

# Ground Mounting System

**2013 Edition v1.3**

This **Engineering Design Guide** was created to help our engineering partners more easily design and specify PV mounting applications using IronRidge components. In addition to this document, IronRidge provides a complete system of technical support including installation guides, pre-stamped certification letters for most PV-friendly states, our on-line Design Assistant software, and live, knowledgeable person-to-person customer service.

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## System Overview

IronRidge provides a comprehensive platform for designing a wide variety of photovoltaic systems for ground mounting applications. Due to its modular architecture, it can handle nearly all commercially available PV modules and can scale to the largest projects. IronRidge products are engineered to last in the most extreme weather conditions and have been installed in every continent in the world.

IronRidge Ground Mounting components are engineered to incorporate locally sourced 2" or 3" schedule 40 pipe to provide a sturdy, cost-effective, and highly scalable solution. The Ground Mount product leverages many of the same components as the Ground Mount. Installers already familiar with the Standard Rail (XRS) mounting components will find that the IronRidge Ground Mount offers an extremely easy-to-install and intuitive experience.

## Technical Specifications

Below is a brief summary of the technical specifications of the IronRidge Ground Mount platform. More detail will be provided in the following pages. If there is additional information you require that is not listed in this Engineering Design Guide, please do not hesitate to contact us at [support@ironridge.com](mailto:support@ironridge.com).

<b>Module Tilt Range</b>	0 to 45 Degrees	<b>Warranty</b>	20 Yr Mfg, 10 Yr Structural
<b>EW Pier Spacing</b>	Up to 17'	<b>Sourced Materials</b>	2" or 3" Schedule 40 Pipe
<b>NS Pier Spacing</b>	7'6"	<b>Bracing</b>	Optional
<b>Max Wind Speed</b>	150 Mph	<b>Elevation Change</b>	Adapts
<b>Module Orientation</b>	Landscape	<b>T-bolts</b>	Yes
<b>Wind Exposure</b>	Category B, C & D	<b>Wire Clips</b>	Yes
<b>Max Ground Snow Load</b>	90 psf	<b>End Caps</b>	Yes
<b>Materials</b>	Aluminum	<b>All Metal Construction</b>	Yes
	Cast Steel ASTM A216	<b>Engineering Support</b>	Yes (P.E. Certified)
	Stainless Steel Fasteners		

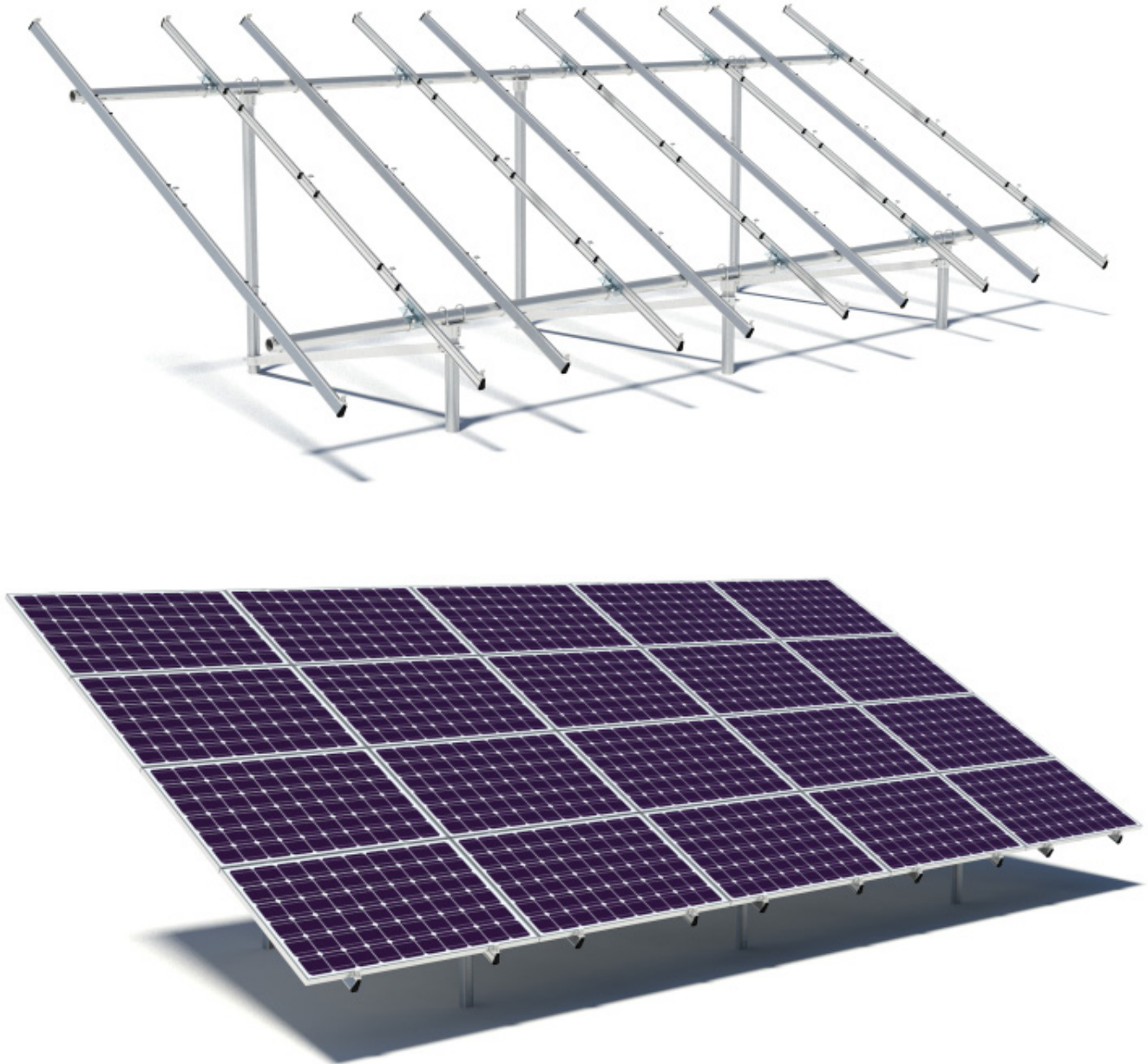
## Design Considerations

IronRidge engineers have developed a standard layout and configuration that supports most ground mount requirements. The advantage of this standardized design is that it simplifies the design, engineering, quoting and ordering of the necessary components. Our standard configuration includes the following assumptions:

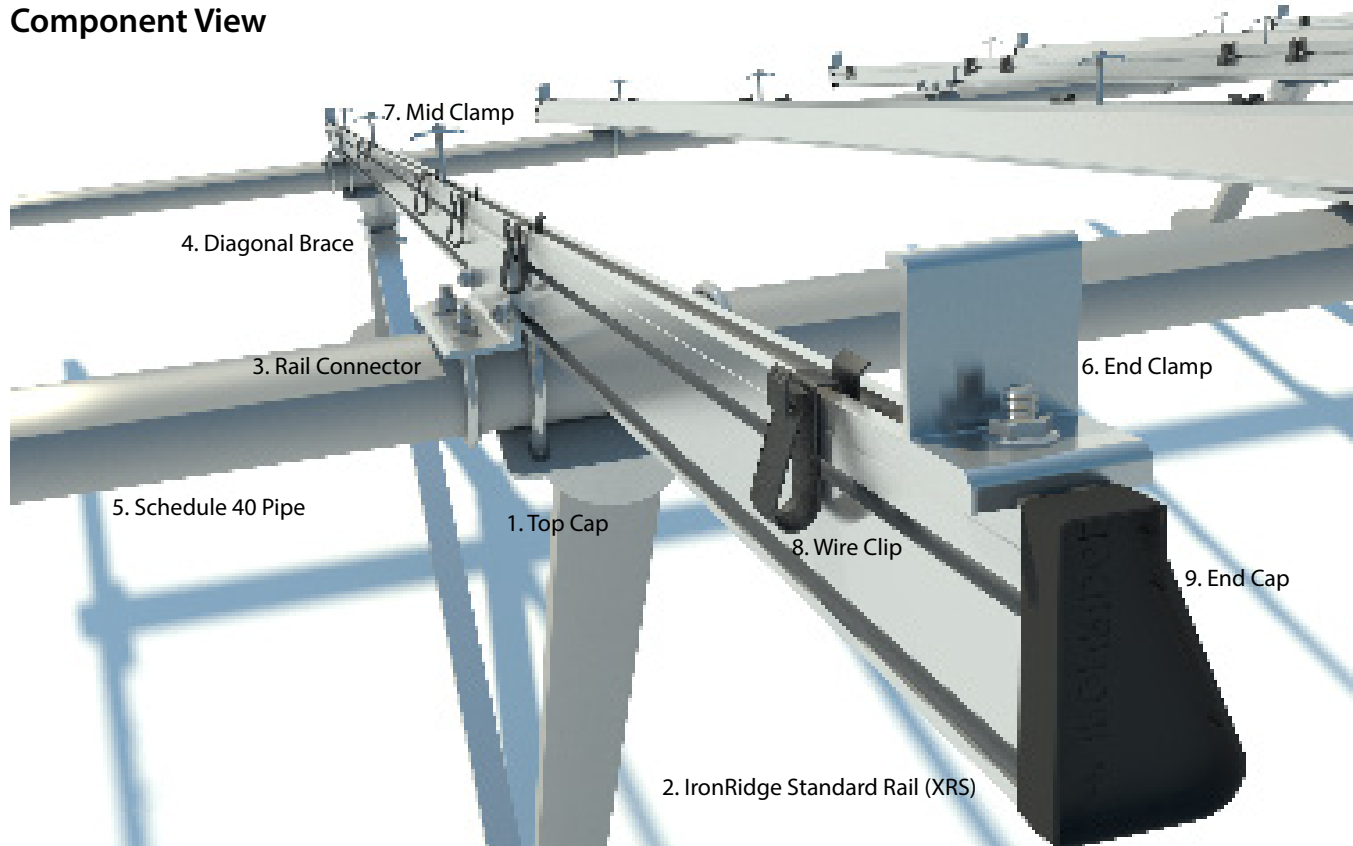
- Modules in landscape orientation (profile orientation available but not price optimized)
- 2 rails per column of modules
- 14' rails – support ~4-5 modules N-S
- Number of EW columns limited only by thermal expansion constraints
- North & South piers set at 7'6" apart

If a non-standard array configuration is desired, please contact IronRidge support.

## Assembled View



## Component View



For a complete 360 degree interactive viewing environment, go to: [ironridge.com/products/groundmounting/360view](http://ironridge.com/products/groundmounting/360view).

**1. Top Caps:** Joins and aligns rail sections into single, continuous length of rail. A splice can be used either as a rigid, structural connection or as a thermal expansion joint.

**2. Rail:** Supports the PV modules. Use two rails for each column of modules. Uses 14' Standard Rail for optimizing spans between cross rails. Can typically hold 4-5 PV modules in landscape mode.

**3. Rail Connector:** Secure the Standard Rails to the Schedule 40 horizontal cross pipes. Each Standard Rail requires two Rail Connectors to create a secure attachment.

**4. Diagonal Brace:** Diagonal Braces are an optional component used for installations in more severe load conditions that require additional support. The braces provide extra stability in the North-South direction.

**5. Schedule 40 Pipe:** The Ground Mount platform leverages 2" or 3" Schedule 40 Steel Pipe as the primary structural element. This component can be sourced locally to reduce shipping costs.

**6. End Clamp:** Secures the PV module to the rail. Use four clamps for each row of modules, one on the end of each rail. Multiple sizes available depending on thickness of PV module.

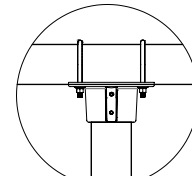
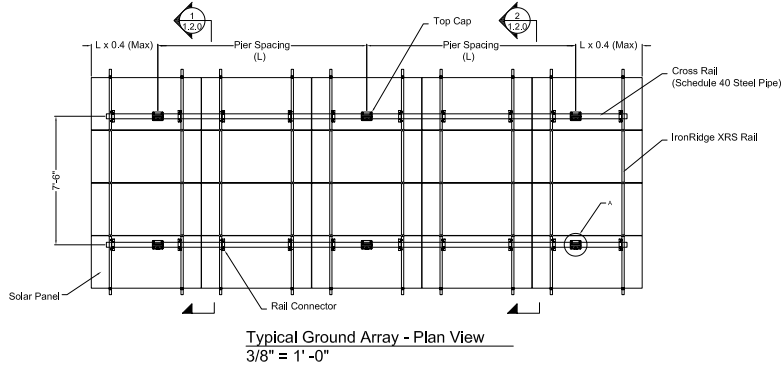
**7. Mid Clamp:** Secures PV modules to the rail when there are multiple modules in a row. The mid clamp fits between two adjacent modules, providing clamping pressure to both simultaneously.

**8. Wire Clip:** Fit into top slot of rails and accommodate up to ten 5mm wires, or one MC4, one Enphase wire, and one dual Enphase wire. Cast from black polycarbonate with UV protection.

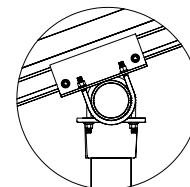
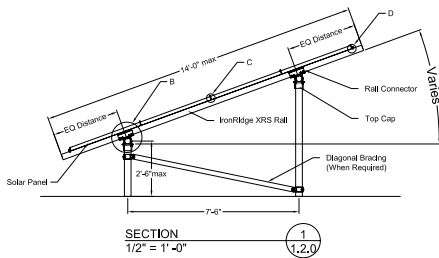
**9. End Cap:** Provides a finished look to the PV system while protecting against the collection of water and debris inside the rails.

Assembly Details

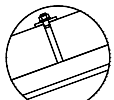
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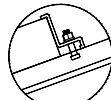
**Detail A - Top Cap To Pipe**  
3" = 1'-0"



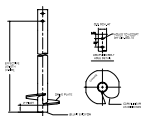
**Detail B - Rail Connector to Horizontal Member**  
3" = 1'-0"



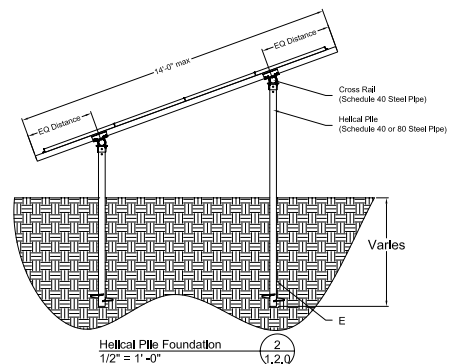
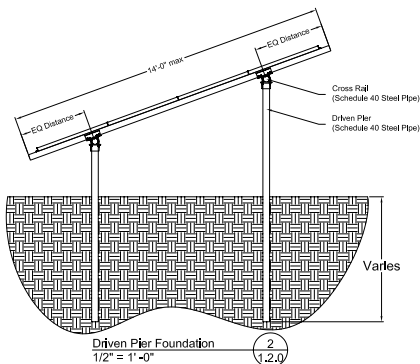
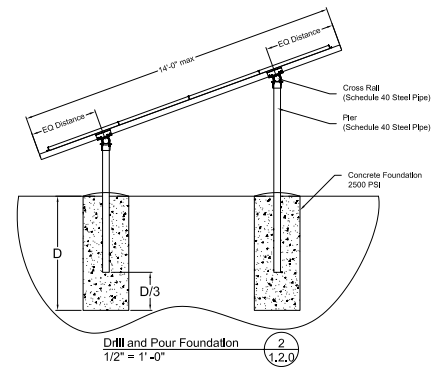
**Detail C - Mid Clamp to XRS Rail**  
6" = 1'-0"



**Detail D - End Clamp to XRS Rail**  
6" = 1'-0"



**Detail E - Helical Pile (Varies by Supplier)**  
Not to Scale



### Top Cap

The IronRidge Top Caps facilitate the quick and easy construction of a Schedule 40 substructure. Available in sizes that fit either 2" or 3" Schedule 40 pipe, this Top Cap secures quickly to multiple pier types with 3 set screws and also supports cross piping (schedule 40) with U-bolt hardware.



Property	Value
Material	ALMAG 535
Finish	Mill
Top Cap Sizes	2" and 3"
2" Top Cap Dimensions	3" x 4.5" x 5" (H x W x L)
Weight (2")	4.3 Lbs
3" Top Cap Dimensions	3.5" x 6" x 7.5" (H x W x L)
Weight (3")	6.47 Lbs
Hardware	3/8" SS

### Schedule 40 Pipe

The IronRidge Ground Mount platform leverages 2" or 3" Schedule 40 Steel Pipe as the primary structural element. This component can be sourced locally to assist installers in reducing shipping costs and shortening delivery times.



Property	Value
Material	Cast Steel ASTM A216
Yield Strength (ksi)	35 ksi (min)
Finish	Hot-Dipped Galvanized
Size (2")	2 3/8" OD x 0.158" Wall
Size (3")	3 1/2" OD x 0.216" Wall
Locally Sourced	Yes
Typical Lengths	20', 24', 40'

### Standard Rail

The IronRidge Standard Rail is a high performance rail that spans over twelve feet under typical load conditions. This rail has slots for both top and bottom PV module mounting and is manufactured using extruded aluminum alloys. The IronRidge Standard Rail supports the PV modules on top of the Schedule 40 sub-structure. Use two rails for each column of modules.



Property	Value
Material	6005A-T5, 6105-T6
Finish	Clear & Black Anodized
Beam Height	3.00"
Weight / Linear Foot	.945 Lbs
Total Cross-Sectional Area	.807 In <sup>2</sup>
Section Modulus (X-axis)	.530 In <sup>3</sup>
Moment of Inertia (X-axis)	.843 In <sup>4</sup>
Moment of Inertia (Y-axis)	.182 In <sup>4</sup>
Torsional Constant	.436 In <sup>3</sup>
Polar Moment of Inertia	0.3299 In <sup>4</sup>

## Rail Connector

Our Rail Connectors secure IronRidge Standard Rails to the Schedule 40 horizontal cross pipes. Each Standard Rail requires two connectors to create a secure attachment.



Property	Value
Material	6105-T5
Finish	Mill
Rail Connector Sizes	2" and 3"
Height (Bracket)	3"
Width (Bracket)	2"
Length (Bracket)	8"
Weight	1 Lbs
Hardware	5/16", 3/8" SS

## Diagonal Brace

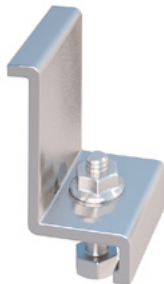
The optional Diagonal Brace Assembly kit is for installations that require extra support. This diagonal brace kit includes the brace, sleeves, and hardware for installation between one north and south pair of support legs. Our Rail Connectors secure IronRidge Standard Rails to the Schedule 40 horizontal cross pipes. Each Standard Rail requires two connectors to create a secure attachment.



Property	Value
Material (Tube)	6061-T6
Finish (Tube)	Mill
Sizes (Tube)	2", 2.5" Square Tube
Length (Tube)	7' 3" and 7' 4.5"
Weight (Tube)	15 and 19 Lbs Material
(Sleeves)	Galvanized Steel
Sleeve Sizes	2", 3"
Hardware	3/8"SS

## End Clamp

IronRidge End Clamps secure PV modules to the Rails using the top slot of these rails. Our Clamps are independent of the module's mounting holes.



Property	Value
Material	5052-H32
Finish	Mill & Black
Height	Varies depending on Module
Width	1.5"
Depth	1.5"
Weight	0.054 Lbs (avg.)
Hardware	1/4"-20 SS Nut and Bolt



## Mid Clamps

IronRidge Mid Clamps secure PV modules to the rail when there are multiple modules in a row. The Mid Clamp fits between two adjacent modules, providing clamping pressure to both modules simultaneously. The Mid Clamps are not dependent upon the PV module's mounting holes and fit to the top slots of our Standard Rails.



Property	Value
Material	5052-H32
Finish	Mill & Black
Spacing between Modules	1/4"
Width	1"
Depth	1.5"
Weight	0.02 Lbs
Hardware	1/4"-20 SS Nut and Bolt

## Under Clamps

IronRidge Under Clamps secure PV modules to the Standard Rail using the mounting holes of the PV module and the side slot of the Standard Rail.



Property	Value
Material	5052-H32
Finish	Mill
Spacing between Modules	1/4"
Width	1.6"
Depth	1.5"
Weight	0.05 Lbs
Hardware	1/4"-20 SS Nut and Bolt

## Wire Clips

IronRidge Wire Clips fit our Standard (XRS) and Light (XRL) Rails, and accommodate up to ten 5mm panel wires, or one MC4, one Enphase wire and one dual Enphase wire. The Wire Clips are molded from black polycarbonate with UV protection.



Property	Value
Material	Polycarbonate
Finish	Black
UV Protection	Yes
Weight	0.01 Lbs

## End Caps

Available for Standard (XRS) Rails, end caps provide a finished look while protecting against the collection of water and debris inside the rail. End caps are molded from black polycarbonate with UV protection.



Property	Value
Material	Polycarbonate
Finish	Black
UV Protection	Yes
Weight	0.02 Lbs

## Grounding

Wiley grounding clips (WEEB DMC) are used in conjunction with the IronRidge Mid Clamps for grounding PV modules to the Standard Rails. Order one grounding clip for every two Mid Clamps used.



Property	Value
Material	304 Stainless Steel
ETL Listed	ANSI/UL 467 Compliant
Maximum Conductor Size	6 AWG ( with two WEEBs contacting each module)
Hardware	None

Wiley grounding lugs are used in conjunction with copper wire to provide a continuous ground for every row of rails.



Property	Value
WEEB Material	304 Stainless Steel
Lug Material	Tin-plated Copper
ETL Listed	ANSI/UL 467 Compliant
Ground Conductor	One 14 AWG to 6 AWG or two 10 AWG, two 12 AWG
Hardware	¼"-20 & ¼"-28 SS

## Summary

With the IronRidge Design Assistant™ our customers move from laboriously designing systems across the span of weeks, to intuitively designing while pricing, bill of materials and engineering calculations all update in real-time.

If you register for an online account, you will then be able to save your work and prevent losing your project's configuration settings between sessions.

The application is so quick and easy to use, multiple what-if scenarios can be evaluated through immediate engineering and pricing feedback. Engineered calculations comply with ASCE 7-05 building codes for expedited P.E. approval.

The IronRidge Design Assistant™ is provided free of charge to IronRidge customers.

## Design, engineer and quote, online, in just minutes.

[ironridge.com/support/designassistant](http://ironridge.com/support/designassistant)



## Code Compliance

IronRidge Ground Mount components, when installed in accordance with the IronRidge Standard Rail Installation Manual and the IronRidge Light Rail Installation Manual, will be structurally adequate and will meet the structural requirements of:

- ASCE/SEI 7-05 Minimum Design Loads for Buildings & Other Structures
- California Building Code, 2007 & 2010 Editions
- AC428, Acceptance Criteria for Modular Framing Systems Used to Support PV Modules, effective 3/1/2011 by ICC-ES
- Aluminum Design Manual, 2005 Edition

## Thermal Expansion

To allow for thermal expansion, IronRidge recommends that cross rails (Schedule 40 Pipe) do not exceed 100 feet in length without a break. If you plan to exceed 100 feet, we recommend that you first consult with a structural engineer.

## Engineering Span Methodology

The procedures for calculating the maximum east-west span values, in the next pages' tables, are based on the following assumptions:

1. Spans values with "/" afterwards indicate diagonal bracing is assumed
2. Shaded cells indicate special engineering required – contact IronRidge
3. Cross pipe splices are not permitted in end spans or in middle 1/3 of interior spans
4. Topographic (Wind) Factor = 1.0 (no topographic effects)
5. Dead Load (Weight) = 3 psf
6. Maximum PV Module Dimension = 78"
7. The north-south span = 90"

To avoid potential problems from the effects of thermal expansion, a maximum total continuous cross pipe length of 100 feet is recommended.

When diagonal bracing is assumed, the values displayed represent the maximum east-west span possible. The user may choose not to use diagonal bracing in which case the east-west span will be reduced. For these values, please refer to the IronRidge Ground Mount Design Assistant at [ironridge.com/sga](http://ironridge.com/sga).

### Maximum Allowable EW Spans for 2" Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Tilt Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
B	85 mph	0	138	142	123	119	113	109/	104/	104/	105/	106/
		10	118	119	110	109	108	107/	104/	104/	105/	106/
		20	99	100	95	94	95	96/	97/	100/	104/	106/
		30	93	94	89	89	90	91/	93/	96/	101/	105/
		40	83	83	82	82	83	85	87/	91/	96/	101/
		50						80	83/	87/	92/	
	90 mph	60							79	83	89	
		0	133	136	117	114	108	104/	99/	99/	100/	100/
		10	115	117	107	106	104	103/	99/	99/	100/	100/
		20	98	99	93	92	93	93/	94/	97/	100/	100/
		30	91	92	88	87	88	89/	90/	93/	97/	100/
		40	83	83	80	80	82	83/	85/	89/	93/	
	100 mph	50						79/	81/	85/	90/	
		60							77/	81/	86/	
		0	122	126	107	104	99/	94/	91/	90/	91/	
		10	110	112	101	100	98/	94/	91/	90/	91/	
		20	94	96	89	88	88/	88/	88/	90/	91/	
		30	89	90	84	84	84	85/	85/	88/	91/	
	110 mph	40	81	82	78	78	79	80/	81/	84/		
		50					74	76/	77/			
		0	119	122	104	101	96/	92/	88/	87/	88/	
		10	108	110	100	98	96/	92/	88/	87/	88/	
		20	93	95	88	87	87/	86/	86/	87/	88/	
		30	88	89	83	83	83	83/	83/	86/	88/	
120 mph	40	80	81	77	77	77	78/	79/	82/			
	50					73	74/	76/				
	0	111	114	97	94	89/	85/	81/	81/			
	10	103	105	95	93	89/	85/	81/	81/			
	20	90	92	84	83	83/	82/	81/	81/			
	30	85	86	80	79	79/	79/	79/	81/			
130 mph	40	78	79	75	74	75/	75/	76/				
	50					71	72/					
	0	104	107	90	88	83/	79/	75/	75/			
	10	99	101	90	88	83/	79/	75/	75/			
	20	87	89	81	80	79/	78/	75/	75/			
	30	83	84	77	76	76/	75/	75/				
140 mph	40	76	77	72	72	72/	72/	72/				
	50					68/						
	0	98	100	85	82	77/	74/	70/	70/			
	10	95	97	85	82	77/	74/	70/				
	20	84	86	78	77	75/	74/	70/				
	30	80	81	74	74	73/	72/	70/				
150 mph	40	74	75	70	69	69/	69/	n/a				
	50					68/						
	0	92	95	80	77/	73/	69/	66/				
	10	91	93	80	77/	73/	69/	66/				
	20	81	83	75	73	72/	69/					
	30	78	79	72	71	70/	69/					
	40	72	74	68	67	66/						

### Maximum Allowable EW Spans for 2" Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Tilt Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
C	85 mph	0	119	122	104	101	96/	91/	88/	87/	88/	
		10	108	110	99	98	96/	91/	88/	87/	88/	
		20	93	94	88	87	86/	86/	86/	87/	88/	
		30	88	89	83	82	83	83/	83/	86/	88/	
		40	80	81	77	77	77	78/	79/	82/		
		50					73	74/	76/			
	90 mph	0	114	117	99	96	91/	87/	83/	83/		84/
		10	105	107	96	94	91/	87/	83/	83/		84/
		20	91	92	85	85	84/	83/	83/	83/		84/
		30	86	87	81	80	80/	80/	80/	83/		84/
		40	79	80	75	75	75	76/	77/			
		50					71	73/	74/			
	100 mph	0	104	107	91	88	83/	79/	75/	75/		
		10	99	101	90	88	83/	79/	75/	75/		
		20	87	89	81	80	79/	78/	75/	75/		
		30	83	84	77	76	76/	76/	75/			
		40	76	77	72	72	72/	72/				
		50					68/					
110 mph	0	101	104	88	85	80/	77/	73/				
	10	97	99	88	85	80/	77/	73/				
	20	86	87	80	78	77/	76/	73/				
	30	81	83	76	75	74/	74/	73/				
	40	76	77	71	71	71/	71/	71/				
	50					67/						
120 mph	0	94	96	81	79/	74/	71/	67/				
	10	92	94	81	79/	74/	71/	67/				
	20	82	84	76	75	73/	71/	67/				
	30	78	80	73	72	71/	70/					
	40	73	74	68	68	67/	67/					
	50											
130 mph	0	87	90	76	73/	69/	65/					
	10	87	89	76	73/	69/	65/					
	20	79	80	72	71/	69/	65/					
	30	76	77	70	68/	67/	65/					
	40	71	72	66	65	64/						
	50											
140 mph	0	82	84	71	68/	64/	61/					
	10	82	84	71	68/	64/	61/					
	20	76	77	69	67/	64/	61/					
	30	73	74	66	65/	64/						
	40	68	70	63	62/	61/						
	50											
150 mph	0	77	79	66	64/	60/	57/					
	10	77	79	66	64/	60/	57/					
	20	73	74	66	64/	60/						
	30	70	71	64	62/	60/						
	40	66	67	61	60/							
	50											

### Maximum Allowable EW Spans for 3" Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
B	85 mph	0	242	248	215	209	198	190	183	182/	184/	185/
		10	206	209	193	191	189	187	183	182/	184/	185/
		20	174	176	166	165	166	168	169	175/	182/	185/
		30	162	164	156	156	158	160	163	169/	176/	184/
		40	145	145	143	143	146	149	153	160	168/	177/
		50					136	140	145	152	161/	
	90 mph	60						138	146	155/		
		0	232	238	205	199	189	181	174	173/	175/	176/
		10	202	204	188	185	183	181	174	173/	175/	176/
		20	171	173	163	162	162	163	164	169/	175/	176/
		30	160	162	153	153	154	156	158	163/	170/	176/
		40	145	145	141	140	143	146	149	155/	163/	
	100 mph	50					134	138	142	148	157/	
		60							135	142	151/	
		0	214	220	188	183	173	165	159/	158/	159/	160/
		10	192	195	178	175	171	165	159/	158/	159/	160/
		20	165	167	156	155	154	154	154/	158/	159/	160/
		30	155	157	148	147	147	148	149/	154/	159/	160/
	110 mph	40	142	144	136	136	137	140	142	147/		
		50					129	132	135			
		0	209	214	183	177	168	160	154/	153/	154/	155/
		10	189	192	174	171	168	160	154/	153/	154/	155/
		20	163	165	154	152	152	151	151/	153/	154/	155/
		30	154	155	146	145	145	145	146/	150/	154/	155/
120 mph	40	141	142	135	134	136	137	139/	144/			
	50					128	130	133/				
	0	194	200	170	165	156	148	142/	141/	142/	143/	
	10	181	184	165	163	156	148	142/	141/	142/	143/	
	20	158	160	148	146	144	144	142/	141/	142/	143/	
	30	149	151	140	139	139	139	138/	141/	142/	143/	
130 mph	40	137	139	131	130	130	131	132/				
	50					124	125					
	0	182	187	158	153	145	138/	132/	131/			
	10	173	176	157	153	145	138/	132/	131/			
	20	153	155	142	140	138	136/	132/	131/			
	30	145	147	135	134	133	132/	131/				
140 mph	40	134	135	127	125	126	126	126/				
	50					119						
	0	171	176	148	144	135	129/	123/				
	10	166	169	148	144	135	129/	123/				
	20	148	150	136	134	132	129/	123/				
	30	140	142	130	129	127	126/	123/				
150 mph	40	130	132	122	121	121	121/	n/a				
	0	161	165	139	135	127	121/	115/				
	10	159	162	139	135	127	121/	115/				
	20	143	145	131	129	126	121/	115/				
	30	136	138	126	124	122	120/					
	40	127	129	119	117	116	116/					

### Maximum Allowable EW Spans for 3" Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Tilt Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
C	85 mph	0	208	214	182	177	168	160	153/	153/	154/	
		10	189	192	174	171	167	160	153/	153/	154/	
		20	163	165	154	152	151	151	151/	153/	154/	
		30	153	155	145	144	145	145	146/	150/	154/	
		40	141	142	135	134	135	137	139/	144/		
		50					128	130	133			
	90 mph	0	199	204	174	169	159	152	146/	145/		
		10	183	187	168	165	159	152	146/	145/		
		20	160	162	150	148	147	146	145/	145/		
		30	150	152	142	141	141	141	141/	145/		
		40	138	140	132	131	132	133	135/	139/		
		50					125	127	129/	134/		
	100 mph	0	182	187	158	154	145	138/	132/	132/		
		10	173	177	157	154	145	138/	132/	132/		
		20	153	155	142	140	138	136/	132/	132/		
		30	145	147	135	134	133	132/	131/			
		40	134	136	127	126	126	126				
		50					119					
	110 mph	0	177	182	154	149	141	134/	128/			
		10	170	173	154	149	141	134/	128/			
20		150	153	139	137	135	133/	128/				
30		143	145	133	132	130	129/	128/				
40		132	134	125	124	123	124/	124/				
50						118						
120 mph	0	164	169	142	138	130	124/	118/				
	10	161	165	142	138	130	124/	118/				
	20	144	147	133	130	128	124/	118/				
	30	137	140	127	125	124	122/					
	40	128	130	120	119	118	117/					
	50											
130 mph	0	153	157	132	128	120	115/					
	10	153	156	132	128	120	115/					
	20	138	141	126	124	120	115/					
	30	132	134	122	120	117	115/					
	40	124	126	115	114	112						
	50											
140 mph	0	143	147	123	119	112/	107/					
	10	143	147	123	119	112/	107/					
	20	133	135	120	118	112/	107/					
	30	127	130	116	114	112/						
	40	120	122	111	109	107						
	50											
150 mph	0	134	139	116	112	105/	100/					
	10	134	139	116	112	105/	100/					
	20	127	130	115	112	105/						
	30	122	125	111	109	105/						
	40	116	118	106	105							
	50											



## Ground Mount Foundation Requirements

The foundation requirements for a cast-in-place drilled concrete pier system may be obtained from Tables 3 & 4. These tables are based on the piers being installed at their maximum allowable spacing. For spacing's less than maximum and for loads cases with snow > 0 psf, the requirements can be determined by using the online Design Assistant at [ironridge.com/sga](http://ironridge.com/sga). The assumptions for the foundation depth values are as follows:

1. Class 4 Soils – ref 2006 IBC Table 1804.2, 2009 IBC Table 1806.2
2. Concrete Weight = 145 pcf /  $f'c = 2500$  psi
3. Skin Friction per 2006 IBC 1808.2.8.4 & 5, 2009 IBC 1810.3.3.1.4 & 5
4. Top 1'-0" of soil neglected for Skin Friction
5. Snow Load = 0 psf – tabulated values are conservative for Snow Loads > 0 psf
6. Special foundation requirements indicated by "\*\*". Contact IronRidge for more information
7. Resistance to corrosion and/or sulfate attack, along with possible adverse effects due to expansive soils has not been considered in these foundation recommendations.

A soils report is widely considered the most reliable and accurate method for determining the type and depth of piers for any ground array system. Soils reports can be obtained through a Geotechnical Engineer. A commonly relied upon alternative to obtaining a site-specific soils report is to use the IBC 2006 Table 1804.2. The advantage of purchasing a site-specific soils report is that the information provided often results in shorter embedment depths, thus lowering both material and installation cost. In addition to concrete pier systems, the IronRidge Ground Mount platform can work well with other foundation types including:

- Helical Pile
- Pre-cast Concrete Ballast
- Driven Pier
- Screw-type Earth Auger

For more detailed engineering-related information about these foundation types, please contact IronRidge directly or one of its foundation partners.

### Minimum Foundation Depths for 2" Unbraced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Snow Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
B	85 mph	12	36	36	36	48	54	54	54	54	54	54
		16	36	36	36	42	48	48	48	48	48	48
		20	36	36	36	36	42	48	48	48	48	48
		24	36	36	36	36	42	42	42	42		
	90 mph	12	36	36	36	48	54	54	54	54	54	54
		16	36	36	36	42	48	48	48	48	48	48
		20	36	36	36	36	42	48	48	48	48	48
		24	36	36	36	36	42	42	42	42		
	100 mph	12	36	36	36	48	54	54	54	54	54	54
		16	36	36	36	42	48	48	48	48	48	48
		20	36	36	36	42	48	48	48	48	48	48
		24	36	36	36	36	42	42				
110 mph	12	36	36	42	48	54	54	54	54	54	54	
	16	36	36	36	42	48	48	48	48	48	48	
	20	36	36	36	42	48	48	48	48			
	24	36	36	36	36	42	42					
120 mph	12	36	36	42	54	54	54	54	54	54	54	
	16	36	36	36	48	48	48	48	48			
	20	36	36	36	42	48	48	48				
	24	36	36	36	42	42	42					
130 mph	12	36	42	42	54	54	54	54	54	54		
	16	36	36	36	48	48	48					
	20	36	36	36	42	48	48					
	24	36	36	36	42	42						
140 mph	12	36	42	42	54	54	54	54	54			
	16	36	36	42	48	48	48					
	20	36	36	36	42	48						
	24	36	36	36	42	42						
150 mph	12	42	48	48	54	54	54					
	16	36	36	42	48	48						
	20	36	36	36	48	48						
	24	36	36	36	42							

### Minimum Foundation Depths for 2" Unbraced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Snow									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
C	85 mph	12	36	36	42	48	54	54	54	54	54	54
		16	36	36	36	42	48	48	48	48		
		20	36	36	36	42	48	48	48			
	90 mph	24	36	36	36	36	42	42				
		12	36	36	42	48	54	54	54	54	54	
		16	36	36	36	48	48	48	48	48		
	100 mph	20	36	36	36	42	48	48				
		24	36	36	36	42	42					
		12	36	42	42	54	54	54	54	54		
	110 mph	16	36	36	36	48	48	48				
		20	36	36	36	42	48					
		24	36	36	36	42	42					
120 mph	12	42	48	48	54	54	54	54	54			
	16	36	36	42	48	48	48					
	20	36	36	36	48	48						
130 mph	24	36	36	36	42	42						
	12	42	48	48	54	54	54					
	16	36	36	42	48	48						
140 mph	20	36	36	36	48	48						
	24	36	36	36	42	42						
	12	48	54	54	54	54	54					
150 mph	16	36	42	42	48							
	20	36	36	42	48							
	24	36	36	36	42							

### Minimum Foundation Depths for 2" Braced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Snow Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
B	85 mph	12	36	36	36	42	48	54	60	66	66	72
		16	36	36	36	36	42	48	54	54	60	66
		20	36	36	36	36	36	42	48	48	54	60
	90 mph	24	36	36	36	36	36	42	42	48	48	54
		12	36	36	36	42	48	54	60	66	72	78
		16	36	36	36	36	42	48	54	60	60	66
	100 mph	20	36	36	36	36	36	42	48	54	54	60
		24	36	36	36	36	36	42	42	48	54	54
		12	36	36	36	42	48	60	66	72	72	78
	110 mph	16	36	36	36	36	42	48	54	60	60	66
		20	36	36	36	36	42	48	54	54	60	66
		24	36	36	36	36	36	42	48	54	54	60
120 mph	12	36	36	36	48	54	60	66	72	78	84	
	16	36	36	36	42	48	54	60	66	72	72	
	20	36	36	36	36	42	48	54	60	60	66	
130 mph	24	36	36	36	36	42	48	48	54	60	60	
	12	36	42	42	48	54	66	72	78	84	90	
	16	36	36	36	42	48	54	60	66	72	78	
140 mph	20	36	36	36	36	42	48	54	60	60	66	
	24	36	36	36	36	42	48	54	60	60	66	
	12	36	48	48	54	60	66	72	78	84	90	
150 mph	16	36	36	36	42	48	54	60	66	72	78	
	20	36	36	36	42	48	54	60	66	72	72	
	24	36	36	36	36	42	48	54	60	66	66	

### Minimum Foundation Depths for 2" Braced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Snow										
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °	
C	85 mph	12	36	36	36	42	54	60	66	72	78	84	
		16	36	36	36	42	48	54	60	60	66	72	
		20	36	36	36	36	42	48	54	54	60	66	
	90 mph	24	36	36	36	36	36	42	48	48	54	54	60
		12	36	36	36	48	54	60	66	72	78	84	
		16	36	36	36	42	48	54	60	66	66	72	
	100 mph	20	36	36	36	36	42	48	54	60	60	60	66
		24	36	36	36	36	42	48	48	54	54	60	66
		12	36	42	42	48	54	66	72	78	84	90	
	110 mph	16	36	36	36	42	48	60	66	72	84	90	
		20	36	36	36	42	48	60	66	66	72	78	
		24	36	36	36	36	42	48	54	54	60	66	
120 mph	12	42	48	48	54	60	66	78	84	90	96		
	16	36	36	36	48	54	60	66	72	78	84		
	20	36	36	36	42	48	54	60	66	66	72		
130 mph	24	36	36	36	36	42	48	54	60	66	66		
	12	42	48	54	60	66	72	78	84	90	96		
	16	36	42	36	48	54	60	72	72	78	84		
140 mph	20	36	36	36	42	48	54	60	66	72	78		
	24	36	36	36	42	48	54	60	66	66	72		
	12	48	54	54	66	72	72	84	90	96			
150 mph	16	36	42	36	42	54	66	72	78	84	90		
	20	36	36	36	48	54	60	66	72	78	84		
	24	36	36	36	42	48	54	60	66	66	72		

### Minimum Foundation Depths for 3" Unbraced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Wind Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
B	12		36	42	42	54	66	78	84	90	90	90
	16		36	36	42	48	60	66	78	78	78	78
	20		36	36	36	48	54	60	66	72	72	72
	24		36	36	36	42	48	60	66	66	66	66
	12		36	42	48	60	66	78	90	90	90	90
	16		36	36	42	54	60	72	78	78	78	78
	20		36	36	36	48	54	66	72	72	72	72
	24		36	36	36	42	54	60	66	66	66	66
	12		42	48	48	60	72	84	90	90	90	90
	16		36	36	42	54	66	72	78	78	78	78
	20		36	36	42	48	60	66	72	72	72	72
	24		36	36	36	48	54	60	66	66	66	66
	12		48	54	60	66	78	84	90	90	90	90
	16		36	42	48	54	66	78	78	78	78	78
	20		36	36	42	54	60	72	72	72	72	72
	24		36	36	42	48	54	66	66	66	66	66
	12		54	60	60	72	78	90	90	90	90	90
	16		42	48	48	60	72	78	78	78	78	78
	20		36	36	42	54	66	72	72	72	72	72
	24		36	36	42	54	60	66	66	66	66	66
12		54	66	66	78	84	90	90	90	90	90	
16		42	48	54	60	72	78	78	78	78	78	
20		36	42	42	54	66	72	72	72	72	72	
24		36	36	42	54	60	66	66	66	66	66	
12		60	72	72	78	84	90	90	90	90	90	
16		48	54	54	66	72	78	78	78	78	78	
20		36	42	48	60	66	72	72	72	72	72	
24		36	36	42	54	60	66	66	66	66	66	

### Minimum Foundation Depths for 3" Unbraced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Tilt Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
C	12	12	42	48	54	60	72	84	90	90	90	90
	16	16	36	42	42	54	66	72	78	78	78	78
	20	20	36	36	42	48	60	66	72	72	72	72
	24	24	36	36	36	48	54	60	66	66	66	66
	12	12	12	48	54	54	66	72	84	90	90	90
	16	16	16	36	42	42	54	66	78	78	78	78
	20	20	20	36	36	42	54	60	72	72	72	72
	24	24	24	36	36	36	48	54	66	66	66	66
	12	12	12	54	60	60	72	78	90	90	90	90
	16	16	16	42	48	48	60	72	78	78	78	78
	20	20	20	36	36	42	54	66	72	72	72	72
	24	24	24	36	36	42	48	60	66	66	66	66
	12	12	12	60	72	72	78	84	90	90	90	90
	16	16	16	48	54	54	60	72	78	78	78	78
	20	20	20	36	42	48	54	66	72	72	72	72
	24	24	24	36	36	42	54	60	66	66	66	66
	12	12	12	66	78	78	84	90	90	90	90	90
	16	16	16	48	60	60	66	78	78	78	78	78
	20	20	20	42	48	48	60	72	72	72	72	72
	24	24	24	36	36	42	54	66	66	66	66	66
	12	12	12	72	84	84	90	96	90	90	90	90
	16	16	16	54	60	60	66	78	78	78	78	78
	20	20	20	42	48	48	60	72	72	72	72	72
	24	24	24	36	42	48	54	66	66	66	66	66
12	12	12	72	90	90	96	96	90	90	90	90	
16	16	16	54	66	66	72	78	78	78	78	78	
20	20	20	48	54	54	60	72	72	72	72	72	
24	24	24	36	42	48	60	66	66	66	66	66	

### Minimum Foundation Depths for 3" Braced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Snow Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
B	85 mph	12	36	42	48	54	60	66	78	84	90	96
		16	36	36	36	48	54	60	66	72	78	84
		20	36	36	36	42	48	54	60	66	72	78
	90 mph	24	36	36	36	36	42	48	54	60	66	72
		12	36	42	48	54	60	72	78	84	90	96
		16	36	36	36	48	54	60	72	72	78	84
	100 mph	20	36	36	36	42	48	54	60	66	72	78
		24	36	36	36	36	48	54	60	60	66	72
		12	42	48	54	66	72	72	84	90	96	
	110 mph	16	36	42	42	48	60	66	72	78	84	90
		20	36	36	36	48	54	60	66	72	78	84
		24	36	36	36	42	48	54	60	66	72	78
	120 mph	12	48	60	60	72	78	84	90	96		
		16	36	42	48	54	60	72	78	84	90	96
		20	36	36	36	48	54	60	72	78	78	90
	130 mph	24	36	36	36	42	48	60	66	72	72	78
		12	54	66	66	78	90	90	90			
		16	42	48	54	60	66	72	78	84	96	
	140 mph	20	36	42	42	48	60	66	72	78	84	90
		24	36	36	36	48	54	60	66	72	72	84
		12	54	72	72	84	96	96	96			
	150 mph	16	42	54	54	66	72	78	84	90	96	
		20	36	42	42	54	60	66	78	84	90	96
		24	36	36	36	48	54	60	72	72	78	84



### Minimum Foundation Depths for 3" Braced Ground Mount

Exposure Category	Wind Speed	Snow (psf)	Tilt Angle									
			0 °	5 °	10 °	15 °	20 °	25 °	30 °	35 °	40 °	45 °
C	12	12	42	54	54	66	72	78	84	90	96	
	16	16	36	42	42	48	60	66	72	78	84	90
	20	20	36	36	36	48	54	60	66	72	78	84
	24	24	36	36	36	42	48	54	60	66	72	78
	12	12	48	54	60	72	78	84	90	96		
	16	16	36	42	48	54	60	66	78	84	90	96
	20	20	36	36	36	48	54	60	72	72	78	84
	24	24	36	36	36	42	48	60	66	66	72	78
	12	12	54	66	66	78	84	90	90			
	16	16	42	48	54	60	66	72	78	84	96	
	20	20	36	42	42	48	60	66	72	78	84	90
	24	24	36	36	36	48	54	60	66	72	78	84
	12	12	54	66	72	84	90	96	96			
	16	16	42	48	54	60	66	72	84	90	96	
	20	20	36	42	42	48	60	66	72	78	84	90
	24	24	36	36	36	48	54	60	66	72	78	84
	12	12	60	72	78	90	96					
	16	16	48	54	60	66	72	78	84	90		
	20	20	36	42	48	54	60	72	78	84	90	96
	24	24	36	36	36	48	54	66	72	78	84	90
	12	12	66	78	84	96						
	16	16	48	60	60	72	78	84	90	96		
	20	20	42	48	48	60	66	72	78	84	90	
	24	24	36	42	42	48	60	66	72	78	84	90
12	12	72	84	90								
16	16	54	66	66	78	84	90	90				
20	20	42	54	54	60	66	72	84	90	96		
24	24	36	42	42	54	60	66	78	84	90	96	
12	12	72	90	96								
16	16	54	66	72	84	90	96	96				
20	20	48	54	54	66	72	78	84	90			
24	24	36	48	48	54	60	72	78	84	90	96	

## Ground Array Components

Part Number	Description	Weight	Packaging
70-0200-SGA	SGA Top Cap at 2"	4.30 Lbs	Kit of 1; Box of 40
70-0300-SGA	SGA Top Cap at 3"	6.47 Lbs	Kit of 1; Box of 40
29-7001-001	SGA Rail Connector at 2"	1.03 Lbs	Kit of 1; Box of 70
29-7001-000	SGA Rail Connector at 3"	1.03 Lbs	Kit of 1; Box of 70
70-0200-CBR	SGA 2" (7.5') Brace Assembly	21.38 Lbs	Box of 4
70-0300-CBR	SGA Rail Connector at 3"	26.78 Lbs	Box of 4

## Rails

The rails for the standardized Ground Mount configuration are set at 14'.

Part Number	Description	Weight	Packaging
51-7000-168A	XRS, Rail 168" (14 Feet), Clear	13.23 Lbs	Sub-bundles of 4; Bundles of 80
51-7000-168B	XRS, Rail 168" (14 Feet), Black	13.23 Lbs	Sub-bundles of 4; Bundles of 80

## Clamps

Module Clamp size depends on the module thickness. Use the table below to determine which Module Clamp will fit your projects module thickness. Reminder: Our Mid and End Clamps fit both Standard (XRS) and Light (XRL) Rails.

Module Thickness		Clamp Info		Part Numers		
Mm	Inches	Clamp Type	Bolt Height	End Clamp	Mid Clamp (hex)	Mid Clamp (tbolt)
31.0 - 32.5	1.22 - 1.28	I	2.00"	29-7000-125	29-7000-105	29-70TB-105
33.3 - 34.8	1.31 - 1.37	A	2.00"	29-7000-134	29-7000-105	29-70TB-105
34.8 - 36.8	1.37 - 1.45	B	2.00"	29-7000-224	29-7000-105	29-70TB-105
39.0 - 41.0	1.53 - 1.61	C	2.25"	29-7000-157	29-7000-101	29-70TB-101
41.1 - 42.7	1.62 - 1.68	J	2.25"	29-7000-165	29-7000-101	29-70TB-101
42.7 - 44.2	1.68 - 1.74	E	2.25"	29-7000-171	29-7000-101	29-70TB-101
45.0 - 47.0	1.77 - 1.85	F	2.50"	29-7000-214	29-7000-108	29-70TB-108
46.7 - 48.3	1.84 - 1.90	K	2.50"	29-7000-187	29-7000-108	29-70TB-108
49.0 - 51.1	1.93 - 2.01	G	2.50"	29-7000-204	29-7000-108	29-70TB-108
57.4 - 58.9	2.26 - 2.32	H	2.75"	29-7000-230	29-7000-104	29-70TB-104

## End Clamps

End Clamps depend on the module thickness. Match the clamp type with the module thickness and order the corresponding end clamp part numbers.

Part Number	Description	Weight	Packaging
29-7000-125	Kit, 4pcs, End Clamp I, 1.25", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-134	Kit, 4pcs, End Clamp A, 1.34", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-224	Kit, 4pcs, End Clamp B, 1.41", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-157	Kit, 4pcs, End Clamp C, 1.57", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-165	Kit, 4pcs, End Clamp J, 1.65", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-171	Kit, 4pcs, End Clamp E, 1.71", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-214	Kit, 4pcs, End Clamp F, 1.81", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-187	Kit, 4pcs, End Clamp K, 1.87", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-204	Kit, 4pcs, End Clamp G, 1.97", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-230	Kit, 4pcs, End Clamp H, 2.30", Mill	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-125B	Kit, 4pcs, End Clamp I, 1.25" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-134B	Kit, 4pcs, End Clamp A, 1.34" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-224B	Kit, 4pcs, End Clamp B, 1.41" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-157B	Kit, 4pcs, End Clamp C, 1.57" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-165B	Kit, 4pcs, End Clamp J, 1.65" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-171B	Kit, 4pcs, End Clamp E, 1.71" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-214B	Kit, 4pcs, End Clamp F, 1.81" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-187B	Kit, 4pcs, End Clamp K, 1.87" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-204B	Kit, 4pcs, End Clamp G, 1.97" Black	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-230B	Kit, 4pcs, End Clamp H, 2.30" Black	0.3 Lbs	Kits of 4; Boxes of 200

## Mid Clamps

Part Number	Description	Weight	Packaging
29-7000-105	Kit, 4pcs, Mid Clamp A/B/I, 2.00", Mill (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-101	Kit, 4pcs, Mid Clamp C/D/J/E, 2.25", Mill (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-108	Kit, 4pcs, Mid Clamp F/K/G, 2.50", Mill (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-104	Kit, 4pcs, Mid Clamp H 2.75", Mill (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-105	Kit, 4pcs, Mid Clamp A/B/I, 2.00", Mill (T-bolt)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-101	Kit, 4pcs, Mid Clamp C/D/J/E, 2.25", Mill (T-bolt)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-108	Kit, 4pcs, Mid Clamp F/K/G, 2.50", Mill (T-bolt)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-104	Kit, 4pcs, Mid Clamp H, 2.75", Mill (T-bolt)	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-105B	Kit, 4pcs, Mid Clamp A/B/I, 2.0", Black (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-101B	Kit, 4pcs, Mid Clamp C/D/J/E, 2.25", Black (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-108B	Kit, 4pcs, Mid Clamp F/K/G, 2.5", Black (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-7000-104B	Kit, 4pcs, Mid Clamp H, 2.75", Black (Hex)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-105B	Kit, 4pcs, Mid Clamp A/B/I, 2.00", Black (T-bolt)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-101B	Kit, 4pcs, Mid Clamp C/D/J/E, 2.25", Black (Tbolt)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-108B	Kit, 4pcs, Mid Clamp F/K/G, 2.50", Black (T-bolt)	0.3 Lbs	Kits of 4; Boxes of 200
29-70TB-104B	Kit, 4pcs, Mid Clamp H, 2.75", Black (T-bolt)	0.3 Lbs	Kits of 4; Boxes of 200

## Under Clamps

Part Number	Description	Weight	Packaging
29-7000-117	Kit, 4pcs, Under Clamp	0.4 Lbs	Kits of 4; Boxes of 200

## Accessories

Part Number	Description	Weight	Packaging
29-4000-099	Standard Rail (XRS) End Cap (Polybag, 20)	11.40 Lbs/Box	20 End Caps/Bag; 500 Caps/Box
29-4000-077	Wire Clip (Polybag, 20)	6.70 Lbs/Box	20 Clips/Bag; 500 Clips/Box
29-5003-005	Kit, ¼ x ¾ Microinverter Mounting	10.65 Lbs/Box	150 Kits/Box

## Grounding

Part Number	Description	Weight	Packaging
29-4000-001	WEEB DMC Compression Clip	.50 Lbs/Box	100 Clips/Box
29-4000-002	WEEB Grounding Lug	12.45 Lbs/Box	100 Lugs/Box

## Ontario FIT-Compliant Products

Part Number	Description	Weight	Packaging
51-70CR-168A	XRS, Rail 168" (14 Feet), Clear, FIT-compliant	13.23 Lbs	Sub-bundles of 4; Bundles of 80
29-70CS-010	XRS Splice, (Fits Standard Rail), FIT-compliant	0.44 Lbs	1 Splice/Kit; 20 Splices/Box

## System Support

IronRidge provides a complete system of technical support including installation guides, ultra-fast project-specific certification letters for most PV-friendly states, our online Design Assistant software, and live, knowledgeable person-to-person customer service.

## Downloadable Support Documents

Our website at [www.ironridge.com/products/groundmounting/systemsupport](http://www.ironridge.com/products/groundmounting/systemsupport) contains all of the technical support information necessary to design, quote, certify, and install an IronRidge Ballasted Ground Mount system. The specific documents that can be found here include:

- CAD files (AutoCAD format)
- Engineering Design Guide
- Pre-stamped Certification Letters
- Installation Guides
- Parts Catalog

## 3rd Party Partners

We've engineered best-of-class 3rd party solutions with our Ground Mount platform to further improve the quality we offer customers. Where appropriate, pre-stamped certification letters are included to simplify and expedite the design, quoting, and permitting processes. At this time, we work with products from the following companies:

- US Wholesale Pipe & Tube
- BestBase Foundation Systems
- Cantsink

## Design Assistant

The IronRidge Design Assistant automates much of the Design and Engineering phases of a project. Easily accessible from our website, the Design Assistant provides a highly intuitive layout interface, automatically calculates critical engineering information based on your project's specific load conditions, provides the ability to add optional components, and determines an accurate bill of materials and quotation.

The Ground Mount Design Assistant can be accessed at: [ironridge.com/sga](http://ironridge.com/sga)

## Engineering Services

IronRidge provides pre-stamped certification letters for many standard load conditions. These letters are available in most PV-friendly states and a few countries including: (italicized states are in progress as of May 2012)

Arizona	Georgia	Minnesota	<i>North Carolina</i>	Tennessee
California	Hawaii	Missouri	Ohio	Texas
Colorado	<i>Illinois</i>	Nevada	Oklahoma	Utah
Connecticut	Louisiana	New Hampshire	Oregon	Virginia
D.C.	Massachusetts	New Jersey	Pennsylvania	Vermont
Delaware	Maryland	New Mexico	<i>Rhode Island</i>	Washington
Florida	<i>Maine</i>	New York	<i>South Carolina</i>	

We can also provide non-standard certifications, wet-stamped letters, or specialized engineering requests. Our preferred engineering firm is Starling Madison Lofquist, Inc. Their contact information is:

Starling Madison Lofquist, Inc.  
5224 South 39th Street  
Phoenix, Arizona 85040  
Phone: 602-438-2500

## Customer Service

The IronRidge support staff is knowledgeable, experienced, friendly, and responsive. We would be happy to provide assistance on any questions you may have. Please feel free to contact us through your preferred method at:

Email: [support@ironridge.com](mailto:support@ironridge.com)  
Phone: 800-227-9523

## Warranty Information

Effective for IronRidge, Inc. (“IronRidge”) mounting structure components (“Products”) manufactured after April 1st, 2012, IronRidge provides the following warranties, for Products installed properly and used for the purpose for which the Products are designed:

- finishes shall be free of visible defects, peeling, or cracking, under normal atmospheric conditions, for a period of three (3) years from the earlier of (i) the date of complete installation of the Product or (ii) thirty days after the original purchaser’s date of purchase of the Product (“Finish Warranty”);
- components shall be free of structurally-related defects in materials for a period of ten (10) years from the earlier of (i) the date of complete installation of the Product or (ii) thirty days after the original purchaser’s date of purchase of the Product;
- components shall be free of functionally-related manufacturing defects for a period of twenty (20) years from date of manufacture.

The Finish Warranty does not apply to: (a) surface oxidation of the galvanized steel components or any foreign residue deposited on Product finish; and (b) Products installed in corrosive atmospheric conditions, as defined solely by IronRidge; corrosive atmospheric conditions include, but are not limited to, conditions where Product is exposed to corrosive chemicals, fumes, cement dust, salt water marine environments or to continual spraying of either salt or fresh water. The Finish Warranty is VOID if (c) the practices specified by AAMA 609 & 610-02 – “Cleaning and Maintenance for Architecturally Finished Aluminum” ([www.aamanet.org](http://www.aamanet.org)) are not followed by Purchaser for IronRidge’s aluminum based components; and (d) if the practices specified by ASTM A780 / A780M - 09 “Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings” are not followed by Purchaser for IronRidge’s galvanized steel-based components.

The warranties above do not cover any parts or materials not manufactured by IronRidge, and exclude non-functionally-related defects, as defined solely by IronRidge. The warranties do not cover any defect that has not been reported to IronRidge in writing within twenty (20) days after discovery of such defect.

In the event of breach of or non-compliance with the

warranties set forth above, IronRidge’s sole obligation and liability, and the sole and exclusive remedy for such breach or non-compliance, shall be correction of defects by repair, replacement, or credit, at IronRidge’s sole discretion. Such repair, replacement or credit shall completely satisfy and discharge all of IronRidge’s liability with respect to these warranties.

Refurbished Product may be used to repair or replace the defective components. Transportation, installation, labor, or any other costs associated with Product replacement are not covered by these warranties and are not reimbursable. These warranties additionally do not cover (a) normal wear, or damage resulting from misuse, overloading, abuse, improper installation (including failure to follow professional instruction and certification), negligence, or accident, or from force majeure acts including any natural disasters, war or criminal acts; and (b) Products that have been altered, modified or repaired without written authorization from IronRidge or its authorized representative; and (c) Products used in a manner or for a purpose other than that specified by IronRidge. A formal document proving the purchase and the purchase date of the Product is required with any warranty claim.

Except as set forth above, IronRidge sells the Products on an “AS IS” basis, which may not be free of errors or defects, and ALL EXPRESS OR IMPLIED REPRESENTATIONS AND WARRANTIES, INCLUDING ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUALITY, WORKMANLIKE EFFORT, CORRESPONDENCE TO DESCRIPTION, DESIGN, TITLE OR NON-INFRINGEMENT, OR ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE OR TRADE PRACTICE, ARE HEREBY DISCLAIMED.