Micro Engineering Company

ASSEMBLY INSTRUCTIONS
HO CITY VIADUCT
75-509, 75-510, 75-511, 75-512
75-168 (TOWER)

Micro Engineering Co.
1120 Eagle Road
Fenton, MO 63026

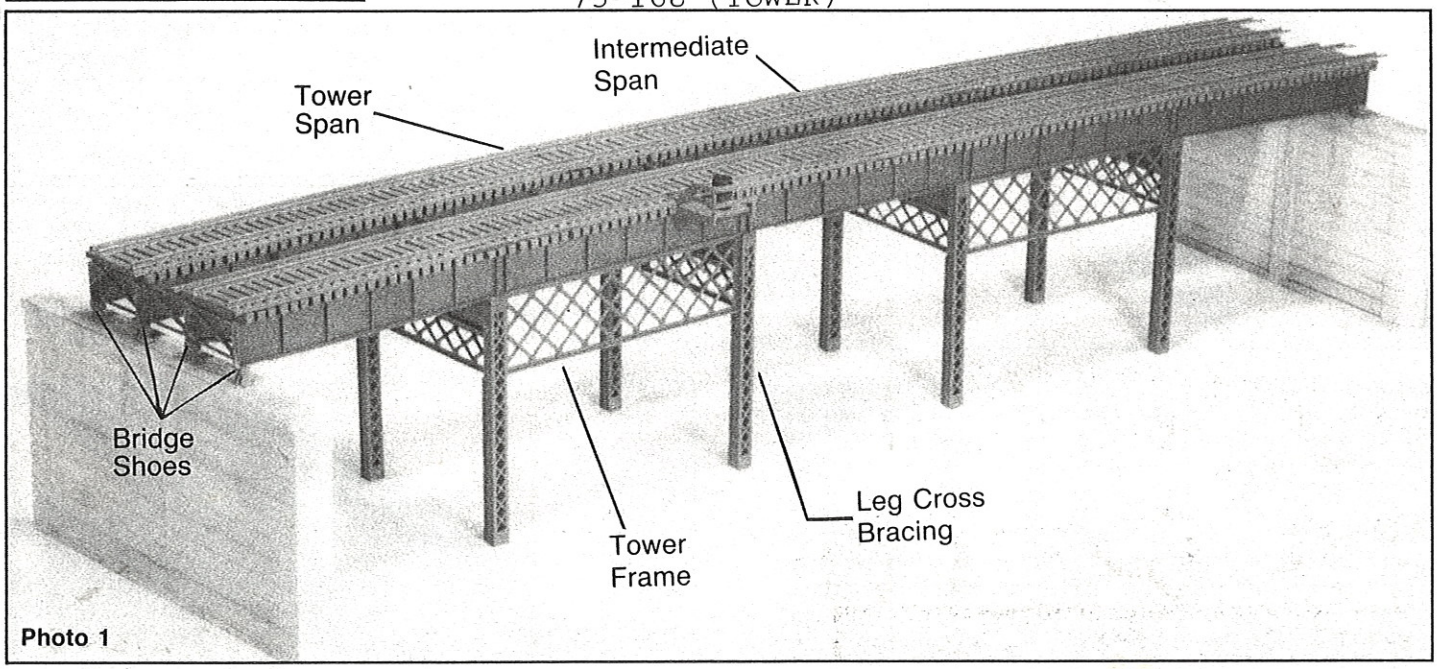


Photo 1

I GENERAL

These instructions will be easier to follow if you familiarize yourself with the parts and terminology listed below, most of which are labeled on the drawing and photos. Read and understand each step completely before proceeding with that step.

Tower Span
Intermediate Span
Tower Frame
Leg Cross Bracing
Bridge Shoes
Girder or Plate Girder
X-brace
Lateral Bracing
Girder Flange
Girder Angle
Rivet Side (of girder angle)
Girder Assembly
Outside Girder
Inside Girder
Cross Girder
Rivet Plates
Lattice
Barrel Platform
Riveted Reinforcing Plates
Guard Timber

The HO City Viaduct kits consist of a series of 30 ft. plate girder spans supported by box girder legs with laced cross bracing.

The City Viaducts measure 30 ft. high to the top of the rails and have a 24 ft. clearance under the **plate girders.** The height can be increased by using commercially available piers or decreased by simply trimming the legs.

The 90 ft. City Viaducts utilize two **intermediate spans** and one **tower span** while the 150 ft. bridges have three **intermediate spans** and two **tower spans.**

Longer viaducts can be constructed by combining two or more City Viaduct kits. Another alternative is to substitute 50' spans from our 75-503 or 75-501 Deck Girder Bridge kits for the 30' **intermediate spans** included with the City Viaduct kit. The 50' girders from kit 75-503 are the same height as the 30' **intermediate span** girders while the girders from kit 75-501 have a greater height. Mixing higher **intermediate span** girders with lower **tower span** girders was common practice on prototype city viaducts to increase strength for heavier equipment. Extra section(s) of HO Code 83 Bridge Flex-Trak,™ 11-101, are also available, if needed.

Single track curved viaducts can be built with radii down to 16 inches. Minimum radius for double track curved viaducts depends on track spacing as described later in these instructions.

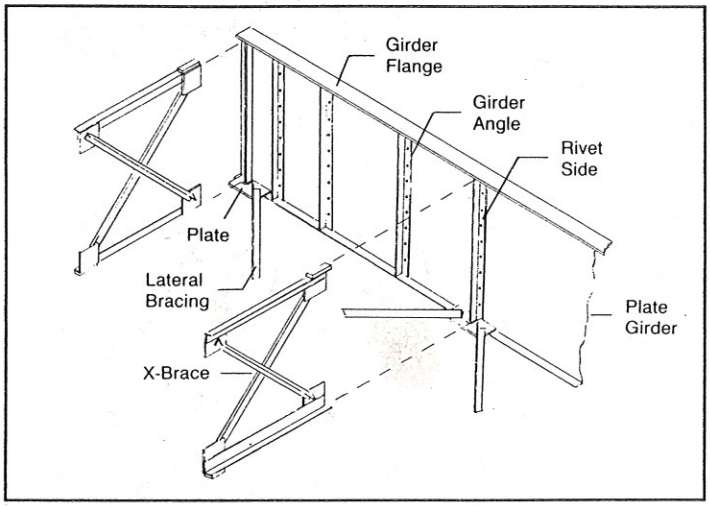
Most parts are made of injection-molded polystyrene and should be glued with a liquid polystyrene cement (such as Testors®). The bridge Flex-Trak sections require a cyanoacrylate (CA) cement (such as Super Glue®) or a rubber-base cement (such as Pliobond®).

Generally, it is best to construct the individual subassemblies—the **Girder Assemblies,** the **Tower Frame**(s), and the **Bridge Track**—then paint and weather these structures, if desired, and finally cement the subassemblies together to form the completed City Viaduct.

II GIRDER ASSEMBLIES

A. Straight Viaducts

1. Each **girder assembly** consists of two **plate girders**, three **X-braces**, and one or two **lateral brace** pieces (see drawing on next page). **Girder assemblies** used in **tower spans** have one **lateral brace** at the top edge only but **girder assemblies** used in **intermediate spans** have two **lateral braces**, one at the top and one at the bottom edge. Single track bridges have one **girder assembly**



per span while double track bridges have two **girder assemblies** per span connected side-by-side with three extra **X-braces** (see photo 2).

2. Clip or cut off the knockout ears and gates from all the **plate girder** parts. Be extremely careful when cutting the delicate **lateral bracing** from its sprue. If the bracing breaks, lay it on a flat surface and glue it back together. With a small file, clean up any remaining marks or flash, but do not worry yet about the draft angle on the top and bottom of the girder.

3. Place one of the **lateral braces** on your work surface with the angles up. Match the notches in the plates with the appropriate **girder angles** on one of the girders. It does not matter which side or which edge of the girder is used. Cement the **lateral bracing** to the inside edge of the **girder flange** (see drawing). If the **girder assembly** is to be used in an **intermediate span**, cement a second **lateral brace** to the other girder. However, with the second **lateral brace**, you must determine which edge of the girder (top or bottom) to cement to so the **rivet side** of the center **girder angle** on both girders will face the same direction once the two girder halves are assembled. Be sure the angles of the second **lateral brace** also face the inside of the **girder assembly.**

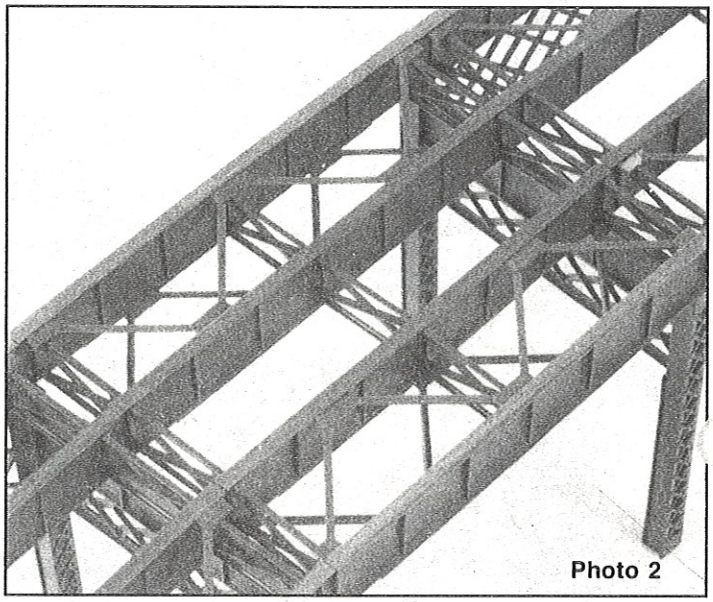


Photo 2

4. Cement three **X-braces**, one at each end and one in the center, on a girder which has the **lateral bracing** attached. The **X-braces** are located on the **rivet side** of the **girder angles** and on top of the **lateral bracing** plates. The angle side of the **X-braces** (the side with the three angles) should face the same direction as the **rivet side** of the **girder angles.** This will leave two **X-braces** facing one direction with the third facing the opposite direction.

5. Put the two girder halves together making sure the **lateral bracing** plates are on the inside edge of the **girder flange** and the **X-braces** are on the proper side of the **girder angles.** Be sure the girders are square, then glue the **lateral bracing** and **X-braces** to the opposite girder.

6. Tape a piece of abrasive paper to a flat surface or use a sanding block to sand the draft angles off the top and bottom of the girders. If the **girder assembly** is to be used in an **intermediate span**, center a **riveted reinforcing plate** on the bottom of each girder and apply cement. **Tower span girder assemblies** do not use a **riveted reinforcing plate.**

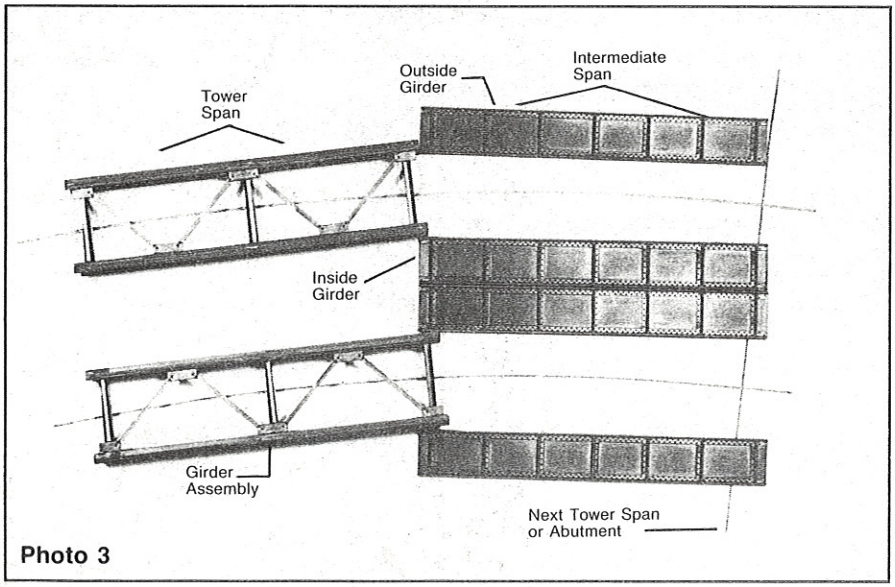


Photo 3

7. If you are building a double track viaduct, attach two **girder assemblies** side-by-side using three **X-braces.** Make sure the **X-braces** are facing in the proper direction and the two **girder assemblies** are square. **Lateral bracing** is not used between the **girder assemblies** (see photo 2).

8. If you are building a straight viaduct, repeat steps 1-7, above, for each **girder assembly** until you have completed three **girder assemblies** for the 90 ft. bridge or five **girder assemblies** for the 150 ft. bridge.

B. Curved Viaducts, Single Track

9. Assemble the **tower span girder assemblies** as described above for straight viaducts (part II, steps 1-6). However, for **intermediate span girder assemblies** the **inside girder** must be shortened before assembly.

10. To determine the correct length of the **inside girder**, draw a curve with the desired radius on a piece of paper using a trammel or a pencil on a string. Place a **tower span girder assembly** so it is centered on the curved line (see photo 3). Place the **outside girder** so it is against the end of the **tower span girder assembly** and is parallel to the curved line (both ends an equal distance from the line). Place the **inside girder** so it overlaps the **tower span girder assembly** and is parallel to the **outside girder**. Now adjust the **inside girder** so its **girder angles** are in line with the **girder angles** of the **outside girder.**

11. Measure the amount the **inside girder** overlaps the tower **girder assembly**. With a razor saw, cut this amount off both ends of the **inside girder** of all **intermediate span girder assemblies.**

12. Assemble the **intermediate span girder assemblies** as described above for straight viaducts (part II, steps 1-6), but using the shortened girders, moving the end **X-braces** in, and trimming the **lateral bracing**, as necessary.

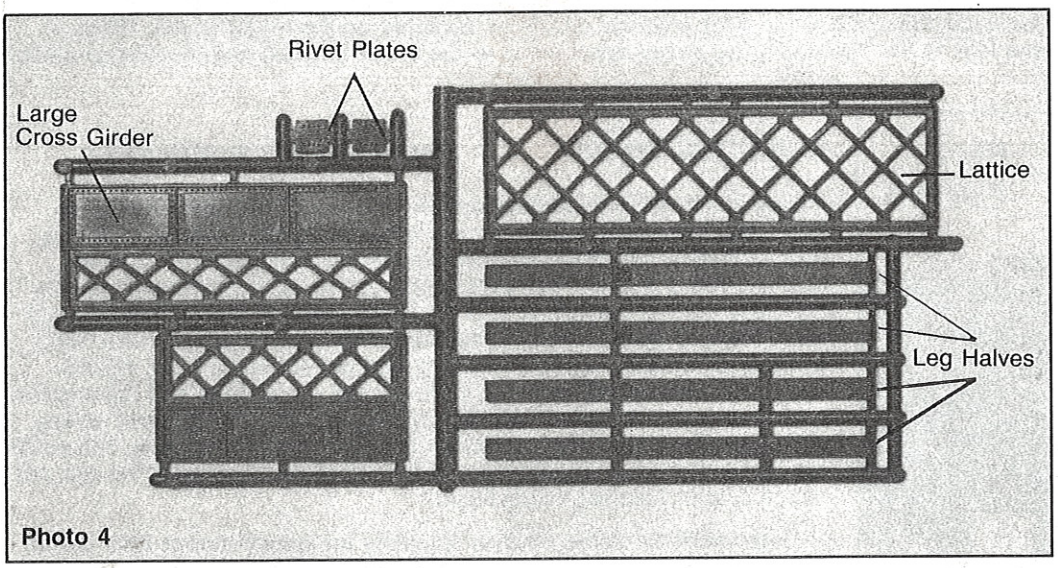


Photo 4

C. Curved Viaducts, Double Track

13. Double track curved viaducts are complicated by the fact that there is a minimum radius for a given track spacing that will allow two trains to pass with clearance. The Double Track City Viaduct was designed with 2 in. track spacing which allows clearance of class I* equipment down to a minimum radius of 53 in. (according to NMRA standard S-8). However, the Double Track City Viaduct can also be built with 2¼ in. track spacing which allows clearance of class I equipment down to a minimum radius of 24 in.

14. To build the **girder assemblies** for double track curved viaducts, follow the instructions for single track curved viaducts, above (part II, steps 9-12) but with the following changes:
Step 9: Same as above.
Step 10: Draw two curved lines, 2 in. apart for 53 in. or greater radii, 2¼ in. apart for 24 in. to 52 in. radii. Place two **tower span girder assemblies** so they are centered on the curved lines and parallel to each other. Place one **outside girder** and three **inside girders** in position (see photo 3).
Step 11: Each **inside girder** will be cut to a different length as determined by their overlap of the **tower span girder assemblies.**
Step 12: Same as above.

15. If you are building the double track curved viaduct with 2 in. track spacing, attach two **girder assemblies** side-by-side using three **X-braces**. Make sure the **X-braces** are facing in the proper direction and the two **girder assemblies** are square. **Lateral bracing** is not used between the **girder assemblies** (see photo 2).

16. If you are building the double track curved viaduct with 2¼ in. track spacing, the **X-braces** are not wide enough to connect the **girder assemblies** together. You may either delete the **X-braces** entirely or install them with $\frac{1}{8}$ in. thick shims on each side to obtain the correct spacing.

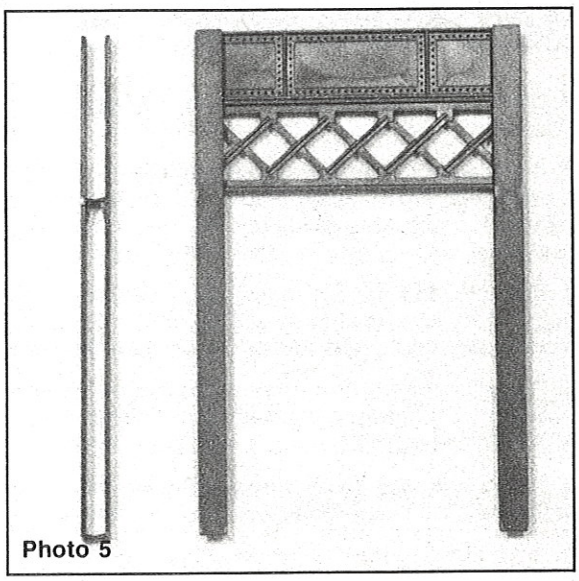


Photo 5

III TOWER FRAME

1. Clean flash and gate marks from the legs, **cross girders,** and **lattice** (see photo 4). Use the small **cross girders** for single track viaducts, the large **cross girders** for double track viaducts. Cement the leg halves together with the support pads and spacers butted end-to-end (see photo 5). Sand the draft angle off the top of the **cross girders** but not off the bottom. Place the **cross girder** between the leg halves so it is almost flush with the outside edge and cement it on top of the support pad. Be sure the **cross girder** does not protrude past the outside edge of the leg and the leg and girder are square. NOTE: If you are building a double track curved viaduct with 2¼ in. track spacing instead of 2 in. spacing, the **tower frame** must be widened about ¼ in. by inserting the **cross girders** only slightly into the legs.

2. File the draft angle off the **lattice** so the edges are flat. Stand the leg set upside down and cement the **lattice** to the side of the leg. If you are building a double track viaduct, the **lattice** should be $\frac{1}{32}$ in. or less from the outside edge. For the single track version cement the **lattice** in the center of the leg. The **lattice** should be flush with the top of the **cross girder** and leg. Cement a second **lattice** piece to the other leg. Now cement another leg set to the ends of the two **lattice** pieces to complete the **tower frame**. Be sure all parts are square.

3. Cement a **tower span girder assembly** to the top of a **tower frame** leaving half the top of each **cross girder** free so there is room to attach the next **girder assembly**.

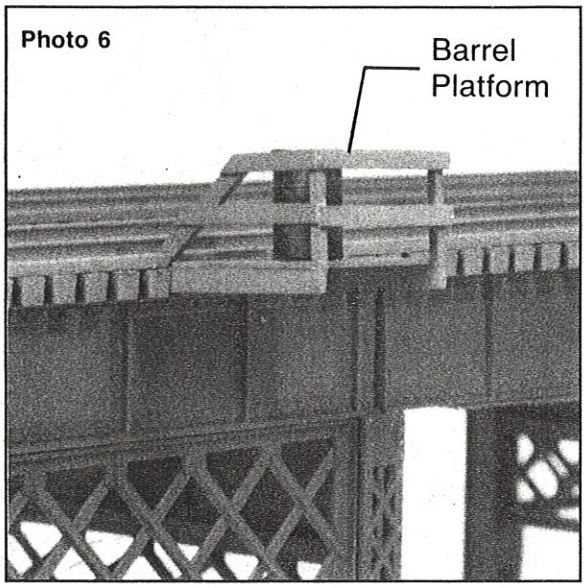
4. Cut the **leg cross-bracing** from its runners and clean up the gate marks with a file. Cement the **leg cross-bracing** to the inside and outside of each leg. Be sure the bracing is flat on the leg edges. If you are building a single track viaduct, cement the **rivet plates** to the top of the legs.

* Class 1 "includes longer steam engines..., larger four and six wheel truck diesels and equivalent rolling stock."

5. If you want to paint or weather your bridge now is the time. Do not paint the Bridge Flex-Trak yet. For simulating rust we recommend toning down Floquil's Rust with their Roof Brown. Clean up the **bridge shoes**, paint them a metallic color and weather with rust. Clean any paint from the top and bottom surfaces of the shoes and glue them to the bottom of the end girders.

6. It is now time to install the City Viaduct on your layout. The end **girder assemblies** will need to be supported by abutments or walls 3$\frac{5}{32}$ in. high. After the abutments have been installed, set the **tower frame**(s) and **girder assemblies** in place and align the bridge to its exact position. **Girder assemblies** for single track viaducts should be centered on the **tower frame.** When in final position, cement the **tower frame** legs to the "ground", the **girder assemblies** to the **cross girders**, and the **bridge shoes** to the abutments.

Photo 6



IV BRIDGE TRACK -- AVAILABLE SEPERATELY

Included with the City Viaduct kits are sections of HO Code 83 Bridge Flex-Trak. This track has the closely spaced, oversize ties used on this type of bridge. The Code 83 rail represents a typical size for modern, mainline rail of 132 lbs. per yard. If you prefer using a different rail size you have several options; A. Cut the spikes and tie plates off the Bridge Flex-Trak and glue your rail to the ties using CA cement or rubber-base cement; B. Omit the Bridge Flex-Trak and use sectional track, flexible track, or individual ties and rail; C. If you are using Code 100 rail it is fairly easy to attach it to the Code 83 rail. Slide a rail joiner halfway on the last piece of Code 100 track. Flatten the other half of the joiner and solder the Code 83 Bridge Flex-Trak rail to the top of the joiner with the top and gauge side of both rail heads flush.

1. Begin working on the track by trimming the **guard timber** from the tie strip and cleaning up the ends of the ties. If your viaduct is on a curve, bend the Flex-Trak to the proper radius, clip off the excess rail, and file the end of the rail square and until it's free of burrs. Install rail joiners and fasten the pieces of the track together. Check that the track is at the proper radius.

2. Clean flash and gate marks from the **barrel platform** parts. Cement the floor board section on top of the bottom board of both side railing assemblies. Cement the two end railings to the two side railings across the back of the platform.

3. If you want to weather the Bridge Flex-Trak, start by spraying the sides of the rail with Floquil's Rail Brown. To give your ties a weathered brown appearance, use a mixture of Roof Brown and Concrete. Spray straight down on the ties so the sides of the rails do not get covered. Spray the **barrel platform** the same color. You may want to weather the center of the ties with black chalk or a wash of paints to simulate oil leaks.

4. Choose a location for the **barrel platform** and spread the ties, if necessary, so the support timbers will fit between them. The edge of the floor boards should be in line with the ends of the ties. You may need to cut out the piece of plastic that connects the ties together to get a good fit. Cement the **barrel platform** to the ties and the Bridge Flex-Trak to the top of the girders.

5. Cement the **guard timbers** to the top of the ties, a scale 2 in. (.023 in.) from the end of the ties. The **guard timbers** must be trimmed to fit between the **barrel platform** railings. If you are building a curved viaduct, the **guard timbers** should be cut to scale 10 ft. lengths (1.378 in.) with each timber angled to follow the curvature when installed.

6. Finish your City Viaduct by weathering the barrel and then cementing it to the **barrel platform**. Connect the track to each end of the viaduct, clean the top of the rails, and you are ready to run.

Suitable bridge abutments and piers are made by A.I.M. Products.