

Part 6 - Constructing Railroad Bridges

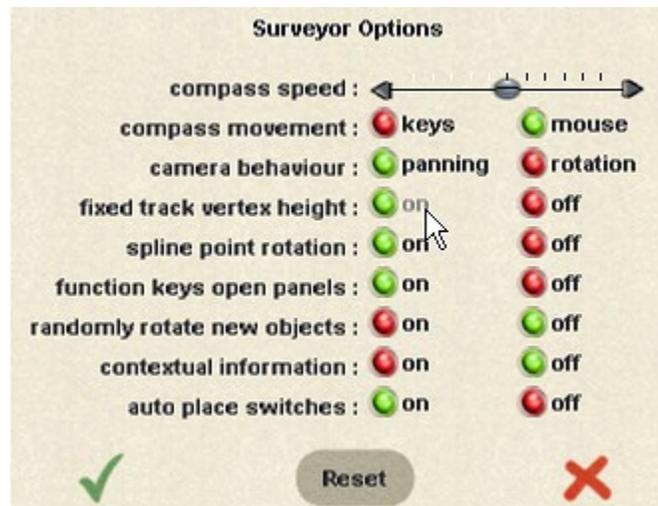
Bridges are a vital part of every railroad, and in Train Simulator we are fortunate to have a large variety of them, both in the game itself and available through the Download Station. They are relatively easy to install, and offer both visual interest and operational flexibility to any route. In this article, we'll be talking about railroad bridges, but the same principles and construction techniques apply to highway bridges as well.

Bridges on level ground

Let's start with a bridge where the track is level and crosses something below, such as a river or other low-lying area. There are several ways to accomplish the task, but one easy technique is to lay the track while the ground is still flat, before you carve out the riverbed below it.

The first thing we want to do is lay our track in such a way that we don't change it when we modify the terrain. That way, when we cut the riverbed it won't change our track.

Let's start by selecting Surveyor Options from the Surveyor menu. That will open the following dialog:



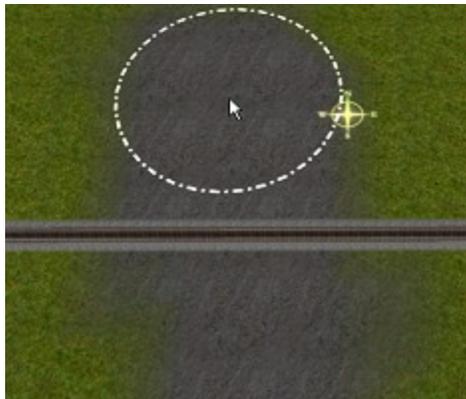
Find the 'fixed track vertex height' and click the 'on' button. Then click the green arrow to get back to the main Surveyor screen.

Selecting this option locks track spline height to the value when you first lay it. If you then change the terrain around it, the track height stays the same. Note that this function is *not* retroactive; it only applies to track laid *after* the option is turned on.

If you've already laid the track at your bridge location, check the color of the splines. If a spline is yellow, then the height is already fixed. If the color is white, then the height can vary with changes in the terrain—if you raise the terrain, you raise the track as well. [Thanks for the tip, Tommy]

You can make variable track fixed, by selecting the 'get vertex height' tool from the track 'advanced options'. Click on the spline in question and its height will appear in the window. Then just select 'apply vertex height' and click the same spline. That will lock the spline and turn it yellow. Alternately, you could just erase the one section of track and re-lay it.

All right, let's get our bridge started. Below is a picture of our terrain, and we've used the texture tool to draw where our riverbed will be:



Now select the 'insert spline point' from the track tool, and insert a new spline point to either side of our riverbed, as shown below:



Notice that the two new splines are both yellow in color, indicating that their vertex heights are fixed. Any change we now make to the terrain won't affect the track.

Now choose your favorite terrain modification tool and carve out the riverbed below the track, like this:



When carving the riverbed, don't cut the hole right up against the track spline-- leave some space between the hole and the spline. We'll need that space in a moment.

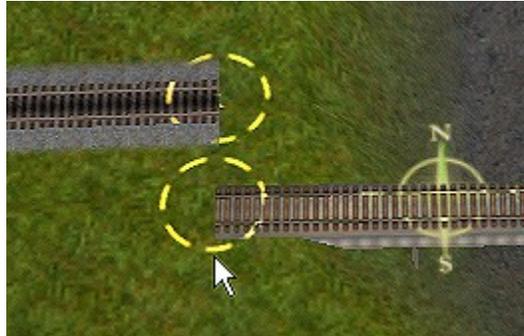
With the terrain set the way we want it, click on the track tool and delete the track section above the river. You'll end up with something like this:



Now we're ready to install the bridge. With track tool active, select 'bridges' as the subcategory.

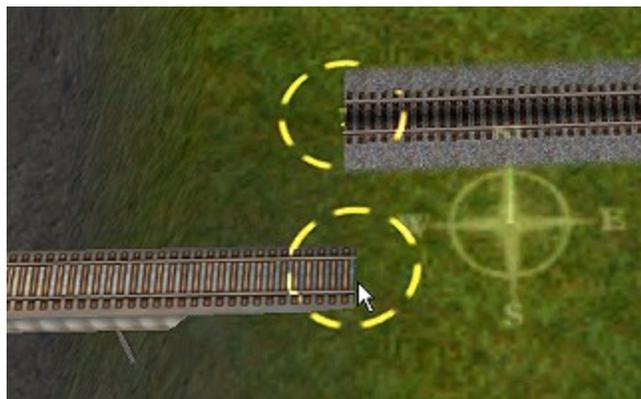


Scroll through the available structures and choose your favorite. Then move to your riverbed and place one end of the bridge. Remember to place the bridge so you maintain your track direction! If the track on either side of the bridge is laid left-to-right, then you'll want to lay the left bridge spline first. See below:



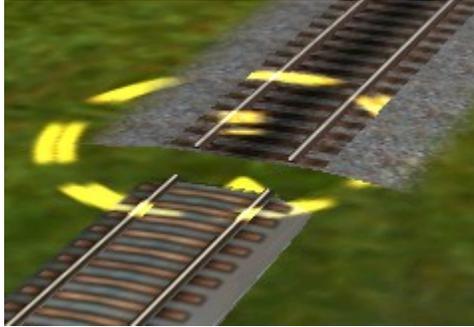
When you lay the bridge spline on the bank, it's important that you keep it away from the track for now. We'll explain why in a moment.

Now lay the other end of the bridge, again taking care to keep the track and the bridge splines separated:

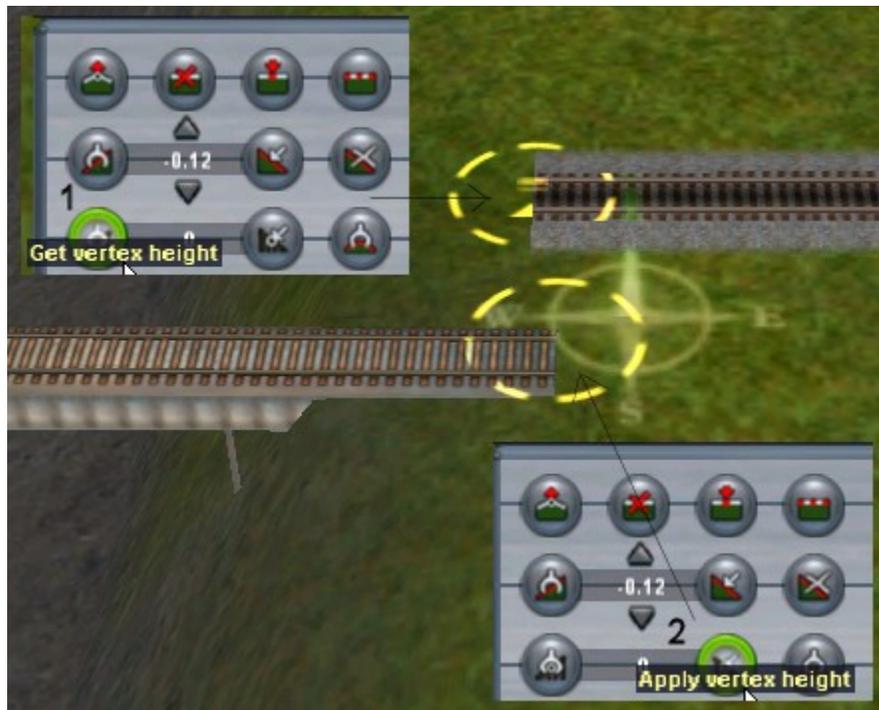


Now we've got both ends of the bridge in about the right position. We keep the bridge and the track separated so the bridge will be easier to move later. But before we can join the bridge and the track, we have to check the height of both pieces.

Let's assume that the track is already the correct height—it came from an existing track after all—so if height of the bridge is not the same, we have to make it match. Why? Because if we don't, we might end up like this:



Look at the drawing below. Our first step is to select the 'Get vertex height' tool and click on the track spline. That will put the height of the spline in the window. You can't see it behind the title, but the height is zero, since we laid this track right on the baseboard.



After getting the height of the track, we do step #2, and select the 'Apply vertex height' tool. With the tool selected, we click on the bridge spline. If the bridge spline was higher or lower than the track, you'll see it change height. We've made the track and the bridge the same height.

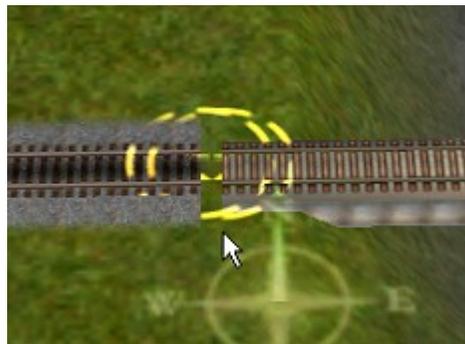
Go to the other end of the bridge and repeat the procedure. Now both the track and the bridge are the same height at each end.

With those steps complete, it's time to join the bridge to the track. You can start at either end, but in this case I did the right side first. Select the track move tool

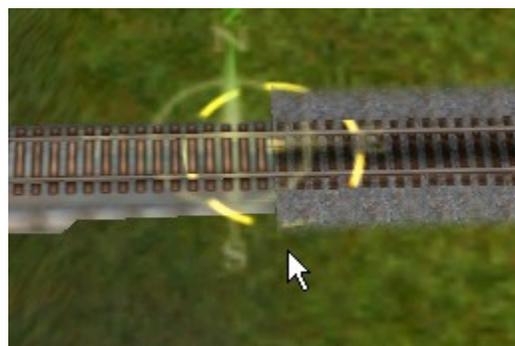
and position the first end of the bridge near---but not on top of---the track, like this:



The bridge will not 'snap' to the track, so that's why we leave a little room between them. Before joining them, however, we go back to the other end of the bridge and do the same thing. In the drawing below, you see the bridge positioned near the track.



Now with the bridge in place, we click on track itself and drag it the short distance to join the bridge. One more trip to the other end of the bridge and we join that end as well.



We're done. Here's our completed bridge:



A couple of notes: When you position the bridge splines near the end of the track, expect to have a little trouble regaining control of spline—they don't always react to the mouse click once placed. Placing them further from the track rather than closer seems to help. If you can't get control of the bridge, just delete it and try again.

One reason we moved the bridge rather than the track was to keep the direction of the original track as much as possible. When we deleted the middle track section, we didn't disturb the track on either side of it. Ideally we want the bridge to simply take the place of the deleted track section

Not only that, but by forcing the bridge to be the same height as the track at each end, we help to maintain the original track grade. It wasn't important in this example, since the track was level, but if the track on your route has a grade, you'd want to maintain that grade across the bridge.

Elevated bridges

In places where the surrounding terrain is below the bridge, we have to build an embankment to support the track on either side. We've leave that part to your creativity and just talk about the bridge itself.

Let's say we have two tracks that cross each other, as shown in drawing below:



Due to increasingly heavy traffic, management has decided that the left-to-right track should be elevated. They opt to build a bridge over the diagonal track below.



Insert new spline points at A and B above. Then type the height you want for your elevated track in the vertex tool window. I used fifteen for this example, but you can use any value you wish.

Once you've typed in the value, select the 'Apply vertex height' tool and click on both A and B splines to lift the track to the new value.



With the track lifted, click 'Smooth Spline Height' to fill in the ground below the track.



You'll end up with the following:



From here on it's the same procedure as the previous bridge we built. Remove the unwanted part of the embankment below the bridge, delete the track, then build the bridge across the gap.



If we had to build an embankment for the bridge from scratch, a height of fifteen is probably too much; you'd probably only want it a bit more than your tallest rolling stock. On the other hand, if you're bridging a gap between two hills in the mountains you might be higher yet.

Why not do a little practice yourself? Open Surveyor and create a new, empty route. Build a few bridges using the techniques described here and before you know it you'll be an expert. :-)