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For product and purchasing inquiries contact:

ecoDIRECT

CLEAN ENERGY SOLUTIONS

www.ecodirect.com



Installation Manual

Universal Top-of-Pole Mount

UNI-TP/12LL



 **IRONRIDGE**
Solar Mounting Solutions

Introduction

The Universal Top-of-Pole Mount UNI-TP/12LL is a very sturdy and straightforward pole mounting solution for small area solar photo voltaic (PV) needs. With its user-adjustable angle settings, it can support installations in a wide range of locations.

In addition, the UNI-TP/12LL supports:

- ◆ Up to 12 PV panels (six panels in each of the two channels, with a combined width of up to 140 inches per channel).
- ◆ A pole diameter of 6.0 inches (requires a properly anchored schedule 40 pipe).

1. Installer Responsibility

The installer is solely responsible for:

- ◆ Complying with all applicable local or national building codes, including any that may supersede this manual
- ◆ Ensuring that IronRidge and other products are appropriate for the particular installation and the installation environment
- ◆ Ensuring that the selected mount can support the array under live load conditions
- ◆ Using only IronRidge parts and installer-supplied parts as specified by IronRidge. Substitution parts may void the warranty
- ◆ Ensuring safe installation of all electrical aspects of the PV array.

2. Customer Support

IronRidge makes every effort to ensure your mounting kit is easy to install. If you need assistance at any point with your installation or have suggestions on how we can improve your experience, call IronRidge customer support: (800) 227-9523

3. Tools Required For Assembly

The following tools are required to assemble the Universal Top-of-Pole Mount:

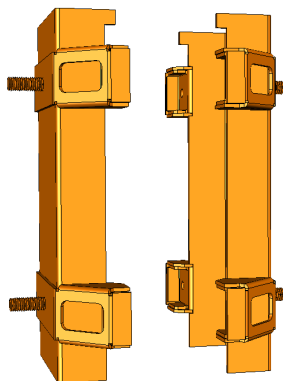
Tool	Use for
Wrenches Open-end wrench, Box-end wrench, or 3/8" or greater socket drive with sockets to support the following size hex heads:	
◆ 3/8"	◆ 3/8 cap-end screws, 3/8 bolts
◆ 5/16"	◆ 5/16 cap-end screws, 5/16 bolts
◆ 1/4"	◆ 1/4 cap-end screws, 1/4 bolts

4. Component List

The Universal Top-of-Pole Mount UNI-TP/12LL kit contains the following parts:

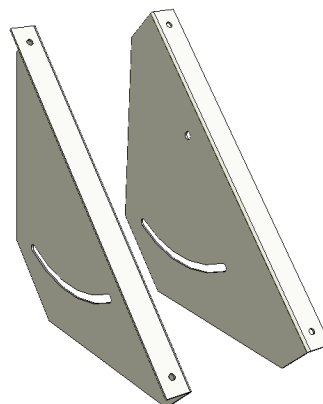
Brace Assembly (51-0626-400) x2

Attaches to the top of the 6-inch pole, providing the foundation for the mount



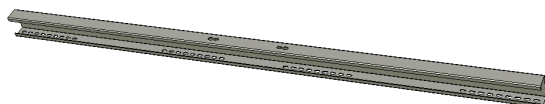
Tilt Plate, left (51-0627-027) and right (51-0627-027A)

Attaches to the brace, providing tilt adjustment for the panel assembly



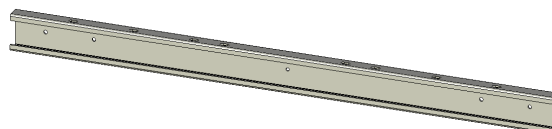
Cross Rail (51-0627-100) x2

Attaches to the tilt plates and support the channel rails



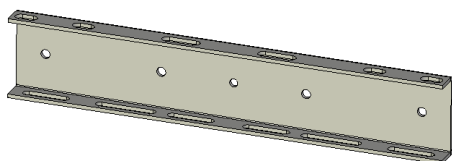
Channel rail (51-0570-001) x8

Attaches directly to the back of the PV modules



Connector (51-0627-021) x4

Connects the channel rails together, extending their usable length



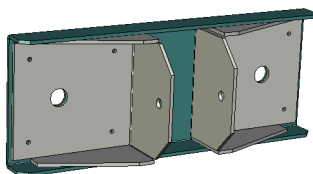
U Bolt (23-0100-060)

Attaches to the pole, supporting the knee brace

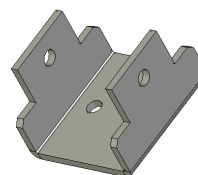


Lower Knee Brace (51-0610-150)

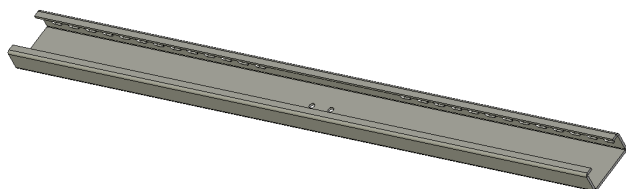
Supports the knee brace at the pole end, supporting the knee brace channel rails


Upper Knee Brace Bracket (51-0610-050)

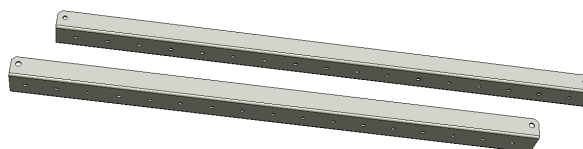
Connects the upper end of the knee brace channel rails to the PV module assembly


Upper Knee Brace Rail (51-0610-200)

Connects the PV module assembly to the knee brace


Knee Brace Channel Inner (51-0534-000) and Outer (51-0534-001)

Supports the PV module's lower end



Part	Qty	Part Number
5/16 x 1" Kit	1	29-5006-005
5/16-18 x 1" SS hex-cap bolt	8	23-3118-021
5/16 flat washer, SS	16	25-3102-000
5/16 split lock washer, SS	8	25-3101-000
5/16 hex nut, SS	8	25-3118-440
Large Pole Bracket Kit	1	29-5008-001
Stud, 3/8-16 x 5.5" Zinc	4	27-1037-016
3/8 flat washer, Zinc	8	27-3702-001
3/8 split lock washer, Zinc	8	27-3701-001
3/8 hex nut, Zinc	8	24-3716-441
Large Tilt Plate Kit	1	29-5007-000
3/8 flat washer, Zinc	4	27-3702-001
3/8 split lock washer, Zinc	4	27-3701-001
3/8 hex nut, Zinc	4	24-3716-441

Component List continued...

Part	Qty	Part Number
Cross Rail Kit	1	29-5010-000
5/16-18 x 2.50" hex-cap bolt, Zinc	4	23-3118-901
5/16 flat washer, Zinc	4	25-3102-001
5/16 med split lock washer, Zinc	4	25-3101-001
5/16-18 fin hex nut, Zinc	4	24-3118-441
Connector Kit	1	29-5000-000
1/4-20 x 3/4" SS hex-cap bolt	8	23-2520-050
1/4 flat washer, SS	16	25-2502-000
1/4 split lock washer, SS	8	24-2501-000
1/4-20 fin hex nut, SS	8	24-2520-440
Knee Brace Assembly Kit	1	29-5000-000
1/4-20 x 3/4" SS hex-cap bolt	4	23-2520-050
1/4 flat washer, SS	8	25-2502-000
1/4 split lock washer, SS	4	24-2501-000
1/4-20 fin hex nut, SS	4	24-5013-440
1/2 flat washer, Zinc	2	25-5002-200
1/2 split lock washer	2	24-5001-000
1/2-13 fin hex nut, Zinc	2	24-2520-440
5/16-18 x 1" SS hex-cap bolt	2	23-3118-021
5/16 flat washer, SS	5	25-3102-000
5/16 split lock washer, SS	3	25-3101-000
5/16 hex nut, SS	3	25-3118-440
5/16-18 x 3" SS hex-cap bolt	1	23-3118-021
3/8-16 x 1" bolt, Zinc	2	27-3716-101
3/8 flat washer, Zinc	4	27-3702-001
3/8 split lock washer, Zinc	2	27-3701-001
3/8 hex nut, Zinc	2	24-3716-441
1/4 x 3/4" Kit	12	29-5000-000
1/4-20 x 3/4" SS hex-cap bolt	48	23-2520-050
1/4 flat washer, SS	48	25-2502-000
1/4 split lock washer, SS	48	24-2501-000
1/4-20 fin hex nut, SS	48	24-2520-440
Spares Kit	1	29-5002-100

5. Assembly

Step 1 -connecting the channel rails together

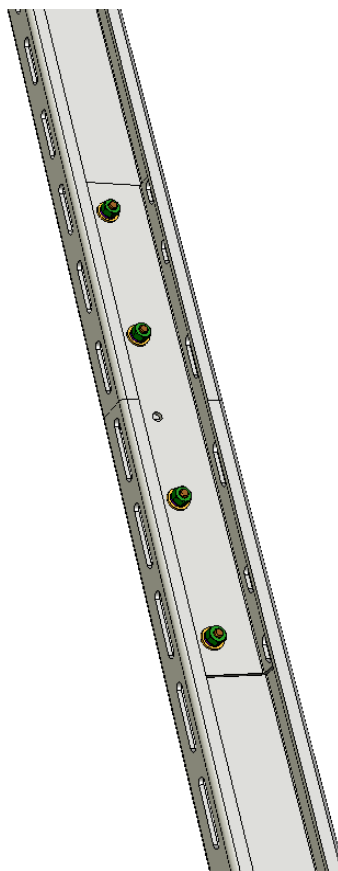
Parts Required	Qty	Part Number
Connector	4	51-0627-021
Channel Rail	8	51-0570-001
1/4-20 x 3/4" SS hex-cap bolt	8	23-2520-050
1/4 flat washer, SS	16	25-2502-000
1/4 split lock washer, SS	8	24-2501-000
1/4-20 fin hex nut, SS	8	24-2520-440

1. Lay two channel rails end to end.

2. Using a connector, bolt the channel rails together.

Tighten the bolts to 7 ft-lbs.

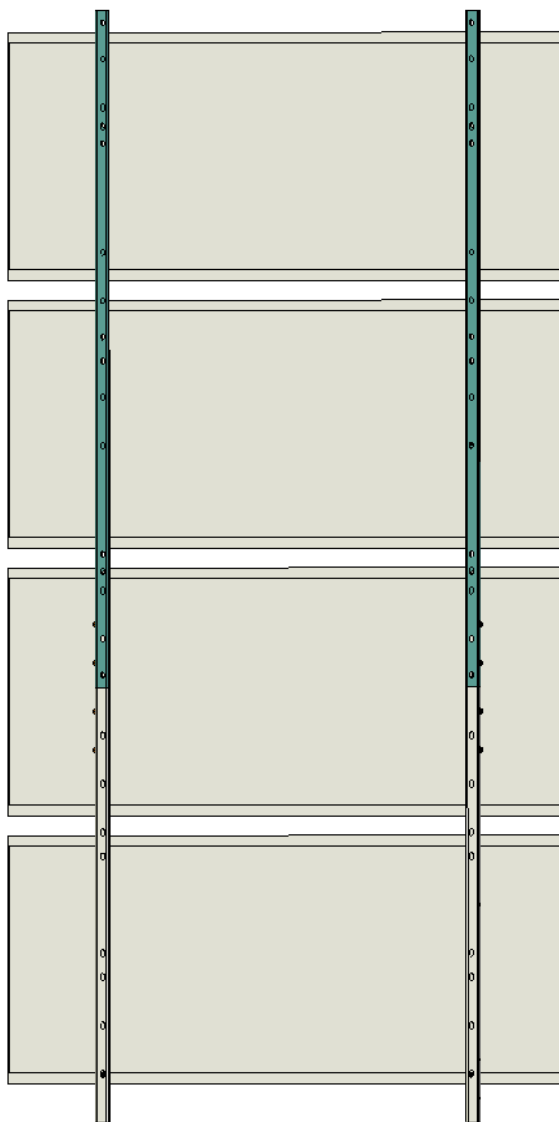
3. Repeat with the remaining set of channel rails.



Step 2 -attaching the channel rails to the PV modules

Parts Required	Qty	Part Number
PV Module	up to 10	User-supplied
1/4-20 x 3/4" SS hex-cap bolt	40	23-2520-050
1/4 flat washer, SS	40	25-2502-000
1/4 split lock washer, SS	40	24-2501-000
1/4-20 fin hex nut, SS	40	24-2520-440

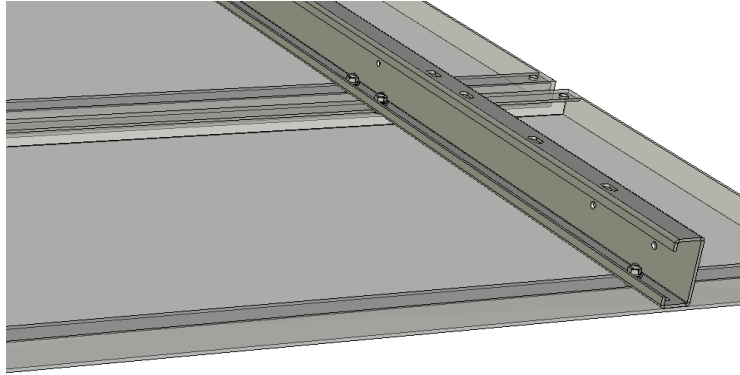
1. Lay the modules face down on a protected surface in the appropriate orientation - up to five modules per set of rails. Leave an inch or two between the panels.
2. Lay the channel rails on the back of the modules with the evenly-spaced holes down, so the flat side of the rails are facing towards the outside edges of the panels.



3. Secure the rails with a bolt, lock washer and hex nut in each of the PV mounting holes.

Tighten the bolts to 7 ft-lbs.

4. Repeat, attaching the remaining PV modules to the two remaining channel rails.

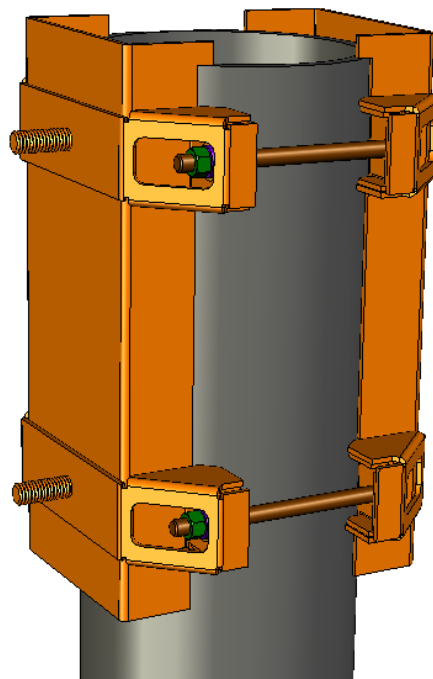


Step 3 - attaching the brace assembly to the pole

Parts Required	Qty	Part Number
Brace Assembly	2	51-0626-400
Stud, 3/8-16 x 5.5" Zinc	4	27-1037-016
3/8 flat washer, Zinc	8	27-3702-001
3/8 split lock washer, Zinc	8	27-3701-001
3/8 hex nut, Zinc	8	24-3716-441

1. Place the brace assembly onto the pole so the "lip" catches the top of the pole.
2. Install the studs and hardware as shown, using a washer and lock washer under each nut.
3. Tighten the stud nuts evenly, making sure that all studs are tightened the same amount so the distance between braces is the same on the front and the back.

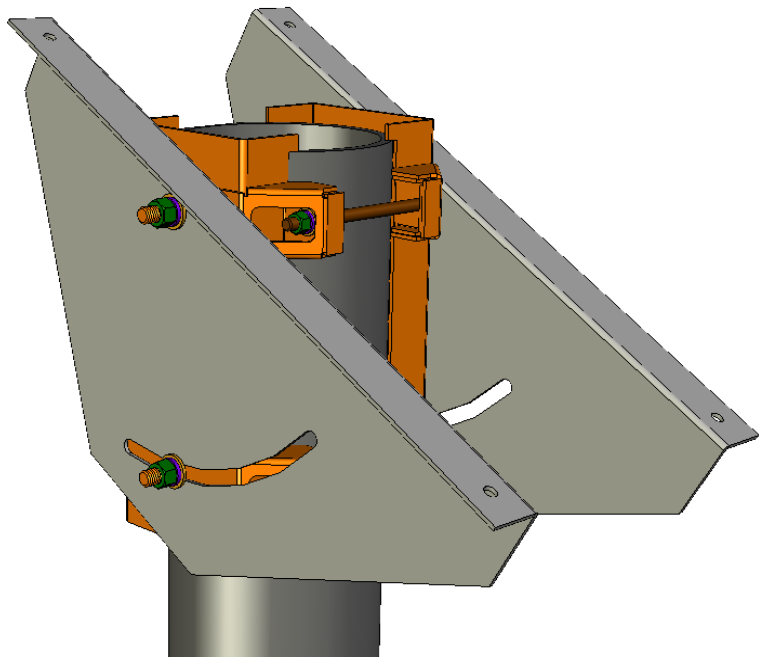
Tighten the studs to 12 ft-lbs.



Step 4 - attaching the tilt plates to the brace

Parts Required	Qty	Part Number
Tilt Plate, left	1	51-0627-027
Tilt Plate, right	1	51-0627-027A
3/8 flat washer, Zinc	4	27-3702-001
3/8 split lock washer, Zinc	4	27-3701-001
3/8 hex nut, Zinc	4	24-3716-441

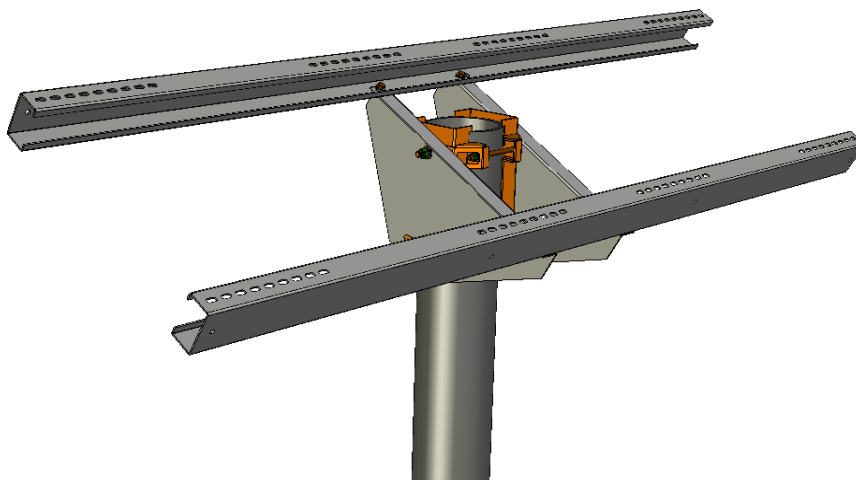
1. Place the tilt plates on the brace assembly as shown.
2. Use a washer, lock washer and nut on each screw, and finger-tighten.



Step 5 - attaching the cross rails to the tilt plates

Parts Required	Qty	Part Number
Cross Rail	2	27-0627-100
5/16-18 x 2.50" hex-cap bolt, Zinc	4	23-3118-901
5/16 flat washer, Zinc	8	25-3102-001
5/16 med split lock washer, Zinc	4	25-3101-001
5/16-18 fin hex nut, Zinc	4	24-3118-441

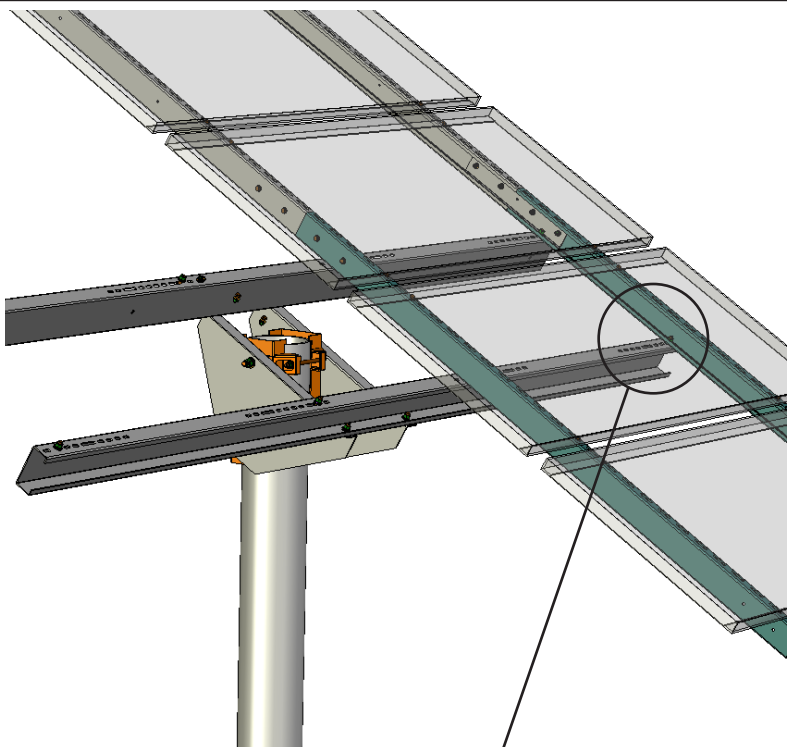
1. Place the cross rails on the tilt plates with the open sides facing towards each other and attach using the specified hardware.
2. Tighten the bolts to 12 ft-lbs.



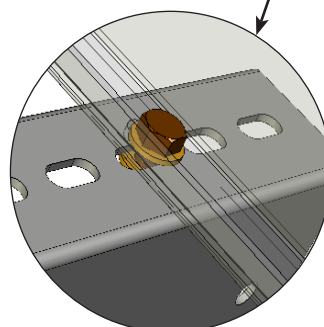
Step 6 - mounting the PV assemblies

Parts Required	Qty	Part Number
5/16-18 x 1" SS hex-cap bolt	8	23-3118-021
5/16 flat washer, SS	16	25-3102-000
5/16 split lock washer, SS	8	25-3101-000
5/16 hex nut, SS	8	25-3118-440

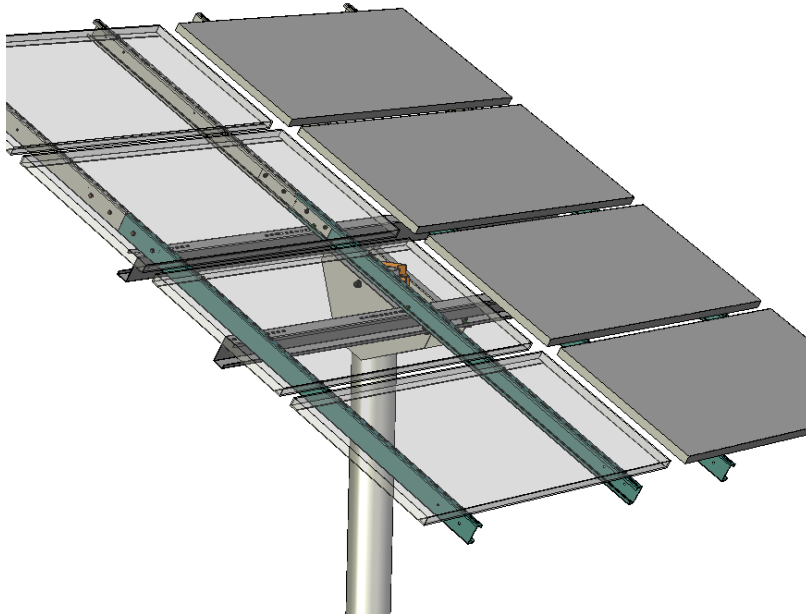
1. Lift one of the the PV array assemblies onto the cross rails and attach using the supplied hardware.



2. Tighten the bolts to 12 ft-lbs.



1. Lift the second PV array assembly onto the cross rails and attach using the supplied hardware.



2. Adjust the tilt of the panel, then tighten the tilt plate nuts to 12 ft-lbs.

Step 7 - mounting the knee brace

Parts Required	Qty	Part Number
U Bolt	1	23-0100-160
Lower Knee Brace	1	51-0610-150
Upper Knee Brace Bracket	1	51-0610-050
Upper Knee Brace Rail	1	51-0610-200
Knee Brace Channel Inner	1	51-0534-000
Knee Brace Channel Outer	1	51-0534-001
1/4-20 x 3/4" SS hex-cap bolt	4	23-2520-050
1/4 flat washer, SS	8	25-2502-000
1/4 split lock washer, SS	4	24-2501-000
1/4-20 fin hex nut, SS	4	24-5013-440
1/2 flat washer, Zinc	2	25-5002-200
1/2 split lock washer	2	24-5001-000
1/2-13 fin hex nut, Zinc	2	24-2520-440
5/16-18 x 1" SS hex-cap bolt	2	23-3118-021
5/16 flat washer, SS	5	25-3102-000
5/16 split lock washer, SS	3	25-3101-000

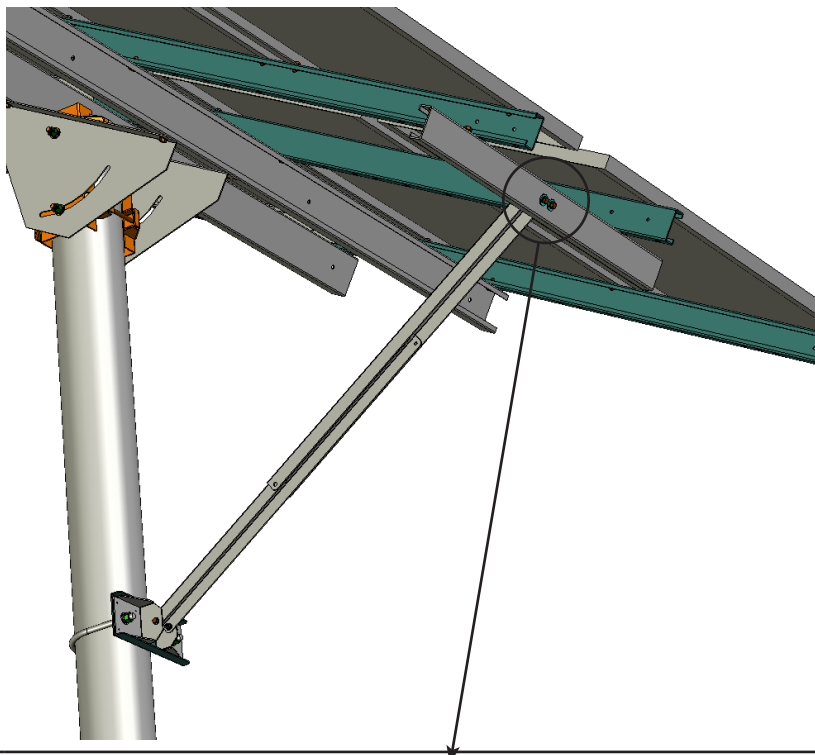
Parts Required	Qty	Part Number
5/16 hex nut, SS	3	25-3118-440
5/16-18 x 3" SS hex-cap bolt	1	23-3118-021
3/8-16 x 1" bolt, Zinc	2	27-3716-101
3/8 flat washer, Zinc	4	27-3702-001
3/8 split lock washer, Zinc	2	27-3701-001
3/8 hex nut, Zinc	2	24-3716-441

1. Attach the lower knee brace to the pole with the U bolt. Place it about 36 inches below the main brace assembly.

Tighten to 12 ft-lbs.

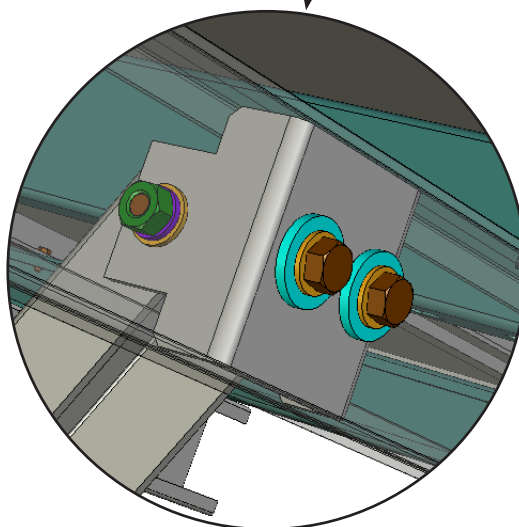
2. Attach the upper knee brace rail to the ends of the PV module channel rails using 3/8" hardware.

Tighten to 12 ft-lbs.



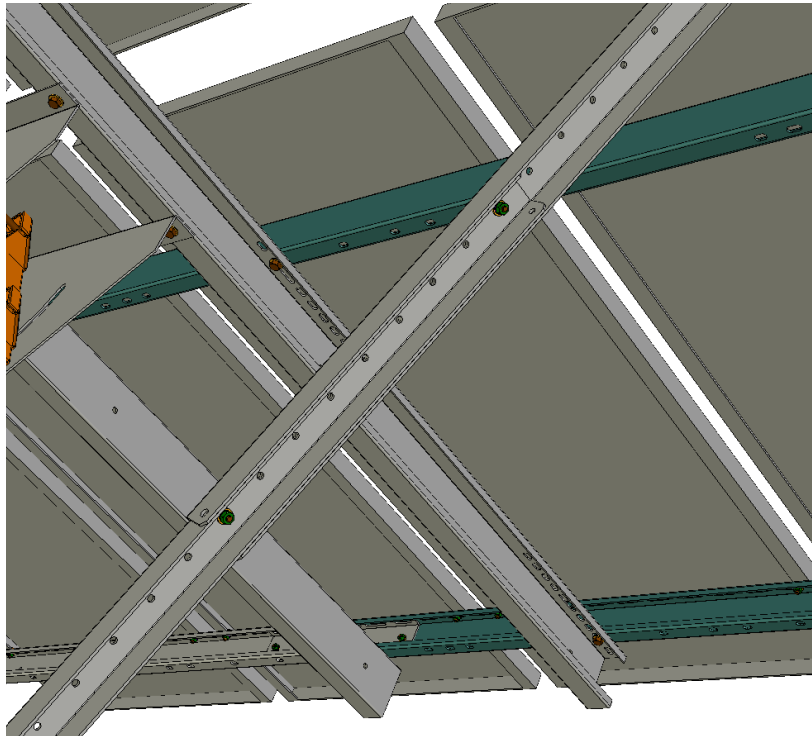
3. Bolt the knee brace bracket to upper knee brace rail using 5/16" hardware.
4. Bolt the inner (narrower) knee brace channel to the lower knee brace using 1/4" hardware.
5. Bolt the outer (thicker) knee brace channel to the upper knee brace bracket, using the supplied 5/16 x 3" bolt.

Tighten these to 12 ft-lbs.



6. Bolt the inner and outer knee brace channels together by lining up the appropriate holes and using two sets of 1/4" hardware.

Tighten to 7 ft-lbs.



IronRidge 10-Year Warranty

Terms and Conditions

IronRidge warrants each Mounting Structure to be free from defects in materials and workmanship for ten (10) years from the date of first purchase ("Warranty Period"), when installed properly and used for the purpose for which it is designed, except for the finish, which shall be free from visible peeling, or cracking or chalking under normal atmospheric conditions for a period of three (3) years, from the earlier of 1) the date the installation of the Product is completed, or 2) 30 days after the purchase of the Product by the original Purchaser ("Finish Warranty"). The Finish Warranty does not apply to any foreign residue deposited on the finish. All installations in corrosive atmospheric conditions are excluded. The Finish Warranty is VOID if the practices specified by AAMA 609 & 610-02 – "Cleaning and Maintenance for Architecturally Finished Aluminum" (www.aamanet.org) are not followed by Purchaser for IronRidge's aluminum based products.

The warranty covers the replacement cost of parts to repair the product to proper working condition. Transportation and incidental costs associated with warranty items are not reimbursable. The warranty does not cover normal wear, or damage resulting from misuse, abuse, improper installation, negligence, or accident. The warranty does not cover any defect that has not been reported in writing to IronRidge within ten (10) days after discovery of such defect. Furthermore, it does not cover units that have been altered, modified or repaired without written authorization from the manufacturer or its authorized representative, or units used in a manner or for a purpose other than that specified by the manufacturer. IronRidge's entire liability and Purchaser exclusive remedy, whether in contract, tort or otherwise, for any claim related to or arising out of breach of the warranty covering the Mounting Structures shall be correction of defects by repair, replacement, or credit, at IronRidge's discretion. Refurbished Mounting Structures may be used to repair or replace the Mounting Structures.

IronRidge shall have no liability for any injuries or damages to persons or property resulting from any cause, whatsoever, or any claims or demands brought against IronRidge by Purchaser, any employee of Purchaser, client of Purchaser, end-user of the Product or other party, even if IronRidge has been advised of the possibility of such claims or demands (collectively, "Third Party Claims"). This limitation applies to all materials provided by IronRidge during and after the Warranty Period.

Daniel W. Stiles, PE

26270 Omar Drive
Fort Bragg, CA 95437
Tel: 707-472-7519

September 8, 2008

IronRidge
Attn: Craig Carni
President
900 Cherry Ave. #400
San Bruno, CA 94066

Subject: Engineering Certification for IronRidge Top of Pole Mounts

Dear Mr. Carni:

I certify that the following IronRidge Pole Mounting Structure, when constructed of materials specified and supplied by IronRidge, meet or exceed the minimum design parameters specified by the 2007 California Building Code(CBC), the 1997 Uniform Building Code, ASCE Standard 7-05, and the Steel Construction Manual, AISC, 13th Edition:

Conditions and location for mounts listed below:

Height of pole: 6 feet above grade

Size of pole: 4" schedule 40

Wind: 90 mph, Exposure C

UNI-TP/02
UNI-TP/04A

UNI-TP/02A

UNI-TP/03

UNI-TP/04

Conditions and location for mounts listed below:

Height of pole: 6 feet above grade

Size of pole: 6" schedule 40

Wind: 90 mph, Exposure C

UNI-TP/06
UNI-TP/08LL
UNI-TP/12LL

UNI-TP/06LL
UNI-TP/10

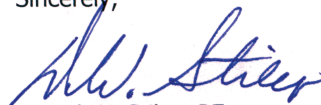
UNI-TP/08
UNI-TP/10LL

UNI-TP/12

I further certify by this letter that the IronRidge Top of Pole Mounts as listed above will be structurally adequate when installed in accordance with IronRidge Installation Manuals provided with, "Universal Top of Pole Mounts", copyrighted by IronRidge, 2008. The structure to which IronRidge Mounting Systems are connected should be evaluated on a case by case basis, per Part 1 of the installation manuals to ensure the adequacy to accept attachments and to support all applied loadings per the CBC.

Please contact me if you have any questions or concerns.

Sincerely,


Daniel W. Stiles, PE

cc: DWS



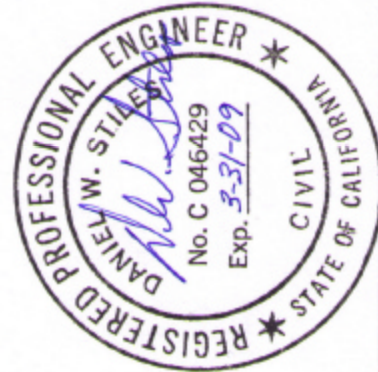
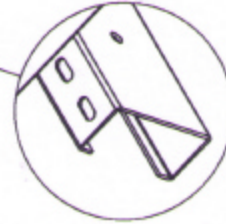
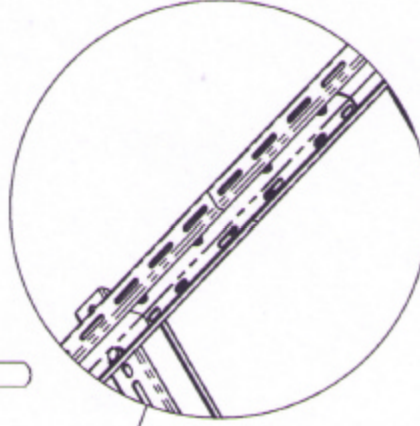
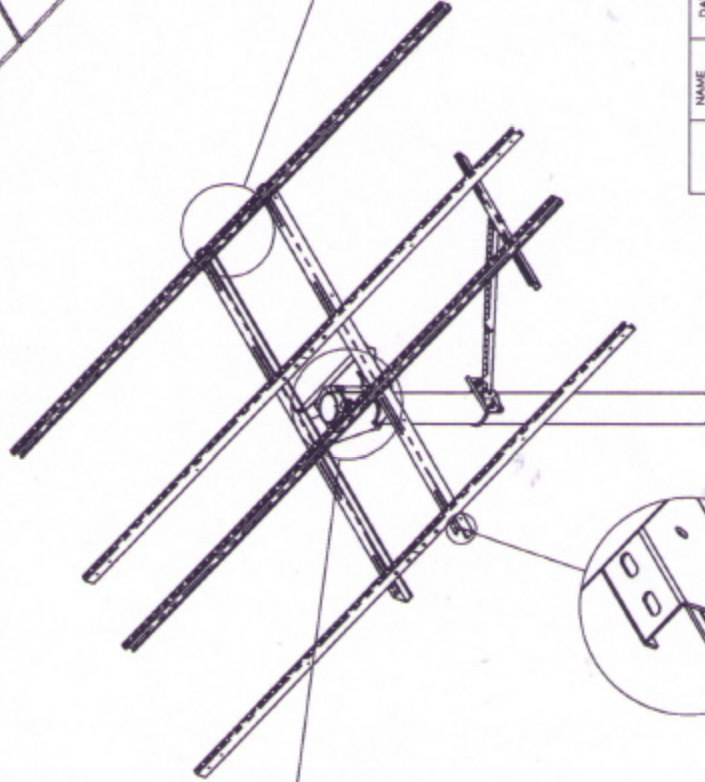
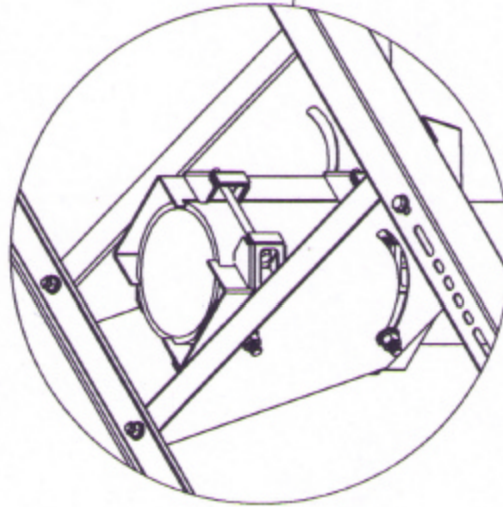
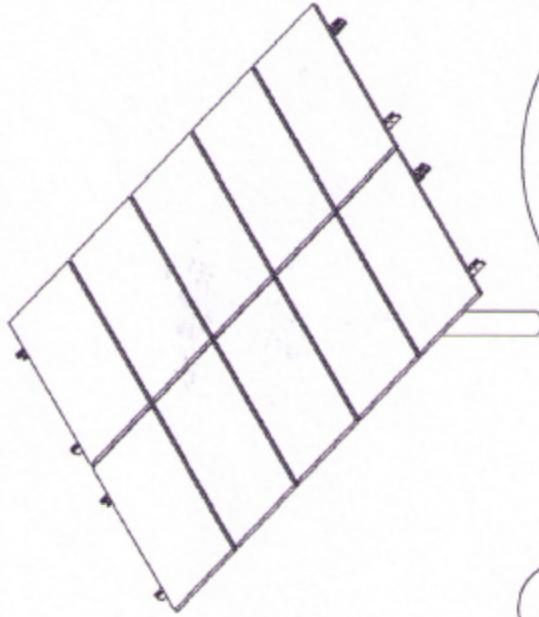
Design Criteria

Wind Speed: 90 mph

Exposure: C

Max Height: 6' Above Ground

Tilt Range: 15° - 75°



UNI-TP/12LL

REV.	DATE	APPROVED
A	09-04-08	D.Stiles

NAME	DATE
D. Stiles	2008

DRWN	CHECKED	ENG. APPR.

SITE	DMG. NO.	REV.
A	UNI-TP/12LL	A

SCALE	SHEET 1 OF 1
1/4"	

DO NOT SCALE DRAWING

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ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ZWO SEAS INC. IS PROHIBITED.

IronRidge Top of Pole Mounts

Foundation Recommendation Addendum

Note: The suggestions below are recommendations only. It is the installer's responsibility to validate foundation parameters prior to installation, as a local geotechnical report may be required to assess ground conditions. We recommend consulting with a local engineer familiar with local regulations and build site requirements, including soil conditions, terrain and load criteria (wind, snow, seismic). All of these parameters may impact foundation requirements.

Mounting Pole Guidelines

Table 1

Part Number	Pipe required
Small Top of Pole Mounts	
UNI-TP/02	4" Nominal Pipe Size, Schedule 40
UNI-TP/02A	4" Nominal Pipe Size, Schedule 40
UNI-TP/03	4" Nominal Pipe Size, Schedule 40
UNI-TP/04	4" Nominal Pipe Size, Schedule 40
UNI-TP/04A	4" Nominal Pipe Size, Schedule 40
Large Top of Pole Mounts	
UNI-TP/06	6" Nominal Pipe Size, Schedule 40
UNI-TP/06LL	6" Nominal Pipe Size, Schedule 40
UNI-TP/08	6" Nominal Pipe Size, Schedule 40
UNI-TP/08LL	6" Nominal Pipe Size, Schedule 40
UNI-TP/10	6" Nominal Pipe Size, Schedule 40
UNI-TP/10LL	6" Nominal Pipe Size, Schedule 40
UNI-TP/12	6" Nominal Pipe Size, Schedule 40
UNI-TP/12LL	6" Nominal Pipe Size, Schedule 40

Note: All IronRidge Top of Pole mounts are engineered for a maximum height of 6' above grade.

Foundation Hole Guidelines

Table 2

Module Area	Max. Wind Speed	Min. Hole Diameter	Min. Hole Depth	Min. Pole Depth
20 Sq Feet	90 MPH	15"	46"	40"
30 Sq Feet	90 MPH	18"	51"	45"
40 Sq Feet	90 MPH	18"	60"	54"
50 Sq Feet	90 MPH	18"	62"	56"
60 Sq Feet	90 MPH	24"	52"	46"
70 Sq Feet	90 MPH	24"	60"	54"
80 Sq Feet	90 MPH	24"	66"	60"
90 Sq Feet	90 MPH	24"	74"	68"
105 Sq Feet	90 MPH	24"	82"	76"



Installation Recommendations

- Auger hole to minimum depth shown in Table 2.
- 6" of hole should be filled with crushed rock or a blocking. This will prevent the pipe from touching the base of the hole, insuring complete encapsulation of the pipe when concrete is poured, as well as allowing for water drainage. See Fig. 1.
- Pipe should be installed vertically no matter the slope of the install site.
- Make arrangements to prevent the pipe from twisting prior to pouring concrete.
- Pipe should be braced to remain plumb until concrete has cured (at least 24 hours).

Fig. 1: Top of Pole Foundation Guideline Diagram

