The author's new railway incorporates several curved trestles, all of which had to fit precisely. Here he tells how he did it, and how you can, too.

Build a custom-radius curved trestle

Some simple geometry is all it takes

by Michael Herhusky
Carmel, California | PHOTOS BY THE AUTHOR

My father has enjoyed model railroading as long as I can remember. He recently moved from a home with backyard into a condominium that offered no space for his railway. For his 85th birthday party, I wanted to construct a railway in my yard that contained several of the major elements of his railroad.

Site challenges

My space is much smaller than that which contained his railway, so my challenge was in fitting elements of his line into my space. I had previously built two Howe truss bridges for his railway that I wanted to incorporate into my new one. These had originally been fitted end-to-end but space limitations required a new orientation for the bridges. In addition, I wanted the track to be raised and set adjacent to a walkway so that trains could be placed on the track from a seated position on a bench, to make it easier on Dad's knees.

To make everything fit required the construction of several curved trestles of different radii. Described below are the techniques that I used to make a curved trestle that was the best fit for the track. **Photo 1** shows the site I had to work with.

Technique for building a custom-fitted trestle

How do you calculate the best fit of a curve to join two segments of straight track? **Figure 1** shows two curves, called radius 1 and radius 2. Radius 1 is too tight, while radius 2 is too shallow. Rather than just guessing at something in between, I wanted to achieve the true best fit—a curve that meets both tracks exactly tangent to the curve. This may bring back nightmares of high-school geometry class, but bear with me; it really is easy to do with some basic equipment.

In my trackplan, I wanted to incorporate the two Howe truss bridges, then curve the track to meet a walkway. One of the supports for the bridge was already fixed in place, seen at the upper middle in **photo 2**. This support became the end-point of the straight piece of track that ran down the bridge center and would be the starting point of the curved trestle. The other end of the curved trestle would meet a straight segment of track that was raised above the walkway, which can be seen in the lower left corner of **photo 2**. The curve could meet that walkway section at any point, but where?

I first extended lines from track ends 1 and 2 to meet at intersection-point "A" (**figure 2**). I used construction twine for this and marked the point of intersection.

Then I measured the distance from point "A" to the ends of the straight track. This distance ("x" in **figure 2**) to both straight-track ends must be equal. In my case, the bridge abutment trestle was

1. The future site of the new railroad.

2. The starting point (upper middle) and end point (lower left) of the proposed trestle. The position of the pier at the upper middle of the picture is fixed.

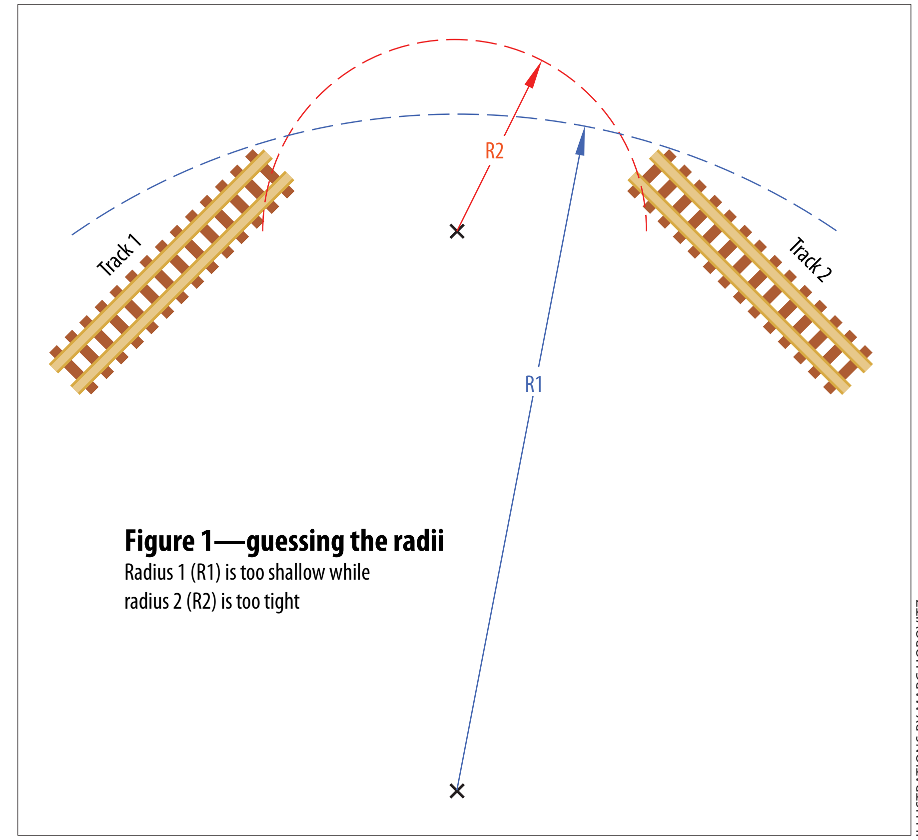


Figure 1—guessing the radii
Radius 1 (R1) is too shallow while radius 2 (R2) is too tight

ILLUSTRATIONS BY MARC HOROVITZ

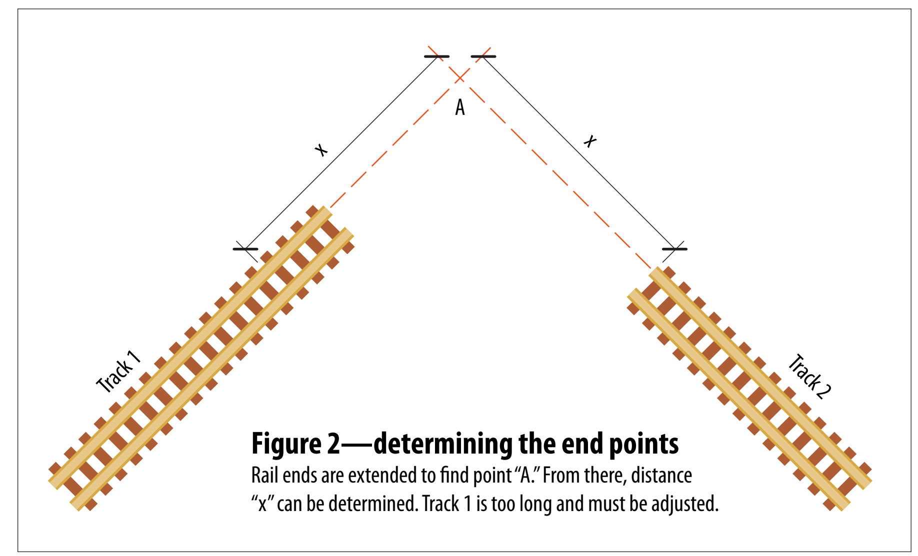


Figure 2—determining the end points
Rail ends are extended to find point "A." From there, distance "x" can be determined. Track 1 is too long and must be adjusted.

3. **Using contractor's tape and a steel square to determine the center point of the curve.**

4. **A template is made on a scrap using the dimensions already determined.**

Articles on trestle building

Articles on trestle building can be found in the following issues of *Garden Railways*:

- September-October 1987
- September-October 1989
- March-April 1993
- February 2000*
- April 2000
- June 2004*
- February 2008*
- June 2008*

Issues marked with an * are available to order at *www.GardenRailways.com* (click on "Shop") or by calling 800-553-6644.

5. **The trestle being assembled upside down. Bents are equally spaced and connected at their outside edges.**

fixed, so I measured the distance from point "A" to the fixed abutment, then marked the same distance from point "A" to the walkway track end, advancing the straight segment slightly along the walkway to make these measurements equal (**figure 3**). (In **photo 2**, note that the distance from the intersection point to the fixed abutment is equal to the distance from the intersection point to the end of the straight trestle segment on the walkway.)

I then extended perpendicular lines toward the center of the curve from the points marked on each of the straight approach tracks. For this I used construction tape and a contractor's square. The lines intersected at point "D" (**figure 3**, **photo 3**). Point "D" is the center of all radius measurements. To mark this point, I used a metal construction stake pounded into ground. I double checked that I had done things correctly by scribing an arc from track 1 to track 2, using a string tied to the stake I that I had driven at point D. As I moved the string from track to track, it met both track ends almost perfectly (**figure 4**).

I used a tape measure to determine the distance from "D" to the center of each approach track at the perpendiculars I had drawn earlier. The distance was 45.5". I also scribed arcs that corresponded to the inside and outside edges of the bents. These I determined by dividing the bent width by 2 and adding/subtracting this amount to the radius of "D" to the track centerline. I used these inside and outside radii to make my pattern.

Making the pattern

Now that I knew the radii of the curves, I needed to know the length of the curve so that I could make a pattern on which to build the trestle. Rather than try to measure the length along the curve, I found it much easier to measure just the chord length of the curve (**figure 5**). This is simply the straight-line distance between the track ends, as measured with a tape measure. Mine was 50".

I used a long piece of scrap wood to make a sort of compass. I loosely fixed this scrap to a small piece of plywood so

6. **Cross bracing is added to the first pair of bents to hold them square.**

that the long piece could rotate freely and scribe an arc. I drilled ¼" holes in the long piece to accommodate a pencil at the radius distances that would form the inside and outside edges of the trestle. Then I drew arcs on a piece of scrap wood (**photo 4**) to make the template. I marked the ends of the arc using the chord-length measurement already determined. I decided upon the approximate spacing of the bents, then adjusted the spacing a little, plus or minus, to divide the arc into equal divisions (**figure 6** and **photo 4**). I also scribed arcs that corresponded to the inside and outside edges of my trestle bents. I then had a template on which to construct my trestle.

Building the trestle

I constructed individual bents using a pattern found in a past issue of *Garden Railways* (June 2008) but any pattern will suffice as long as the bents are aligned with arcs scribed above. I marked lines using the arm of my "compass," so that all the bents radiated along lines that passed through center-point "D" (**figure 6**). By ensuring that bents were spaced equally on the pattern, it was easier to construct the trestle because the various pieces of cross bracing were consistent in length

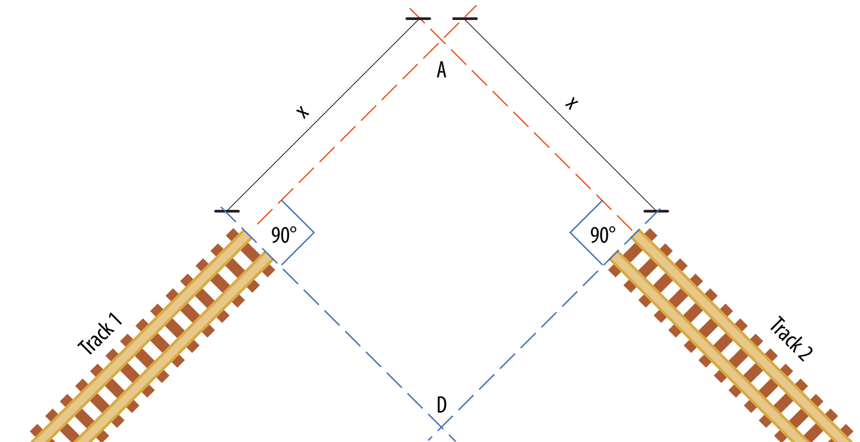


Figure 3—determining the center point
With track 1 trimmed back, perpendicular lines are extended from the rail ends. Where they cross is the center of the arc.

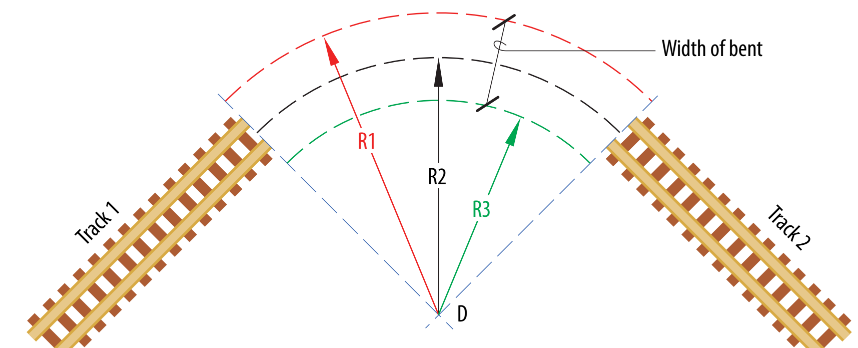


Figure 4—laying out the trestle radii
R1 = Outside edge of bent to center point "D"
R2 = Centerline of track to center point "D"
R3 = Inside edge of bent center point "D"

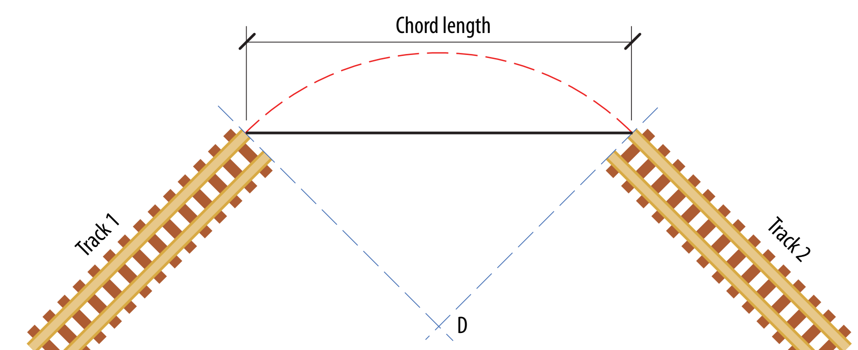
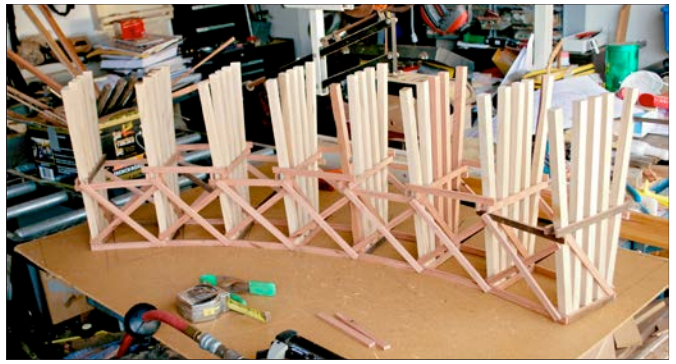


Figure 5—determining the chord length

between segments and, therefore, could be cut in bulk. I found that one nearly essential tool is a 23-gauge pin nailer. This makes construction rapid and strong, as each piece can be both glued and nailed in place.

I constructed the trestle upside down. Bents were first connected along their outside edges, equally spaced (**photo 5**). Cross bracing was added to the first pair of bents so that they were held true, 90° to the template (**photo 6**). This made the



7. Once the outside of the trestle was completely braced and square, braces were added to the inside.

8. The completed trestle, ready for installation.

9. The ends of some of the bent timbers were trimmed to rest on the wooden walkway.

10. The finished trestle in place—an excellent fit.

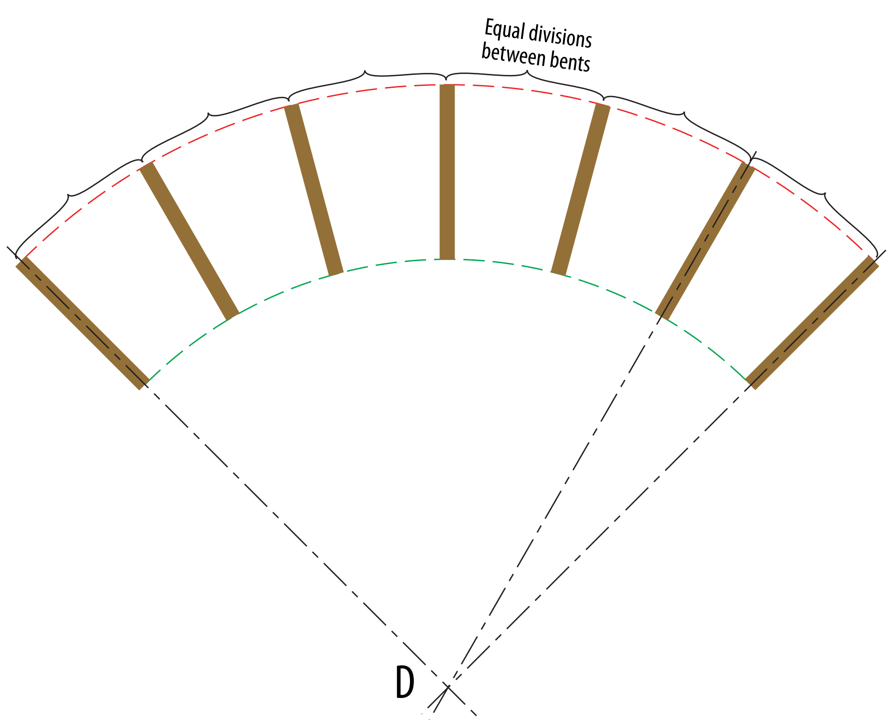


Figure 6—laying out the bents
Divide the arc into equal divisons for bent placement

Online extras

Subscribers can download a copy of the trestle-bent pattern used by the author, originally published in the June 2008 issue. Visit *www.GardenRailways.com* and click on "Construction & Landscaping" under "How to."

addition of each bent easy to true up as bracing was added because the first pair was held rigid.

Once the outside of the trestle was completed, I finished the inside in a similar manner, again confirming that all pieces were true and properly positioned on my template (**photo 7**). The completed trestle (**photo 8**) was added to the railroad, spaced properly with regard to the straight track ends, and set level, with mortar holding the base of each bent. I also wanted the trestle to partially rest on the walkway so I trimmed the bent ends to accomplish this (**photo 9**). The finished trestle can be seen in **photo 10**.