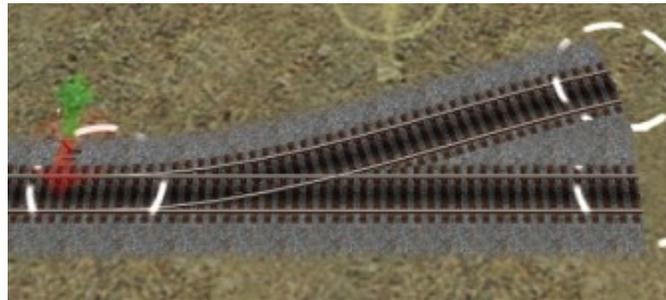


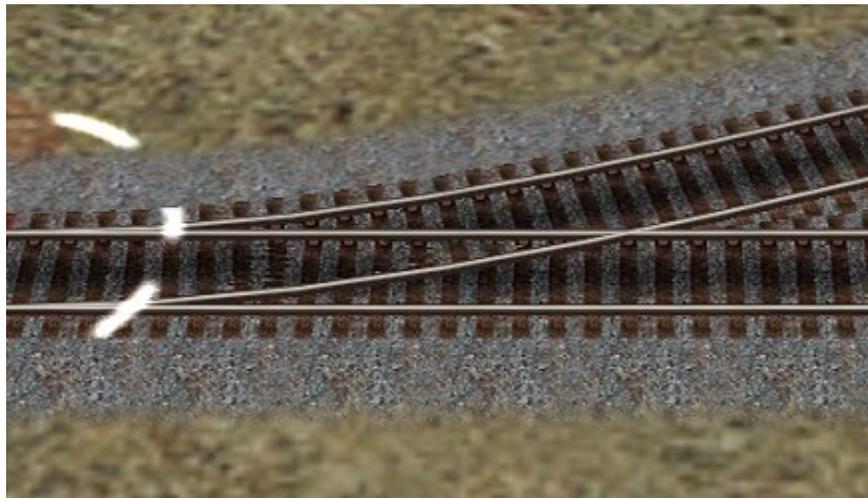
## Part 2 - Making Your Switches Look Nice

### Doing it on the level

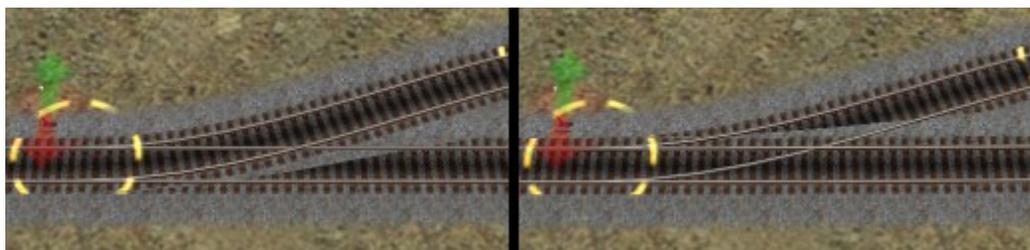
The easiest way to place switches is on ground that is perfectly flat. If the approach tracks and the switch itself are level, the switch will look great. Check out the drawing below:



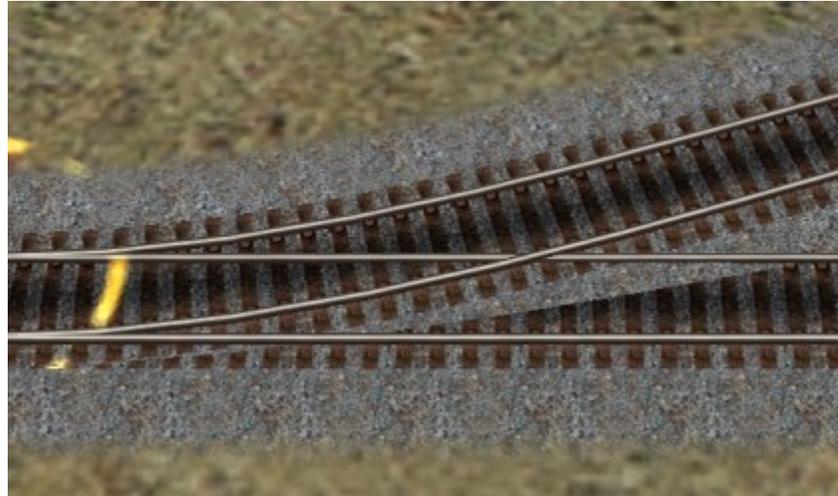
Notice how the rails merge together nicely when all the track splines are the same height. Let's take a closer look in the drawing below, at the frog, the point where the inside rails cross. See how they blend together? That's what you want your switches to look like.



All too often, though, we see maps where switches look like the following:



In the drawings above, something is wrong and the results don't look nearly as nice as the first example. Most of the time, the trouble is one spline higher or lower than the others. Below is a closer look at the drawing on the left above:



Up close, it's pretty obvious that the sidetrack is higher at the frog than the mainline. If you want your turnouts to look nice, you need to be on the lookout for uneven switches and fix them.

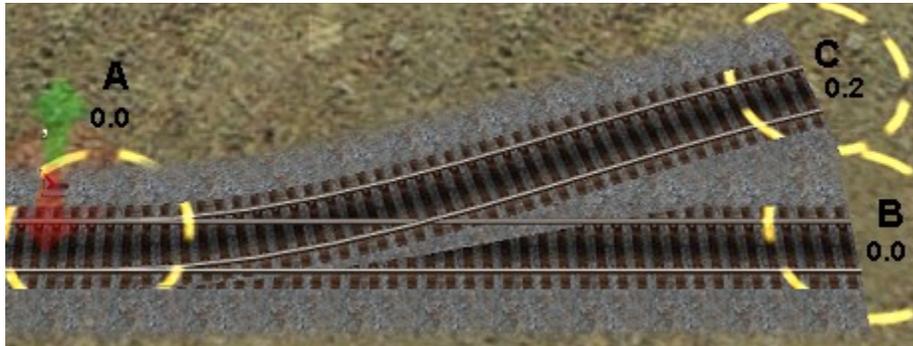
### Using the vertex height tool

The easiest way to deal with height problems is to use the vertex height tools, found in the 'advanced' section of the track tool:



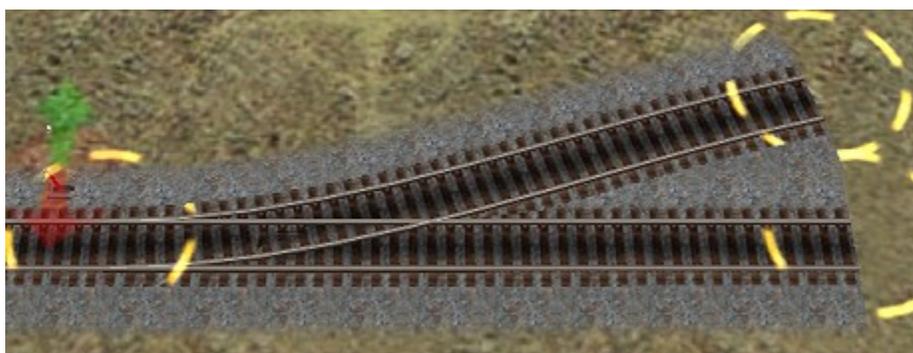
The highlighted portion at the bottom of the picture above shows the vertex height tools. Selecting the left button and clicking on a spline gets the height of that spline and places it in the display window. Selecting the right hand tool allows you to assign the track height displayed in the window to one or more other splines.

Let's fix the problem in our previous example. First, we select the left, 'get vertex height' tool. If we then click on each of the splines in the drawing above, we read the following values:



As you can see, the spline point at C is higher than those at A and B, and as a result, the track from A to C is higher going through the frog than the track from A to B. How do we fix the problem? We do it by manually making C the same height as the other two.

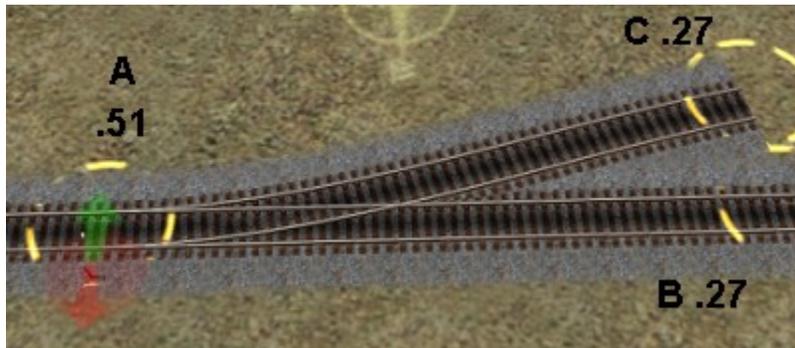
Here's how we do it. Click once again on spline A. That places the height of that spline, 0.0, in the window. Now we select the right hand, 'apply vertex height' tool and click on C. That assigns the value in the window to C.



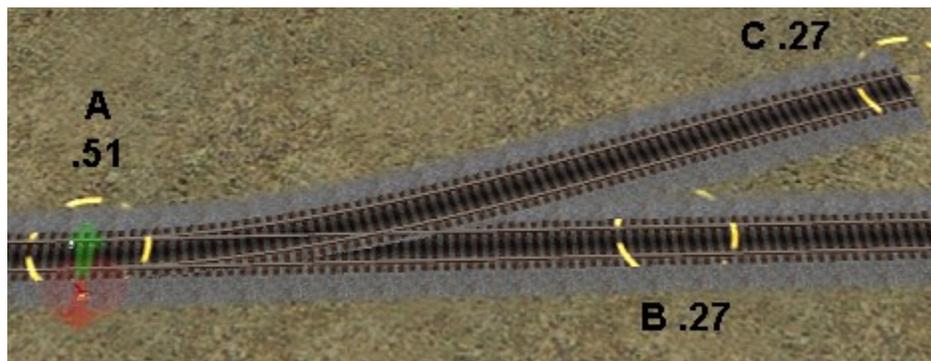
Now all three splines have the same height, and the rails merge in a professional manner.

## Dealing with turnouts on a grade

But how do we deal with switches that are on a grade? I've found that, by and large, if both trailing splines are the same distance from the point spline and the same height, you'll still be okay. See below:

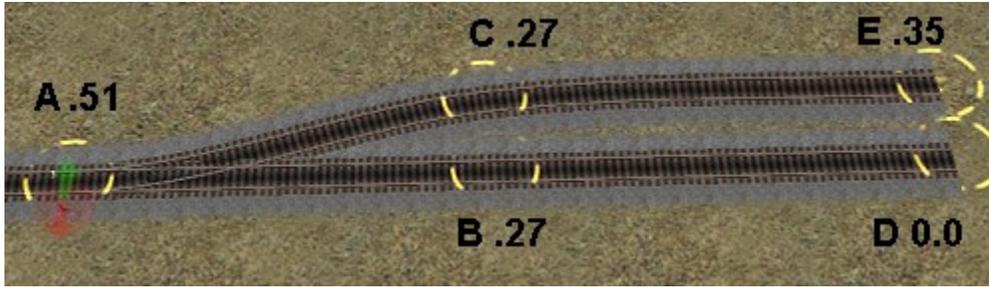


Notice that although the heights of splines B and C are different than A, we're still okay, because both B and C have identical heights and they are the same distance from A. If, however, we change either of these factors, we have a problem.

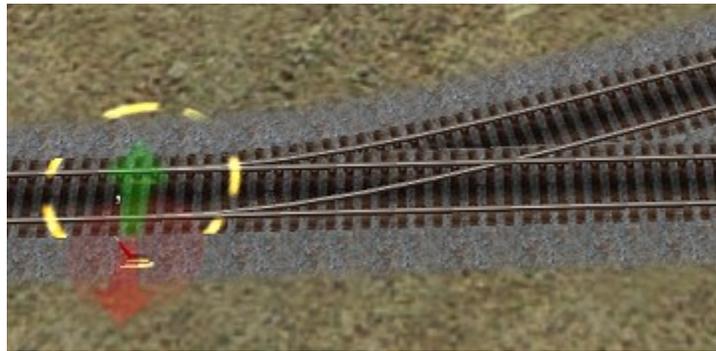


See? Even though B and C are the same height, their distances from A change the height of track A-C through the frog enough that it is visibly lower than track A-B. This is a problem you'll deal with on a regular basis if you want your turnouts to look nice. We'll discuss how to fix it in just a moment.

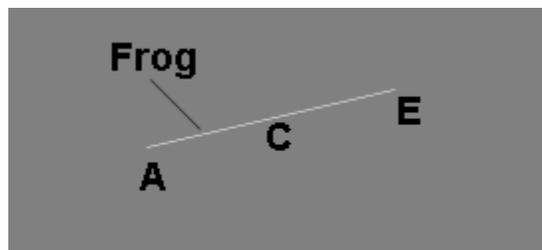
Even if we make all three points the same height and distance, though, we may still have a problem, caused by the height of connecting tracks. Consider the following:



Notice that A, B and C are the same height as before, but the grades from B to D and C to E are different. The track from B to D is descending, while the track from C to E is climbing. So, even though B and C are the same, the track height through the switch is affected by the difference in grades. In fact, look at a close-up of the frog:



See how the sidetrack is actually lower through the frog than the mainline? Why? Well, think of our track as a seesaw in the following drawing. :



If you have a piece of wood from A through C to E, raising E tends to force A down. In our example above, the track running through the frog is 'bent' downward by the grade from C to E. In the same way, the downward grade of B-D forces that track upward at the frog. Get the idea?

We can fix the problem by 'mis-adjusting' the height of either B or C slightly to compensate. In this case, I'll opt to fix the sidetrack and leave the mainline as is.

Using the vertex height tool, we type in and manually assign small increases in C's height, checking after each change to see if the rails cross correctly. Two or three changes are usually sufficient to achieve the correct height, and the end result looks like this.



So, even though the mainline and sidetrack are diverging in height, it's still possible to have great-looking track. Some might say that this is a lot of extra work, the switch will work just fine without all the tweaking. That's correct, it will. It's just a matter of how much effort you're willing to expend. 😊

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