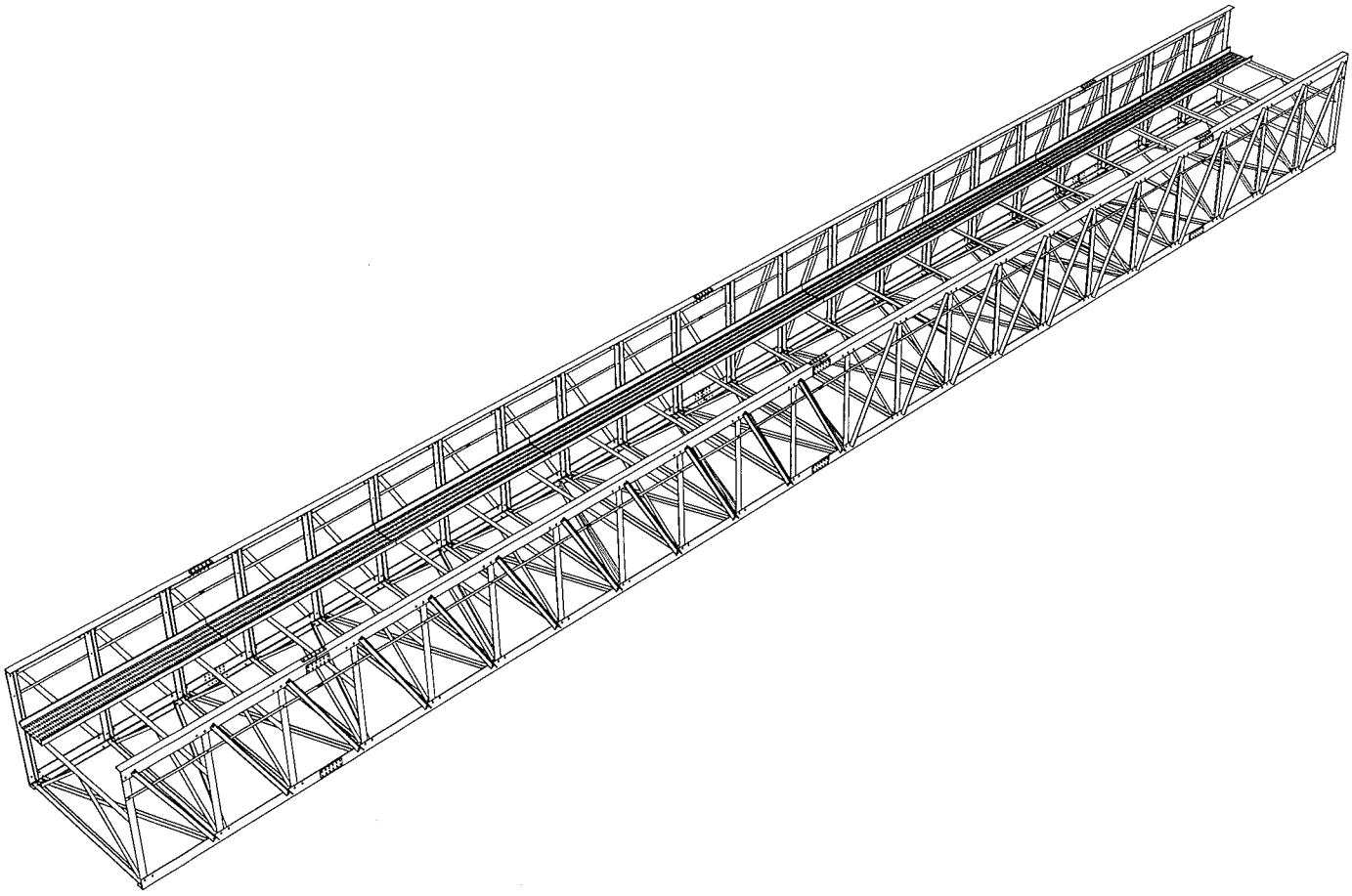
HUNTER'S
Worldwide
GROUP, LLC

# AG Products



## OPEN TRUSS CATWALK
## INSTALLATION MANUAL

# CONTACTS

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# CONTENTS

# GENERAL SAFETY STATEMENT

After your product is delivered, it is your responsibility as the owner or erector to understand not only the specific requirements for building the tower, but also the precautions and hazards that exist in the building process. All persons of interest in building of the tower should understand and follow the necessary safety requirements for your particular tower.

Please maintain a safe work environment for all that are involved by utilizing this manual for building of your tower and understanding and following the process safety requirements in this product.

# BOLT SPECIFICATIONS

*BOLT GRADE A325 MECHANICAL PROPERTIES (or as denoted in erection drawing set)

**NOTE**: Any substitute bolts MUST meet these minimum standards (unless noted otherwise in erection drawing set)

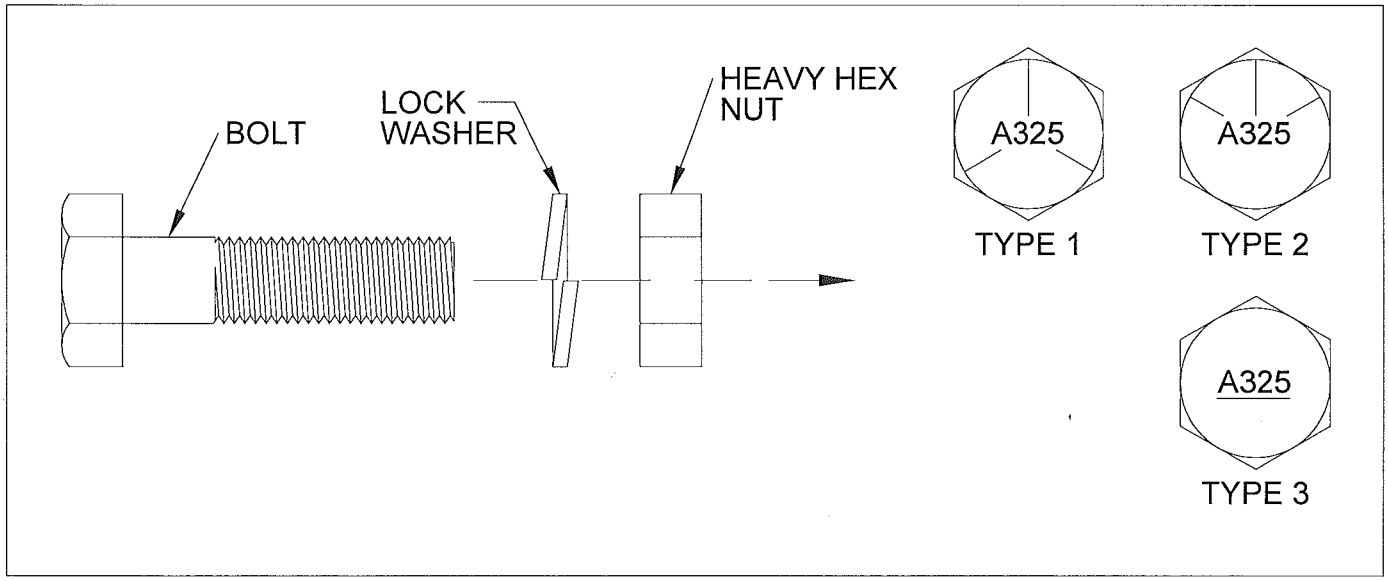
| Specs | Nominal Size (inch) | Proof Load Stress (ksi) | Tensile Strength (min ksi) | Material Notes |
|---|---|---|---|---|
| ASTM A325 TYPE 1 | ½ THRU 1 | 85 | 120 | 1,a |
| | 1 1/8 THRU 1 1/2 | 74 | 105 | |
| ASTM A325 TYPE 2 | ½ THRU 1 | 85 | 120 | 2,a |
| | 1 1/8 THRU 1 1/2 | 74 | 105 | |
| ASTM A325 TYPE 3 | ½ THRU 1 | 85 | 120 | 3,a |
| | 1 1/8 THRU 1 1/2 | 74 | 105 | |

Material Notes:

1. Medium Carbon Steel
2. Low Carbon Martensite
3. Weathering Steel
4. All hardware items are hot-dipped galvanized unless otherwise noted.

Process:

a. Cold Drawn




ASTM A325 HEAVY HEX BOLT ASSEMBLY

# BOLT TIGHTENING METHOD

Installation and Tightening of High-Strength Fasteners: *Turn-of-Nut Method*

***Guidelines below are derived from: Specifications for Structural Steel Joints using High Strength Bolts (RCSC – Dec. 12, 2009). Please refer to the most current RCSC specification for updates and addendums.**

1.0 Bolted Parts and General Provisions

1.1 Slope of surface shall not exceed 1:20. Correct with hardened beveled washers. (If required by drawings)

1.2 All surfaces free of loose scale, dirt, or other foreign material.

1.3 All fastener components shall be properly lubricated and protected from contamination, dirt, and moisture.

1.4 Hardened washers may be required for standard holes or special washers may be required for oversize or slotted holes.

1.5 Tightening may be done by turning the bolt while the nut is prevented from rotating until it is impractical to turn the nut. Pneumatic impact wrenches, if used, shall be of adequate capacity and sufficiently supplied with air to perform the required tightening of each bolt in approximately 10 seconds. Electrical impacts can be used as well.

2.0 Snug Tightening Procedure

2.1 Bolts shall be installed in the appropriate holes of the connection and brought up to a "snug tight" condition.

2.2 Snug tight is defined as the tightness that exists when the plies of the joint are in firm contact. Adequate tightness may be obtained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. The snug tightening procedure used in the work shall be the same snug tightening procedure used when conducting the "Turn-of-Nut Verification Test" in paragraph 2.3.

2.3 Snug tightening shall progress systematically from the most rigid part of the connection to the free edges. Start the pattern near the end of each member being spliced at the center of the pattern and work toward all edges of the splice plate.

2.4 Following this initial snug tightening, all bolts in the joint shall be again systematically tightened as necessary using a similar pattern until all bolts are simultaneously snug tight and the connection is fully compacted.

# BOLT TIGHTENING METHOD

3.0 Final Turn-of-Nut Tightening

3.1 Following this snug tightening operation, all bolts in the connection shall be tightened by the applicable amount of rotation as specified in Table 10.17B below.

Table 10.17B – Nut Rotation from Snug Tight

| Bolt Length | Both Faces Normal | One Face Normal – One Face Sloped Not More Than 1:20 | Both Faces Sloped Not More Than 1:20 |
|---|---|---|---|
| 4 x Dia. or Less | 1/3 Turn | 1/2 Turn | 2/3 Turn |
| Greater Than 4 but No More Than 8 x Bolt Dia. | 1/2 Turn | 2/3 Turn | 5/6 Turn |
| Greater Than 8 x Bolt Dia. Not Exceeding 12 x | 2/3 Turn | 5/6 Turn | 1 Turn |

3.2 During the tightening operation there shall be no rotation of the part not turned by the wrench.

3.3 Tightening shall progress systematically from the most rigid part of the joint to its free edges. Start the pattern near the end of each member being spliced at the center of the pattern and work toward all edges of the splice plate.

# BOLT TESTING

1.0 Turn-of-Nut Verification Testing

(In some situations a turn-of-nut verification may be required. If required, follow the instructions below)

1.1 Equipment required – Calibrated bolt tension measuring device. Spacers and/or washers with proper hole size. Rigid mounting for bolt tension calibrator. Use air impact wrenches to install fasteners in the structure.

1.2 Select at least 3 bolt, nut and washer (when required) assemblies of each diameter, length and grade to be used in the work.

1.3 Install and tighten each assembly in the bolt tension measuring device using the snug tightening procedure which will be used to snug tight the fasteners in the work. Snug tight is defined as the tightness that exists when the plies of the joint are in firm contact. This may be obtained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Assure the proposed "snug tightening" procedure does not produce more than 50% of required fastener tension as specified by Table 10.17A below. If so, revise snug tightening procedure.

Table 10.17A – Required Fastener Tension (Kips)

| Bolt Dia. (in) | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1 1/8 | 1 1/4 | 1 3/8 | 1 1/2 |
|---|---|---|---|---|---|---|---|---|---|
| M164 (A325) | 13 | 20 | 29 | 41 | 54 | 59 | 75 | 89 | 108 |
| M253 (A490) | 16 | 25 | 37 | 51 | 67 | 84 | 107 | 127 | 155 |

1.4 Follow snug tightening, mark nut or device socket to a reference point on bolt tension calibrator and further tighten to the rotation shown below.

| Bolt length | 4 x bolt dia. or less | Greater than 4 but no more than 8 x bolt dia. | Greater than 8 x bolt dia. |
|---|---|---|---|
| Required Rotation | 1/3 | 1/2 | 2/3 |

1.5 At this rotation, the minimum bolt tension (Kips) shall be as follows:

| Bolt Dia. (in) | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1 1/8 | 1 1/4 | 1 3/8 | 1 1/2 |
|---|---|---|---|---|---|---|---|---|---|
| M164 (A325) | 13 | 20 | 29 | 41 | 54 | 59 | 75 | 89 | 108 |
| M253 (A490) | 16 | 25 | 37 | 51 | 67 | 84 | 107 | 127 | 155 |

# MATERIAL GRADE

| MATERIAL | A-36 (36ksi) | A572-50 (50ksi) | A529-50 (50ksi) |
|---|---|---|---|
| CHANNEL | ✓ | | |
| FLAT BAR | ✓ | ✓ | |
| PLATE | | ✓ | |
| SOLID ROUND | | ✓ | |
| ANGLE | | | ✓ |

(NOTE: Any substitutes MUST use these standards)

Electrode Polarity Chart:

| Electrode | DC* | AC | Position | Penetration | Usage |
|---|---|---|---|---|---|
| 7014 | EP, EN | ✓ | All | Medium | Smooth, Easy, Fast |
| 7018 | EP | ✓ | All | Low | Low Hydrogen, Strong |
| 7024 | EP, EN | ✓ | Flat, Horz. Fillet | Low | Smooth, Easy, Faster |
| 308L | EP | ✓ | All | Low | Stainless Steel |

***EP=Electrode Positive** (Reverse Polarity); **EN=Electrode Negative** (Straight Polarity)

(NOTE: Only use 70 series Electrode on A572 & A529 material)

(NOTE: Confirm grade material in erection set before welding)

# PRE-ASSEMBLY INSTRUCTIONS

Begin by taking inventory of all items as they are unloaded off the truck and mark off on the supplied shipper that they have been received. If possible, begin sorting the materials according to section. Detailed instructions are listed below. If any parts are missing or damaged after all trucks have been received, call Lambton immediately for replacements (See Contacts, Page 1).

Hardware should be located in containers; either small barrels or boxes. The hardware will be combined by size and will have the included hardware listed on the top or side of the container. Contents of the container can be checked against the supplied shipper pages to ensure that all required hardware is accounted for.

After unloading the material from the truck, catwalk sections should be staged on the ground according to section and location. Catwalks will consist of 3 section numbers; S1 (beginning section), S2 (middle section or sections), and S3 (ending section). Occasionally catwalks will require multiple sections depending on site conditions. See assembly overview (sheet A) for catwalk specific section number details. Separate the remaining parts by part number.

**NOTE:**

**ALL PIECES MUST BE INVENTORIED WITHIN 48 HOURS OF DELIVERY TO JOB SITE. ANY SHORTAGES REPORTED AFTER 48 HOURS OF DELIVERY WILL BE THE RESPONSIBILITY OF THE SUB-CONTRACTOR AND/OR TOWER ERECTOR.**

## General Safety

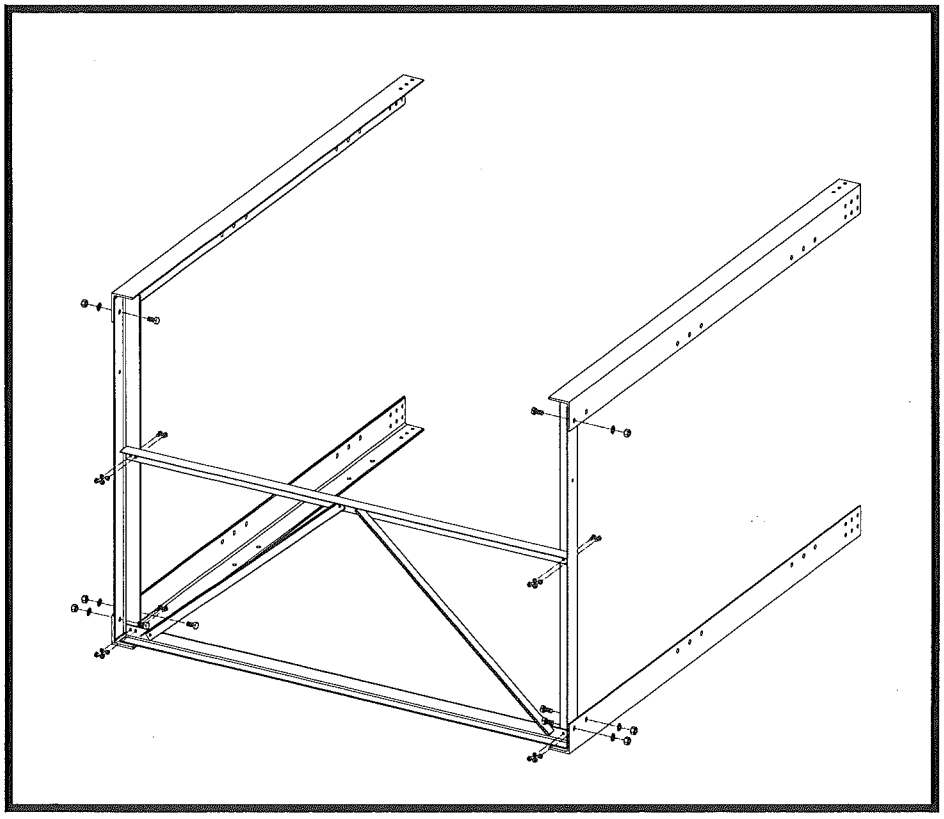
Cranes or fork trucks are highly recommended to move or lift assembled sections due to their weight. Weights of all catwalk components can be found in the "Shipper". Always follow proper safety regulations.

## General Catwalk Erection and Assembly

Erector/Installer can build the full catwalk assembly on the ground and install the completed assembly with a crane, or the Erector/Installer can build the catwalk in sections, hoist them up individually, and connect them using the supplied splice plates. Weights of catwalk sections can be found on your shipper in your detailed erection set. Only hand-tighten all bolts until full catwalk is assembled. Once catwalk is fully assembled, "shake out" and check for squareness, then the Erector/Installer must tighten all bolts fully.

## Bolt Installation

All bolts should be installed from inside the catwalk with the nut and washer assembled on the outside of the catwalk. This helps to eliminate any interference that would occur from bolt threads or nuts hitting each other. It is suggested that all installed bolts be left loose to ensure proper fit until the catwalk has been checked for squareness.



**End View showing bolt installation direction**

# ASSEMBLY INSTRUCTIONS

**1). Catwalk Sections**

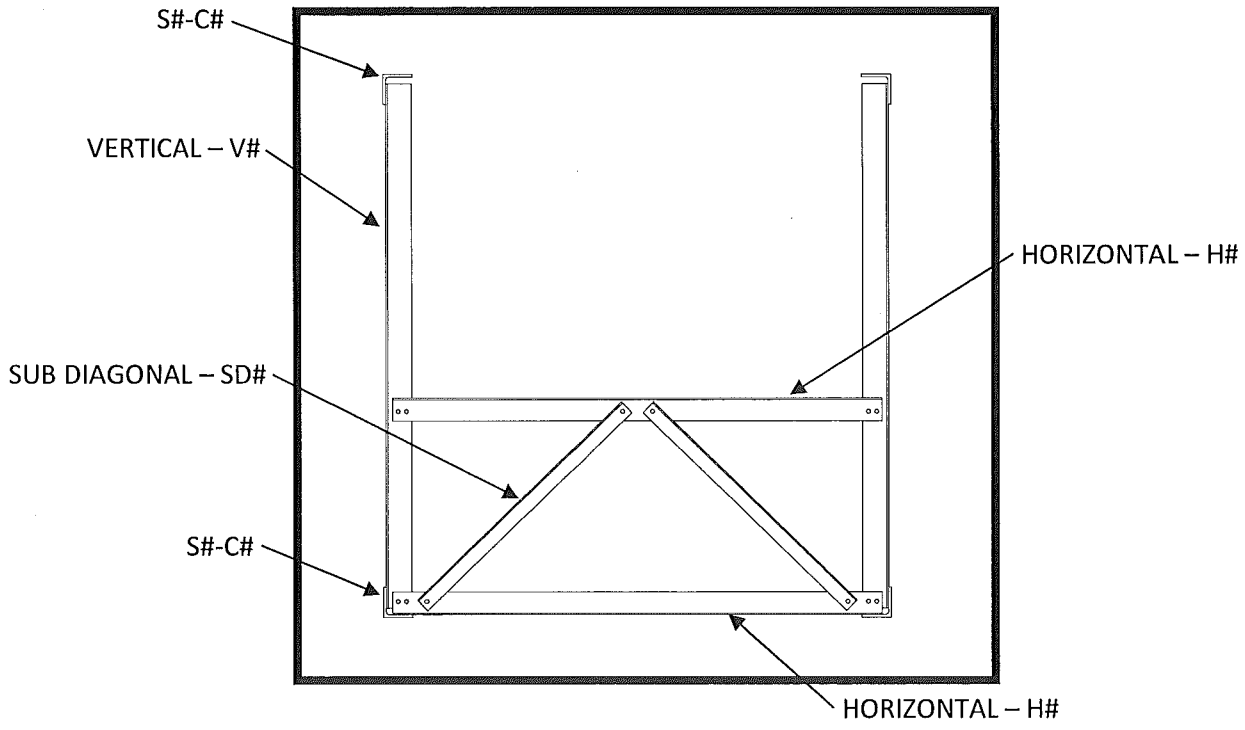
Catwalk sections are detailed as if you are looking at the full length of the catwalk from left to right; therefore critical points and locations are based on the left end of the catwalk assembly. Refer to the Assembly Overview and Installation Details that are included within the print set for your specific catwalk. Detailed assembly instructions are located on sheet "A1" of your drawing set.

Catwalks consist of chords, diagonals, verticals, horizontals, and sub diagonals. The Chords are tied together using the verticals, horizontals, and sub-diagonals. These parts are considered the core components of the catwalk. These core components can be pre-assembled should the Erector/Installer choose to, but should be left loose to ensure an appropriate fit until the catwalk has been checked for squareness.

## Part List Key

| Part | DESCRIPTION |
|---|---|
| D# | DIAGONAL |
| MR# | MID-RAIL |
| H# | HORIZONTAL |
| V# | VERTICLE |
| SD# | SUB-DIAGONAL |
| S#C# | CHORD |

**CATWALK ENDVIEW**



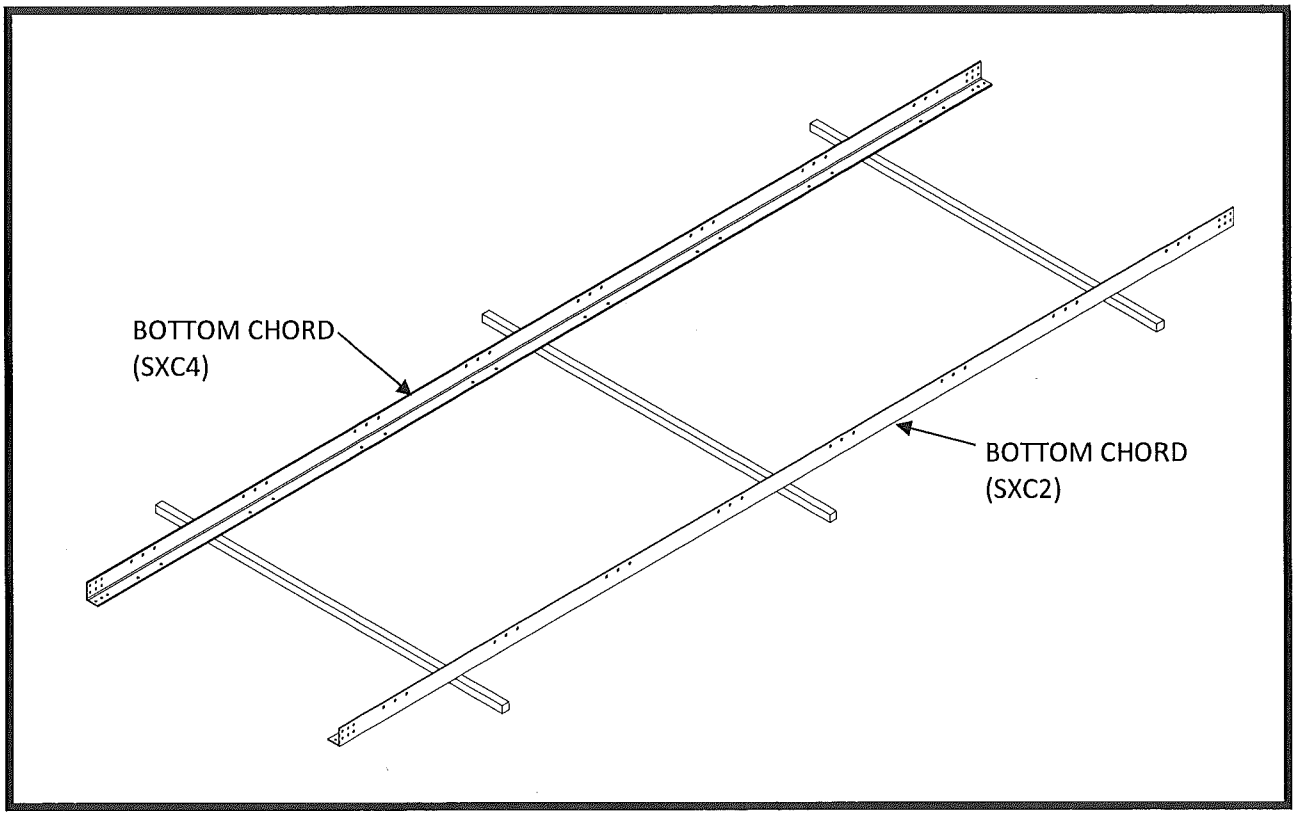
# ASSEMBLY INSTRUCTIONS

Chords are the main structural members that form the frame of the catwalk, and are designated by section and location. For example, chord "S2C2" would be for section 2, lower right hand location.

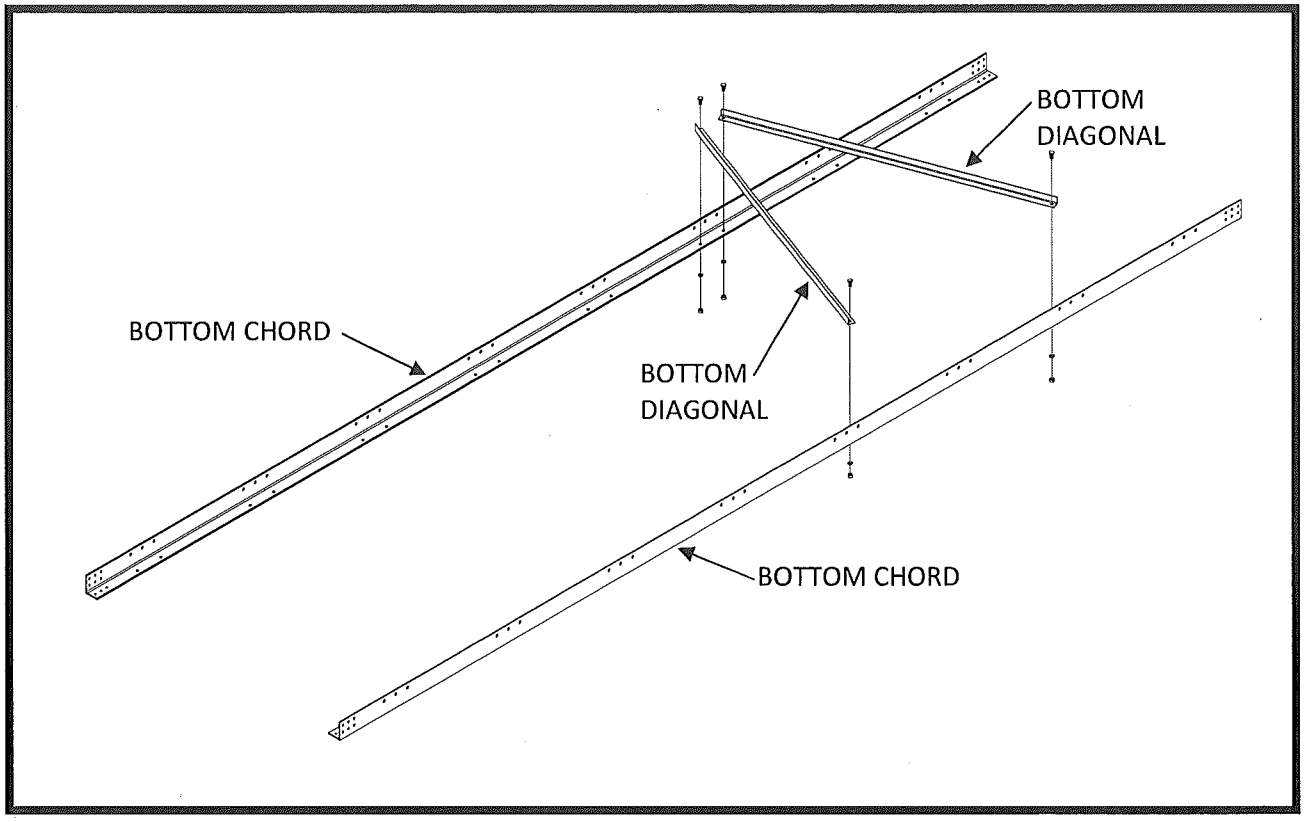
Erector/Installer can build the full catwalk assembly on the ground and install the completed assembly with a crane, or the Erector/Installer can build the catwalk in sections, hoist them up individually, and connect them using the supplied splice plates. Only hand-tighten all bolts until full catwalk is assembled. Once catwalk is fully assembled the Erector/Installer must tighten all bolts fully.

Begin by laying out section one; chords 2 & 4 (S1C2 & S1C4). Spread the chords to the appropriate width according to the Assembly Overview. (Sheet A)

**Note**: Use 4X4 studs or similar as cribbing for bottom bolt installation.



Attach the bottom diagonals according to the layout shown on the Assembly Overview (Sheet A).

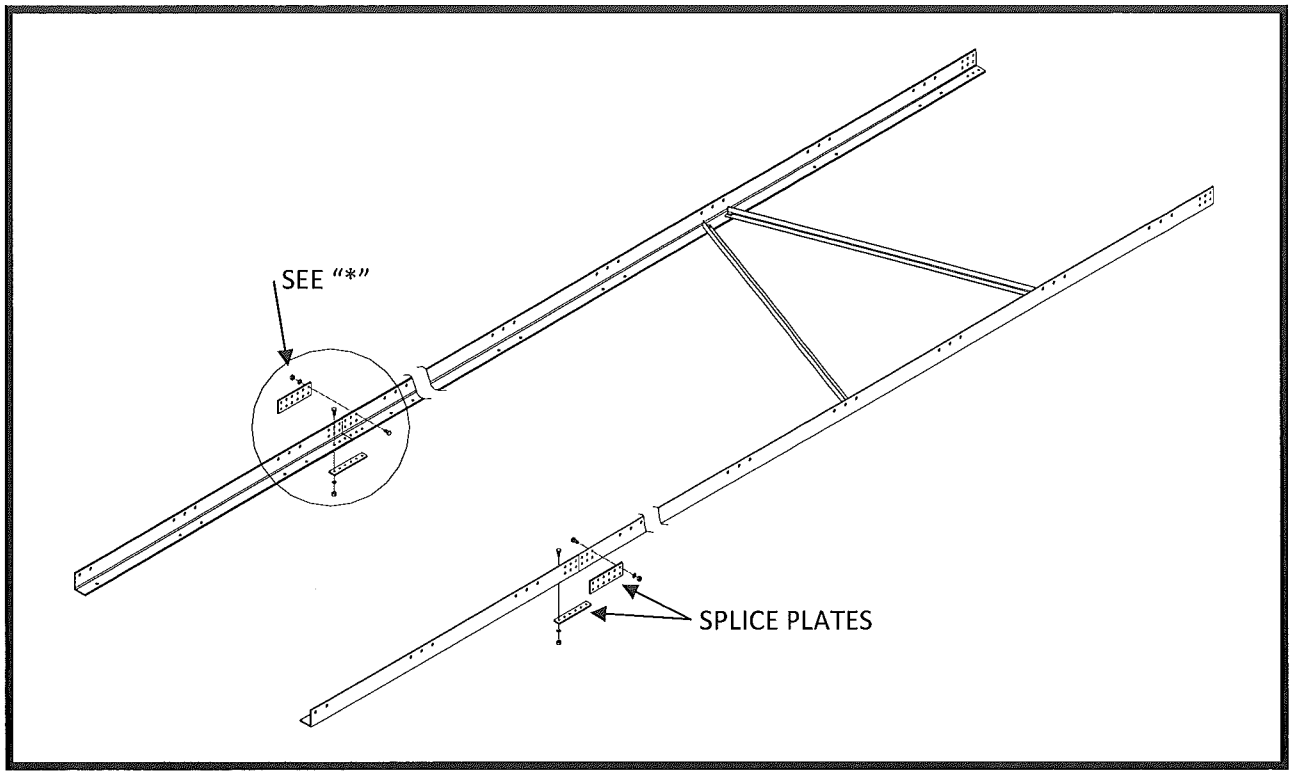


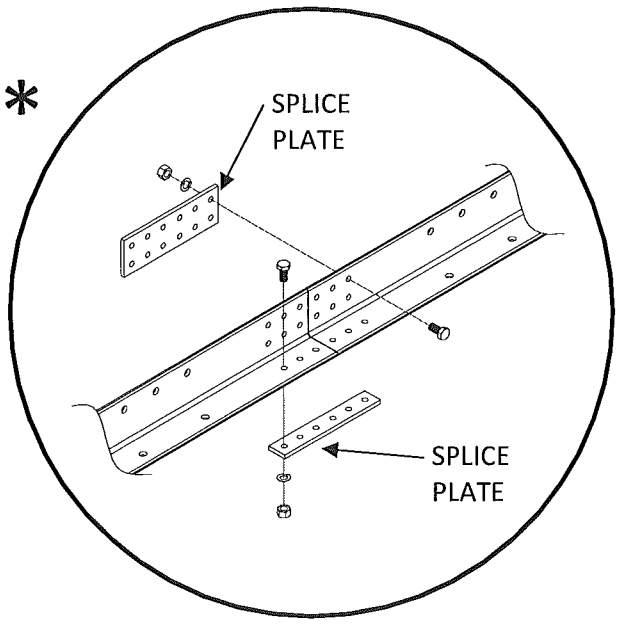

**NOTE:**

If assembling the entire catwalk as one unit prior to installation, layout the remaining chords according to the Assembly Overview. (Sheet A)

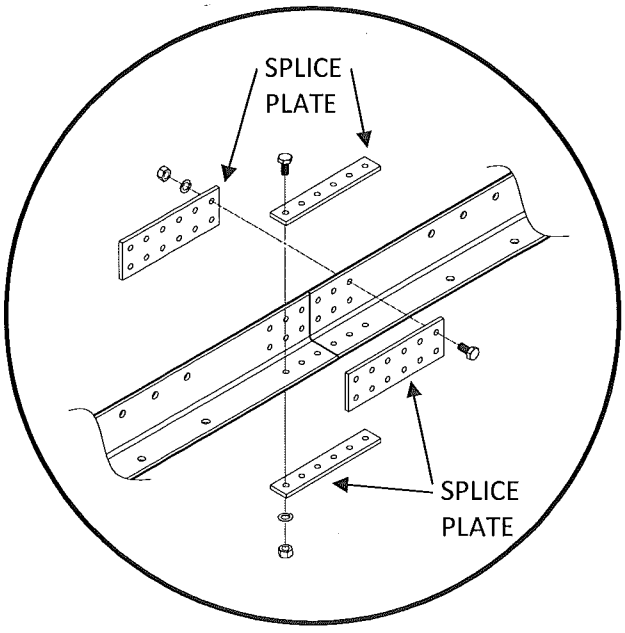
# ASSEMBLY INSTRUCTIONS

Connect the sections together using the supplied splice plates. Refer to Assembly Overview (Sheet "A") to determine if your catwalk has a single or double splice plate connection.



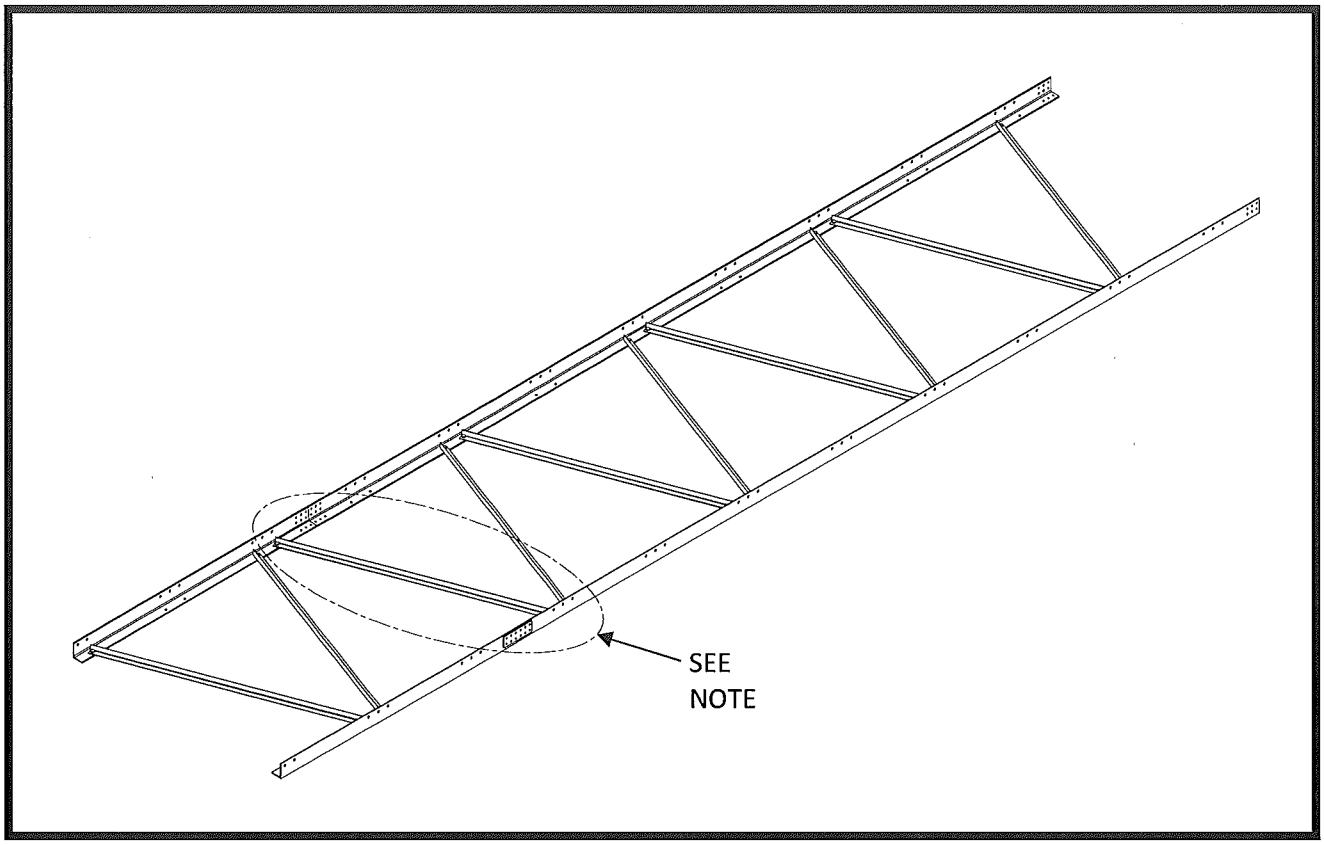




**SINGLE SPLICE CONNECTION**




**DOUBLE SPLICE CONNECTION**

Install the remaining bottom diagonals.

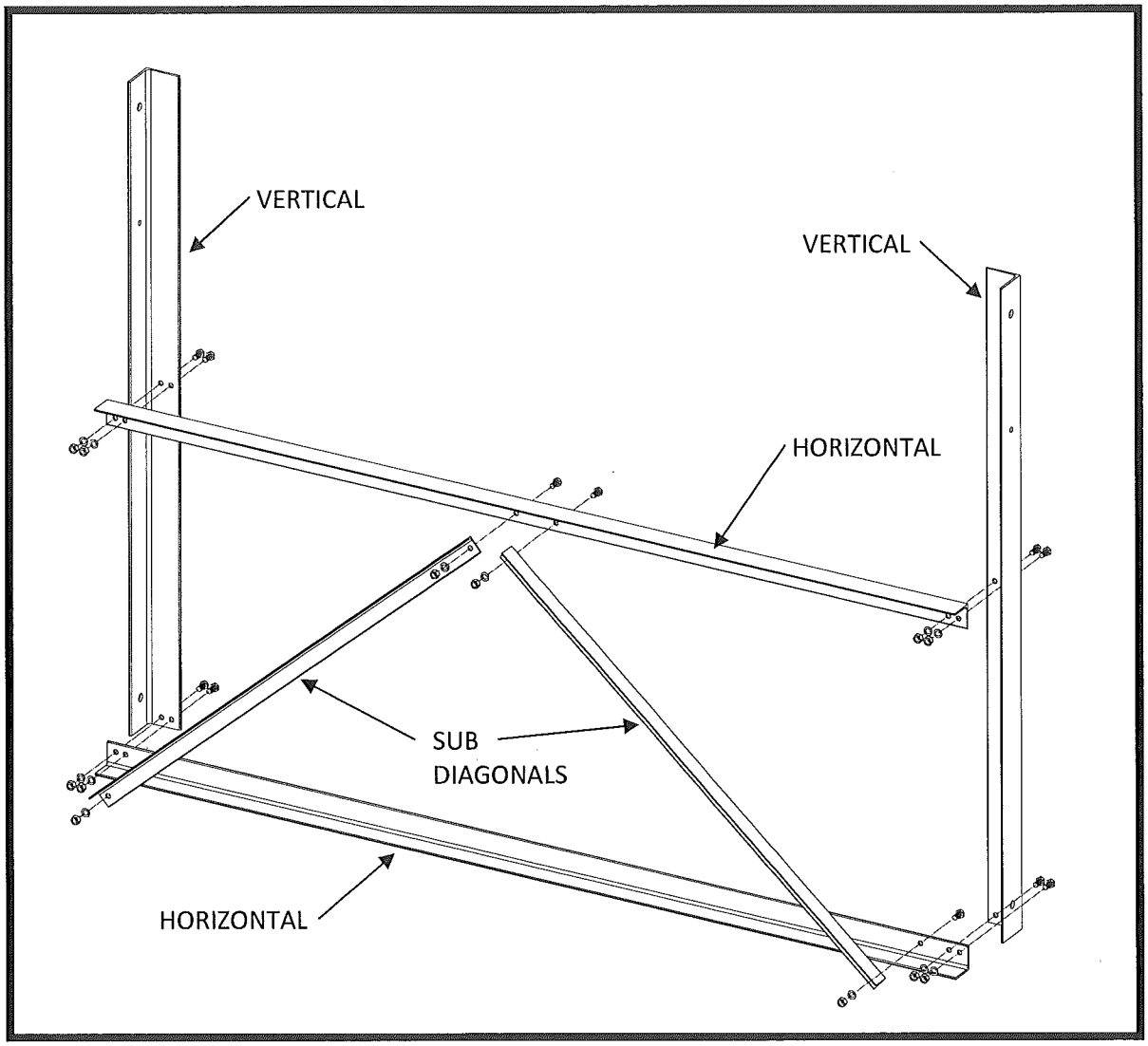



**NOTE:**

One diagonal will be interlaced at each chord/catwalk splice connection.

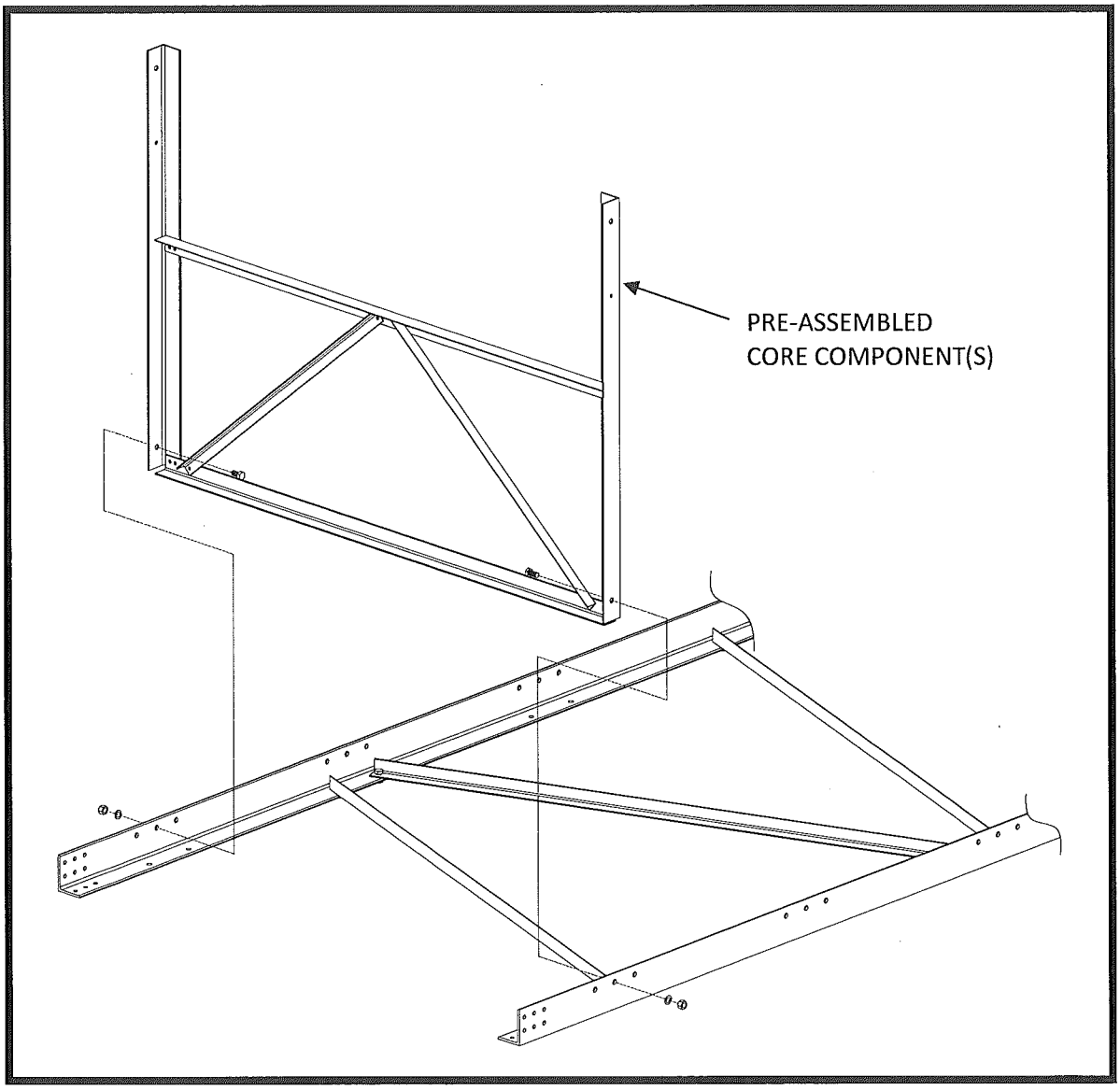
# ASSEMBLY INSTRUCTIONS

After installing the bottom diagonals, you need to build the core components assembly.



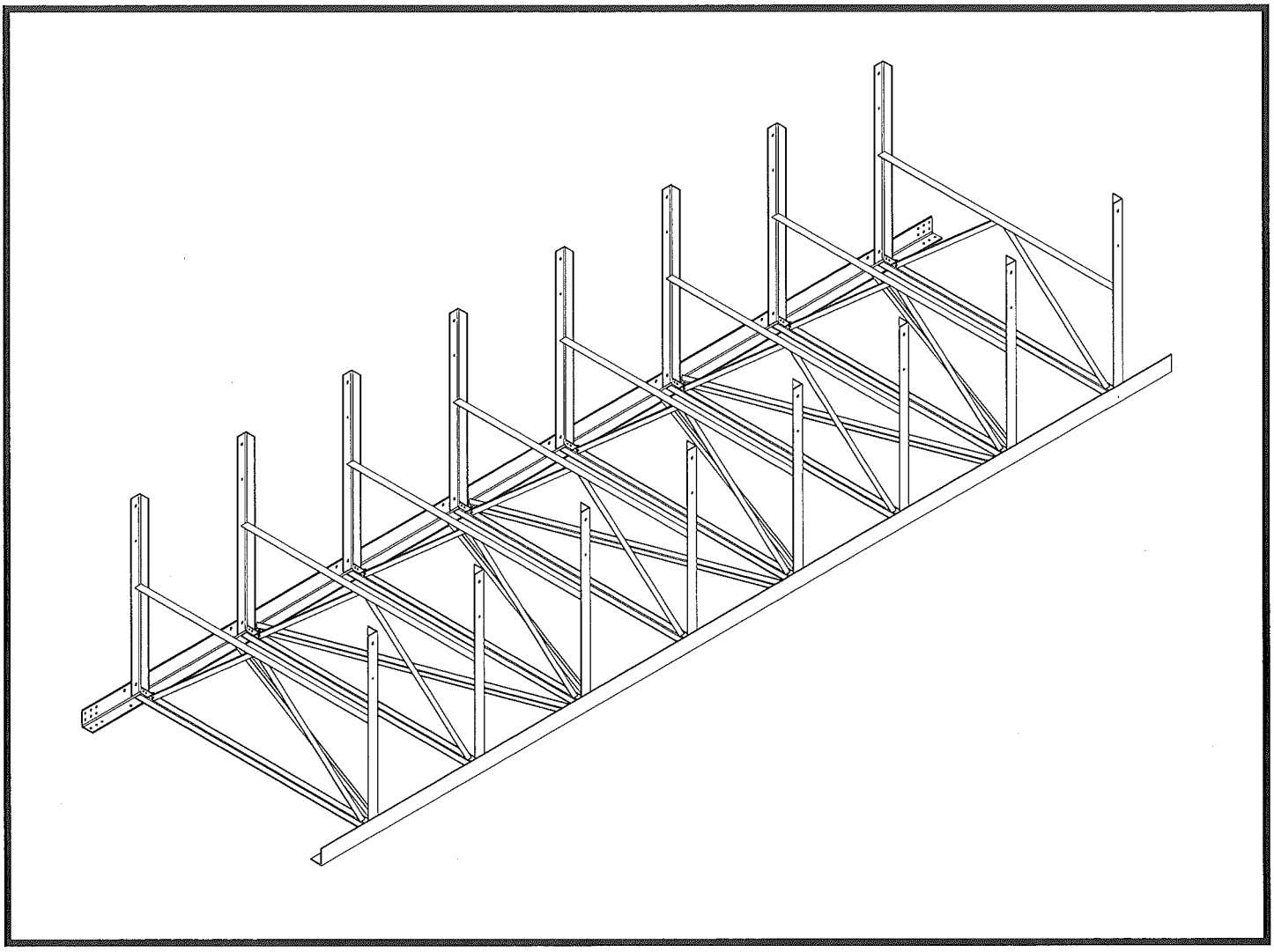
# ASSEMBLY INSTRUCTIONS

Once you have the core assembly built, you are now ready to install the core component assemblies in the bottom chord assembly.



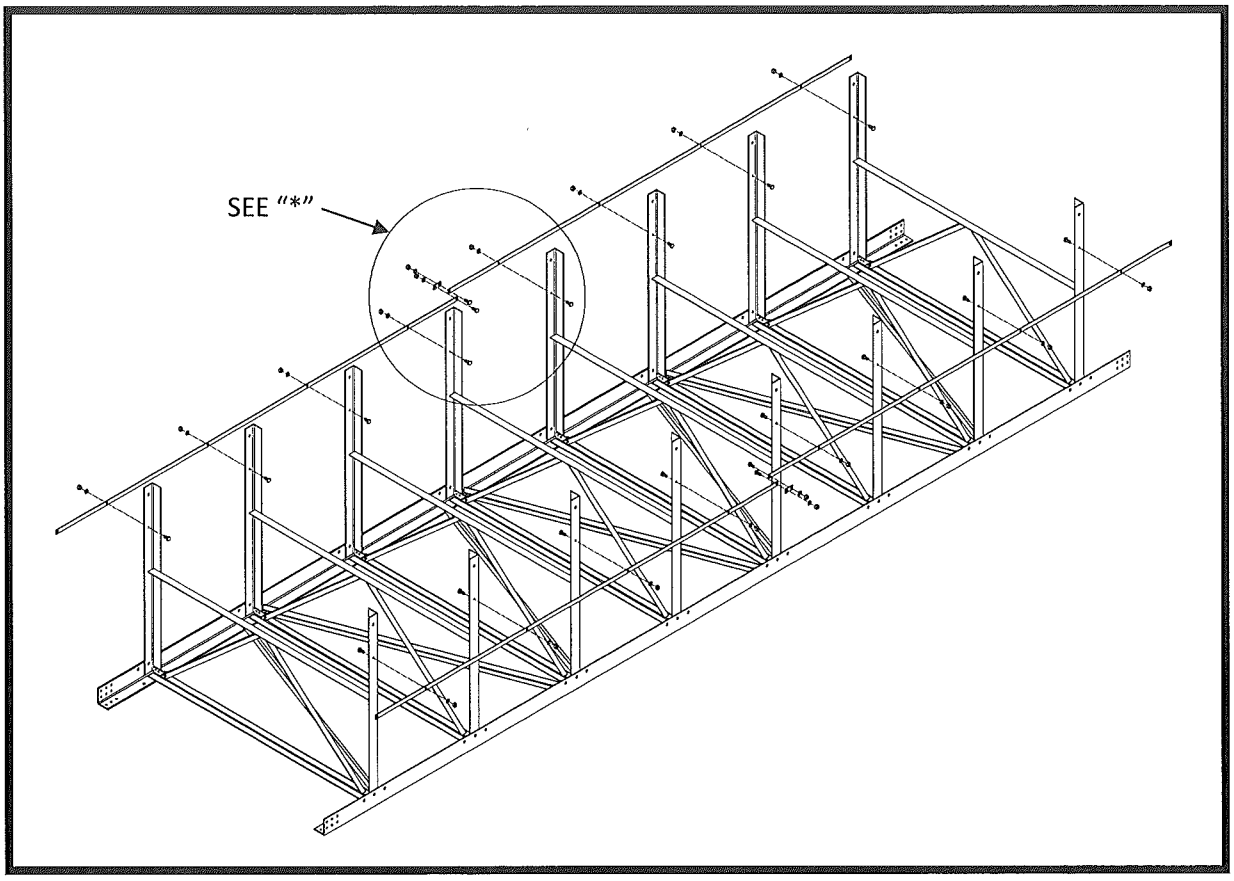
# ASSEMBLY INSTRUCTIONS

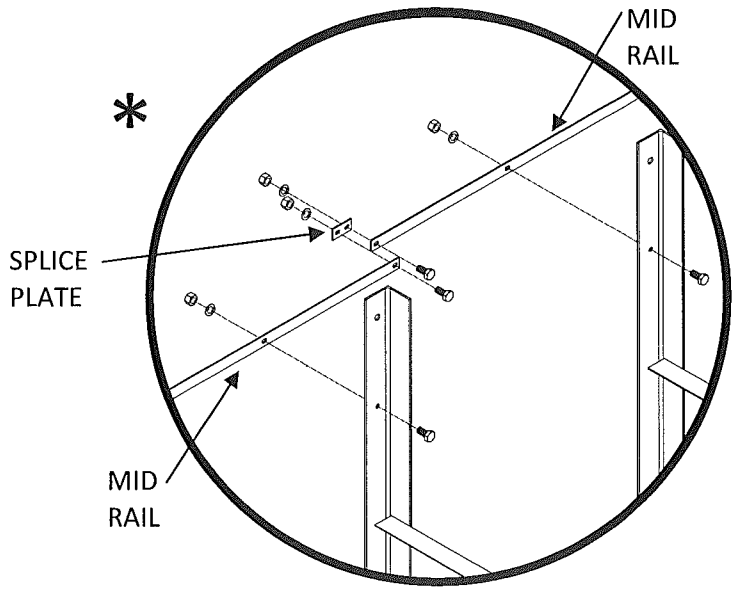
Install all core component assemblies as shown.



# ASSEMBLY INSTRUCTIONS

After all of the core component assemblies have been installed, you must install the mid-rails to the verticals.

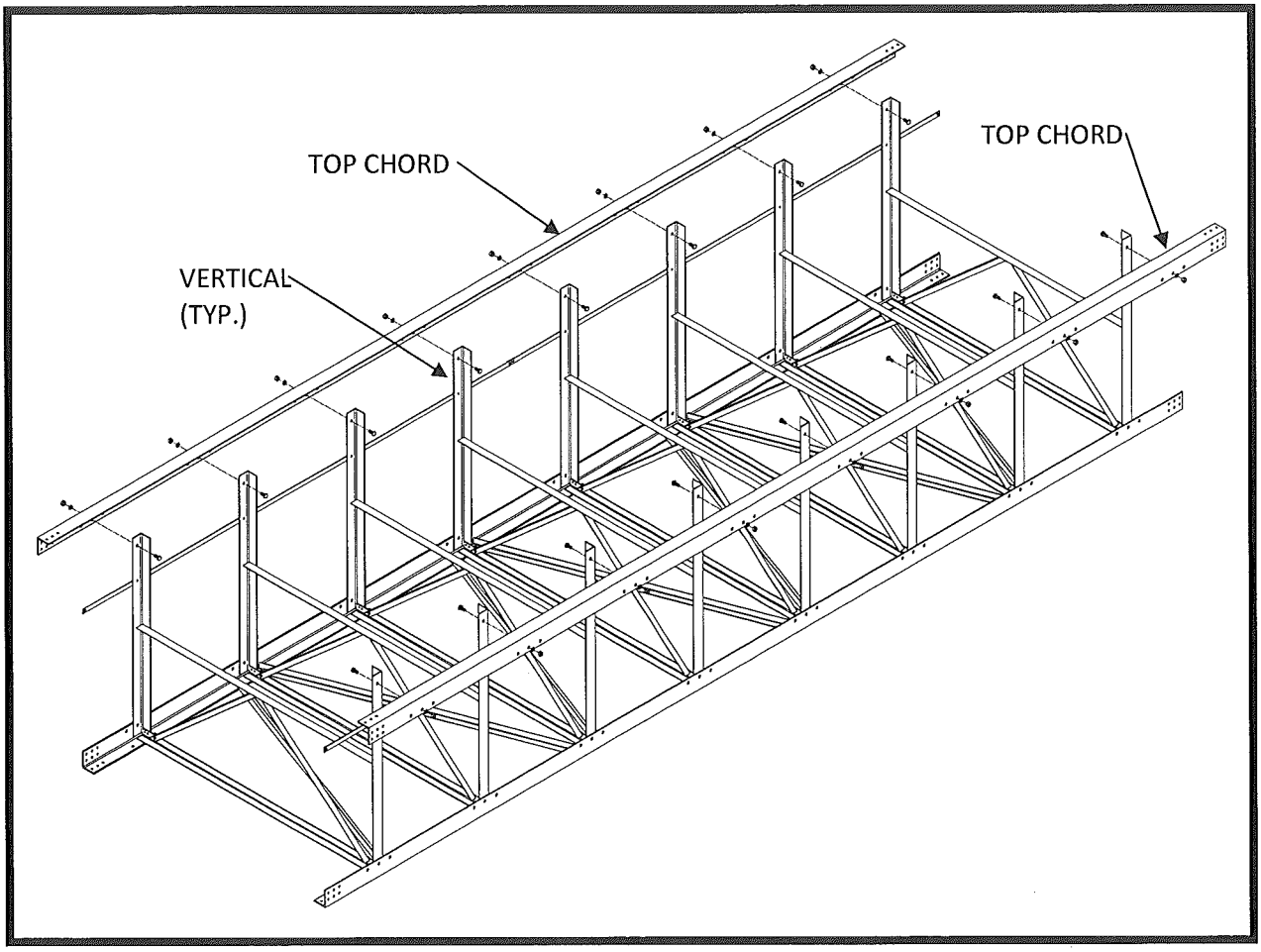


# ASSEMBLY INSTRUCTIONS

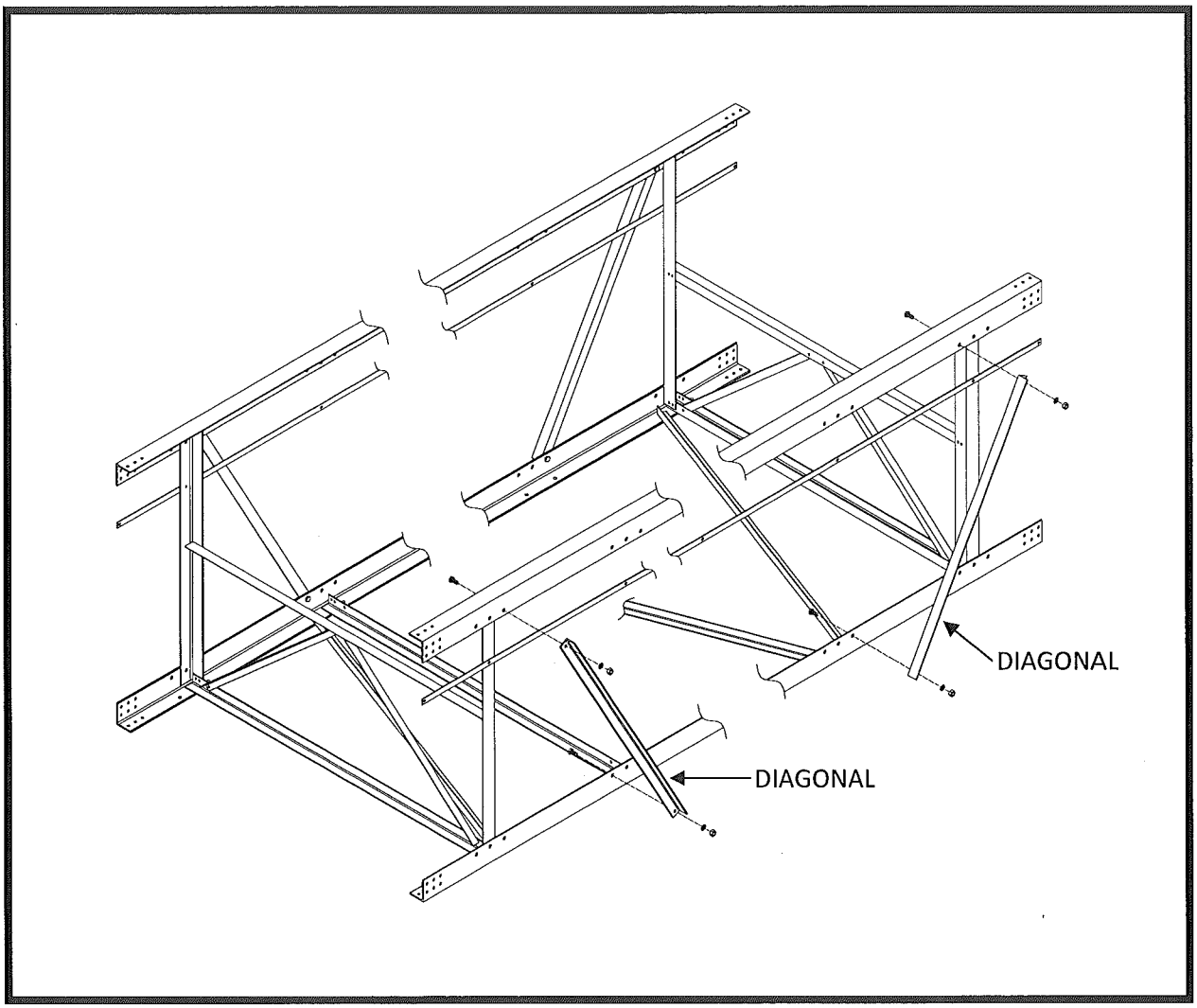
After installing the mid-rails, the top chords can be installed. **PLEASE USE EXTREME CAUTION WHEN ATTACHING THE TOP CHORDS. KEEP FORK TRUCK UNDER TOP CHORDS UNTIL SECTION HAS BEEN FULLY ASSEMBLED.**

Attach the top chords to the verticals.

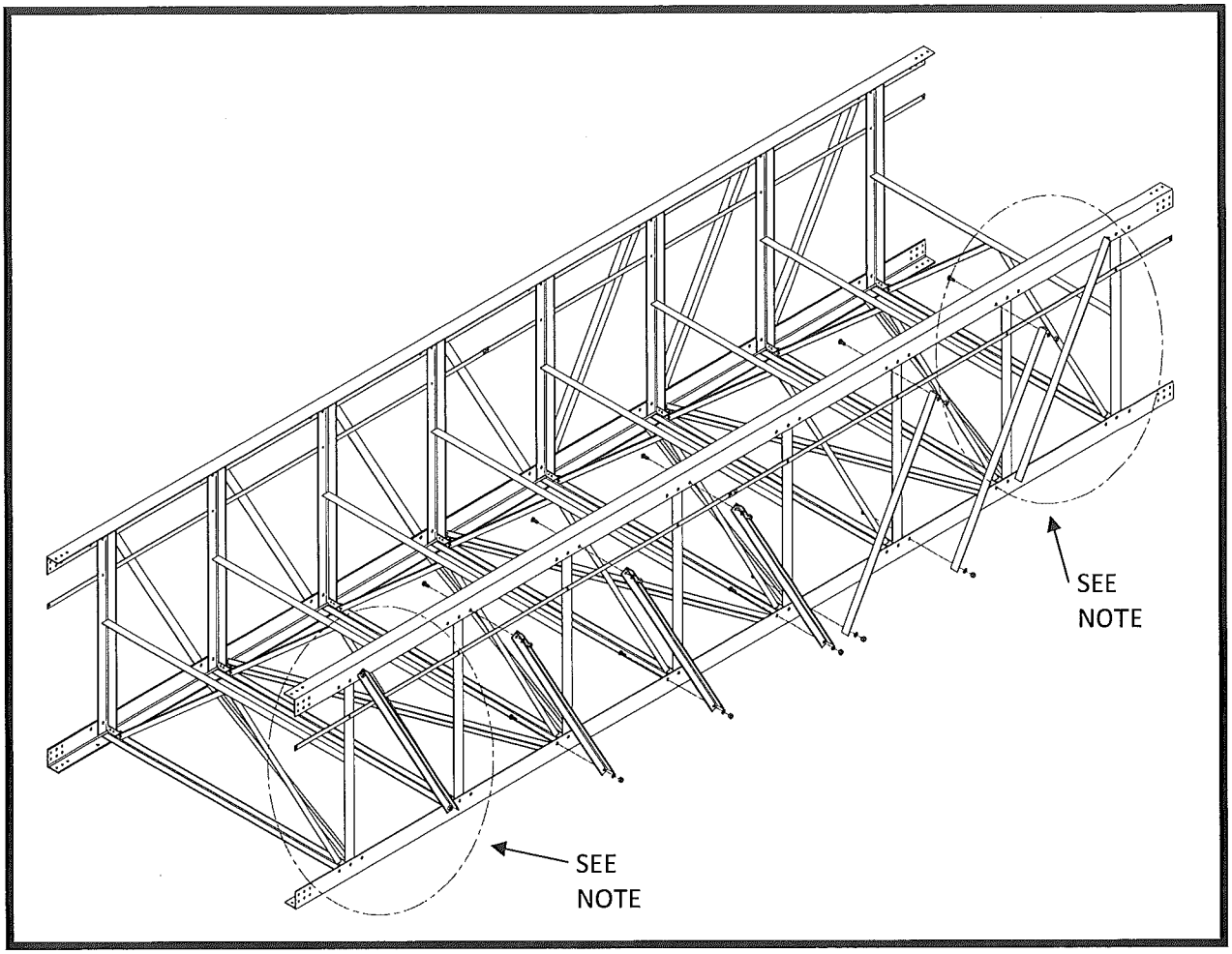


# ASSEMBLY INSTRUCTIONS

Once top chords have been installed, the side diagonal located at the end of each section can be installed. First install the side diagonals in each end of the section in opposite direction **temporarily** to prevent the section from "scissoring". If this is not done, the top chords could push to one end and could cause the catwalk to collapse within itself and **could result in injury or death.**



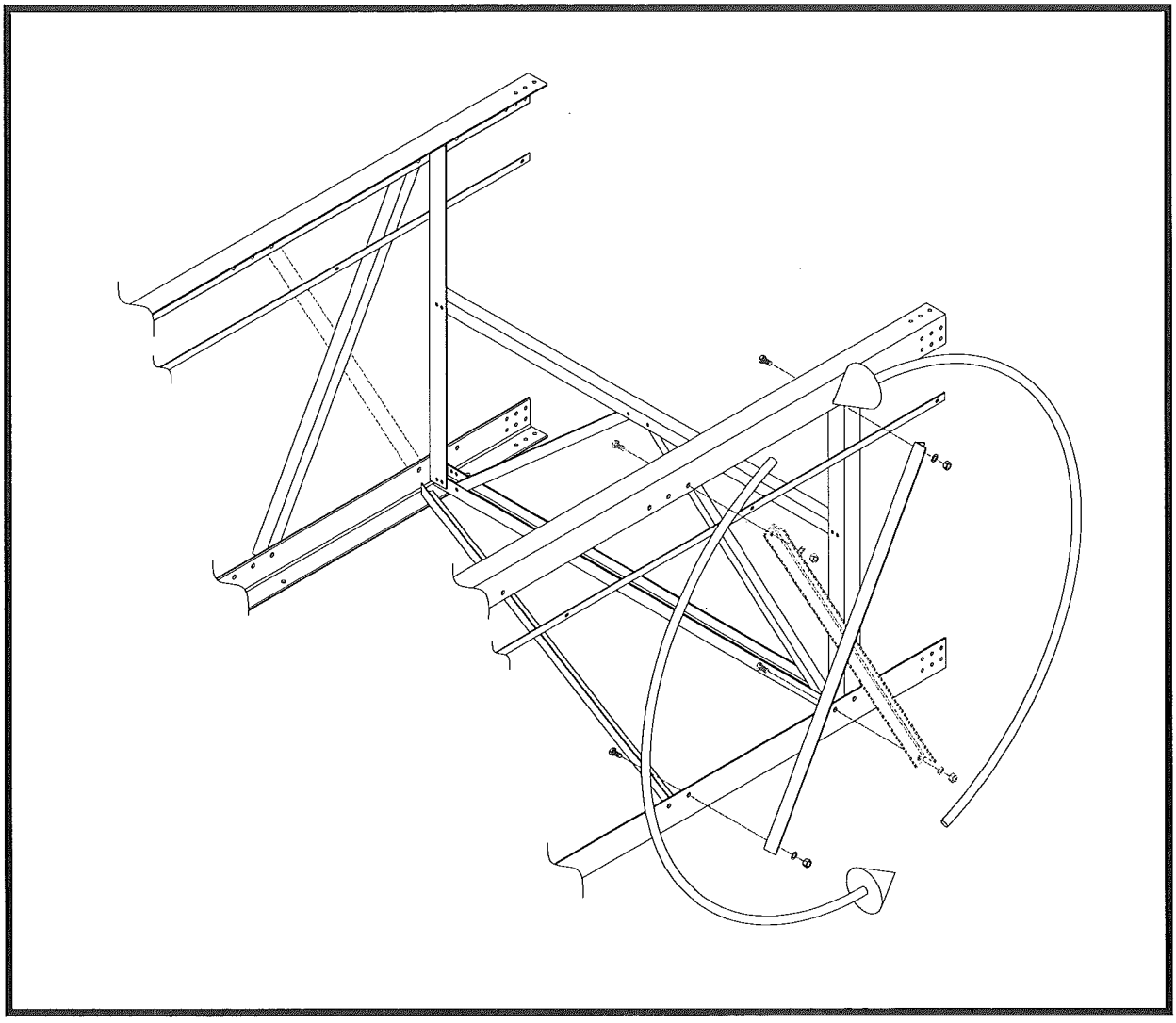
Install the remaining side diagonals in the orientation shown on the Assembly Overview (Sheet A).



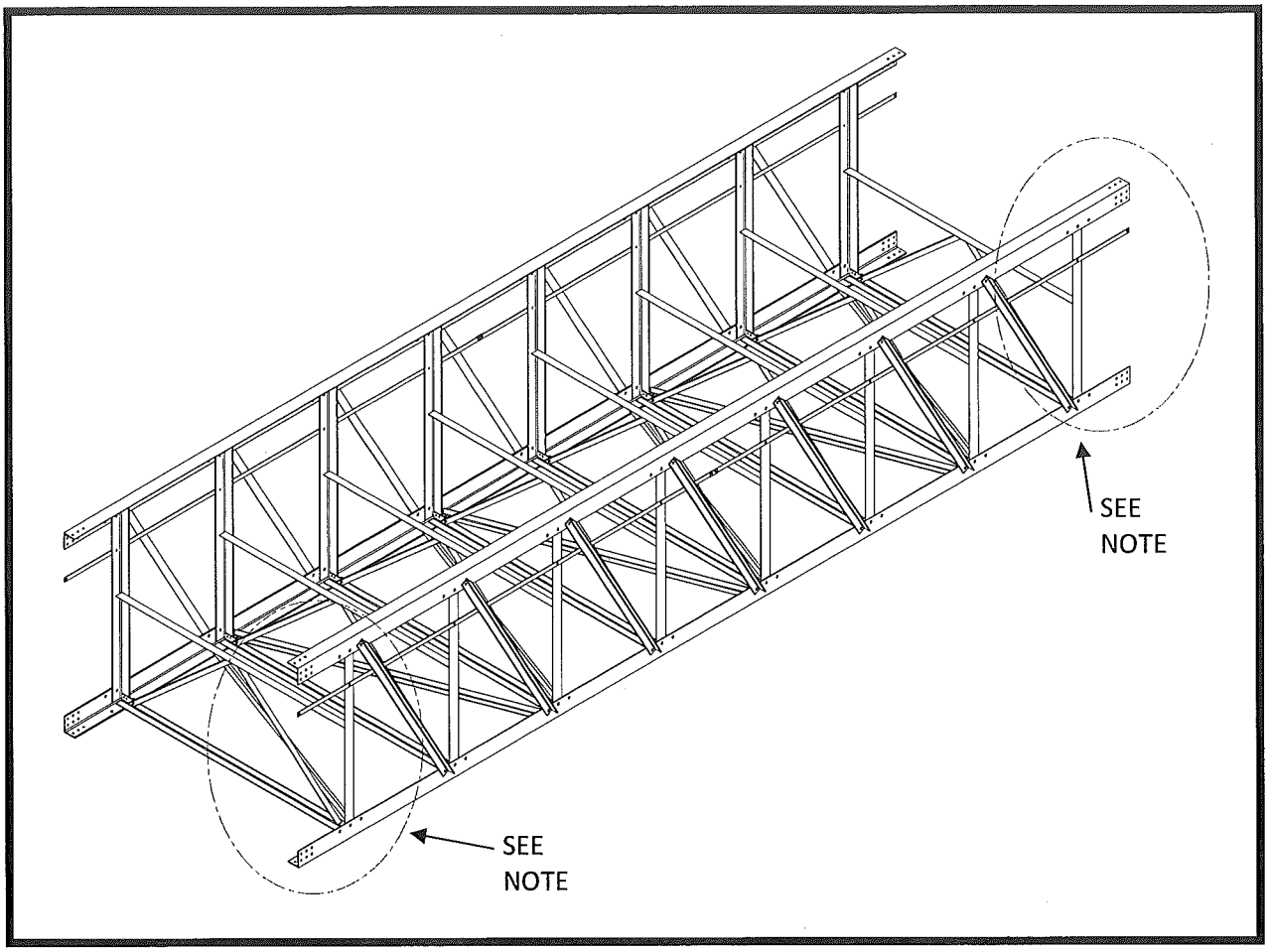

**NOTE:**

After installing the remaining side diagonals, remove any that were used as a temporary brace, and re-install in orientation as shown on assembly overview (sheet A). See detail "A" on page 23.

Detail "A"



Continue with both sides of the catwalk, section by section until complete.



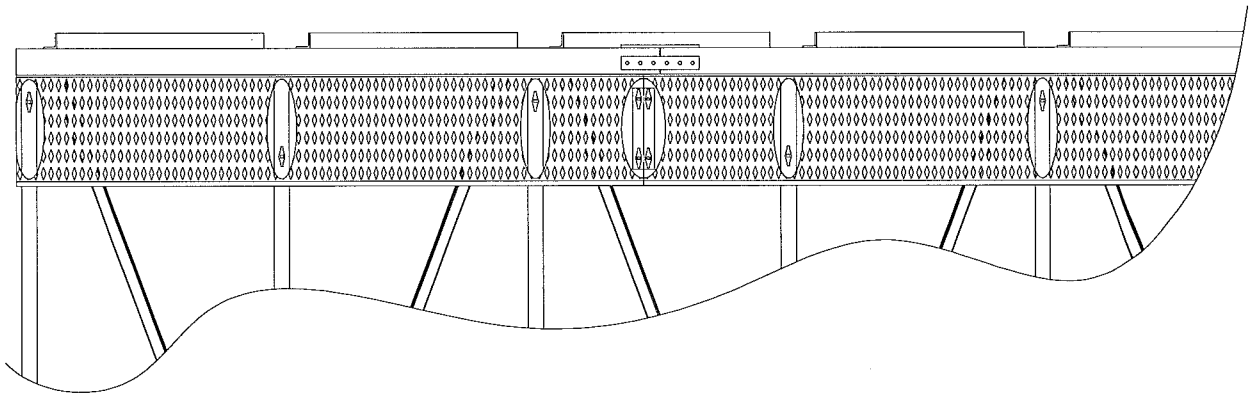

ASSEMBLED CATWALK SECTION

**NOTE:**

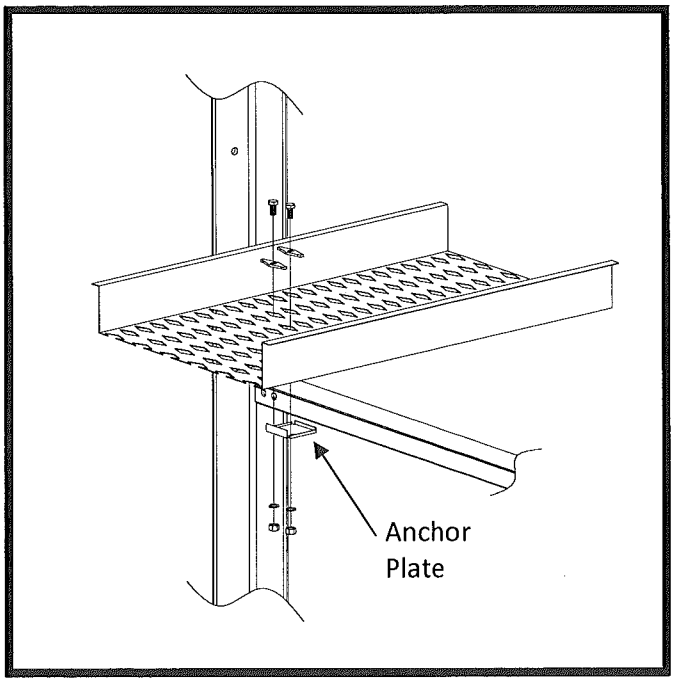
Connect catwalk sections using splice plates (see Pg. 14) if you have not already done so.

# ASSEMBLY INSTRUCTIONS

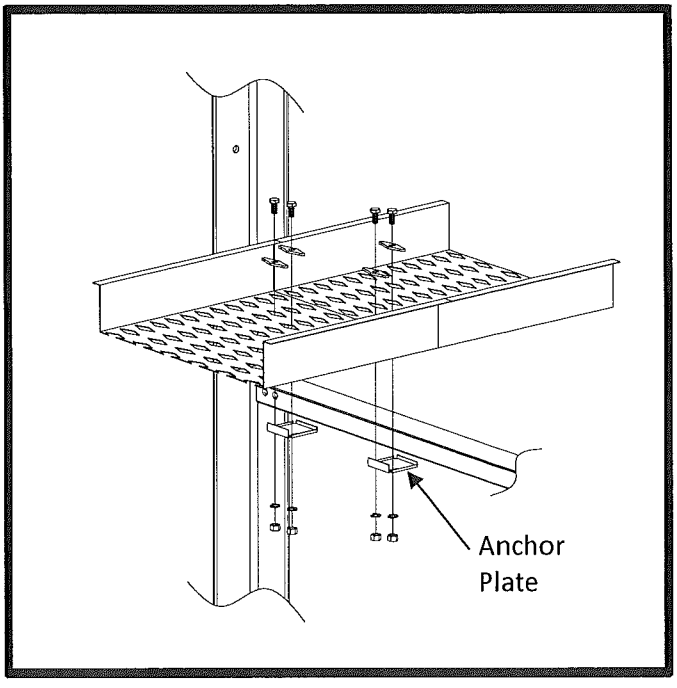
Once the catwalk section(s) have been assembled, it will be time to install the safety walkway. Install the walkway using the anchor plates and 5/16"x2 ½" Dia. carriage bolts with diamond washers, flat washers and nuts. Alternate from side to side at each horizontal. (See Detail "A") Use (2) anchor plate assemblies if splicing two sections of walkway together at a horizontal. (See Detail "B")



VIEW SHOWING ALTERNATING CONNECTIONS



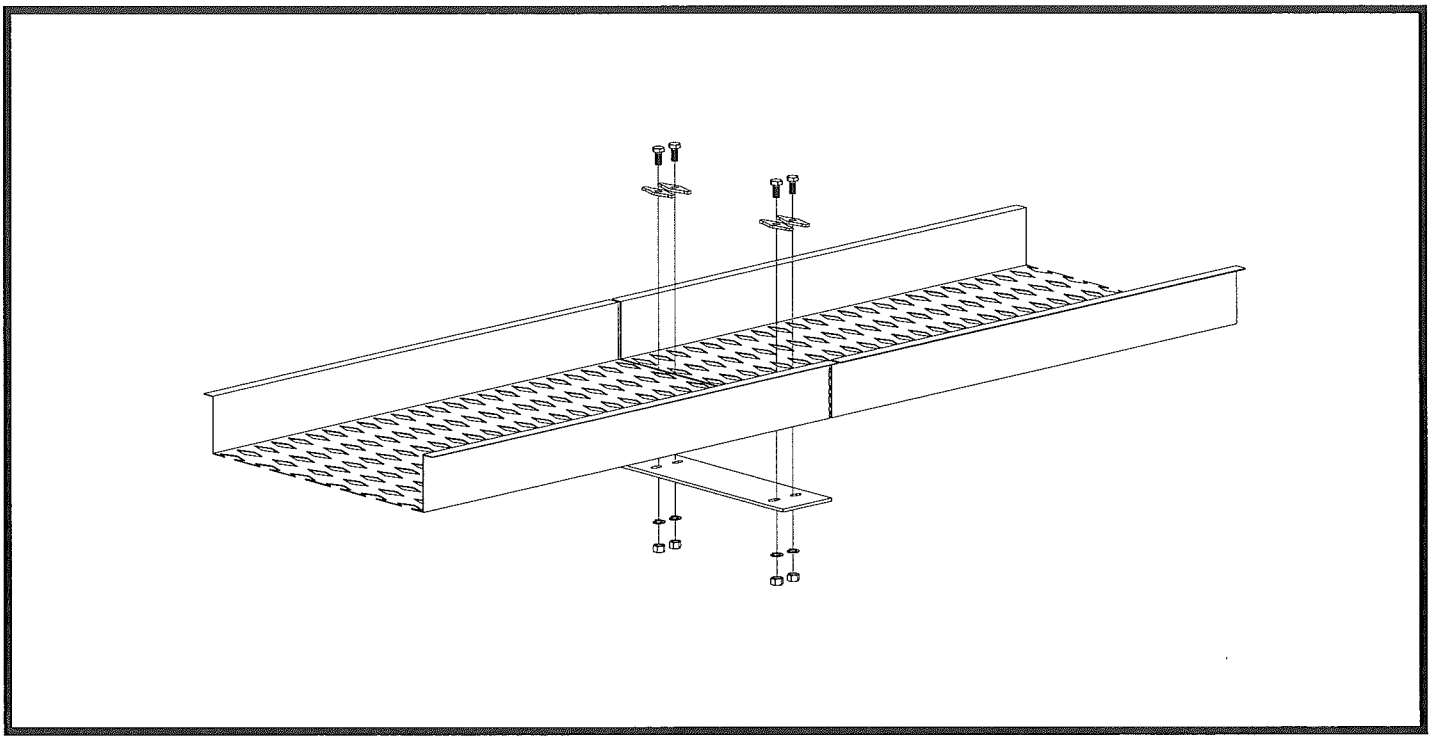

Detail "A"




Detail "B"

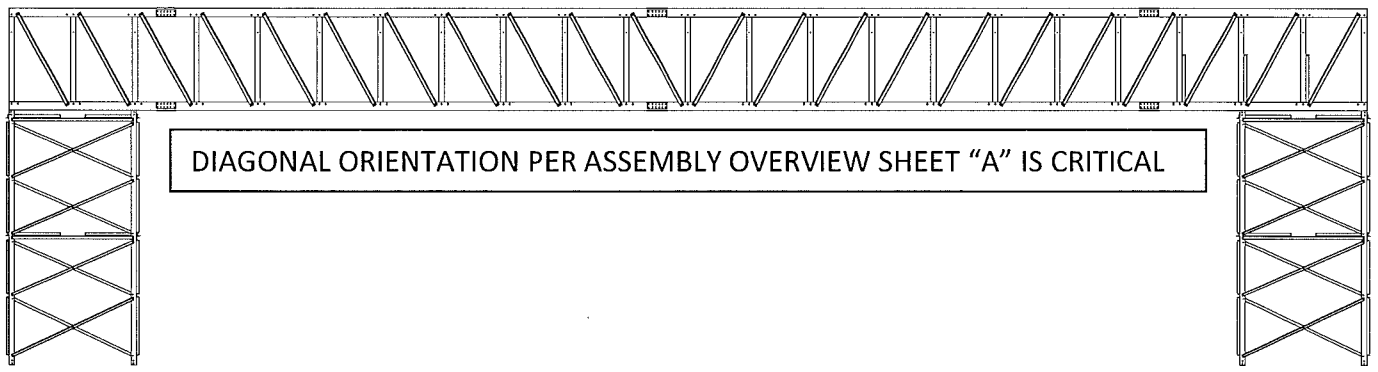
# ASSEMBLY INSTRUCTIONS

You must use (1) safety walkway splice plate and (4) 5/16"x2 ½" Dia. Carriage bolts with diamond washers, flat washers, lock washers and nuts where two walkways meet. Install plate on underside of safety walkway. (**Omit** splice plate if safety walkway sections connect on top of a horizontal and secure using horizontal attachment method shown on pg. 25.)



# ASSEMBLY INSTRUCTIONS

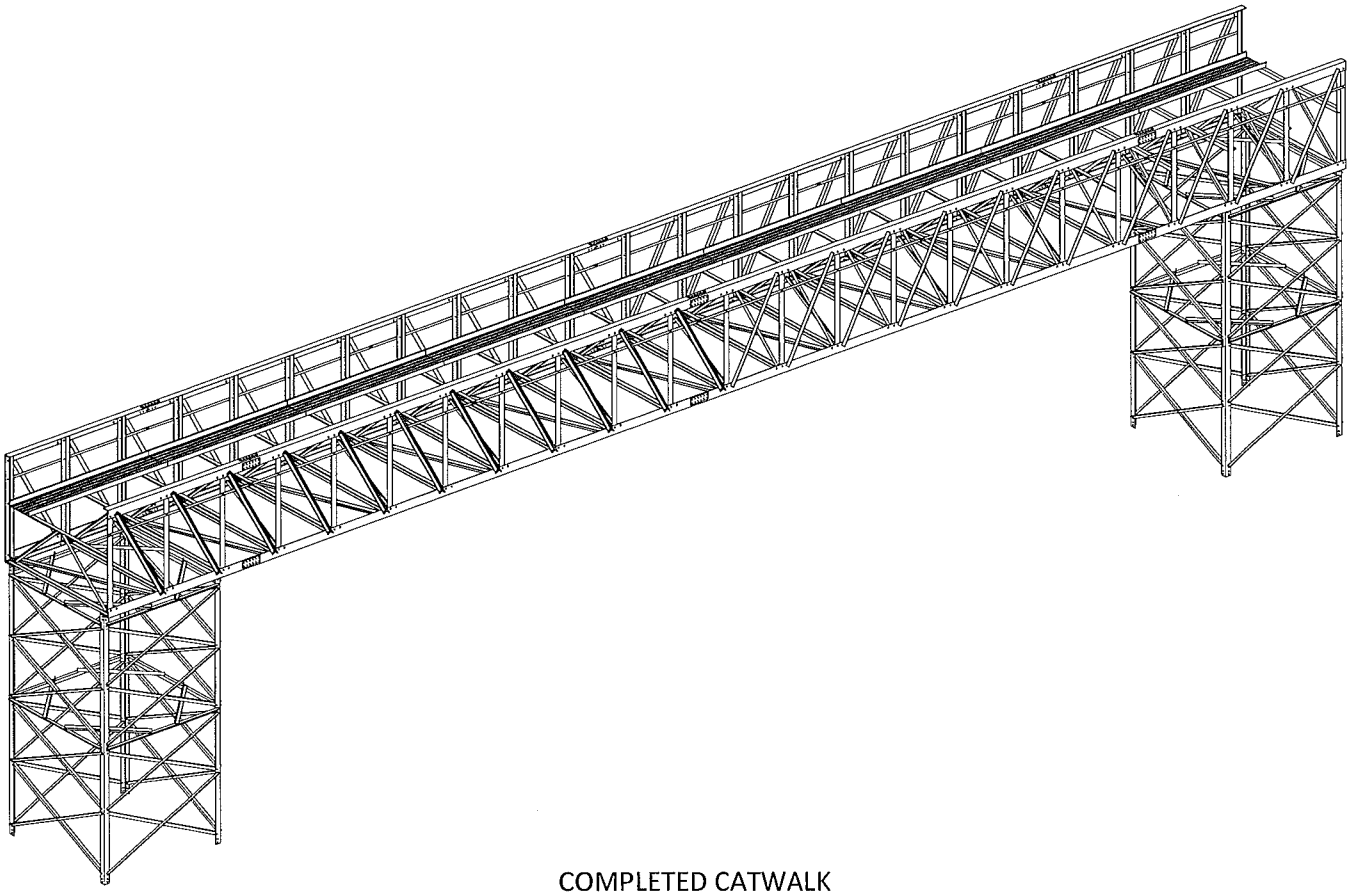
*Confirm that your catwalk side diagonals are oriented as shown on the assembly overview (sheet "A"), included in your erection set of drawings.




EXAMPLE ONLY

You have now completed your catwalk assembly.

Be sure and check that all materials have been installed properly, connections are sufficiently tightened and all steps were completed before using your tower.



COMPLETED CATWALK

# TROUBLESHOOTING

**Reminder:** It is suggested that all installed bolts be left loose until catwalk sections are fully assembled. When installing bolts, always try to insert the bolt pointing to the outside of the structure to help avoid clearance issues.

1. Bolts not clearing other bolts or material in order to tighten?

    a. Some bolts may have to be removed and reinstalled in the opposite direction to avoid clearance and tightening issues.

**References:**


1. Research Council on Structural Steel Connections, December 31, 2009.