KB RACKING®
Simple solutions you can count on.

AEROGRID®

INSTALLATION MANUAL

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KB RACKING®
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Introduction

INTRODUCTION

This manual provides an illustrative guide on how to install the AeroGrid racking system. It will cover each step of the assembly process with guidance on how to prevent damage to equipment and tips on assembling efficiently.

Read all the instructions carefully prior to installation. Should you have any questions, please contact your KB Racking Project Manager.

REFERENCE DOCUMENTS

The images and diagrams in this manual are for reference only. The steps in this installation manual are to be followed for all projects in conjunction with project specific documents and dimensions provided by KB Racking. Ensure you have the following documents prior to beginning the installation:

1. Spacing Diagram
2. Layout Diagram
3. Ballast Layout Diagram
4. Rail Table

LIABILITY/DISCLAIMER

The installer of each project is responsible for the safe and proper installation of each system. They are required to supervise all safety programs and precautions for each project site, as well as provide all necessary protection to ensure a safe working environment.

KB Racking does not perform any portion of its mounting system installation and therefore does not have any duty or responsibility for the safe and proper installation.

RECEIVING

Upon receiving parts, ensure the correct type and quantities of parts have been delivered by unboxing all components and checking for any damages. If you have received damaged or missing components, document with photos and immediately notify your KB Racking Project Manager.

KB RACKING IS NOT RESPONSIBLE FOR ANY DAMAGES INCURRED ONCE THE SHIPMENT HAS BEEN SIGNED FOR AND RECEIVED.

STORAGE CONSIDERATIONS

KB Racking recommends installing racking components shortly after delivery to the project site. If components are not installed immediately, they should be stored in a well ventilated and dry location. Failure to do so may cause the moisture to form stains and/or white rust which may decrease the coating service life and overall component performance. KB Racking is not liable for claims related to improper storage and such claims are not covered by the product warranty.

Safety

OVERVIEW

Precautionary measures must be taken to ensure a safe working environment. Prior to beginning installation, it is important to identify potential hazards and implement a safety plan to ensure safe work practices during installation.

PERSONAL SAFETY

Only qualified professionals should install solar modules, DC cabling, and any anti-lightning safety devices. Some personal safety considerations include:

PPE – While installing the PV system, proper safety equipment should be worn. Wear safety gloves when handling parts. Newly fabricated parts may have sharp edges.

Fall Prevention – If roof/building has a fall distance of 10ft (3m) or greater, appropriate safety measures must be taken (i.e., harnesses) for installation of modules closer than 6.5ft (2m) to roof edges or skylights.

KB Racking Inc. requires all arrays to be no closer than 3ft (0.9m), unless otherwise stated, from a building's roof edge to validate wind load calculations and ensure the system is safely ballasted.

Unpacking – KB Racking components may have shifted during shipping. Take extra care when moving and unpacking components.

SITE SAFETY

A structural analysis of the roof should be conducted prior to installing to determine the load capacity. Always observe all governing codes and ordinances. Some site safety considerations include:

Roof Debris – Inspect the roof for damages prior to installation and record any existing damage with a camera. Clean the roof surface and remove all dirt and debris.

Roof Flooding – Ensure proper drainage on the roof. Water accumulations may lower the load reserve of the rooftop and decrease lifespan. Additionally, constant submersion of PV supports in water may damage parts. Consult with a KB Racking Project Manager if this is the case.

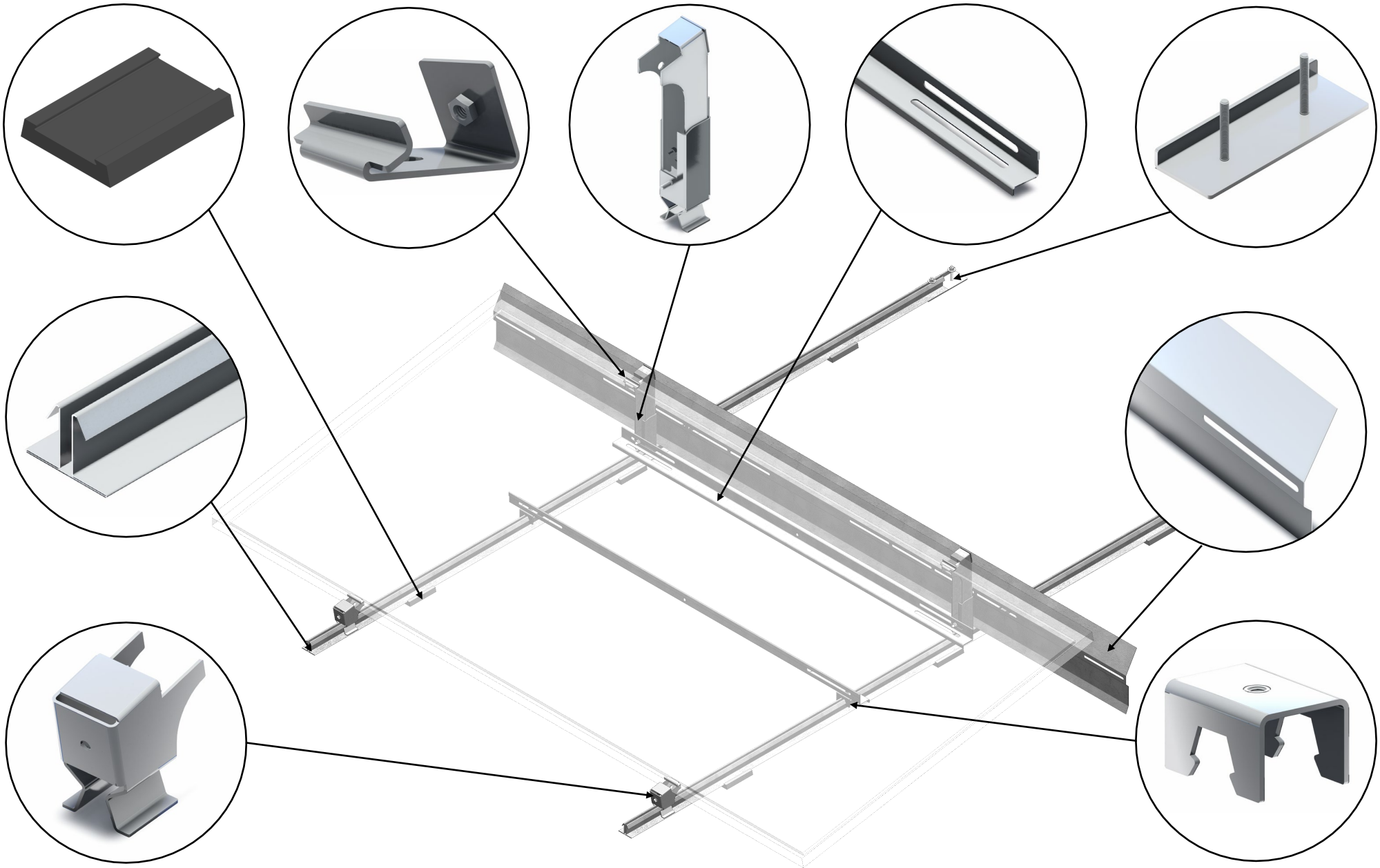
UL2703 List of Approved Modules

MODULE COMPATIABILITY – Racking system to be used with modules where compatibility from the manufacturer has been approved

GROUNDING – Racking system may be used to ground and/or mount a PV module complying with UL1703 and/or UL61703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.

MODULE MANUFACTURER	MODULE TYPE
Boviet	Boviet 35mm Module Frames: BVMYYYYM-xxx-H-HC-BF-ZZ Where “YYYY” can be 6610/6612/7610/7612 & “ZZ” can be DG or Blank.
Canadian Solar	Canadian Solar 33mm Module Frames: CS7N-xxxMB-AG
Hanwha - QCells	QCells 35mm Module Frames: Q.PEAK DUO XL-GXX.Y/ZZZ Where “XX’ can be 10/11, “Y” can be 2/3/c/d & “ZZZ” can be BFG/BGT or Blank.
JA Solar	JA Solar 35mm Module Frames: JAM72Y30-xxx/MZ Where “Y” can be D, S & “Z” can be R, B
Jinko	Jinko 40mm Module Frames: JKMxxxM-72HL4-Y Where “Y” can be v, tv
Longi	Longi 35mm Module Frames: LRY-72HBD Where “Y” can be 4, 5
Talesun	Talesun 30mm Module Frames: TD6IYYM Where “YY” can be 60, 72
Trina	Trina 35mm Module Frames: TSM-DEG21C.20
VSun	Vsun 35mm Module Frames: VSUNxxx-144BMH-DG
ZnShine	ZnShine 30mm Module Frames: ZXM7-SHLDD144

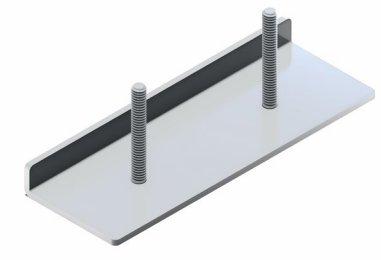
System Overview



System Components

COMPONENTS NOT TO SCALE

Rail, XX in
G00-GS-01-XX

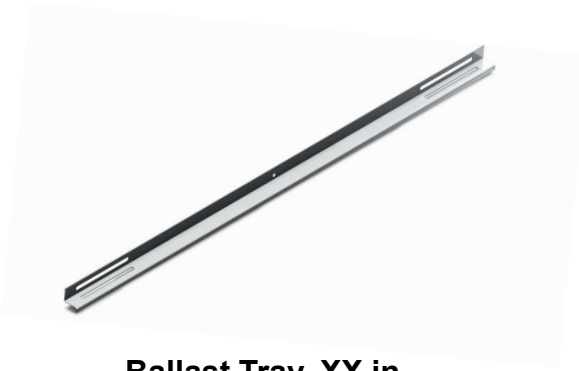


Splice
G00-GS-02

Bottom Support
GXX-GS-03

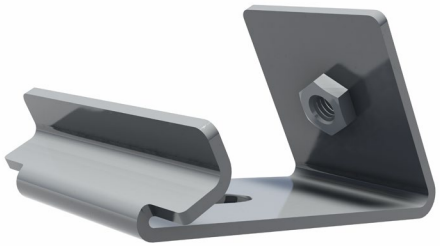
Top Support
GXX-GS-04

Accessory Bracket
G00-GS-05

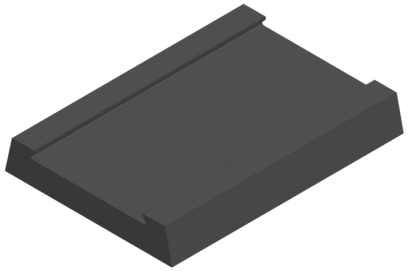


Ballast Tray, XX in
G00-GS-06

Windshield
GXX-GS-07



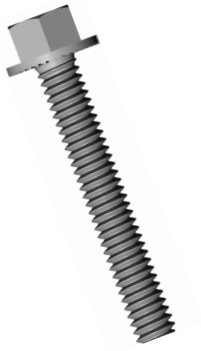
Pull Clamp
G00-GS-08



Roof Protection Mat
G00-RBR-01

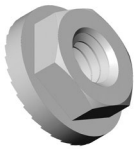
System Hardware

COMPONENTS NOT TO SCALE



1/4”-20 x 1 3/4” Hex Bolt
9111-1420-1340-SS0

1/4”-20 x 5/8” Hex Bolt
9111-1420-580-SS0



1/4”-20 Hex Nut
9211-1420-SS0

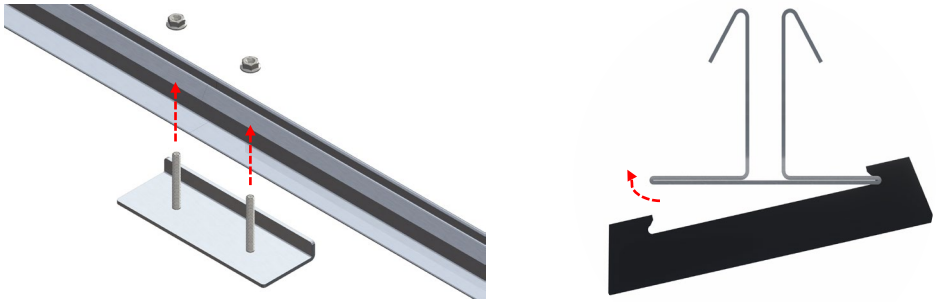
Installation Tools

- ○ 7/16” Hex Socket
- ○ 3/8” Hex Socket
- ○ Ratchet
- ○ Power Drill – **NOTE:** Do **NOT** use Impact Driver
- ○ Torque Wrench
- ○ Safety Gloves
- ○ Safety Glasses
- ○ Chalk Reel
- ○ Measuring Tape
- ○ Spacer Sticks (Pre-Cut Wooden Spacers)

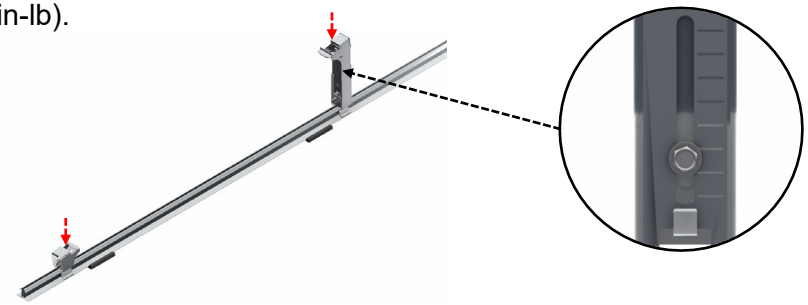
Quickstart Installation Guide

INSTALLATION STEPS

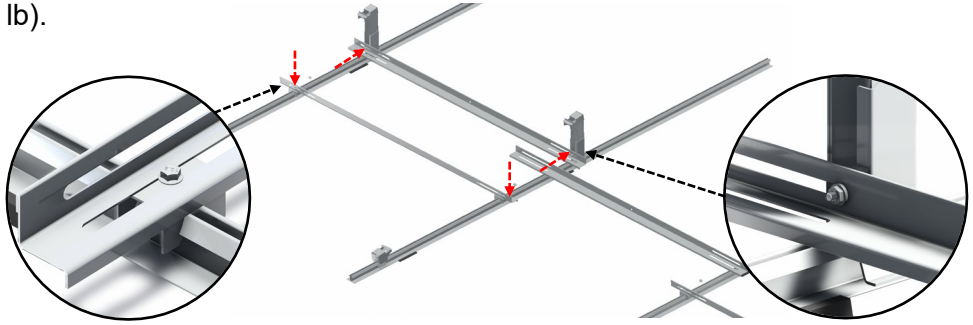
1. Place rails on roof with assembled roof protection mats. Fasten rails together with splice (Torque splice to 75 in-lb).



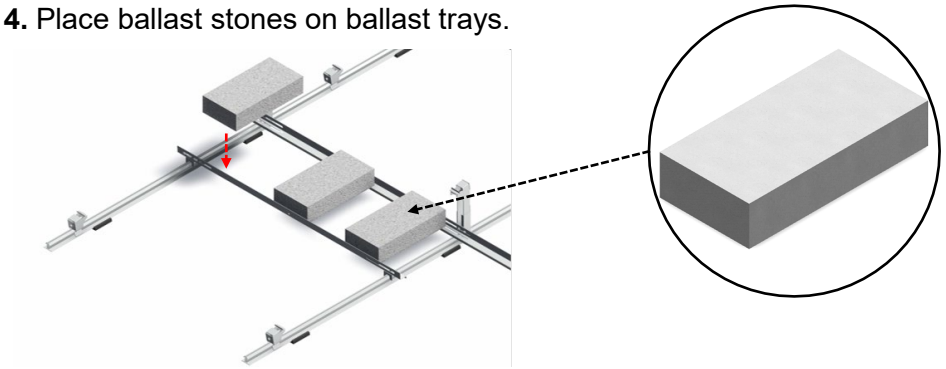
2. Set top support to the proper height using notch marks as a reference. Click-in bottom and top supports on rails (Torque top support to 75 in-lb).



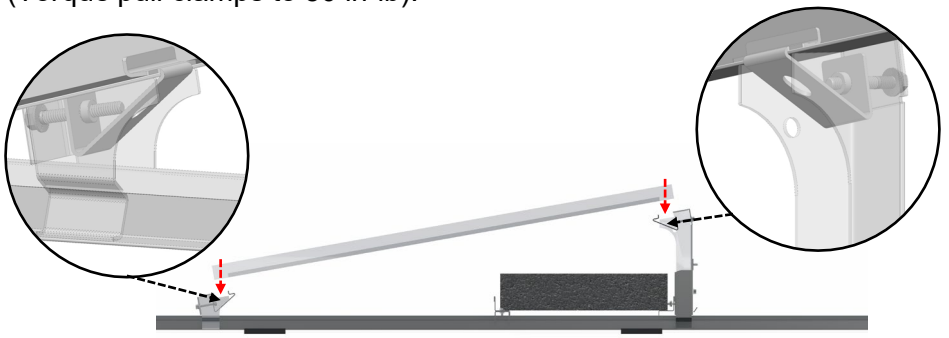
3. Click-in accessory brackets on rails and fasten ballast trays to accessory bracket and top support studs (Torque ballast trays to 75 in-lb).



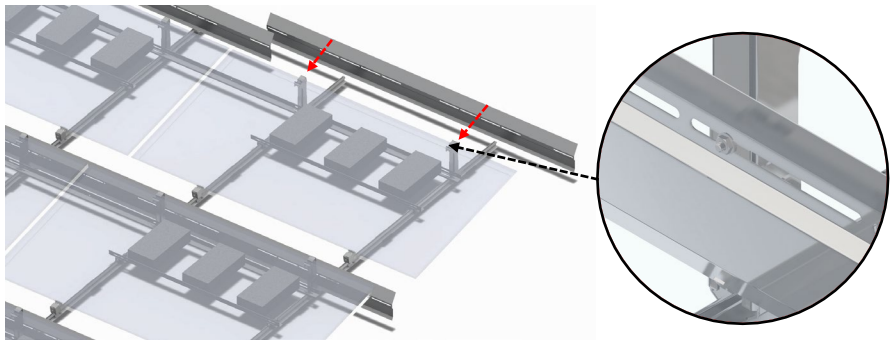
4. Place ballast stones on ballast trays.



5. . Install modules on supports and fasten pull clamps to module (Torque pull clamps to 50 in-lb).



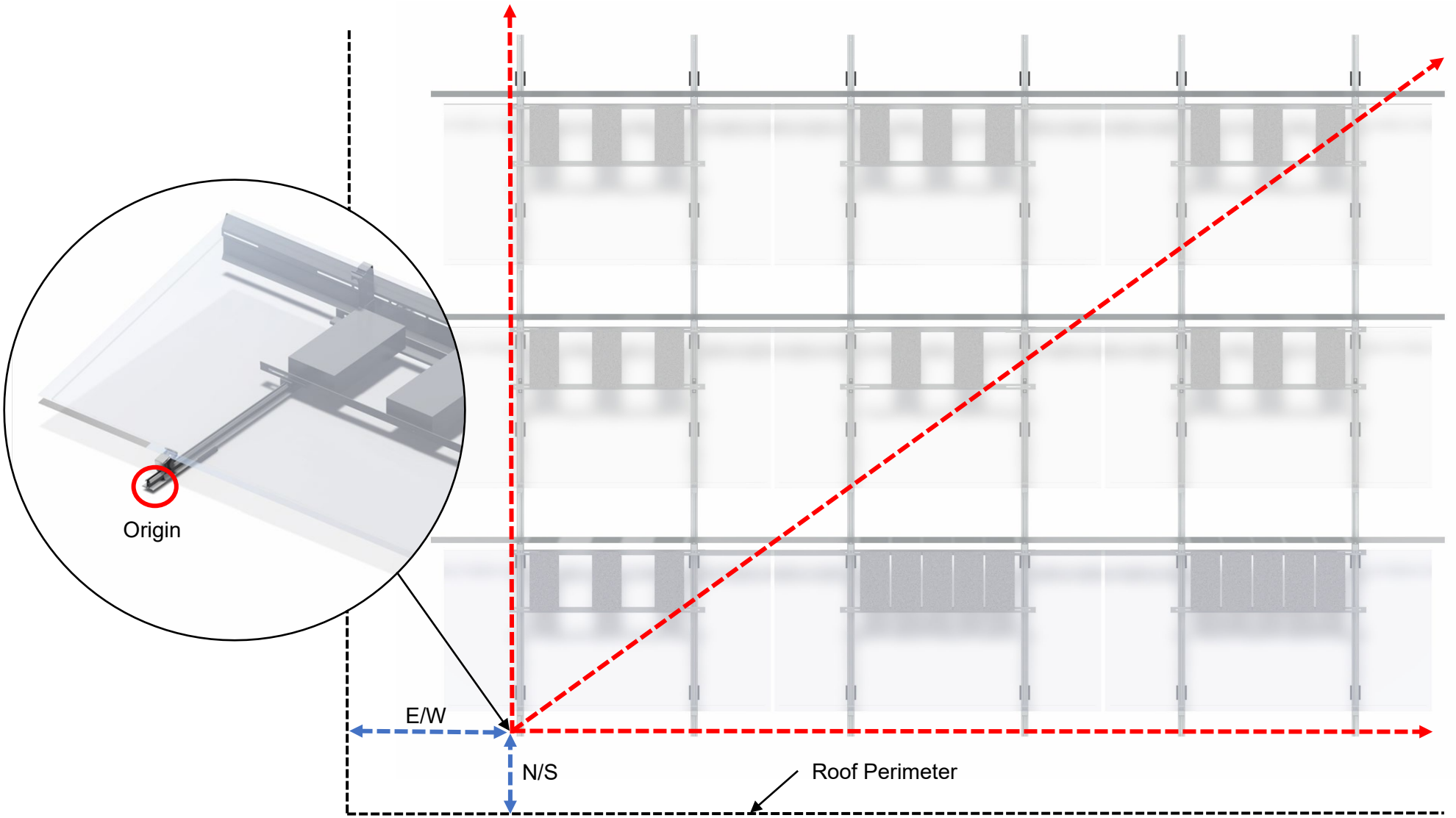
6. Fasten windshield to supports studs (Torque windshield to 75 in-lb).



How to Begin Assembly

1. From the layout, use the N/S and E/W dimensions of your roof as the ORIGIN (i.e., the beginning) of your installation. The corner of the rail will be the origin point for assembling the module array.

TIP: During the assembly, begin with the origin and cascade outward in the N/S and E/W directions simultaneously.



How to Use Your Spacing Diagram

Your ***Spacing Diagram*** will indicate the following dimensions.

A. N/S SUPPORT SPACING (N/S distance between supports)

B. INTER-ROW SPACING (Inter-row distance between supports)

C. E/W RAIL SPACING (E/W distance between rails)

D. E/W INTER-COLUMN SPACING (E/W distance between columns rails)

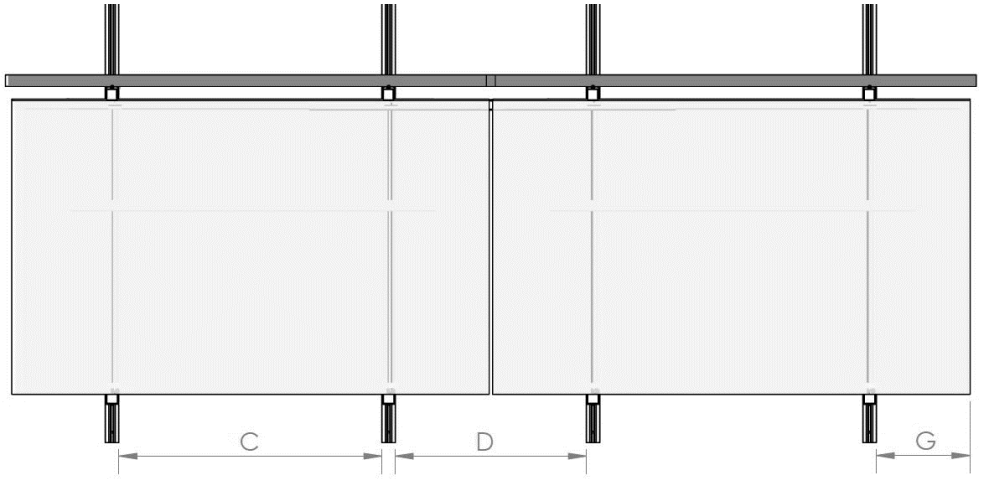
E. ROW SPACING (N/S distance between similar points)

F. ACCESSORY BRACKET SPACING (N/S distance between bottom support and accessory bracket)

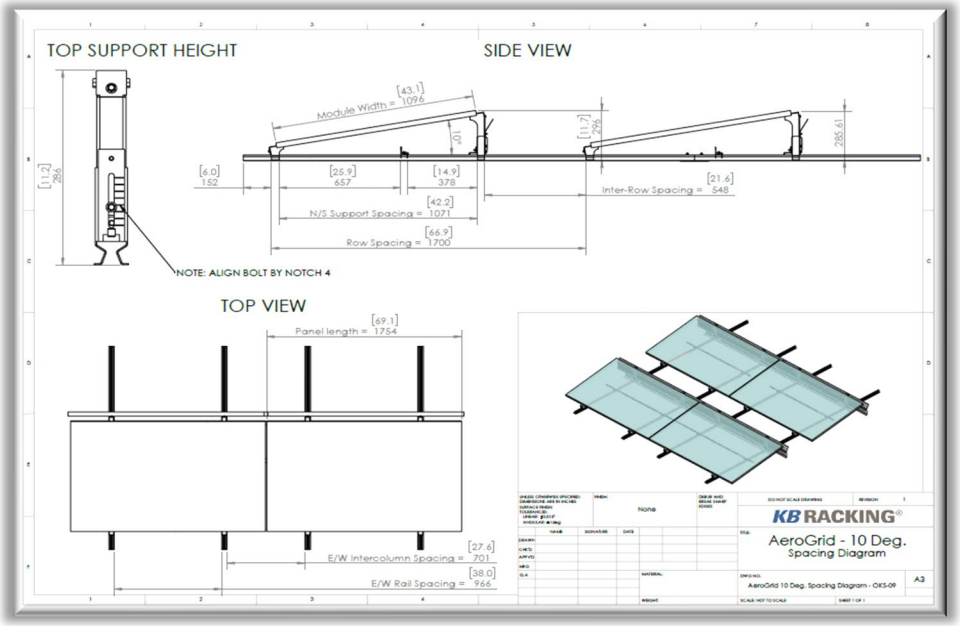
G. E/W MODULE SPACING(E/W distance between module and rails)

H. TOP SUPPORT SPACING (Top support slot height) – See page 17

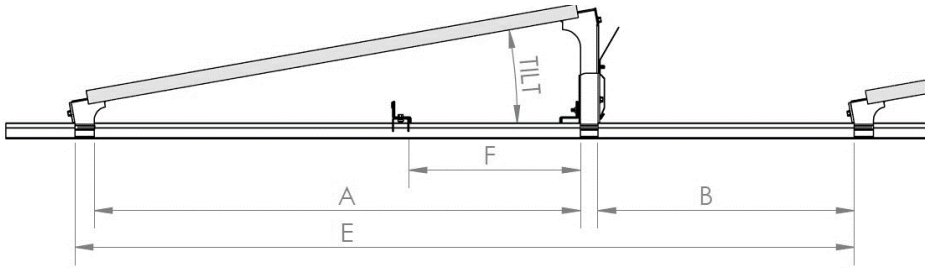
TIP: Create spacer sticks for the first four dimensions listed.



SPACING DIAGRAM EXAMPLE:



Spacing diagrams are specific to each installation.



How to Use Your Rail Table

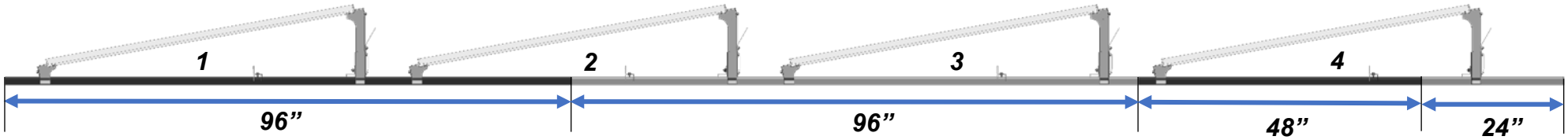
AeroGrid consists of 3 rail lengths including **96”, 48”, and 24”.** Combinations of these rail lengths are used within an array assembly. Refer to your Rail Table to determine rail quantities used within each array.

NOTE: Modules on a rail column references the number of module rows within a given array and the associated quantities of rail combinations used.

RAIL TABLE EXAMPLE:

Modules on Rail	# of Rail Pieces Required		
	96"	48"	24"
4	2	1	1

Rail tables are specific to each installation. Above, where 4 modules are on a rail, install two 96” rails, one 48” rail and one 24” rail as seen in the illustration below.



Installing Roof Protection Mats

Roof protection mats are used as a protective layer between the rail and roof surface to avoid any sharp edges from penetrating the roof.

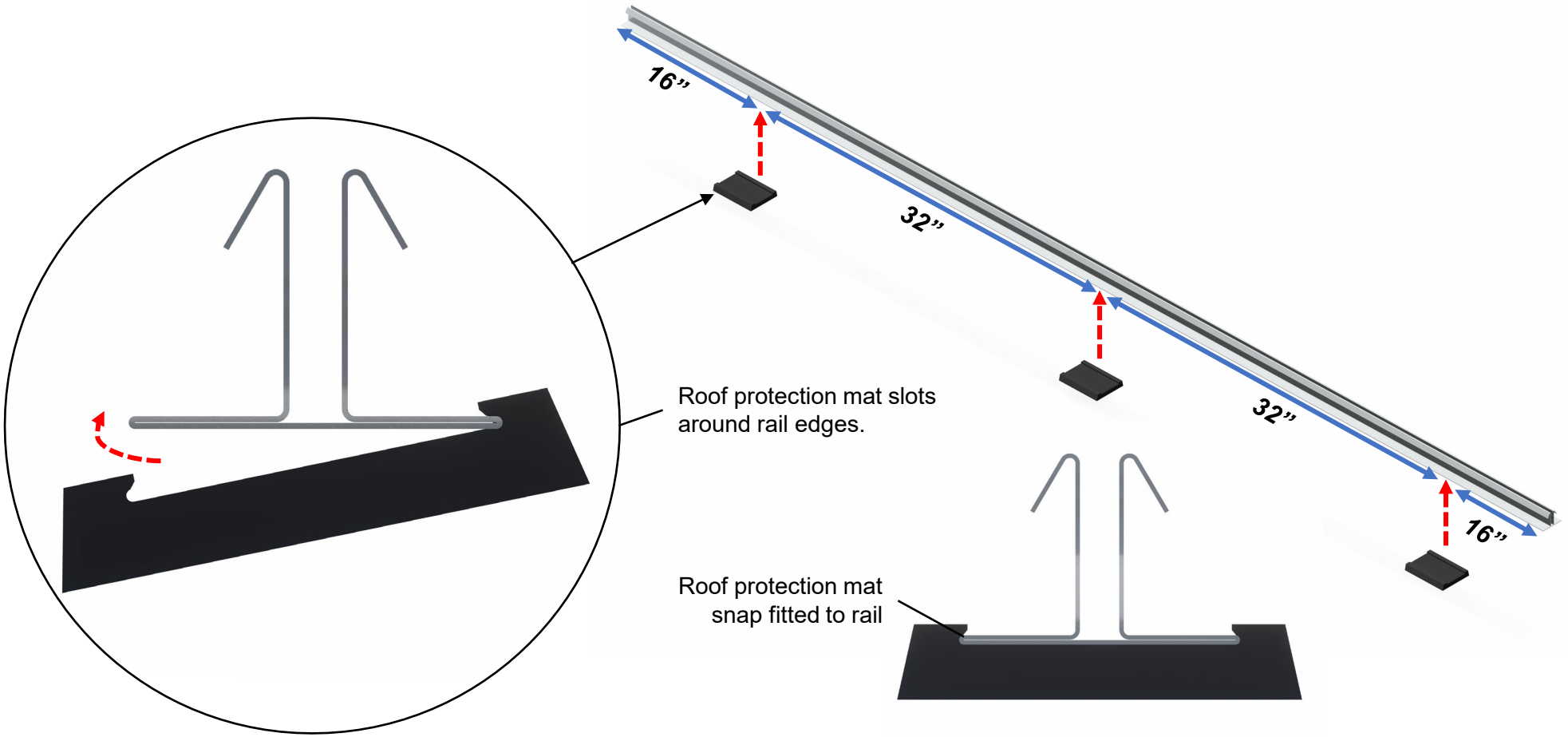
1. Slot one end of the mat and push the other end around the rail until a snap fit is achieved on the rail.

2. Space out the roof protection mats to install the following quantities per rail length. Roof protection mats are to be spaced equidistant.

Space roof protection mats a max of 32” apart.

MAT QUANTITIES PER RAIL:

Rail Length	Number of Mats
96”	3
48”	2
24”	1



Installing Rails

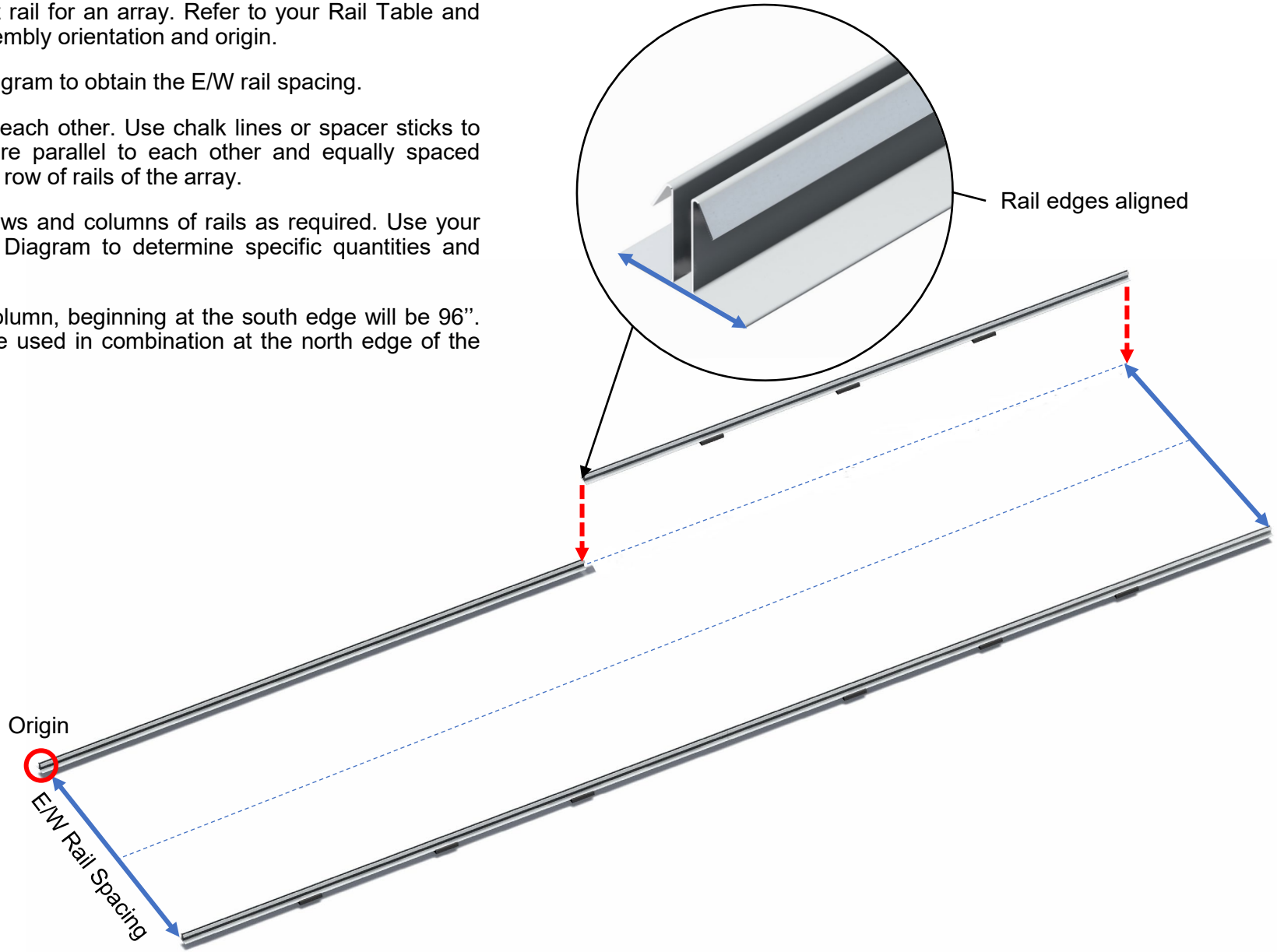
1. Place down your first rail for an array. Refer to your Rail Table and Layout Diagram for assembly orientation and origin.

2. Use your Spacing Diagram to obtain the E/W rail spacing.

3. Lay rails adjacent to each other. Use chalk lines or spacer sticks to ensure adjacent rails are parallel to each other and equally spaced apart. Complete the first row of rails of the array.

4. Continue installing rows and columns of rails as required. Use your Rail Table and Layout Diagram to determine specific quantities and combinations.

TIP: The rail within a column, beginning at the south edge will be 96''. 48", and 24" rails will be used in combination at the north edge of the rail column.



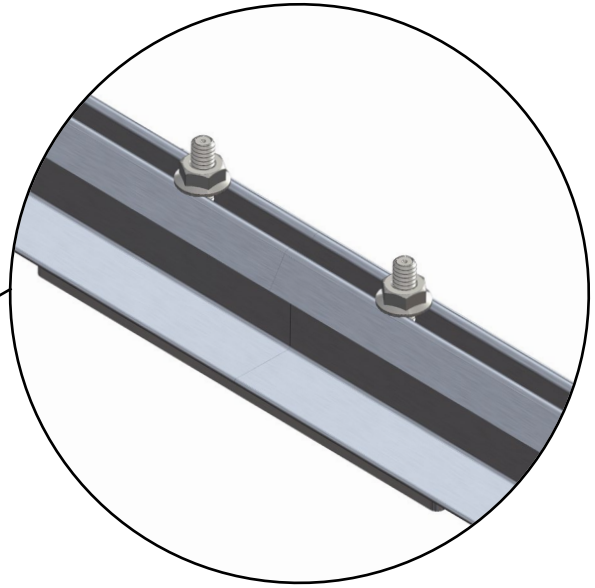
Installing Splices

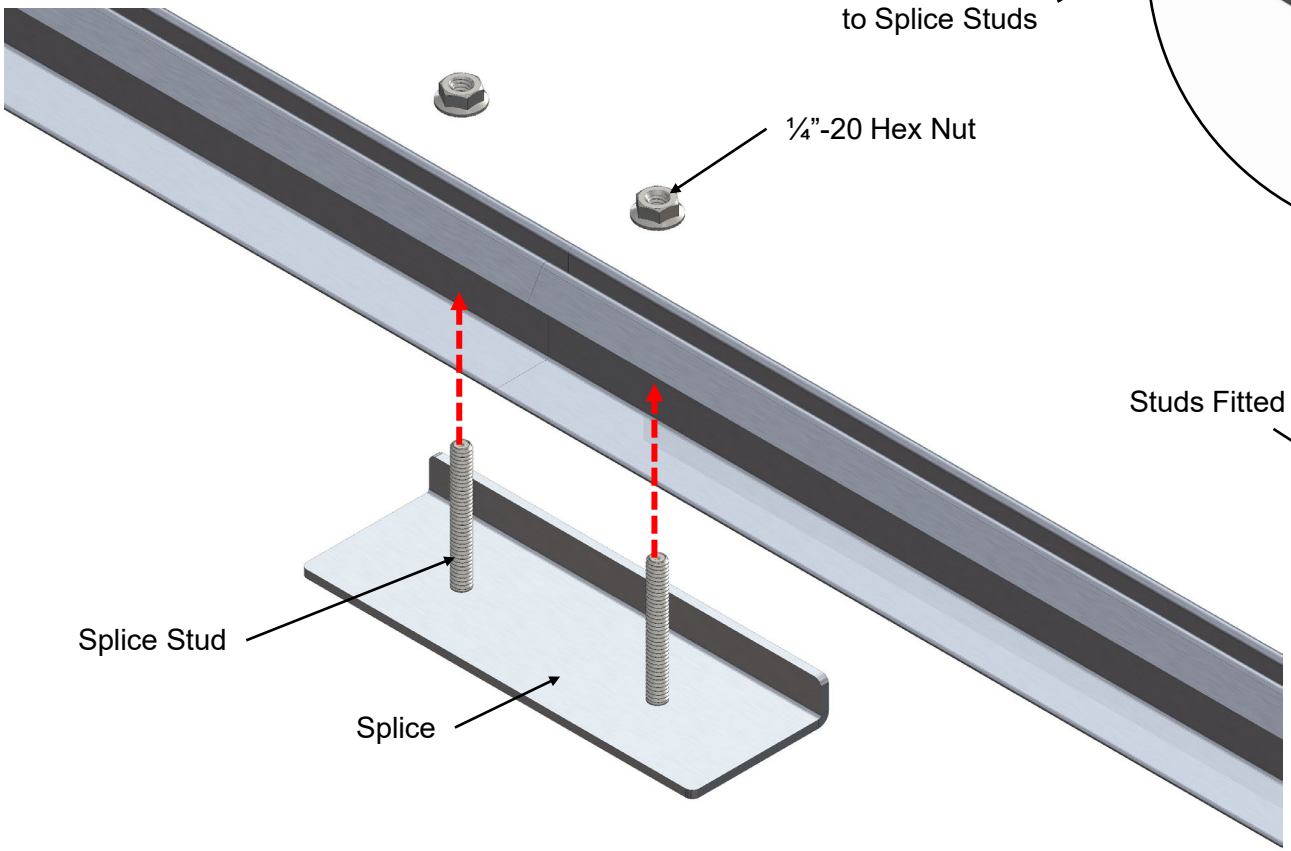
Splices are used to fasten two rails together. One splice is used per two rails.

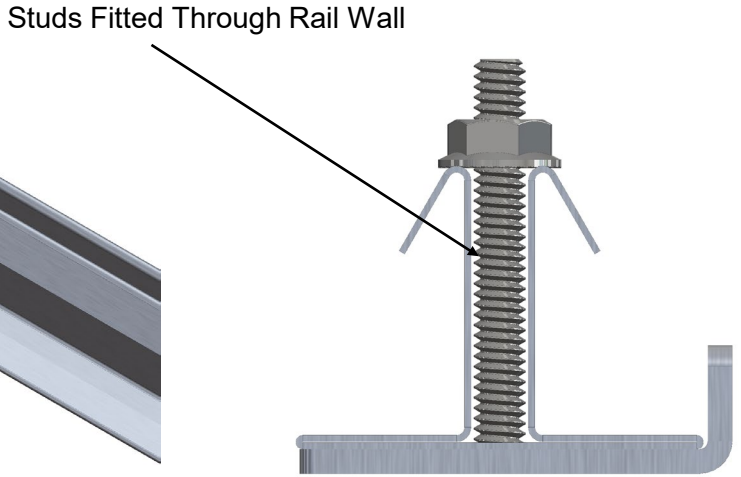
1. Place splice studs through rail holes. Splice stud will be situated between rail walls as seen in the image below

2. Fasten both ¼”-20 hex nuts to splice studs.

TORQUE TO 75 IN-LB.







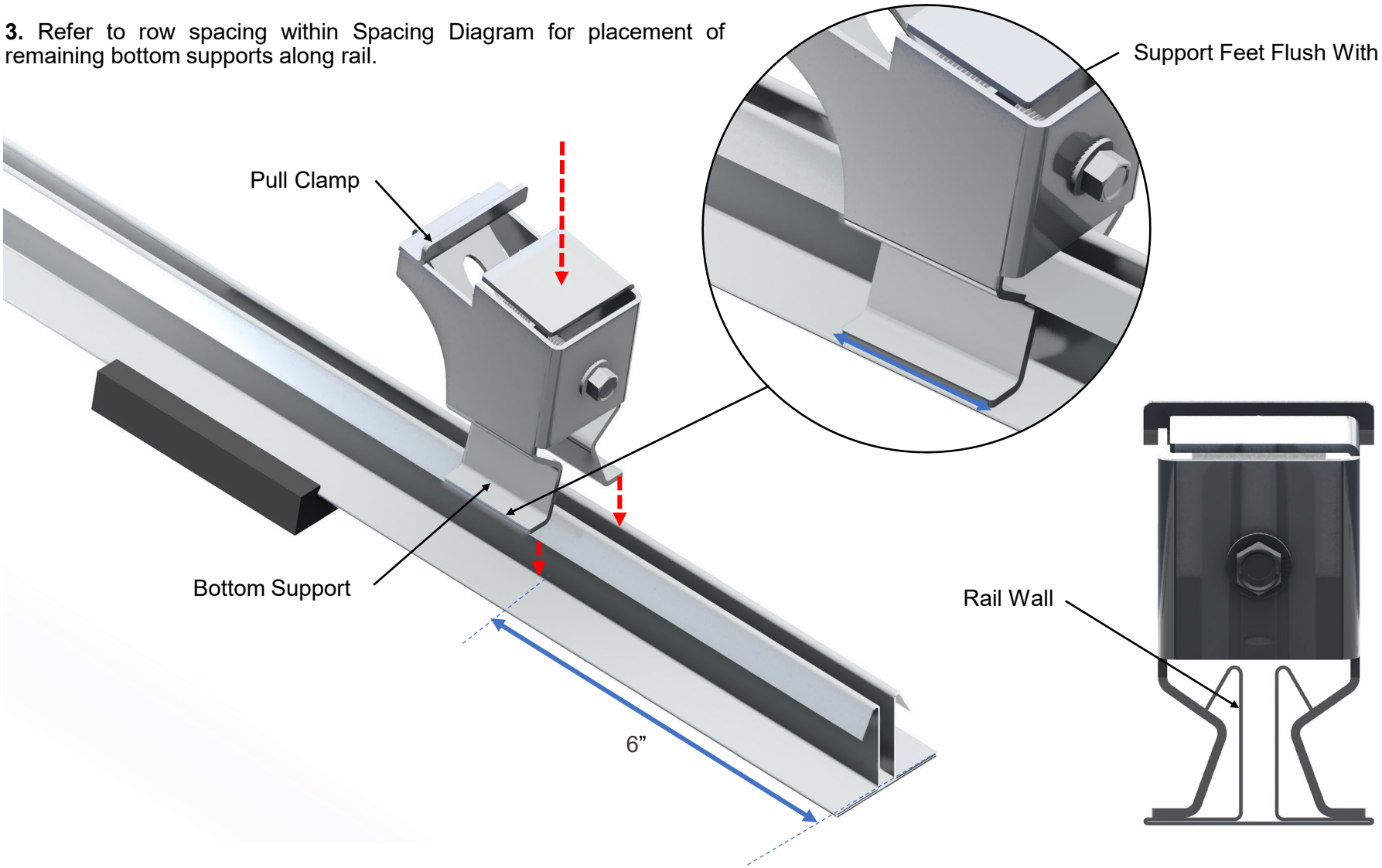
Installing Bottom Supports

1. Mark 6” setback from rail edge along the south edge.

2. Seat bottom support on rail. Apply downward pressure on the support with your hands until the click-in feature has engaged with the rail. Support feet will rest flush along the rail.

3. Refer to row spacing within Spacing Diagram for placement of remaining bottom supports along rail.

TIP: The support will create a click-in sound once the support is engaged with the rail. The rail walls will compress inward until the support are flush with the rail.



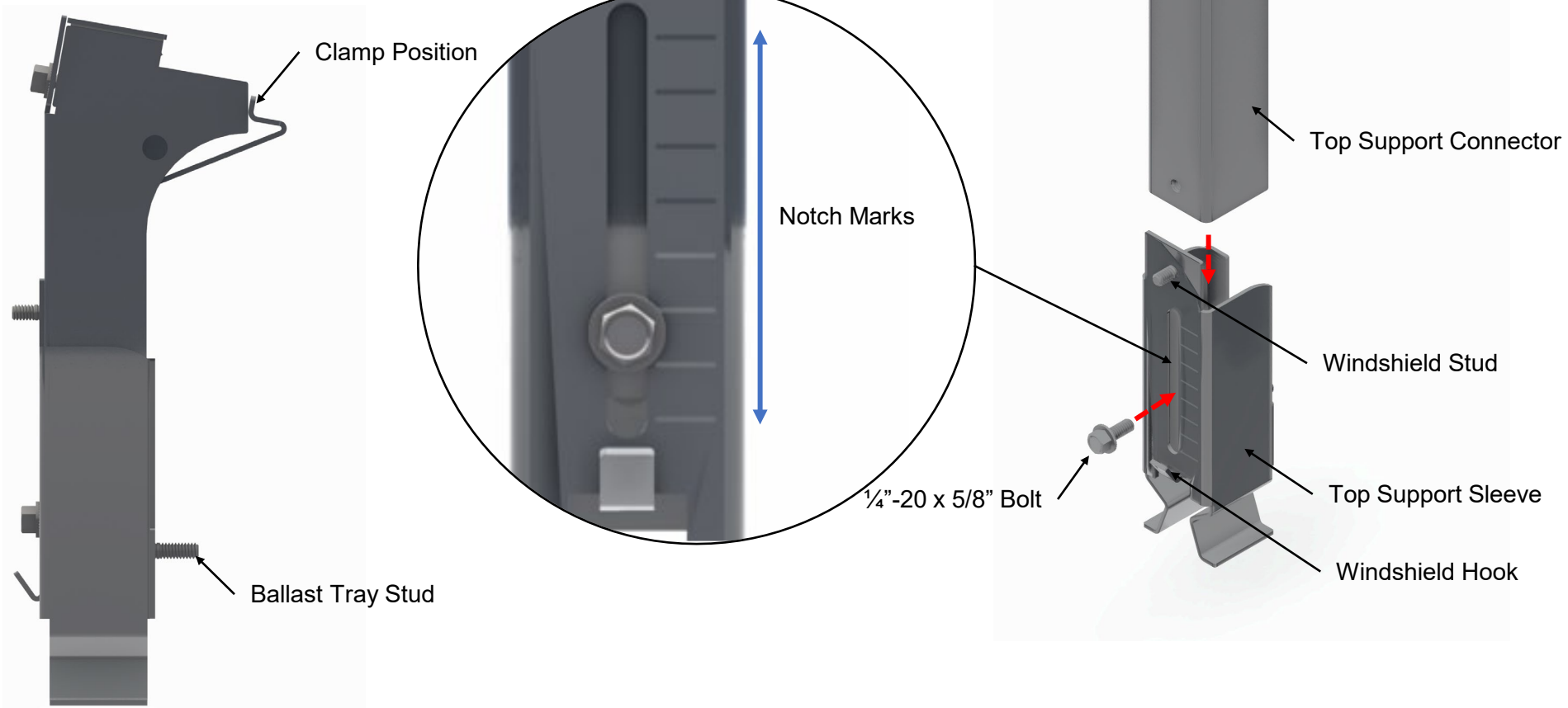
Top Support Assembly

1. Refer to your Spacing Diagram to measure the top support height. . Align the ¼-20 x 5/8” bolt to the proper notch mark on the top support sleeve.

2. Fasten ¼”-20 x 5/8” bolt to the specified height.

TORQUE TO 75 IN-LB.

3. Ensure pull clamp is loosened, and clamp position is sitting as seen in the image below.

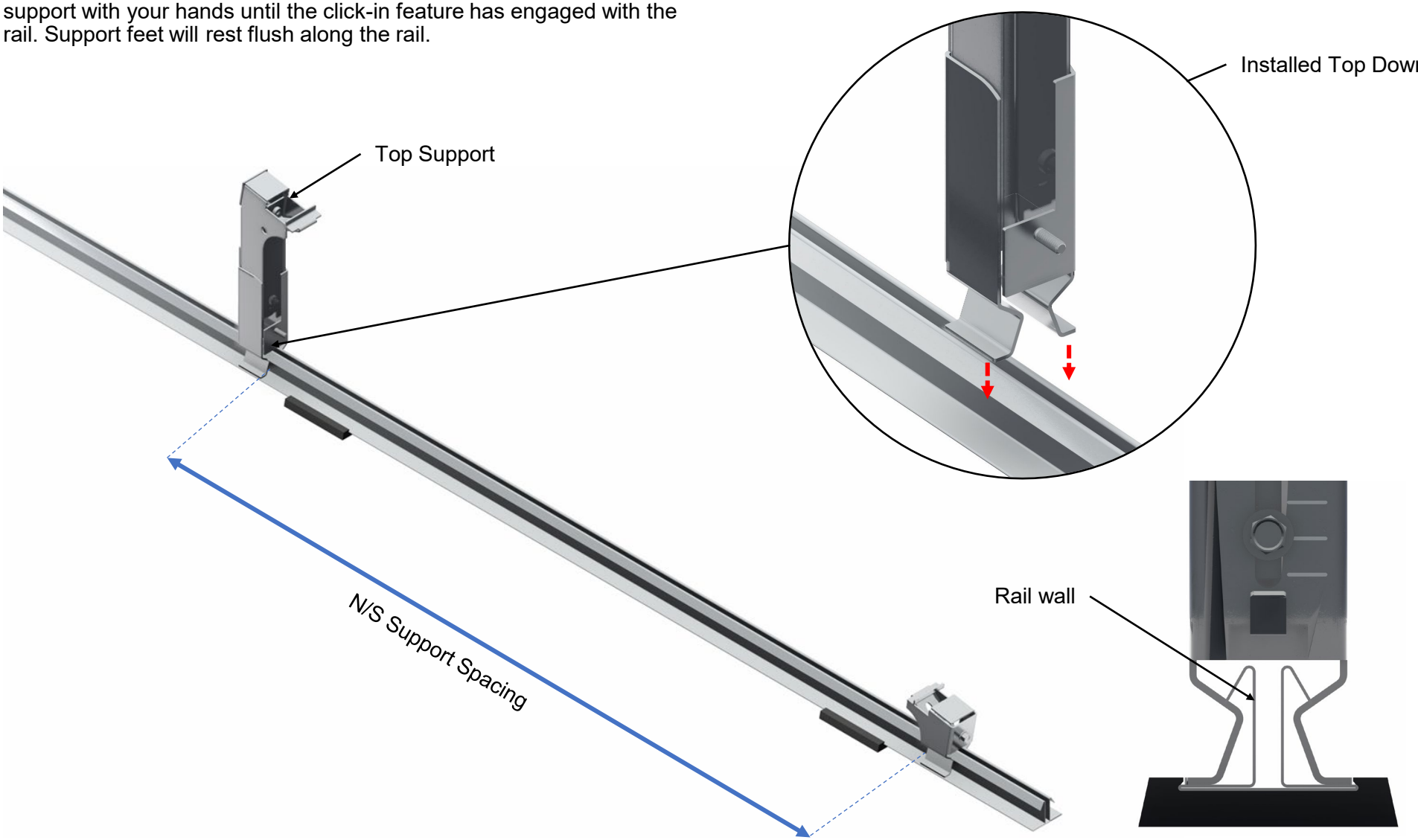


Installing Top Supports

1. Refer to your *Spacing Diagram* for the N/S support spacing length and mark setback.

2. Seat bottom support on the rail. Apply downward pressure on the support with your hands until the click-in feature has engaged with the rail. Support feet will rest flush along the rail.

TIP: The support will create a click-in sound once the support is engaged with the rail. The rail walls will compress inward until the support are flush with the rail.



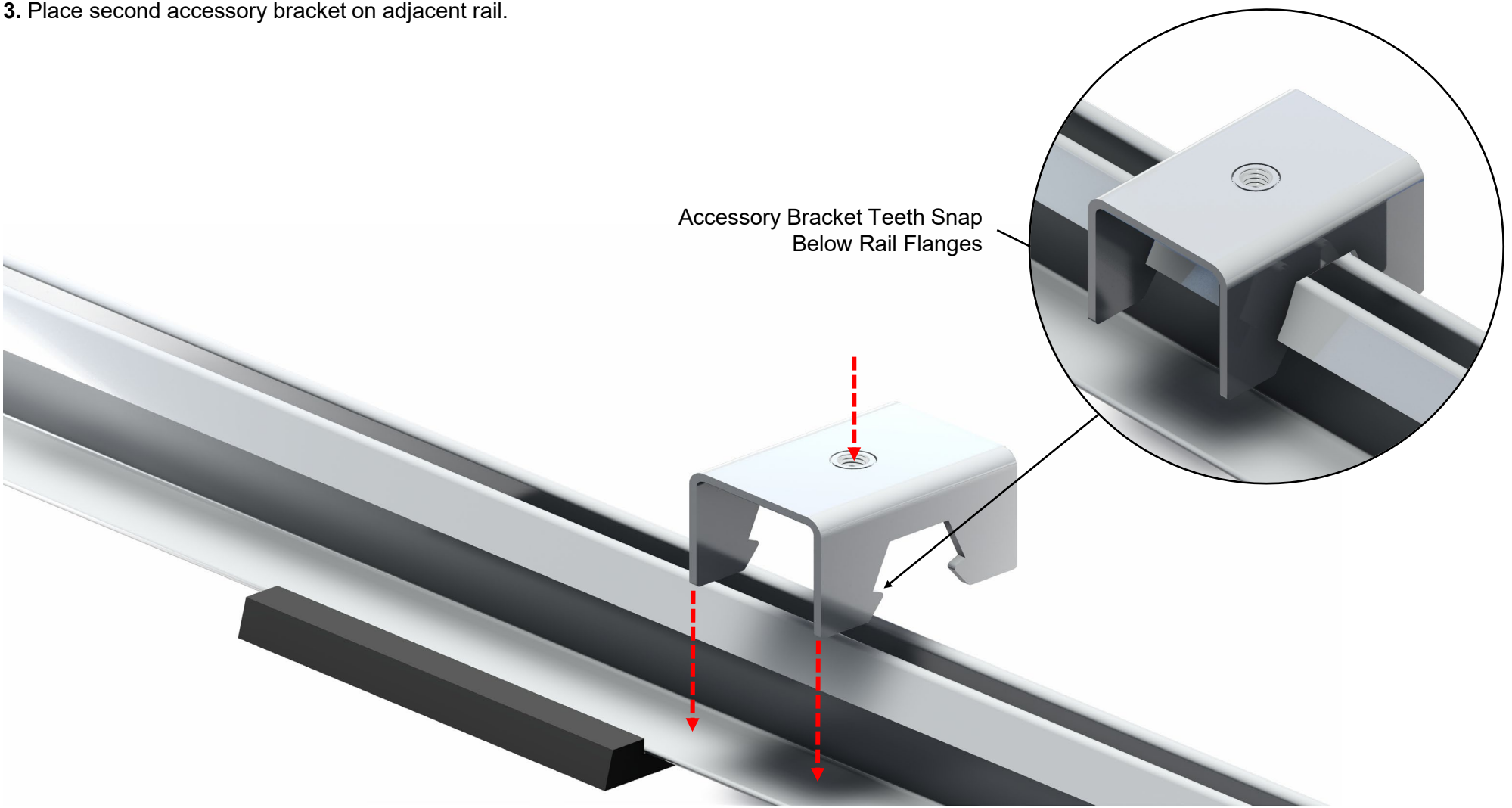
Installing Accessory Brackets

1. Refer to your *Spacing Diagram* for accessory bracket spacing. Mark distance on rail.

2. Click-in accessory bracket by applying downward pressure with foot until the accessory bracket is clicked-in to rail.

3. Place second accessory bracket on adjacent rail.

TIP: the accessory bracket click-in feature will create a snap sound once the support is engaged with the rail.



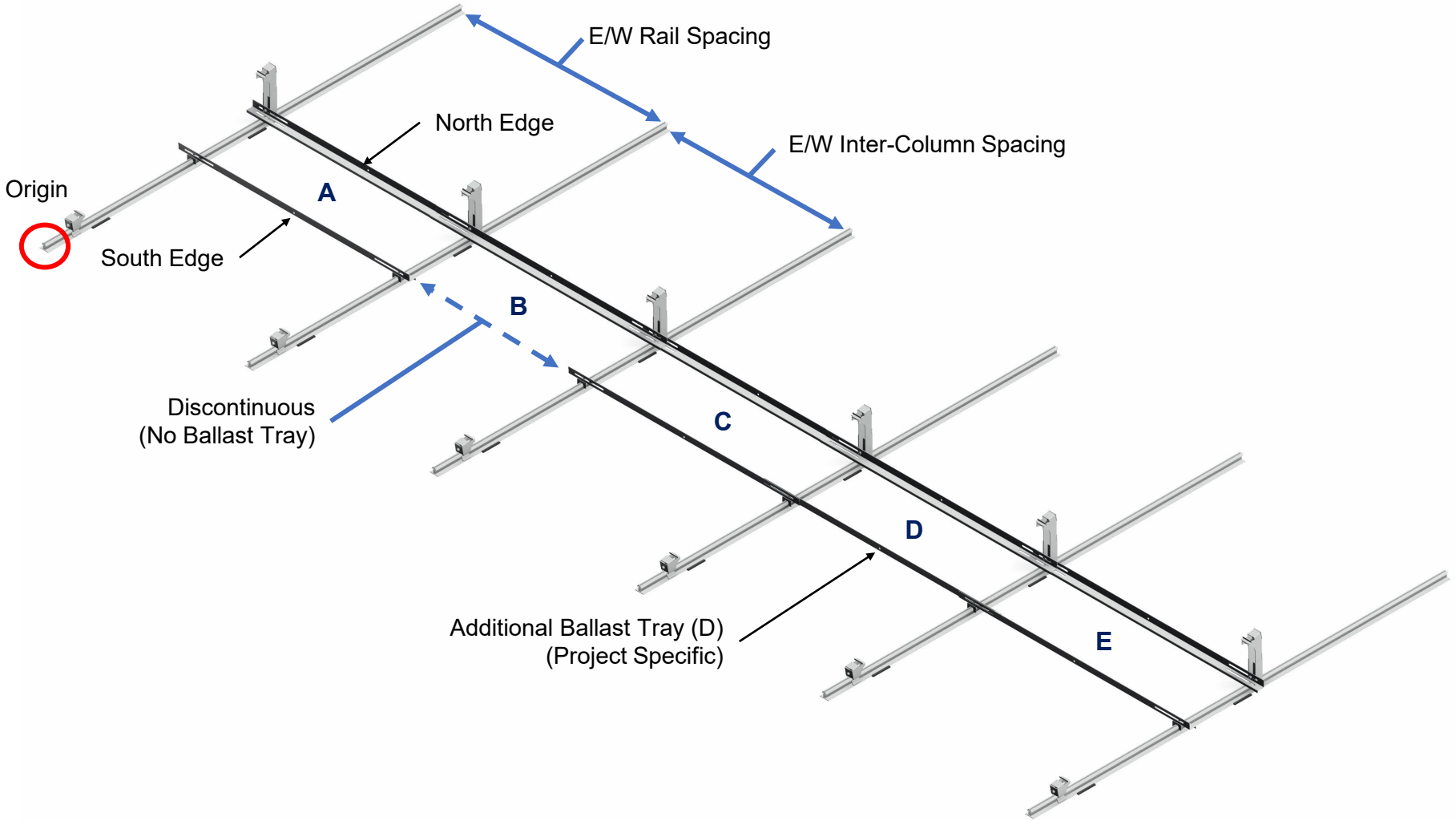
Ballast Tray Assembly

Ballast trays are installed in the E/W directions to allow for ballast stones to be placed over top.

Ballast trays along the north edge are continuous and overlap each other (A-E). Ballast Trays along the south edge are discontinuous and are placed every other rail column (A, C, E).

NOTE: In certain layouts, additional ballast trays may be required along the south edge to allow for maximum ballasting in areas where **7+** large ballast stones are required (additional ballast tray D).

Review Ballast Layout to verify where additional ballast trays are to be installed if required.



Installing Ballast Trays on Accessory Brackets

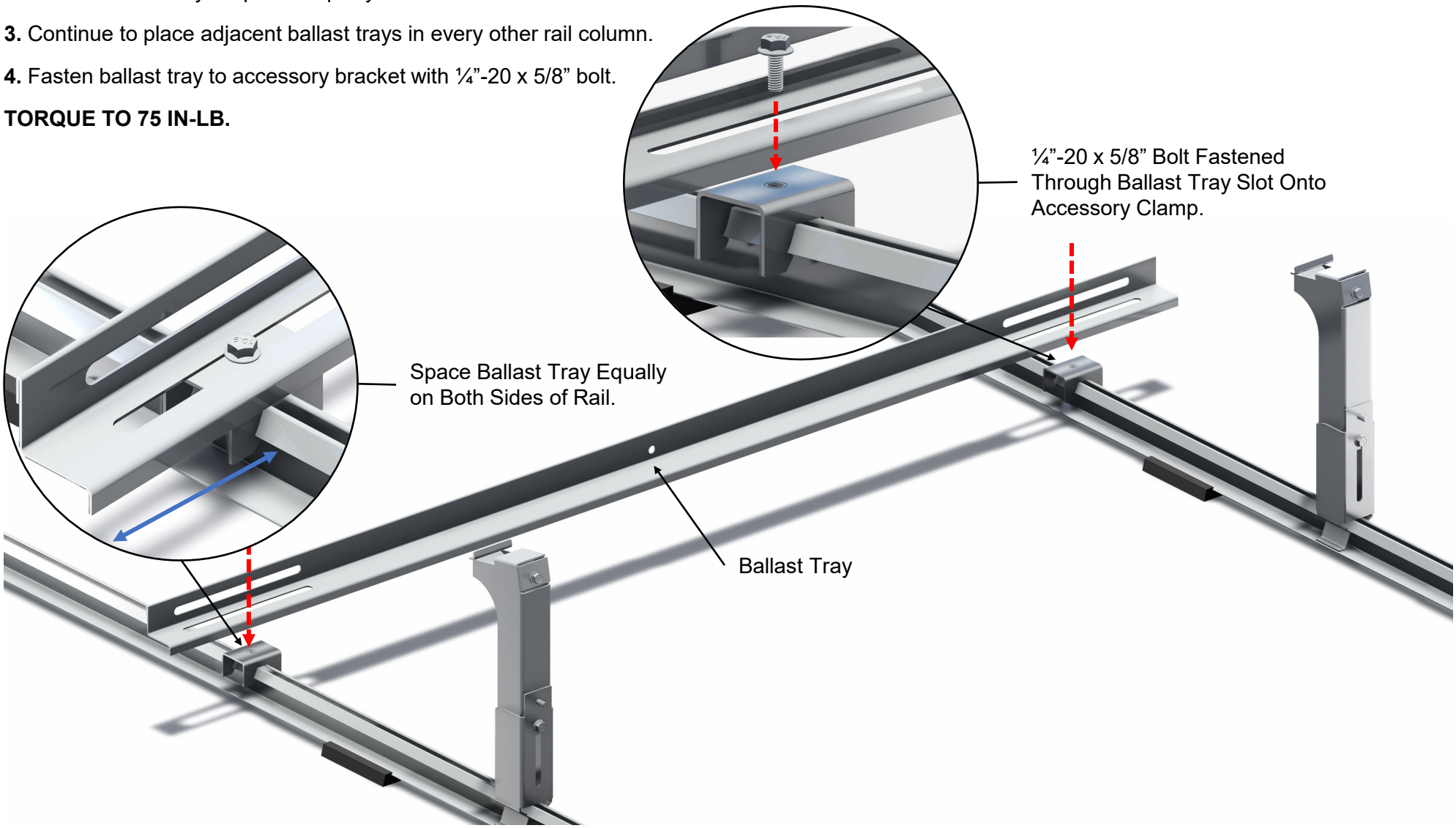
1. Place ballast tray on top of accessory brackets, ensuring ballast tray slots are aligned with press-fit nut.

2. Ensure ballast tray is spaced equally between rails.

3. Continue to place adjacent ballast trays in every other rail column.

4. Fasten ballast tray to accessory bracket with ¼”-20 x 5/8” bolt.

TORQUE TO 75 IN-LB.



Installing Ballast Trays on Supports

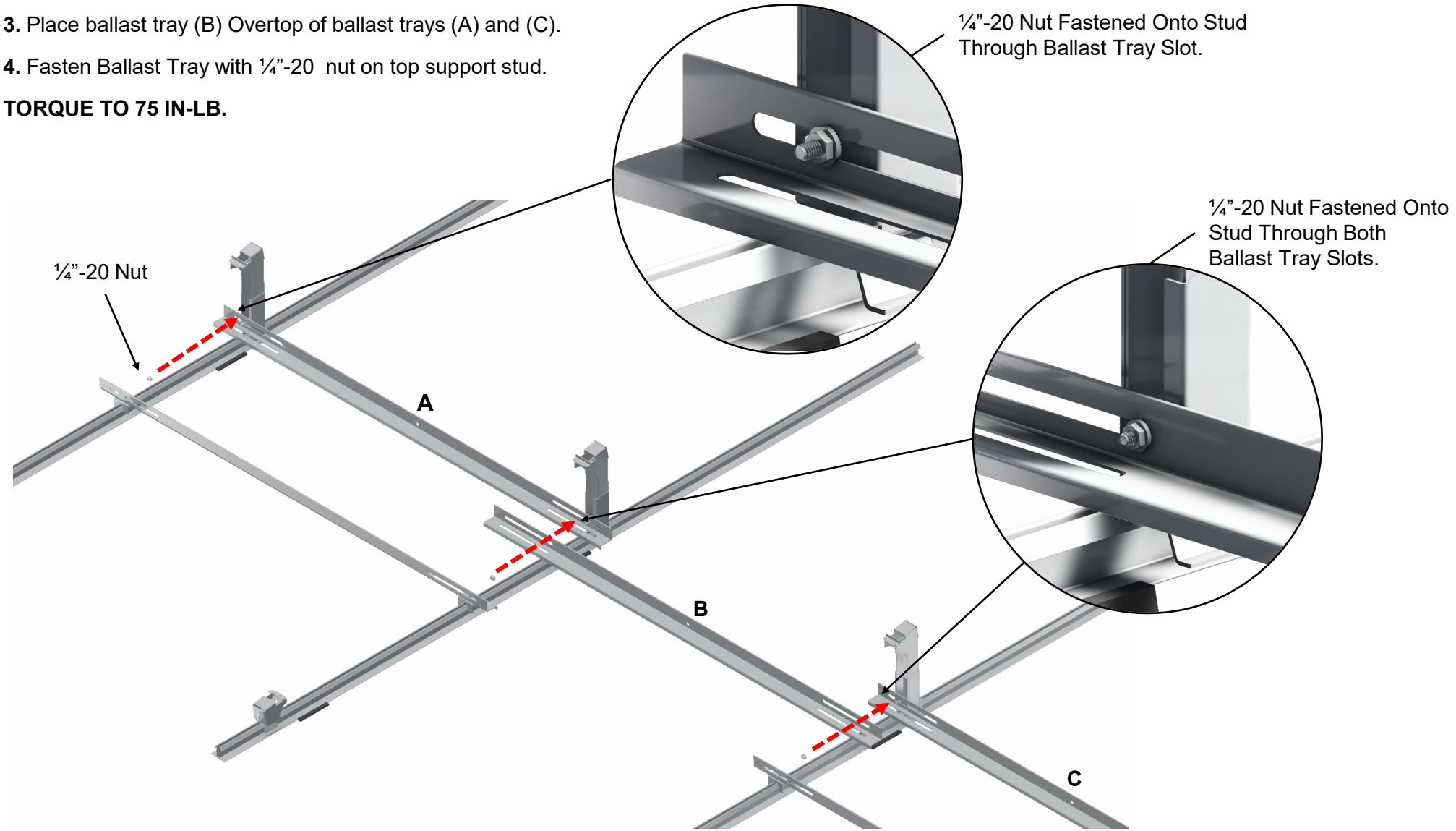
1. Place ballast tray (A) and (C) on top support press-fit studs.

2. Ensure ballast tray is spaced equally between rails.

3. Place ballast tray (B) Overtop of ballast trays (A) and (C).

4. Fasten Ballast Tray with ¼”-20 nut on top support stud.

TORQUE TO 75 IN-LB.



Installing Ballast Stones

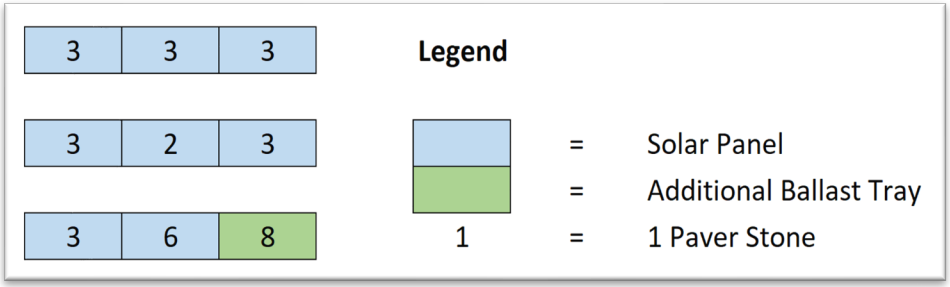
Ballast stones are used to hold down the racking on top of the roof. Ballasting requirements are unique to each project and are dependent on multiple variables.

1. Place ballast stones top-down. The ballast layout will specify the quantity of stones to be placed underneath each module. Ensure ballasts are evenly distributed on both ballast trays.

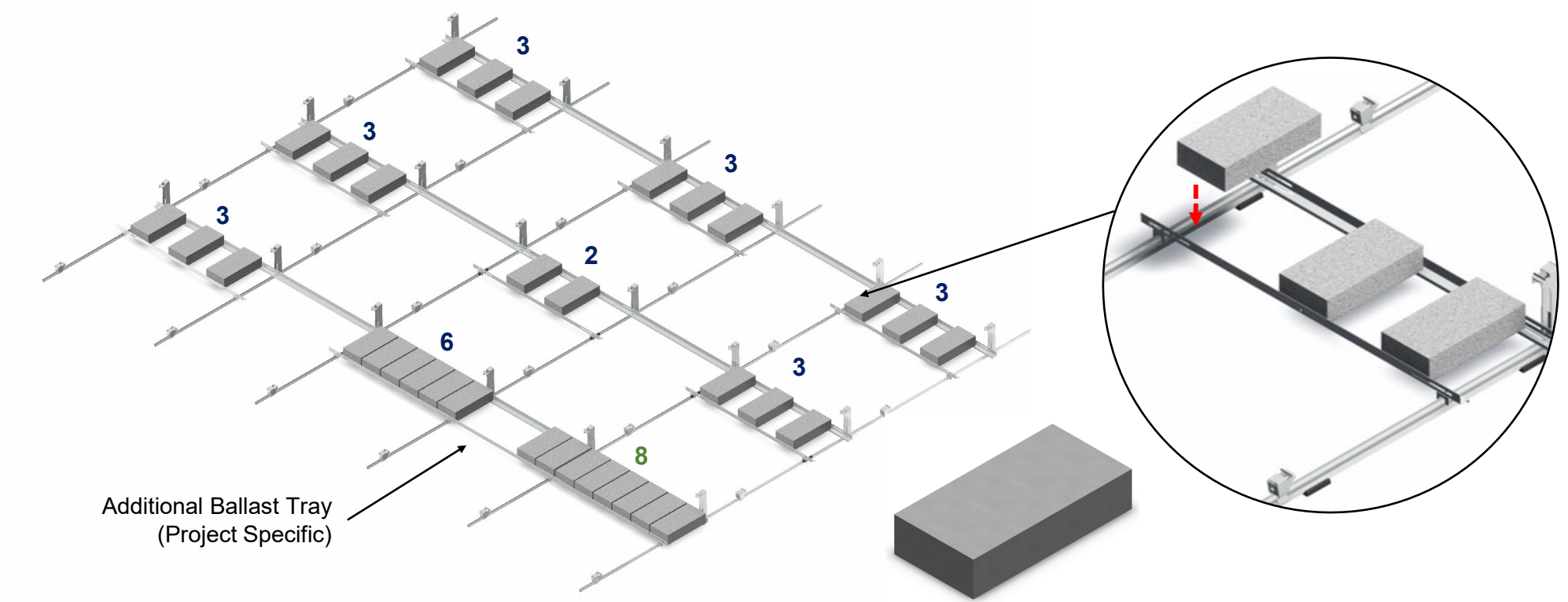
NOTE: Standard **4”x8”x16”** ballast stones (32 lbs.) are best suited for AeroGrid. Alternative ballast stone sizes may be used upon request.

TIP: Do not step on Ballast Stones.

BALLAST LAYOUT EXAMPLE:



Ballast Layouts are specific to each installation. Green module locations require an additional ballast tray.



Ballast stone: 4”x8”x16”
32 lbs.

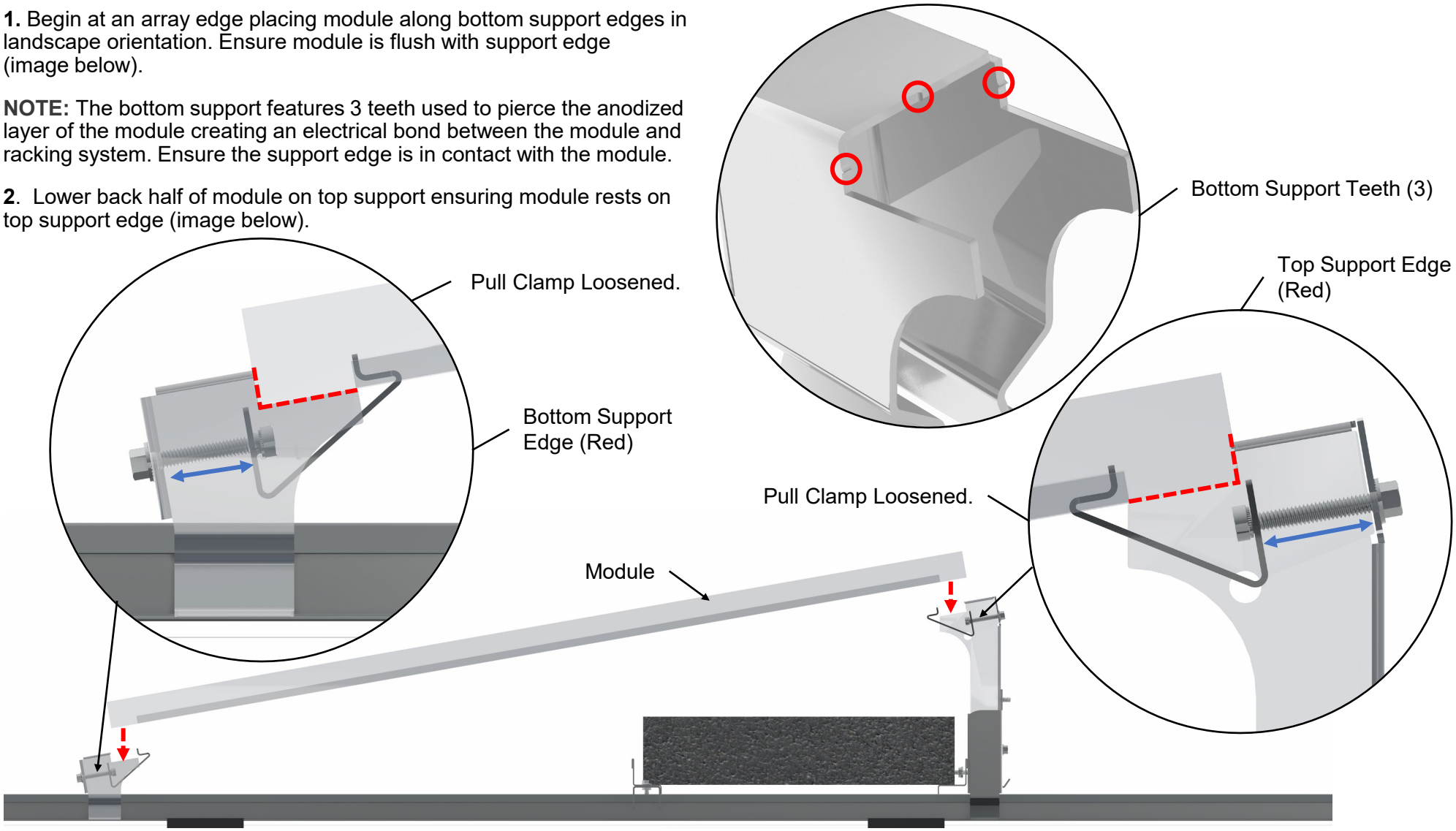
Installing PV Modules

NOTE: Pull clamps must be loosened completely prior to modules being placed on supports. Loosen pull clamps to the end of the bolt thread so the pull clamp is not resting along support edges (see below).

1. Begin at an array edge placing module along bottom support edges in landscape orientation. Ensure module is flush with support edge (image below).

NOTE: The bottom support features 3 teeth used to pierce the anodized layer of the module creating an electrical bond between the module and racking system. Ensure the support edge is in contact with the module.

2. Lower back half of module on top support ensuring module rests on top support edge (image below).



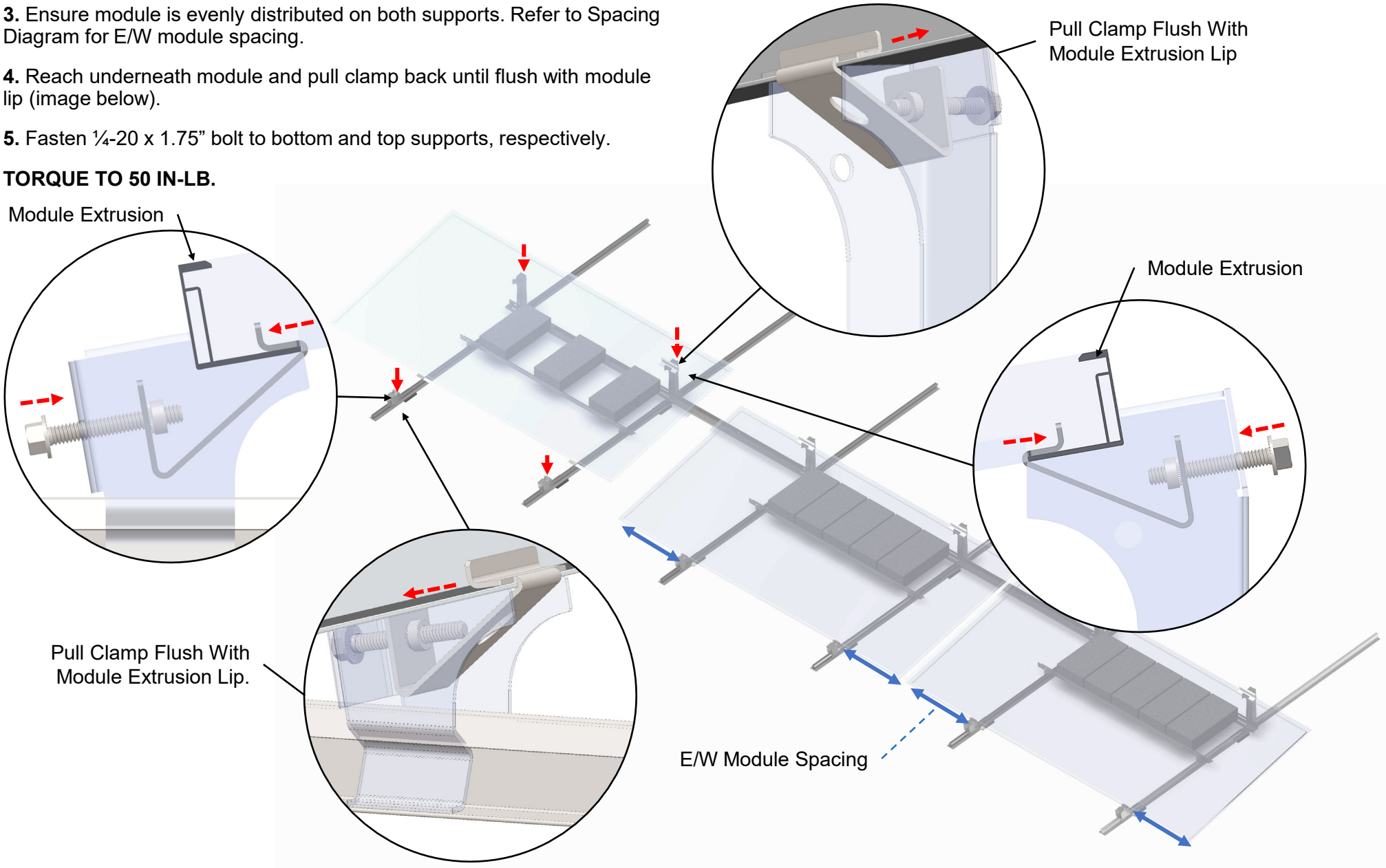
Installing PV Modules, continued

3. Ensure module is evenly distributed on both supports. Refer to Spacing Diagram for E/W module spacing.

4. Reach underneath module and pull clamp back until flush with module lip (image below).

5. Fasten ¼-20 x 1.75” bolt to bottom and top supports, respectively.

TORQUE TO 50 IN-LB.



Installing Windshields

NOTE: Never leave an array under ballasted without windshields during assembly once PV modules are installed.

1. Begin along end column. Align the windshield slots with the top support press-fit studs.

2. Hook windshield with top support hook.

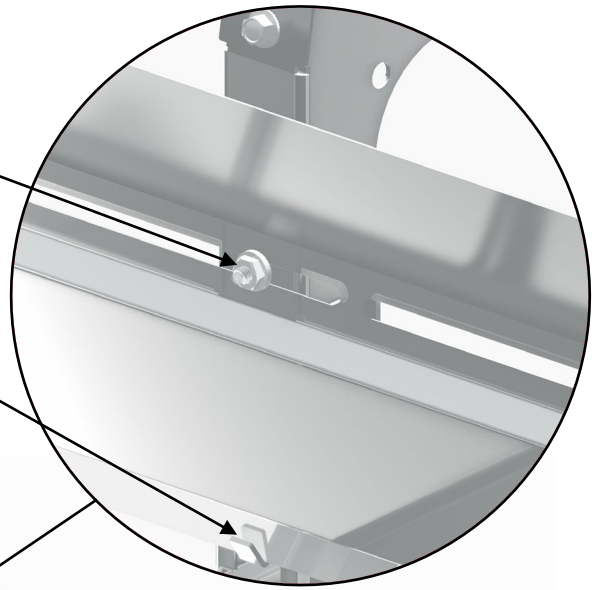
3. Space the windshield equidistant between the module frame.

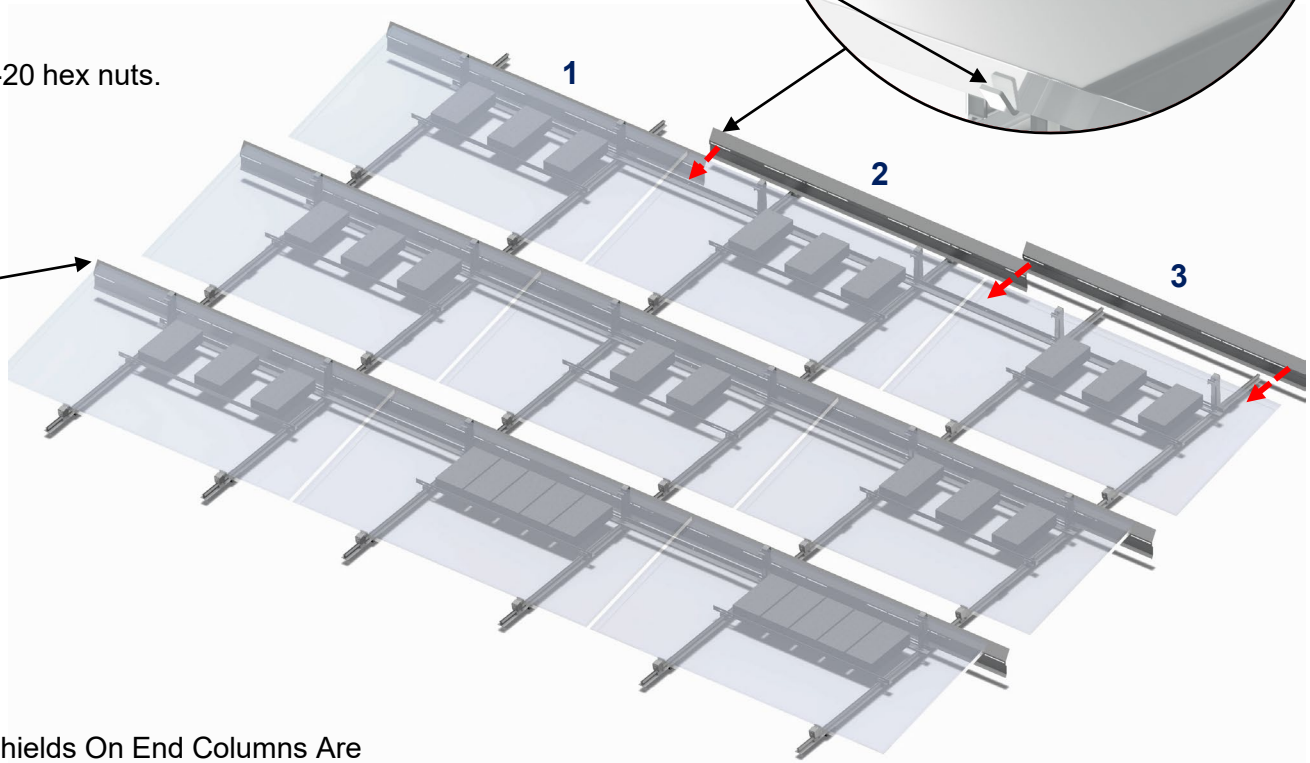
NOTE: The end column windshields will align in parallel with the module edge, ensuring the windshield does not interfere with the roof setback area.

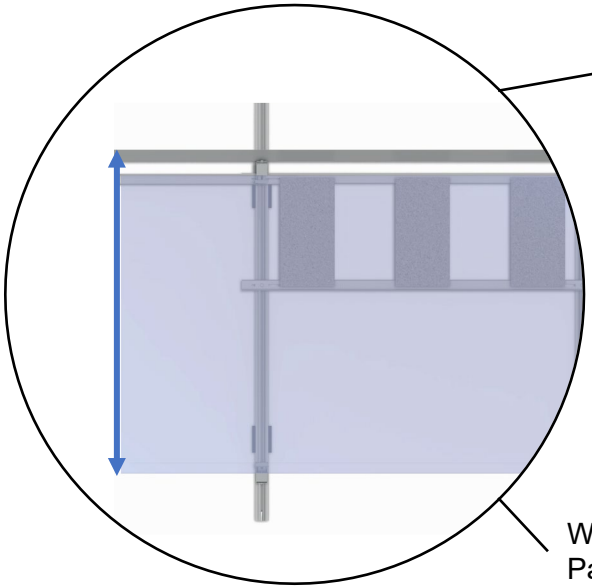
4. Place adjacent windshields within the same row. Windshields will overlap each other.

5. Fasten windshield to top support studs with ¼”-20 hex nuts.

TORQUE TO 75 IN-LB.







Windshields On End Columns Are Parallel With Module Edge.

Electrical Grounding

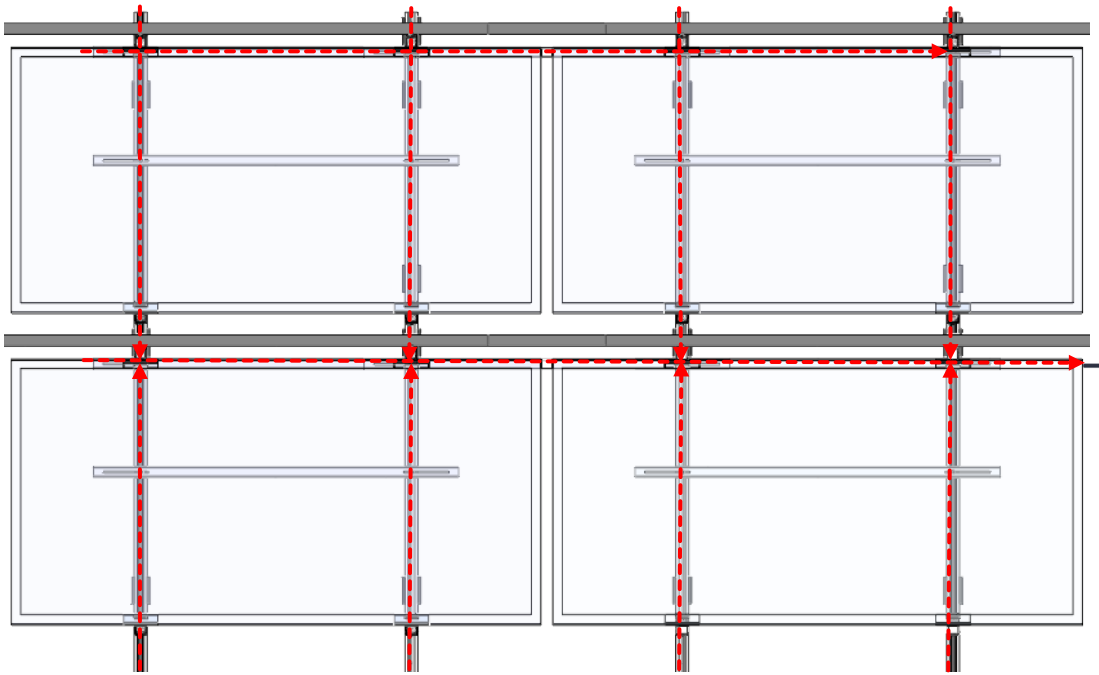
The bottom and top Supports contain protruding teeth that pierce the module frame to provide an electrical bonding connection between the module and racking. The grounding continues through the racking to the base rail where the system is connected to a grounding wire through grounding lugs.

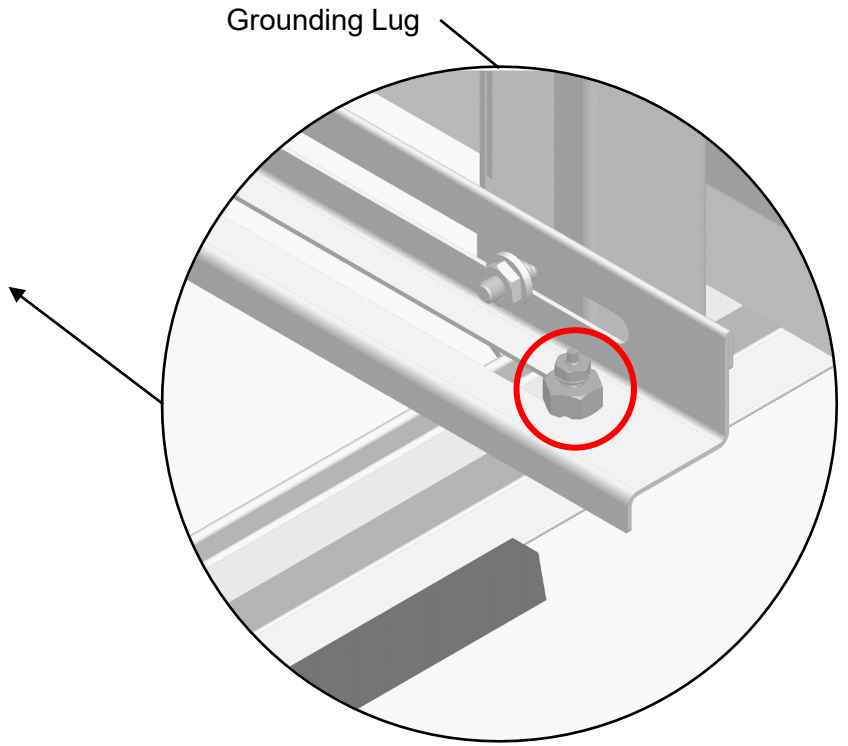
Grounding is transferred through ballast trays for E/W and Rails in the N/S directions.

IMPORTANT

For electrical bonding, only one grounding lug is required per array per 20x25 modules in the E/W x N/S directions, respectively. If the array area exceeds 20x25 modules, then additional grounding lugs are required, per each additional area.

Maximum Series Fuse Rating: 30 Amps





Installing ETL Certified Grounding Lugs

COMPATIBLE GROUNDING LUGS

AeroGrid is compatible with any ETL listed grounding lug including the Ilsco and Tyco grounding lug.

Installer is responsible for and shall provide an appropriate method of direct-to-earth grounding in accordance with the latest edition of the Canadian Electrical Code Part 1, CSA 22.1 Safety Standard for Electrical Installations or the National Building Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems. Please refer to your local Building and Electrical Codes.

Keep Copper away from Aluminum components in a fashion that maintains a minimum of ¼" separation.

The bonding path for grounding is a result of the interconnection of all components in the array;

During scheduled maintenance, the removal of modules, rails, ballast trays or other components must be carefully and methodically considered. By removing a column of modules and ballast trays, you may be disrupting the bonding path in the East-West direction.

At all times, the array must be interconnected to the grounding lug (as well as during maintenance).

TYCO GROUNDING LUG INSTALLATION

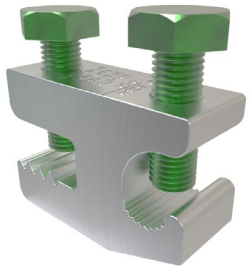
1. Screw threaded post of grounding lugs (not provided) into any one Rail per array. Tighten the hex washer nut. Torque to 2.82 Nm (2.1 ft-lb).

2. Insert grounding lug wires. Insert #6 AWG – RW75 uninsulated copper ground wire into the wire slot. Tighten the hex nut. Torque to 5.08 Nm (3.75 ft-lb).

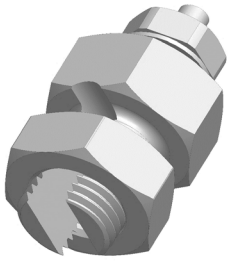
ILSCO GROUNDING LUG INSTALLATION

1. Fasten grounding lugs (not provided) onto any one ballast tray per Array. Tighten bolt. Torque to 5.00 Nm (3.75 ft-lb).

2. Insert #6 AWG – RW75 uninsulated copper ground wire into wire slot. Tighten bolt. Torque to 5.08 Nm (3.75 ft-lb).



Ilsco Grounding Lug



Tyco Grounding Lug

Product Maintenance

OVERVIEW

Regular inspection and maintenance play a crucial role in guaranteeing the secure and effective functioning of your AeroGrid racking system. The following guidelines are suggested to identify and address issues proactively to prevent performance degradation and/or safety concerns.

SYSTEM MAINTENANCE

1. GENERAL INSPECTION

- Verify that intended connections are secure with clamps and hardware.
- Check for loose or missing hardware (bolts, fasteners, nuts) and clamps.
- Check for any signs of shifted components, cracked ballast stones, or ballast stones touching roof.
- Inspect for signs of stress or damage (warping, bent, etc.) to the racking components.

2. STEEL INSPECTION

- Examine steel components for any indication of excessive rust, such as flaking or discoloration.
- Thoroughly examine regions where galvanized coating might by damaged or scratched as these areas are more susceptible to corrosion.

3. TORQUE INSPECTION

- Use a torque wrench to verify that all fasteners are tightened to manufacturer specifications.

4. ELECTRICAL INSPECTION

- Inspect electrical components (junction box, wiring, connectors, etc.) and connections for signs of wear, corrosion, or loose wires.
- Monitor performance of inverters and other electrical equipment per manufacturer's instructions.

5. MODULE MAINTENANCE

- Clean solar modules and remove bird waste.
- Remove debris from roof which may damage module or stop solar absorption.

RUST TREATMENT

It is normal for rust to form along cut edges of steel components. For additional protection, or installers wishing to apply additional treatment to rust, the installer can choose to follow KB Racking's suggested actions below:

- Remove loose rust and corrosion using a wire brush or sandpaper.
- Apply a suitable rust primer or inhibitor to reduce the rate of oxidation and prevent further corrosion.
- Apply a topcoat of cold galvanized spray to provide a protective layer and clean finish.

ROUTINE MAINTENANCE

Inspections are to be conducted every six months to maintain the reliability of your AeroGrid racking system.

It is also important to consider environmental conditions that may require additional inspections when necessary. It is highly recommended that projects are inspected after any severe weather event.

APPENDIX A | SolarEdge Power Optimizer Install Guide

How to install the SolarEdge power optimizer P300 – P700 . A detailed install guide can be requested from KB Racking. This install guide is only applicable to the SolarEdge power optimizer; please contact KB Racking to determine applicability with other microinverters. Provide KB Racking with specific microinverter/optimizer datasheets.

NOTE: Power optimizers are recommended to be assembled prior to windshield component.

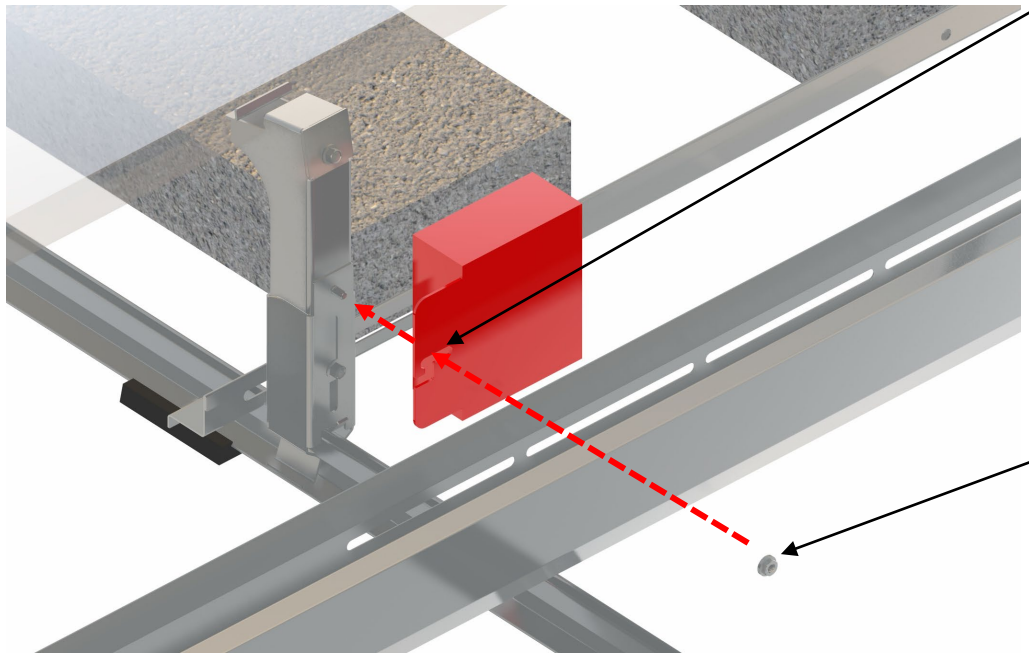
1. Align SolarEdge power optimizer slot with top support press-fit stud.

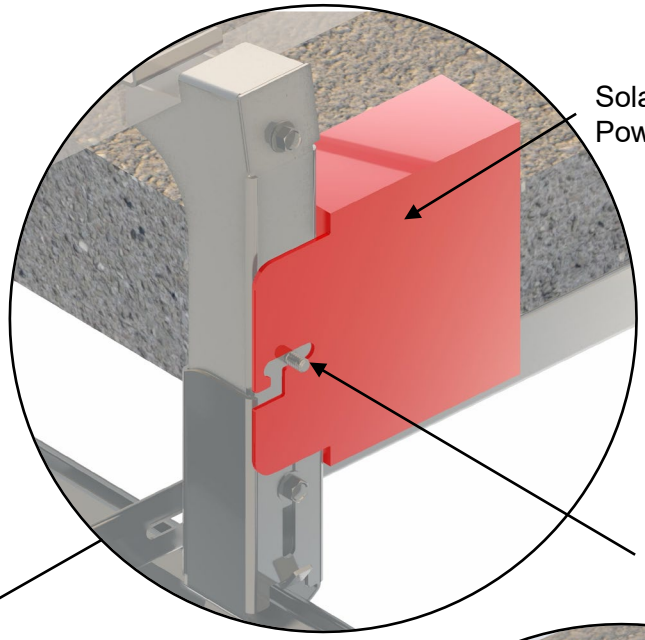
NOTE: Power optimizers can be assembled on any top support.

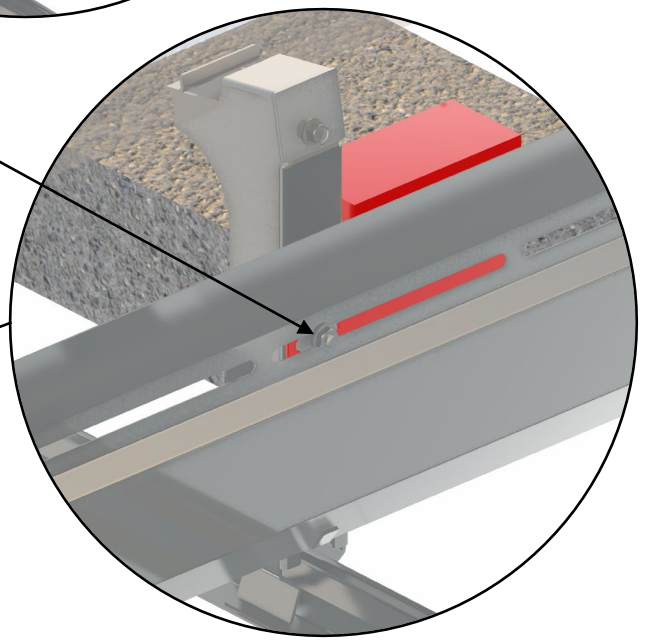
2. Place windshield behind power optimizer.

3. Fasten windshield to top support studs with ¼”-20 nuts.

TORQUE TO 75 IN-LB.







APPENDIX B | OMG PowerGrip Plus Install Guide

How to install Anchors with AeroGrid. A detailed install guide can be requested from KB Racking. This install guide is only applicable to OMG PowerGrip Plus model.

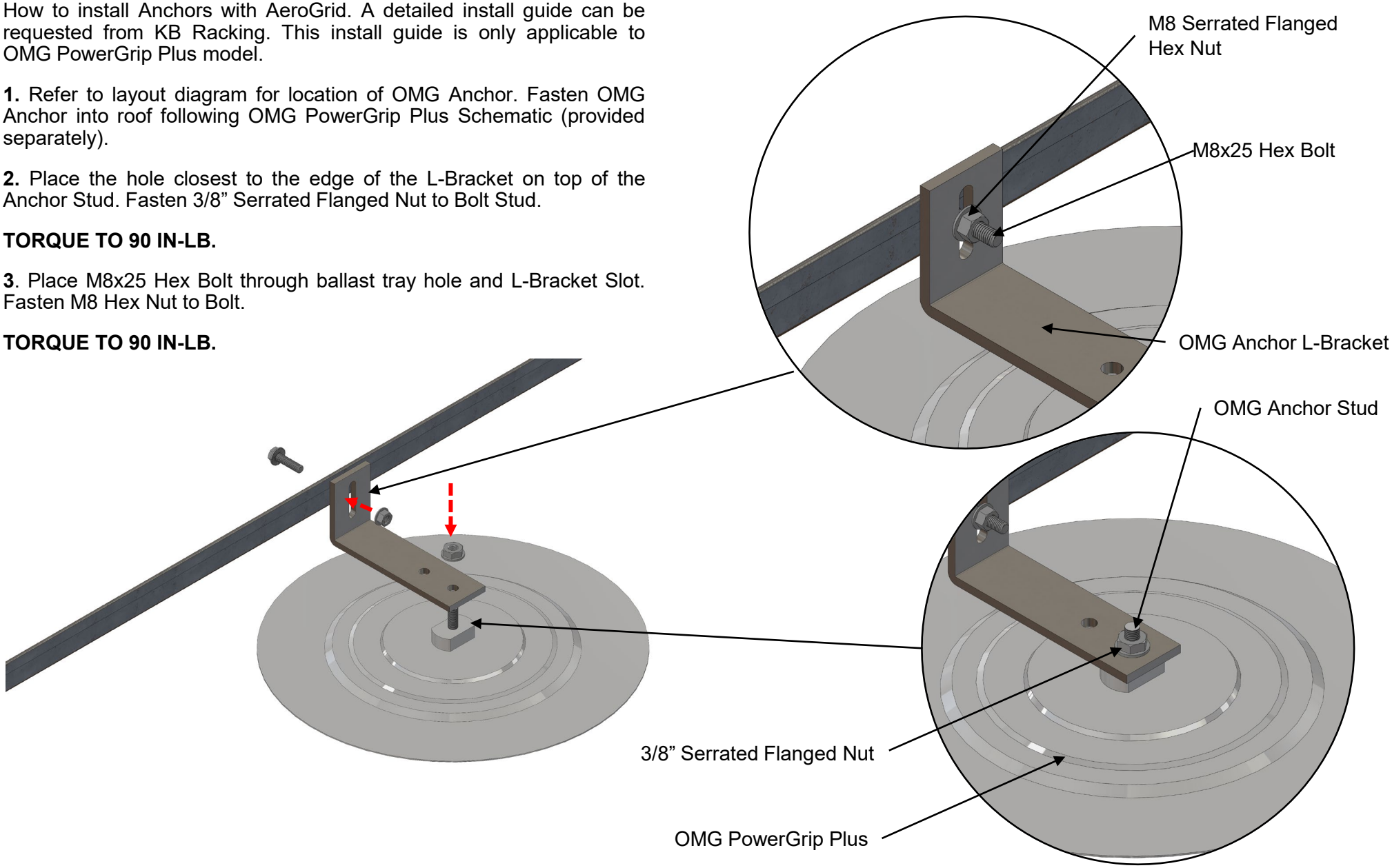
1. Refer to layout diagram for location of OMG Anchor. Fasten OMG Anchor into roof following OMG PowerGrip Plus Schematic (provided separately).

2. Place the hole closest to the edge of the L-Bracket on top of the Anchor Stud. Fasten 3/8" Serrated Flanged Nut to Bolt Stud.

TORQUE TO 90 IN-LB.

3. Place M8x25 Hex Bolt through ballast tray hole and L-Bracket Slot. Fasten M8 Hex Nut to Bolt.

TORQUE TO 90 IN-LB.



APPENDIX C | OMG Universal 7 Install Guide

How to install Anchors with AeroGrid. A detailed install guide can be requested from KB Racking. This install guide is only applicable to OMG Universal 7 model.

1. Refer to layout diagram for location of OMG Anchor. Fasten OMG Anchor into roof following OMG Universal 7 Schematic (provided separately).

2. Place the hole closest to the center of the L-Bracket on top of the Anchor Stud. Fasten 3/8" Serrated Flanged Nut to Bolt Stud.

TORQUE TO 90 IN-LB.

3. Place M8x25 Hex Bolt through ballast tray hole and L-Bracket Slot. Fasten M8 Hex Nut to Bolt.

TORQUE TO 90 IN-LB.