99	91	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	118	106	96	103	103	96	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
130 mph	8-20	97	80	72	97	80	72	92	80	72	91	80	72	82	80	72	74	74	72	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	112	89	82	105	89	82	89	89	82	87	87	82	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	108	97	86	103	97	86	88	88	86	87	87	86	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
140 mph	8-20	86	73	65	86	73	65	86	73	65	86	73	65	82	73	65	74	73	65	68	68	65	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	102	81	74	102	81	74	89	81	74	87	81	74	81	81	74	76	76	74	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	99	89	78	99	89	78	88	88	78	87	87	78	80	80	78	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
150 mph	8-20	80	67	60	80	67	60	80	67	60	80	67	60	80	67	60	74	67	60	68	67	60	64	64	60	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	96	74	67	96	74	67	89	74	67	87	74	67	81	74	67	76	74	67	72	72	67	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	91	82	72	91	82	72	88	82	72	87	82	72	80	80	72	75	75	72	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
160 mph	8-20	74	61	48	74	61	48	74	61	48	74	61	48	74	61	48	74	61	48	68	61	48	64	61	48	60	60	48	57	57	48	54	54	48	51	51	48	49	49	48
	21-27	86	68	64	86	68	64	86	68	64	86	68	64	81	68	64	76	68	64	72	68	64	65	65	64	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	83	76	67	83	76	67	83	76	67	83	76	67	80	76	67	75	75	67	72	72	67	67	67	67	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
170 mph	8-20	69	53	40	69	53	40	69	53	40	69	53	40	69	53	40	69	53	40	68	53	40	64	53	40	60	53	40	57	53	40	54	53	40	51	51	40	49	49	40
	21-27	81	64	56	81	64	56	81	64	56	81	64	56	81	64	56	76	64	56	72	64	56	65	64	56	61	61	56	58	58	56	55	55	55	52	52	52	50	50	50
	28-45	78	72	64	78	72	64	78	72	64	78	72	64	78	72	64	73	72	64	69	69	64	66	66	64	64	64	64	60	60	60	58	58	58	55	55	55	53	53	53
175 mph	8-20	67	48	38	67	48	38	67	48	38	67	48	38	67	48	38	67	48	38	67	48	38	64	48	38	60	48	38	57	48	38	54	48	38	51	48	38	49	48	38
	21-27	78	61	49	78	61	49	78	61	49	78	61	49	78	61	49	76	61	49	72	61	49	65	61	49	61	61	49	58	58	49	55	55	49	52	52	49	50	50	49
	28-45	75	68	60	75	68	60	75	68	60	75	68	60	75	68	60	72	68	60	68	68	60	65	65	60	64	64	60	60	60	60	57	57	57	55	55	55	53	53	53
180 mph	8-20	65	43	36	65	43	36	65	43	36	65	43	36	65	43	36	65	43	36	65	43	36	64	43	36	60	43	36	57	43	36	54	43	36	51	43	36	49	43	36
	21-27	76	59	44	76	59	44	76	59	44	76	59	44	76	59	44	75	59	44	72	59	44	65	59	44	61	59	44	58	58	44	55	55	44	52	52	44	50	50	44
	28-45	72	66	58	72	66	58	72	66	58	72	66	58	72	66	58	72	66	58	68	66	58	64	64	58	64	64	58	59	59	58	57	57	57	55	55	55	53	53	53

= min 72" span = min 64" span = min 48" span

REV 9/30/2019

Grouping of ASCE 7-16 Roof Zones (Gable)

Roof Slope	8° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1 2e	2n 2r 3e	3r	1 2e 2r	2n 3r	3e



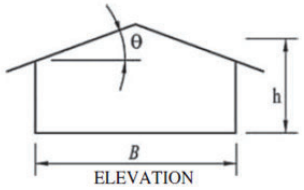


Figure 2: ASCE roof zone locations for gable roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Rail: XR100	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 67.5" (60 cell typ.), Max Module SF: 21 SF Exposure D																																						
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf			80 psf			90 psf			100 psf			110 psf			120 psf		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	130	118	105	110	110	105	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	128	120	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	118	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
95 mph	0-7	130	110	97	110	110	97	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	119	112	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	124	111	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
100 mph	0-7	126	103	91	110	103	91	92	92	91	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	112	104	105	105	104	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	118	105	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
105 mph	8-20	120	96	86	110	96	86	92	92	86	91	91	86	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	129	105	97	105	105	97	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	125	112	99	103	103	99	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
110 mph	8-20	112	90	80	110	90	80	92	90	80	91	90	80	82	82	80	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	124	99	92	105	99	92	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	118	106	96	103	103	96	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
115 mph	8-20	104	85	75	104	85	75	92	85	75	91	85	75	82	82	75	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	117	96	86	105	96	86	89	89	86	87	87	86	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	112	101	90	103	101	90	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
120 mph	8-20	96	80	72	96	80	72	92	80	72	91	80	72	82	80	72	74	74	72	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	111	88	82	105	88	82	89	88	82	87	87	82	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	107	96	85	103	96	85	88	88	85	87	87	85	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
130 mph	8-20	85	72	64	85	72	64	85	72	64	85	72	64	82	72	64	74	72	64	68	68	64	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	100	80	73	100	80	73	89	80	73	87	80	73	81	80	73	76	76	73	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	97	88	77	97	88	77	88	88	77	87	87	77	80	80	77	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
140 mph	8-20	79	66	57	79	66	57	79	66	57	79	66	57	79	66	57	74	66	57	68	66	57	64	64	57	60	60	57	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	92	73	66	92	73	66	89	73	66	87	73	66	81	73	66	76	73	66	72	72	66	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	88	80	72	88	80	72	88	80	72	87	80	72	80	80	72	75	75	72	72	72	72	67	67	67	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
150 mph	8-20	73	60	44	73	60	44	73	60	44	73	60	44	73	60	44	73	60	44	68	60	44	64	60	44	60	60	44	57	57	44	54	54	44	51	51	44	49	49	44
	21-27	85	66	61	85	66	61	85	66	61	85	66	61	81	66	61	76	66	61	72	66	61	65	65	61	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	82	74	65	82	74	65	82	74	65	82	74	65	79	74	65	74	74	65	72	72	65	66	66	65	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
160 mph	8-20	67	48	38	67	48	38	67	48	38	67	48	38	67	48	38	67	48	38	67	48	38	64	48	38	60	48	38	57	48	38	54	48	38	51	48	38	49	48	38
	21-27	79	61	50	79	61	50	79	61	50	79	61	50	79	61	50	76	61	50	72	61	50	65	61	50	61	61	50	58	58	50	55	55	50	52	52	50	50	50	50
	28-45	75	69	60	75	69	60	75	69	60	75	69	60	75	69	60	72	69	60	68	68	60	65	65	60	64	64	60	60	60	60	57	57	57	55	55	55	53	53	53
170 mph	8-20	64	41	34	64	41	34	64	41	34	64	41	34	64	41	34	64	41	34	64	41	34	64	41	34	60	41	34	57	41	34	54	41	34	51	41	34	49	41	34
	21-27	74	54	40	74	54	40	74	54	40	74	54	40	74	54	40	74	54	40	72	54	40	65	54	40	61	54	40	58	54	40	55	54	40	52	52	40	50	50	40
	28-45	72	64	53	72	64	53	72	64	53	72	64	53	72	64	53	72	64	53	67	64	53	64	64	53	61	61	53	59	59	53	56	56	53	54	54	53	53	53	53
175 mph	8-20	61	38	32	61	38	32	61	38	32	61	38	32	61	38	32	61	38	32	61	38	32	61	38	32	60	38	32	57	38	32	54	38	32	51	38	32	49	38	32
	21-27	72	49	37	72	49	37	72	49	37	72	49	37	72	49	37	72	49	37	69	49	37	65	49	37	61	49	37	58	49	37	55	49	37	52	49	37	50	49	37
	28-45	67	64	48	67	64	48	67	64	48	67	64	48	67	64	48	67	64	48	66	64	48	64	64	48	60	60	48	58	58	48	56	56	48	54	54	48	52	52	48
180 mph	8-20	59	36	30	59	36	30	59	36	30	59	36	30	59	36	30	59	36	30	59	36	30	59	36	30	59	36	30	57	36	30	54	36	30	51	36	30	49	36	30
	21-27	69	44	35	69	44	35	69	44	35	69	44	35	69	44	35	69	44	35	69	44	35	65	44	35	61	44	35	58	44	35	55	44	35	52	44	35	50	44	35
	28-45	65	60	44	65	60	44	65	60	44	65	60	44	65	60	44	65	60	44	65	60	44	64	60	44	60	60	44	58	58	44	56	56	44	54	54	44	52	52	44

= min 72" span = min 64" span = min 48" span

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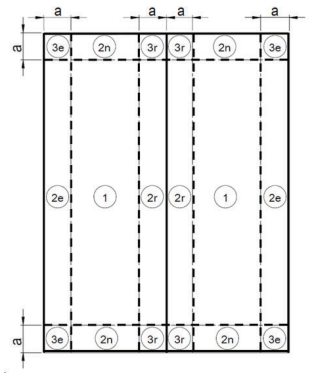
Grouping of ASCE 7-16 Roof Zones (Gable)

Roof Slope	8° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1 2e	2n 2r 3e	3r	1 2e 2r	2n 3r	3e



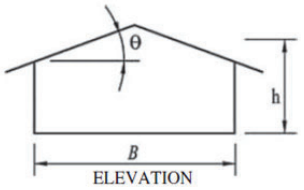


Figure 2: ASCE roof zone locations for gable roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Gable Roof		UFO Application Table XR100 Rail, Maximum Module Length 67.5" (21 SF Max)																										
		Standard Modules									Exposed Modules									Edge Modules								
Wind Speed (mph)	Roof Slope (deg.)	Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20																											
	21-27																											
	28-45																											
95 mph	0-7																											
	8-27																											
	28-45																											
100 mph	0-7																											
	8-27																											
	28-45																											
105 mph	8-20																											
	21-27																											
	28-45																											
110 mph	8-20																											
	21-27																											
	28-45																											
115 mph	8-20																											
	21-27																											
	28-45																											
120 mph	8-20																											
	21-27																											
	28-45																											
130 mph	8-20																											
	21-27																											
	28-45																											
140 mph	8-20																											
	21-27																											
	28-45																											
150 mph	8-20																											
	21-27																											
	28-45																											
160 mph	8-20																											
	21-27																											
	28-45																											
170 mph	8-20																											
	21-27																											
	28-45																											
175 mph	8-20																											
	21-27																											
	28-45																											
180 mph	8-20																											
	21-27																											
	28-45																											

= Shaded cells of the included UFO Application Table indicate conditions in which UFO Mid Clamp connection capacity is exceeded. Refer to parameter 9 on page 2.

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Rail: XR100	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 80" (72 cell typ.), Max Module SF: 24 SF Exposure B																																					
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf*			80 psf*			90 psf*			100 psf*			110 psf*			120 psf*		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
95 mph	0-7	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
100 mph	0-7	123	123	122	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
105 mph	8-20	123	123	114	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
110 mph	8-20	123	120	107	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
115 mph	8-20	123	113	101	102	102	101	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	115	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	112	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
120 mph	8-20	123	107	96	102	102	96	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	115	109	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	106	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
130 mph	8-20	123	96	85	102	96	85	86	86	85	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	104	98	99	99	98	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	109	98	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
140 mph	8-20	110	87	77	102	87	77	86	86	77	84	84	77	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	118	96	88	99	96	88	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	113	101	90	98	98	90	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
150 mph	8-20	98	79	72	98	79	72	86	79	72	84	79	72	75	75	72	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	108	87	80	99	87	80	84	84	80	83	83	80	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	105	96	83	98	96	83	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
160 mph	8-20	88	72	65	88	72	65	86	72	65	84	72	65	75	72	65	68	68	65	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	100	80	74	99	80	74	84	80	74	83	80	74	76	76	74	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	97	87	77	97	87	77	83	83	77	82	82	77	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
170 mph	8-20	80	67	59	80	67	59	80	67	59	80	67	59	75	67	59	68	67	59	64	64	59	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	93	74	68	93	74	68	84	74	68	83	74	68	76	74	68	69	69	68	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	90	81	72	90	81	72	83	81	72	82	81	72	76	76	72	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
175 mph	8-20	77	64	55	77	64	55	77	64	55	77	64	55	75	64	55	68	64	55	64	64	55	58	58	55	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	90	72	65	90	72	65	84	72	65	83	72	65	76	72	65	69	69	65	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	87	78	69	87	78	69	83	78	69	82	78	69	76	76	69	72	72	69	66	66	66	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
180 mph	8-20	73	64	48	73	64	48	73	64	48	73	64	48	73	64	48	68	64	48	64	64	48	58	58	48	55	55	48	52	52	48	49	49	48	48	48	48	45	45	45
	21-27	87	69	64	87	69	64	84	69	64	83	69	64	76	69	64	69	69	64	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	84	76	67	84	76	67	83	76	67	81	76	67	75	75	67	72	72	67	66	66	66	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49

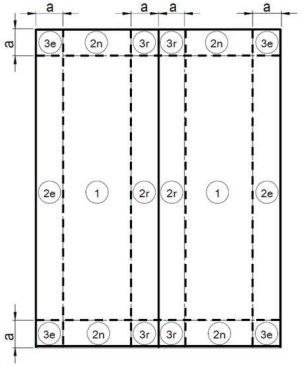
= min 72" span = min 64" span = min 48" span

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 2 for details.

REV 9/30/2019

Grouping of ASCE 7-16 Roof Zones (Gable)

Roof Slope	8° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1 2e	2n 2r 3e	3r	1 2e 2r	2n 3r	3e



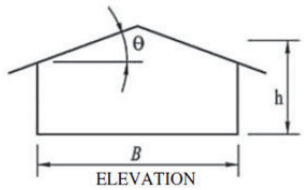


Figure 2: ASCE roof zone locations for gable roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Rail: XR100	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 80" (72 cell typ.), Max Module SF: 24 SF Exposure C																																				
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf*			80 psf*			90 psf*			100 psf*			110 psf*			120 psf*		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	123	123	112	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
95 mph	0-7	123	117	104	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	119	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	114	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
100 mph	0-7	123	109	97	102	102	97	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	117	110	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	108	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
105 mph	8-20	123	102	91	102	102	91	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	110	103	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	115	103	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
110 mph	8-20	123	96	85	102	96	85	86	86	85	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	104	98	99	99	98	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	109	98	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
115 mph	8-20	116	90	80	102	90	80	86	86	80	84	84	80	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	98	92	99	98	92	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	104	92	98	98	92	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
120 mph	8-20	108	85	76	102	85	76	86	85	76	84	84	76	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	116	93	87	99	93	87	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	112	99	88	98	98	88	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
130 mph	8-20	96	76	68	96	76	68	86	76	68	84	76	68	75	75	68	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	105	84	78	99	84	78	84	84	78	83	83	78	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	102	91	80	97	91	80	83	83	80	82	82	80	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
140 mph	8-20	84	69	64	84	69	64	84	69	64	84	69	64	75	69	64	68	68	64	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	96	76	72	96	76	72	84	76	72	83	76	72	76	76	72	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	93	83	74	93	83	74	83	83	74	82	82	74	76	76	74	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
150 mph	8-20	74	64	51	74	64	51	74	64	51	74	64	51	74	64	51	68	64	51	64	64	51	58	58	51	55	55	51	52	52	51	49	49	49	48	48	48	45	45	45
	21-27	88	72	64	88	72	64	84	72	64	83	72	64	76	72	64	69	69	64	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	85	77	68	85	77	68	83	77	68	82	77	68	75	75	68	72	72	68	66	66	66	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
160 mph	8-20	69	56	40	69	56	40	69	56	40	69	56	40	69	56	40	68	56	40	64	56	40	58	56	40	55	55	40	52	52	40	49	49	40	48	48	40	45	45	40
	21-27	81	65	59	81	65	59	81	65	59	81	65	59	76	65	59	69	65	59	64	64	59	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	79	72	64	79	72	64	79	72	64	79	72	64	74	72	64	69	69	64	65	65	64	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
170 mph	8-20	64	45	34	64	45	34	64	45	34	64	45	34	64	45	34	64	45	34	64	45	34	58	45	34	55	45	34	52	45	34	49	45	34	48	45	34	45	45	34
	21-27	75	59	48	75	59	48	75	59	48	75	59	48	75	59	48	69	59	48	64	59	48	59	59	48	56	56	48	53	53	48	50	50	48	48	48	48	48	48	48
	28-45	73	66	58	73	66	58	73	66	58	73	66	58	72	66	58	67	66	58	64	64	58	60	60	58	58	58	58	55	55	55	53	53	53	51	51	51	49	49	49
175 mph	8-20	64	40	32	64	40	32	64	40	32	64	40	32	64	40	32	64	40	32	64	40	32	58	40	32	55	40	32	52	40	32	49	40	32	48	40	32	45	40	32
	21-27	73	56	41	73	56	41	73	56	41	73	56	41	73	56	41	69	56	41	64	56	41	59	56	41	56	56	41	53	53	41	50	50	41	48	48	41	48	48	41
	28-45	72	64	55	72	64	55	72	64	55	72	64	55	72	64	55	67	64	55	64	64	55	60	60	55	57	57	55	55	55	55	53	53	53	51	51	51	49	49	49
180 mph	8-20	60	36	30	60	36	30	60	36	30	60	36	30	60	36	30	60	36	30	60	36	30	58	36	30	55	36	30	52	36	30	49	36	30	48	36	30	45	36	30
	21-27	72	51	37	72	51	37	72	51	37	72	51	37	72	51	37	69	51	37	64	51	37	59	51	37	56	51	37	53	51	37	50	50	37	48	48	37	48	48	37
	28-45	68	64	49	68	64	49	68	64	49	68	64	49	68	64	49	66	64	49	64	64	49	59	59	49	57	57	49	55	55	49	52	52	49	51	51	49	49	49	49

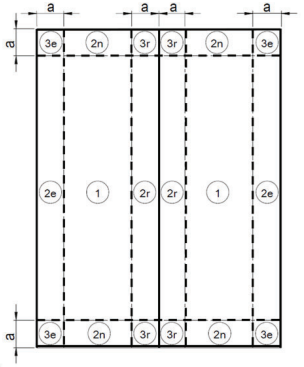
= min 72" span = min 64" span = min 48" span

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 2 for details.

REV 9/30/2019

Grouping of ASCE 7-16 Roof Zones (Gable)

Roof Slope	8° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1 2e	2n 2r 3e	3r	1 2e 2r	2n 3r	3e



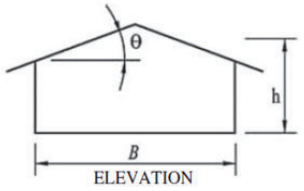


Figure 2: ASCE roof zone locations for gable roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Rail: XR100	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 80" (72 cell typ.), Max Module SF: 24 SF Exposure D																																					
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf*			80 psf*			90 psf*			100 psf*			110 psf*			120 psf*		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	123	112	99	102	102	99	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	120	114	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	111	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
95 mph	0-7	123	104	92	102	102	92	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	113	106	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	105	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
100 mph	0-7	123	97	87	102	97	87	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	105	99	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	110	99	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
105 mph	8-20	117	91	81	102	91	81	86	86	81	84	84	81	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	99	92	99	99	92	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	105	93	98	98	93	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
110 mph	8-20	109	85	76	102	85	76	86	85	76	84	84	76	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	116	96	87	99	96	87	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	112	100	88	98	98	88	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
115 mph	8-20	101	80	72	101	80	72	86	80	72	84	80	72	75	75	72	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	110	88	82	99	88	82	84	84	82	83	83	82	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	106	96	84	98	96	84	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
120 mph	8-20	96	76	67	96	76	67	86	76	67	84	76	67	75	75	67	68	68	67	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	104	84	77	99	84	77	84	84	77	83	83	77	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	101	90	80	97	90	80	83	83	80	82	82	80	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
130 mph	8-20	83	68	60	83	68	60	83	68	60	83	68	60	75	68	60	68	68	60	64	64	60	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	96	76	69	96	76	69	84	76	69	83	76	69	76	76	69	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	92	83	73	92	83	73	83	83	73	82	82	73	76	76	73	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
140 mph	8-20	73	64	48	73	64	48	73	64	48	73	64	48	73	64	48	68	64	48	64	64	48	58	58	48	55	55	48	52	52	48	49	49	48	48	48	48	45	45	45
	21-27	86	69	64	86	69	64	84	69	64	83	69	64	76	69	64	69	69	64	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	84	76	66	84	76	66	83	76	66	81	76	66	75	75	66	72	72	66	66	66	66	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
150 mph	8-20	67	52	37	67	52	37	67	52	37	67	52	37	67	52	37	67	52	37	64	52	37	58	52	37	55	52	37	52	52	37	49	49	37	48	48	37	45	45	37
	21-27	79	64	56	79	64	56	79	64	56	79	64	56	76	64	56	69	64	56	64	64	56	59	59	56	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	77	72	61	77	72	61	77	72	61	77	72	61	73	72	61	68	68	61	65	65	61	61	61	61	58	58	58	56	56	56	53	53	53	51	51	51	49	49	49
160 mph	8-20	64	41	32	64	41	32	64	41	32	64	41	32	64	41	32	64	41	32	64	41	32	58	41	32	55	41	32	52	41	32	49	41	32	48	41	32	45	41	32
	21-27	73	58	42	73	58	42	73	58	42	73	58	42	73	58	42	69	58	42	64	58	42	59	58	42	56	56	42	53	53	42	50	50	42	48	48	42	48	48	42
	28-45	72	65	56	72	65	56	72	65	56	72	65	56	72	65	56	67	65	56	64	64	56	60	60	56	57	57	56	55	55	55	53	53	53	51	51	51	49	49	49
170 mph	8-20	58	34	28	58	34	28	58	34	28	58	34	28	58	34	28	58	34	28	58	34	28	58	34	28	55	34	28	52	34	28	49	34	28	48	34	28	45	34	28
	21-27	68	45	34	68	45	34	68	45	34	68	45	34	68	45	34	68	45	34	64	45	34	59	45	34	56	45	34	53	45	34	50	45	34	48	45	34	48	45	34
	28-45	66	60	45	66	60	45	66	60	45	66	60	45	66	60	45	65	60	45	64	60	45	59	59	45	56	56	45	54	54	45	52	52	45	50	50	45	49	49	45
175 mph	8-20	54	32	27	54	32	27	54	32	27	54	32	27	54	32	27	54	32	27	54	32	27	54	32	27	54	32	27	52	32	27	49	32	27	48	32	27	45	32	27
	21-27	66	41	32	66	41	32	66	41	32	66	41	32	66	41	32	66	41	32	64	41	32	59	41	32	56	41	32	53	41	32	50	41	32	48	41	32	48	41	32
	28-45	64	58	41	64	58	41	64	58	41	64	58	41	64	58	41	64	58	41	61	58	41	58	58	41	56	56	41	54	54	41	52	52	41	50	50	41	48	48	41
180 mph	8-20	50	30	25	50	30	25	50	30	25	50	30	25	50	30	25	50	30	25	50	30	25	50	30	25	50	30	25	50	30	25	49	30	25	48	30	25	45	30	25
	21-27	64	37	29	64	37	29	64	37	29	64	37	29	64	37	29	64	37	29	64	37	29	59	37	29	56	37	29	53	37	29	50	37	29	48	37	29	48	37	29
	28-45	61	55	37	61	55	37	61	55	37	61	55	37	61	55	37	61	55	37	60	55	37	58	55	37	55	55	37	53	53	37	51	51	37	49	49	37	48	48	37

= min 72" span = min 64" span = min 48" span

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 2 for details.

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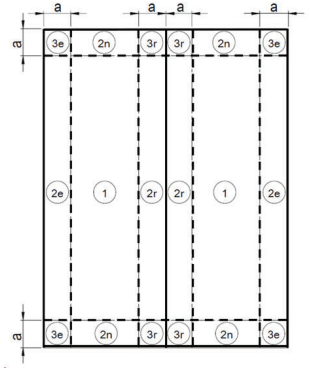
Grouping of ASCE 7-16 Roof Zones (Gable)

Roof Slope	8° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1 2e	2n 2r 3e	3r	1 2e 2r	2n 3r	3e



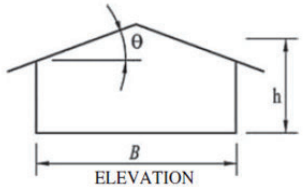


Figure 2: ASCE roof zone locations for gable roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Gable Roof		UFO Application Table XR100 Rail, Maximum Module Length 80" (24 SF Max)																										
		Standard Modules									Exposed Modules									Edge Modules								
Wind Speed (mph)	Roof Slope (deg.)	Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20																											
	21-27																											
	28-45																											
95 mph	0-7																											
	8-27																											
	28-45																											
100 mph	0-7																											
	8-27																											
	28-45																											
105 mph	8-20																											
	21-27																											
	28-45																											
110 mph	8-20																											
	21-27																											
	28-45																											
115 mph	8-20																											
	21-27																											
	28-45																											
120 mph	8-20																											
	21-27																											
	28-45																											
130 mph	8-20																											
	21-27																											
	28-45																											
140 mph	8-20																											
	21-27																											
	28-45																											
150 mph	8-20																											
	21-27																											
	28-45																											
160 mph	8-20																											
	21-27																											
	28-45																											
170 mph	8-20																											
	21-27																											
	28-45																											
175 mph	8-20																											
	21-27																											
	28-45																											
180 mph	8-20																											
	21-27																											
	28-45																											

= Shaded cells of the included UFO Application Table indicate conditions in which UFO Mid Clamp connection capacity is exceeded. Refer to parameter 9 on page 2.

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Rail: XR100	Hip Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 67.5" (60 cell typ.), Max Module SF: 21 SF Exposure B																																							
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf			80 psf			90 psf			100 psf			110 psf			120 psf		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	130	130	130	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
95 mph	0-7	130	130	130	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
100 mph	0-7	130	130	130	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
105 mph	8-20	130	130	130	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
110 mph	8-20	130	130	128	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
115 mph	8-20	130	128	123	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	127	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
120 mph	8-20	130	123	116	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	122	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
130 mph	8-20	126	111	105	110	110	105	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	121	121	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	111	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
140 mph	8-20	114	101	96	110	101	96	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	111	111	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	124	124	102	103	103	102	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
150 mph	8-20	104	92	88	104	92	88	92	91	88	91	91	88	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	128	102	102	105	102	102	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	115	114	93	103	103	93	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
160 mph	8-20	96	85	80	96	85	80	92	85	80	91	85	80	82	82	80	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	119	96	96	105	96	96	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	107	105	87	103	103	87	88	88	87	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
170 mph	8-20	88	79	75	88	79	75	88	79	75	88	79	75	82	79	75	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	111	88	88	105	88	88	89	88	88	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	100	97	81	100	97	81	88	88	81	87	87	81	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
175 mph	8-20	85	76	72	85	76	72	85	76	72	85	76	72	82	76	72	74	74	72	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	107	84	84	105	84	84	89	84	84	87	84	84	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	97	93	78	97	93	78	88	88	78	87	87	78	80	80	78	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
180 mph	8-20	83	74	72	83	74	72	83	74	72	83	74	72	81	74	72	74	73	72	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	103	82	82	103	82	82	89	82	82	87	82	82	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	93	91	75	93	91	75	88	88	75	87	87	75	80	80	75	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53

= min 72" span = min 64" span = min 48" span

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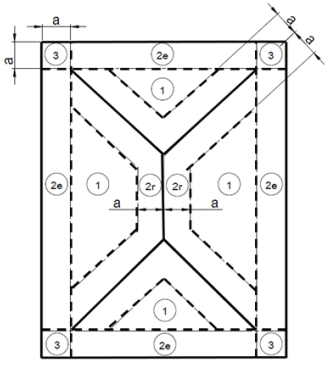
Grouping of ASCE 7-16 Roof Zones (Hip)									
Roof Slope	8° - 20°			21° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1	2r	2e 3	1	2e 2r	3	1	2e	2r 3



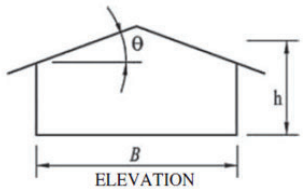


Figure 3: ASCE roof zone locations for hip roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Rail: XR100	Hip Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 67.5" (60 cell typ.), Max Module SF: 21 SF Exposure C																																							
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf			80 psf			90 psf			100 psf			110 psf			120 psf		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	130	130	130	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
95 mph	0-7	130	130	126	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
100 mph	0-7	130	125	121	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	126	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
105 mph	8-20	130	118	113	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	130	130	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	120	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
110 mph	8-20	126	112	107	110	110	107	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	124	124	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	113	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
115 mph	8-20	121	105	100	110	105	100	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	117	117	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	108	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
120 mph	8-20	114	100	96	110	100	96	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	111	111	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	124	124	103	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
130 mph	8-20	103	91	86	103	91	86	92	91	86	91	91	86	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	128	100	100	105	100	100	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	113	112	92	103	103	92	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
140 mph	8-20	92	82	78	92	82	78	92	82	78	91	82	78	82	82	78	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	116	92	92	105	92	92	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	104	103	84	103	103	84	88	88	84	87	87	84	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
150 mph	8-20	84	75	72	84	75	72	84	75	72	84	75	72	82	75	72	74	74	72	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	107	84	84	105	84	84	89	84	84	87	84	84	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	96	96	78	96	96	78	88	88	78	87	87	78	80	80	78	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
160 mph	8-20	79	72	66	79	72	66	79	72	66	79	72	66	79	72	66	74	72	66	68	68	66	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	99	78	78	99	78	78	89	78	78	87	78	78	81	78	78	75	75	75	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	90	86	72	90	86	72	88	86	72	87	86	72	80	80	72	75	75	72	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
170 mph	8-20	73	65	61	73	65	61	73	65	61	73	65	61	73	65	61	73	65	61	68	65	61	64	64	61	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	91	72	72	91	72	72	88	72	72	87	72	72	80	72	72	74	72	72	69	69	69	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	83	79	65	83	79	65	83	79	65	83	79	65	80	79	65	75	75	65	72	72	65	68	68	65	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
175 mph	8-20	72	64	58	72	64	58	72	64	58	72	64	58	72	64	58	72	64	58	68	64	58	64	64	58	60	60	58	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	87	69	69	87	69	69	87	69	69	86	69	69	79	69	69	73	69	69	69	69	69	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	80	77	64	80	77	64	80	77	64	80	77	64	80	77	64	75	75	64	72	72	64	68	68	64	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
180 mph	8-20	69	60	53	69	60	53	69	60	53	69	60	53	69	60	53	69	60	53	67	60	53	64	60	53	60	60	53	57	57	53	54	54	53	51	51	51	49	49	49
	21-27	84	67	67	84	67	67	84	67	67	84	67	67	78	67	67	73	67	67	68	67	67	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	78	74	61	78	74	61	78	74	61	78	74	61	78	74	61	75	74	61	72	72	61	67	67	61	64	64	61	61	61	61	58	58	58	55	55	55	53	53	53

= min 72" span = min 64" span = min 48" span

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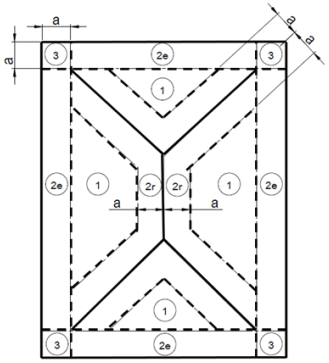
Grouping of ASCE 7-16 Roof Zones (Hip)									
Roof Slope	8° - 20°			21° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1	2r	2e 3	1	2e 2r	3	1	2e	2r 3



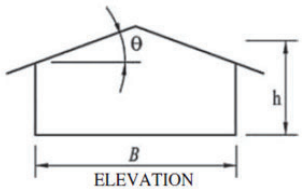


Figure 3: ASCE roof zone locations for hip roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

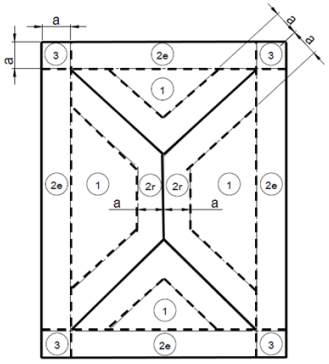
Θ = Angle of roof plane from horizontal, in degrees.

Rail: XR100	Hip Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 67.5" (60 cell typ.), Max Module SF: 21 SF Exposure D																																						
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf			80 psf			90 psf			100 psf			110 psf			120 psf		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	130	126	122	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	128	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
95 mph	0-7	130	121	116	110	110	110	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	131	131	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	121	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
100 mph	0-7	128	113	108	110	110	108	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	8-27	131	125	125	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	114	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
105 mph	8-20	122	107	101	110	107	101	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	118	118	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	128	128	108	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
110 mph	8-20	114	100	96	110	100	96	92	92	92	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	112	112	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	124	125	103	103	103	103	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
115 mph	8-20	108	96	91	108	96	91	92	92	91	91	91	91	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	131	105	105	105	105	105	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	118	118	97	103	103	97	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
120 mph	8-20	101	90	86	101	90	86	92	90	86	91	90	86	82	82	82	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	126	100	100	105	100	100	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	113	112	92	103	103	92	88	88	88	87	87	87	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
130 mph	8-20	91	82	78	91	82	78	91	82	78	91	82	78	82	82	78	74	74	74	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	114	91	91	105	91	91	89	89	89	87	87	87	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	103	101	83	103	101	83	88	88	83	87	87	83	80	80	80	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
140 mph	8-20	83	74	72	83	74	72	83	74	72	83	74	72	81	74	72	74	74	72	68	68	68	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	104	83	83	104	83	83	89	83	83	87	83	83	81	81	81	76	76	76	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	96	92	77	96	92	77	88	88	77	87	87	77	80	80	77	75	75	75	72	72	72	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
150 mph	8-20	77	67	65	77	67	65	77	67	65	77	67	65	77	67	65	74	67	65	68	67	65	64	64	64	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	96	75	75	96	75	75	89	75	75	87	75	75	80	75	75	75	75	75	72	72	72	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	87	83	69	87	83	69	87	83	69	87	83	69	80	80	69	75	75	69	72	72	69	68	68	68	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
160 mph	8-20	72	64	60	72	64	60	72	64	60	72	64	60	72	64	60	72	64	60	68	64	60	64	64	60	60	60	60	57	57	57	54	54	54	51	51	51	49	49	49
	21-27	88	72	72	88	72	72	88	72	72	86	72	72	79	72	72	73	72	72	69	69	69	65	65	65	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	80	77	64	80	77	64	80	77	64	80	77	64	80	77	64	75	75	64	72	72	64	68	68	64	64	64	64	61	61	61	58	58	58	55	55	55	53	53	53
170 mph	8-20	66	57	49	66	57	49	66	57	49	66	57	49	66	57	49	66	57	49	66	57	49	64	57	49	60	57	49	57	57	49	54	54	49	51	51	49	49	49	49
	21-27	82	65	65	82	65	65	82	65	65	82	65	65	78	65	65	72	65	65	68	65	65	64	64	64	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	75	72	58	75	72	58	75	72	58	75	72	58	75	72	58	75	72	58	72	72	58	67	67	58	64	64	58	61	61	58	58	58	58	55	55	55	53	53	53
175 mph	8-20	65	52	44	65	52	44	65	52	44	65	52	44	65	52	44	65	52	44	65	52	44	64	52	44	60	52	44	57	52	44	54	52	44	51	50	44	49	49	44
	21-27	79	64	64	79	64	64	79	64	64	79	64	64	77	64	64	72	64	64	67	64	64	64	64	64	61	61	61	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	73	67	52	73	67	52	73	67	52	73	67	52	73	67	52	73	67	52	72	67	52	66	66	52	64	64	52	61	61	52	58	58	52	55	55	52	53	53	52
180 mph	8-20	64	48	42	64	48	42	64	48	42	64	48	42	64	48	42	64	48	42	64	48	42	64	48	42	59	48	42	57	48	42	54	48	42	51	48	42	49	48	42
	21-27	75	60	60	75	60	60	75	60	60	75	60	60	75	60	60	72	60	60	66	60	60	64	60	60	60	60	60	58	58	58	55	55	55	52	52	52	50	50	50
	28-45	72	65	44	72	65	44	72	65	44	72	65	44	72	65	44	72	65	44	72	65	44	66	65	44	64	64	44	60	60	44	58	58	44	55	55	44	53	53	44

= min 72" span = min 64" span = min 48" span

REV 9/30/2019

Grouping of ASCE 7-16 Roof Zones (Hip)									
Roof Slope	8° - 20°			21° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1	2r	2e 3	1	2e 2r	3	1	2e	2r 3



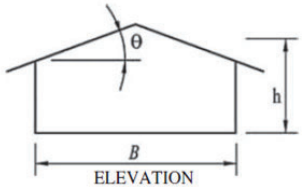


Figure 3: ASCE roof zone locations for hip roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Hip Roof		UFO Application Table XR100 Rail, Maximum Module Length 67.5" (21 SF Max)																										
		Standard Modules									Exposed Modules									Edge Modules								
Wind Speed (mph)	Roof Slope (deg.)	Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20																											
	21-27																											
	28-45																											
95 mph	0-7																											
	8-27																											
	28-45																											
100 mph	0-7																											
	8-27																											
	28-45																											
105 mph	8-20																											
	21-27																											
	28-45																											
110 mph	8-20																											
	21-27																											
	28-45																											
115 mph	8-20																											
	21-27																											
	28-45																											
120 mph	8-20																											
	21-27																											
	28-45																											
130 mph	8-20																											
	21-27																											
	28-45																											
140 mph	8-20																											
	21-27																											
	28-45																											
150 mph	8-20																											
	21-27																											
	28-45																											
160 mph	8-20																											
	21-27																											
	28-45																											
170 mph	8-20																											
	21-27																											
	28-45																											
175 mph	8-20																											
	21-27																											
	28-45																											
180 mph	8-20																											
	21-27																											
	28-45																											

= Shaded cells of the included UFO Application Table indicate conditions in which UFO Mid Clamp connection capacity is exceeded. Refer to parameter 9 on page 2.

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Rail: XR100	Hip Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 80" (72 cell typ.), Max Module SF: 24 SF Exposure B																																					
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf*			80 psf*			90 psf*			100 psf*			110 psf*			120 psf*		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
95 mph	0-7	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
100 mph	0-7	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
105 mph	8-20	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
110 mph	8-20	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
115 mph	8-20	123	122	116	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
120 mph	8-20	123	116	110	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	116	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
130 mph	8-20	120	105	99	102	101	99	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	115	115	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	106	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
140 mph	8-20	109	96	91	102	96	91	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	106	106	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	97	98	98	97	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
150 mph	8-20	99	87	83	99	87	83	86	84	83	84	84	83	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	118	97	97	99	97	97	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	109	108	89	98	98	89	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
160 mph	8-20	91	80	76	91	80	76	86	80	76	84	80	76	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	113	89	89	99	89	89	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	101	100	82	98	98	82	83	83	82	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
170 mph	8-20	84	74	72	84	74	72	84	74	72	84	74	72	75	74	72	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	105	83	83	99	83	83	84	83	83	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	96	93	77	96	93	77	83	83	77	82	82	77	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
175 mph	8-20	79	72	68	79	72	68	79	72	68	79	72	68	75	72	68	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	101	80	80	99	80	80	84	80	80	83	80	80	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	91	89	74	91	89	74	83	83	74	82	82	74	76	76	74	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
180 mph	8-20	78	69	66	78	69	66	78	69	66	78	69	66	75	69	66	68	67	66	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	97	77	77	97	77	77	84	77	77	83	77	77	76	75	75	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	88	86	72	88	86	72	83	83	72	82	82	72	76	76	72	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49

= min 72" span = min 64" span = min 48" span

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 2 for details.

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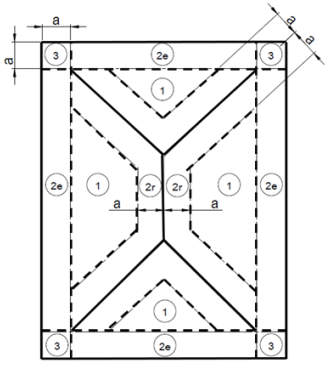
Grouping of ASCE 7-16 Roof Zones (Hip)									
Roof Slope	8° - 20°			21° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1	2r	2e 3	1	2e 2r	3	1	2e	2r 3



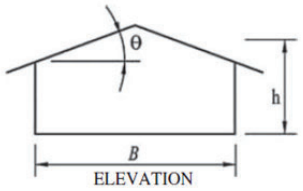


Figure 3: ASCE roof zone locations for hip roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

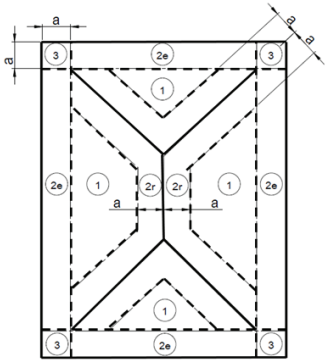
Rail: XR100	Hip Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 80" (72 cell typ.), Max Module SF: 24 SF Exposure C																																					
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf*			80 psf*			90 psf*			100 psf*			110 psf*			120 psf*		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
95 mph	0-7	123	123	119	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
100 mph	0-7	123	117	111	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
105 mph	8-20	123	110	104	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	110	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
110 mph	8-20	122	103	98	102	102	98	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	114	114	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	104	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
115 mph	8-20	115	98	92	102	98	92	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	108	108	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	99	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
120 mph	8-20	107	92	88	102	92	88	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	103	103	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	114	114	96	98	98	96	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
130 mph	8-20	96	84	79	96	84	79	86	84	79	84	84	79	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	118	92	92	99	92	92	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	104	103	85	98	98	85	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
140 mph	8-20	85	76	72	85	76	72	85	76	72	84	76	72	75	75	72	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	107	84	84	99	84	84	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	97	96	78	97	96	78	83	83	78	82	82	78	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
150 mph	8-20	78	72	66	78	72	66	78	72	66	78	72	66	75	72	66	68	68	66	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	98	78	78	98	78	78	84	78	78	83	78	78	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	89	87	72	89	87	72	83	83	72	82	82	72	76	76	72	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
160 mph	8-20	72	64	61	72	64	61	72	64	61	72	64	61	72	64	61	68	64	61	64	64	61	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	91	72	72	91	72	72	84	72	72	82	72	72	75	72	72	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	83	80	67	83	80	67	83	80	67	82	80	67	76	76	67	72	72	67	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
170 mph	8-20	68	60	55	68	60	55	68	60	55	68	60	55	68	60	55	67	60	55	64	60	55	58	58	55	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	84	66	66	84	66	66	82	66	66	81	66	66	74	66	66	68	66	66	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	77	75	61	77	75	61	77	75	61	77	75	61	76	75	61	72	72	61	67	67	61	64	64	61	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
175 mph	8-20	65	57	51	65	57	51	65	57	51	65	57	51	65	57	51	65	57	51	64	57	51	58	57	51	55	55	51	52	52	51	49	49	49	48	48	48	45	45	45
	21-27	81	64	64	81	64	64	80	64	64	79	64	64	73	64	64	68	64	64	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	75	72	59	75	72	59	75	72	59	75	72	59	75	72	59	72	72	59	66	66	59	64	64	59	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
180 mph	8-20	64	54	45	64	54	45	64	54	45	64	54	45	64	54	45	64	54	45	64	54	45	58	54	45	55	54	45	52	52	45	49	49	45	48	48	45	45	45	45
	21-27	78	64	64	78	64	64	78	64	64	78	64	64	72	64	64	67	64	64	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	72	68	57	72	68	57	72	68	57	72	68	57	72	68	57	72	68	57	66	66	57	64	64	57	59	59	57	56	56	56	53	53	53	51	51	51	49	49	49

= min 72" span = min 64" span = min 48" span

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 2 for details.

REV 9/30/2019

Grouping of ASCE 7-16 Roof Zones (Hip)									
Roof Slope	8° - 20°			21° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1	2r	2e 3	1	2e 2r	3	1	2e	2r 3



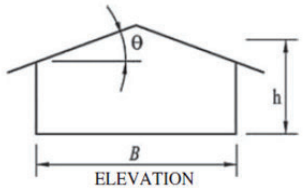


Figure 3: ASCE roof zone locations for hip roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Rail: XR100	Hip Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 80" (72 cell typ.), Max Module SF: 24 SF Exposure D																																				
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf*			80 psf*			90 psf*			100 psf*			110 psf*			120 psf*		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	123	123	117	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
95 mph	0-7	123	114	109	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	114	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
100 mph	0-7	123	108	102	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	8-27	121	119	119	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	109	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
105 mph	8-20	117	101	96	102	101	96	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	112	112	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	102	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
110 mph	8-20	109	96	90	102	96	90	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	105	105	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	117	117	96	98	98	96	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
115 mph	8-20	102	90	85	102	90	85	86	86	85	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	121	99	99	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	111	112	92	98	98	92	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
120 mph	8-20	96	85	80	96	85	80	86	85	80	84	84	80	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
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	28-45	106	106	87	98	98	87	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
130 mph	8-20	87	77	73	87	77	73	86	77	73	84	77	73	75	75	73	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	109	85	85	99	85	85	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	97	96	78	97	96	78	83	83	78	82	82	78	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
140 mph	8-20	78	72	66	78	72	66	78	72	66	78	72	66	75	72	66	68	68	66	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	99	77	77	99	77	77	84	77	77	83	77	77	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	90	87	72	90	87	72	83	83	72	82	82	72	76	76	72	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
150 mph	8-20	72	64	60	72	64	60	72	64	60	72	64	60	72	64	60	68	64	60	64	64	60	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45
	21-27	91	72	72	91	72	72	83	72	72	82	72	72	74	72	72	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	83	80	66	83	80	66	83	80	66	82	80	66	76	76	66	72	72	66	67	67	66	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49
160 mph	8-20	66	59	51	66	59	51	66	59	51	66	59	51	66	59	51	66	59	51	64	59	51	58	58	51	55	55	51	52	52	51	49	49	49	48	48	48	45	45	45
	21-27	83	66	66	83	66	66	81	66	66	80	66	66	73	66	66	68	66	66	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
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170 mph	8-20	64	48	41	64	48	41	64	48	41	64	48	41	64	48	41	64	48	41	64	48	41	58	48	41	55	48	41	52	48	41	49	48	41	48	48	41	45	45	41
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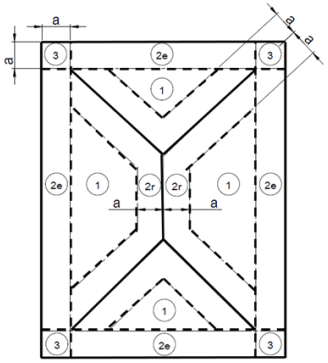
	28-45	72	67	54	72	67	54	72	67	54	72	67	54	72	67	54	69	67	54	65	65	54	64	64	54	59	59	54	56	56	54	53	53	53	51	51	51	49	49	49
175 mph	8-20	60	44	37	60	44	37	60	44	37	60	44	37	60	44	37	60	44	37	60	44	37	58	44	37	55	44	37	52	44	37	49	44	37	48	44	37	45	44	37
	21-27	74	59	59	74	59	59	74	59	59	74	59	59	72	59	59	66	59	59	64	59	59	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48
	28-45	69	65	44	69	65	44	69	65	44	69	65	44	69	65	44	69	65	44	65	65	44	64	64	44	59	59	44	56	56	44	53	53	44	51	51	44	49	49	44
180 mph	8-20	58	40	35	58	40	35	58	40	35	58	40	35	58	40	35	58	40	35	58	40	35	58	40	35	55	40	35	52	40	35	49	40	35	48	40	35	45	40	35
	21-27	72	55	55	72	55	55	72	55	55	72	55	55	72	55	55	65	55	55	64	55	55	58	55	55	55	53	53	53	50	50	48	48	48	48	48	48	48	48	48
	28-45	66	64	37	66	64	37	66	64	37	66	64	37	66	64	37	66	64	37	64	64	37	61	61	37	58	58	37	56	56	37	53	53	37	51	51	37	49	49	37

= min 72" span = min 64" span = min 48" span

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 2 for details.

REV 9/30/2019

Grouping of ASCE 7-16 Roof Zones (Hip)									
Roof Slope	8° - 20°			21° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1	2r	2e 3	1	2e 2r	3	1	2e	2r 3



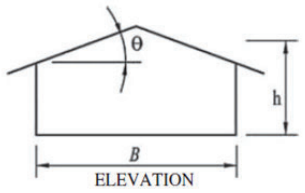


Figure 3: ASCE roof zone locations for hip roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in feet.

h = Mean roof height, in feet

Θ = Angle of roof plane from horizontal, in degrees.

Hip Roof		UFO Application Table XR100 Rail, Maximum Module Length 80" (24 SF Max)																										
		Standard Modules									Exposed Modules									Edge Modules								
Wind Speed (mph)	Roof Slope (deg.)	Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D			Exposure B			Exposure C			Exposure D		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20																											
	21-27																											
	28-45																											
95 mph	0-7																											
	8-27																											
	28-45																											
100 mph	0-7																											
	8-27																											
	28-45																											
105 mph	8-20																											
	21-27																											
	28-45																											
110 mph	8-20																											
	21-27																											
	28-45																											
115 mph	8-20																											
	21-27																											
	28-45																											
120 mph	8-20																											
	21-27																											
	28-45																											
130 mph	8-20																											
	21-27																											
	28-45																											
140 mph	8-20																											
	21-27																											
	28-45																											
150 mph	8-20																											
	21-27																											
	28-45																											
160 mph	8-20																											
	21-27																											
	28-45																											
170 mph	8-20																											
	21-27																											
	28-45																											
175 mph	8-20																											
	21-27																											
	28-45																											
180 mph	8-20																											
	21-27																											
	28-45																											

= Shaded cells of the included UFO Application Table indicate conditions in which UFO Mid Clamp connection capacity is exceeded. Refer to parameter 9 on page 2.

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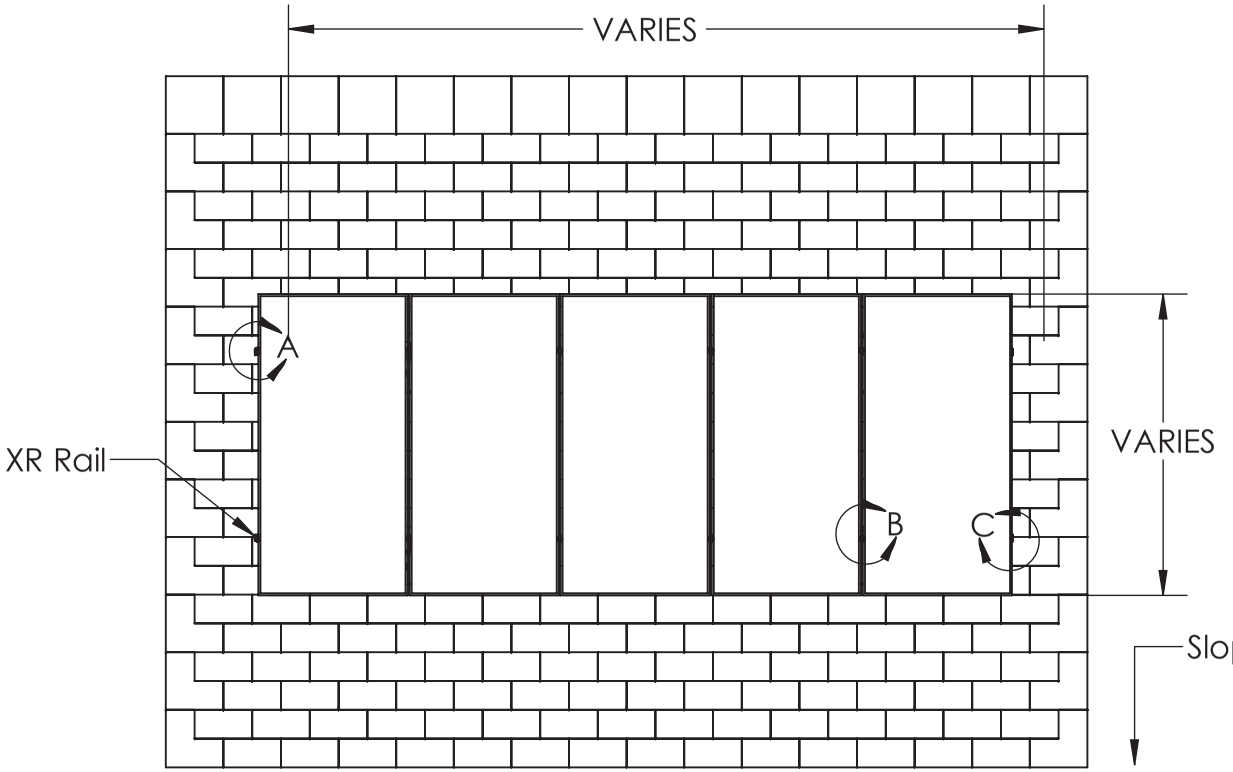
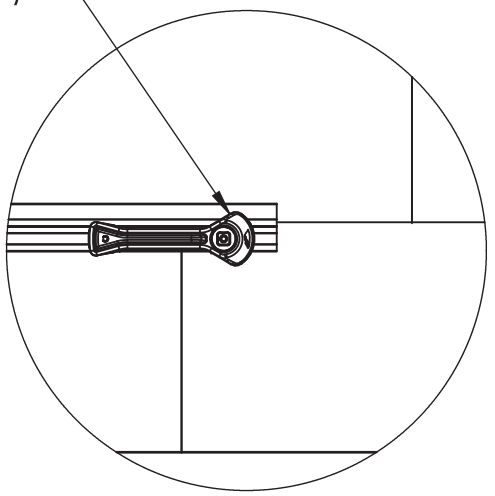
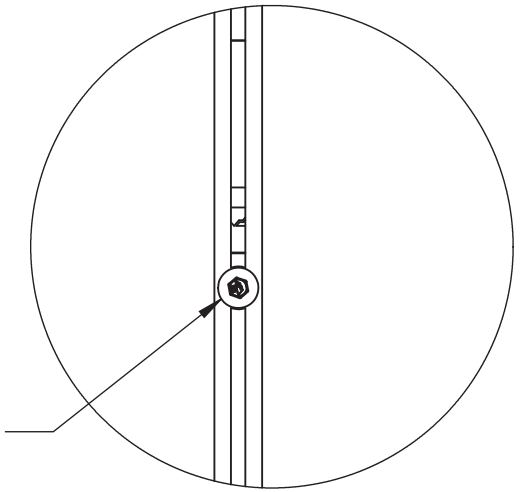
05/25/2018



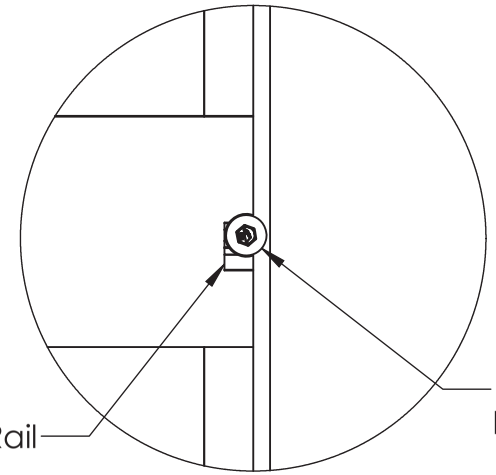
PLAN VIEW



DETAIL C
(Module Removed for Clarity)



DETAIL B



DETAIL A

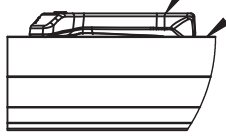
EXHIBIT: EX-0015 - page 1 of 3

IRONRIDGE

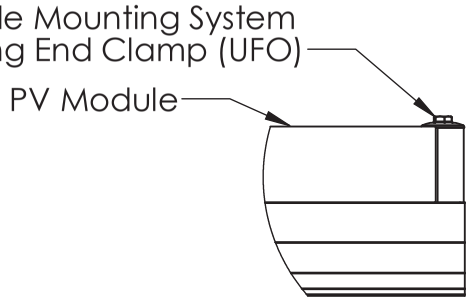
FLUSH MOUNT SYSTEM

SIZE	DWG. NO.	
--	EX-0015	
SCALE: NTS	WEIGHT: N/A	SHEET 1 OF 3

05/25/2018

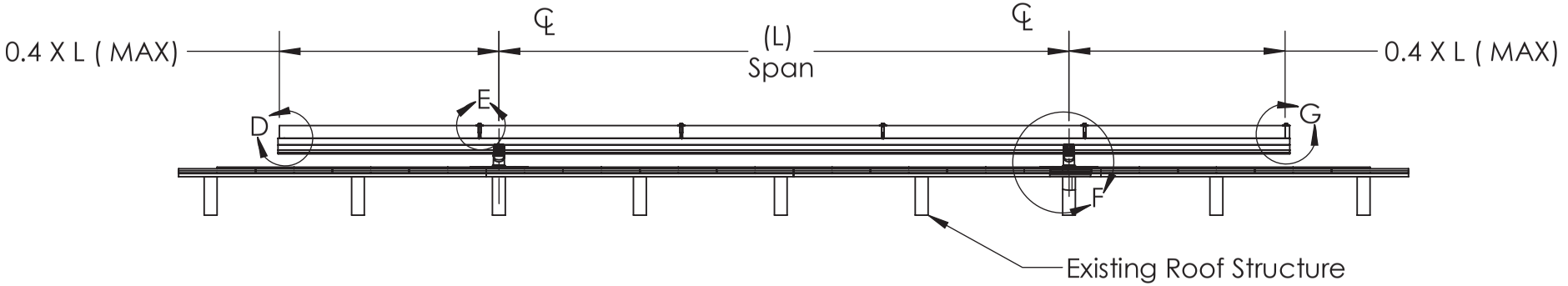


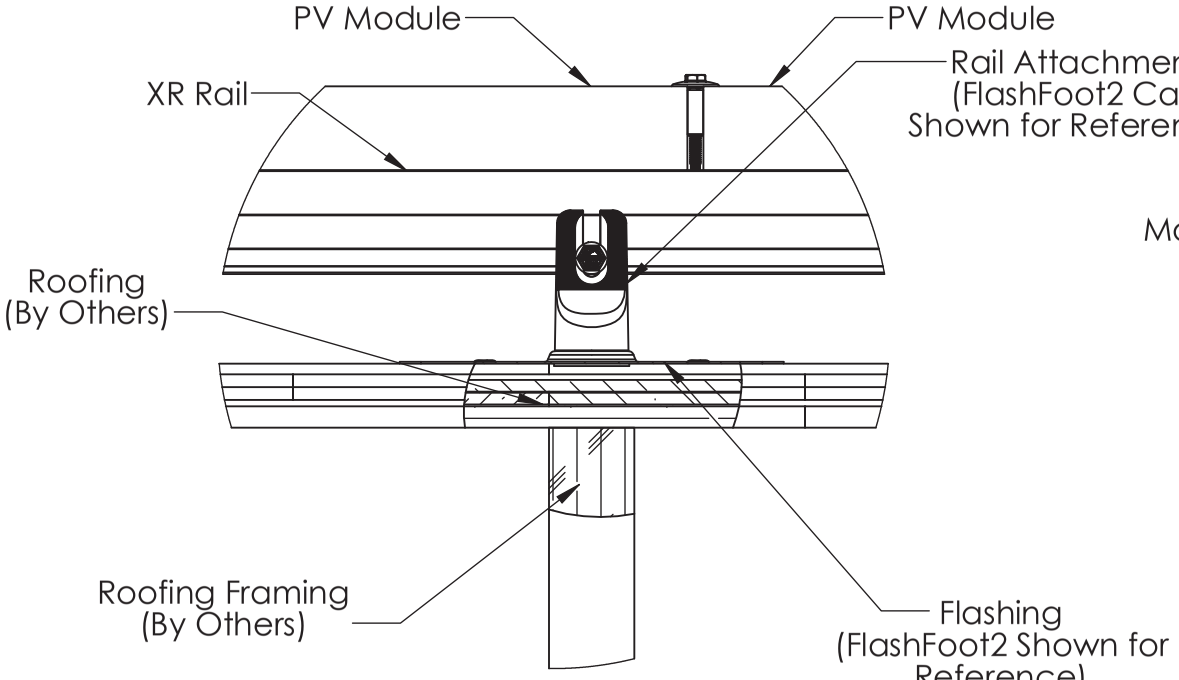
DETAIL D
(Module Removed For Clarity)



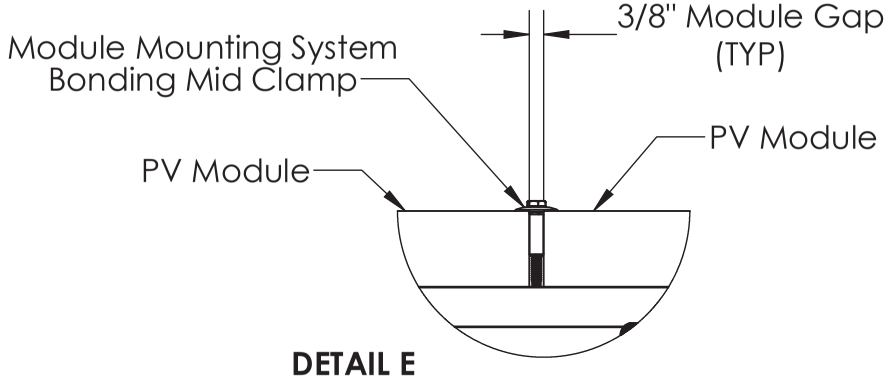
DETAIL G

PLAN VIEW





DETAIL F



DETAIL E

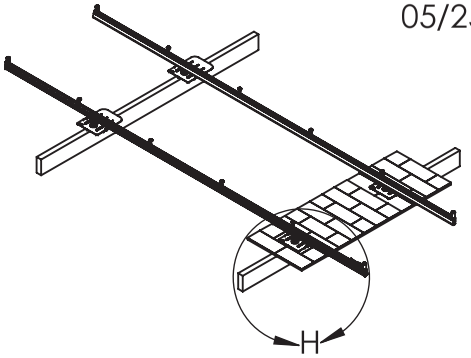
IRONRIDGE

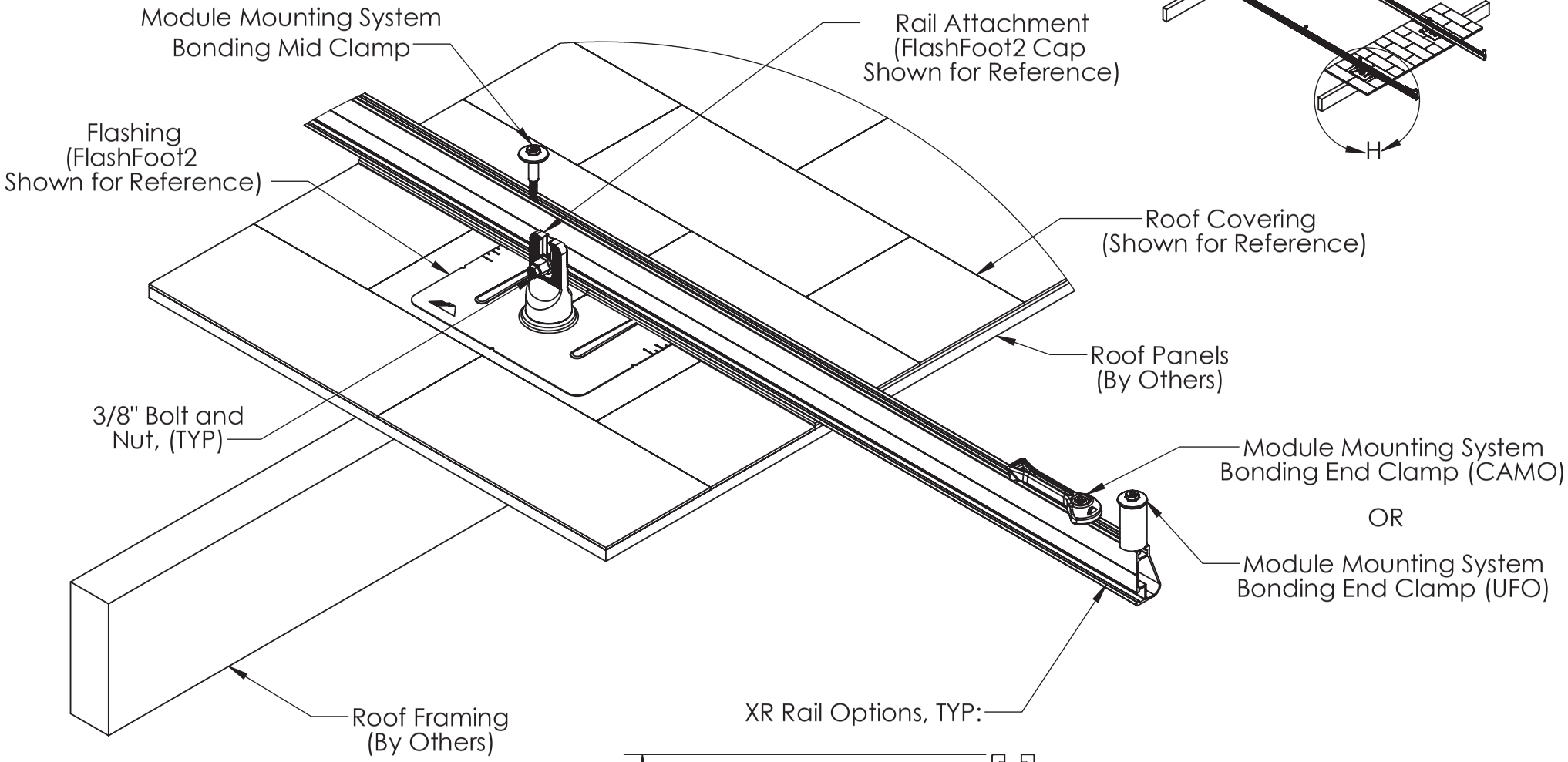
FLUSH MOUNT SYSTEM

SIZE	DWG. NO.	
--	EX-0015	
SCALE: NTS	WEIGHT: N/A	SHEET 2 OF 3

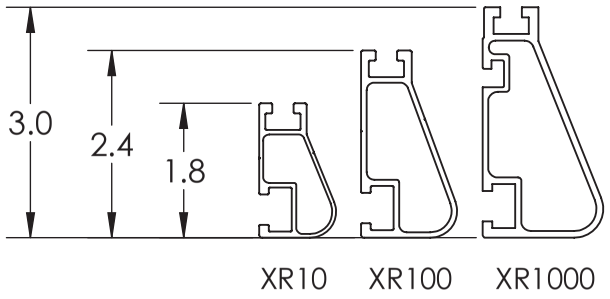
EXHIBIT: EX-0015- page 2 of 3

05/25/2018





DETAIL H



IRONRIDGE

FLUSH MOUNT SYSTEM

SIZE	DWG. NO.	
--	EX-0015	
SCALE: NTS	WEIGHT: N/A	SHEET 3 OF 3

EXHIBIT: EX-0015 - page 3 of 3