

SunRanger® Assembly Procedure

Seasonal Tilt Model ST-15L

(+/- 2382 mm x 1134 mm)

Panel dimensions vary by manufacturer;
please verify compatibility before installation.



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Pre-Project Checklist

Before beginning installation, be sure you have completed the following:

- ☐ Obtain necessary development/building permits, if applicable. Please check with your municipal office to confirm if additional permits are needed.
- ☐ Request line locates before beginning any ground-work or trenching.
- ☐ When preparing to install your system, lay all materials out first to allow for a simplified set-up. Secure your pallet(s) of panels; as you remove panels, the remainder may tip over and shatter if not secured.
- ☐ Before beginning your installation, please read pages 21 and 23 to ensure you have a thorough understanding of the correct procedure.

Important Notes & Recommendations

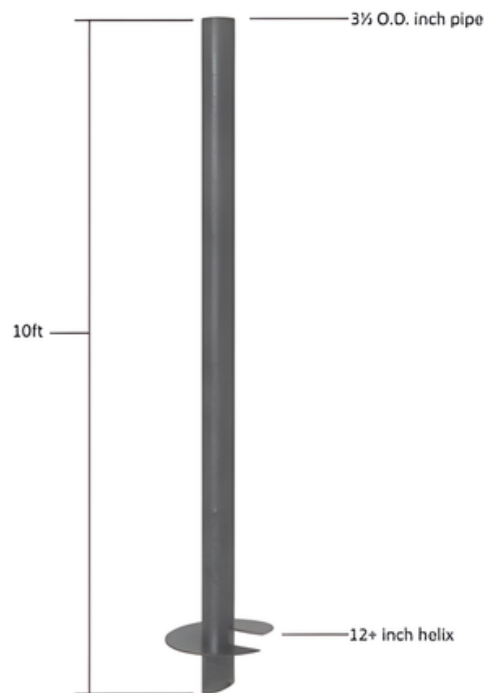
- If you are completing a self-installation, **you will need at least 2-3 people** as some components are quite heavy and will need to be maneuvered throughout the process.
- If you are completing the electrical work yourself, you will need to obtain disconnect stickers from a certified electrician. These will be required to pass your electrical inspection after project completion.
- Plan your work and follow safety precautions. Use eye protection, hearing protection and a hard hat during the installation.
- You may find it beneficial to have a 110V outlet installed in your solar system breaker panel, to plug in tools or your DTU/ECU.
- Remote monitoring may not function if your system is too far from your wi-fi source or does not have a clear line-of-sight. To avoid issues, consider running an underground ethernet cable when trenching to connect the system directly.

Should you have any questions during the installation process or if you require assistance, please contact our office at 403-236-5501

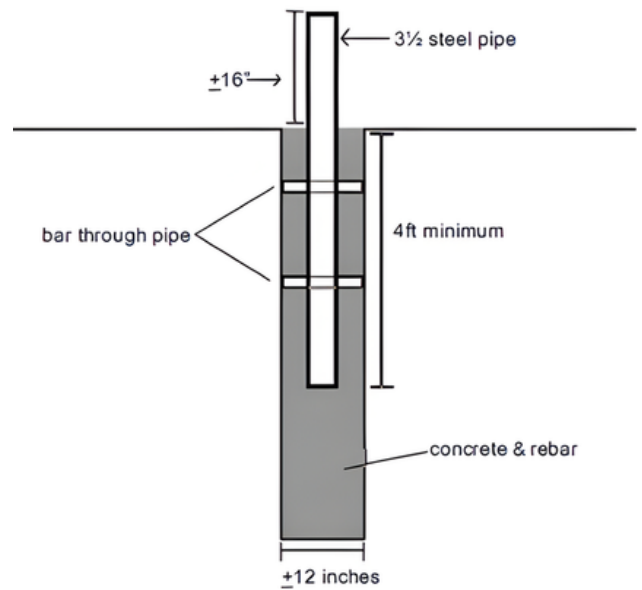
Foundation Options for SunRanger

The SunRanger can be adapted to attach to most foundation types:

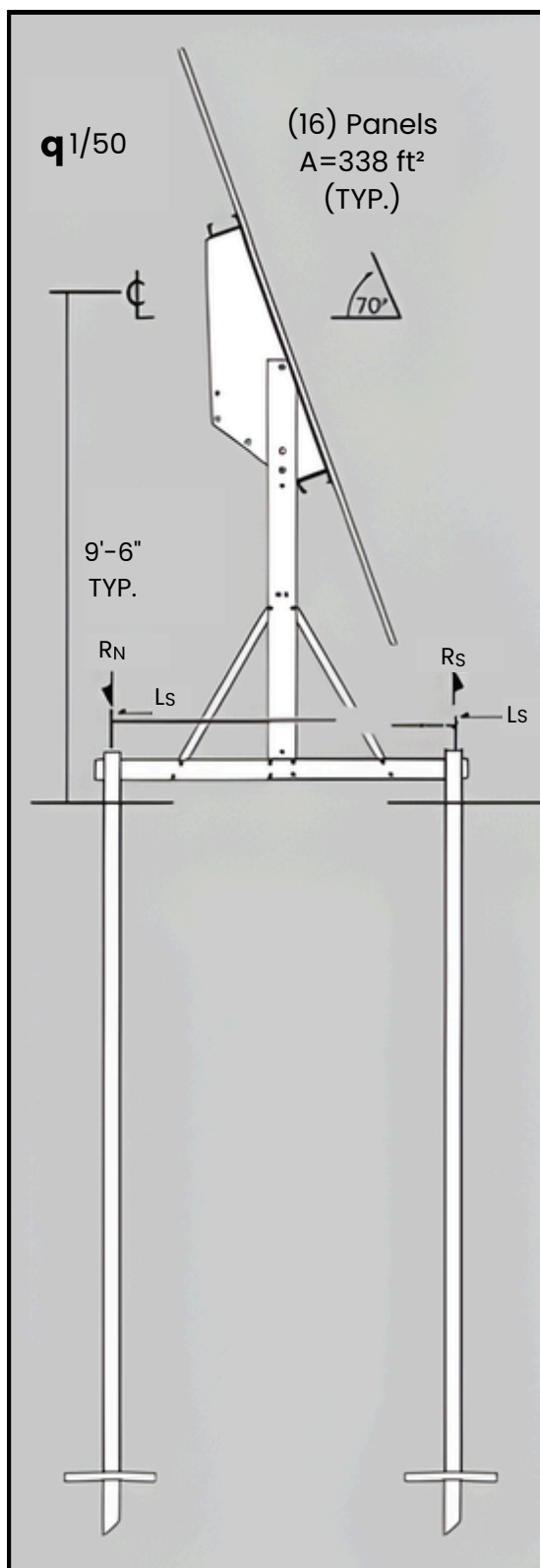
Helical Screw Pile



Steel Pipe in Concrete



Foundation Loads for SunRanger



Hourly Wind Press., $q_{1/50}$ (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.

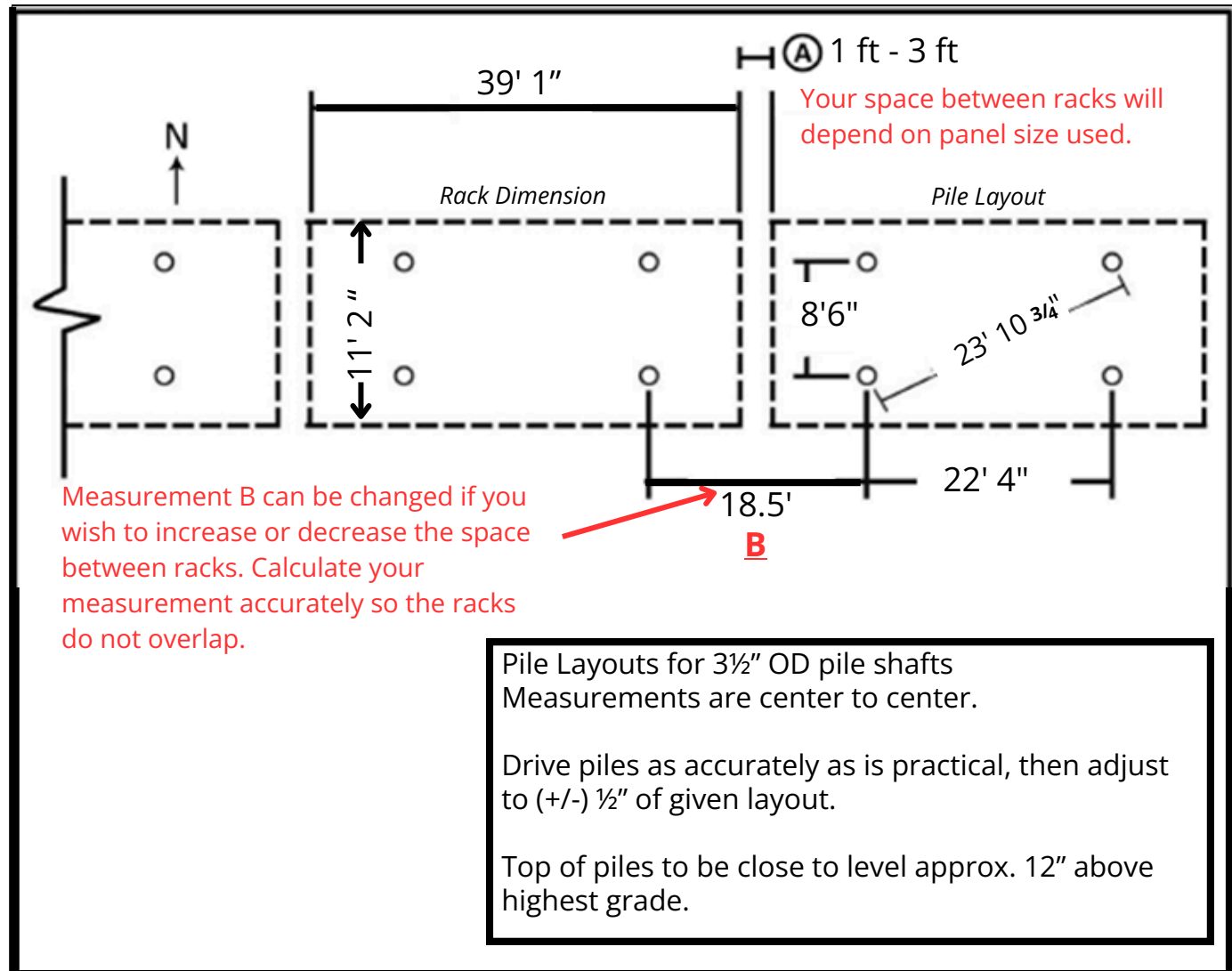
IMPORTANT

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

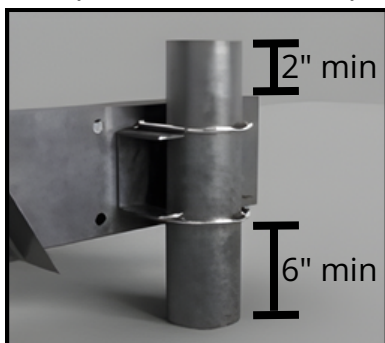
Helical Screw Pile Layout

Step 1:

Before beginning the ST-15L rack assembly, ensure that the screw-piles have been installed as per the layout diagram below.



- (A)** The distance between solar units will vary depending on the type and size of solar panels used, this space may vary between 1 ft - 3 ft.



Allow sufficient pile length so the leg beam is not on the ground or too close to the top of the pile.

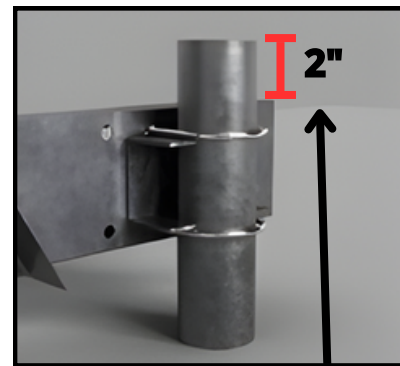
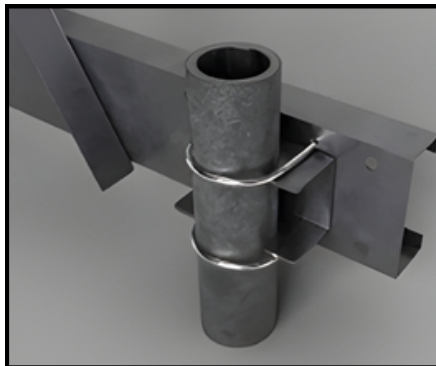
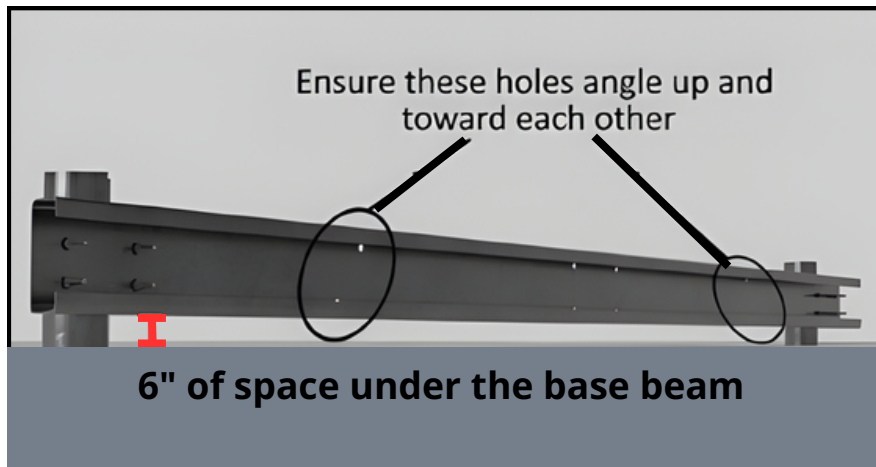
Base Beam Installation

Step 2:

If you are installing multiple racks in a line, all of the base beams should be at a similar elevation to prevent shading. To do so, **start with the rack where the ground is highest.**

Attach the base beams to the piles using the U-bolts and saddles. These two beams go on the outside of the piles with the flat sides facing toward each other. Ensure that the angled holes are oriented as shown in the top 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.



Top of U-bolt should be a minimum of 2" below the top of pile.



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

Important Note: The "long end" of base beam should be installed on the "North" pile location



Base Beam Add-on

IMPORTANT NOTE: ALL PARTS ARE LASER-ETCHED WITH DIRECTIONAL POSITIONING—EAST AND WEST

A) Drill 11/32" size hole in the slot provided through the screw pile.



B) Do not over size the hole. The 3/8 bolt provided is a thread cutting bolt and will need to be installed with an impact wrench.



C) Install a 3/8 bolt and washer provided with Loctite on threads.



D) Tighten bolt with impact wrench (Loctite optional)



Leveling Base Beams & Legs

1. Ensure your leg beams are horizontally level



2. Vertically level the legs as you are tightening the leg bolts



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



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



Pivot Plates

Step 3:

Method 1—Attach PRIOR to Erecting Vertical Leg Beams

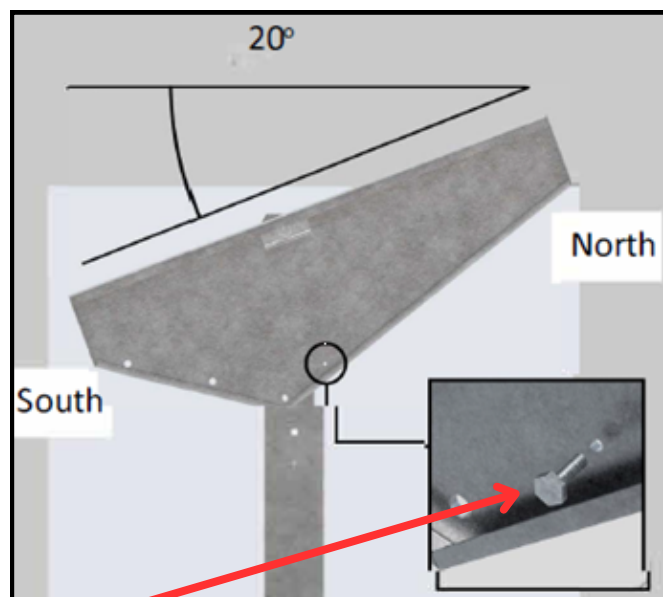
The pivot plate should be on the outside of each leg. The plate needs to be able to pivot easily around the top bolt, so do not tighten the bolts too much yet.

Move the pivot plate to the “Summer Position” by rotating the plate until the top flange is at a 20° 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.

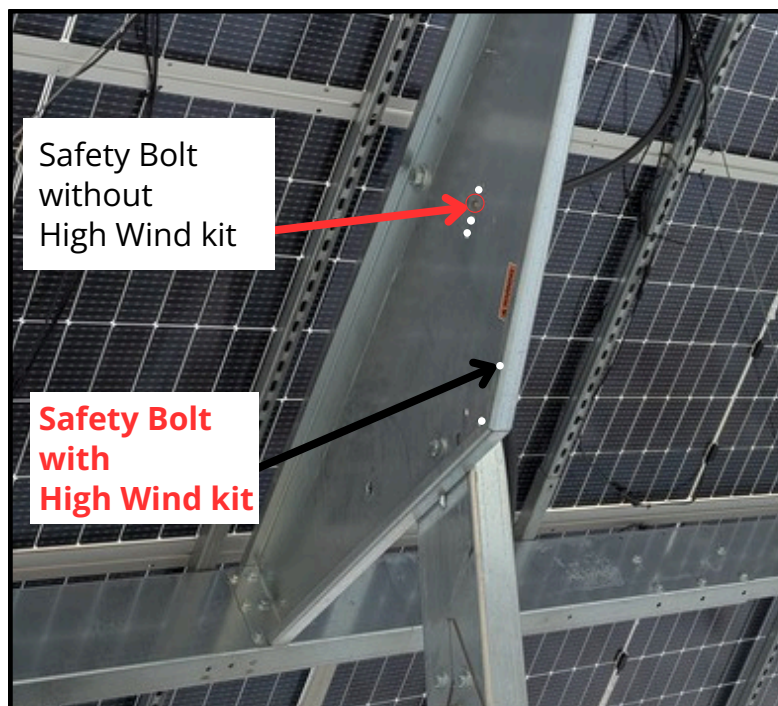
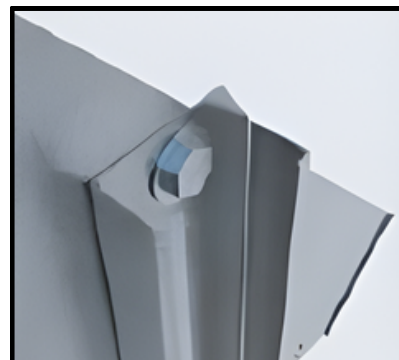
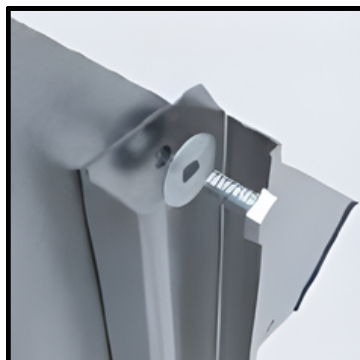
You will be changing the tilt at various steps.

Larger washer on each side. Lock washer on nut side.

Method 2—Attach AFTER Attaching Vertical Leg Beams



IMPORTANT: Ensure safety bolt is inserted before moving ahead with installation steps.



Insert a 1/2" bolt here facing inward to stop against the leg beam if over-tilted during installation

Leg Beams

Step 4:

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 serrated bolts past snug until the angle braces (next step) have had all fasteners loosely installed.

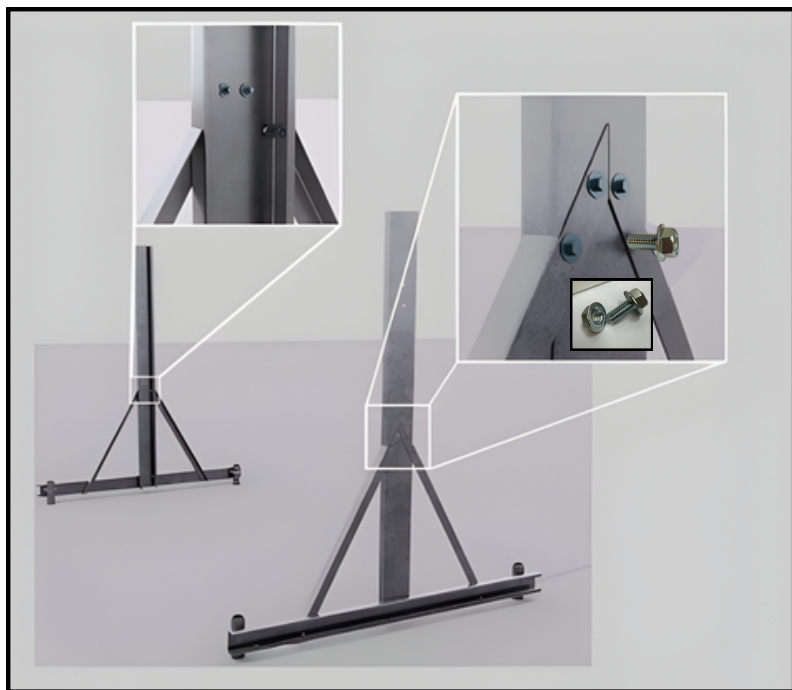


Step 5:

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).



Main Beams

Step 6:

The SunRanger racking has a three-part beam, which will have a center splice and two outer beams.

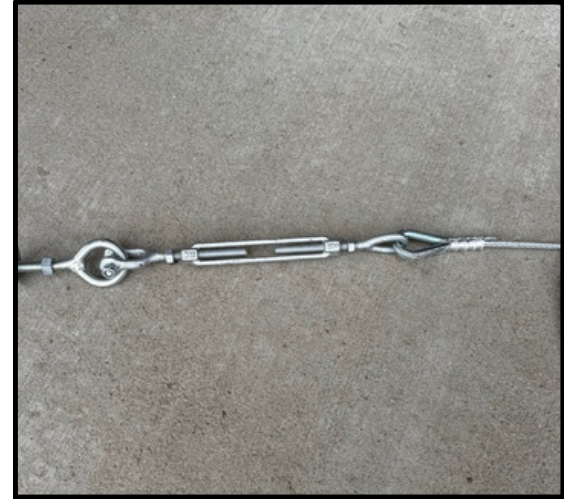
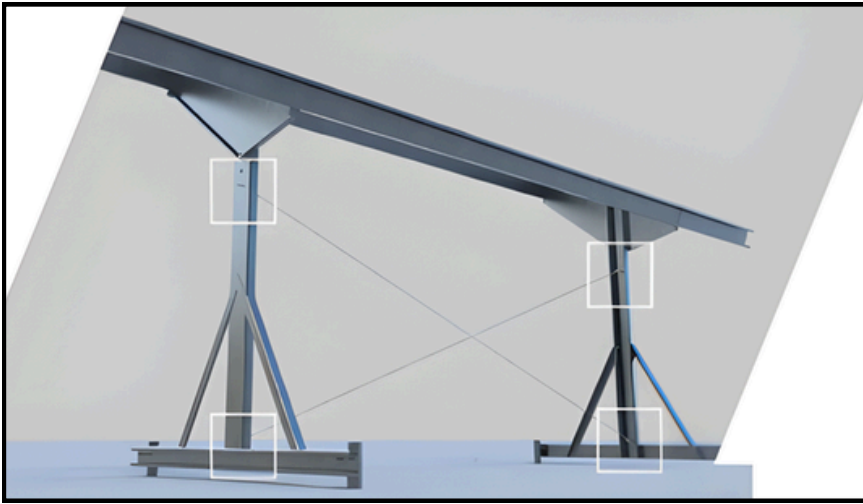


Loosely install all serrated bolts and nuts. **Tighten the top 3 bolts first**, then tighten remainder.

Leg Cross Cables

Step 7:

Prior to installing main beams, attach cross cables to the legs provide lateral support. The cross cables come pre-assembled and are attached using a nut and washer on either side of the leg beam. **Do not** tighten I-bolts past snug **until after step 9**.



You may have a complete cable assembly where the cable clamps mentioned below will not be necessary.

Tighten the turnbuckle to snug tightness. Do NOT over-tighten.



IMPORTANT! The cable clamp will be installed at the center of the cable-crossing **after solar module installation is completed**.

Main Beams

Step 8:

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

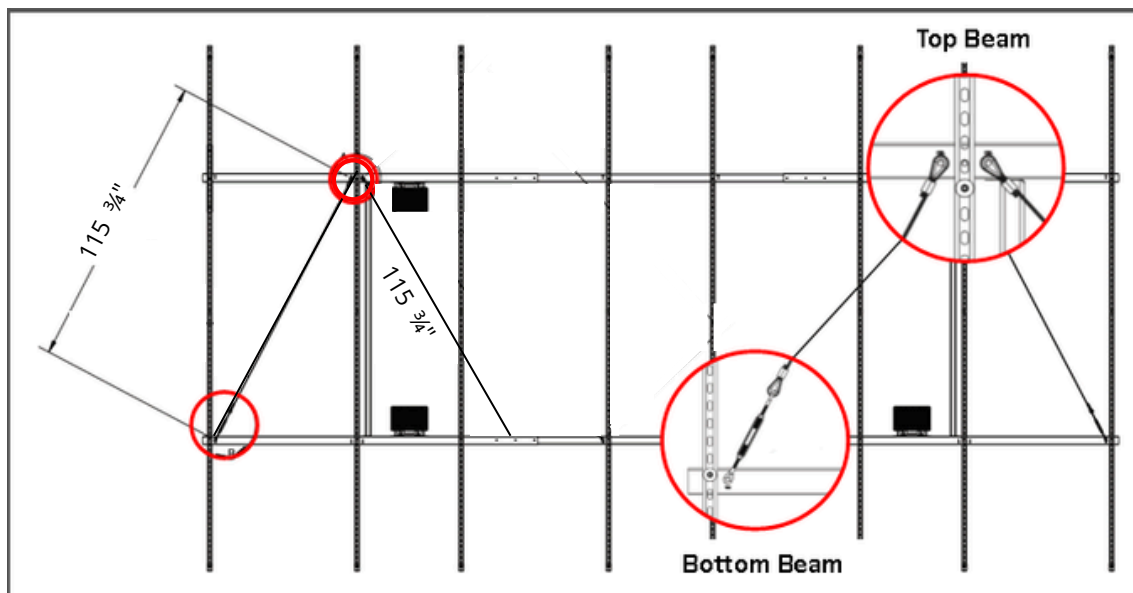


Install one fastener initially, then lift the other end and install all remaining fasteners. **Do not tighten fasteners until beam is in place.** Once all fasteners are in place, you may finish tightening all fasteners.

Top Truss Cables

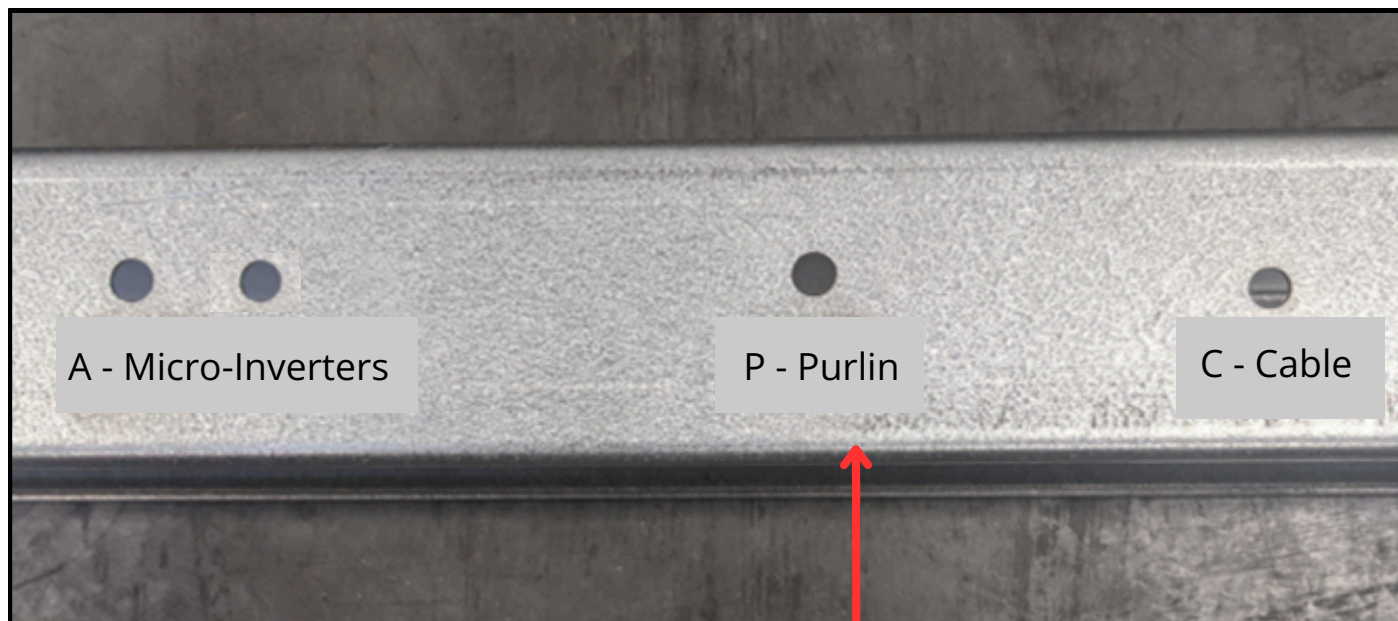
Step 9:

Attach Top Truss Cables to the main beams. All four cables are the same length, which will be attached to the "C" laser etched hole on the top of the main beams. See the following page for an assembly diagram. Tighten to snug, but do not overtighten until after all panels are installed.



Purlin Location

Step 10:

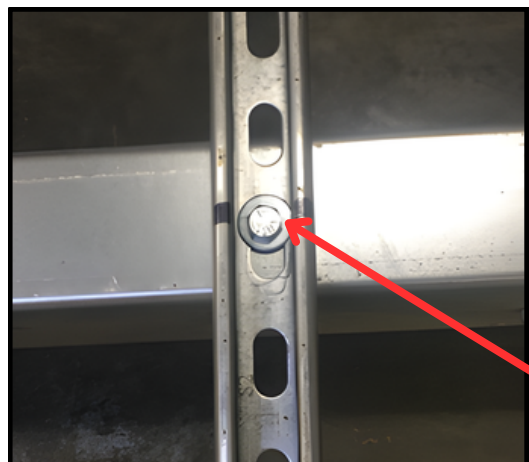
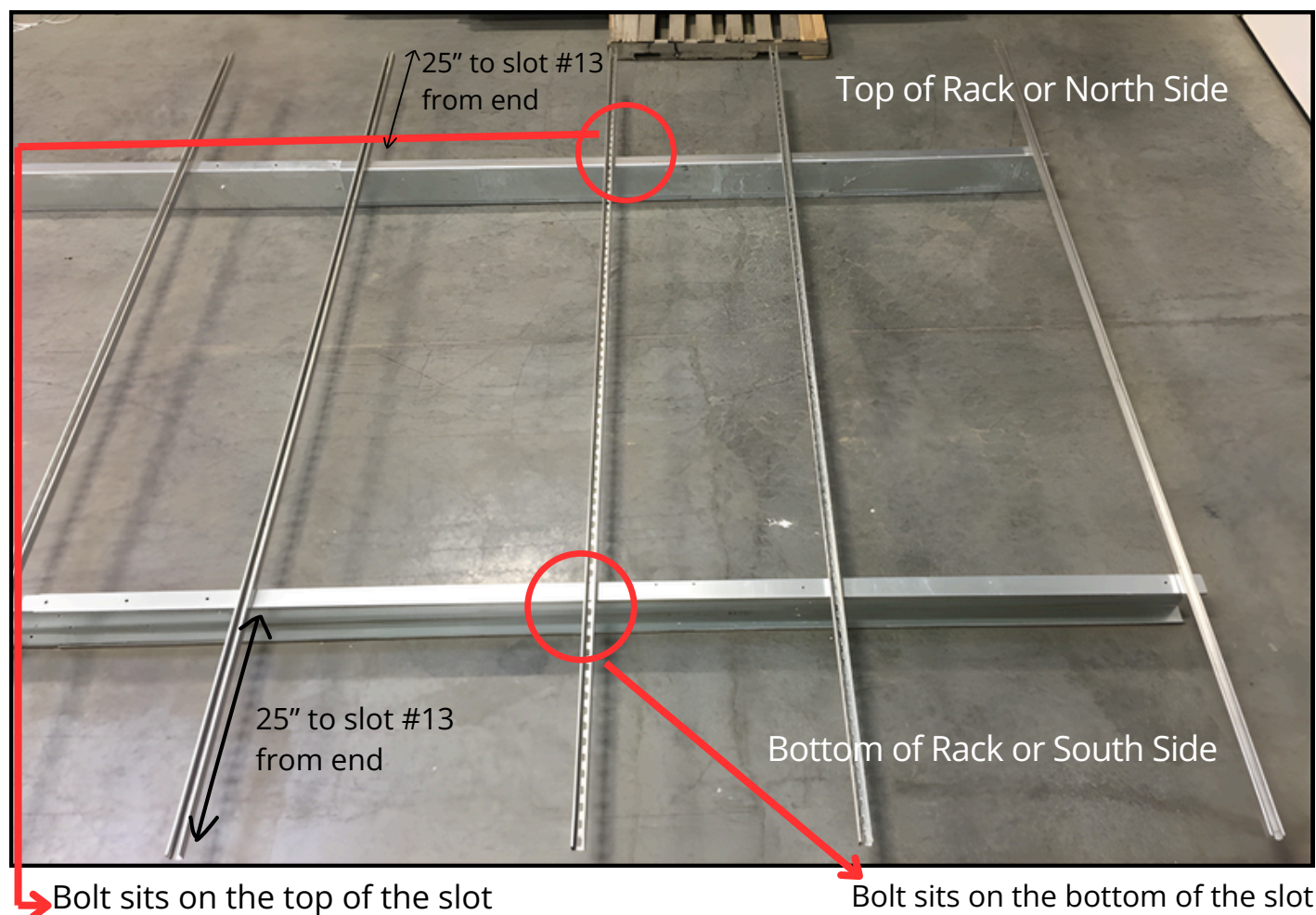


On the horizontal beam you will notice markings mounting, "P" for purlins and "C" for top truss cables.

Purlin Location

Before installing the purlins pre-mark both ends of the purlin with the slot that is 25" (inches) or the 13th slot from the bottom ends of the purlin as well as from the top of the purlins.

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 13th slot for the bolt.

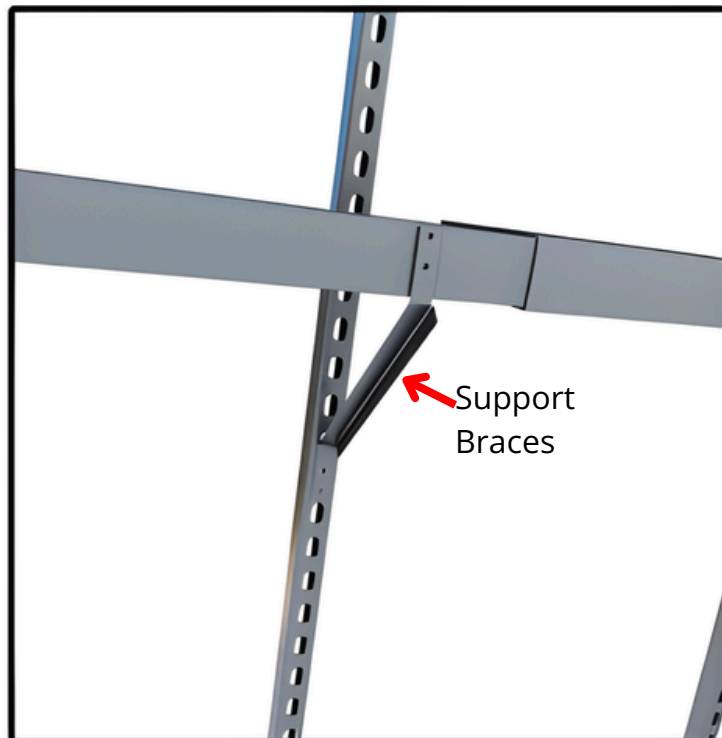
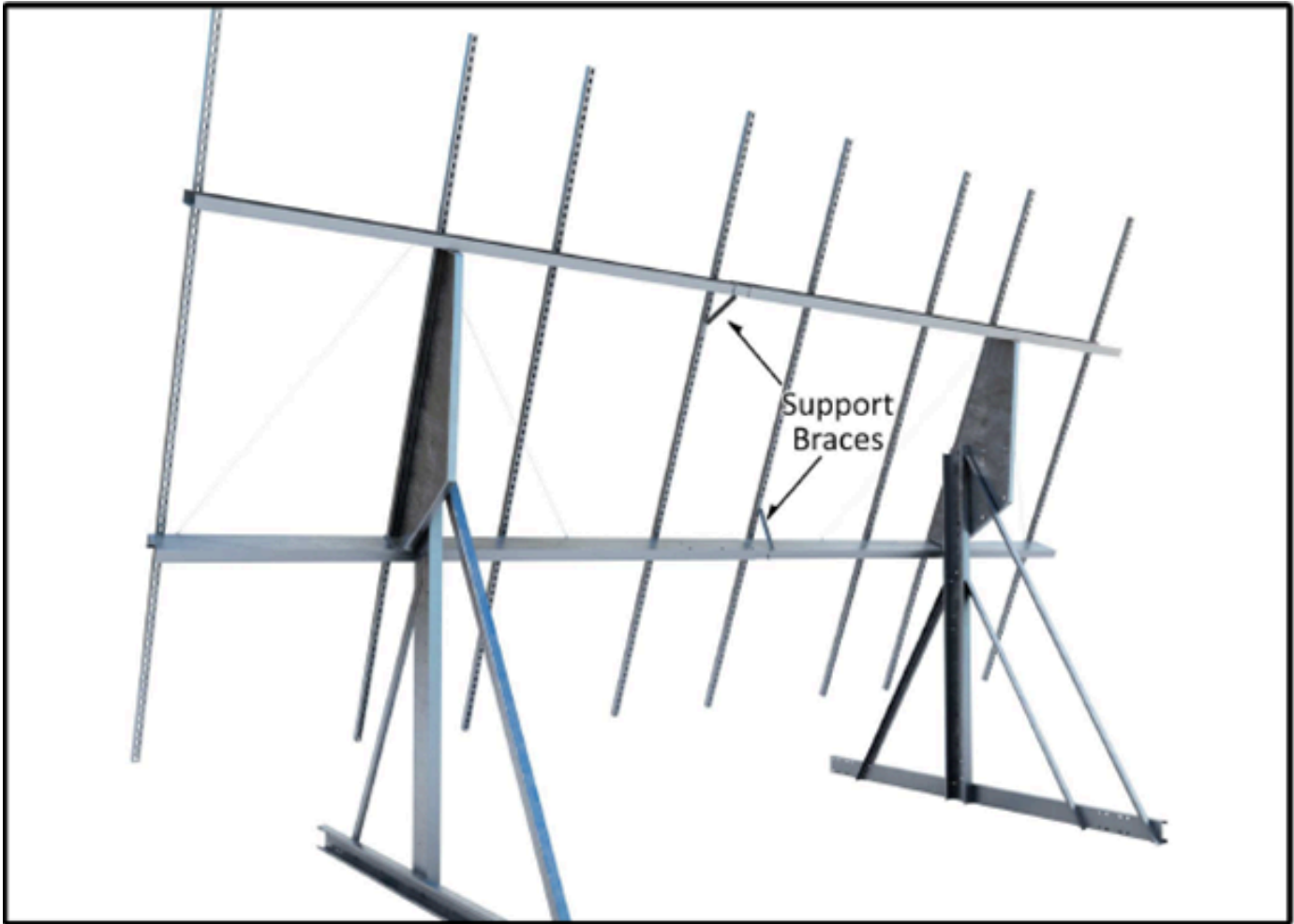


Note:

When installing the first bolt, ensure the purlin is pushed fully into the correct position. This will depend on which end you begin the purlin installation from, the top or bottom.



Purlin Support Brace

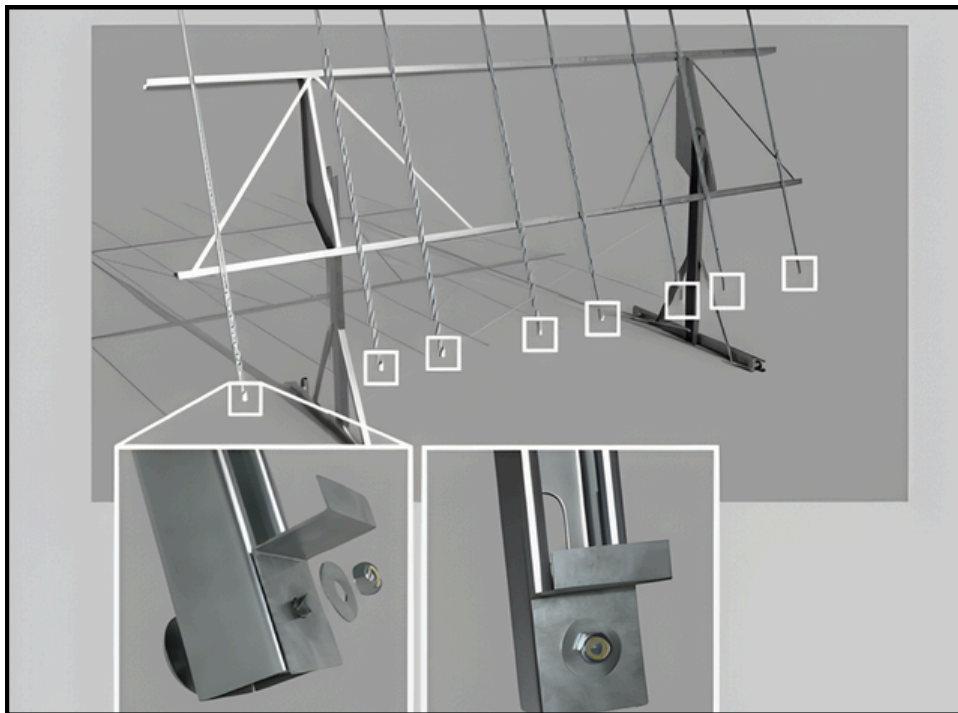


Solar Module Installation

Step 11:

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.

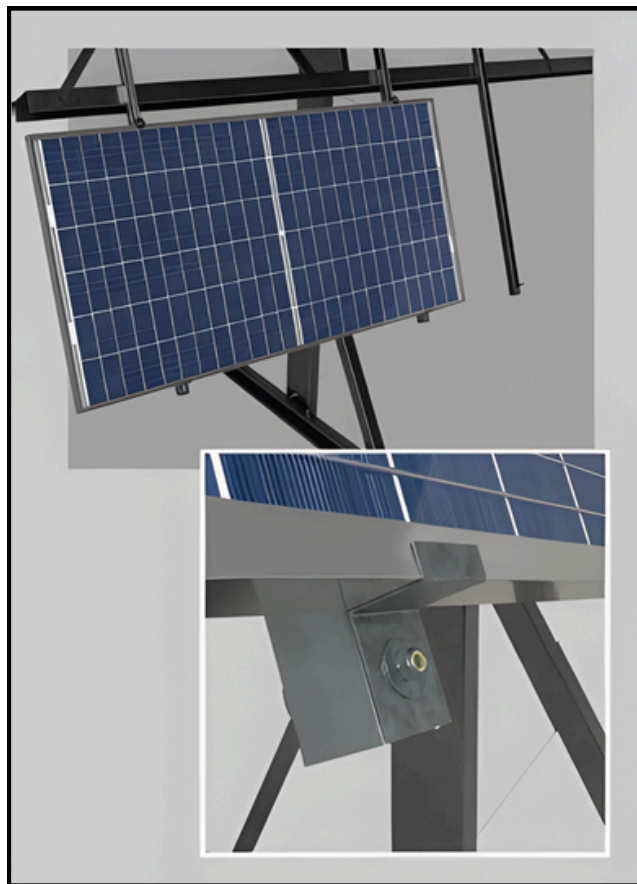
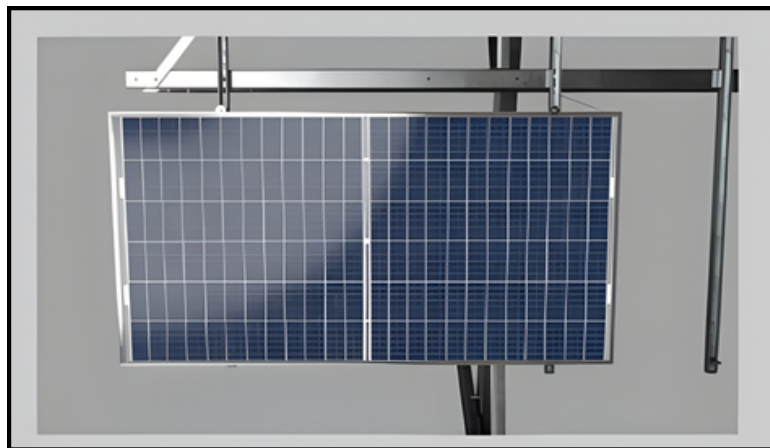


Step 12:

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.

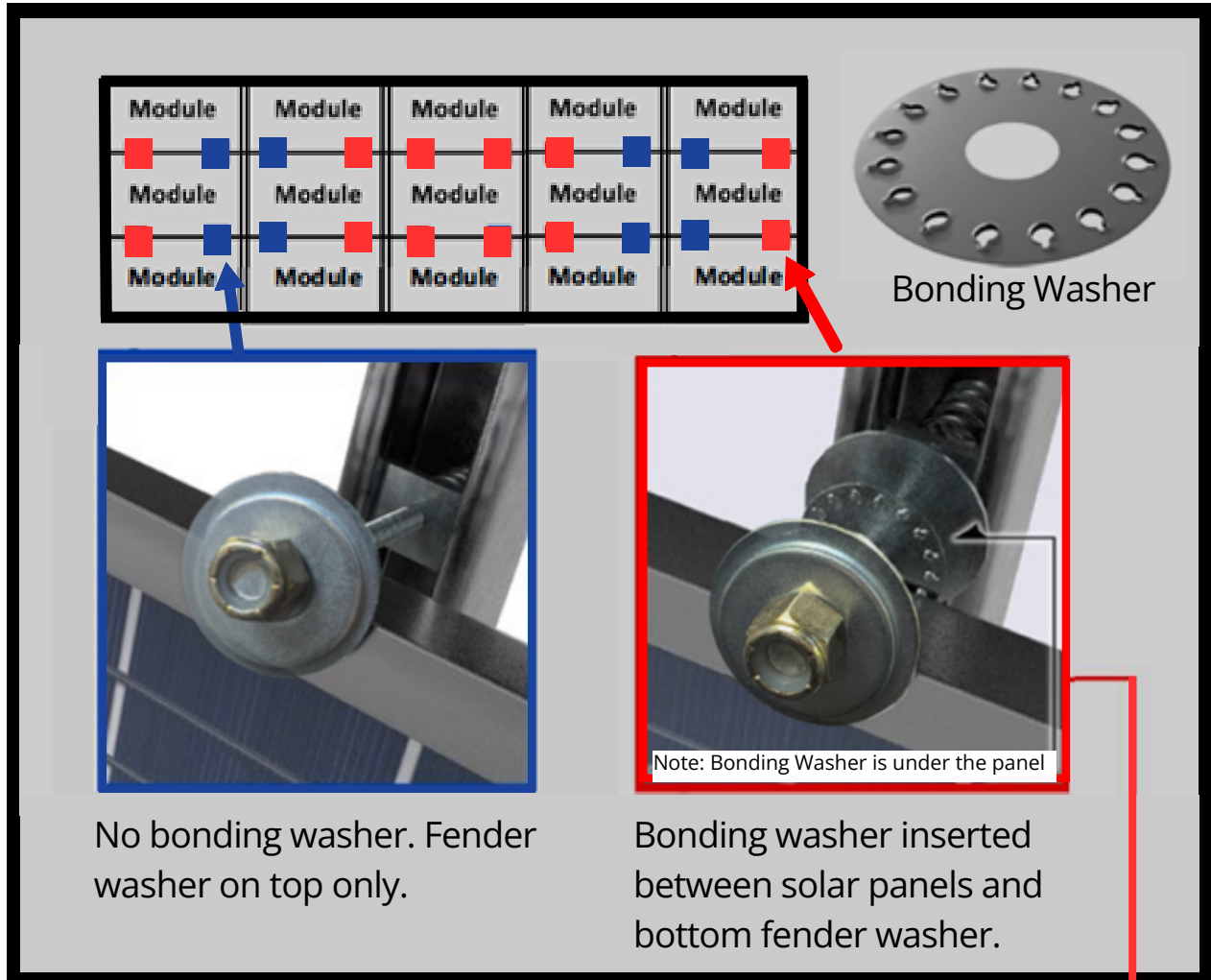
Refer to the following page for panel bolting/bonding washer details.



Panel Bolting Detail

Step 13:

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



- Spring-bolts with 3/8" x 2-1/2" studs, placed into the purlins
- A 3/8" fender washer
- An AKS bonding washer
- Two solar modules placed -one of either side of the protruding stud
- A fender washer placed onto the stud
- A 7/16" flat washer
- A 3/8" Nyloc nut installed and torqued to 12-15 lbs. - ft once solar panels are in position on each side of the fastener.
- **IMPORTANT:** DO NOT OVER-TIGHTEN THE PANEL NUTS. Overtightening may shatter the solar panel.

Solar Module Installation

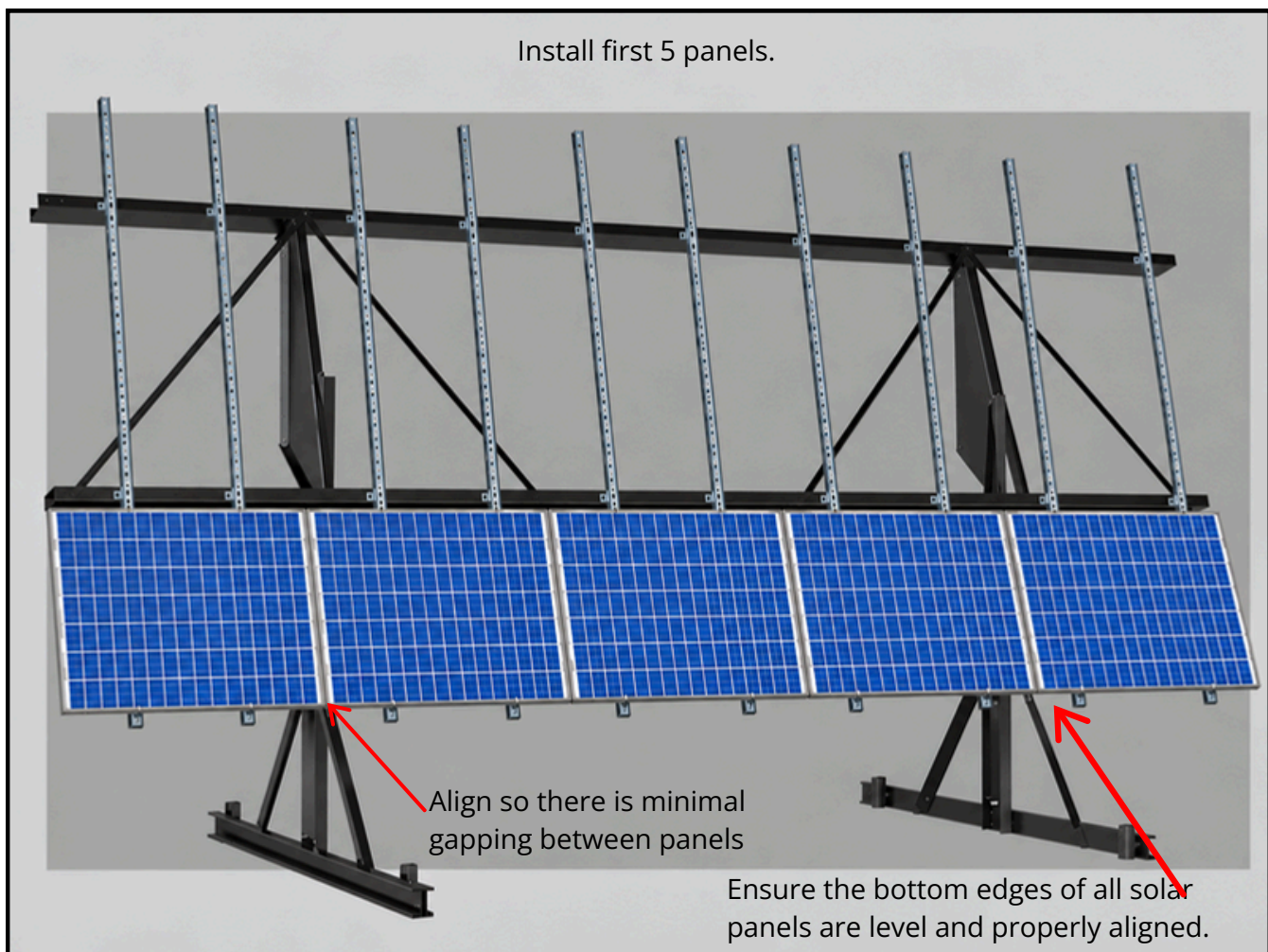
Step 14:

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 re-tighten the Z-clip fasteners. Also, check to see if the amount of the panel overhanging past the outside purlins is approximately equal on both sides and adjust if necessary.

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



Solar Module Installation

Spring Clip Installation Note:

IMPORTANT! When installing the solar panels on top of the spring clip bolt, 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 will be able to tell as the spring clip bolt will be protruding out further.



The clip should remain within the trench of the purlin.

Solar Module Installation

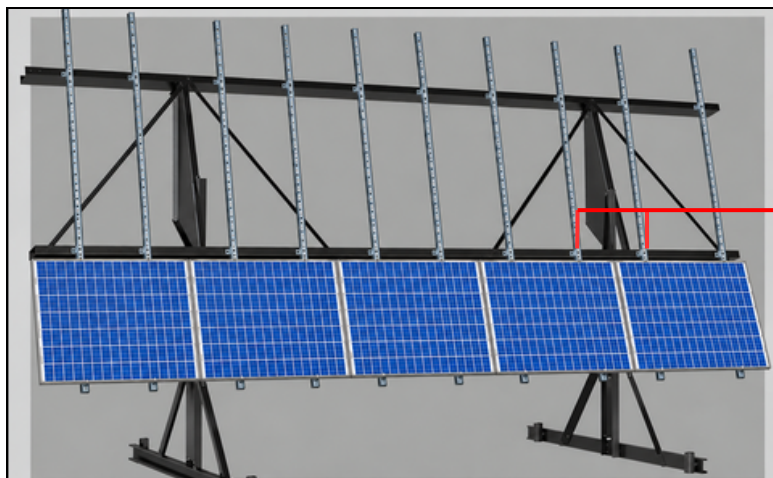
Step 15:

There are a number of ways to complete the solar panel installation. We have illustrated 3 methods on the next several pages. Determine which method you are the most comfortable with and, most importantly, please consider your safety as well as the safety of others while installing.

Solar Module Installations: 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.

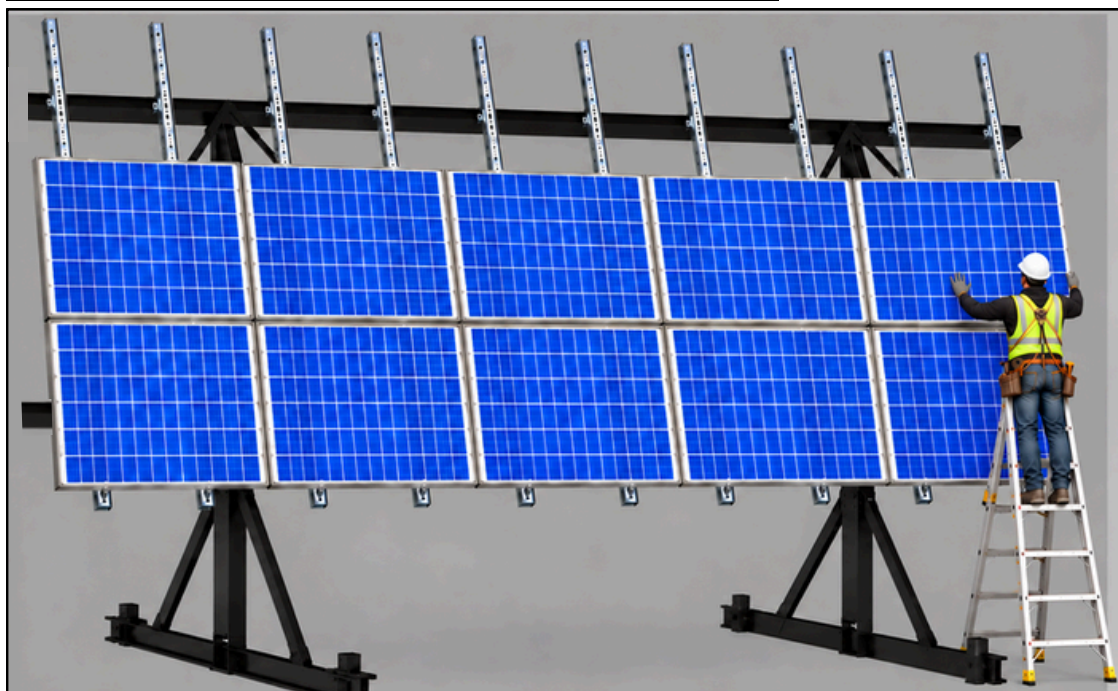
If they're misaligned, loosen the Z-clips and adjust the Z-clips until the panels are in place.



Refer to page 19 for location and type of spring bolts and washers.

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

-First five panels



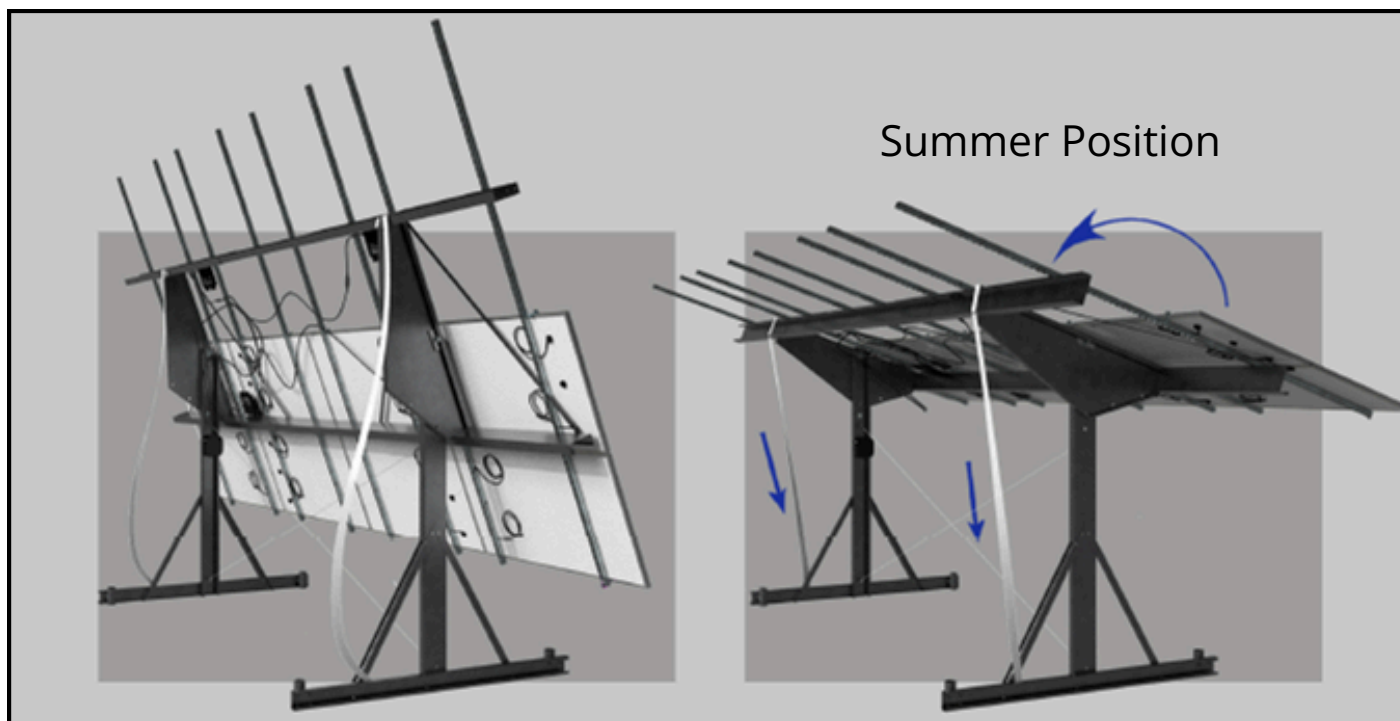
-Next row of panels

Solar Module Installation

Method 1 Continued:

Once the second row of panels is installed, use straps and pullies to pull the system into the "Summer Position". It will be too heavy to pivot by hand at this stage in the installation process. Once in the Summer position, secure it with a bolt before continuing with the module installation.

(The photos shown below depict the ST16 configuration and are for reference purposes only.)



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

REMINDER! The cable clamp will be installed at the center of the cable-crossing **after solar module installation is completed.**

Solar Module Installation

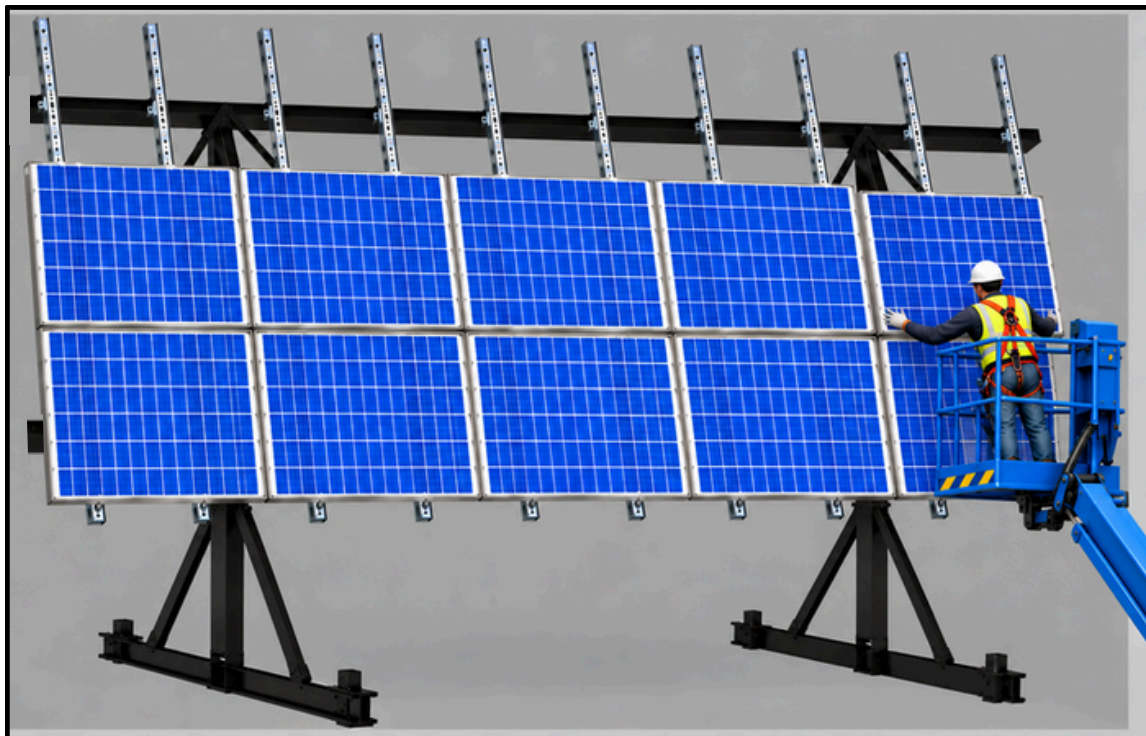
Module Installation Method 2:

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



Module Installation Method 3:

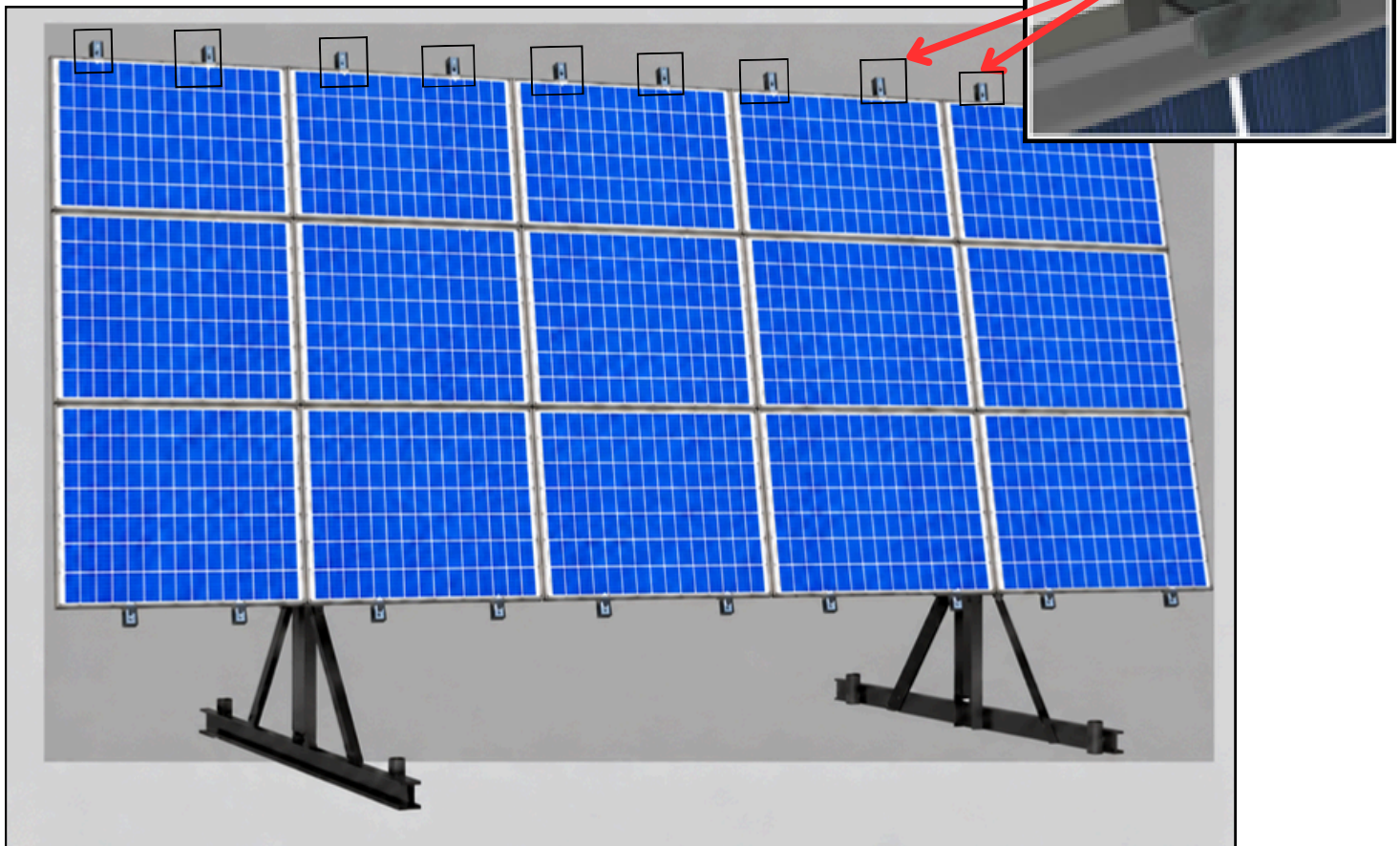
If you have access to a manlift, it's best to keep the rack in the winter position as you install the panels. Install the solar panels row by row.



Solar Module Installation

Step 18:

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.

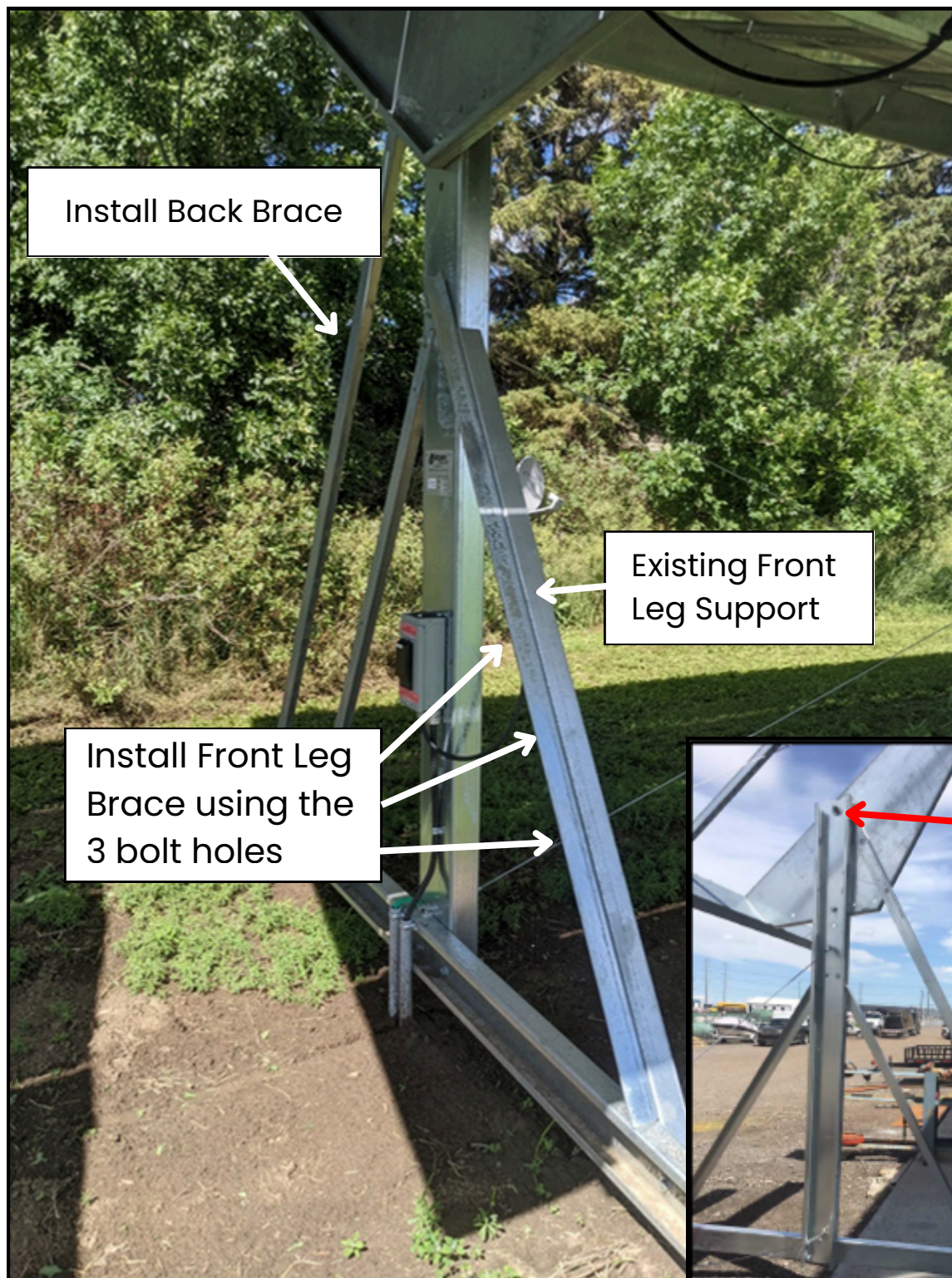


When rack and panels are complete, move to the "Summer Position" and tighten pivot plate bolts.

The top pivot plate bolt should be snug, but not overtightened, as this may restrict movement of the rack when changing positions. Tighten the bolt until the lock washer is fully flattened. If necessary, adjust the bolt slightly to ensure the pivot plate moves freely.

IMPORTANT! Do not leave racking units with solar panels partially installed in windy conditions. Move to the "Summer Position" if partially completed.

High Wind Support



Post-Installation Checklist

Upon completion of your solar system installation, Azgard Solar requires the following:

- ☐ Take a photo of the completed system (front and back view).
- ☐ Check that all bolts and nuts have been tightened.
- ☐ Check and re-tighten U-bolts on piles
- ☐ Check that the rack moves smoothly from summer to winter position. If the rack is hard to move, adjust the top pivot plate bolt 1/4 turn or adjust leg cross cables.
- ☐ Ensure the pivot plate safety bolt is installed.
- ☐ Visually check that all solar panel spring bolts are the same length and did not rotate during installation (refer to page 21 of Installation Manual). Push on the back of the solar panel to confirm the spring bolt is locked in place.
- ☐ Check leg cross cables and table top cross cables for tightness and adjust turnbuckle as needed.
- ☐ Establish a yearly maintenance procedure:
 - Visually inspect all wires, bolt connections, and the overall solar system.
 - Check U-bolts on piles and retighten if needed.
 - Inspect cross leg cables and adjust turnbuckles if required.
 - Inspect overall solar panel condition.

Note: Racking warranty is valid upon completion of yearly maintenance checks.

Maximize the Value of your SunRanger® Solar System

☐

Sign up for the **Solar Club** through our other division, Azgard Energy inc.

- **Get paid for your excess solar production and accelerate your system's payout.**
- Call 403-236-5501 today to learn about our special pre-solar rate available until your system is installed, or **visit www.azgardenergy.com** to get started. It's free to join!

☐

Sell your Carbon Credits:

- Visit **www.solaroffsets.ca** and click sign up, Enter your information in the form, when completing the form, under "how did you hear about us" Select My Installer and "who was your installer" **Select Azgard Solar Inc.**

☐

For Incorporated Businesses:

- Consult your accountant regarding the Refundable Investment Tax Credit (ITC) and Capital Cost Allowance (CCA) to determine eligibility and **maximize available deductions.**

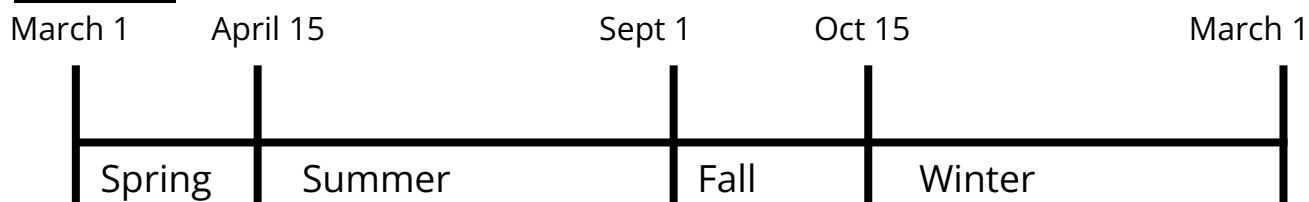
If you would like assistance registering with these programs or would like to learn more, please contact our office at 403-236-5501

SunRanger Seasonal Adjustment Dates

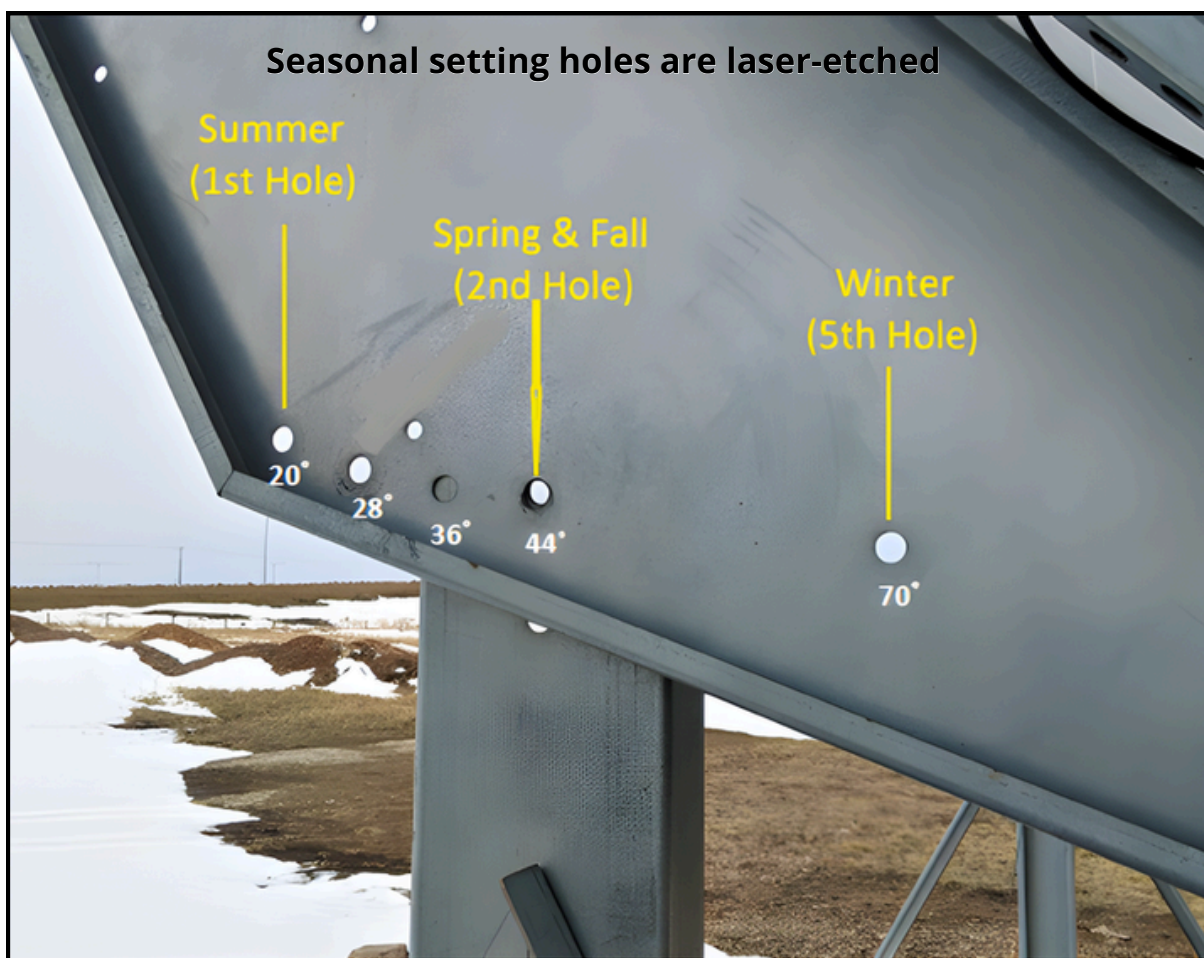
2 X Year



4 X Year



Important Note: in the event of extremely high winds or severe storms, system may be adjusted to summer position for less wind-resistance



Thank you for your purchase!
If you have any questions regarding these instructions,
please contact our office.

Patrick Fulawka

Cell: (403)-815-8515

Office: (403)-236-5501

Email: pfulawka@azgard.com

Head Office Address:

Unit 2, 34 Wrangler Pl SE

Calgary, AB T1X 0L7

Email: info@azgard.com

Access step-by-step installation videos through Azgard resources:

Online: www.azgardsolarracking.com

YouTube: SunRanger Instructional Install Video

