Micro Engineering Company

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ASSEMBLY INSTRUCTIONS
HO & HOn3 TALL STEEL VIADUCT TOWER
- Or -
2 THREE STORY BENTS
75-169

I. GENERAL

• This kit contains one Tall Steel Viaduct Tower which is designed to support the Micro Engineering 30 ft. Deck Girder Bridge span #75-502 for HO and #75-504 for HOn3, available separately. The 30 ft. Bridge Connector kit, #75-526 for HO and #75-529 for HOn3, inludes both the tower and the 30 ft. bridge span. Two of these towers are used in the complete Tall Steel Viaduct bridge kit. This kit can also be used to construct two Three Srory Bents. As with the full bridge kit, it's fun to see how the week, floppy individual parts go together to form a strong, sturdy tower.

• Most parts in this kit are made of injection molded styrene plastic and should be glued with a styrene solvent cement (such as Testors®). We strongly recommend using a glass tube, one drop cement applicator. If using Delrin® plastic track, glue it and the white metal parts with a cyanoacrylate (CA) or a rubber based cement (such as Pliobond®, available from Micro Engineering).

• Read each instruction step completely before proceeding with that step. Refer to the photos and box label for reference.

II. SPECIAL NOTES

• Figure 1 identifies the major assemblies and sub-assemblies of the Tall Steel Viaduct Tower.

• Parts **(6)**, **(7)**, **(8)**, and **(9)** have excess plastic that extends from their gusset plates at one or both ends. The excess plastic should be trimmed from these parts. Parts **(10)**, **(11)**, **(12)**, **(13)**, and **(20)** have similar extensions off their ends that are part of the part. Do **NOT** trim the extensions off these parts. See figure 2.

III. PARTS

• The parts photo and parts list are shown in figure 2. The part numbers are keyed to the photo. Extra parts that will not be used may be included in your kit.

• Some sprues have a molded in sprue number. Keep the parts on their sprue until ready to assemble so the parts remain keyed to the sprue number. When cutting the plastic and white metal parts from their sprues, file or trim off any flash, ejector pads, or gate nibs. Use care when handling the parts as some are thin and easily broken. If a part breaks, lay it on a flat surface and cement it back together. The Micro Engineering Rail Nipper #48-102 is excellent for cutting these small parts.

IV. ASSEMBLY

Bent Assemblies

1. Cement two **bent halves (1)** together. Be sure the edges of both **bent halves** are flush with one another. See fig 3.

Cement the **bent halves (1)** together by laying a **bent half** flat on your work surface. Place another **bent half** on top of the first. Place a thick, heavy straight edge on each side of the bent assembly to align the edges flush. Apply cement between a spacer and the **bent half** and apply pressure until dry. Repeat at each spacer. **Tip:** see next page.

Fig. 1 Assemblies / Terminology

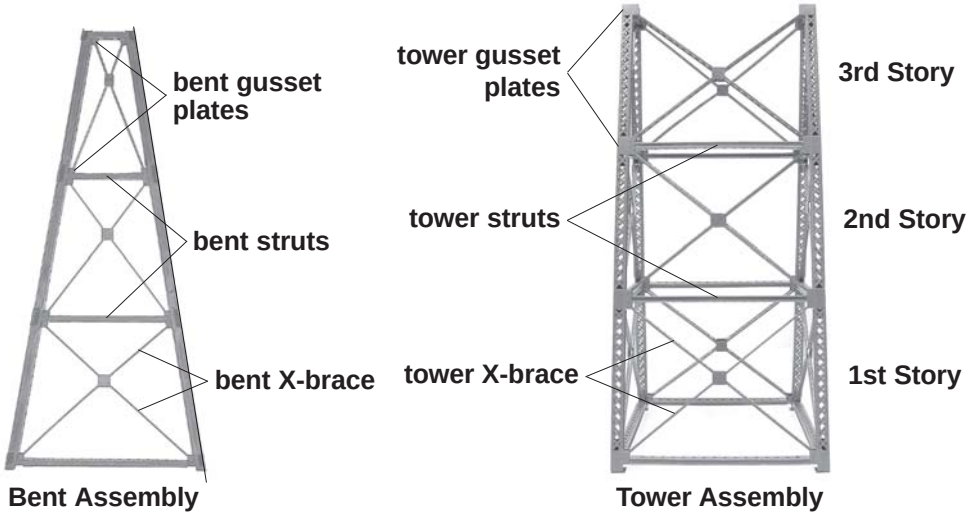
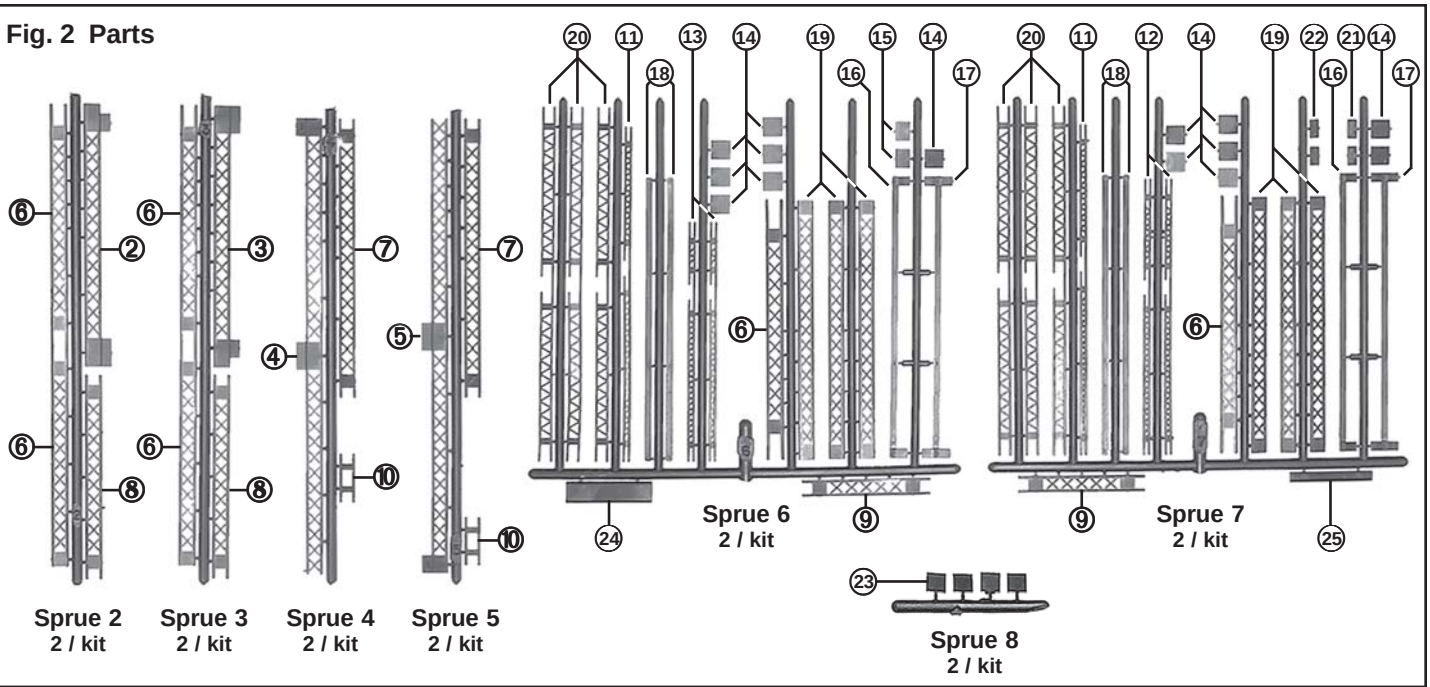


Fig. 2 Parts



Part No.	Part Name	Sprue No.	Parts / Kit
1.	**bent half** (not shown)	1	4
2.	**outside bent lattice, lower LH**	2	2
3.	**outside bent lattice, lower RH**	3	2
4.	**outside bent lattice, upper LH**	4	2
5.	**outside bent lattice, upper RH**	5	2
6.	**inside bent lattice**	2, 3, 6, 7	12
7.	**bent strut lattice, 1st story**	4, 5	4
8.	**bent strut lattice, 2nd story**	2, 3	4
9.	**bent strut lattice, 3rd story**	6, 7	4
10.	**bent strut brace, top**	4, 5	4
11.	**bent X brace, 1st story**	6, 7	4
12.	**bent X brace, 2nd story**	7	4
13.	**bent X brace, 3rd story**	6	4
14.	**large rivet plate**	6, 7	20
15.	**small rivet plate**	6	4
16.	**tower strut side, inside 1st story**	6, 7	2
17.	**tower strut side, inside 2 & 3 story**	6, 7	4
18.	**tower strut side, outside**	6, 7	6
19.	**tower strut lattice**	6, 7	12
20.	**tower X brace**	6, 7	12
21.	**top tower gusset plate, left-hand**	7	2
22.	**top tower gusset plate, right-hand**	7	2
23.	**bearing plates**	8	8
24.	**I beam, for HO**	6	2
25.	**I beam, for HOn3**	7	2

Tip: If the bent assembly develops a warp as assembly proceeds, lay the bent on a flat work surface and place weights on it after each work session.

2. If building the three story bents instead of the full tower assembly, trim off the two gusset plate extensions from parts **(2)**, **(3)**, **(4)**, and **(5)**. See figs. 4, 5, & 8.

Using the raised rib on the back side of the parts as a guide, trim off the extensions along the outside of the rib.

Note: Do not trim these parts if building the full tower.

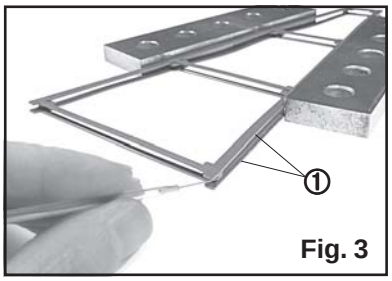


Fig. 3

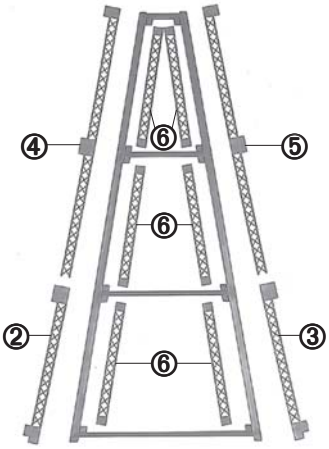


Fig. 4 Bent lattice

3. Cement the **outside bent lattice**, parts **(2)**, **(3)**, **(4)**, and **(5)** to the bent assembly. Figure 4 shows their general position. (For clarity, the parts are shown flat in figure 4, they would actually be on edge if cemented to the bent halves.)

Note that all bent lattices have a raised rib along each edge on one face. To assemble the **outside bent lattice**, lay part **(2)** flat on the work surface with the rib side up. See fig. 5. Place the bent assembly on edge on top of part **(2)** so the ribs are on the outside of each bent half. Cement in place, one edge at a time, while holding the bent half against the rib. Be sure the end of part **(2)** is flush with the end of the bent. Repeat with parts **(3)**, **(4)**, and **(5)**. The eight gusset plate extensions on parts **(2), (3)**, **(4)**, and **(5)** should all extend in

the same direction, i.e. up with the bent assembly flat on the work surface. See fig. 5 & 8.

4. Trim the excess plastic from the gusset plates of parts **(6), (7)**, **(8)**, and **(9)** but not **(10)**. **Important:** See **II Special Notes** on page 1.

5. Cement the **inside bent lattice** parts **(6)** to the bent assembly. Figure 4 shows their general position.

To assemble, pick up the bent assembly and hold part **(6)** against the bent edges, with its ribs outside each bent half. Apply cement along one edge at a time. See Fig. 6.

Tip: Check these parts for fit before cementing as it may be necessary to file the ends shorter so they fit between the bent gusset plates without bowing.

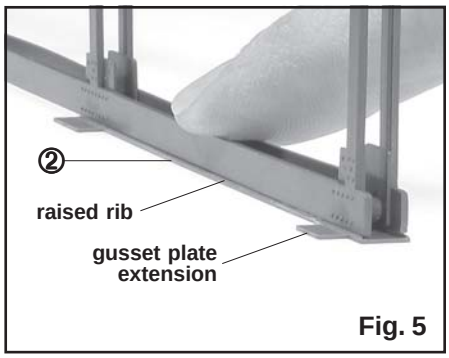


Fig. 5

6. Cement the upper and lower **bent strut lattice** and **brace**, parts **(7)**, **(8)**, **(9)** and **(10)** to the bent assembly. Figure 7 shows their general position.

Assemble as in step 5. See Fig. 6.

Tip: On each story, install the upper part first then the lower part. This will make it easier to center the lower part.

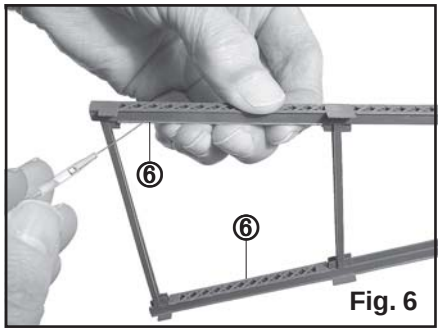


Fig. 6

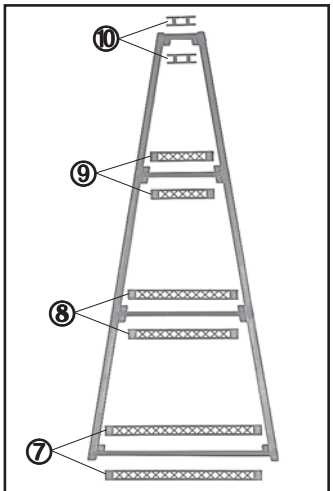


Fig. 7 Bent strut lattice

7. Cement the **bent X braces, 1st, 2nd & 3rd story** parts **(11), (12)** and **(13)** to the bent assembly (see fig. 1 & 8) or substitute truss rods for the X braces as described in step 9.

Position, but do not cement, a **bent X brace**, part 11, between the bent gusset plates at the upper right corner and lower left corner of a story. See fig. 8. Position the **bent X brace** so it is centered in the story with the notch facing up and its lattice straps toward the top of the bent. Align the X brace at each end with the rows of rivets on the bent gusset plates. Position the second **bent X brace** in the same way in the opposite two corners but with the notch down. Turn the bent assembly over and adjust the position of each X brace on the opposite side gusset plates. Once both **bent X braces** are centered and positioned correctly, without bow, cement the four ends to the gusset plates on both sides of the bent assembly.

Tip: If the X brace bows when positioned in place, it may not be pushed far enough under the gusset plate or it may be a little long. If long, remove the part, trim a little off each end, and check for fit again.

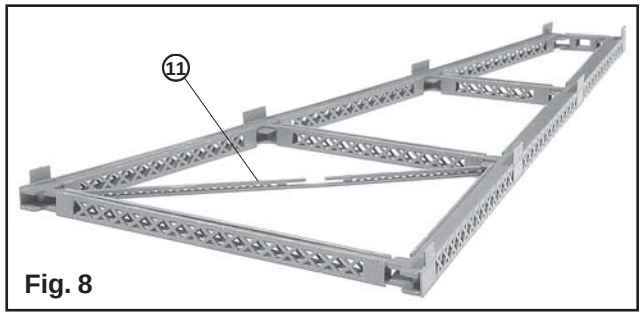


Fig. 8

8. Cement the **rivet plates** at the intersection of the two X-braces in each story. Use the **large rivet plates** part **(14)** for the 1st and 2nd story bent X braces and the **small rivet plates** part **(15)** for the 3rd story bent X braces.

Apply cement on the edges of the X braces at their intersection. Using tweezers, place a **rivet plate** on the cemented area and align the rows of rivets on the **rivet plate** with the X-braces. See fig. 9. The edges of the **rivet plate** should also be vertical and horizontal. Once in correct position, apply pressure to the **rivet plate** so it makes contact and is cemented to all three X brace edges. Turn the bent assembly over and cement a second **rivet plate** to the opposite side of the two X braces. Be sure the two **rivet plates** are aligned with each other when viewed from either side of the bent assembly.

Note: The rows of rivets on the rivet plates will not align precisely with the 2nd story X braces.

Tip: Some rivet plates are easier to align and cement by laying the assembly flat on the work surface and working from the back side.

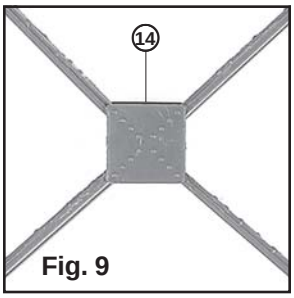


Fig. 9

9. Truss Rod Modification: Narrow gauge or light weight steel viaducts often used truss rod X-bracing instead of the cross-laced lattice X-bracing. To use truss rod bent and tower X-bracing, substitute .020" dia. brass wire (not included) and Grandt #4019 turnbuckles (not included) for the bent X-bracing parts **(11), (12)** and **(13),** and the

tower X-bracing part **(20)**. The truss rod modification will require 48 turnbuckles and six or seven 36" lengths of brass wire.

10. The first bent assembly is complete. Assemble the other bent assembly. If building the two three story bents, skip to step 20.

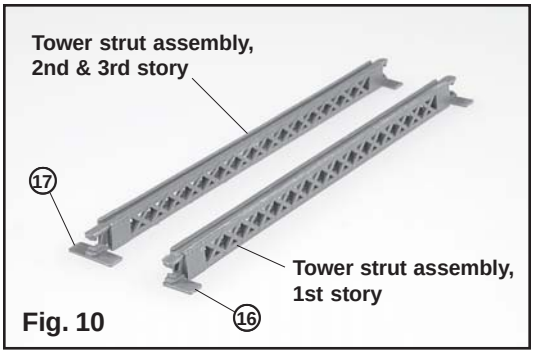


Fig. 10

Tower Struts

Two 1st story and four 2nd & 3rd story tower struts must be constructed. The 1st story struts use part **(16)** while the 2nd & 3rd story struts use part **(17)**. See fig. 10.

Tip: Since cementing the fourth side in place helps square up the assembly, it is best to assemble an entire tower strut in one session while the cemented joints still have some flexibility.

11. Cement a **tower strut side, inside** part **(16)** or **(17)** to a **tower strut lattice** part **(19)**.

On a block of soft wood or a piece of cardboard, place part **(19)** with the rib side up, across a corner of the block so both ends overhang the block slightly. See fig. 11. Pin the part to the block with several straight pins so it cannot move. Place part **(17)** on edge on part **(19)**, against the inside of the raised rib, with the spacers to the inside and flush with the ends of part **(19)**. Apply cement along the rib, making sure part **(17)** is vertical and perpendicular to part **(19)**. Use the plates at each end for reference.

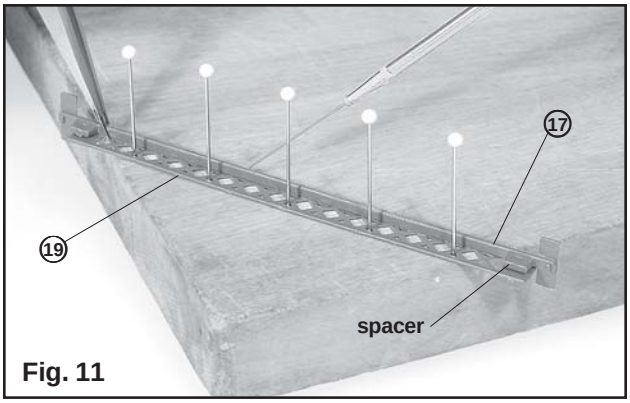


Fig. 11

12. Cement a **tower strut side, outside** part **(18)** to the tower strut assembly.

Place part **(18)** on edge on part **(19)**, against the inside of the other raised rib. Be sure the small spacers on part **(18)** are to the inside. Align both ends with the ends of part **(17)** and apply cement along the rib. Also apply cement between the large spacers and part **(18)**. Be sure part **(18)** is vertical and perpendicular to part **(19)**.

13. Cement a second **tower strut lattice** part **(19)** to the top of the tower strut assembly.

To assemble, remove the straight pins, pick up the tower strut assembly, and hold part **(19)** against the assembly (similar to fig. 6) with its lattice straps up and the ribs to the outside. Apply cement along the ribs while applying pressure.

14. The first tower strut is complete. Assemble five more tower struts.

Tower Assemblies

15. Cement six **tower struts** to a **bent assembly**.

a. Lay a bent assembly on the work surface with the gusset plate extensions up. Holding a tower strut vertically, place the end on the bent assembly, with its gusset plate to the inside. See fig. 12. The two tower struts with half gusset plates are used on the 1st story, with the half gusset plates toward the top of the bent assembly.

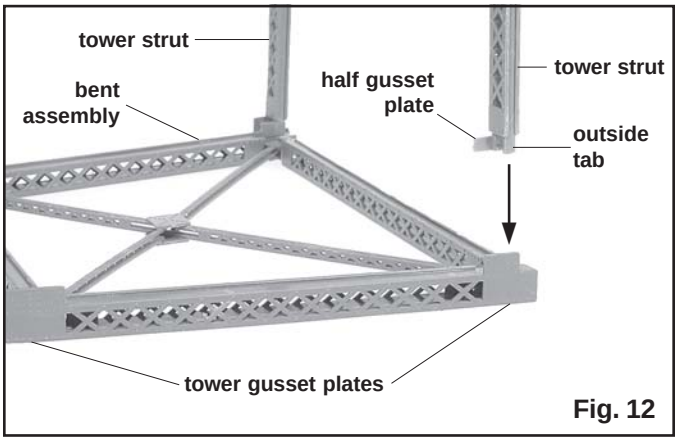


Fig. 12

b. Check that the ends of the lattice on the tower strut will butt against the tower gusset plate on the bent assembly. See fig. 13. It will probably be necessary to trim and/or file the ends of the tower strut shorter for correct fit.

Tip: Check the fit of both ends of each tower strut at this time since it will be difficult to trim the second end later. Check the fit at the actual location on the bent assemblies where each tower strut will be cemented.

c. Put cement only on the outside tab of the tower strut and press this tab against the inside of the tower gusset plate with tweezers. See fig. 12.

d. Position the tower strut as follows; 1. The tower strut should be aligned with the double row of rivets on the tower gusset plate, see fig. 13; 2. Looking

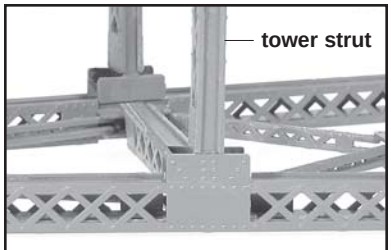


Fig. 13

from above, the tower strut should be slightly canted so it is aligned with the slope of the bent; 3. The lattice sides of the tower strut should be fairly square with the bent assembly and the outside face of the tower strut should be fairly square to the work surface.

Tip: The outside tab on the tower strut or the tower gusset plate on the bent assembly can be twisted or bent with tweezers to help align the tower strut.

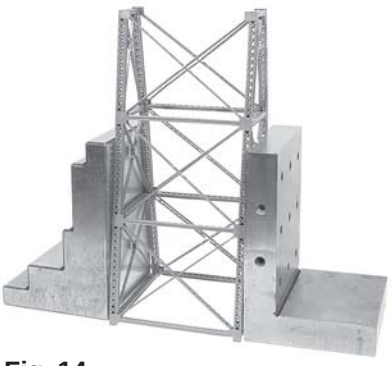


Fig. 14

16. Cement the 2nd **bent assembly** to the opposite ends of the six **tower struts**.

Lay the 2nd bent assembly on the work surface with the gusset plate extensions up. Hold the tower assembly from step 14 upside down (with the tower struts down) and place the ends of the tower struts on the 2nd bent assembly. Cement and align each tower strut to the 2nd bent assembly as done in step 15. View the tower assembly from above to check the squareness of the bent assemblies to each other.

Tip: Set the tower upright and use angle plates, a square and weights, or other suitable tools to hold the tower square as the cement dries. See fig. 14.

17. Cement the **tower X braces** part **(20)** to the tower assembly or substitute truss rods for the X braces as described in step 9.

The **tower X braces** are assembled in the same manner as the bent X braces. Follow the instructions in step 7. Part **(20)** is used for all three stories, on both sides of the tower. After positioning but before cementing the X braces in place, use angle plates, a square and weights, or other suitable tools to hold the tower square. Be sure the lattice straps on the X braces are facing the top of the tower. Once the tower is square and the X braces are in their correct position, cement the X braces in place. Note that the top end of the 3rd story X braces can only be cemented to an outside gusset plate.

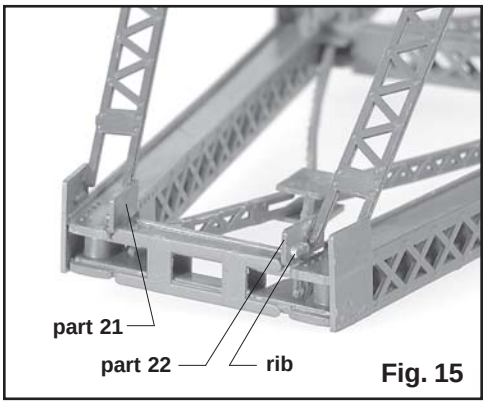


Fig. 15

18. Cement the **top tower gusset plates (21)** and **(22)** to the tower.

Lay the tower on a bent side and cement parts **(21)** and **(22)** to the bent assembles and to the 3rd story tower X braces. Align these parts so the rib is to the inside, down, and toward the top of the tower. Part **(21)** is cemented on the left side, part **(22)** on the right. See fig. 15. Repeat on the other bent side of the tower.

19. Cement the **large rivet plates** part **(14)** at the intersection of the two X-braces in all three stories and on both sides of the tower.

The tower **rivet plates** are assembled in a similar manner to the bent **rivet plates**. Follow the instructions in step 8. Lay the tower on its back and cement a **rivet plate** on the outside of one X brace intersection. Then turn the tower over and cement a **rivet plate** to the inside of the same X brace intersection.

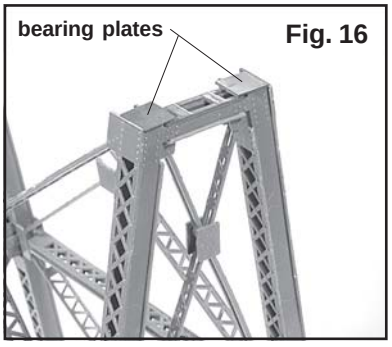


Fig. 16

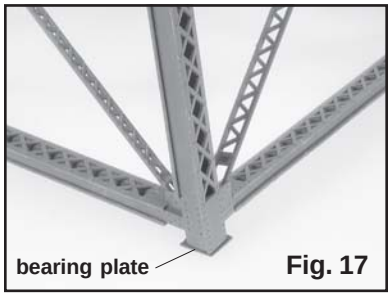


Fig. 17

20. Cement the **bearing plates** part **(23)** to the top and bottom of the tower.

The top **bearing plate** is cemented on top of the bent edge and against the tower gusset plate. The edge of the bearing plate should be flush with the bent face. See fig. 16. The bottom **bearing plate** is cemented on top of both the bent edge and the tower gusset plate edge. See fig. 17.

The Tall Steel Viaduct Tower or Three Srory Bents are complete.

21. When installing the 30 girder span to the top of the tower (not included): If needed, cement the two I beams part **(24)** or **(25)** to the bottom of each end of the 30 ft. span that will be installed on the tower (or bents).

The I beams are used to raise the height of the 30 foot girder span to match the height of 50 foot girder spans when they are used between towers. The I beams are not needed when 30 foot girder spans are used between towers.