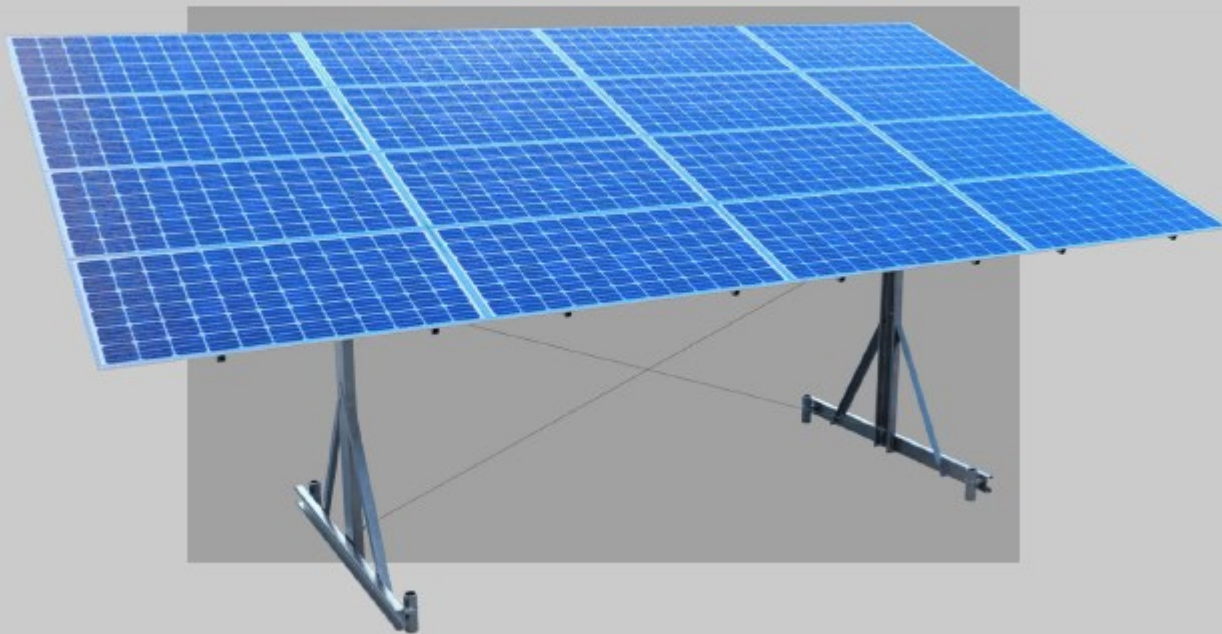


SunRanger Model ST-300CF-16

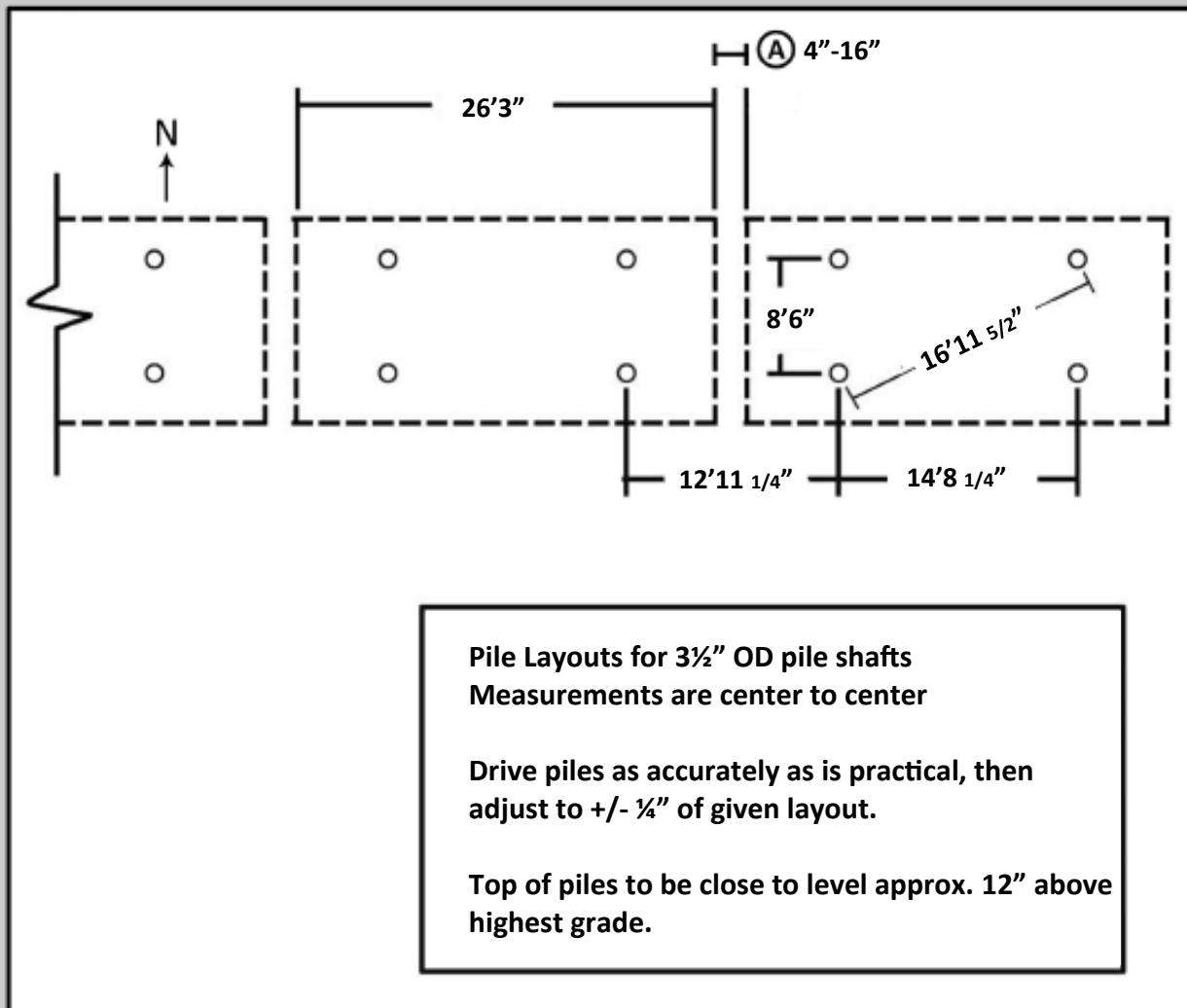
Step by Step Assembly Procedure



SunRanger ST

Step 1: Screwpile Foundation Layout

Before beginning rack assembly, ensure that the screw-piles have been installed as per the layout diagram.



(A) The distance between solar units will vary depending on the type of solar modules used. May vary between 4" - 16".



Step 2:

If multiple racks are placed in a line, all of the base beams should be at a similar elevation to prevent shading, so start with the rack where the ground is highest. Attach the Base Beams to the piles using U-bolts and saddles. These two beams go on the outside of the piles, with the flat sides facing toward each other, ensuring that the angled holes are oriented as in the picture. The two hole beams must be level and at the same elevation. Some dunnage (pieces of wood) under the beam may be helpful in steadying them at the correct height. Once the beams have been accurately positioned, tighten the U-bolts.

6" of clear space under the Base Beam should be provided to prevent frost heave from pushing up on the beam.



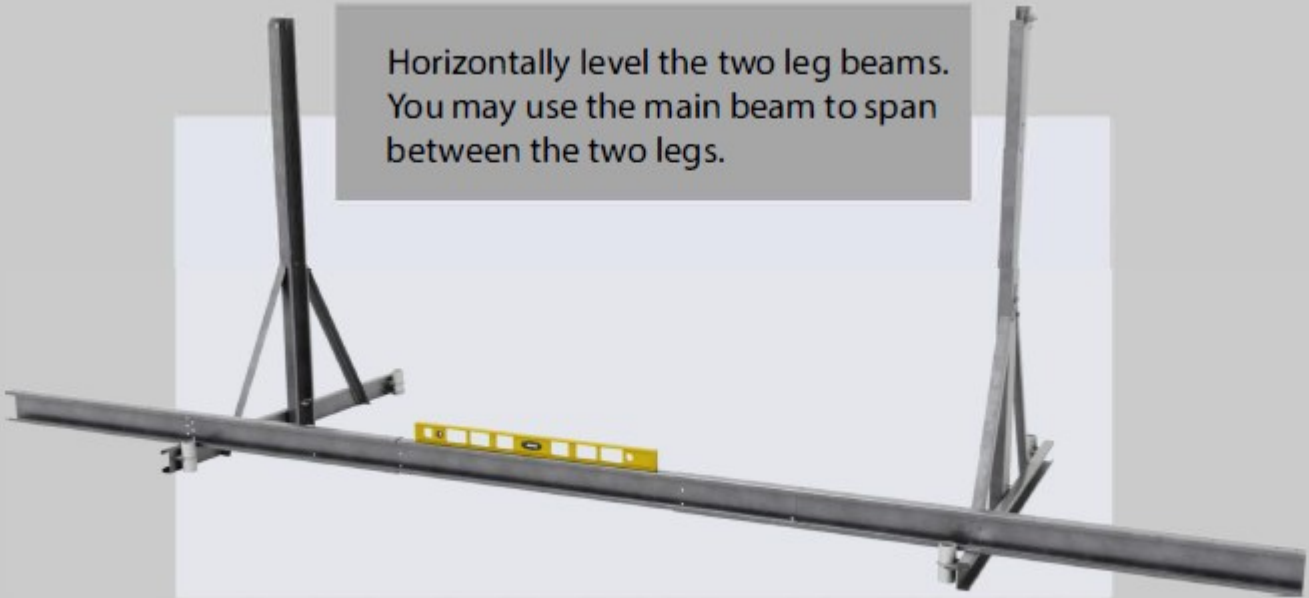
Horizontally level leg beams



Vertically level legs as you
are tightening leg bolts



Horizontally level the two leg beams.
You may use the main beam to span
between the two legs.



Keep legs level vertically as you
are tightening the cross cables,
later in the installation process.



Step 3:

Attach the main legs to the base beams. The angled cut at the top of the leg should be to the south.

Do not tighten the bolts past snug until the angle braces (next step) have been installed with all their fasteners loosely installed.



Step 4:

Use a level to make sure legs are vertical.

Then tighten all fasteners on the legs and angle braces.

Note: Tighten all structural bolts by “Turn of the Nut” method: One-third turn past snug (mating members tight together).



Step 5:

Method 1.

Attach pivot plate prior to erecting vertical leg beam.

The pivot plate should be on the outside of each leg. The plate needs to be able to pivot easily around the top bolt, so don't tighten the bolts too tightly yet.

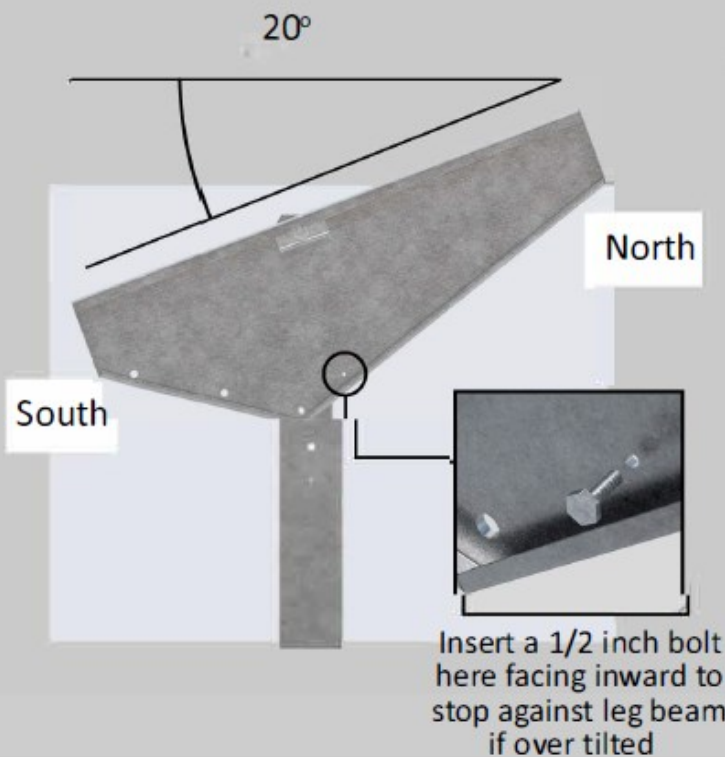
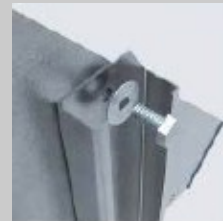


Move the pivot plate to the "Summer Position" by rotating the plate until the top flange is at a 20 degree angle. Insert a bolt through the holes in the plate and leg that align in position, with a nut on the bolt but not tightened.

- You will be changing the tilt at various further steps.

Method 2.

Attach pivot plate after vertical leg beam is attached.



Step 6:

You will have an inner and outer beam. Slide beams together to where holes match up.

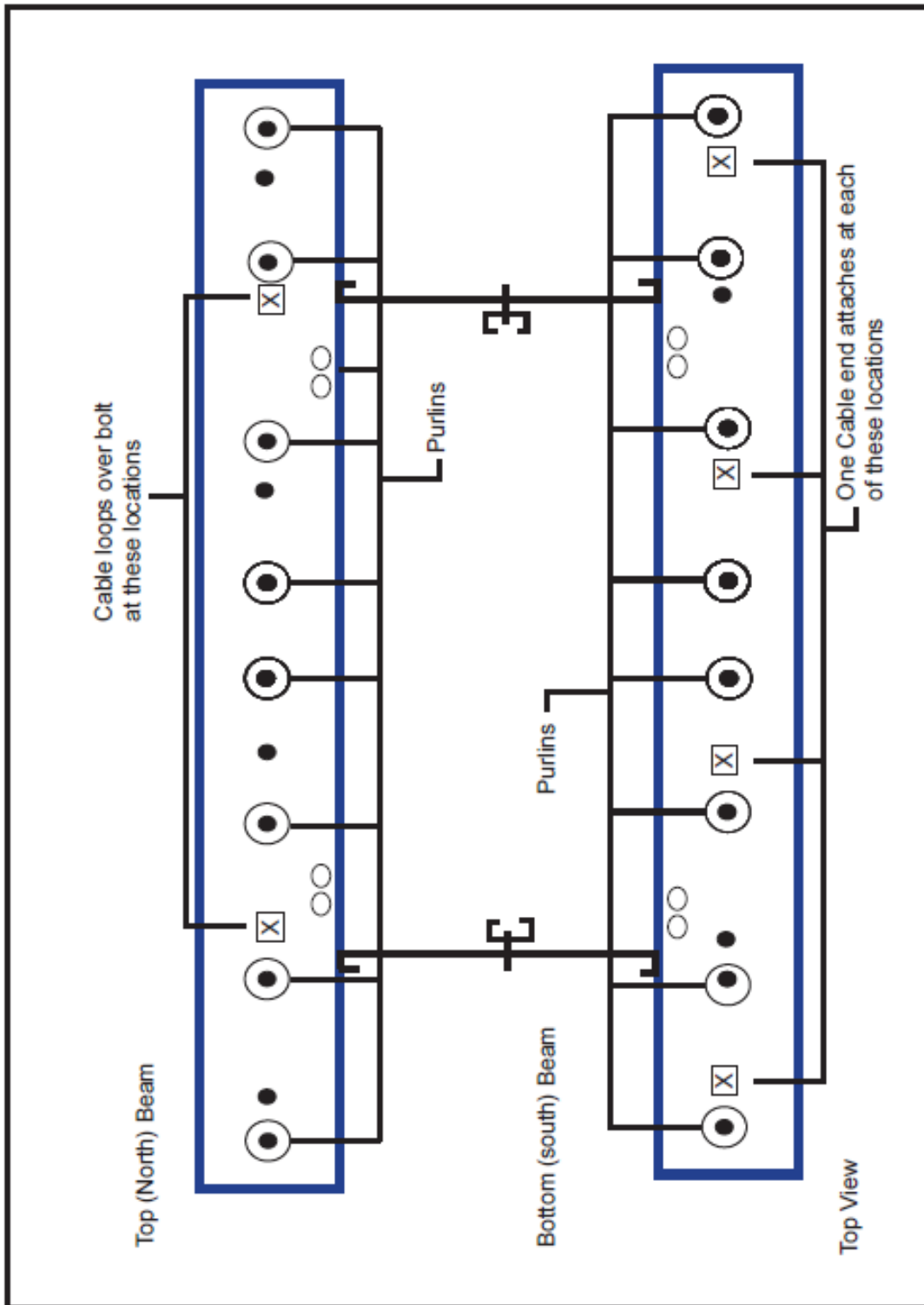


Loosely install all bolts, washers and nuts tighten top 3 bolts first, then tighten remainder.



Note: While beams are on the ground, mark the purlin and support cable holes with a marker on the upper and lower beams. Support cable locations are different on the upper and lower beams.

Support Cable & Purlin Location Map:



Step 7:

Prior to installing main beams, attach cross cables (please see Step 9) to provide lateral support. **Do not** tighten I-bolts past snug until Step 9.

Install the main beams to the pivot plates. Ensure that the beam flange with the holes is facing upwards on both beams.



Install just one fastener initially, then lift the other end and install all remaining fasteners; do not tighten all fasteners until both beams are in place. Once all fasteners are in place, you may finish tightening all fasteners.

Step 8:

Refer to the “Support Cable and Purlin Map”. Attach support cable to the main beams. On the top north, main beam, there are two connection points for the cables. On the bottom south, main beam, there are four connection points for the cables. Fully extend the turnbuckle and attach the cable to the three points. Leave the top north main beam bolt loose and tighten it last. Tighten the bottom two bolts on the south main beam. Then hand-tighten the turnbuckle until cable is tight; do not over tighten. Tighten the top north, main beam bolt.

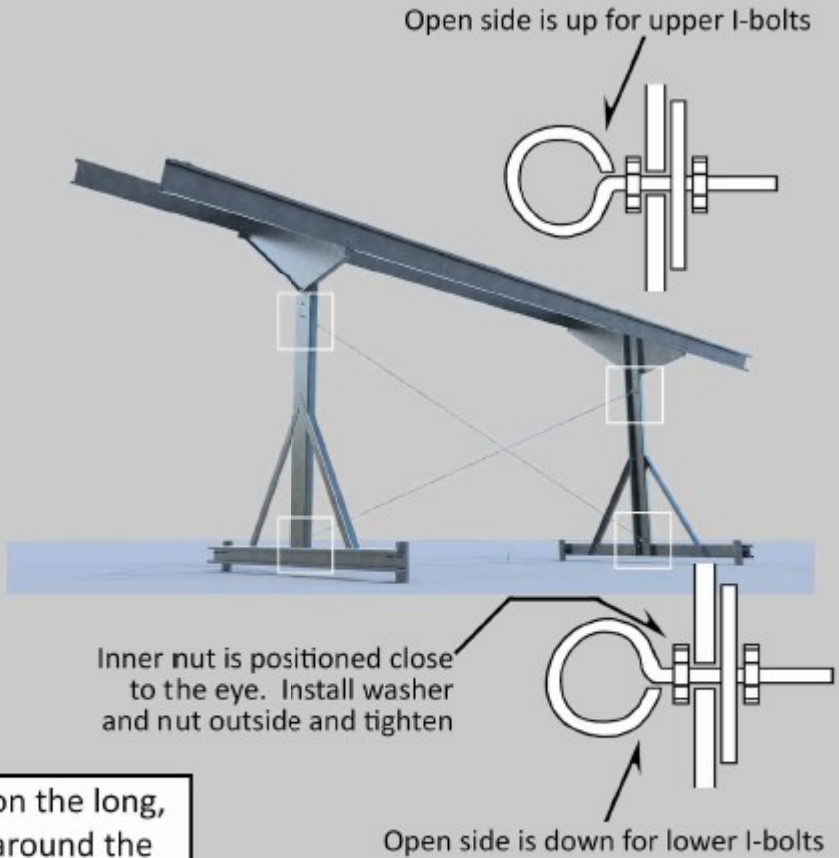


Step 9:

Install the I-bolts to the main legs.



'Saddle' of the cable-clamps is on the long, continuous strand. U-bolts go around the short, discontinuous strand.

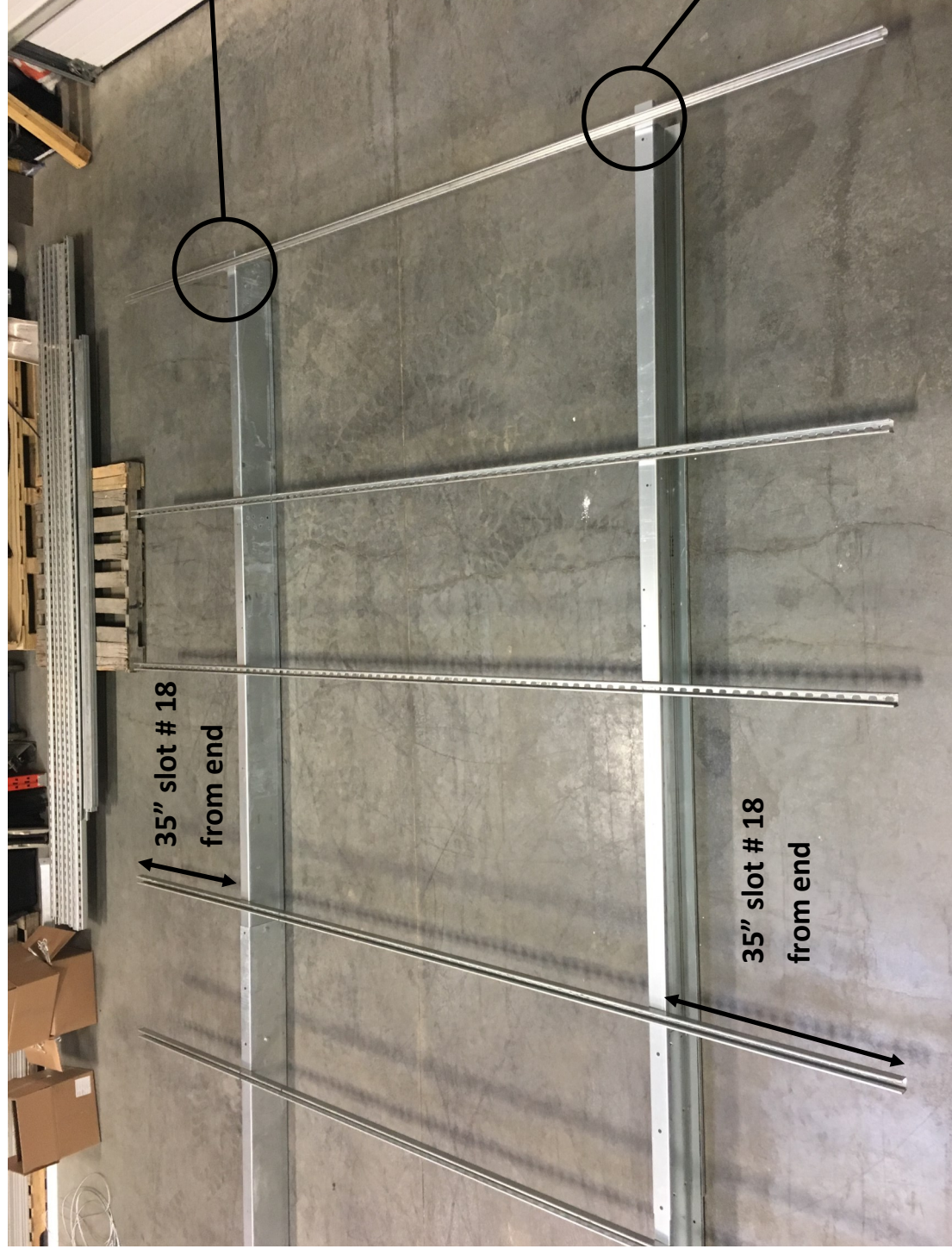


Step 10:

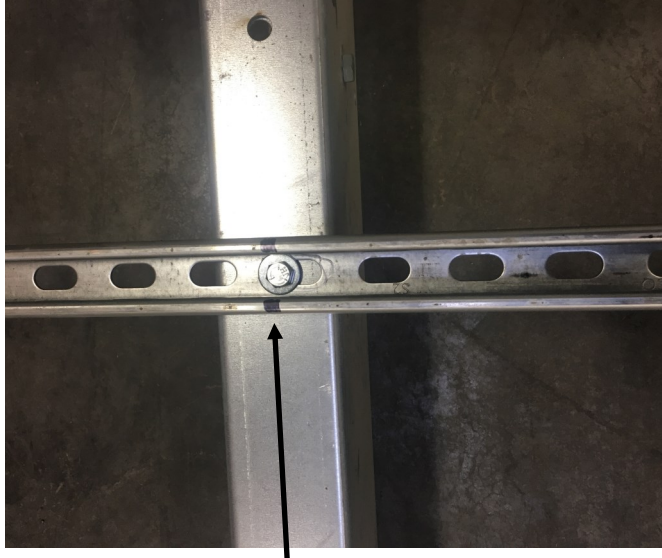
Refer to Purlin Location on the next page.

Purlin Location

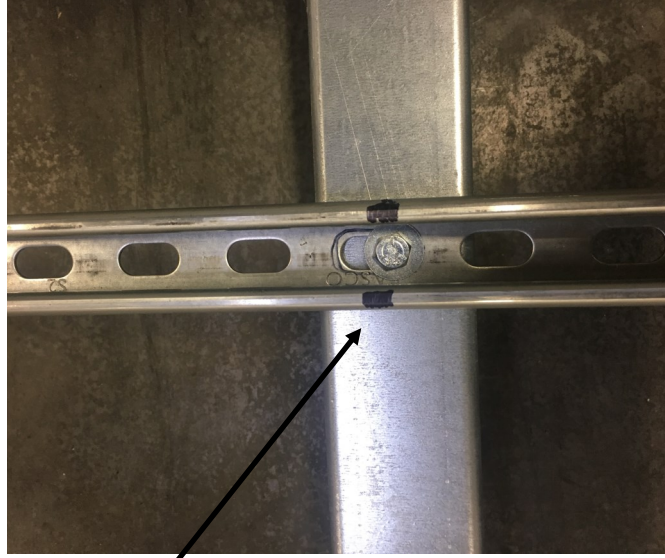
Top of Rack or North Side



Bolt sits on the top of the slot



Bolt sits on the bottom of the slot

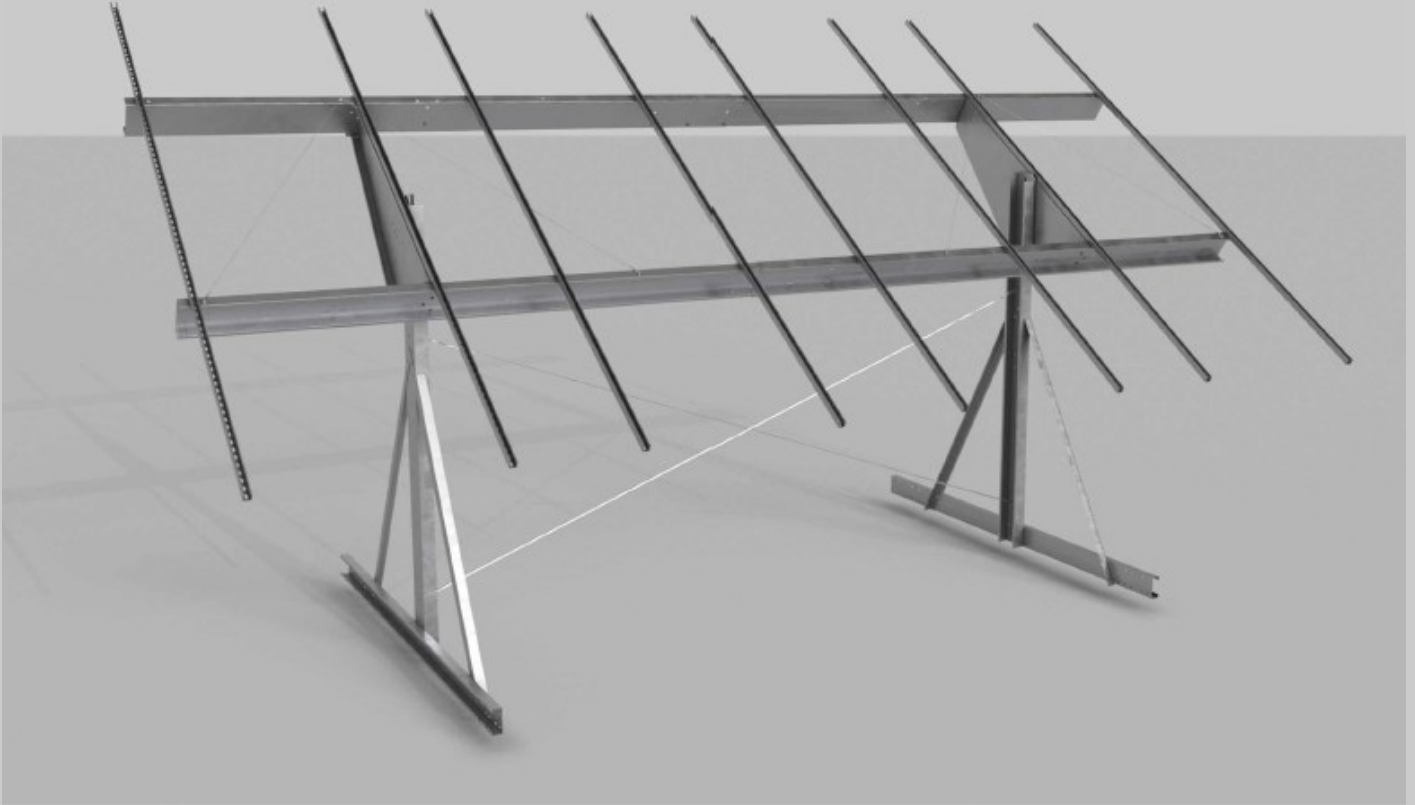


Bottom of Rack or South Side

- Before installing the purlins pre-mark both ends of the purlin with the slot that is 35 inches or the 18th slot from the ends of the purlin.
- The beam may sag slightly in the center of the rack so you may need to push up on the bottom beam to align the 18th slot for the bolt.

Step 11:

Once completed, you should have eight purlins installed.



Step 11a:

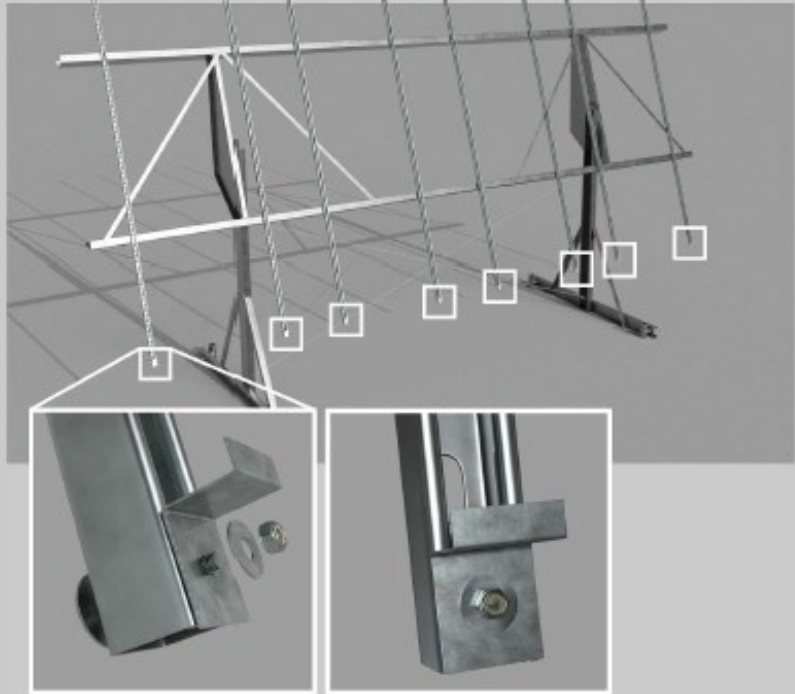
Install four inverters.

Refer to “Inverter Placement Map” for location and positioning instructions.

Step 12:

Install the bottom (south) Z-clips to the lower end of the purlins.

The fender washer will be on the bottom of the purlin with the Z-clip on the top.



Step 13:

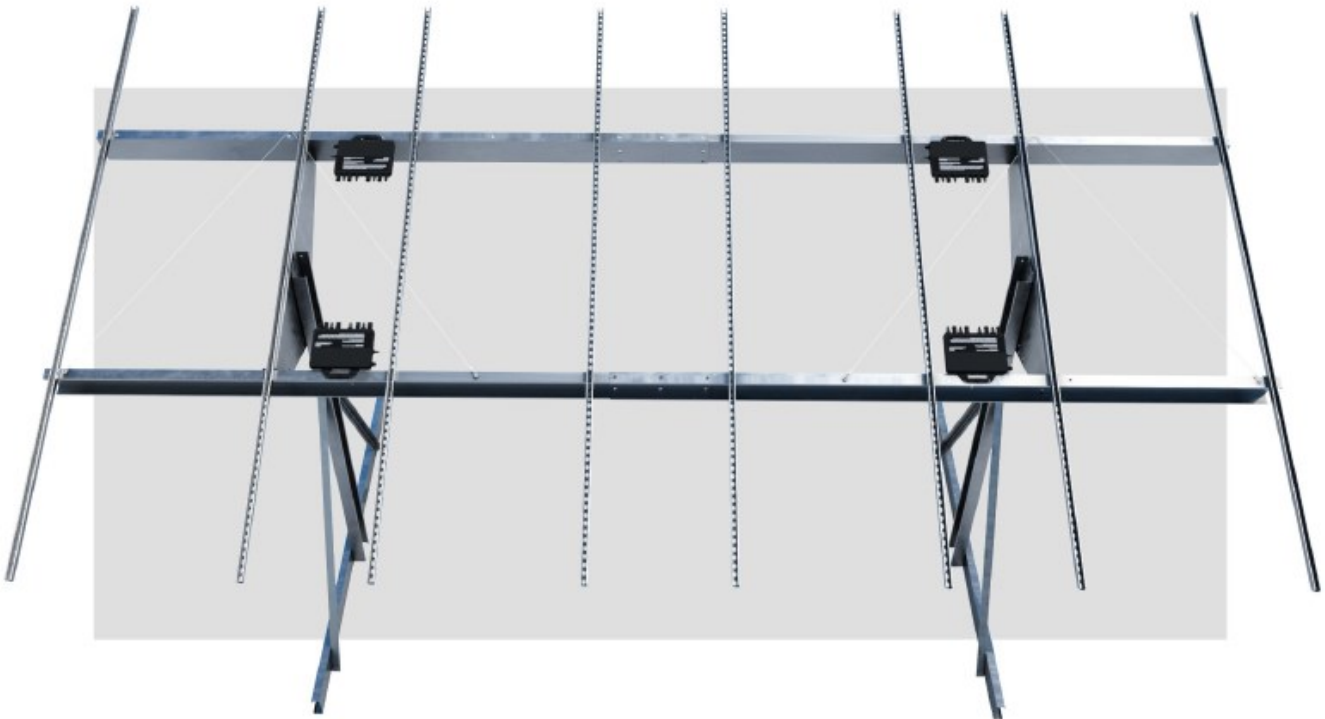
Insert the first module into place at the end of the rack.

The panel should be in landscape position. Final adjustments will be required once the first row of panels is completed, to center the panels.

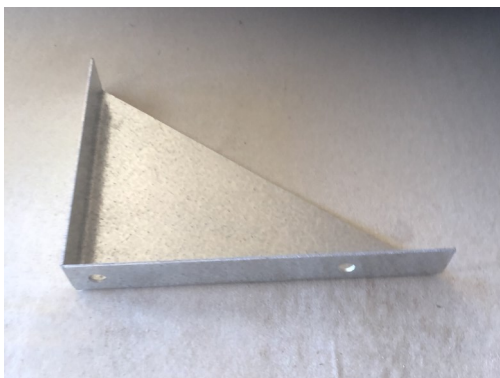
Refer to Step 13a for panel bolting/bonding washer details.



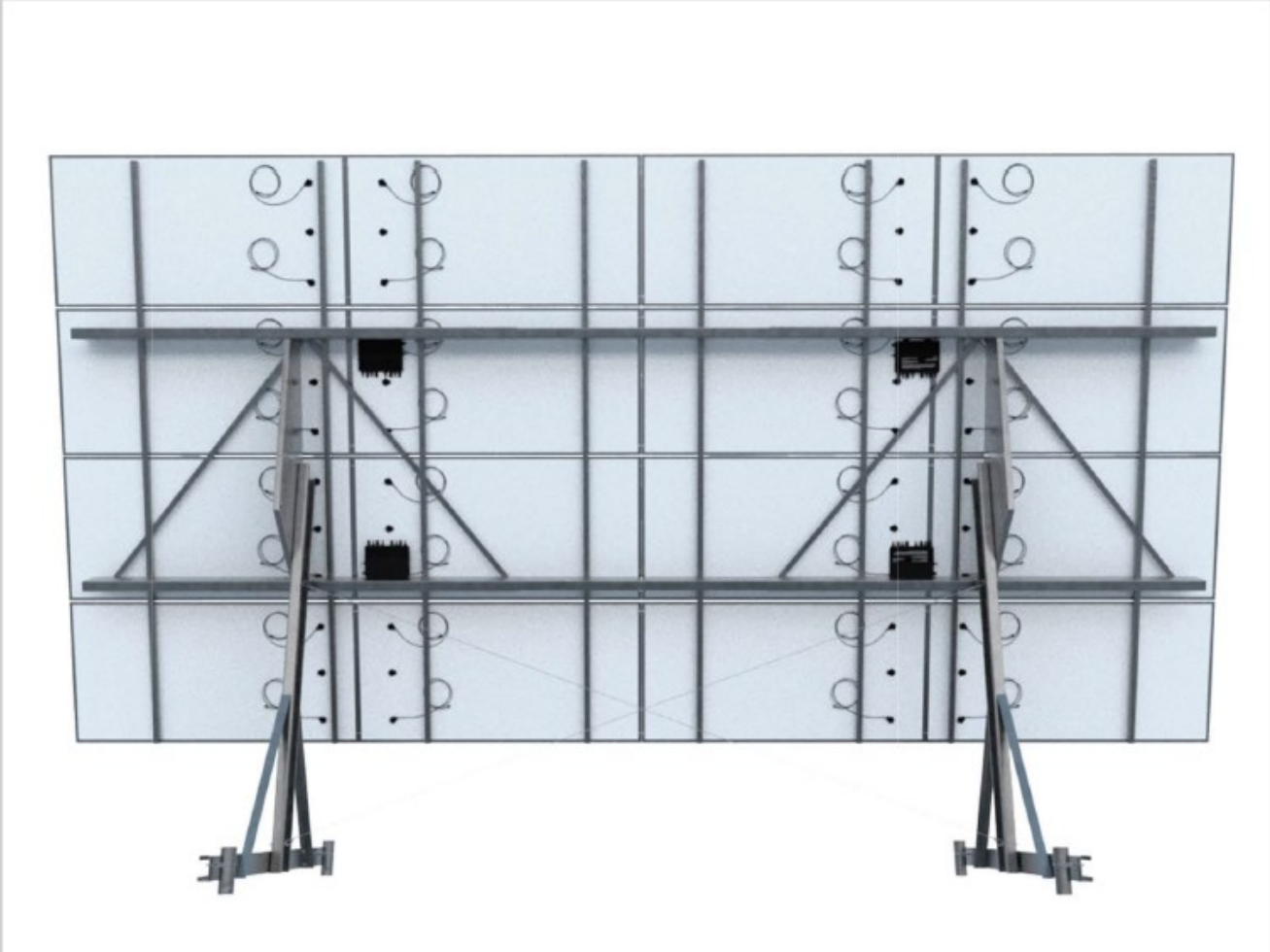
Inverter Placement Map



- Place inverter midway between the two purlins where the 2 pre-drilled holes are.
- Bolt on with larger washer on top of the inverter.
- Install microinverters prior to installing solar panels.
- Install Triangle inverter support under the inverters at pre-drilled holes.
- Remove one bar code sticker from each inverter and place in corresponding location on connection map.



Solar Panel Layout



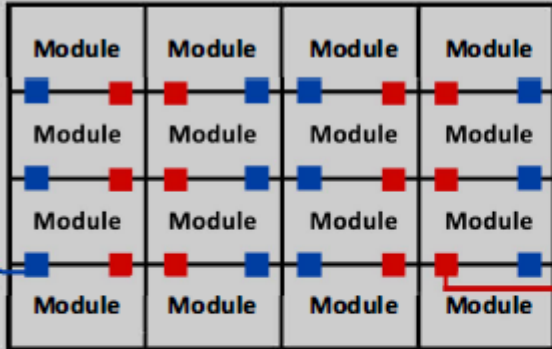
Mount the panels so the wire end of the panels are next to each other.

If mounted correctly, all of the wires should be as close to the inverters as possible.

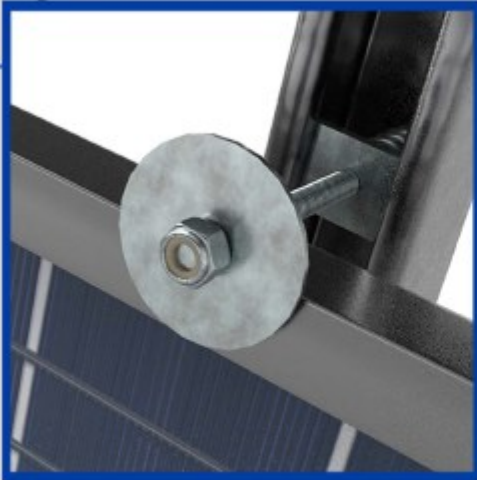
Step 13a:

Panel Bolting Detail

Bonding washers are to be used one time only. If any modules are removed and replaced, new bonding washers must be installed.



Bonding Washer



No Bonding Washer, Fender Washer on top only



Bonding Washer inserted between solar panels and bottom fender washer

- Spring-bolts with, 5/16" studs, placed into the purlins,
- A 5/16" fender washer,
- An AKS bonding washer,
- Two solar modules placed - one on either side of the protruding stud,
- A fender washer placed on to the stud,
- A 5/16" Nylok nut installed and **torqued to 12 -15 lb-ft** once solar panels are in position on each side of fastener

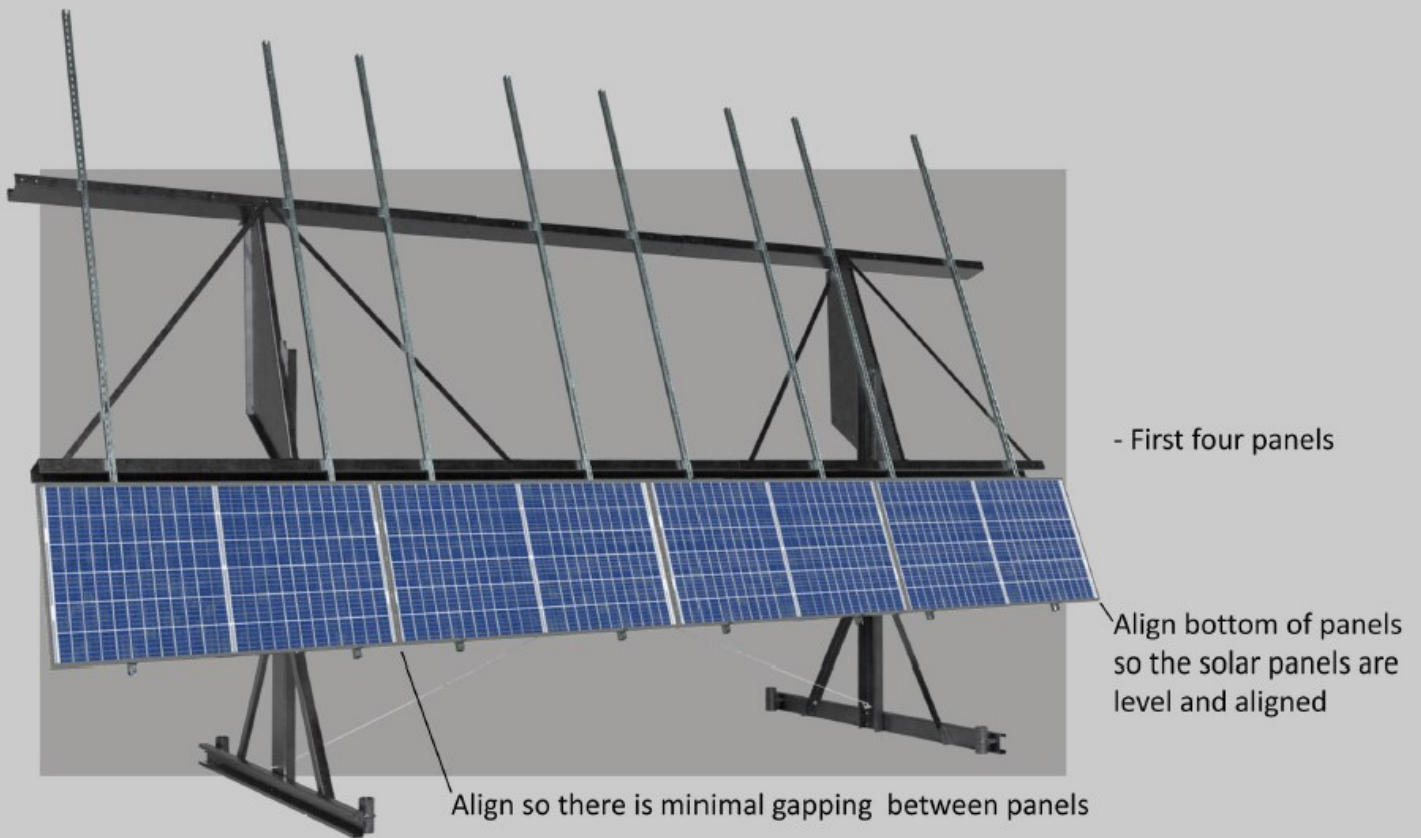
Step 14:

Continue Installing Remaining Solar Panels:

Install the rest of the bottom row of panels. Make sure they are carefully aligned with each other along the top and bottom before moving on to the next row.

If they are misaligned, loosen and adjust the Z-clips until the panels are aligned, then retighten the Z-clip fasteners. Also, check to see if the amount of the panel overhanging past the outside purlins is approximately equal, and adjust if necessary.

After any adjustments to the bottom row alignment are complete, install remaining panels row by row.



Spring Clip Installation Note

Be aware when installing the solar panels on top of the spring clips bolt that sliding the panels along the spring clip bolt may cause the bolt to turn and unlock from the purlin below.

After installing the washer and nut on the spring clip bolt, check that the length of the bolt is consistent with the others. Pull on the solar panel to be sure the spring clip bolt is locked in place.

The solar panel will lift off if the spring clip bolt is not seated correctly.



If the clip has popped out of the purlin, you'll be able to tell by the spring clip bolt being longer.



The clip should remain in the trench of the purlin.

Step 14a Pt 1:

There are a number of ways to complete the solar panel installation.

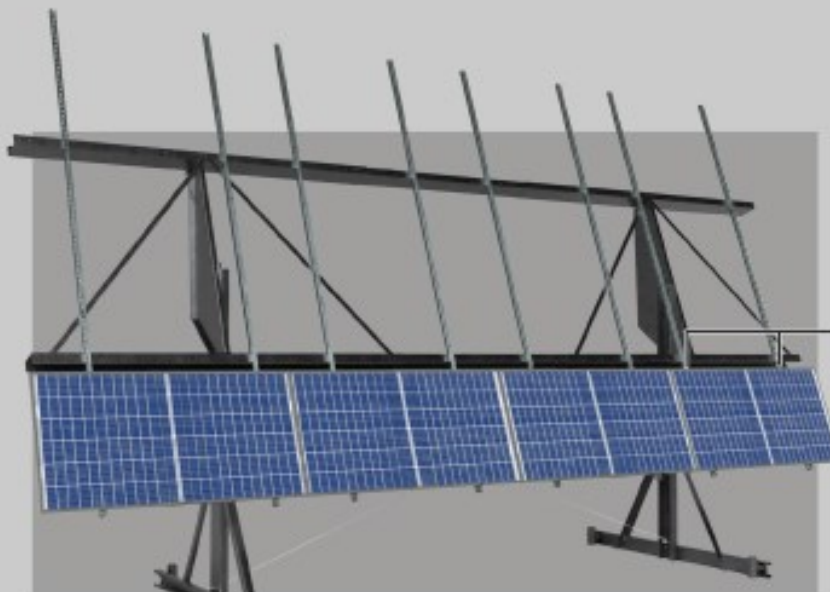
We have illustrated 3 methods. Determine which method you are the most comfortable with.

Always work safely, please consider your safety as well as the safety of others.

Solar Panel Installation Method #1:

Install the rest of the bottom row of panels. Make sure they're perfectly aligned with each other along the top and bottom before moving on to the next row.

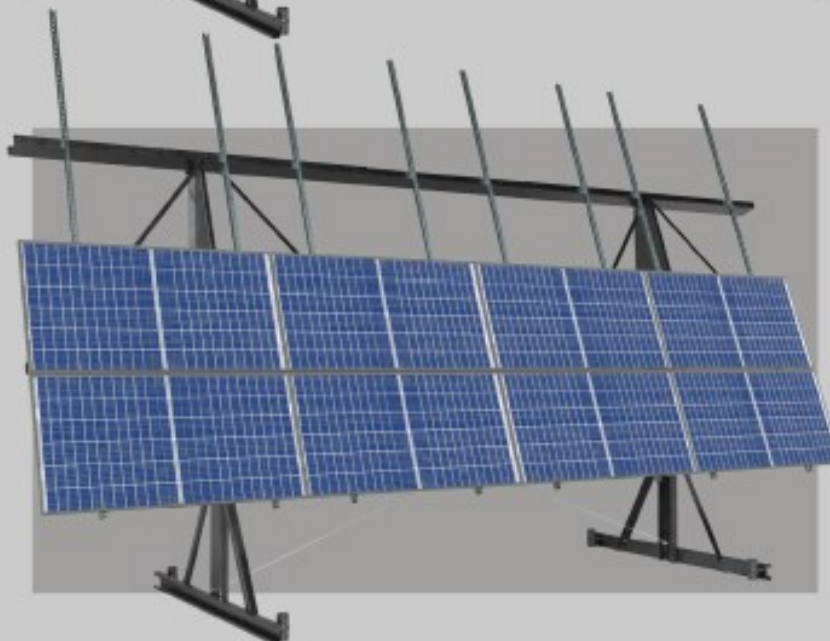
If they're misaligned, loosen the Z-clips and adjust the Z-clips until the panels are in place.



Refer to page _ for location and type of spring bolts and washers

Install spring bolts on all purlins to hold down solar panels.

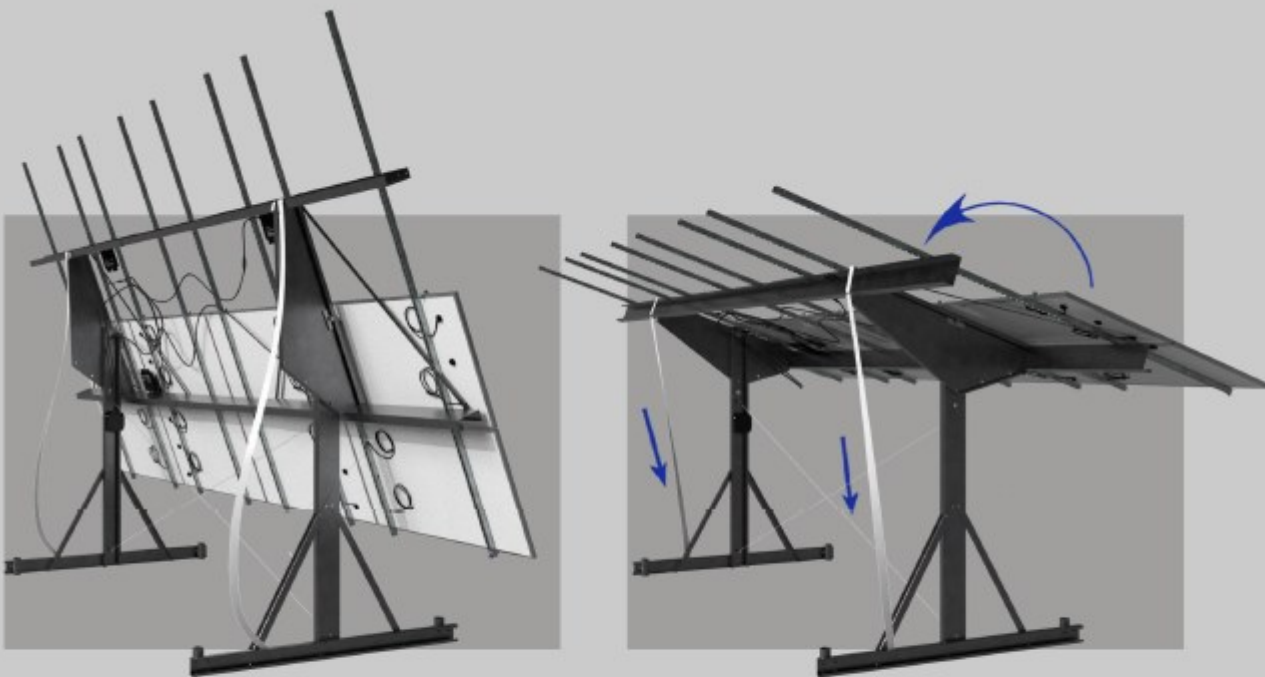
- *First four panels*



- *Next row of panels*

Step 14a Pt 2:

Once the second row of panels is installed, use straps and pullies to pull the system into the “Summer Position” (it’ll be too heavy to pivot by hand at this point in the process) and secure it with a bolt in the summer position.



From this summer position you will need ladders to install the last two rows of panels.

Step 14b:

Solar Panel Installation Method #2:

Install all solar panels with the racking in the “Summer Position”.



Step 14c:

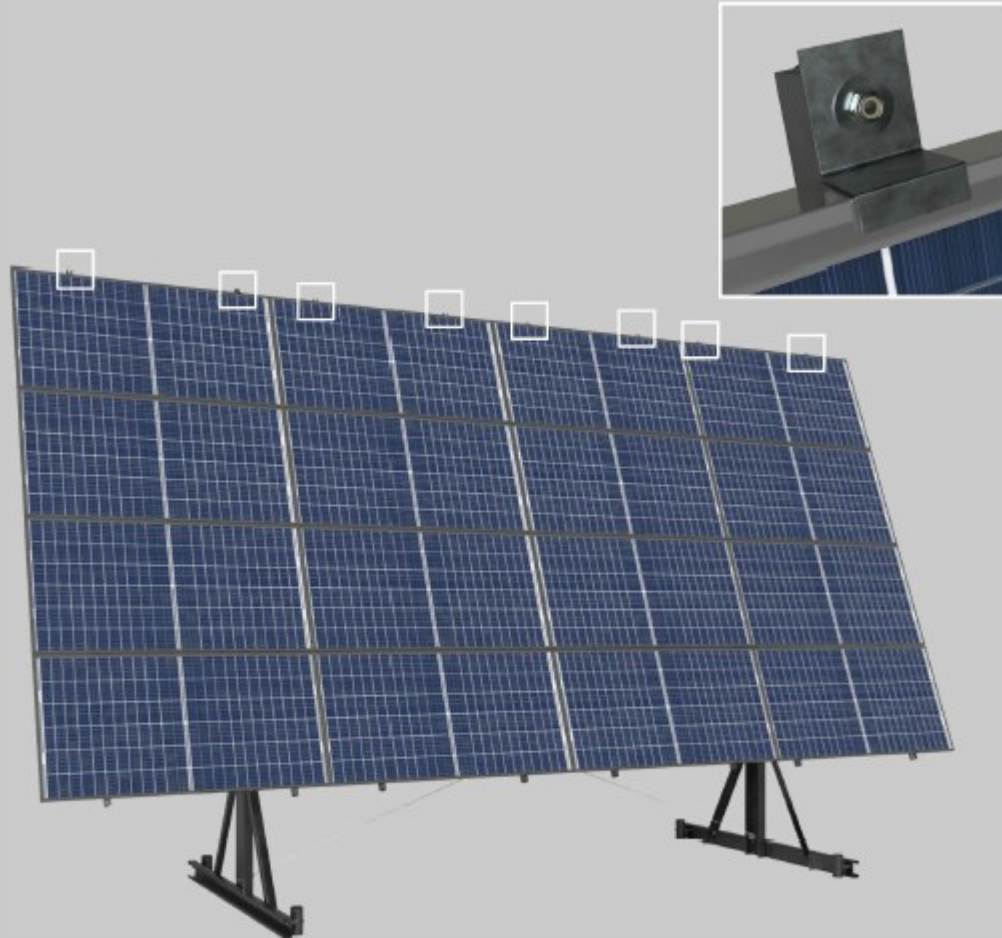
Solar Panel Installation Method #3:

If you have access to a manlift, it's best to keep the rack in the winter position as you install the panels. Install the solar panels row by row.



Step 15:

Install the top (north) Z-clips (with spring nuts hardware) on the top row. Ensure the grooves in the spring nuts remain engaged with the lip edges inside the purlins while tightening (if the end of the purlin is slightly deformed the spring nut may not remain engaged through the tightening).

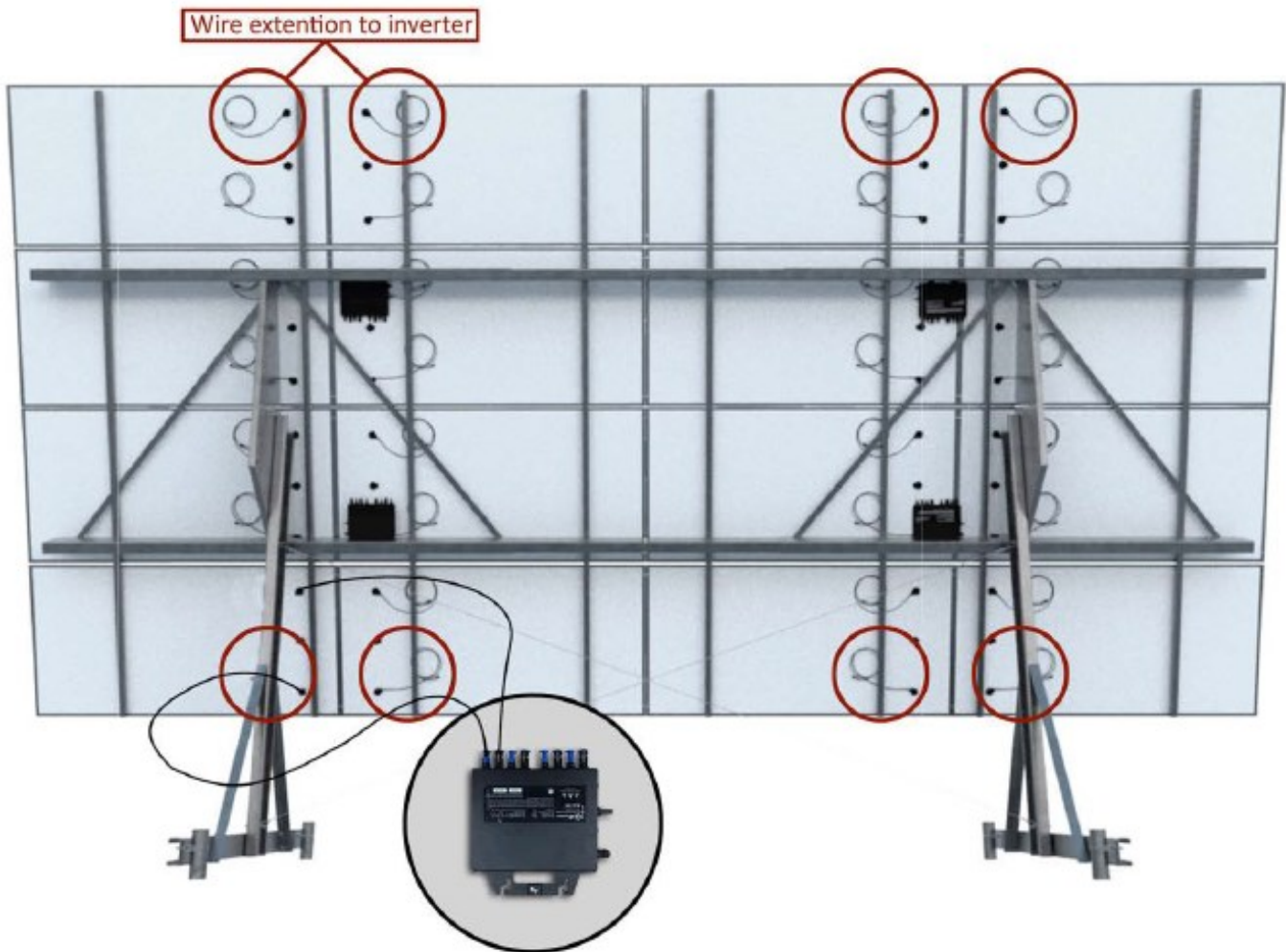


When rack and panels are complete, move to the “Summer Position” and tighten pivot plate bolts.

Do not leave racking units with solar panels partially completed in windy conditions.

Move to the “Summer Position” when possible if partially completed.

Solar Panel to Inverter Connection

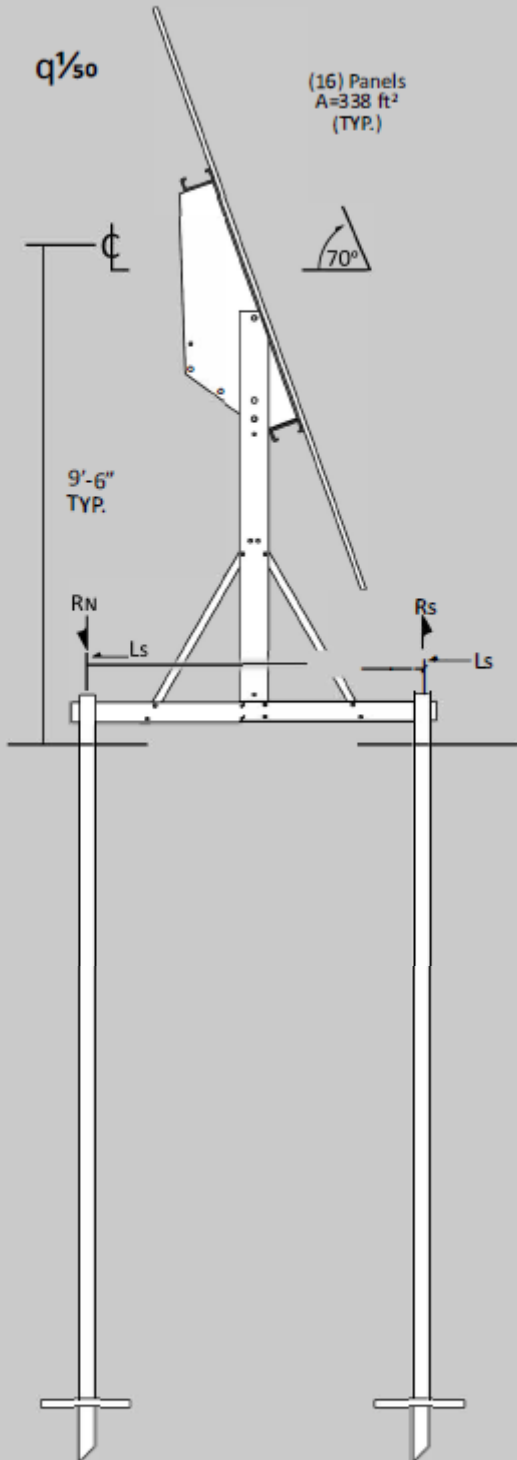


1. Each QS1 microinverter connects to 4 solar panels.
2. String the solar panel cables between the purlins and the solar panels where possible.
3. Connect the 2 cables from each solar panel side by side onto the inverter (image).
4. Press firmly to make the proper connection, you will hear a “click”.
5. Arrange the cables together and use zip ties to secure the cables.
6. Use 2 wire extensions per inverter.

Foundation Options for SunRanger

The SunRanger can be adapted to attach to most foundation types. Here are a few options:

Foundation Loads for SunRanger Solar Rack



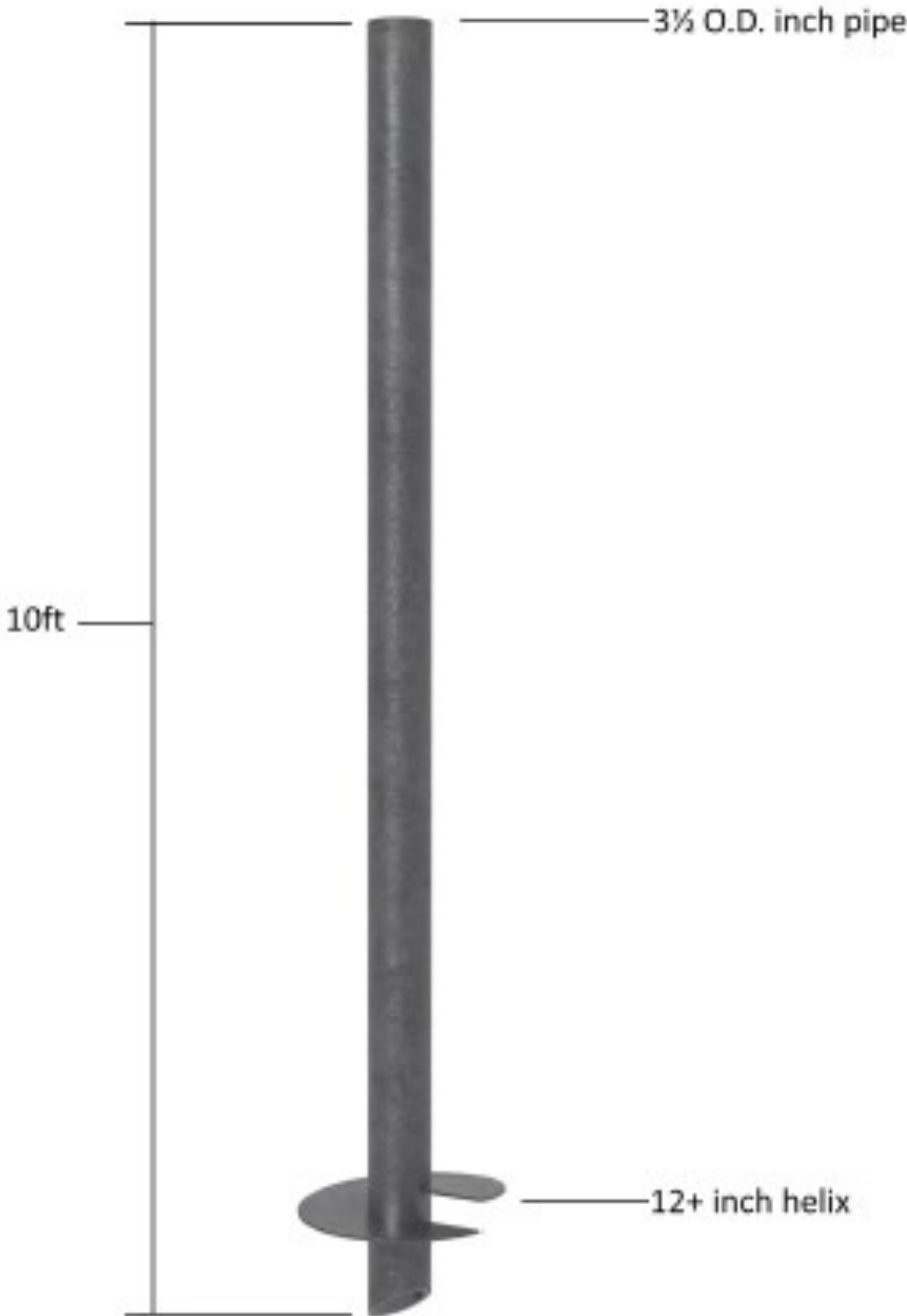
Hourly Wind Press., q/so (kPa)	equiv. vel. (kph)	Unfactored Vert. Resist. per anchor (+/- lbf)	Unfactored Lat. Resist. per anchor (+/- lbf)
0.30	80	1790	650
0.35	86	2145	760
0.40	92	2500	865
0.45	98	2855	975
0.50	103	3210	1085
0.55	108	3565	1190
0.60	113	3920	1300
0.65	117	4275	1410
0.70	122	4630	1515
0.75	126	4985	1625
0.80	130	5340	1735
0.85	134	5700	1840
0.90	138	6050	1950

As per 4.1.3.2.4 of the National Building Code, if overturning, uplift, or sliding is to be countered by ballast weight, 0.9 of that weight should be considered as acting in that regard.

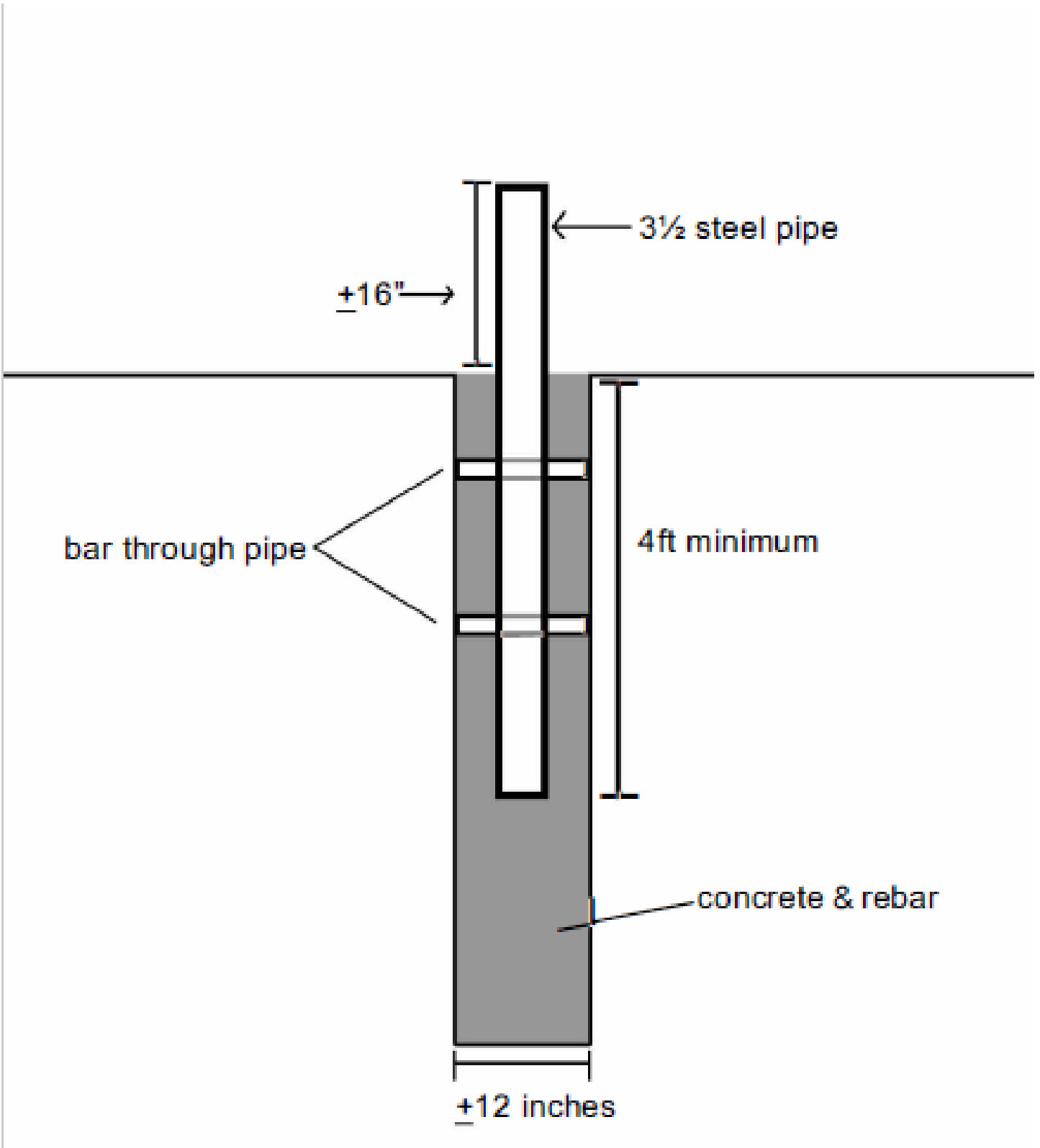
0.9 of the self-weight of the rack and PV modules has been applied to the required resistances provided.

Foundation requirements will vary by location and soil condition. Verify foundation type and capacity by a qualified foundation professional or installer.

Helical Screw Pile

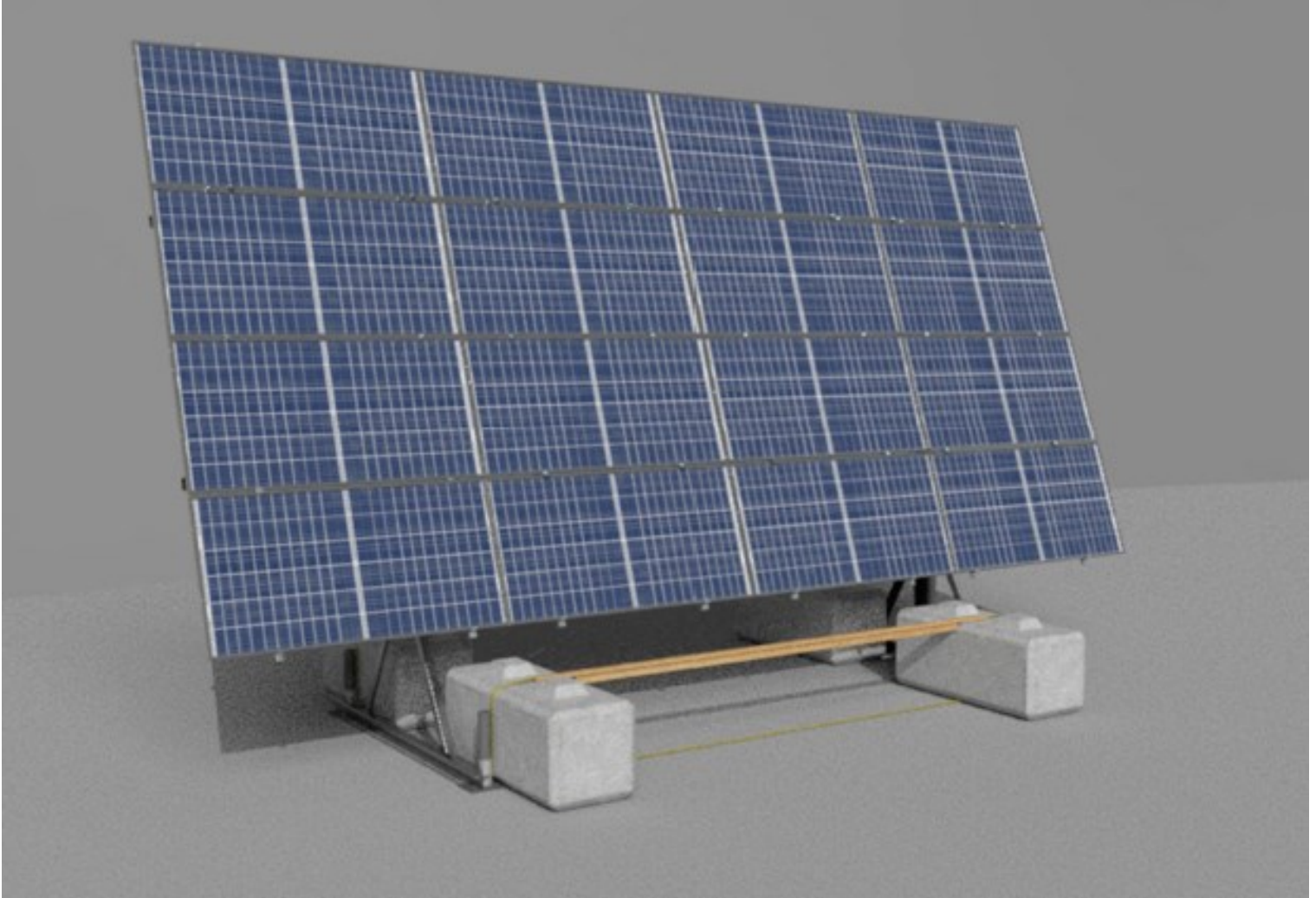


Steel Pipe in Concrete

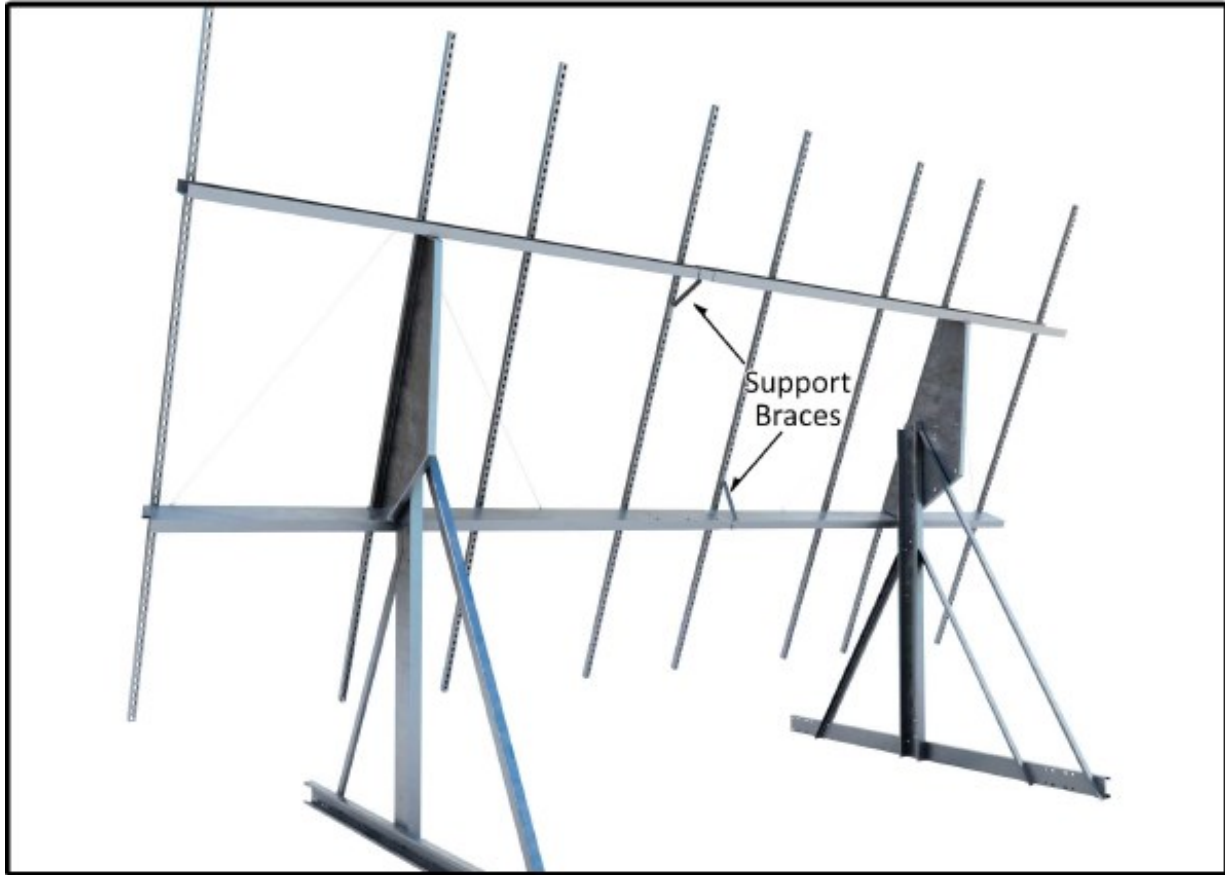


Note: Do not weld rebar.

Concrete Block Foundation



High Wind Support System

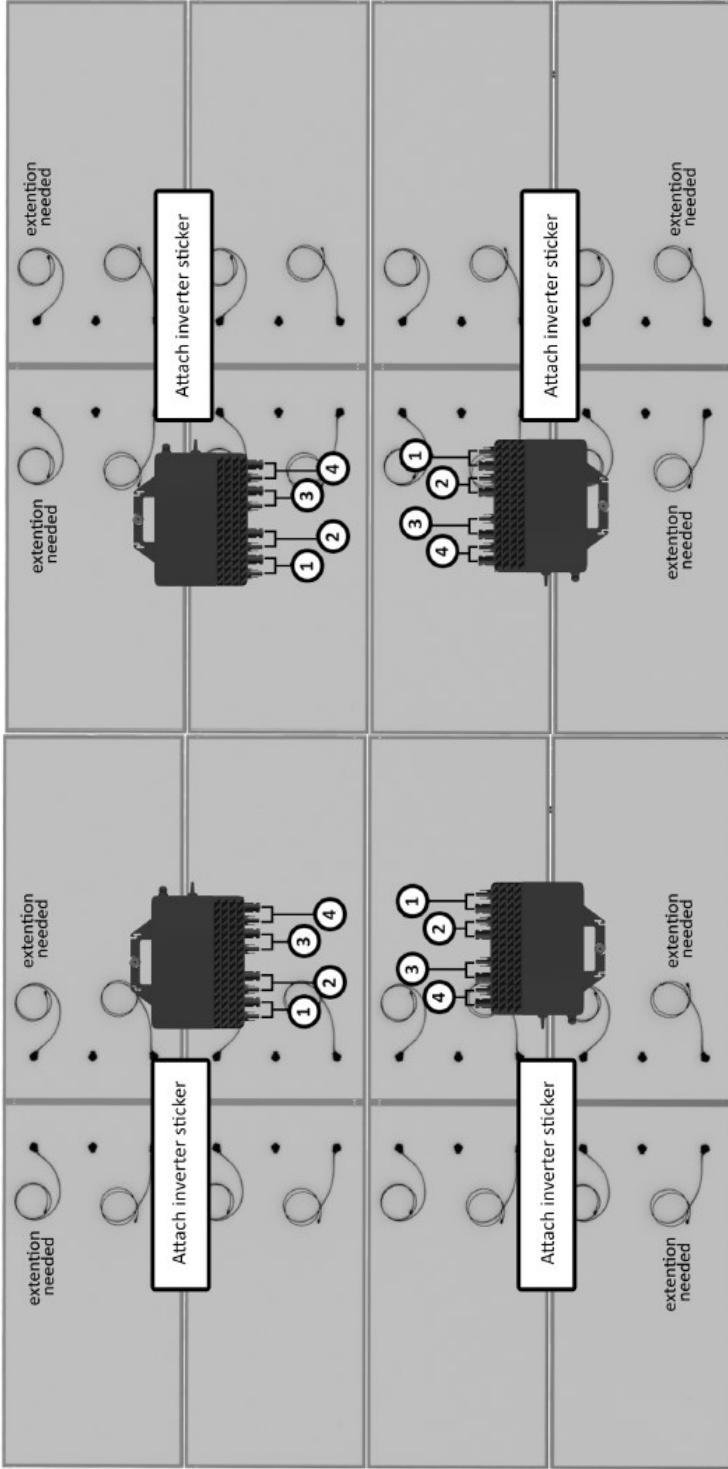


Connection Map

Rear View of Rack

Rack #: _____

Top of Rack



Bottom of Rack

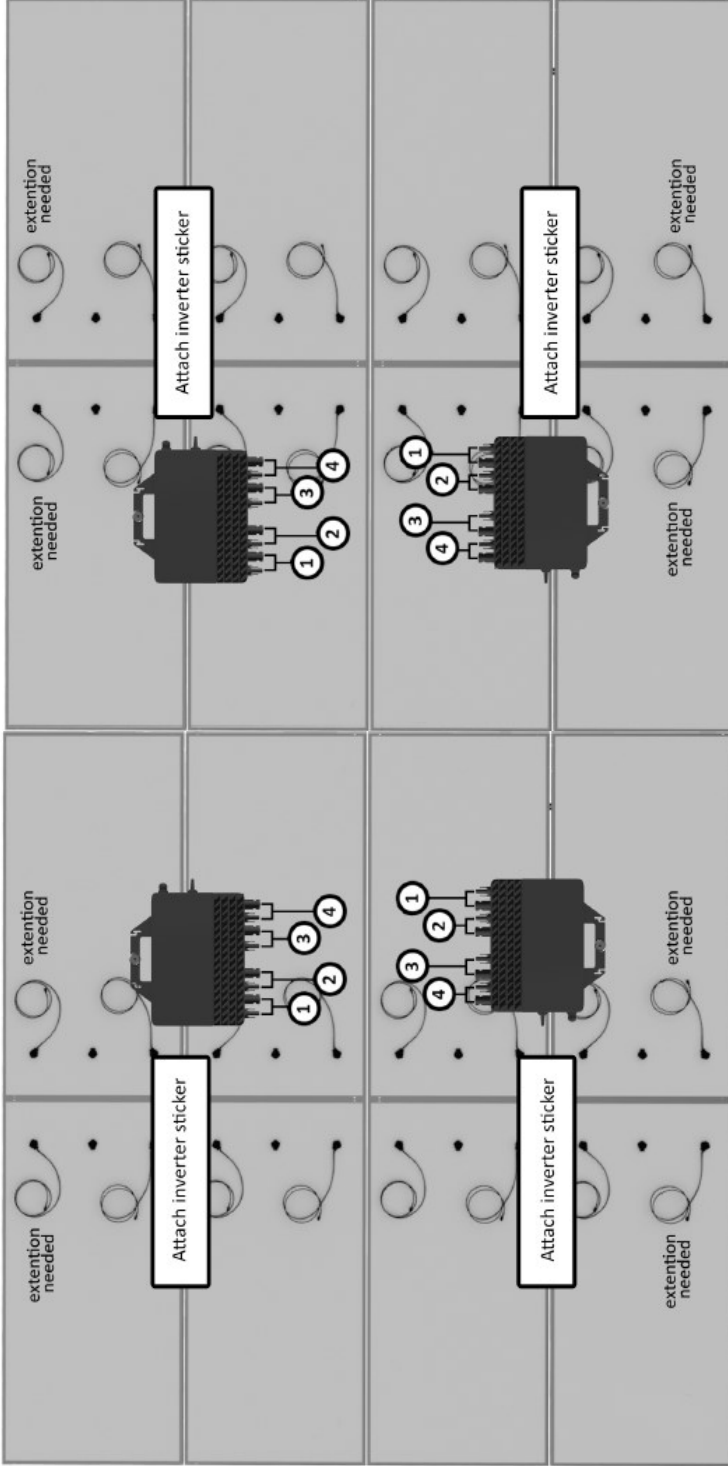
- Use one connection map per racking unit.
- Remove one bar code sticker from the inverter and place in corresponding location on the connection map.
- If you have multiple racks, number the connection maps in order of the racks from east to west.
- Write down ECU 12-digit registration # _____
- Please send a copy to Azgard Solar Inc. and keep a copy for your own records.

Connection Map

Rear View of Rack

Rack #: _____

Top of Rack



Bottom of Rack

- Use one connection map per racking unit.
- Remove one bar code sticker from the inverter and place in corresponding location on the connection map.
- If you have multiple racks, number the connection maps in order of the racks from east to west.
- Write down ECU 12-digit registration # _____
- Please send a copy to Azgard Solar Inc. and keep a copy for your own records.

Thank you for your purchase.
If you have any questions regarding these instructions please contact Patrick Fulawka.

Patrick Fulawka
Cell: (403)-815-8515
Office: (403)-235-5501

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