

Installation Manual

LTP- LCR/124HW-HLK-MAN 2020 Edition v2.1

For Model:

LTP-LCR/124HW Top-of-Pole Mount
With added High Load Kit



NOTE: When adding this High Load Kit to the LTP-LCR/124HW top-of-pole mount, use this manual for assembly and disregard the manual that comes with the main mount kit.

Purpose

This instruction manual, and the associated parts listed, is to be used as a **replacement** for the instruction manual that came with the LTP-LCR/124HW pole-top mount kit. When installing the LTP-LCR/124HW with this High Load kit, disregard the instruction manual that came with the basic mount and follow the instructions in this manual.

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Introduction

The **LTP-LCR/124HW** Top of Pole Mount with added **High Load Kit** is an extremely sturdy, universal pole mounting solution designed for mounting six 60 or 72-cell solar photovoltaic (PV) modules (41" module width maximum) With its user adjustable angle settings (0° to 60° in 10° increments), the Top of Pole Mount can support installations in a wide range of locations.

Customer Support

Tamarack Solar makes every effort to ensure your mounting kit is easy to install. If you need assistance at any point in your installation or have suggestions on how we can improve your experience, call technical support at **1-800-819-7236 ext. 556** or email us at **support@tamaracksolar.com**

***NOTE:** References to physical direction in this manual, such as “north” and “south”, apply to installations in the Northern Hemisphere. For installations in the Southern Hemisphere, reverse these physical directions.*

Tools Required

Tools that support the following size hex heads: Torque values are “dry”, add 15% if using anti-seize lubricant on **stainless steel** hardware (Recommended). Deep sockets for 5/16” and 1/2”, long combination wrench for 5/16”.

- | | |
|-------------------------------------|-------------------------------------|
| 1. 1/2” = 480 In-Lbs. or 40 Ft Lbs. | 2. 3/8” = 240 In Lbs. or 20 Ft-Lbs. |
| 3. 5/16”= 144 In-Lbs. or 12 Ft Lbs. | 4. 1/4” = 84 In Lbs. or 7 Ft-Lbs. |

Components Lists:

LTP-LCR/124HW PARTS LIST

PART NUMBER	DESCRIPTION	QTY.
51-07CA-017	6-inch Pipe Clamp Assembly	1
51-07BC-TLT REV A	Channel, Tilt Plate Mounting	2
51-07TP-LR2 REV C	Tilt Plate L\R	2
51-07CR-066 REV C	Cross Rail, 66 inch	6
51-07SP-060 REV A	Cross Rail Connector	3
51-07TC-068 REV A	Module Support Rail 68 inch	4
51-07TC-056 REV A	Module Support Rail 56 inch	4
51-07CN-030 REV C	Connector, 30"	4
51-07KC-066 REV A	Upper Cross Rail, 66 inch	2
51-07SP-015 REV A	Upper Cross Rail Connector	1
51-0539-HWI rev A	Inner Brace Channel	2
51-0539-HWO rev A	Outer Brace Channel	2
51-06HW-015 rev A	Inner Swivel Bracket	2
51-06HW-020 rev A	Outer Swivel Bracket	4
51-07KB-58HW rev A	Attaching Angle Bracket	2
51-07KB-59HW rev A	Clamp, 6" Knee Brace	1
23-0675-GLV	Bolt, U 1/2-13 6" Pipe HDG	1

LTP-HLKT-124 HIGH LOAD KIT PARTS LIST

PART NUMBER	DESCRIPTION	QTY.
51-07CR-066 REV C	Cross Rail, 66 Inch	6
51-07SP-060 REV A	Cross Rail Connector	3
51-07TC-068 REV A	Panel Support TP 68 inch	4
51-07TC-056 REV A	Panel Support TP 56 inch	4
51-07CN-030 REV D	Connector, 30"	4
29-UNCP-HLK	Under Panel Clamp Kit	3
29-5007-015	Kit, 1/2 x 1.25 (2) Set Galvanized	1
29-5020-020	Kit, 3/8 x 1 (4 set) Flange	4
29-5020-030	Kit, 3/8 x 1 (6 set) SST	2
29-5002-010	Kit, 5/16 x 7/8 (8 set) Stainless	4

Galvanized coated sheet steel components will show rust on cut edges and is normal and will not affect the structure and function of the mount.

LTP-LCR/124HW WITH HIGH LOAD KIT HARDWARE BAGS LIST & KIT CONTENTS

BAG PART NUMBER	PART NUMBER	DESCRIPTION	QTY.
29-5007-010		Kit, 1/2 x 1.25 (5) Set Galvanized	2
Kit Contents	23-5013-125	Bolt, 1/2-13x1.25" HDG	10
	25-5002-GLV	Washer, Flat 1/2" HDG	20
	25-5001-GLV	Washer, Lock 1/2" HDG	5
	24-5013-GLV	Nut, Hex 1/2-13 Fin HDG	5
29-5020-050		Kit, 3/8 x 1 (8 set) Flange	6
Kit Contents	23-3716-100	Bolt, 3/8-16 x 1.0 Hex SST.	48
	25-3702-000	Washer, Flat 3/8" SST.	48
	25-2501-016	Nut, Flange Serrated 3/8-16 SST.	48
29-5020-030		Kit, 3/8 x 1 (6 set) SST	2
Kit Contents	23-3716-100	Bolt, 3/8-16 x 1.0 Hex SST.	12
	25-3702-000	Washer, Flat 3/8" SST.	24
	25-3701-000	Washer, lock 3/8" SST.	12
	24-3716-440	Nut, 3/8-16 Hex SST.	12
29-5002-010		Kit, 5/16 x 7/8 (8 set) Stainless	5
Kit Contents	23-3118-875	Bolt, 5/16-18 x 7/8 Hex CS SS	40
	25-3102-000	Washer, flat 5/16" SS	40
	25-2501-015	Nut, flange 5/16 SST	40
29-5003-000		Kit, 1/4 x 3/4 (8 set) Stainless	3
Kit Contents	23-2520-050	Bolt, Hex 1/4-20 x .75 SST	24
	25-2502-000	Washer, flat 1/4 SS	48
	25-2501-000	Washer, lock 1/4"	24
	24-2520-440	Nut, 1/4-20 fin hex SS	24
29-5000-010		Kit, 1/4 x 3/4 (4 set) Stainless	3
Kit Contents	23-2520-050	Bolt, Hex 1/4-20 x .75 SST	12
	25-2502-000	Washer, flat 1/4 SS	12
	25-2501-014	Nut, Flange Serrated 1/4-20 SST	12

BAG PART NUMBER	PART NUMBER	DESCRIPTION	QTY.
29-5002-200		Kit, Spare Hardware	1
Kit Contents	23-3716-100	Bolt, 3/8-16 x 1.0 Hex SST.	1
	25-3702-000	Washer, Flat 3/8" SST.	2
	25-3701-000	Washer, lock 3/8" SST.	1
	24-3716-440	Nut, 3/8-16 Hex SST.	1
	25-3102-000	Washer, flat 5/16" SS	1
	25-2501-015	Nut, flange 5/16 SST	1
	23-3118-875	Bolt, 5/16-18 x 7/8 Hex CS SS	1
	23-2520-050	Bolt, Hex 1/4-20 x .75 SST	1
	25-2502-000	Washer, flat 1/4 SS	1
	25-2501-000	Washer, lock 1/4"	1
	25-2501-014	Nut, Flange Serrated 1/4-20 SST	1
	23-5013-125	Bolt, 1/2-13x1.25" HDG	1
	25-5002-GLV	Washer, Flat 1/2" HDG	1
	25-5001-GLV	Washer, Lock 1/2" HDG	1
	24-5013-GLV	Nut, Hex 1/2-13 Fin HDG	1

Pre-Assembly for Model LTP-LCR/124HW with High Load Kit

***NOTE:** Some parts and hardware come from both the High Load Kit and the basic mount. The following steps supersede some of the steps in the instruction manual included with the mount this High Load Kit is being installed onto. The original mount manual should be disregarded, and this manual used in its place.*

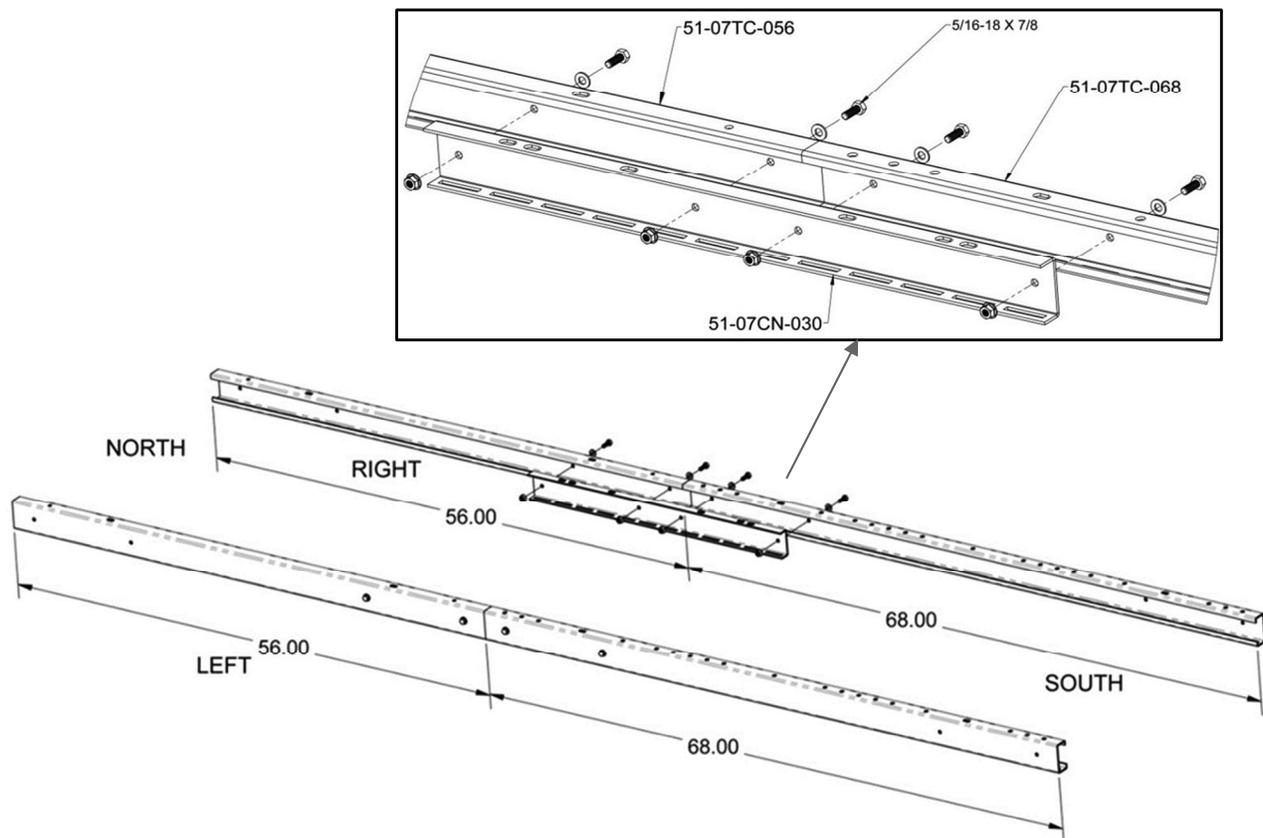
Step 1: Assembling the Aluminum PV Module Support Rails

The kit for the LTP-LCR/124HW top-of-pole mount will contain four 56" and four 68" Module Support Rails, along with four 30" Connectors. The High Load Kit will contain an additional two 56" and two 68" Rails with two additional 30" Connectors. The two inside rail assemblies are doubled up to provide more strength for higher wind and snow loading.

***NOTE:** Each column of three PV modules will need either one left side or one right-side single Module Support Rail assembly (when viewed from the south side of the pole) and one doubled Module Support Rail assembly. The open sides of the two single-rail assemblies (one per column) will be attached to the back of the PV modules (and then to the mount) facing inward towards the center of the PV modules. The doubled rail assemblies are to be placed on the inside (nearest to the pole) of each three-module column. All of the rail assemblies need to have the 56" rail sections on the upper (north end) of each three-module column, as shown in **Detail E**.*

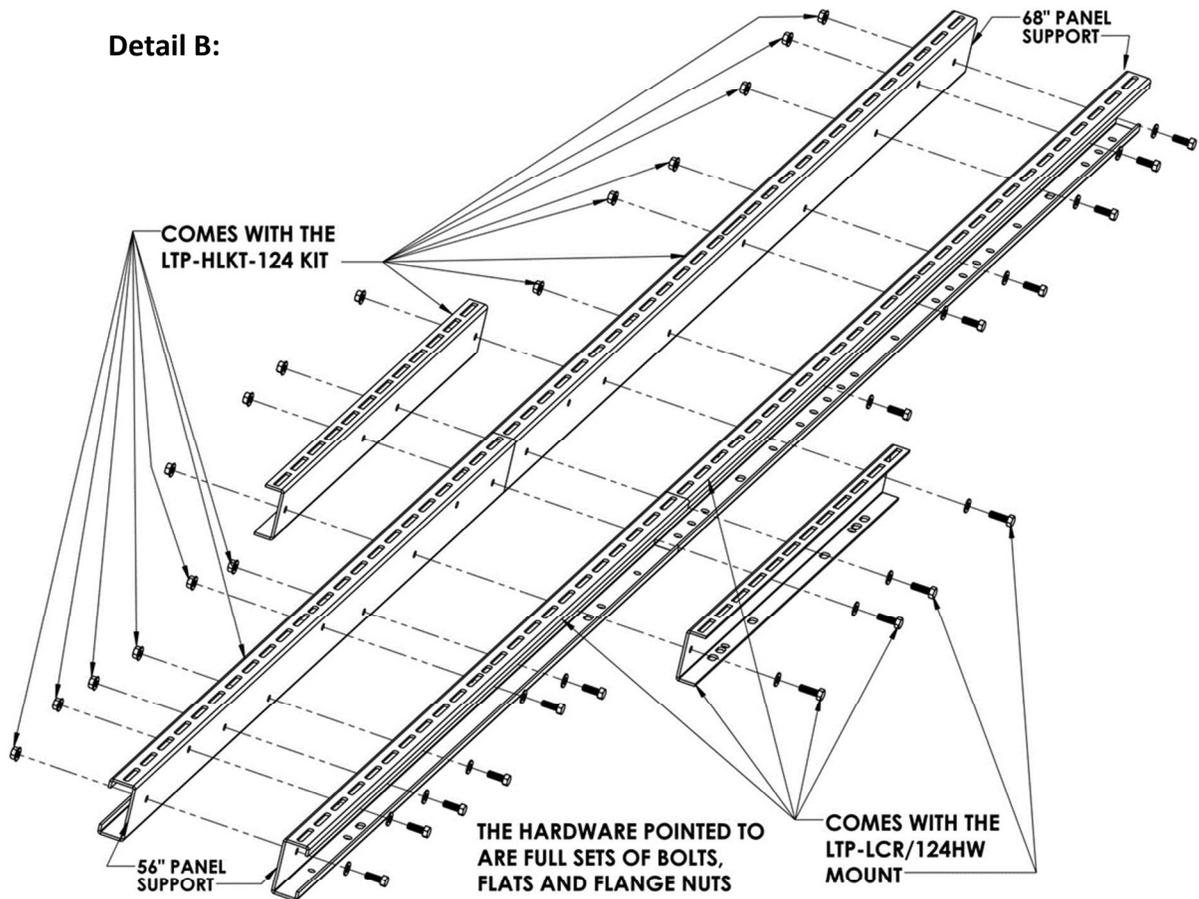
- A. Start by assembling the two single-rail units, one left-side and one right-side. Lay one 56" and one 68" rail end-to-end, with the insides of the rails facing the same way, and with the flanges with the obround slots on the same side of both rails, and bolt them together using one of the 30" Connectors. Center the Connector on the seam between the two rail lengths and be sure that the obround slots in the Connector are on the same side of the obround slots in the rails.
- B. Repeat with a second set of 56" and 68" Module Support Rails and Connector, except reverse the position of the 56" rail section to be on the opposite end of this 68" Channel compared to the first assembly. See **Detail A** for both assemblies.

Detail A:



- C. Tighten the 5/16"-18 x 7/8" hex bolts, flat washers, and flange nuts to 144 in-lbs (dry) and set these assemblies aside.
- D. Next, assemble the two double-rail units. Each unit will consist of two 56" Module Support Rails, two 68" Module Support Rails, and two rail Connectors. The two 56" sections need to be together on the same end of the assembly. Lay two 56" and two 68" Module Support Rails end to end and back-to-back with a Connector in the middle on both sides, as shown in **Detail B**. Make sure that the side flanges with the obround holes and the side of the Connectors with the obround slots are all facing in the same direction, and that the two 56" rails are on the same end of the assembly as shown in **Detail B**.

Detail B:



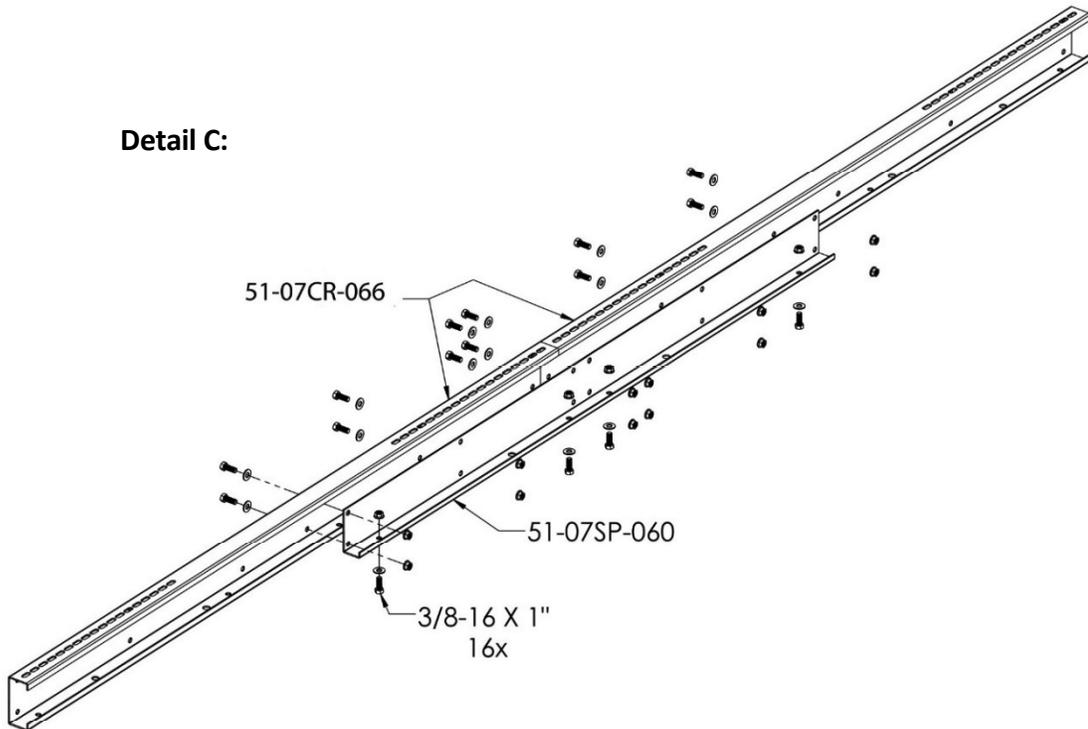
- E. Tighten the 5/16"-18 x 78" bolts, flat washers, and flange nuts to 144 in-lbs (dry) and set these sub-assemblies aside.

Step 2: Assembling the Galvanized Steel Cross Rails

Note: The LTP-LCR/124HW Kit will contain six 66" Cross Rails (galvanized steel) and three Connectors, and the High Load Kit will contain two additional 66" Cross Rails and one additional Connector. These parts are used to assemble one double-rail Cross Rail unit, one single-rail Cross Rail unit, and one single-rail Knee Brace Cross Rail unit.

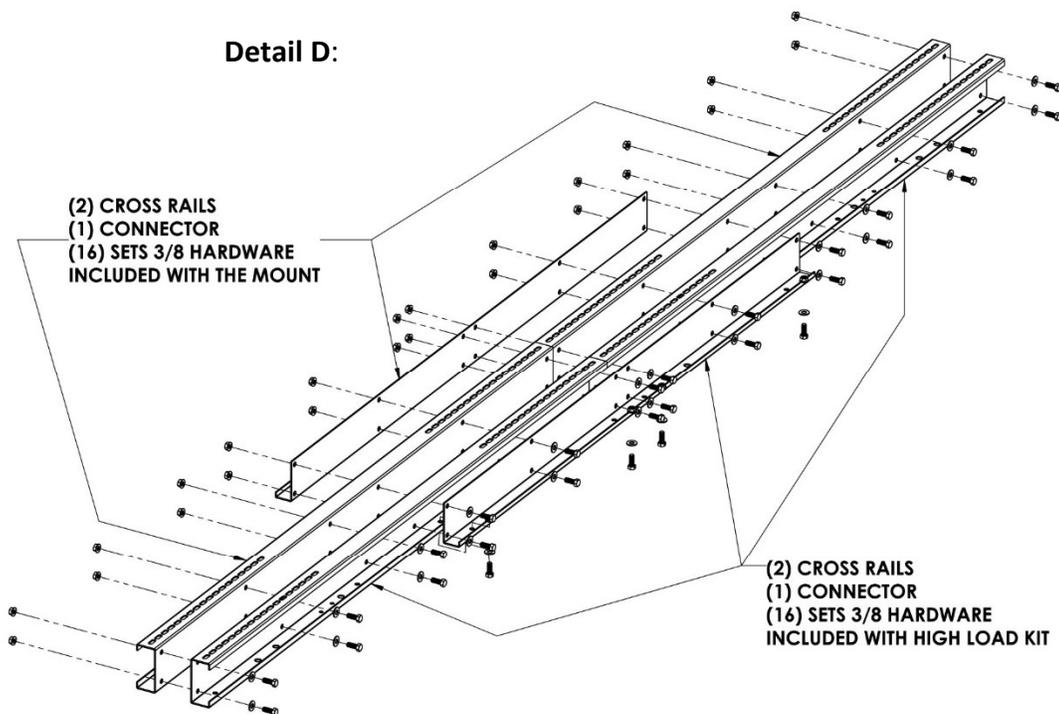
- A. To make the two single-rail sets, lay two of the 66" Cross Rails end to end, with the rail open sides facing the same way, and with the sides with the obround slots facing up, with a Connector in the middle centered on the seam between the two rail sections, with its flange down, as shown in **Detail C**. Repeat with the other two pairs of rails and two connectors. Tighten all the 3/8"-16 x 1" hex bolts, flat washers, and flange nuts to 20 ft-lbs (dry) and set these two sub-assemblies aside.

Detail C:

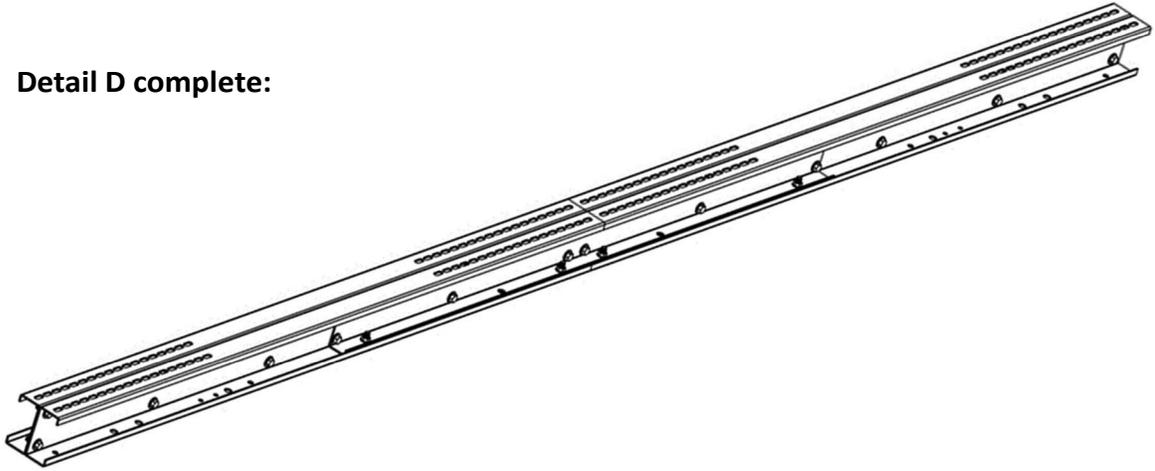


- B. To make the double-rail assembly, lay four of the Cross Rails end-to end and back-to back, as shown in **Detail D**. Make sure that the sides with the obround slots all face up. Place two rail connectors, one on each side, in the open sides of the rails, centered on the seam between the two rail halves, and with their flanges down, as shown in **Detail D**. Bolt the double-rail assembly together using the 3/8"-16 x 1" hex bolts, flat washers, and flange nuts. Tighten all the bolts to 20 ft-lbs (dry) and set this assembly aside.

Detail D:



Detail D complete:

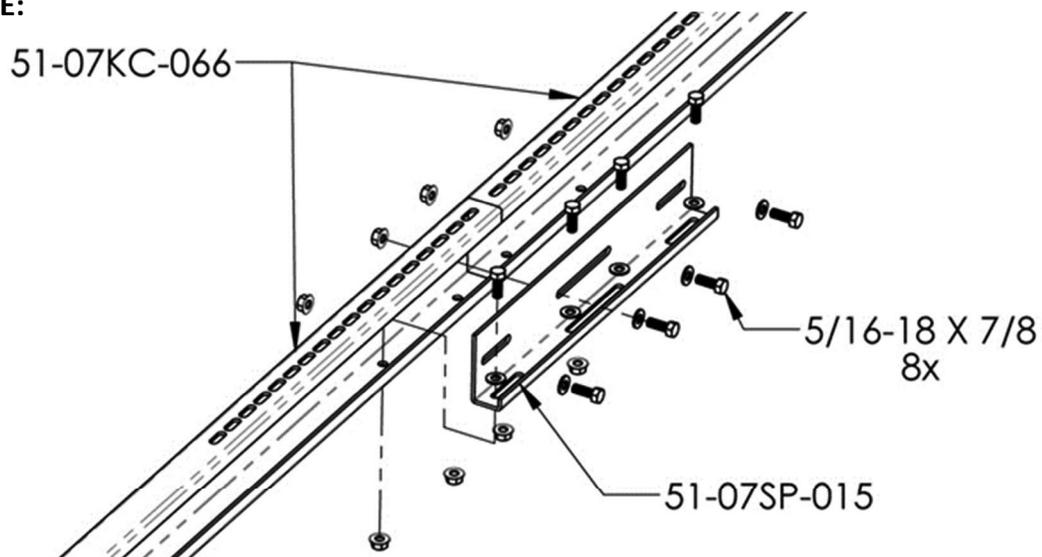


Step 3: Assembling the Aluminum Upper Cross Rail

There are two 66" aluminum Upper Cross Rails included, used with the supplied aluminum Connector to assemble one 132" Upper Cross Rail assembly.

- A. Lay the two 66" Upper Cross Rails end to end, with the obround slots facing up, the open sides facing the same direction. Place the Connector inside the rails, centered over the seam between the two rail sections, and with the connector's flange down, as shown in **Detail E**. Bolt the assembly together using the supplied 5/16"-18 x 7/8" hex bolts, flat washers, and flange nuts. Tighten to 144 in-lbs (dry). Set this sub-assembly aside.

Detail E:



Step 4: Connecting PV modules to Module Support Rail assemblies:

The LTP-LCR/124HW mount, with the added High load Kit, utilizes three PV modules per column, two columns side-by-side. For assembly purposes, attach the middle PV modules only at this point, one to each pair of Module Support Rails, as shown in **Detail F**. This will establish the spacing between the Module Support Rails based on the mounting hole locations in the PV module frames, which vary by brand and model.

***NOTE:** For ease of wiring and wire management of the PV modules, it is best to have as much of the output wiring as close to the inside, near the pole. PV module brands and models can differ in the location of their output wiring junction boxes. Additionally, the proper location of the junction boxes on the mount may differ depending on whether the modules are to be wired in series or parallel, or a combination of series and parallel. This depends on the intended use for the solar array. Be sure to plan this out beforehand.*

If the PV modules that you are using have a single wiring junction box (containing wiring for both positive and negative connections to it) at one end of the back of the modules, it is best if all of the modules are mounted on the racking with these junction boxes towards the inside (closest to the pole), in each of the two module columns. Since during later assembly of the two columns of modules to the Cross Rails, the 56" sections of the Module Support Rail assemblies need to be on the north side of the pole (higher side when tilted), make sure that while assembling (per the following instructions) that you attach the center PV module to one pair of Module Support Rail assemblies with the module's junction box on one side of the rails, and assemble the second set with the center module's junction box on the other side of the rails, in relation to the 56" rail sections of each Module Support Rail sub-assembly.

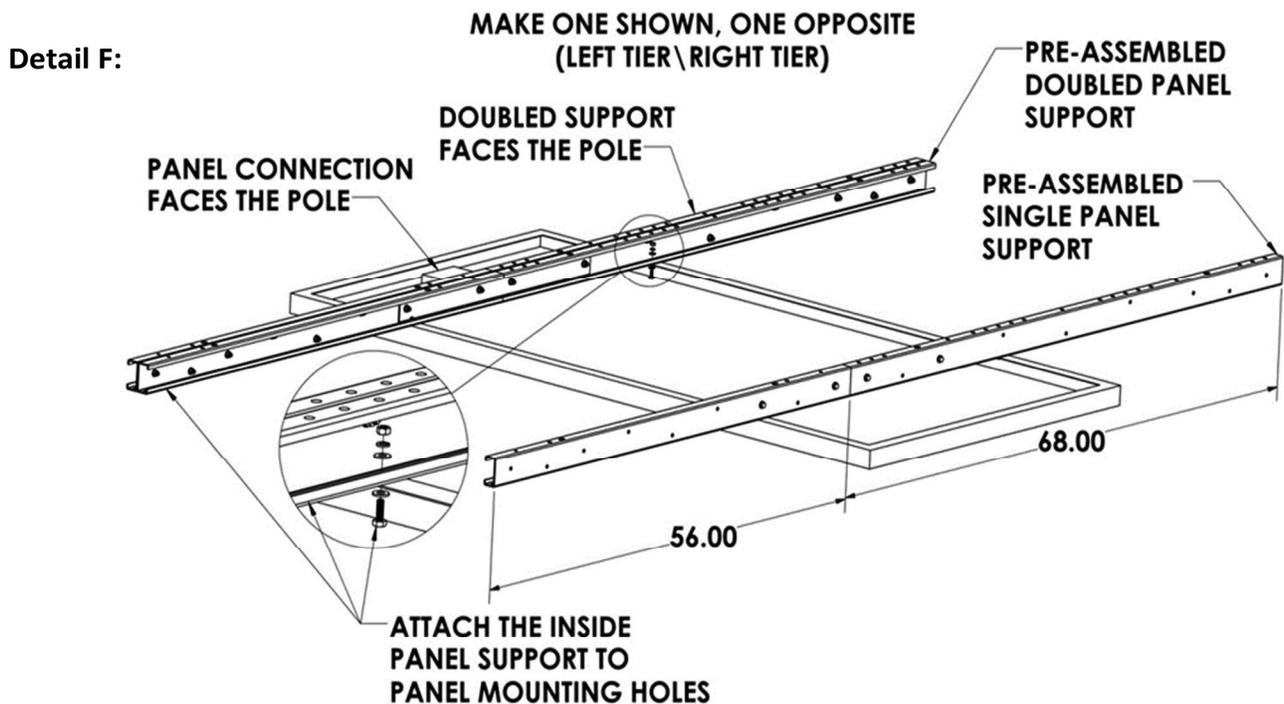
If the PV modules have two wiring junction boxes in the middle of the module (one positive and one negative), the best arrangement for wiring will vary depending on usage. Be sure to plan out your wiring options before attaching the modules to the Module Support Rails. If the modules are to be wired in series strings, make sure that the wire leads are long enough to reach between modules

You will need to make one left side and one right side sub-assembly (left and right determined by viewing from the south side of the pole). The doubled Module Support Rail assemblies will need to be located to the inside (pole side) in both columns and the 56" module support rail sections need to be on the north side of the pole as shown in **Detail F**. Be sure to place the PV modules on the rails with their wiring junction boxes on the proper side based on the wiring note above.

- A. Lay one of the PV modules on a flat surface, frame side up as shown in **Detail F**
- B. Place one doubled and one single Module Support Rail assembly across the PV module with the obround slots in the rails face down on the module frame, and the open side of the single-rail assembly facing towards the center of the module, as shown in **Detail F**. Make sure that the 56" sections of the rail assemblies are on the same side of the PV module (also see note on previous page about placement of the PV module wiring junction boxes). Place the PV module in the center of the rail assembly and align the mounting holes of the module frame with the obround slots on the Module Support Rails. Attach the rail assemblies to the module frame using the 1/4" x 3/4" bolts, flat washers, lock washers and nuts. Tighten only enough to hold firmly, **do not fully torque at this time**.

Note: On the doubled Module Support Rail assembly, the assembly is only bolted to the module frame, using the mounting holes in the PV module's frame, on the inside of the rail assembly – the side facing the center of the PV module. The outer doubled Module Support Rail in the assembly will be attached later.

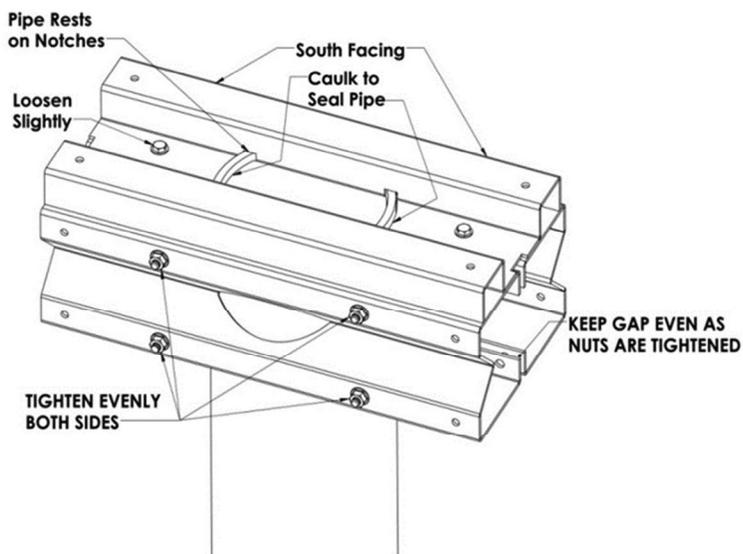
- C. Repeat Step 4 A and B with a second PV module, the second double rail assembly and the second single rail assembly. However, you may want to have the PV module's junction box on the opposite side of the rail assemblies, or with a different polarity position on the rails, per the note about junction boxes above. Make sure that the 56" sections of the rail assemblies are on the same side of the PV module. Tighten only enough to hold firmly, **do not fully torque at this time**. Set aside these two PV module and rail sub-assemblies.



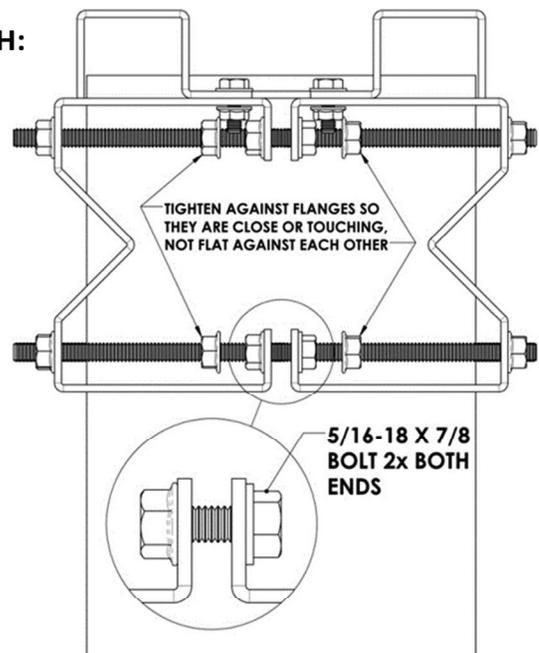
Step 5: Attach Pole Clamp assembly to Top of Pole

- A. Loosen the four 1/4" bolts on the top of the Pole Clamp slightly to allow enough slack for the Clamp halves to slip over the top of the pole and slide the pre-assembled Pole Clamp unit over the pole. The top edges of the pole should fit into the notches of the Pole Clamp assembly (see **Detail G**).
- B. Orient the long side of the pole clamp to face in the desired solar array direction. This is generally true South, although site specifics may dictate a different array orientation.
- C. Tighten the 8 outside 5/16" flange nuts on the threaded rods evenly, making sure that each nut is tightened the same amount of turns so the distance between the Clamp halves is the same on each side of the pole, until the torque setting is reached. 12 Ft-lbs (dry).
- D. Finger-tighten the 8 inside 5/16" flange nuts on the threaded rods up to the flanges of the Clamp halves. Using a long 5/16" box wrench, tighten the 5/16" inside flange nuts, alternating turns from side to side, pulling the flanges closer together. (Close to or touching each other, but not flattened out). This tightens the two sides of the clamp to the outside of the pole.
- E. Install the four 5/16" x 7/8 bolts, each with a flat washer against the heads, and flange nuts in the four holes of the clamp halves flange ends. Tighten the 5/16" bolts, alternating turns from side to side, pulling the outer flanges together (again, close or touching, not flattened out) (see **Detail G**).
- F. Check the torque of the 8 outside flange nuts, and re-torque as needed.
- G. Torque the four previously loosened 1/4" bolts on the top of the Pole Clamp to 84 in-lbs.
- H. (Optional) caulk the seams on top of pipe clamp to seal, to prevent water from entering the pipe.

Detail G:



Detail H:

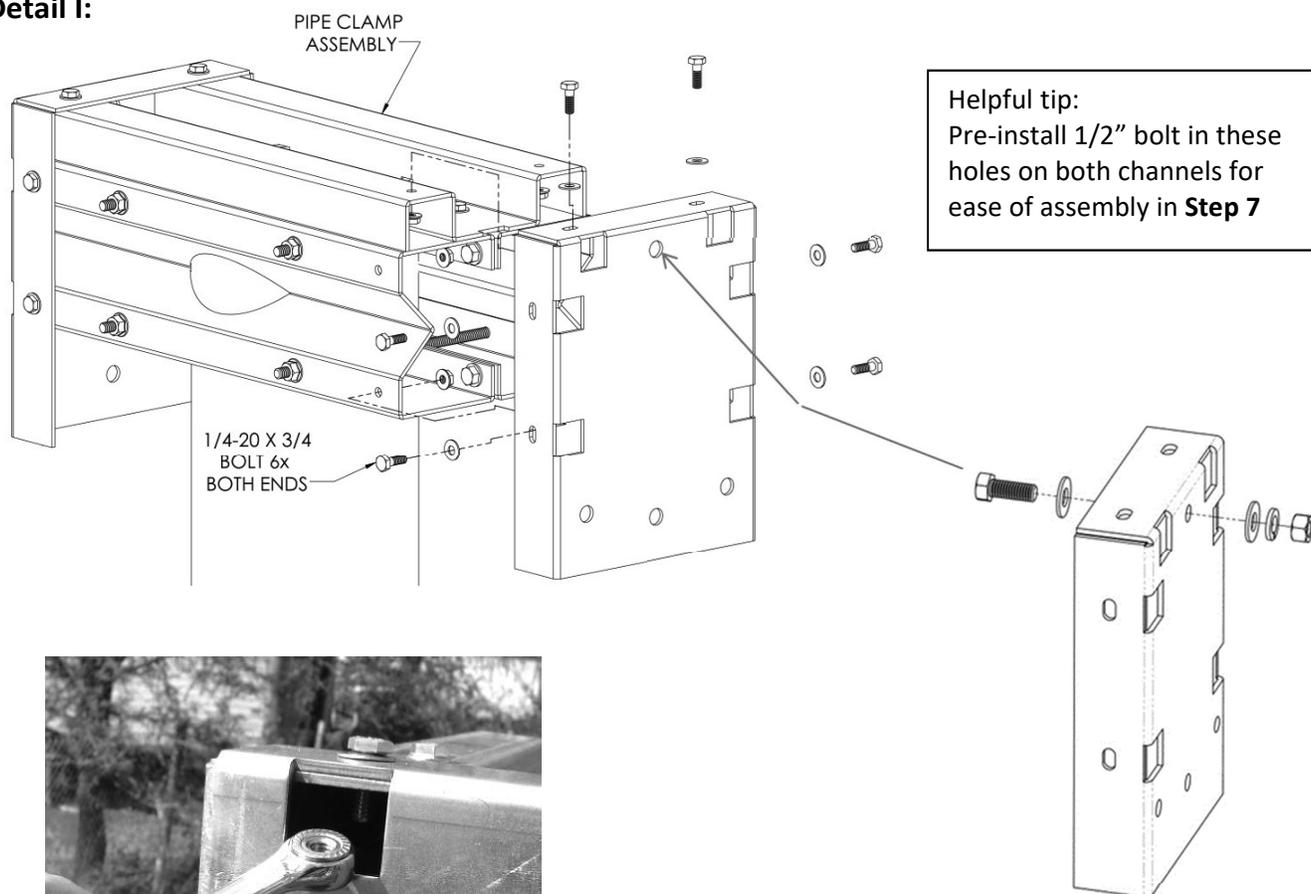


Step 6: Attach Tilt Plate Mounting Channels

- A. Place the two Tilt Plate Mounting Channels on the sides of the Pole Clamp assembly as shown in **Detail I**. Also note the “helpful tip” in **Detail I**.
- B. Install 1/4" bolts, flat washers, and flange nuts in the six mounting holes on each Tilt Plate Mounting Channel (two on each side, and two on the top). Tighten to 84 in-lbs.

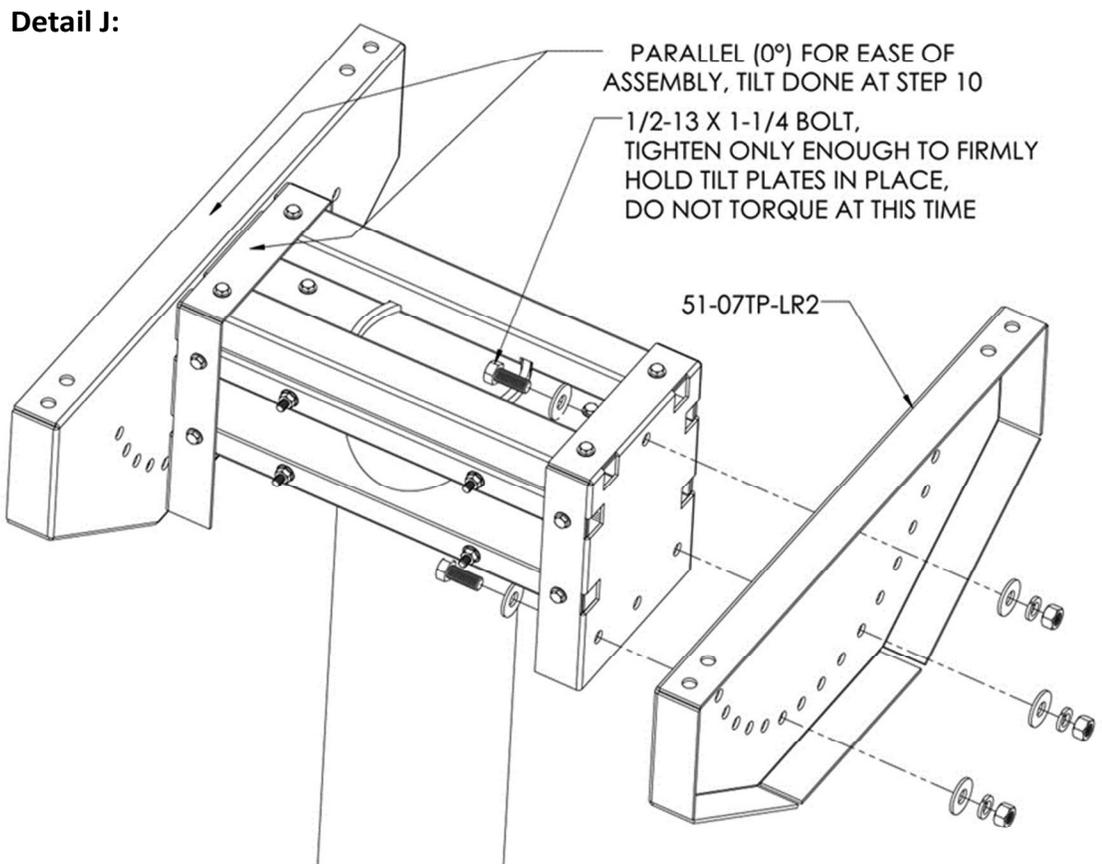
***Note:** Placing the flange nut in the “closed” side of the wrench to align with the bolt through the cutout will make it easier to start the nuts on the treads and help prevent dropping the nut into the assembly where they cannot be easily retrieved. (see photo in **Detail I**).*

Detail I:



Step 7: Attach Tilt Plates

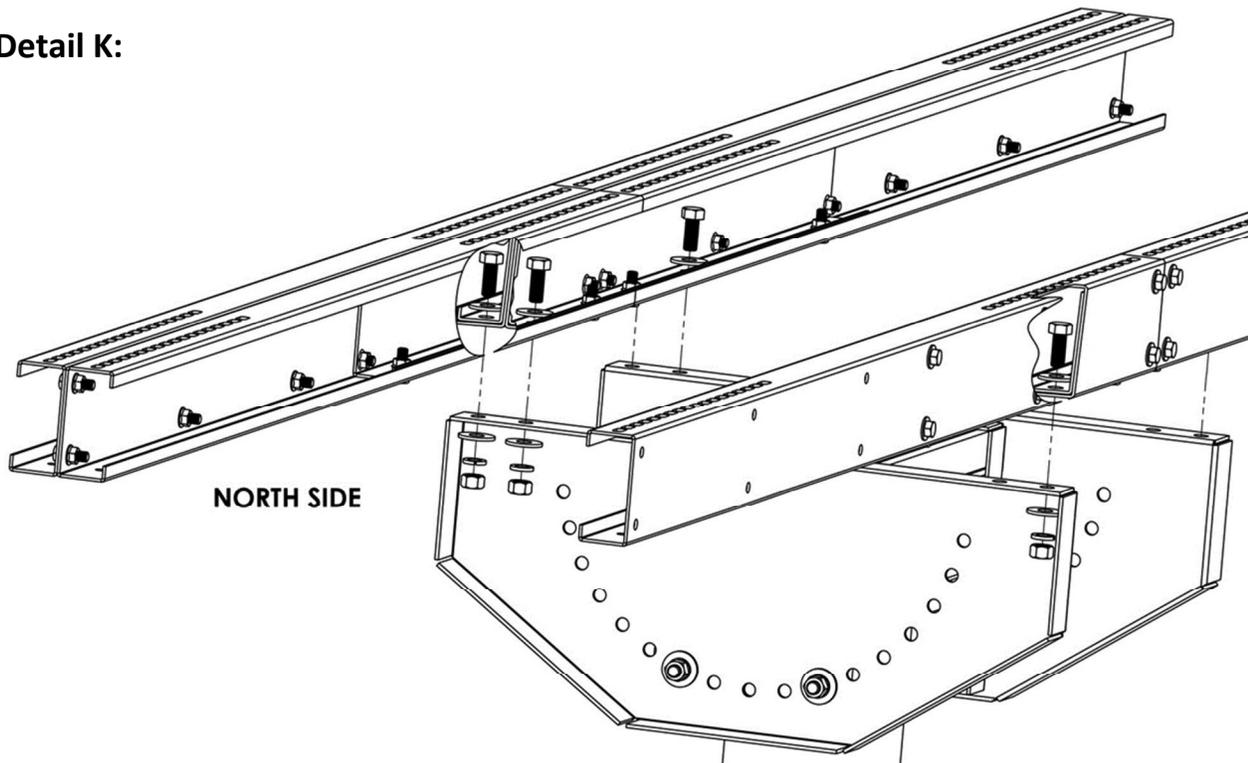
- A. Attach Tilt Plates, with the flanges facing to the outside as shown in **Detail J**, using the six 1/2"-13 x 1.25" bolts (three for each Tilt Plate), flat washers, lock washers and nuts. Position the Tilt Plates with the top level (0° tilt). Do not torque at this point, but tighten snugly, only enough to hold the Tilt Plates firmly for the next assembly steps.



Step 8: Attach Cross Rails to Tilt Plates.

- A. Place the previously assembled doubled Cross Rail assembly across the north end of the Tilt Plates, and one of the single-rail Cross Rail assemblies across the south end of the Tilt Plates, with the open side of the single-rail assembly facing to the inside. Place so that both rail assemblies have the obround slots facing up, as shown in **Detail K**. Center the two assemblies on the Pole Clamp, using the seam between the two Cross Rail sections as the location of the center of the assembly. Attach the two Cross Rail assemblies to the Tilt Plates using the 1/2"-13 x 1.25" bolts, flat washers, lock washers, and nuts, in the six places shown in **Detail K**. Torque to 40 ft-lbs.

Detail K:

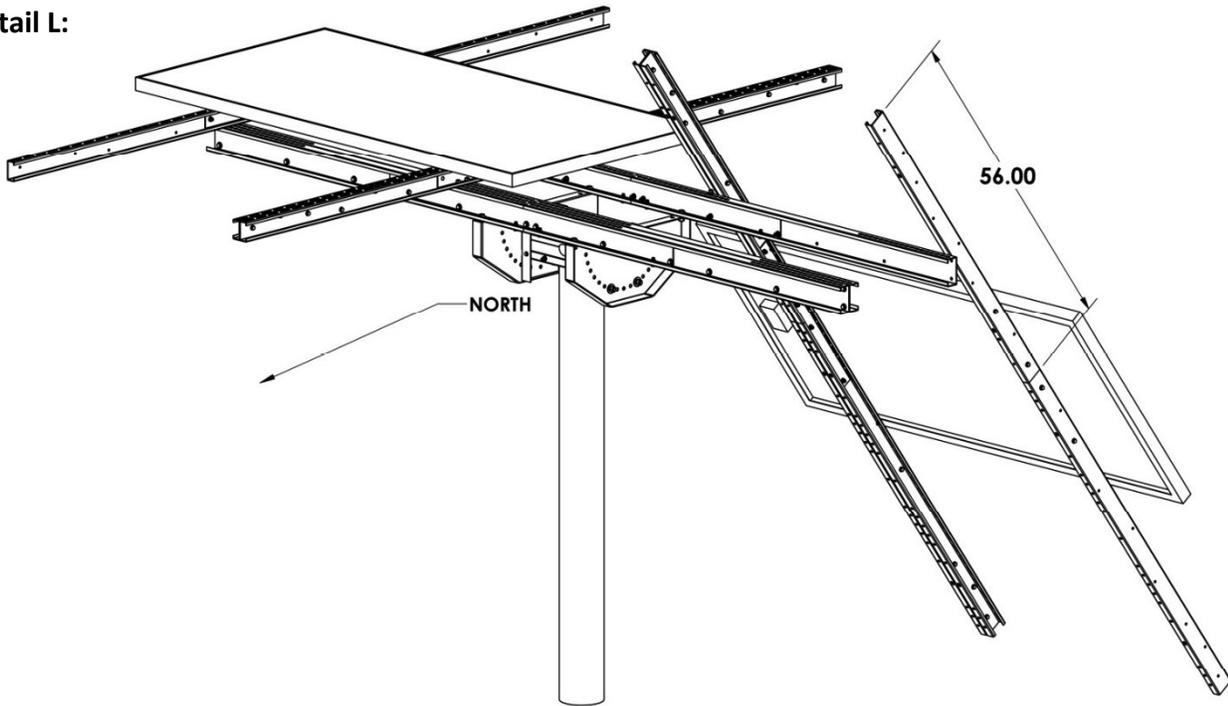


Step 9: Attach PV Module Support Rail Sub-Assemblies to Cross Rails

- A. Lean one of the 124" module support sub-assemblies (with the single center PV module attached) against the cross rail, as seen in **Detail L**, with the 56" Rail sections on the north end, the doubled rail assembly to the inside (near the pole) and with the PV module's wiring junction box in the proper location for final wiring. Lift the bottom end up and slide the sub assembly onto both Cross Rails.

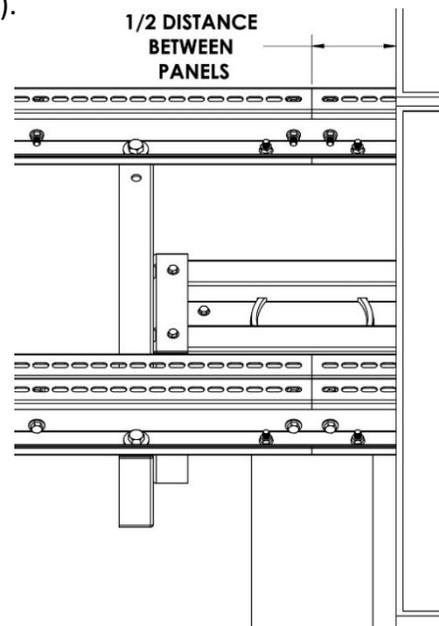
***Note:** Make sure that the 56" sections of Module Support Channels are on the north end of the two Cross Rails, and that the doubled Module Support Rail assembly is toward the inside near the pole. Make sure that the PV module wiring junction box is in the proper location for wiring. If all three of those directives are not present, either the assembly was not done correctly, or this particular assembly needs to go on the other side of the pole.*

Detail L:



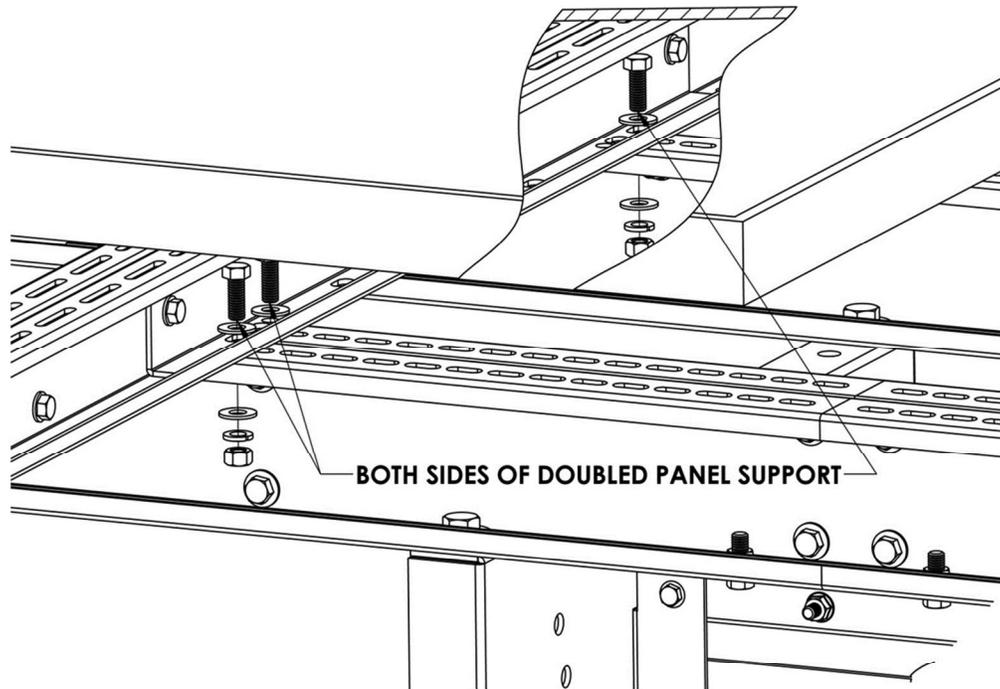
- B. Place the seam, where the 56" and 68" Module Support Rails meet, centered between the two Cross Rail assemblies.
- C. Place the inside edge of the PV module near the center of the Cross Rails (where the seam is between the two connected Cross Rails). See **Detail M**. Move in or out to leave 1/2 of the desired spacing between the two PV module columns (east to west). Spacing between the two columns is typically around 1" but can be wider if there is enough space on the Cross Rails to catch the full assembly (a wider gap will let more wind pressure through).

Detail M:



- D. Drop eight 3/8" x 1" bolts with flat washers into the appropriate slots in order to bolt the Module Support Rails down to the Cross Rails as shown in **Detail N**. There will be three bolts on each side of the doubled Module Support Rail. Add the bottom flat washers, lock washers and nuts, finger tight. Check the center gap spacing and adjust if necessary. Make sure that the Module Support Rails are square to the Cross Rails, and torque the 3/8" x 1" bolts to 20 ft-lbs.

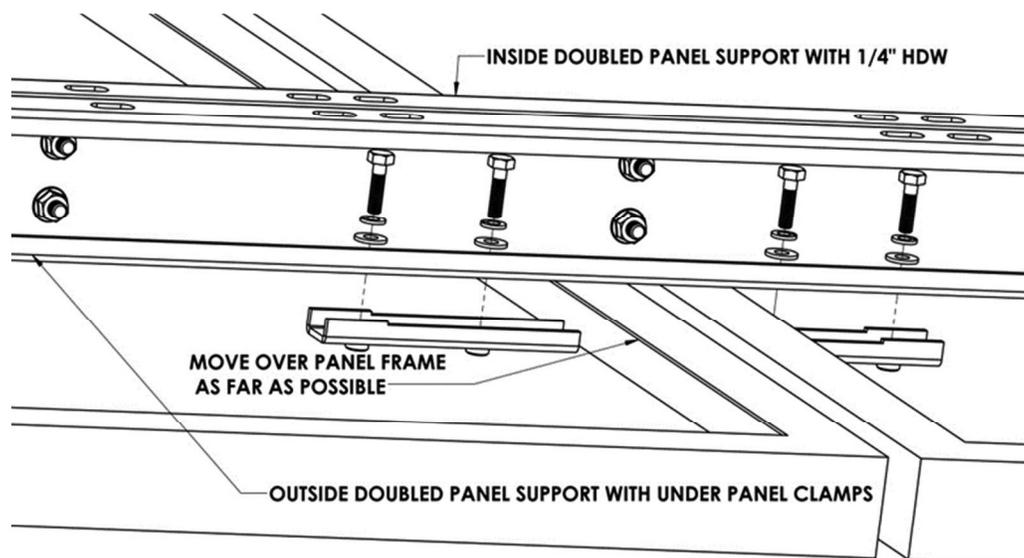
Detail N:



- E. Repeat A through D above for the second Module Support Rail/PV module assembly on the other side of the pole, again making sure that the doubled Module Support Rail is towards the inside, that the 56" sections of the support rails are on the north end, and that the PV module's junction box is in the proper location.
- F. Lift the next PV module (#3 of the six) up onto one of the Module Support Rail assemblies on the north side (again with the module's junction box in the proper location). Align the mounting holes so that the gap between it and the center module is approximately 1". Loosely install with 1/4" x 3/4" bolts, flat washers, lock washers and nuts. Repeat with the fourth module on the other side of the pole, north end, then repeat again with the remaining two PV modules on the south sides of the two columns. All module wiring junction boxes should be checked for proper location.
- G. Do a final adjustment of all of the spacing of all the PV modules to be even and parallel, and torque the 1/4" bolts to 84 in-lbs.

- H. Install the under-module clamps to the outer rail of the doubled Module Support Rails as shown in **Detail O**.

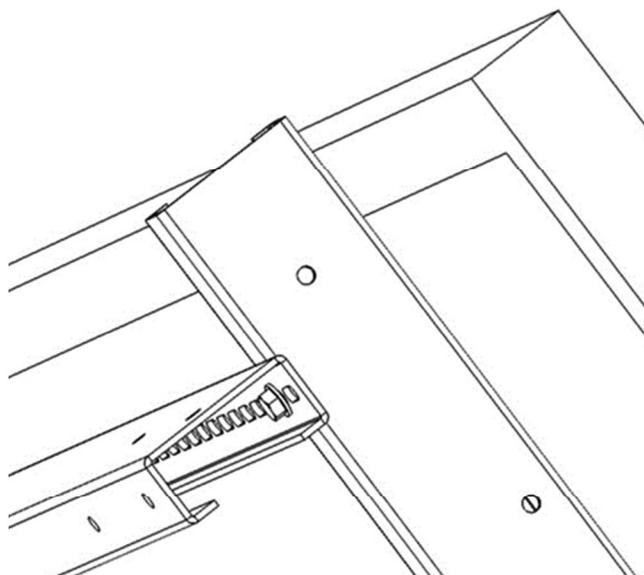
Detail O: (viewed from underside)



Step 10: Install Upper Cross Brace and Knee Brace Rails

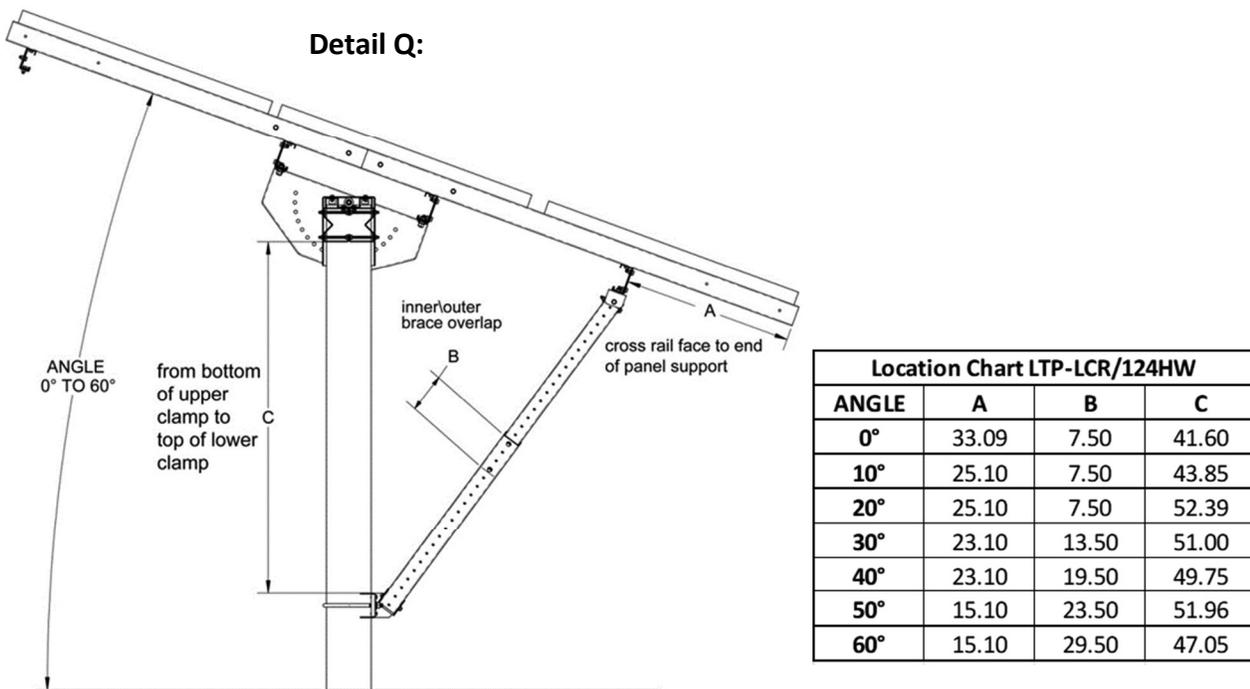
- A. Install Upper Cross Brace Rail assembly, with the open side facing the pole, across the north underside of the Module Support Rail assemblies. Place the 5/16"-18 x 7/8" bolts, flat washers and flange nuts in the last hole in from the end of the Module Support Rails, as shown in **Detail P**. The ends of the Upper Cross Brace Rail should be the same distance in from the ends as the two main Cross Rails are to the Module Support Channels. Torque to 144 in-lbs (dry).

Detail P:

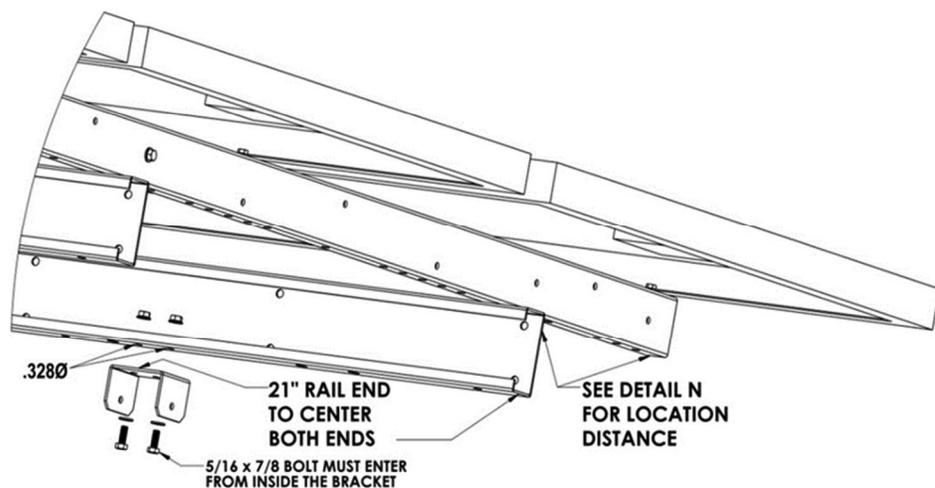


- B. Repeat across the south end of the Module Support Rails, using the third set of Cross Rails previously pre-assembled (see **Details Q and R**). This will act as the Knee Brace Cross Rail. Install with the open side of the Rail assembly facing the pole, and the same distance in from the ends as the other Cross Rails.

*Note: the location of this Knee Brace Cross Rail assembly is determined by the final desired angle setting for the array, as seen in the table in **Detail Q**.*



Detail R:



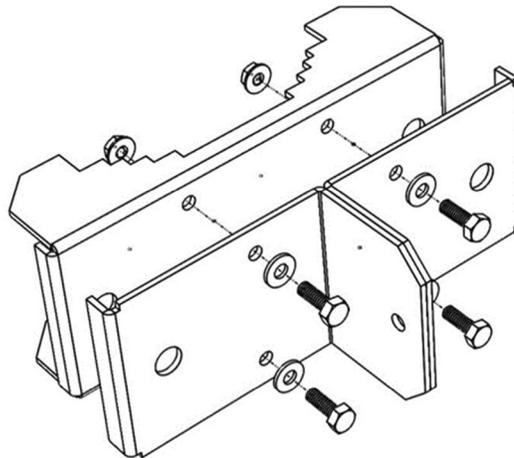
Step 11: Adjust Tilt Angle

- A. Remove the lower two 1/2"-13 x 1.25" bolts from the Tilt Plates and tilt the array to the desired angle. The array tilts in 10° increments from 0° to 60°. Re-install the 1/2"-13 bolts and torque all six bolts (three per Tilt Plate) to 40 ft-lbs.

Step 12: Install Lower Knee Brace

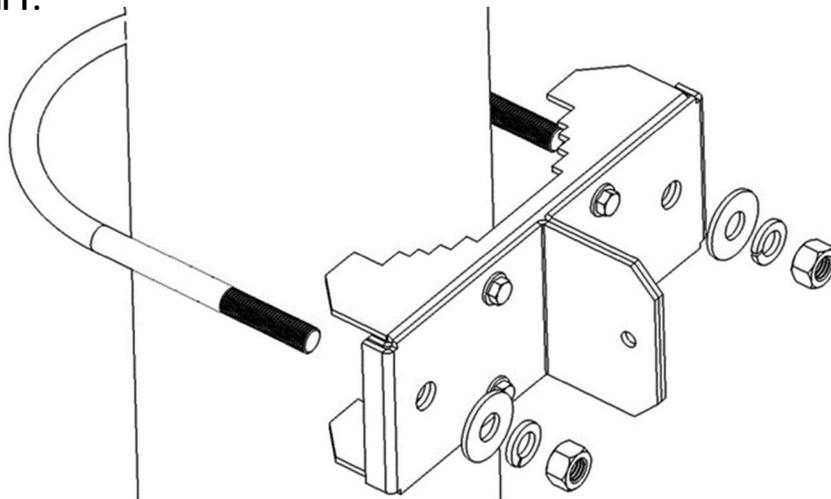
- A. Pre-assemble the Lower Knee Brace Clamp body to the Angle Brackets with the 1/4" x 3/4" bolts, flat washers and flange nuts, and torque to 84 in-lbs. (see **Detail S**). Set aside the 5/16"-18 x 1" bolt, flat washer and flange nut attached to one of the Angle Brackets.

Detail S:



- B. Attach the Lower Knee Brace Clamp loosely to the pole with the 1/2"-13 x 6" U-bolt, flat washers, lock washers and nuts as shown in **Detail T**). Hand tighten just enough to keep it from sliding down the pole. See previous **Detail Q** table for clamp location position on the pole.

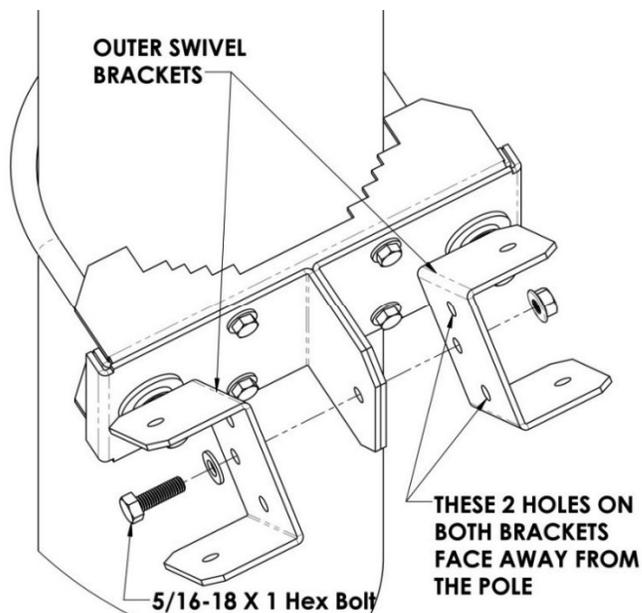
Detail T:



- C. Loosely attach the Outer Swivel Brackets to the Lower Knee Brace Clamp with the (previously set aside) 5/16"-18 x 1" bolt, flat washer, and flange nut, as shown in **Detail U**.

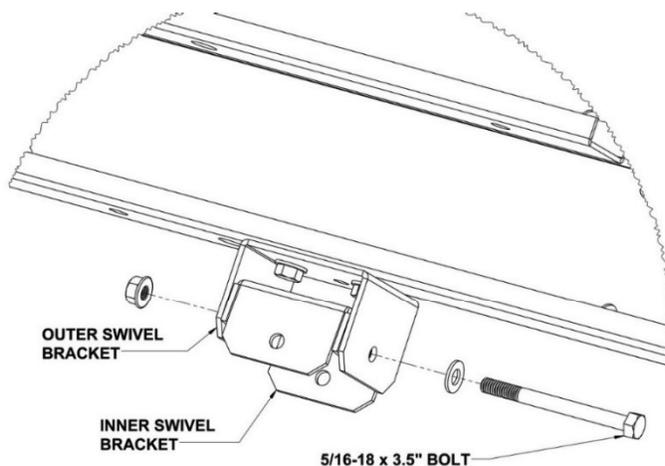
*Note: The flanges on both brackets need to face to the outside as shown in **Detail U**.*

Detail U:

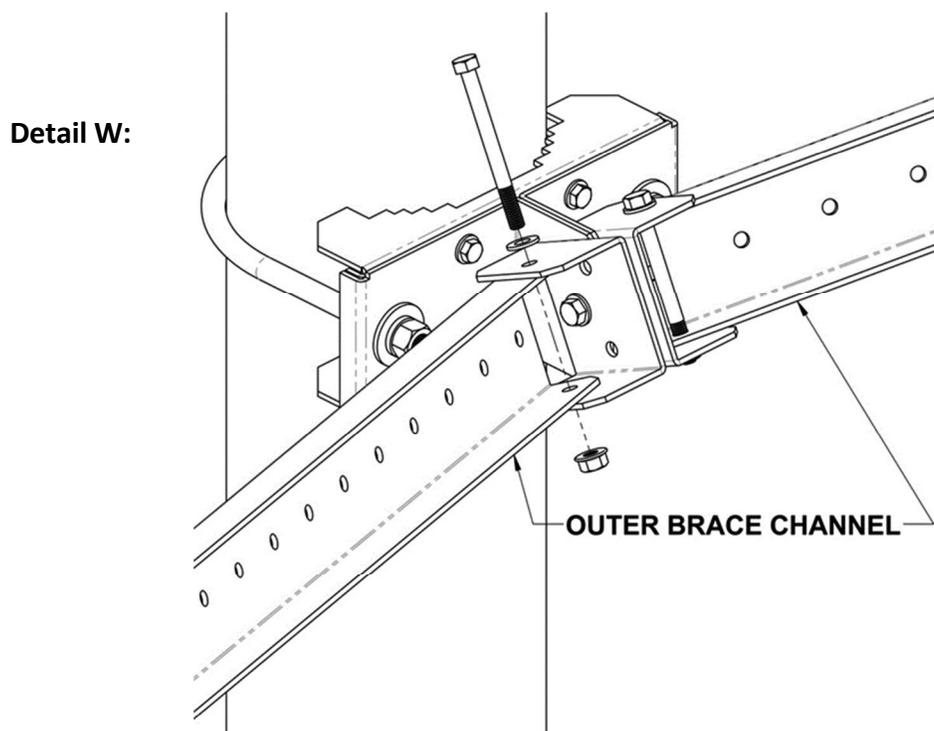


- D. Attach the two Outer Swivel Brackets to the lower flange of the Knee Brace Cross Rail, one on each side, and 21" in from the ends of the Knee Brace Cross Rail, as shown in **Detail R**. using the 5/16"-18 x 7/8" bolts, flat washers, and flange nuts (two bolts per bracket). Flange nuts to be on the inside of the Knee Brace Cross Rail. Tighten to 144 in-lbs (dry).
- E. Loosely attach the Inner Swivel Brackets to the Outer Swivel Brackets, as shown in **Detail V**, using the 5/16"-18 X 3.5" bolts, flat washers, and flange nuts.

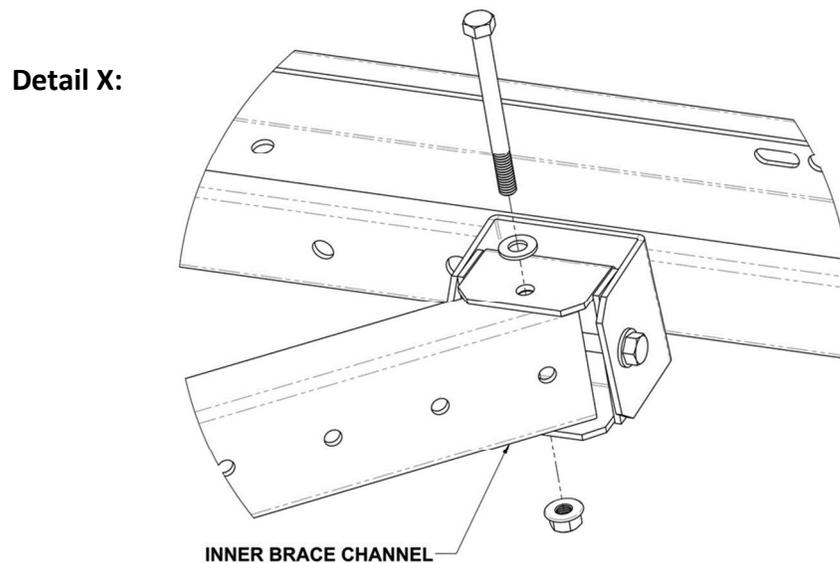
Detail V:



- F. Loosely attach the two 39.5" Outer Knee Brace Channels to the Outer Swivel Brackets on the Lower Knee Brace Clamp (on the pole), with the open sides facing in, as shown in **Detail W**, using the 5/16"-18 x 3.5" bolts, flat washers, and flange nuts.



- G. Loosely attach the 39.5" Inner Brace Channels to the Inner Swivel Brackets on the Knee Brace Rail, open side facing in, with 5/16"-18 x 3.5" bolts, flat washers, and flange nuts, as shown in **Detail X**.

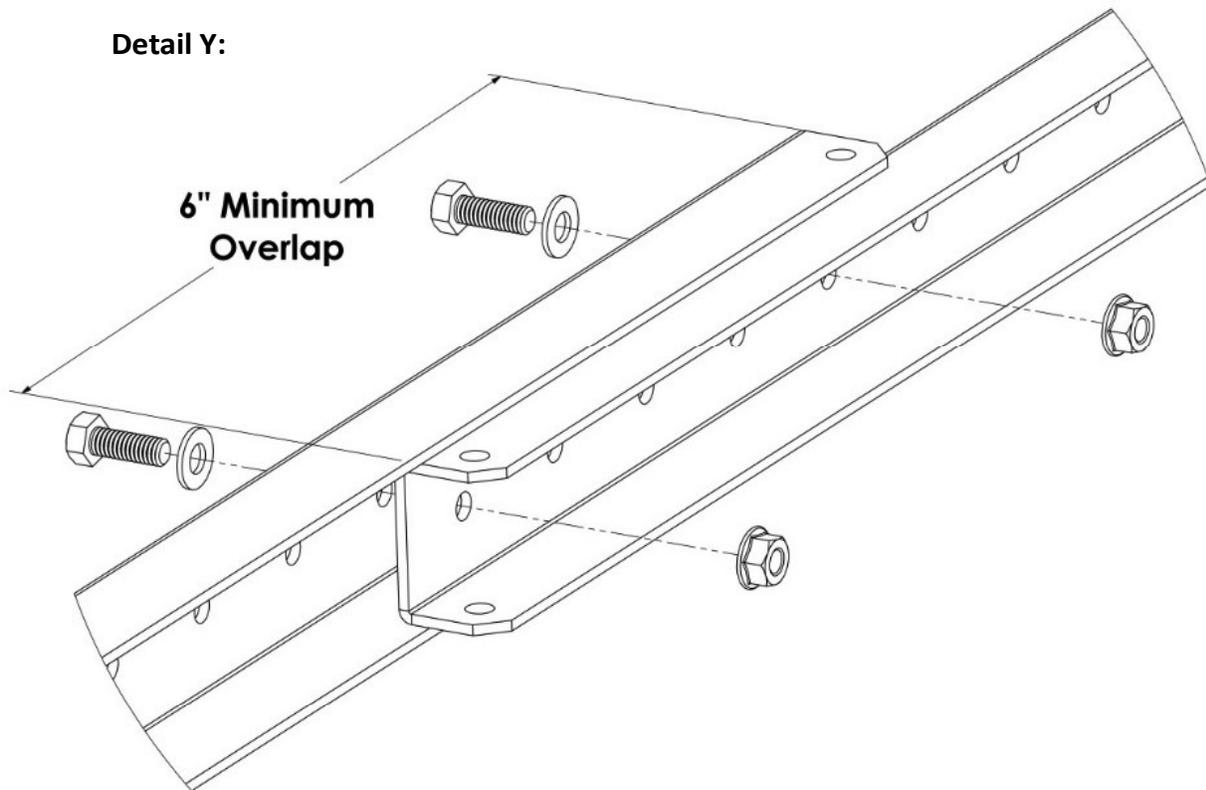


- H. Connect the Inner Knee Brace Channels to the Outer Knee Brace Channels, as shown in **Detail Y**, using the 5/16"-18 x 7/8" bolts, flat washers, and flange nuts, in the holes nearest to each end of the Inner and Outer Channels (see **Detail Y**).

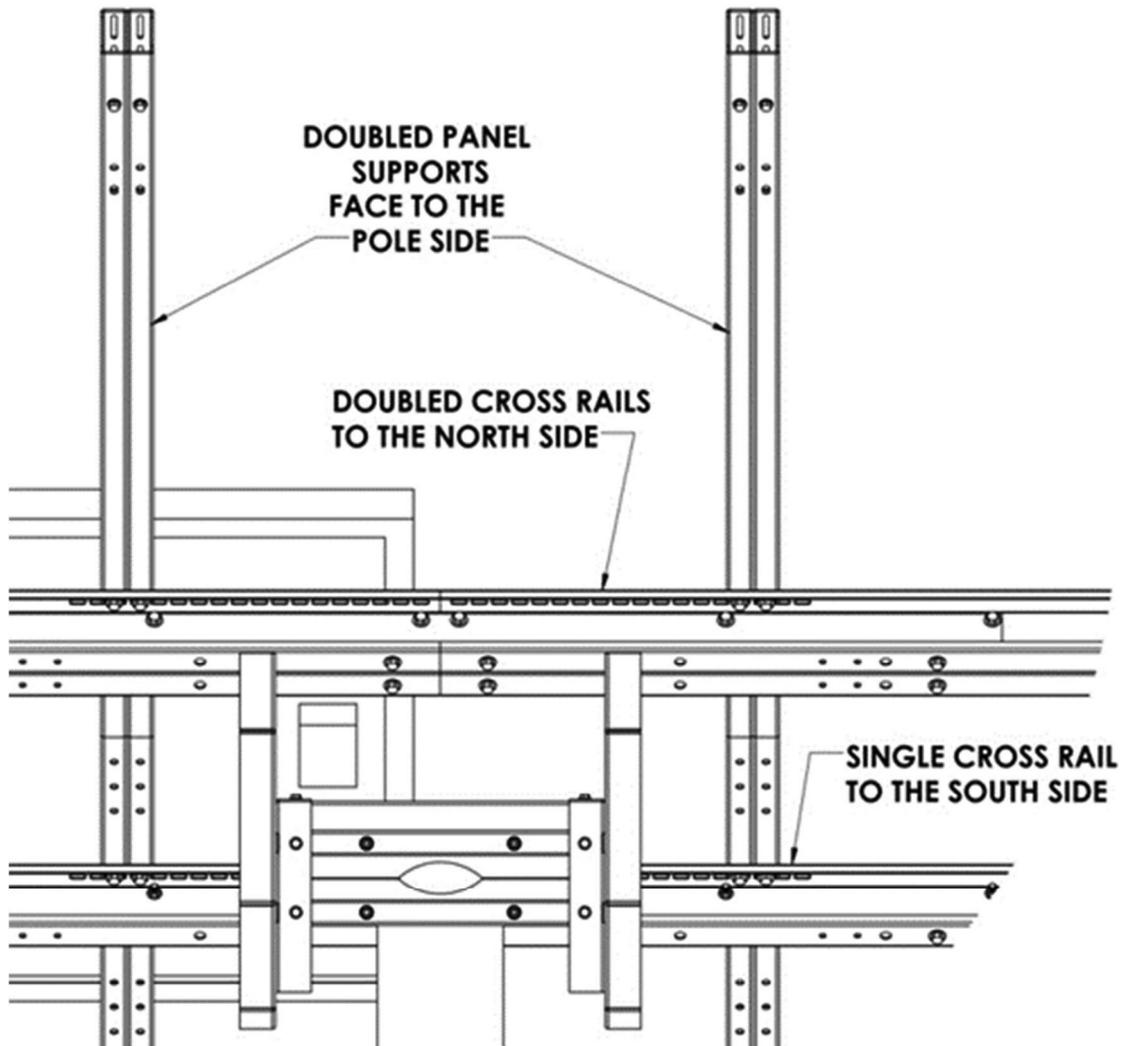
If the holes do not line up, adjust the Lower Knee Brace Clamp up or down the pole slightly to get the holes in the Channels to align.

Tighten all of the 5/16" hardware to 144 in-lbs (dry)

Note: There must be a minimum 6" overlap of the inner and outer channels



Finished Detail:



Foundation Hole Guidelines

The suggestions below are **recommendations only**. It is the installer's responsibility to validate foundation parameters prior to installation, as local geotechnical report may be required to assess soil 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. Lines **highlighted** require the High Load Kit.

6 Module 60 cell	Footing depth/feet		Footing depth/feet		6" Pipe sch
	Class 5		Class 4		
Soil Type	Class 5		Class 4		
Hole diameter	18"	30"	18"	30"	
0°	4.50	3.75	4.00	3.25	40
10°	5.50	4.50	4.75	4.00	40
20°	6.75	5.50	5.75	4.75	40
20° High Load	7.00	5.75	6.00	5.00	40
30°	8.25	6.75	7.00	5.75	40
30° High Load	8.75	7.25	7.50	6.25	40
40°	9.00	7.25	7.75	6.25	40
40° High Load	9.75	8.00	8.50	7.00	40
50°	N/A	N/A	N/A	N/A	N/A
50° High Load	11.00	9.00	9.25	7.50	80
60°	N/A	N/A	N/A	N/A	N/A
60° High Load	11.50	9.50	9.75	8.00	80

6 Module 72 cell	Footing depth/feet		Footing depth/feet		6" Pipe sch
	Class 5		Class 4		
Soil Type	Class 5		Class 4		
Hole diameter	18"	30"	18"	30"	
0°	4.50	3.75	4.25	3.25	40
10°	6.25	5.00	5.25	4.25	40
20°	6.75	5.50	5.75	4.75	40
20° High Load	7.50	6.00	6.25	5.25	40
30°	8.25	6.50	7.00	5.75	40
30° High Load	9.25	7.75	8.00	6.75	40
40°	N/A	N/A	N/A	N/A	N/A
40° High Load	10.00	8.25	8.75	7.25	40
50°	N/A	N/A	N/A	N/A	N/A
50° High Load	11.25	9.00	9.50	7.75	80
60°	N/A	N/A	N/A	N/A	N/A
60° High Load	11.75	9.50	10.00	8.00	80

Soil Classifications

Class 4 - Loose to medium dense sands; firm to stiff clays and silts; alluvial fills

Class 5 - Uncompacted fill; peat; organic clays

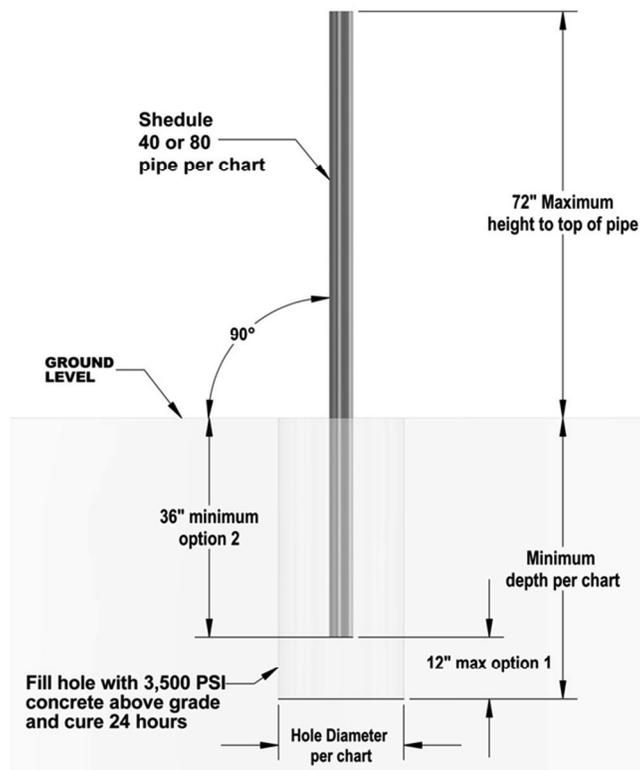
If in doubt about the soil type and holding strength, consult a local engineer.

Installation Recommendations: Concrete to be min 3,500 PSI

1. Auger hole to minimum depth shown in foundation guidelines, + 6" for (#2). Drilled holes to be filled with concrete shall be cleaned to remove all loose cuttings.
2. Stumps or other decomposable material exceeding 3 inches in the least dimension located within the drilled diameter of the foundation shall be removed entirely prior to placing concrete.
3. The bottom 6" of hole should be filled with crushed rock or a blocking; this will prevent the pole from touching the base of the hole, ensuring complete encapsulation of the pole when concrete is poured, as well as allowing for water drainage. (see option 1)
4. The pole should be installed vertically no matter the slope of the install site and centered in the hole.
5. Make arrangements to prevent the pole from twisting or moving prior to and during pouring of the concrete.
6. The pole should be braced to remain plumb and in position until concrete has cured at least 24hrs.
7. The solar system shall not be attached to the support pole until the concrete has reached 3,500 psi.

The Steel Pole be embedded into the concrete pier using one of the following options:

- A. **Option 1:** To within 12" of the bottom of the concrete pier.
- B. **Option 2:** The steel pole embedment shall be a minimum of 36" into the concrete pier with two #5 rebars extending vertically to within 12" of the bottom of the pier, one on each side of the steel pole. The rebar shall lap with the steel pole a minimum of 30". A bolt (5/16" minimum) shall be placed through the steel pole at approximately 6" (+/- 2") from the bottom of the pole with a hand tightened nut to provide uplift resistance in direct bearing with the concrete.



Installer Responsibility

The installer is solely responsible for:

1. Complying with all applicable local or national building codes, including any that may supersede this manual.
2. Ensuring that Tamarack Solar and other products are appropriate for the particular installation and the installation environment.
3. Using only Tamarack Solar parts and installer-supplied parts as specified by Tamarack Solar. Substitution parts may void the warranty.
4. Ensuring safe installation of all electrical aspects of the PV array.
5. Ensuring correct and appropriate design parameters are used in determining the design loading used for the specific installation. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer

Warranty Information

Tamarack Solar 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.

Galvanized coated sheet steel components will show rust on cut edges and is normal and will not affect the structure and function of the mount.

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 Tamarack Solar’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, or typographical errors in instruction manuals. The Warranty does not cover any defect that has not been reported in writing to Tamarack Solar 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. Tamarack Solar’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 Tamarack Solar’s discretion. Refurbished Mounting Structures may be used to repair or replace the Mounting Structures

Tamarack Solar 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 Tamarack Solar by Purchaser, any employee of Purchaser, client of Purchaser, end-user of the Product or other party, even if Tamarack Solar has been advised of the possibility of such claims or demands (collectively, “Third Party Claims”). This limitation applies to all materials provided by Tamarack Solar during and after the Warranty Period.