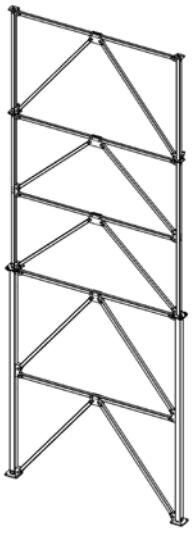
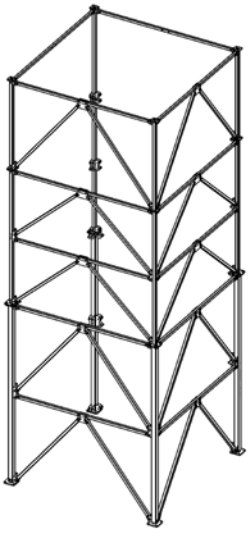




2-Leg and 4-Leg QuickBolt™ Towers

Installation Manual

PNEG-2115

Version 1.0

Date: 01-04-17

PNEG-2115

All information, illustrations, photos, and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Contents

NOTES

1 Safety Precautions

Topics Covered in this Chapter

- Safety Guidelines
- Cautionary Symbol Definitions
- Safety Precautions
- Safety Sign-off Sheet

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Save these safety guidelines for future reference.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in SERIOUS INJURY or DEATH.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

Personnel operating or working around equipment must read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

ST-0001–3

Cautionary Symbol Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.

Table 1-1 *Description of the different cautionary symbols*

Symbol	Description
	This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**
	This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**
	This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**
	This symbol is used to address practices not related to personal injury.
	This symbol indicates a general hazard.
	This symbol indicates a prohibited activity.
	This symbol indicates a mandatory action.

ST-0005–2

Safety Precautions

This is all the topics contained in the Master Safety Reference File. Mainly used to verify formatting before releasing the topic.

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection

Respiratory Protection

Foot Protection

Hearing Protection

Head Protection

Fall Protection

Hand Protection

- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004–1

Follow Safety Instructions

- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.

ST-0002–1

Sharp Edge Hazard

- This product has sharp edges, which can cause serious injury.
- To avoid injury, handle sharp edges with caution and always use proper protective clothing and equipment.

ST-0036–2

Toxic Fume and Dust Hazard

- Remove paint before welding or heating.
- Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.
- Do all work outside or in a well-ventilated area. Dispose of paint and solvent properly.
- Remove paint before welding or heating:
  - — If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
  - — If you use solvent or paint-stripper, remove stripper with soap and water before welding.
  - — Remove solvent or stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating

ST-0043–1

Stay Clear of Hoisted Equipment

- Always use proper lifting or hoisting equipment when assembling or disassembling equipment
- Do not walk or stand under hoisted equipment.
- Always use sturdy and stable supports when needed for installation. Not following these safety precautions creates the risk of falling equipment, which can crush personnel and cause serious injury or death.

ST-0047–1

Avoid Falls During Service and Installation

- Use proper fall protection equipment.
- Anchor the bottom of any ladder being used in a bin or silo to prevent it from slipping.
- Use rubber pads or other anti-slip devices to prevent the ladder from slipping on the bin floor.
- Exercise caution when using a ladder to perform work in a partially filled grain bin. The ladder can sink into the grain and cause a fall.
- Because the equipment is suspended from chains in the center, be cautious of positioning the ladder against the equipment. The equipment can move or swing from the weight of a person climbing on the ladder.
- When setting a ladder against the equipment, a vise grip or other type of tie down must be used in the front and back of the track drive unit. This keeps the equipment from rolling or sliding around the bin while service work is being performed.
- During heavy service work, such as removing the auger drive, electric motors, or replacing electrical swivel, tying the ladder to the main frame or other solid component is advised.
- Never climb out on the main beam or augers from the ladder or roof manhole. The equipment can swing, causing a fall.
- Do not climb Stir-Ator down augers to make adjustments or repairs. Slipping can cause falling, bodily injury, or both.
- If an unusual amount of service work needs to be performed, consider lowering the unit onto sawhorses.

ST-0010–2

Fall Hazard

- Ladders, stairways and platforms are for use by competent and trained personnel only. Do not allow children or other unauthorized persons to have access to the equipment.
- Access to the equipment must be restricted by the use of security fencing and lockable gates.
- Lower sections of ladders must be fitted with a lockable safety gate to prevent unauthorized access.
- Make sure that hot surfaces have had adequate time to cool before working on or in the equipment.
- Lock out and tag out power supplies and fuel supplies to all equipment.
- Do not attach lifting equipment to ladders or platforms.
- Do not go outside of the safety rails provided on elevated platforms.
- Do not work at heights during high winds, rain, snow, or ice storms.

ST-0056–1

Fall Hazard

- Keep access door closed while on a platform to avoid falls.
- Always use proper personal protective equipment and proper clothing when using equipment. Failure to follow safety precautions can result in severe injury or death.

ST-0042–2

Platform Load Limit

- The platform load limit is 500 LBS (2.25 kN). Do not exceed this weight.
- Excessive load will damage the platform and cause platform to fall. Severe injury or death will result.

ST-0044–2

Ladder Load Limit

- The ladder load limit is 300 LBS (1.34 kN). Do not exceed this weight.
- Excessive load will damage the ladder and severe injury or death will result.
- Ladders, stairways and platforms are for use by competent and trained personnel only. Do not allow children or other unauthorized persons to have access to the equipment.
- Access to the equipment must be restricted by the use of security fencing and lockable gates.
- Lower sections of ladders must be fitted with a lockable safety gate to prevent unauthorized access.
- Lock out and tag out power supplies to all equipment.
- Do not attach lifting equipment to ladders .
- Do not work at heights during high winds, rain, snow, or ice storms.

ST-0059–2

Safety Sign-off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

Date	Employee Name	Supervisor Name

ST-0007

2 General Information

Topics Covered in this Chapter

- Overview
- Required Specifications
- Hole Preparation
- Elevator Guy Bracket
- Anchor Washers
- Bin Guy Kit for 2-Leg Towers
- Seal Plate Kit
- Top Tower Beams
- Catwalk Location
- Tower Erection

Overview

1. All A325 bolts in splice connections are to be tightened by the turn-of-the-nut method. Bracing bolts are to be “snug-tight” only.
2. All GSI provided steel is hot dipped galvanized per ASTM-123A/123M.
3. No bridge members can be removed at any time unless it was designed for it. Drawings will show exact layout of members and how they are to be installed.
4. No tower members can be removed at any time unless it was designed for it. Drawings will show exact layout of members and how they are to be installed.

Required Specifications

1. Steel W sections are ASTM A992, A709 or A572 Grade 50.
2. Steel channels, angles and S sections are ASTM A36.
3. Steel HSS is ASTM A500 GR B, 46 KSI.
4. All structural bolts are A325 unless otherwise specified.
5. All field welds are 3/16 in. (0.48 cm) min. size fillet weld E60XX or E70XX.
6. All grade 8 bolts are to be installed in snug-tight condition.

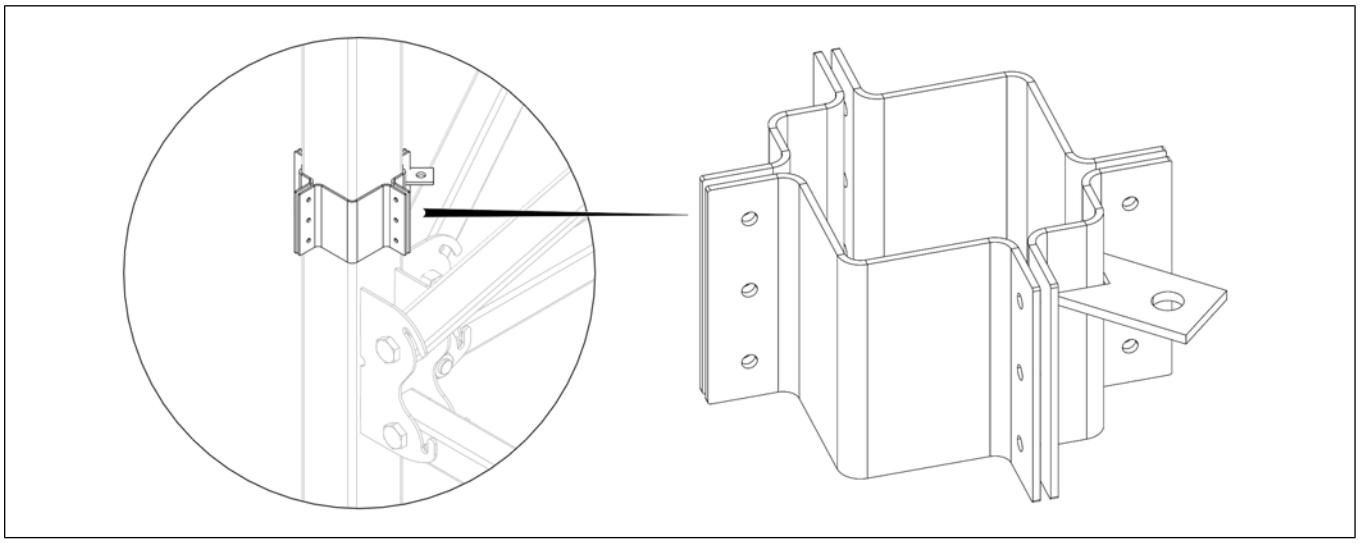
Hole Preparation

1. Since GSI steels are galvanized, bolt holes may be smaller than the requirement due to the build up of galvanizing around the holes.
2. The bolt holes are usually 1/16” greater than the bolts in diameter.
3. The holes may be deburred so that the bolt can be inserted through the holes.

Elevator Guy Bracket

1. Elevator guy brackets should be installed close to the shear plates on the column.
2. Each bracket should be installed at a maximum of 20 ft intervals to all four columns of the tower.
3. These brackets should be installed only to the columns and not to the horizontal struts or diagonal braces.
4. These brackets need not to be welded to the columns.

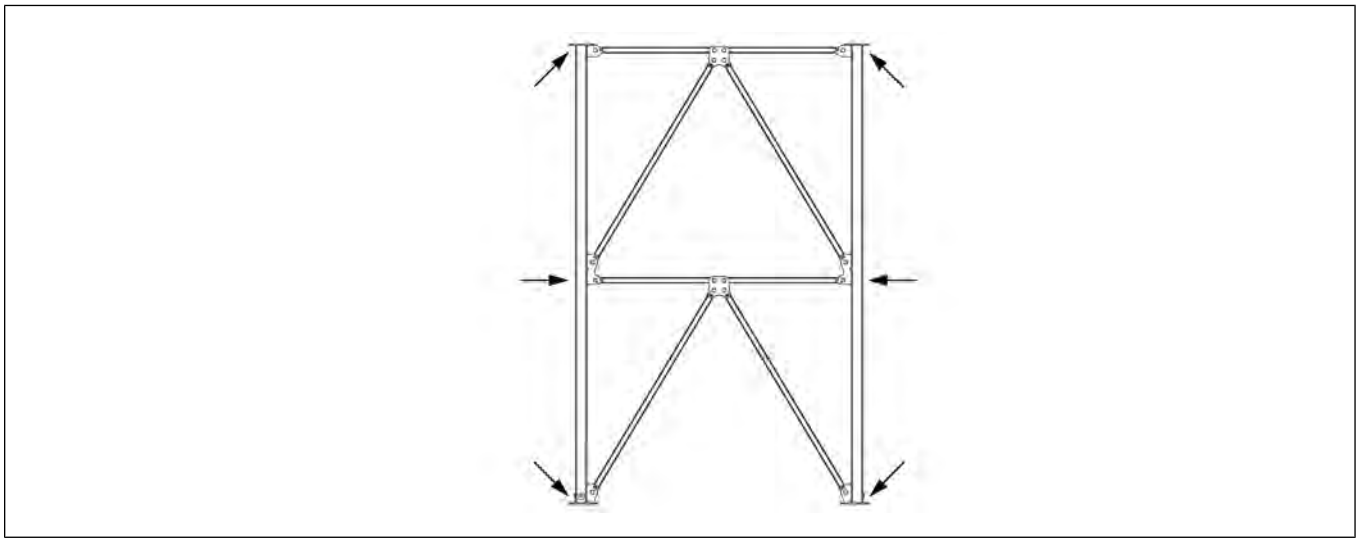
Figure 2-1 *Elevator guy bracket*



Elevator Guy Bracket Attachment

1. The elevator guy system is used as an internal brace for the tower.
2. If the elevator leg is outside of the tower, the four corners of the leg should be connected to the two tower columns.
3. If two elevator legs are placed in a single tower, frame the two legs together and brace all four corners back to the tower.

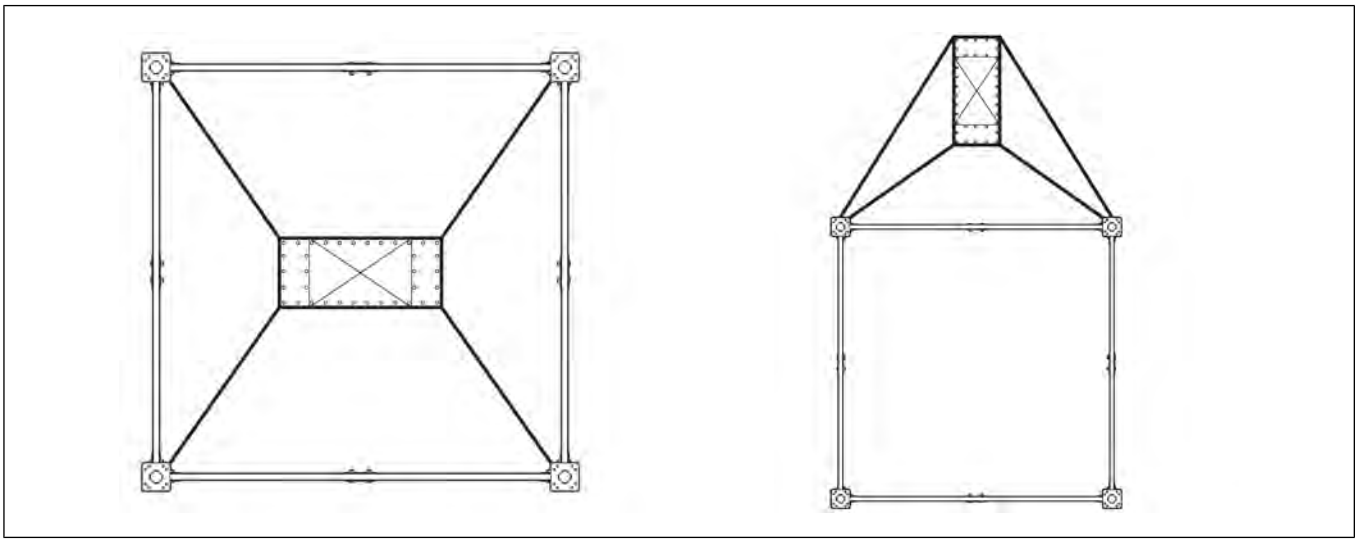
Figure 2-2 *Elevator guy bracket attachment – shear plate locations*



Elevator Guy Bracket Position

1. When possible, the elevator leg should be centered within the tower so that the wind load transmitted to the tower is distributed equally between the two parallel sides of the tower.
2. If the elevator guy is outside the tower, when possible, the leg should be centered between the two nearest columns of the tower so that the wind load is distributed to the tower equally.

Figure 2-3 *Elevator guy bracket position*



Anchor Washers

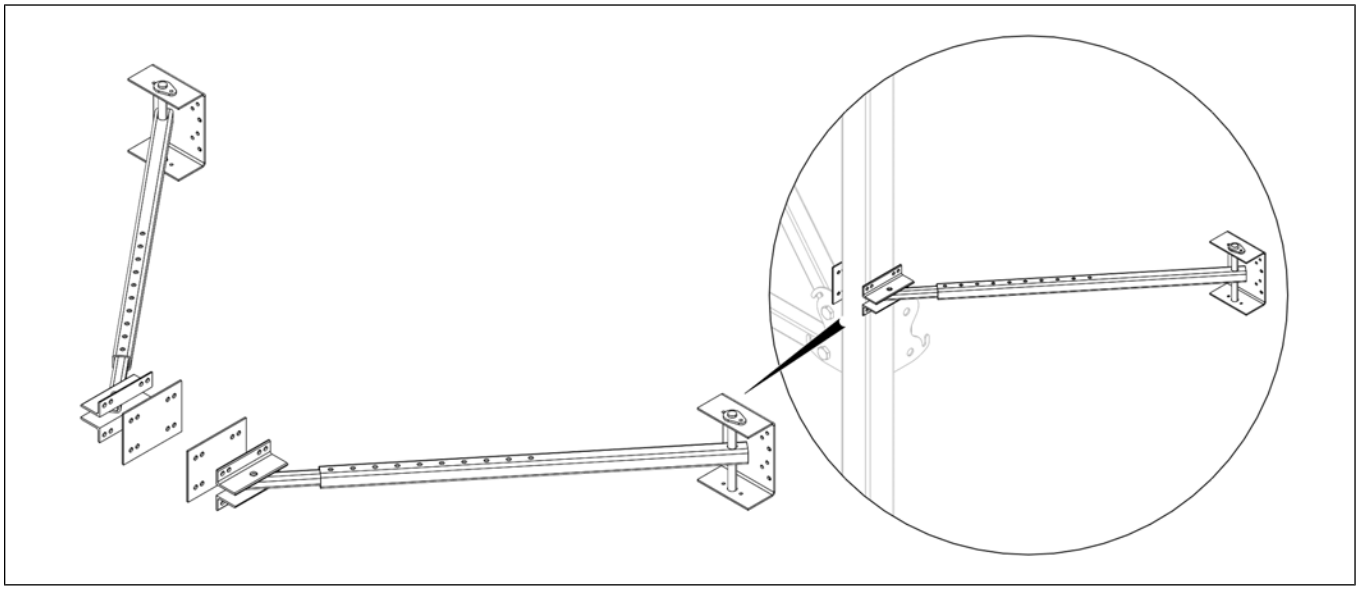
1. GSI specifies a diameter and grade of anchor rod.
2. GSI provides anchor washers corresponding to the recommended sizes.

Recommended Maximum Sizes for Anchor-Rod Holes in Base Plates (AISC 360–10)			
Anchor Rod Diameter (in.)	Maximum Hole Diameter (in.)	Minimum Washer Size (in.)	Minimum Washer Thickness (in.)
3/4	1 5/16	2	1/4
7/8	1 9/16	2 1/2	5/16
1	1 13/16	3	3/8
1 1/4	2 1/16	3	1/2
1 1/2	2 5/16	3 1/2	1/2
1 3/4	2 3/4	4	5/8
2	3 1/4	5	3/4
2 1/2	3 3/4	5 1/2	7/8

Bin Guy Kit for 2-Leg Towers

1. The bin guy kit has a clamp that will fit around the column and a plate that will require field drilling to the nearest bin stiffeners.
2. The clamp should be attached close to a shear plate.
3. The guy bracket should not be attached at the stiffener splice.

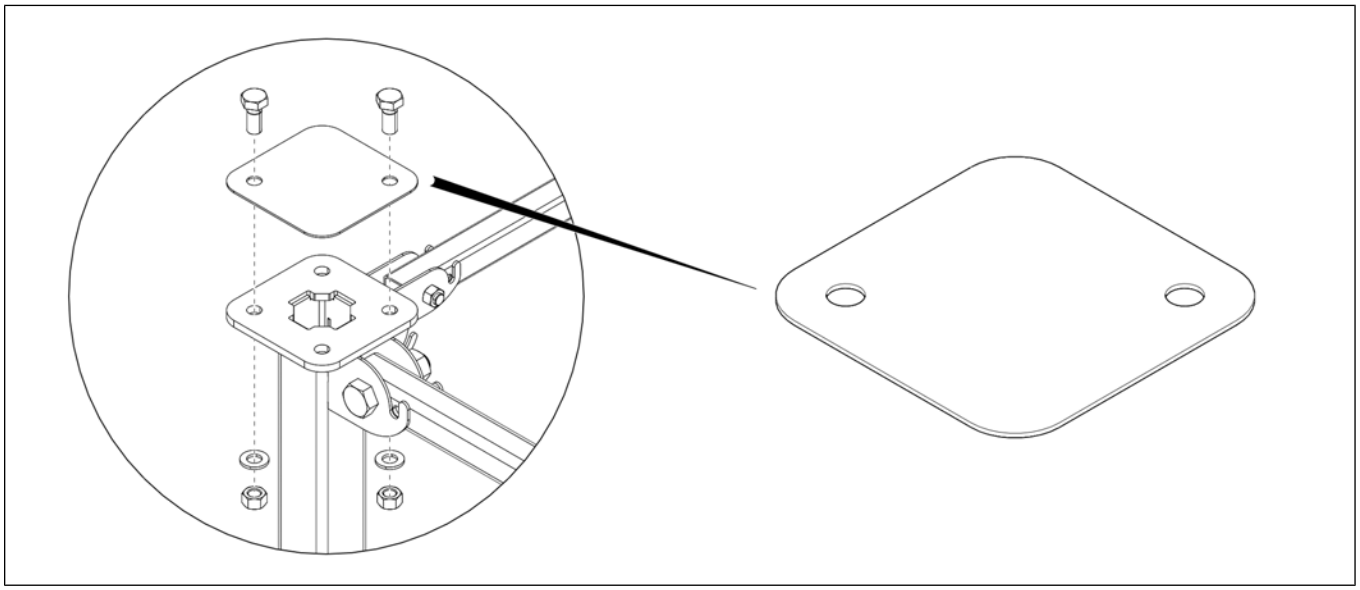
Figure 2-4 *Bin guy kit for 2-leg towers*



Seal Plate Kit

1. The seal plate kits may not be shipped with every tower.
2. If needed, it is installed on top of each of the 2-leg or 4-leg tower columns to prevent water or trash buildup inside of the column.

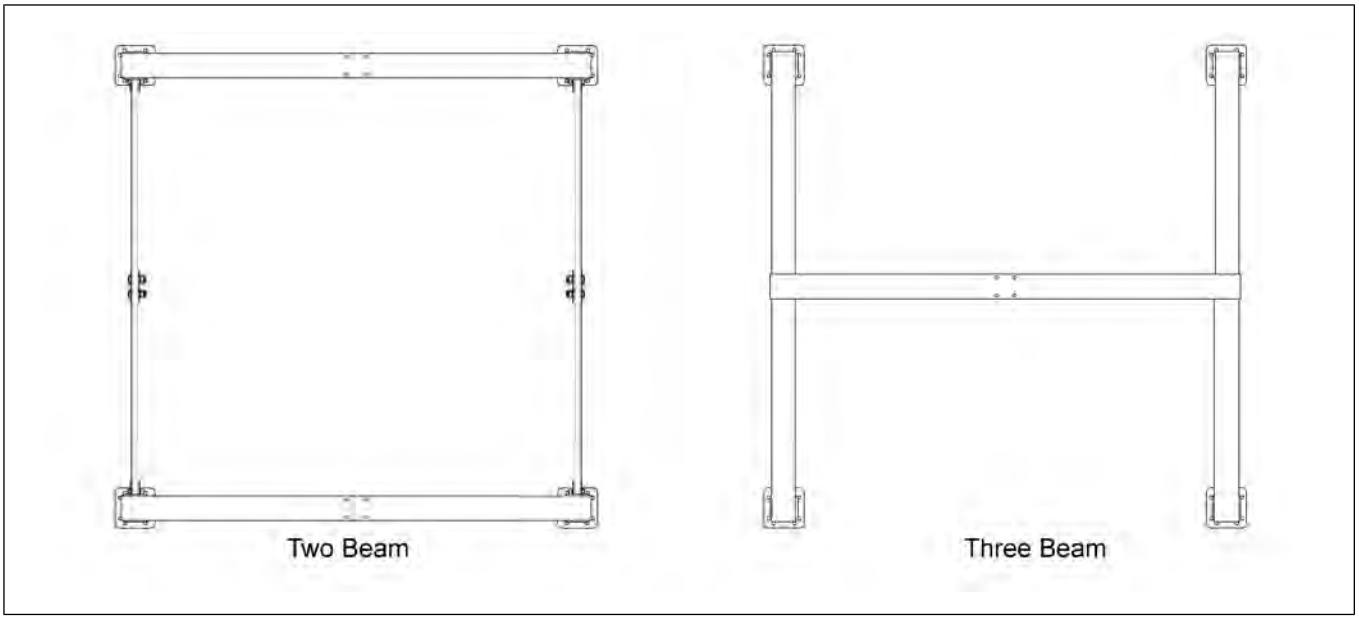
Figure 2-5 *Seal plate kits*



Top Tower Beams

1. The top tower beams can be either in a 2-beam or 3-beam configuration.
2. If it is a two beam configuration, the beams will be one on each pair of legs.
3. If it is a three beam configuration, the beams will appear as shown below.

Figure 2-6 *Top tower beam configurations*



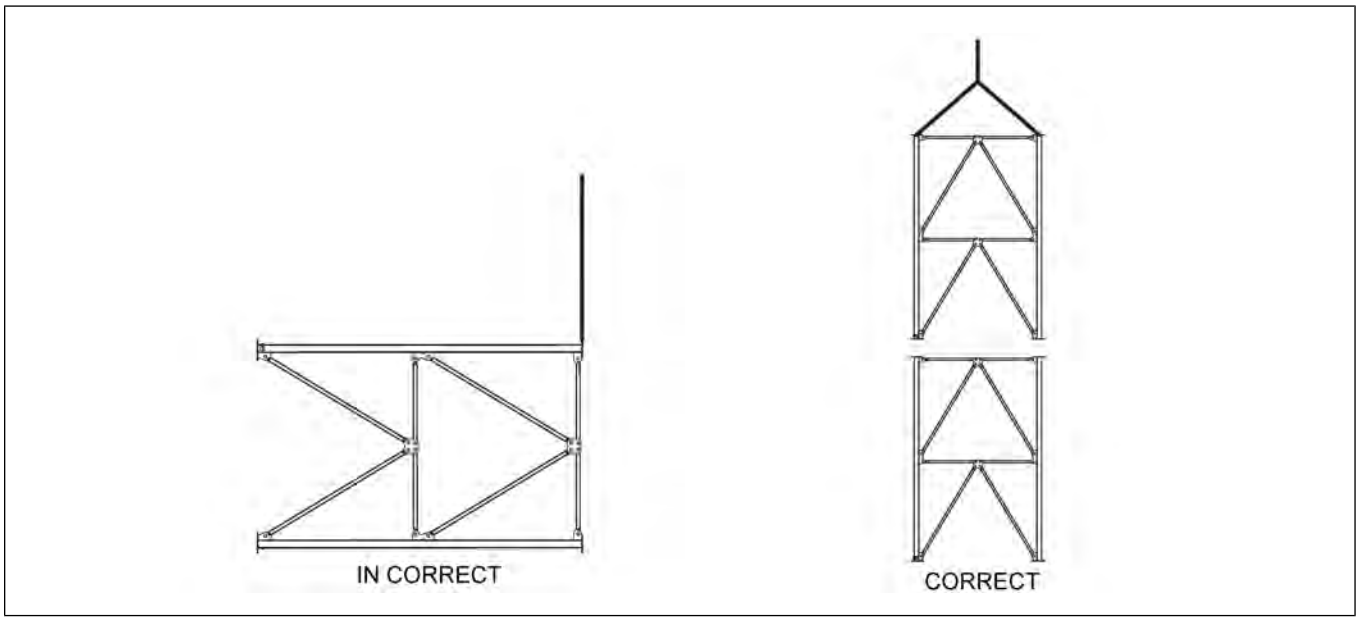
Catwalk Location

The catwalk is supported in the middle of the tower so that the load of the catwalk is distributed equally between the two sides of the tower.

Tower Erection

1. The tower is assembled vertically with various sections depending on the required height.
2. The tower sections should not be assembled by lifting on the sides.
3. The tower is designed with each section in a specific location, it is critical to assemble the tower with the correct members in each section.
4. Square each section and then tighten the hardware before stacking the next section.
5. The shipping bolts should not be used in the tower assembly.

Figure 2-7 *Stacking the sections – tower erection*



NOTES

3 Hardware Requirements

Overview

Installation of all bolts should be in accordance to AISC Specifications for structural joints using ASTM A325 bolts. No other bolts should be substituted for those supplied by GSI. The following is adapted from AISC J3.

Hardware Tightening – Splice Connections

Using an impact wrench, or spud wrench, tighten all fasteners until the splices are touching. Using bar on wrench, turn the nut the appropriate turn distance (degree) to achieve the desired pretension. It is critical that the head of the bolt be held with a wrench so that it does not turn during tightening.

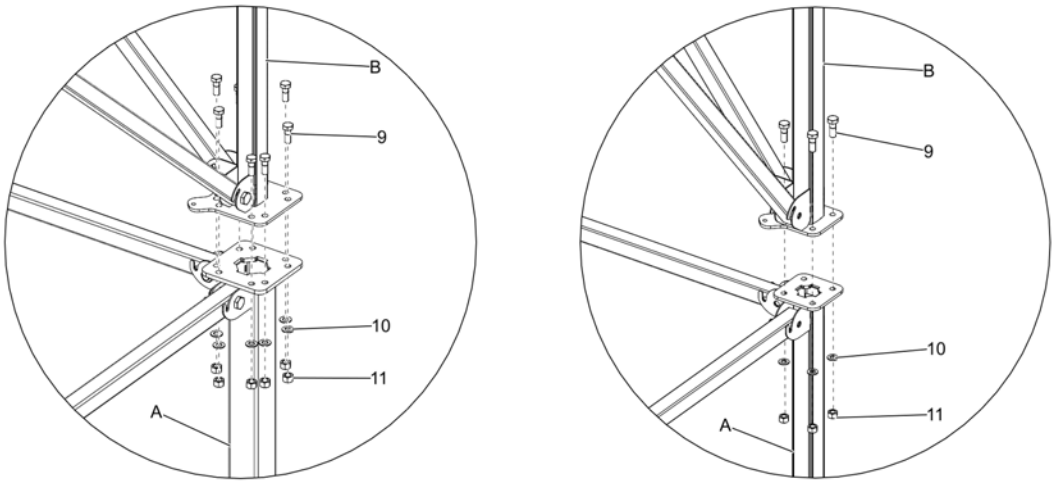
Bolt Tightening

Pretensioned Bolts

1. Pretension is required for the bolts that connect the sections of the tower columns.
2. Using a calibrated wrench or the turn-of-the-nut method, this pretension can be done using the values in the following table.

Minimum Bolt Pretension for A325 Bolts	
Bolt Diameter (in.)	**Pretension (kips)**
7/8	39
1	51
1-1/4	71
1-1/2	103

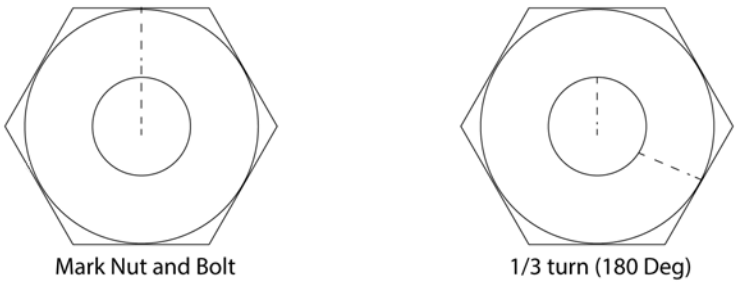
Figure 3-1 *Connection of tower section columns*



A	First 4-Leg Section	10	Washer
B	Second 4-Leg Section	11	Nut
9	Bolt		

3. The turn-of-the-nut method can be done in three steps.
   - Snug tighten the bolts in the joint.
   - Match-mark the nut and protruding end of the bolt.
   - Rotate the nut by the value listed in the below table*.

Figure 3-2 *Turn-of nut method*



Bolt Diameter	Bolt Length	Required Turns	Bolt Length	Required Turns	Bolt Length	Required Turns
7/8"	l ≤3-1/2"	1/3	3-1/2" < l ≤ 7"	1/2	7" < l ≤ 10-1/2"	2/3
1"	l ≤4"	1/3	4" < l ≤ 8"	1/2	8" < l ≤ 12"	2/3
1-1/4"	l ≤5"	1/3	5" < l ≤ 10"	1/2	10" < l ≤ 15"	2/3
1-1/2"	l ≤6"	1/3	6" < l ≤ 12"	1/2	12" < l ≤ 18"	2/3

– For required turns of 1/3 turn (120 degrees) the rotation tolerance is +/- 30 degrees.
– For required turns of 1/2 turn (180 degrees) the rotation tolerance is +/- 30 degrees.
– For required turns of 2/3 turn (240 degrees) the rotation tolerance is +/- 45 degrees.

*This table applies to flat surfaces under the bolt head and nut.
*This symbol “≤” represents “Less than or equal to”.
*This symbol “>” represents “Greater than”.

Snug-Tightened Bolts

1. All hardware in bracing locations is tightened to a “snug-tight” condition.
2. The snug-tight condition is a tightness required to bring the connected plies into firm contact.
3. Snug-tight condition can be attained by a few impacts of an impact wrench or the full effort put by worker with an ordinary spud wrench.
4. Bolts to be tightened to a condition other than snug-tight shall be clearly identified on design drawings.

Washer Location

1. Washers are used to cover the slotted holes in an outer ply.
2. Washers are need to be placed under the turning element.

Reuse of A325 Bolts

Galvanized A325 bolts should not be reused after they have been tightened.

Bolt Length

The bolts used should have length that the end of the bolt extends beyond the nut or at least flush with outer surface of the nut.

Splice Kit Hardware

Splice Hardware Usage	Bolt		Nut		Washer	
	Part Number	Description	Part Number	Description	Part Number	Description
4" Column, 1/2" Splice Plate	S-8557	Bolt HHCS 7/8-9 x 2-1/4 GV A325	S-8364	Nut Hex 7/8-9 GV A325	S-8560	Washer Flat 7/8 GV A325
4"-6" Transition, 1/2"-3/4" Splice Plate	S-10454	Bolt HHCS 1-8 x 2-3/4 GV A325	S-10488	Nut, Hex 1-8 GV A563	S-10496	Washer, Flat 1 GV F436
6" Column, 3/4" Splice Plate	S-10455	Bolt HHCS 1-8 x 3 GV A325	S-10488	Nut, Hex 1-8 GV A563	S-10496	Washer, Flat 1 GV F436
6" Column, 1" Splice Plate	S-10457	Bolt HHCS 1-8 x 3-1/2 GV A325	S-10488	Nut, Hex 1-8 GV A563	S-10496	Washer, Flat 1 GV F436
8" Column, 1" Splice Plate	S-10472	Bolt HHCS 1-1/4-7 x 3-1/2 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325	S-10497	Washer, Flat 1-1/4 GV F436
10" Column, 1" Splice Plate	S-10508	Bolt HHCS 1-1/2-6 x 3-1/2 GV A325	S-8624	Nut, Hex 1-1/2-6 GV	S-10498	Washer, Flat 1-1/2 GV F436

Bracing Kit Hardware

Bracing Hardware Usage	Bolt		Nut	
	Part Number	Description	Part Number	Description
Small Towers: 4' - 6' Footprint				
4" Columns, 2" Bracing	S-10432	Bolt HHCS 3/4-10 x 3-1/2 GV A325	S-8364	Nut Hex 7/8-9 GV A325
6" Columns, 2-1/2" Bracing	S-10461	Bolt HHCS 1-8 x 4-1/2 GV A325	S-10488	Nut, Hex 1-8 GV A563
8" Columns, 3" Bracing	S-10477	Bolt HHCS 1-1/4-7 x 5-1/2 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325
10" Columns, 3" Bracing	S-10478	Bolt HHCS 1-1/4-7 x 6 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325
Medium Towers: 8' - 14' Footprint				
4" Columns, 2-1/2" Bracing	S-10461	Bolt HHCS 1-8 x 4-1/2 GV A325	S-10488	Nut, Hex 1-8 GV A563
6" Columns, 3" Bracing	S-10476	Bolt HHCS 1-1/4-7 x 5 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325
8"-10" Columns, 3" Bracing	S-10477	Bolt HHCS 1-1/4-7 x 5-1/2 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325
Large Towers: 16' - 20' Footprint				
4" Columns, 3" Bracing	S-10463	Bolt HHCS 1-8 x 5 GV A325	S-10488	Nut, Hex 1-8 GV A563
6" Columns, 3-1/2" Bracing	S-10477	Bolt HHCS 1-1/4-7 x 5-1/2 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325
8" Columns, 4" Bracing	S-10479	Bolt HHCS 1-1/4-7 x 6-1/2 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325
10" Columns, 4" Bracing	S-10479	Bolt HHCS 1-1/4-7 x 6-1/2 GV A325	S-10490	Nut, Hex 1-1/4-7 GV A325

4 2-Leg Towers

Topics Covered in this Chapter

- 2-Leg Tower Layout
- Assembling the 2-Leg Tower Section (Chevron Bracing)
- Assembling the 2-Leg Tower Section (Warren Bracing)
- Stacking the 2-Leg Tower Section

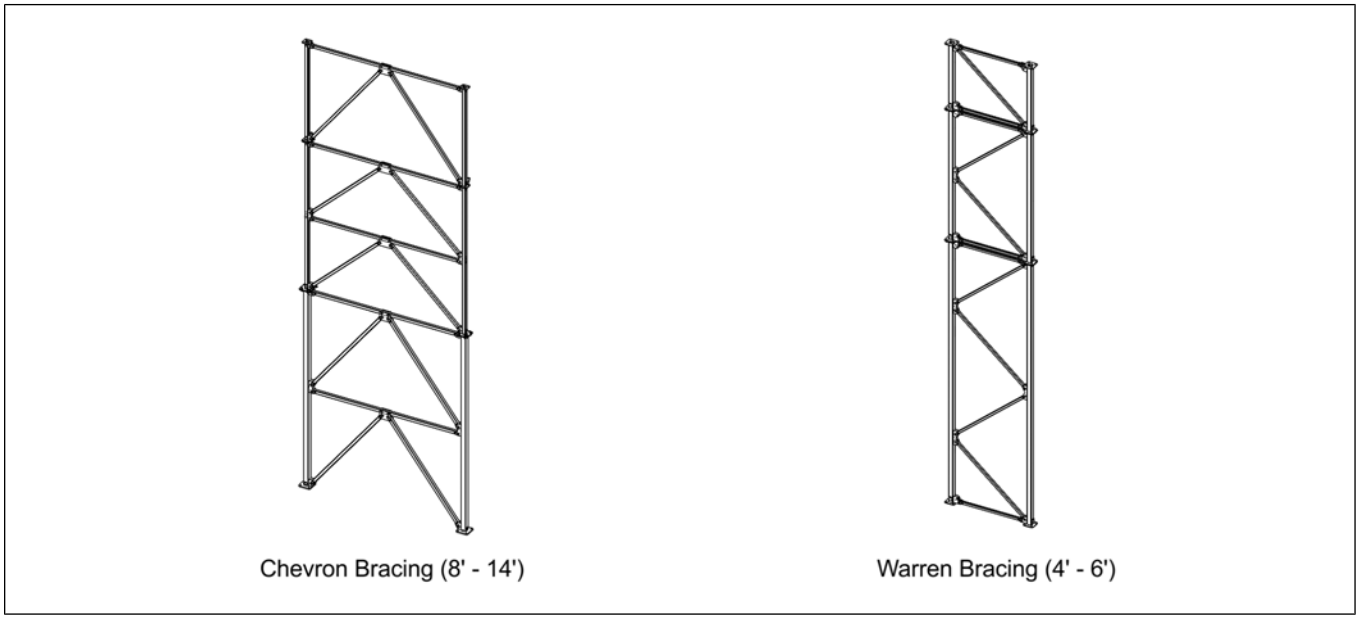
2-Leg Tower Layout

Two different bracing styles are used in the 2-leg tower assemblies, dependent on the foot print. Each tower may consist of various section heights to achieve the required overall height.

NOTE:

- ***For 4 ft to 6 ft towers, use warren bracing style.***
- ***For 8 ft and larger towers, use chevron bracing style.***

Figure 4-1 *2-leg tower layout*



Assembling the 2-Leg Tower Section (Chevron Bracing)

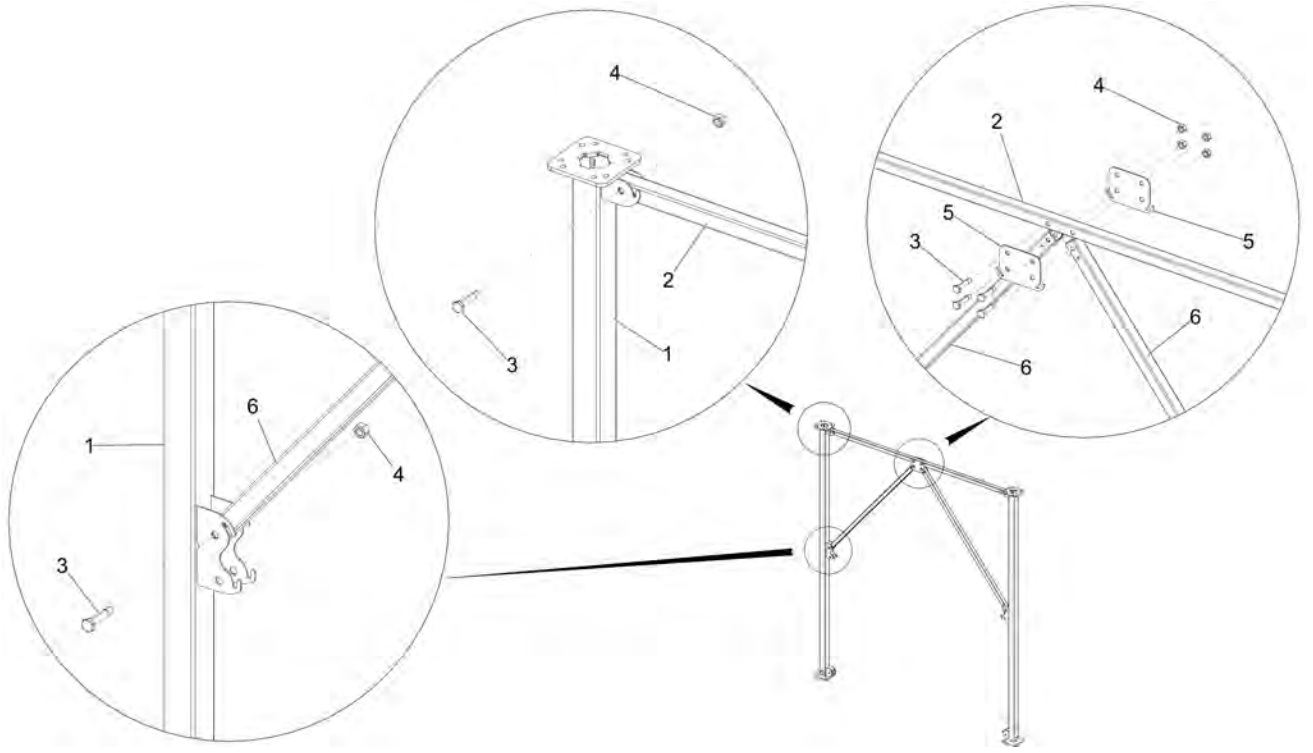
The following assembly procedure can be used for any section with 2-bays of chevron bracing. A similar procedure can be used for assembling the different sizes of chevron braced 2-leg tower sections.

What You Should Know

Assemble the braces starting from the top working towards the bottom. Square the tower section and tighten all hardware before stacking.

1. Insert the strut (2) between the shear plates located at the top of the columns (1) and connect them using bolts (3) and nuts (4).
2. Assemble the two gusset plates (5) to the strut (2) using bolts (3) and nuts (4).
3. Assemble the two diagonal braces (6), aligning the top of each brace to the gusset plates (5) and the bottoms to each column (1) using bolts (3) and nuts (4).

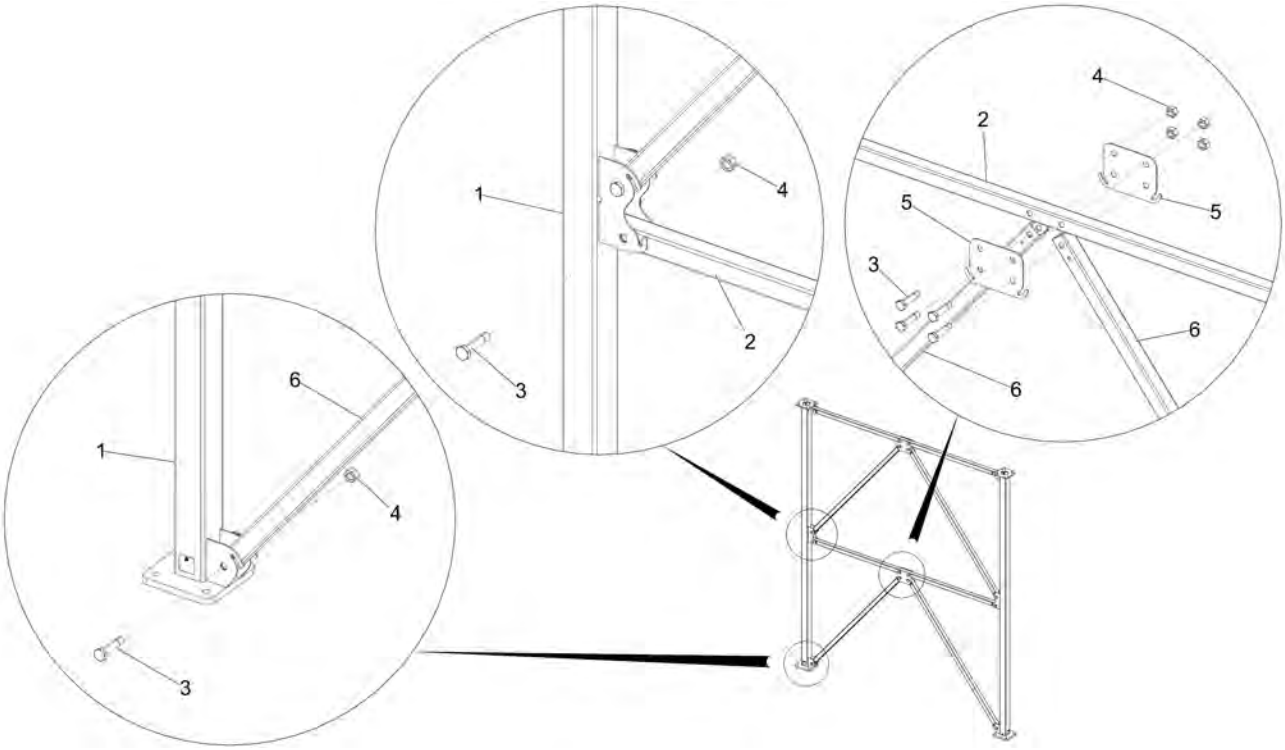
Figure 4-2 *Chevron bracing – top*



1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

4. Repeat the previous steps to assemble the remaining strut (2), gusset plates (5) and diagonal braces (6) to complete the 2-leg tower section.

Figure 4-3 *Chevron bracing – middle*



1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

5. If the section has only 1-bay (10 ft or shorter), ignore the above step (step-4) for assembly.

Assembling the 2-Leg Tower Section (Warren Bracing)

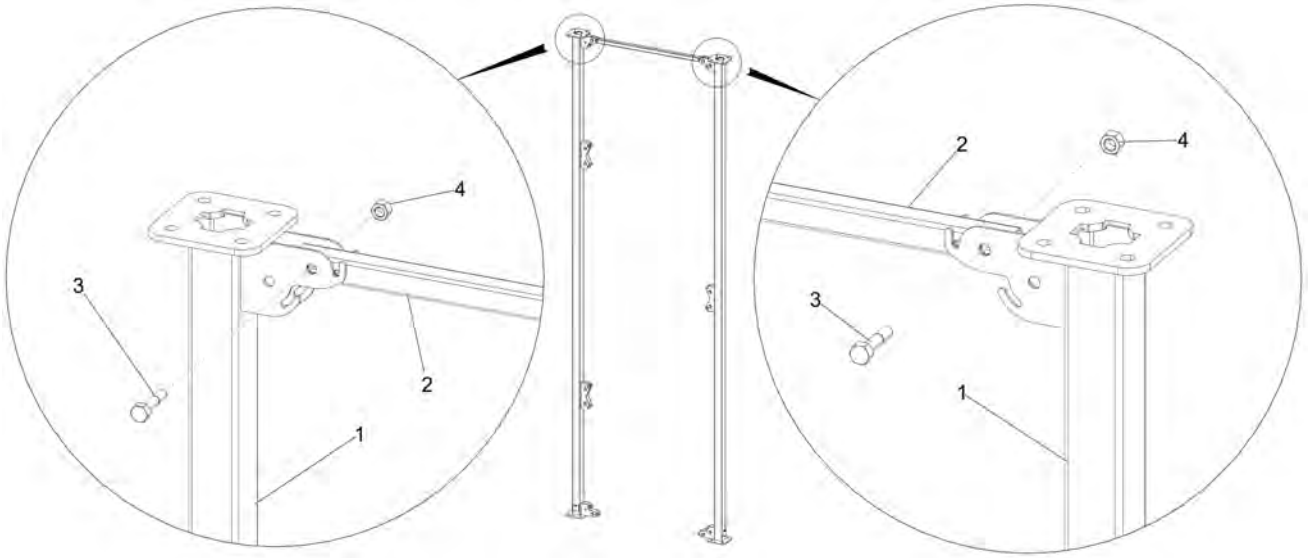
The following assembly procedure can be used for any section with 4-bays of warren bracing. A similar procedure can be used for assembling the different sizes of warren braced 2-leg tower sections.

What You Should Know

Assemble the braces starting from the top working towards the bottom. Square the tower section and tighten all hardware before stacking.

1. Insert the strut (2) between the shear plates located at the top of the columns (1) and connect them using bolts (3) and nuts (4).

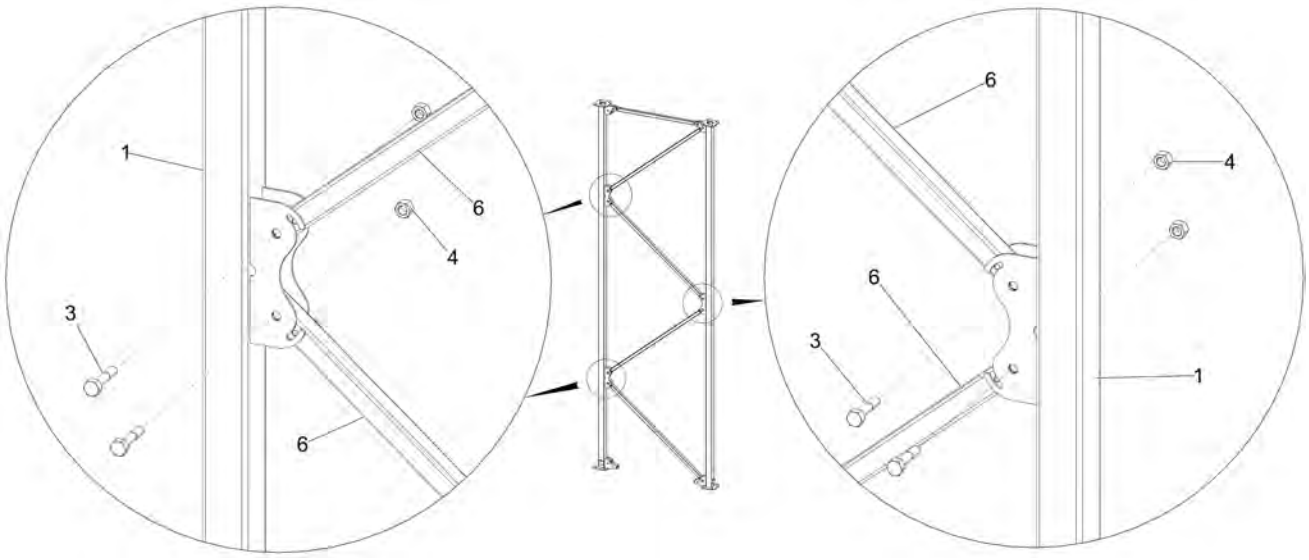
Figure 4-4 *Assembling the top strut*



1	Weld Column	3	Bolt
2	Strut	4	Nut

2. Assemble the diagonal braces (6) to the shear plates, starting at the top between the columns (1) using bolts (3) and nuts (4).

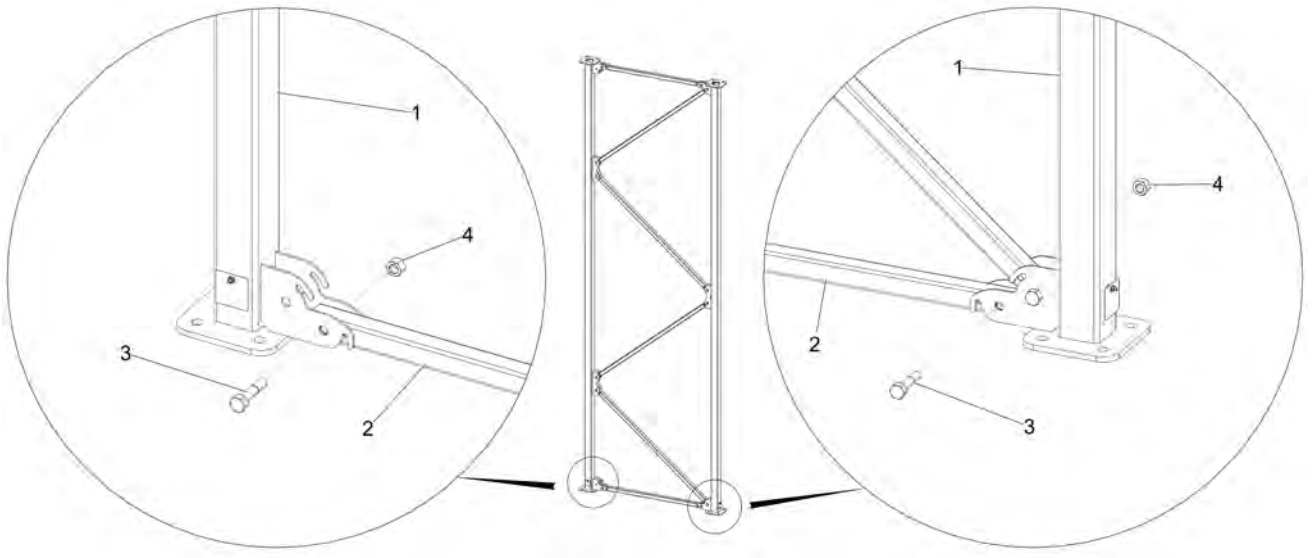
Figure 4-5 *Assembling diagonal braces*



1	Weld Column	4	Nut
2	Strut	6	Diagonal Tube
3	Bolt		

3. Insert the bottom strut (2) into the shear plates located at the bottom of the columns (1) and connect them using bolts (3) and nuts (4) to complete the 2-leg tower section.

Figure 4-6 *Assembling the bottom strut*



1	Weld Column	3	Bolt
2	Strut	4	Nut

Stacking the 2-Leg Tower Section

The following is the general procedure for stacking sections of a 2-leg tower.

Before You Begin
Assemble all the required 2-leg tower sections on the ground. Square each section and tighten all hardware before stacking.

DANGER

Follow all safety procedures when hoisting equipment. Wear hard hats and make sure everyone is clear of the working area.

1. Hoist the first 2-leg section (A) and place them on the foundation anchors.

   NOTE: *After the section has been anchored to the foundation, tighten all the splice hardware.*

2. Hoist the next 2-leg section (B) onto the previous 2-leg section (A) and install using bolts (9), washers (10) and nuts (11).

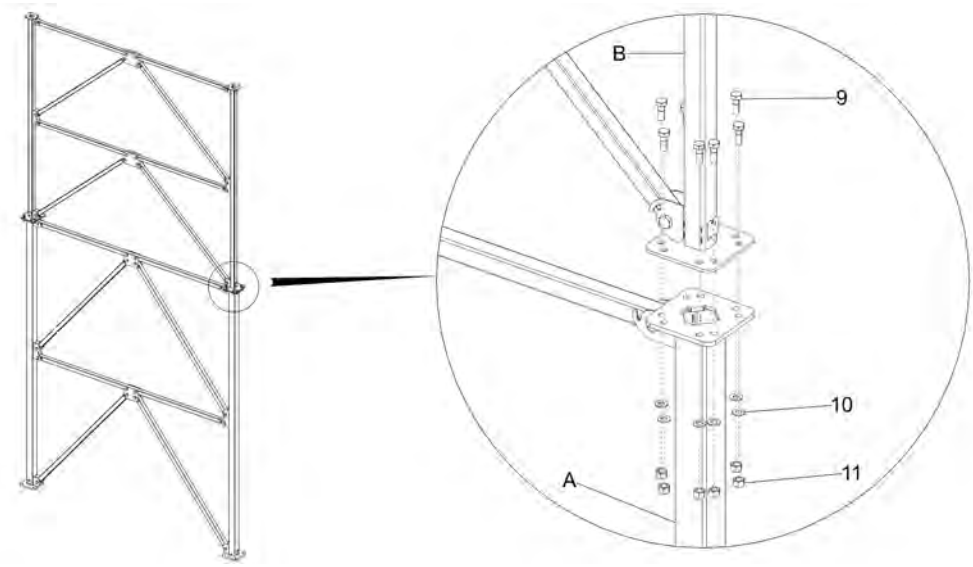
   NOTE: *After the section has been stacked to the previous section, tighten all the splice hardware.*

3. Repeat the previous step to continue installing the remaining 2-leg tower sections until the correct tower height is reached.

4. If required, attach sealing plates or top tower beams at the top corners of the last 2-leg section, tighten all the splice hardware. See *Seal Plate Kit, page 17* for sealing plates or *Top Tower Beams, page 18* for top tower beams.

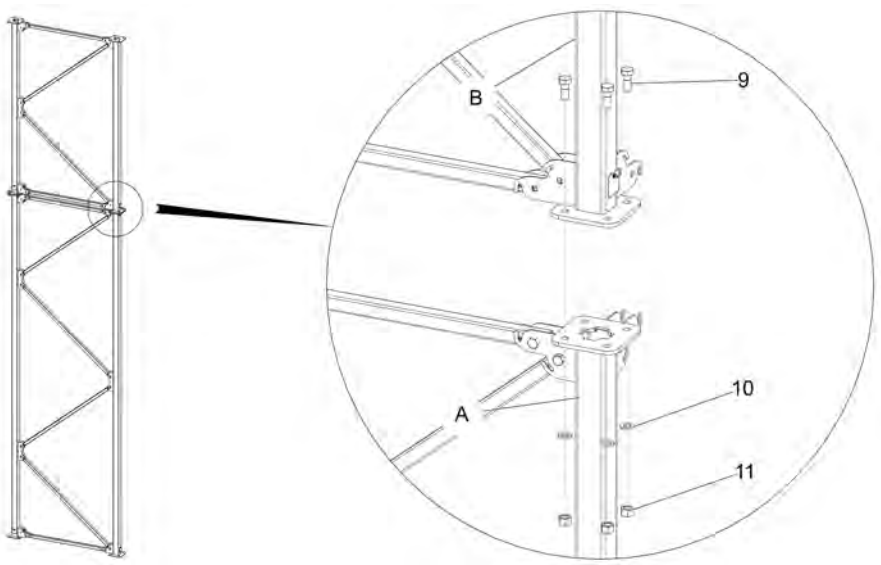
   NOTE: *Sealing the top is job dependent and not supplied in the shipping bundle.*

Figure 4-7 *Stacking the 2-leg tower sections (Chevron Bracing)*



A	First 2-leg Section	10	Washer
B	Second 2-leg Section	11	Nut
9	Bolt		

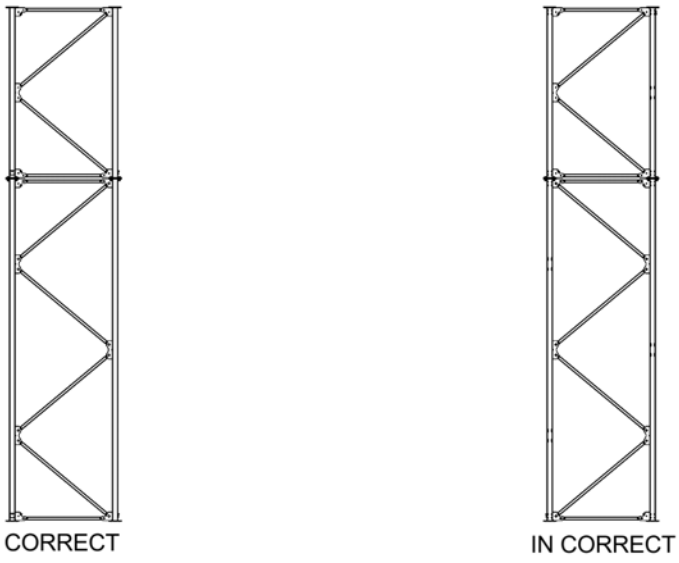
Figure 4-8 *Stacking the 2-leg tower sections (Warren Bracing)*



A	First 2-leg Section	10	Washer
B	Second 2-leg Section	11	Nut
9	Bolt		

IMPORTANT: *When stacking the 2-leg warren braced tower, it is critical that the sections should be stacked so that the bracing appears continuous. It means that the diagonal should always connect where another diagonal comes in right above or below.*

Figure 4-9 *Correct stacking of the 2-leg tower sections (Warren Bracing)*



5 4-Leg Towers

Topics Covered in this Chapter

- 4-Leg Tower Layout
- Assembling the 4-Leg Tower Section (Chevron Bracing)
- Assembling the 4-Leg Tower Section (Warren Bracing)
- Assembling the 4-Leg Tower Section (Chevron and Warren Bracing)
- Stacking the 4-Leg Tower Section

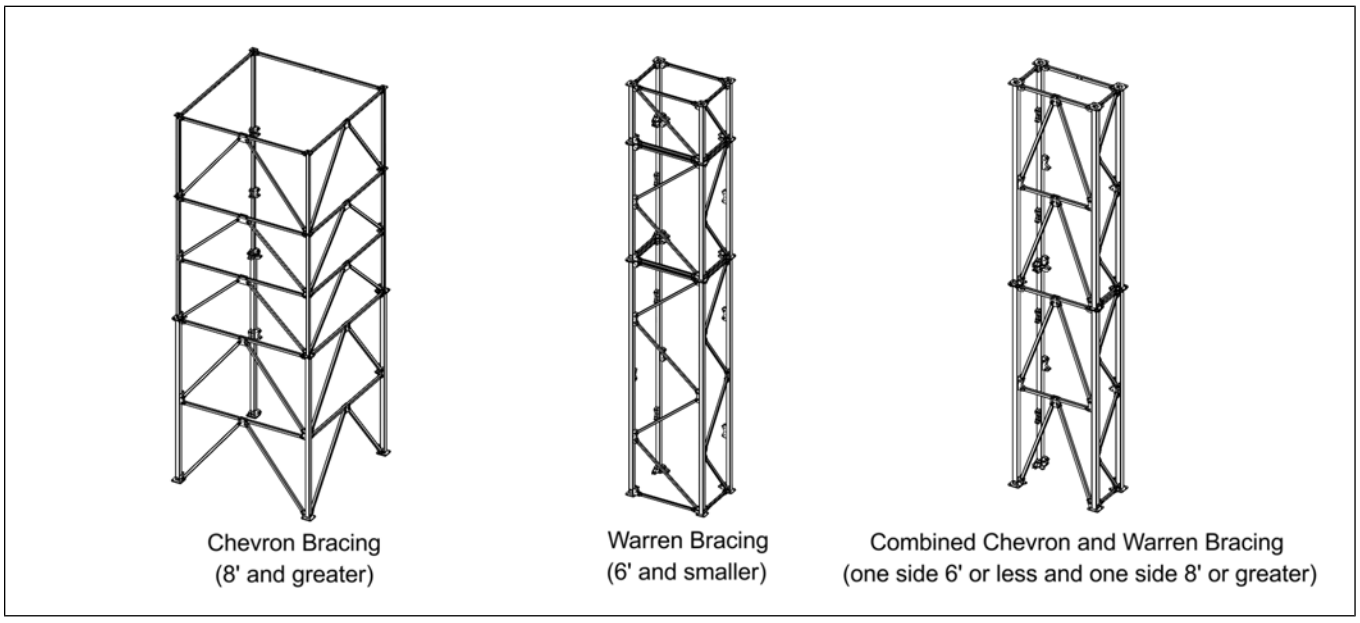
4-Leg Tower Layout

Three different bracing styles are used in 4-leg tower assemblies, dependent on the foot print. Each tower may consist of various section heights to achieve the required overall height.

NOTE:

- ***If all sides of the tower are 8 ft or greater, chevron bracing style will be used.***
- ***If all sides of the tower are 6 ft or smaller, warren bracing style will be used.***
- ***If one side is 6 ft or smaller and the other side is 8 ft or greater, then a combination of warren and chevron bracing style will be used.***

Figure 5-1 *4-leg tower layouts*



Assembling the 4-Leg Tower Section (Chevron Bracing)

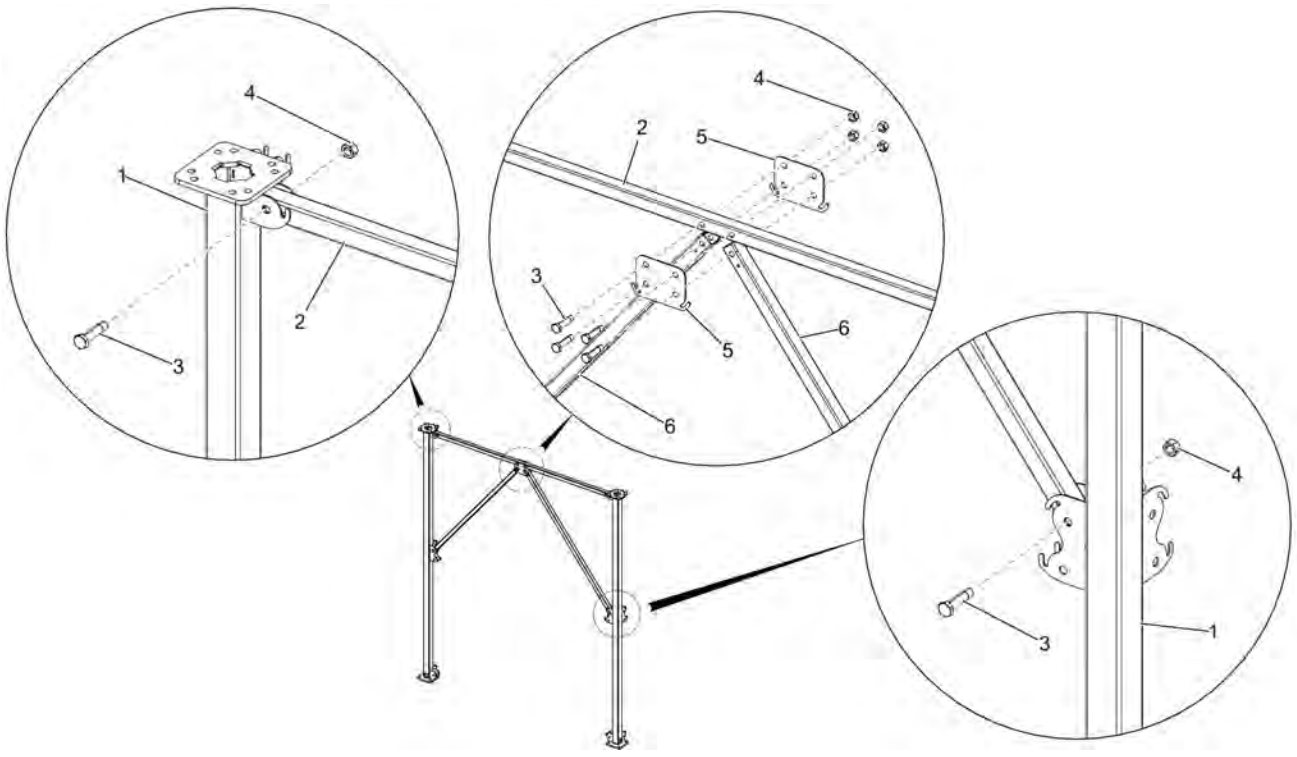
The following assembly procedure can be used for any section with 2-bays of chevron bracing. A similar procedure can be used for assembling the different sizes of chevron braced 4-leg tower sections.

What You Should Know

You will assemble two completed sides (front and rear) and connect them together to complete the 4-leg section. Assemble the braces starting from the top working towards the bottom. Square the tower section and tighten all hardware before stacking.

1. Insert the strut (2) between the shear plates located at the top of the columns (1) and connect them using bolts (3) and nuts (4).
2. Assemble the two gusset plates (5) to the strut (2) using bolts (3) and nuts (4).
3. Assemble the two diagonal braces (6), aligning the top of each brace to the gusset plates (5) and the bottom to each column (1) using bolts (3) and nuts (4).

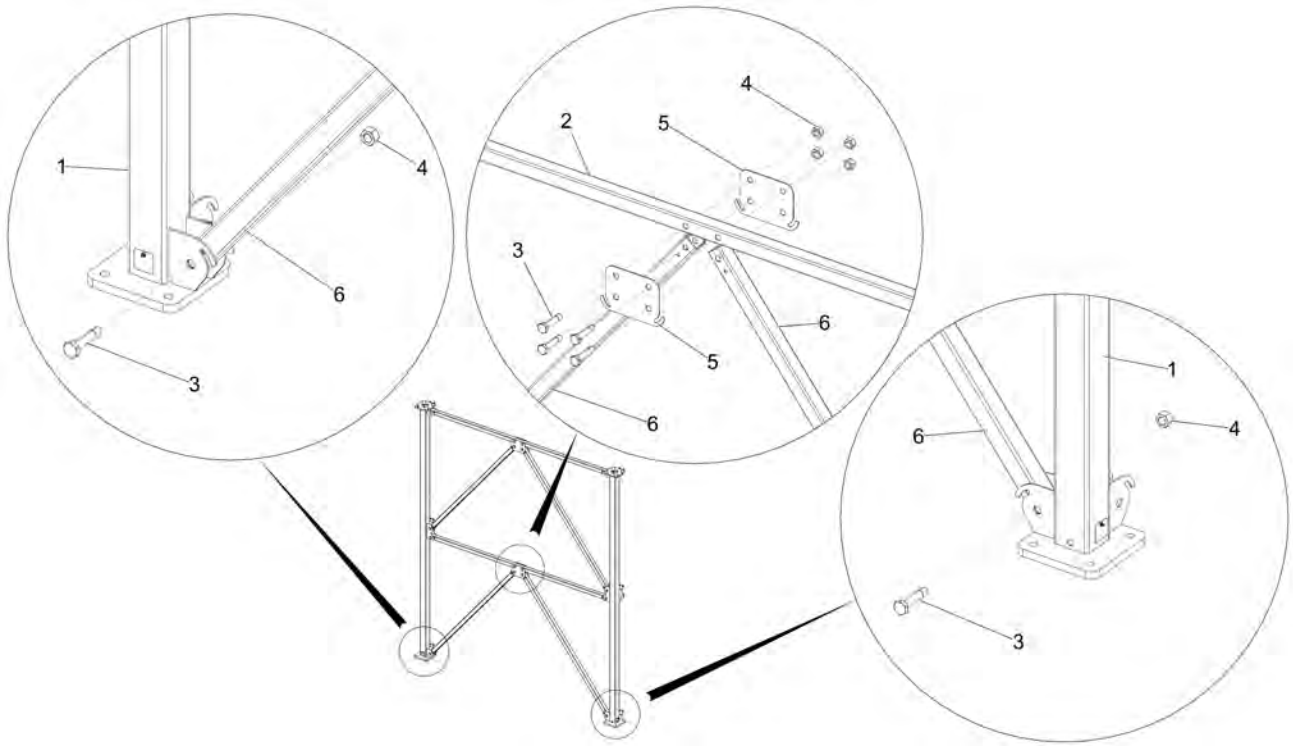
Figure 5-2 *Chevron bracing – top strut*



1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

4. Repeat the previous steps to assemble the remaining strut (2), gusset plates (5) and diagonal braces (6) to complete the front side of the 4-leg tower section.

Figure 5-3 *Chevron bracing – diagonal braces*

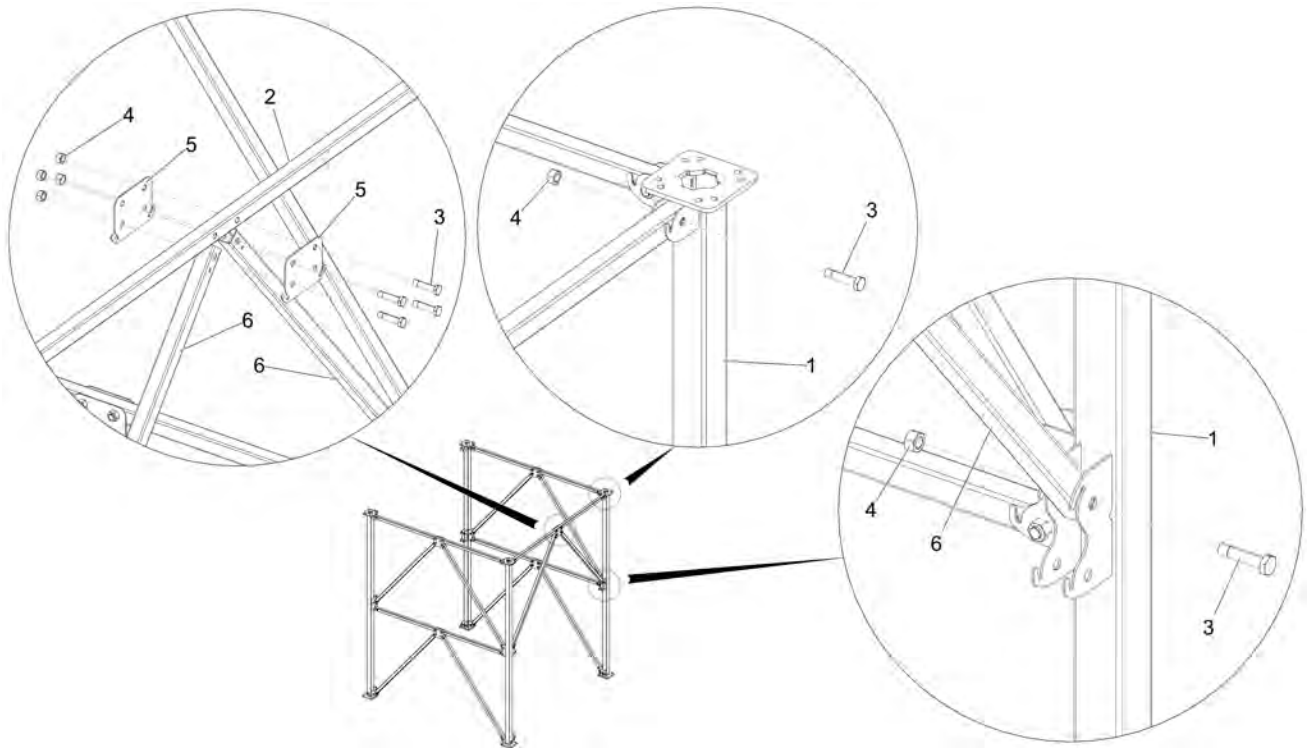


1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

5. If the section has only 1-bay (10 ft or shorter), ignore the above step (step-4) for assembly.
6. Repeat the previous steps to assemble the rear side of the 4-leg tower section.

7. Connect the front and rear sides together by inserting the strut (2) between the shear plates located at the top of the columns (1) and connecting them using bolts (3) and nuts (4).
8. Assemble the two gusset plates (5) to the strut (2) using bolts (3) and nuts (4).
9. Assemble the two diagonal braces (6), aligning the top of each brace to the gusset plates (5) and the bottoms to each column (1) using bolts (3) and nuts (4).

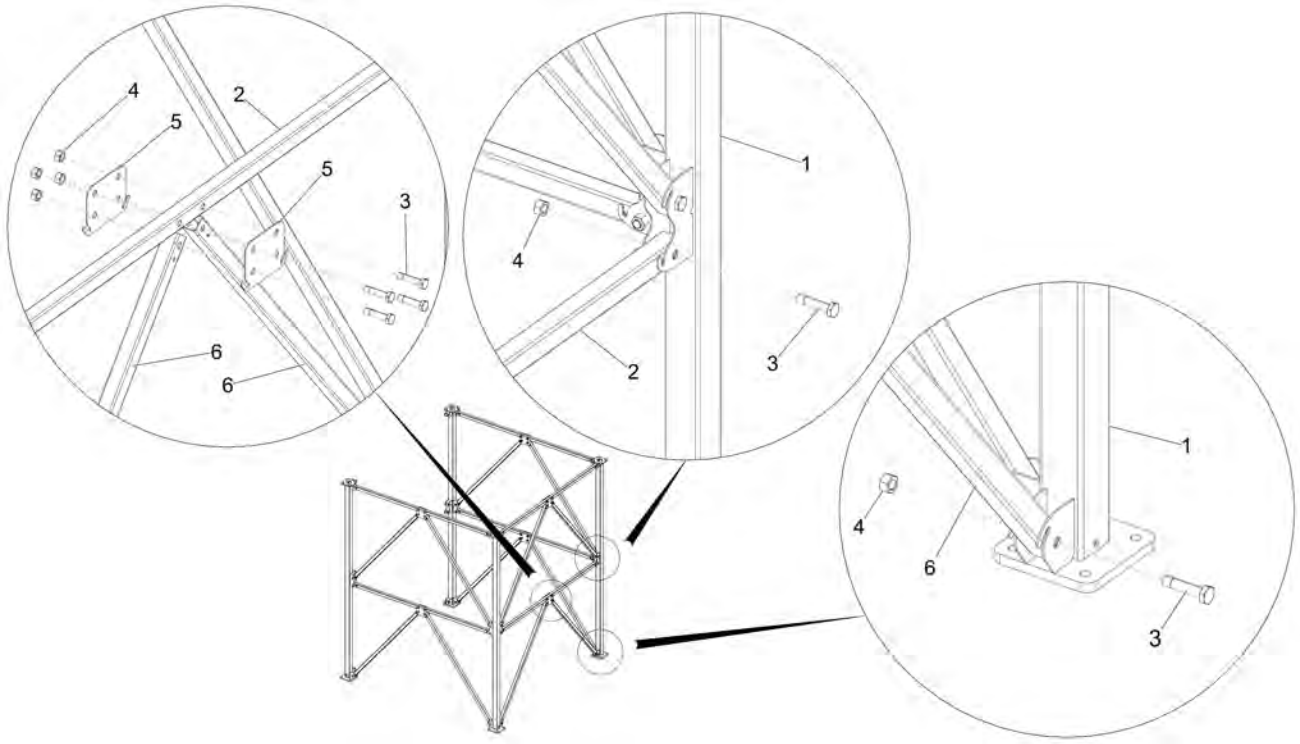
Figure 5-4 *Chevron bracing – top side connections*



1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

10. Repeat the previous steps to assemble the remaining strut (2), gusset plates (5) and diagonal braces (6) to complete the 4-leg tower section.

Figure 5-5 *Chevron bracing – middle side connections*



1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

11. If the section has only 1-bay (10 ft or shorter), ignore the above step (step-10) for assembly.

Assembling the 4-Leg Tower Section (Warren Bracing)

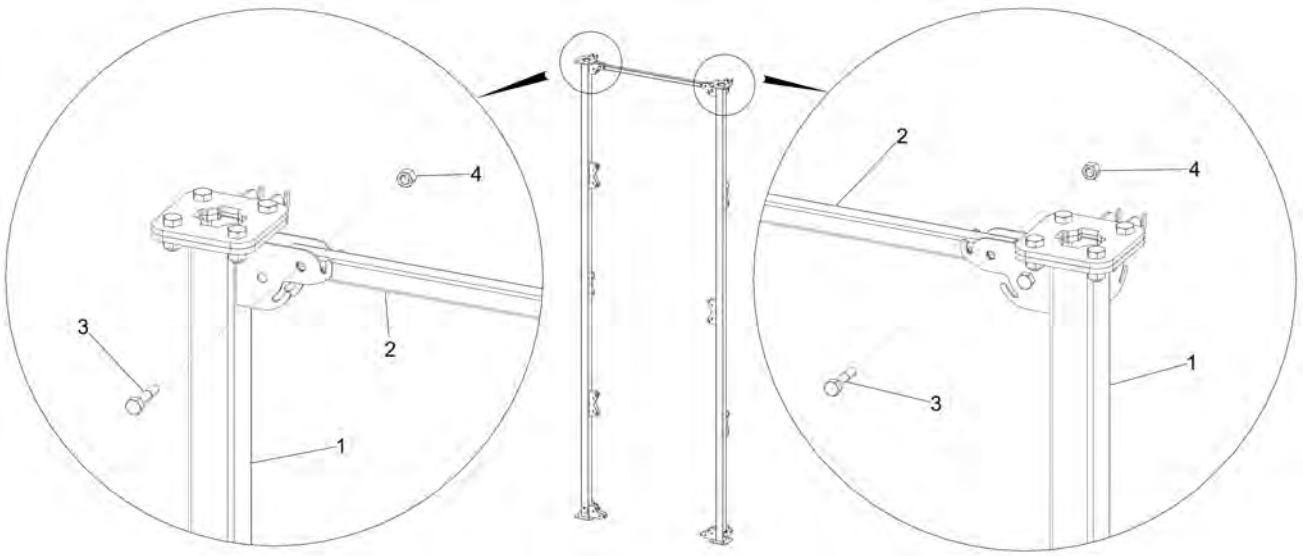
The following assembly procedure can be used for any section with warren bracing that may have one, two or four-bays. A similar procedure can be used for assembling the different sizes of warren braced 4-leg tower sections.

What You Should Know

You will assemble two completed sides (front and rear) and connect them together to complete the 4-leg section. Assemble the braces starting from the top working towards the bottom. Square the tower section and tighten all hardware before stacking.

1. Insert the strut (2) between the shear plates located at the top of the columns (1) and connect them using bolts (3) and nuts (4).

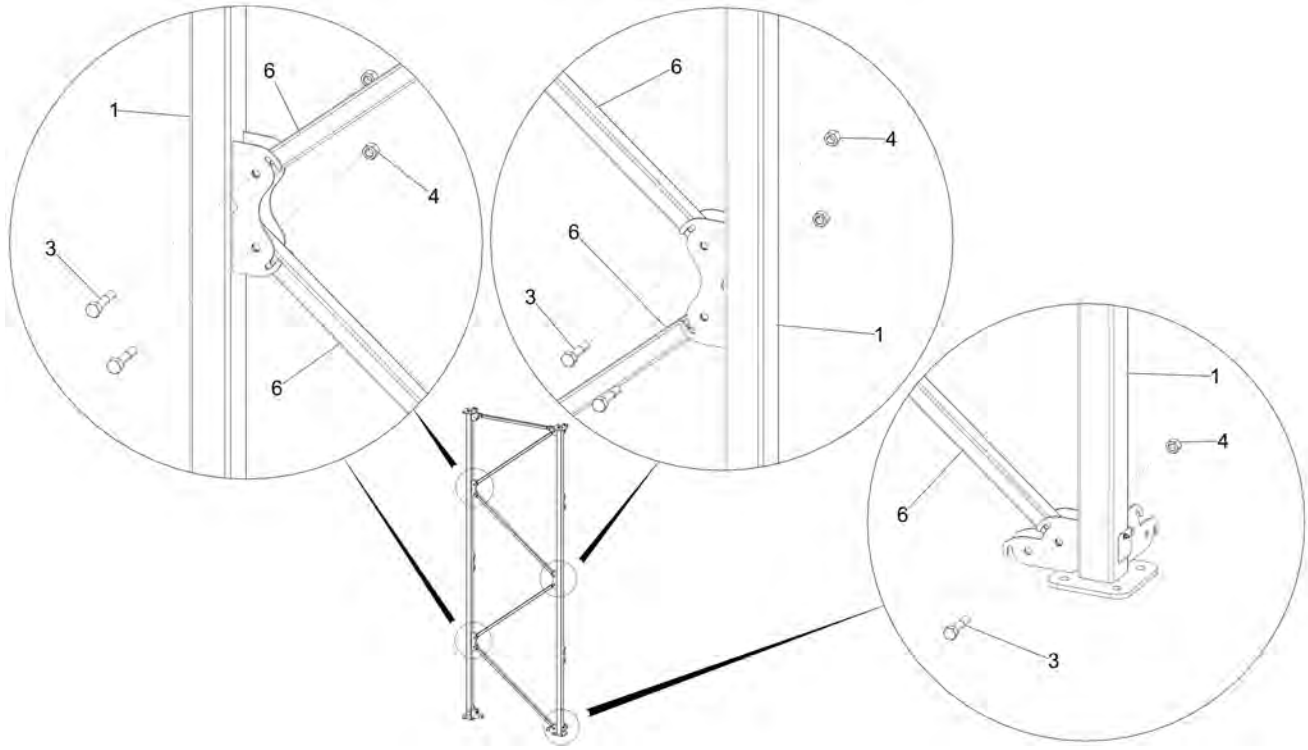
Figure 5-6 *Assembling the top strut*



1	Weld Column	3	Bolt
2	Strut	4	Nut

2. Assemble the diagonal braces (6), starting at the top between the columns (1) using bolts (3) and nuts (4).

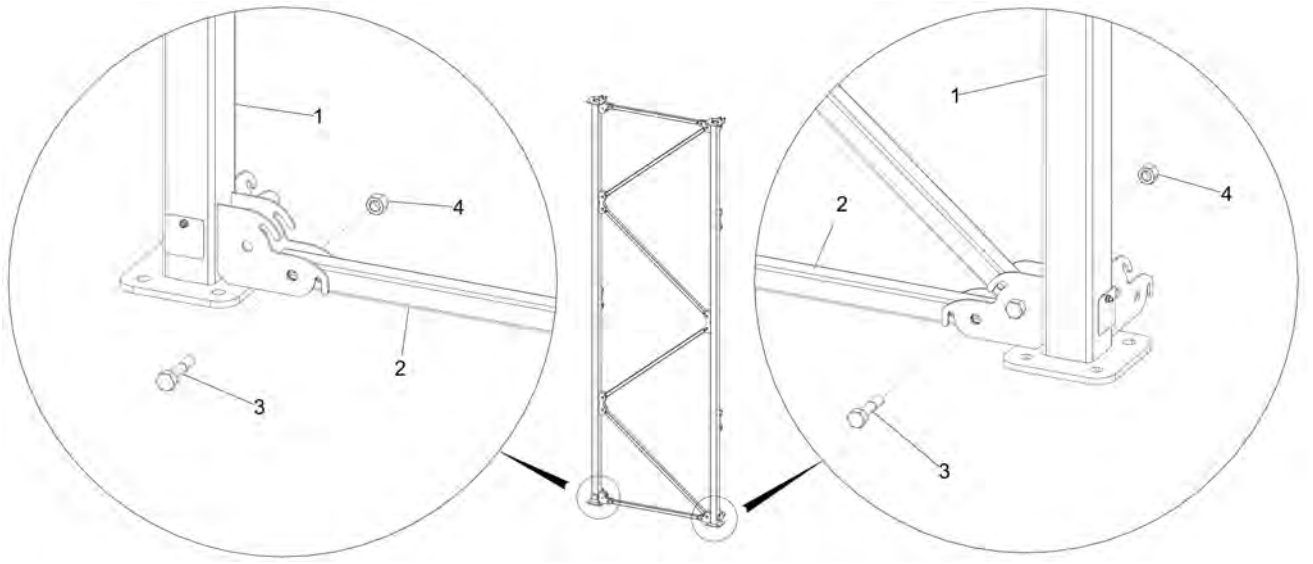
Figure 5-7 *Assembling diagonal braces*



1	Weld Column	4	Nut
2	Strut	6	Diagonal Tube
3	Bolt		

3. Insert the bottom strut (2) into the shear plates located at the bottom of the columns (1) and connect them using bolts (3) and nuts (4) to complete the front side of 4-leg tower section.

Figure 5-8 *Assembling the bottom strut*



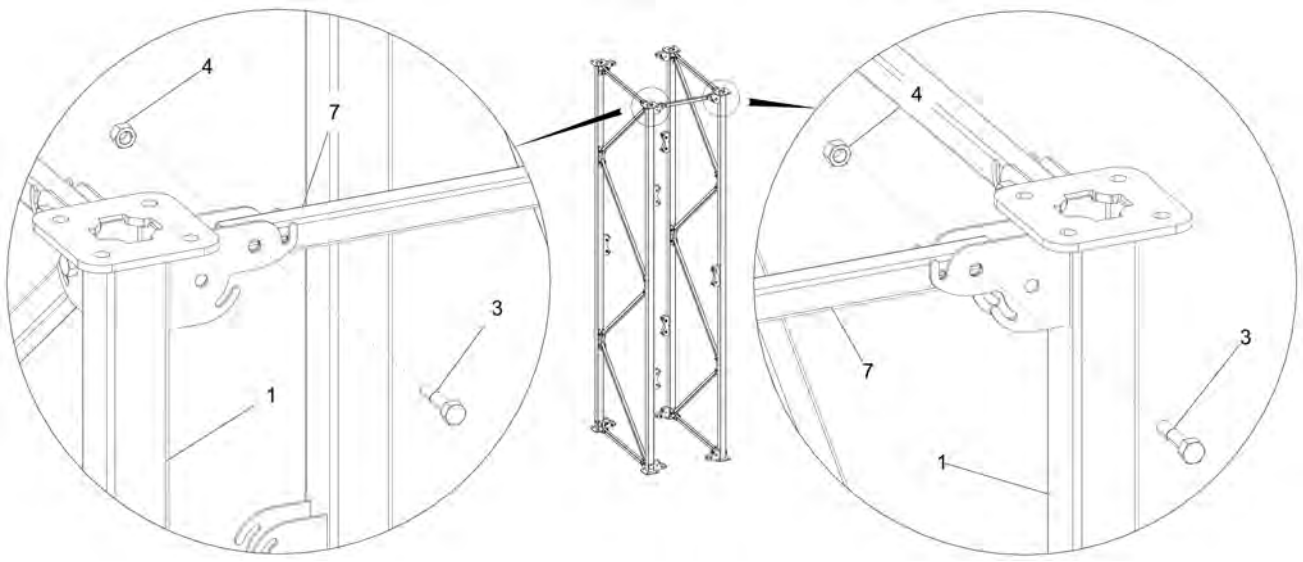
1	Weld Column	3	Bolt
2	Strut	4	Nut

4. Repeat the previous steps to assemble the rear side of 4-leg tower section.

5. Connect the front and rear side sections by inserting the strut (2) between the shear plates located at the top of the columns (1) and connecting them using bolts (3) and nuts (4).

   NOTE: *Make sure the shear plates on the front and rear side sections are facing each other and the diagonal bracing are running in opposite directions.*

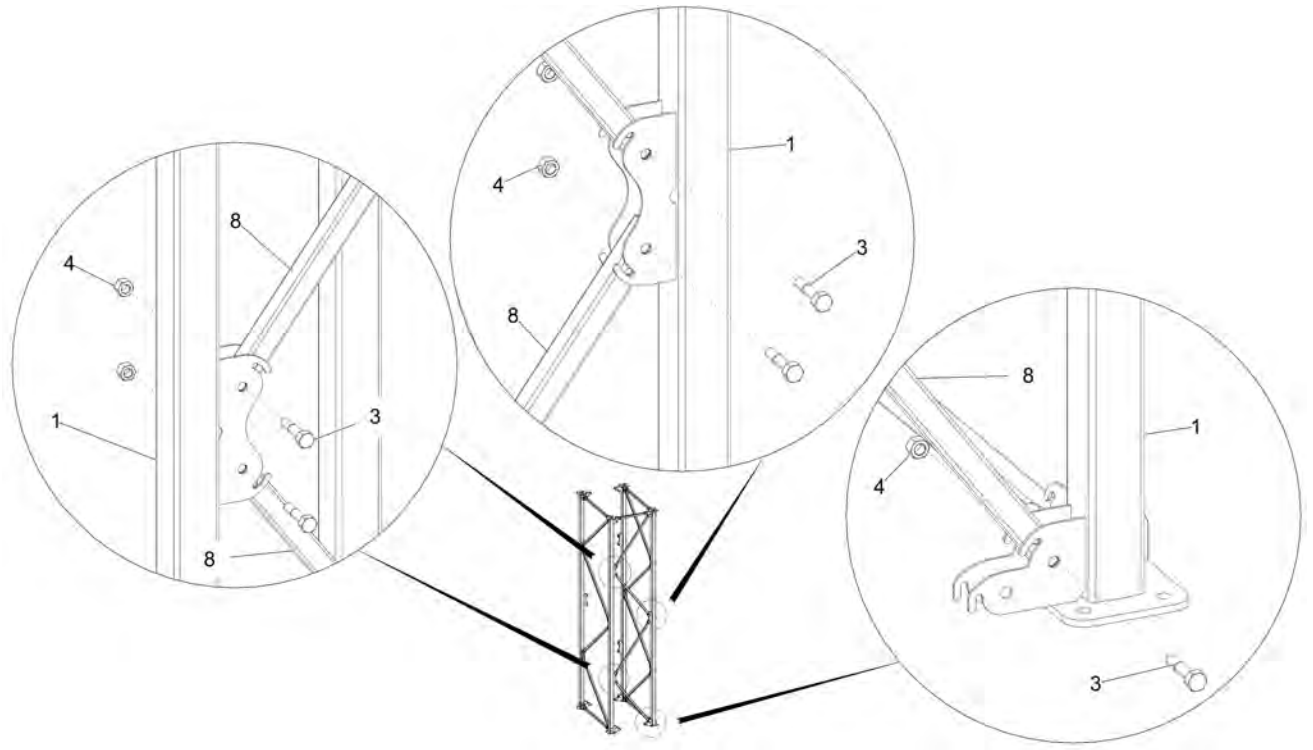
Figure 5-9 *Warren bracing – top side strut*



1	Weld Column	4	Nut
3	Bolt	7	Strut

6. Assemble the diagonal braces (8), starting at the top between the side columns (1) using bolts (3) and nuts (4).

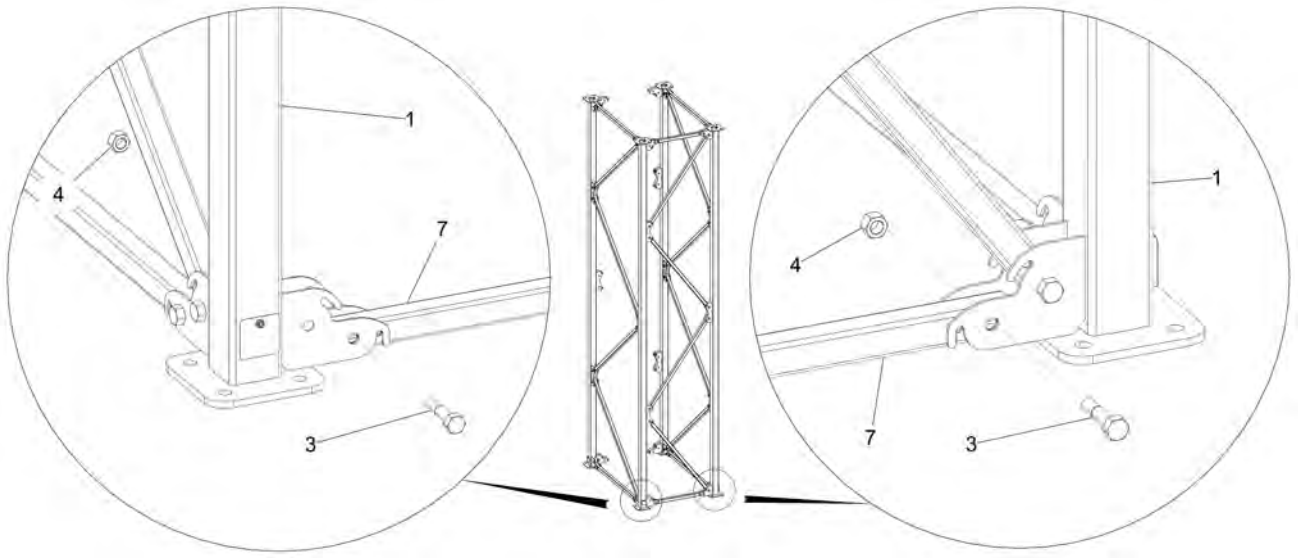
Figure 5-10 *Warren bracing – diagonal side bracing*



1	Weld Column	4	Nut
3	Bolt	8	Diagonal Tube

7. Insert the bottom strut (2) into the shear plates located at the bottom of the columns (1) and connect them using bolts (3) and nuts (4) to complete the third side of the 4-leg tower section.

Figure 5-11 *Assembling the strut at the bottom between front and rear sides*



1	Weld Column	4	Nut
3	Bolt	7	Struct

8. Repeat the previous steps for assembling the last side to complete the 4-leg tower section.

   NOTE: *Make sure to assemble the diagonal braces in the last side at the opposite direction to the third side.*

Assembling the 4-Leg Tower Section (Chevron and Warren Bracing)

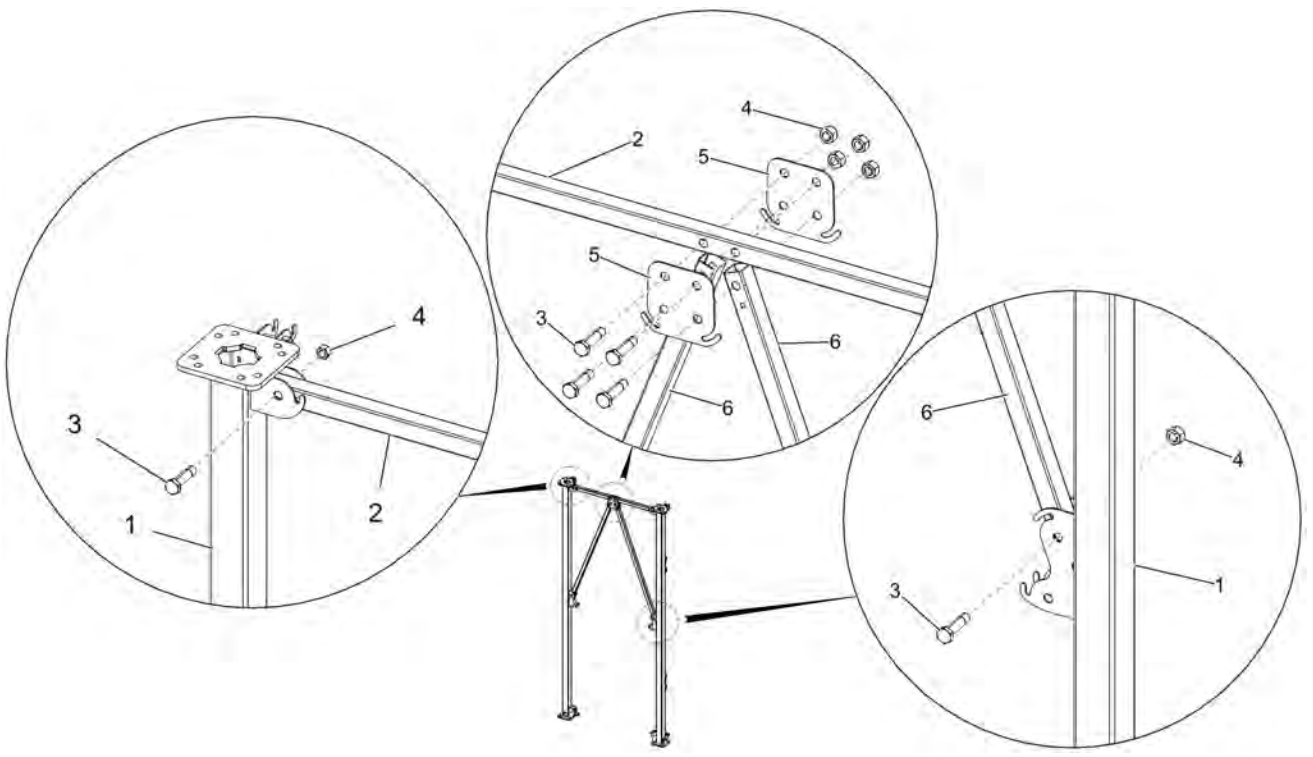
The following assembly procedure can be used for any section with two-bays of chevron and four-bays of warren bracing. A similar procedure can be used for assembling the different sizes of chevron and warren bracing 4-leg tower sections.

What You Should Know

You will assemble two completed sides (front and rear) and connect them together to complete the 4-leg section. Assemble the braces starting from the top working towards the bottom. Square the tower section and tighten all hardware before stacking.

1. Insert the strut (2) between the shear plates located at the top of the columns (1) and connect them using bolts (3) and nuts (4).
2. Assemble the two gusset plates (5) to the strut (2) using bolts (3) and nuts (4).
3. Assemble the two diagonal braces (6), aligning the top of each brace to the gusset plates (5) and the bottom to each column (1) using bolts (3) and nuts (4).

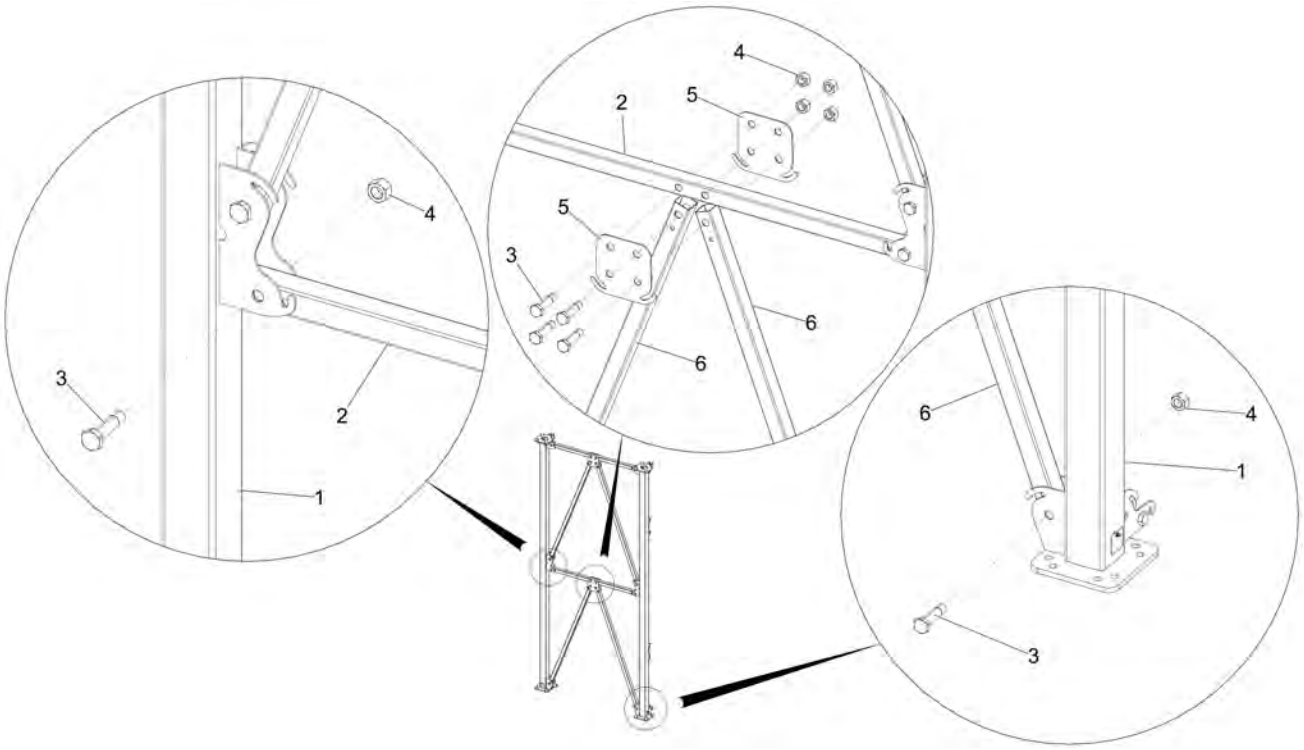
Figure 5-12 *Chevron bracing – top strut*



1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

4. Repeat the previous steps to assemble the remaining strut (2), gusset plates (5) and diagonal braces (6) to complete the front side of the 4-leg tower section.

Figure 5-13 *Chevron bracing – diagonal braces*

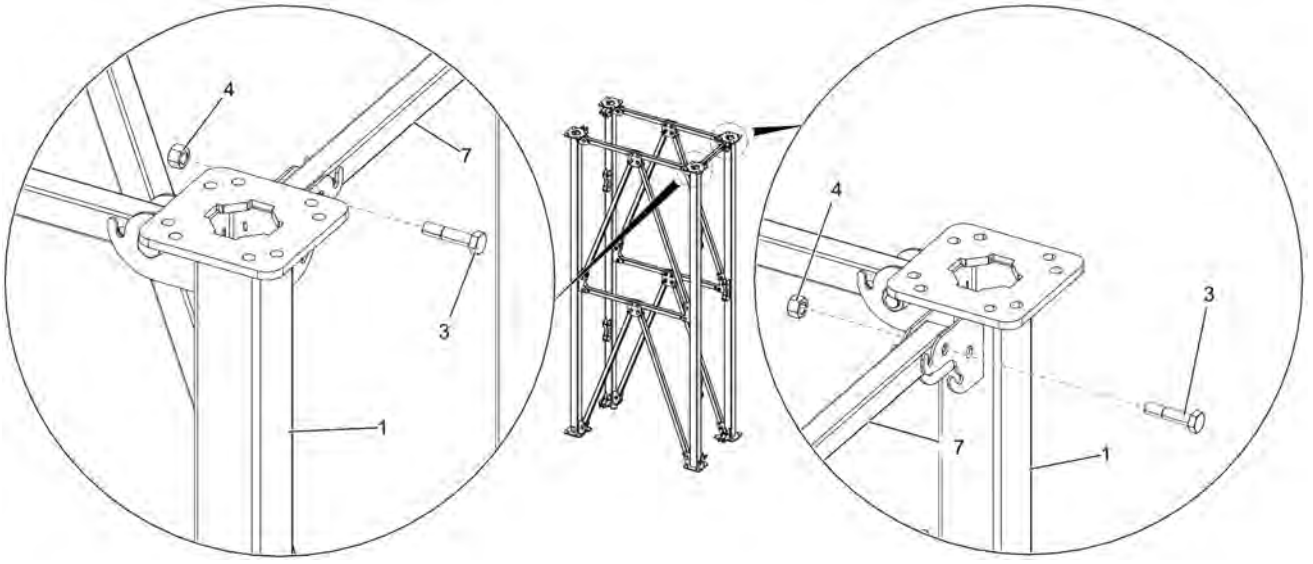


1	Weld Column	4	Nut
2	Strut	5	Gusset Plate
3	Bolt	6	Diagonal Tube

5. If the section has only 1-bay (10 ft or shorter), ignore the above step (step-4) for assembly.
6. Repeat the previous steps to assemble the rear side of the 4-leg tower section.

7. Connect the front and rear sides by inserting the strut (2) between the shear plates located at the top of the columns (1) and connecting them using bolts (3) and nuts (4).

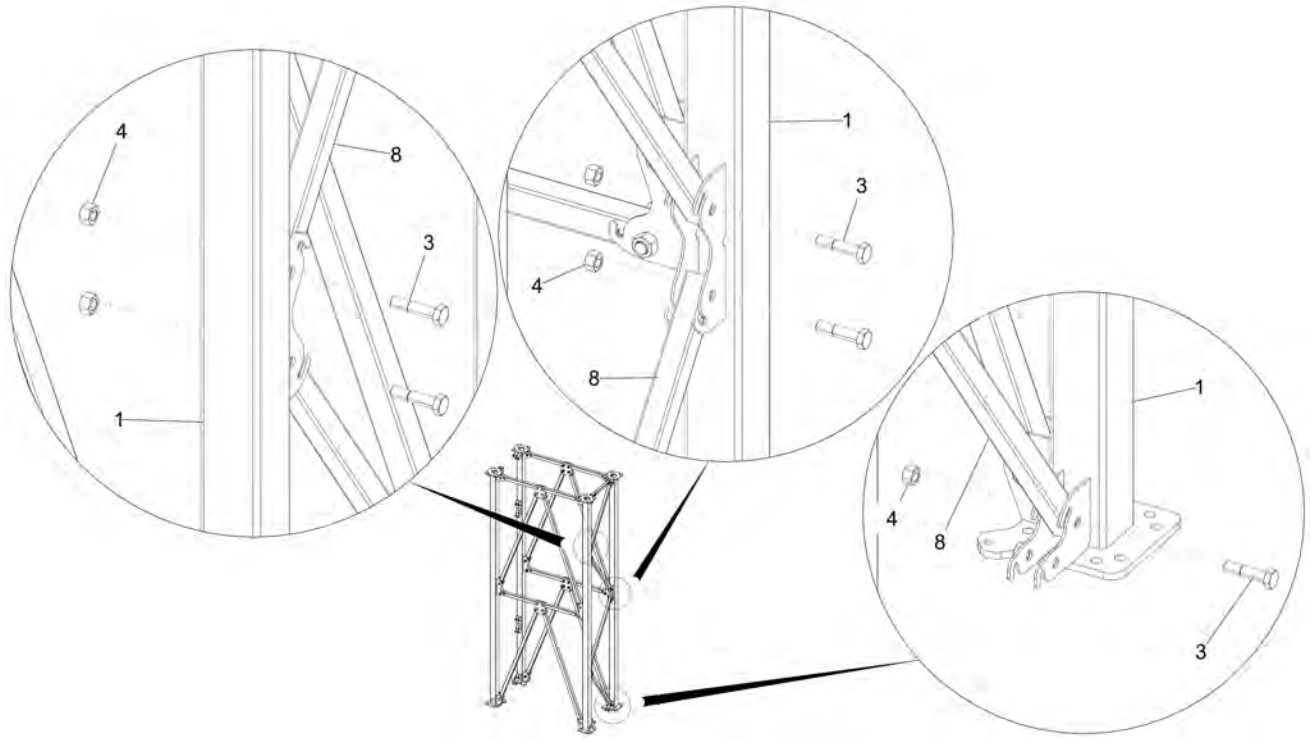
Figure 5-14 *Chevron- warren side strut*



1	Weld Column	4	Nut
3	Bolt	7	Strut

8. Assemble the diagonal braces (8), starting at the top between the two columns (1) using bolts (3) and nuts (4).

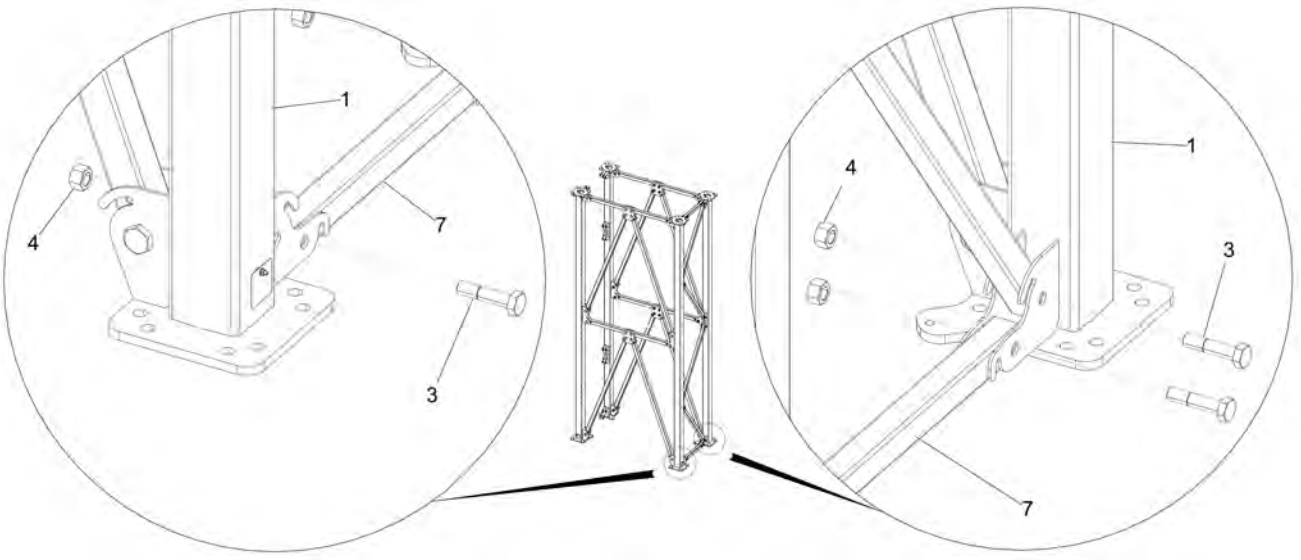
Figure 5-15 *Chevron- warren side diagonal braces*



1	Weld Column	4	Nut
3	Bolt	8	Diagonal Tube

9. Insert the bottom strut (2) into the shear plates located at the bottom of the columns (1) and connect them using bolts (3) and nuts (4) to complete the third side of 4-leg tower section.

Figure 5-16 *Assembling the bottom strut*



1	Weld Column	4	Nut
3	Bolt	7	Struct

10. Repeat the above steps for assembling the last side to complete the 4-leg tower section.

NOTE: *Make sure to assemble the diagonal braces in the last side at the opposite direction to the third side.*

Stacking the 4-Leg Tower Section

The following is a general procedure for stacking sections of a 4-leg tower.

Before You Begin
Assemble all the required 4-leg tower sections on the ground. Square each section and tighten all hardware before stacking.

DANGER

Follow all safety procedures when hoisting equipment. Wear hard hats and make sure everyone is clear of the working area.

1. Hoist the first 4-leg section (A) and place them on the foundation anchors.

   NOTE: *After the section has been anchored to the foundation, tighten all the splice hardware.*

2. Hoist the next 4-leg section (B) onto the previous 4-leg section (A) and install using bolts (9), washers (10) and nuts (11).

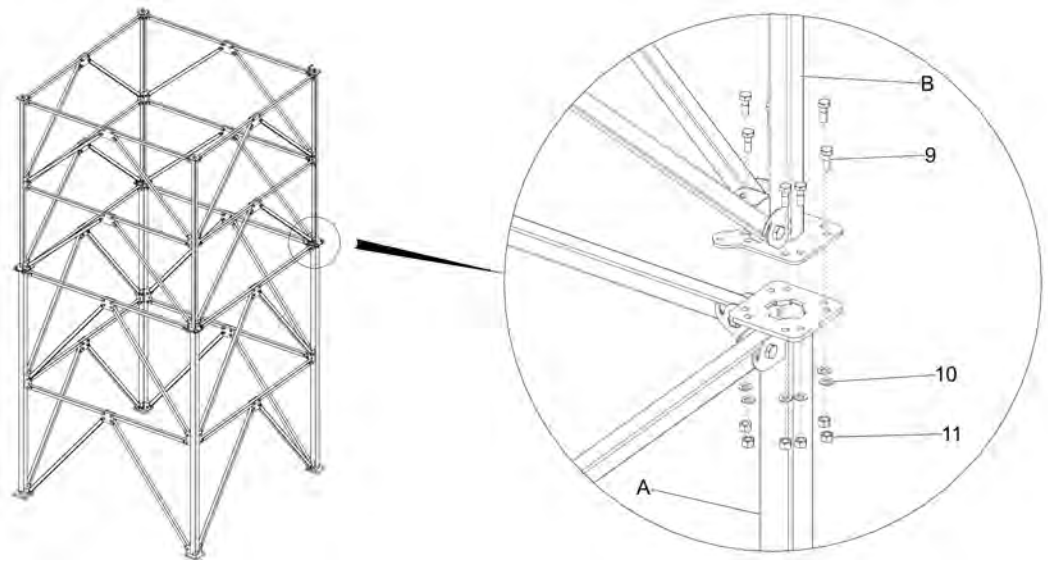
   NOTE: *After the section has been stacked to the previous section, tighten all the splice hardware.*

3. Repeat the previous step to continue installing the remaining 4–leg tower sections until the correct tower height is reached.

4. If required, attach sealing plates at the top corners of the last 4-leg section, tighten all the splice hardware. See *Seal Plate Kit, page 17* for sealing plates.

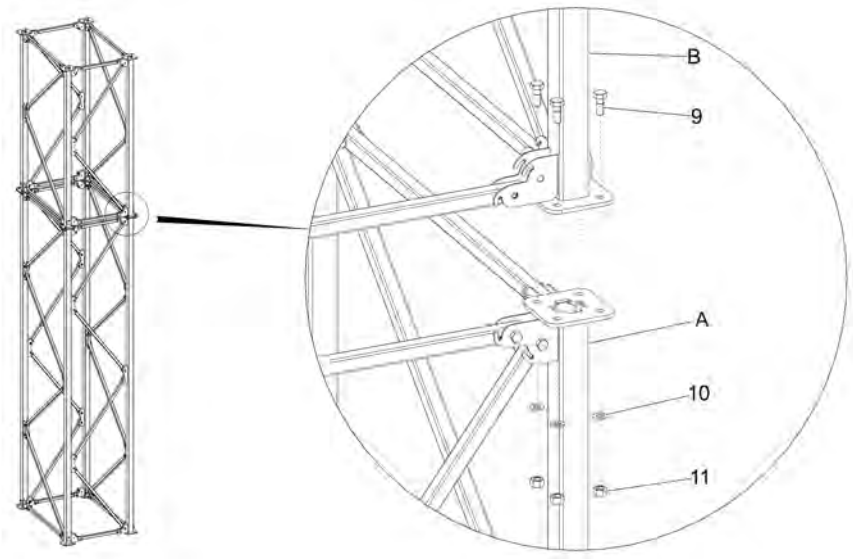
   NOTE: *Sealing the top is job dependent and not supplied in the shipping bundle.*

Figure 5-17 *Stacking the 4-leg (Chevron Bracing) tower sections*



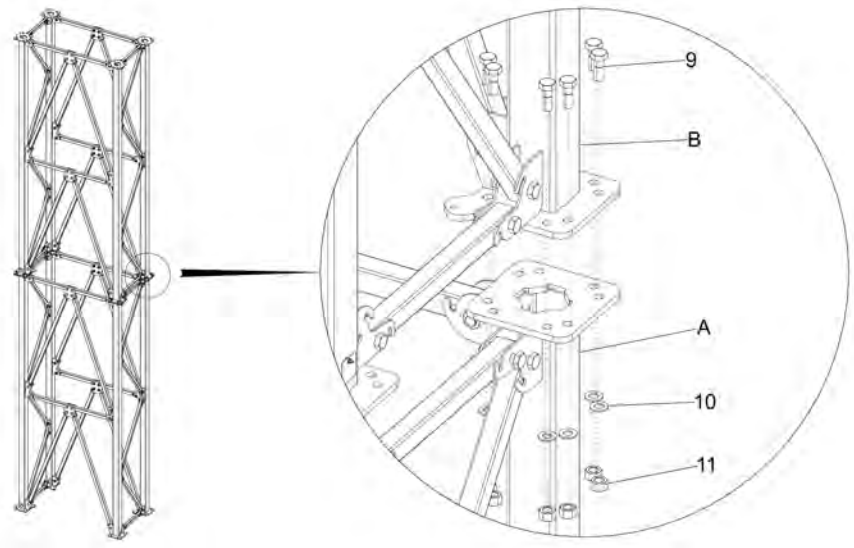
A	First 4-leg Section	10	Washer
B	Second 4-leg Section	11	Nut
9	Bolt		

Figure 5-18 *Stacking the 4-leg (Warren Bracing) tower sections*



A	First 4-leg Section	10	Washer
B	Second 4-leg Section	11	Nut
9	Bolt		

Figure 5-19 *Stacking the 4-leg (Chevron and Warren Bracing) tower sections*



A	First 4-leg Section	10	Washer
B	Second 4-leg Section	11	Nut
9	Bolt		

GSI Group, LLC Limited Warranty

The GSI Group, LLC ("GSI") warrants products which it manufactures to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months after sale to the original end-user or if a foreign sale, 14 months from arrival at port of discharge, whichever is earlier. The end-user's sole remedy (and GSI's only obligation) is to repair or replace, at GSI's option and expense, products that in GSI's judgment, contain a material defect in materials or workmanship. Expenses incurred by or on behalf of the end-user without prior written authorization from the GSI Warranty Group shall be the sole responsibility of the end-user.

Warranty Extensions: The Limited Warranty period is extended for the following products:

	Product	Warranty Period
AP Fans and Flooring	Performer Series Direct Drive Fan Motor	3 Years
	All Fiberglass Housings	Lifetime
	All Fiberglass Propellers	Lifetime
AP/Cumberland	Flex-Flo/Pan Feeding System Motors	2 Years
Cumberland Feeding/Watering Systems	Feeder System Pan Assemblies	5 Years **
	Feed Tubes (1-3/4" and 2.00")	10 Years *
	Centerless Augers	10 Years *
	Watering Nipples	10 Years *
Grain Systems	Grain Bin Structural Design	5 Years
Grain Systems Farm Fans Zimmerman	Portable and Tower Dryers	2 Years
	Portable and Tower Dryer Frames and Internal Infrastructure †	5 Years

* Warranty prorated from list price:
0 to 3 years - no cost to end-user
3 to 5 years - end-user pays 25%
5 to 7 years - end-user pays 50%
7 to 10 years - end-user pays 75%

** Warranty prorated from list price:
0 to 3 years - no cost to end-user
3 to 5 years - end-user pays 50%

† Motors, burner components and moving parts not included.
Portable dryer screens included.
Tower dryer screens not included.

GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12^{th}) month from the date of purchase and continuing until the sixtieth (60^{th}) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation, and/or shipping costs incurred in the performance of this extended warranty.

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH ABOVE. SPECIFICALLY, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) PRODUCT MANUFACTURED OR SOLD BY GSI OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI shall not be liable for any direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. The sole and exclusive remedy is set forth in the Limited Warranty, which shall not exceed the amount paid for the product purchased. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor.

GSI assumes no responsibility for claims resulting from construction defects or unauthorized modifications to products which it manufactured. Modifications to products not specifically delineated in the manual accompanying the equipment at initial sale will void the Limited Warranty.

This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained. This Limited Warranty extends solely to products manufactured by GSI.

Prior to installation, the end-user has the responsibility to comply with federal, state and local codes which apply to the location and installation of products manufactured or sold by GSI.

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This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

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