Q. On a dual carriageway road, how do I have separate gradings on each carriageway?

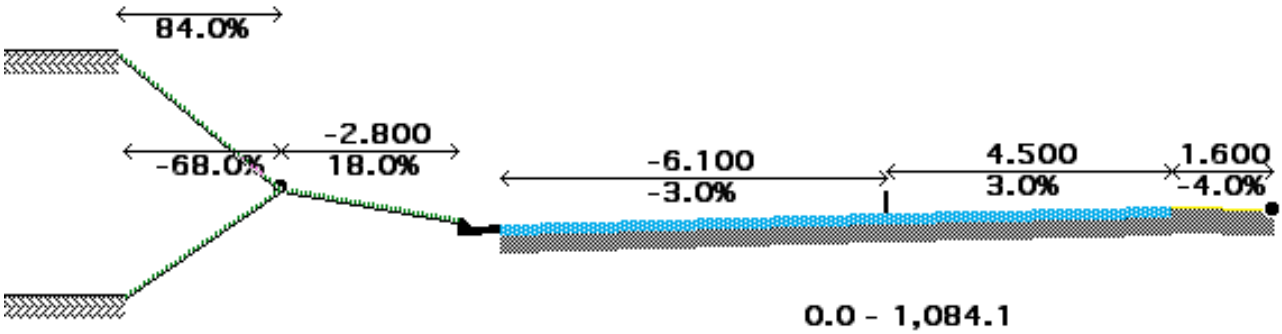
A. There is not a way to have two gradings attached to the same control line, so its necessary to do some creative thinking about how to keeping two alignments synchronised.

Its often important to have the cross sections matching for each of the carriageways. This can be done by creating two control lines on exactly the same alignment. Start by creating a control line along the centre of the median strip for the dual carriageway road.

To begin with I recommend you create a typical section for the full width of this road and do a trial design to get the horizontal alignment approximately correct. And similarly with the vertical alignment – do a preliminary design using this single control line, and a full width typical section. In this way you'll get to know the terrain, and the constraints on the alignment. Keep refining the design to the point where you need to explore separate gradings.

You might want to choose Save As at this point in case you need to come back to using this model.

The current control line will become the control line for the left carriageway. The typical section will be centred on the carriageway, as though the horizontal alignment for this road is along the carriageway centreline. Draw the left side first – that is, the outer lane, the shoulder, and the cut and fill batter slopes.



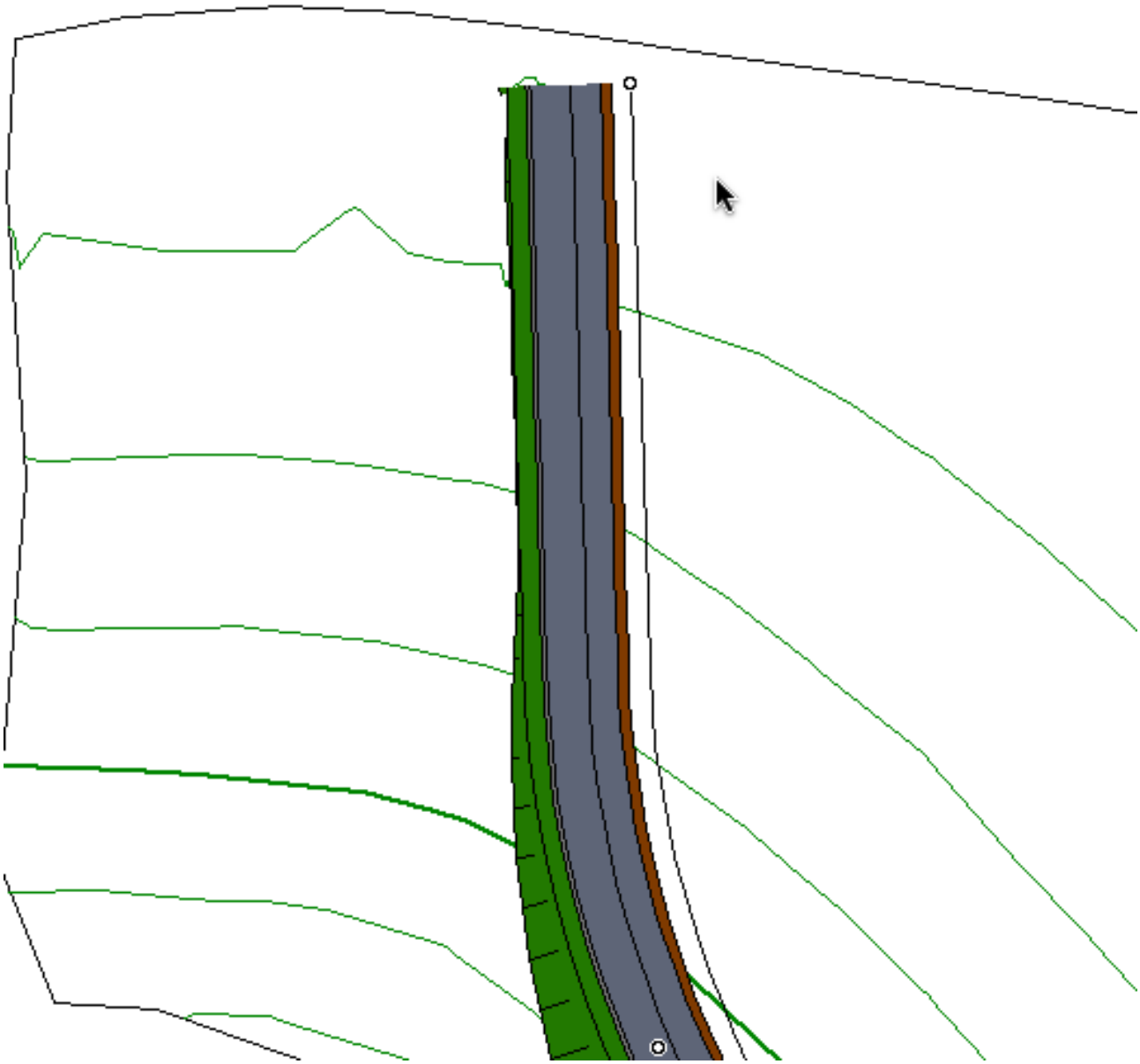
The actual position of the control line is along the centreline of the median strip. The typical section though is centred on the left carriageway, which is 9 metres to the left of the median centre. Offset the typical section by choosing Typical Section Offset from the Typical Section menu, and set the offset at -9.0 metres. This will move the typical section 9.0 metres to the left of the control line so it is centred correctly.

Notice that the right hand side of this typical section finishes at the shoulder – that is at the edge of the grassed median strip. The median strip will be modelled as part of the right carriageway.

You can now go ahead and design this carriageway of the divided road.

This is how the plan view will appear now:

You can see the road is to the left of the control line, rather than centred on it. The right side will be modelled by another control line, and it will be attached to the edge of this carriageway.

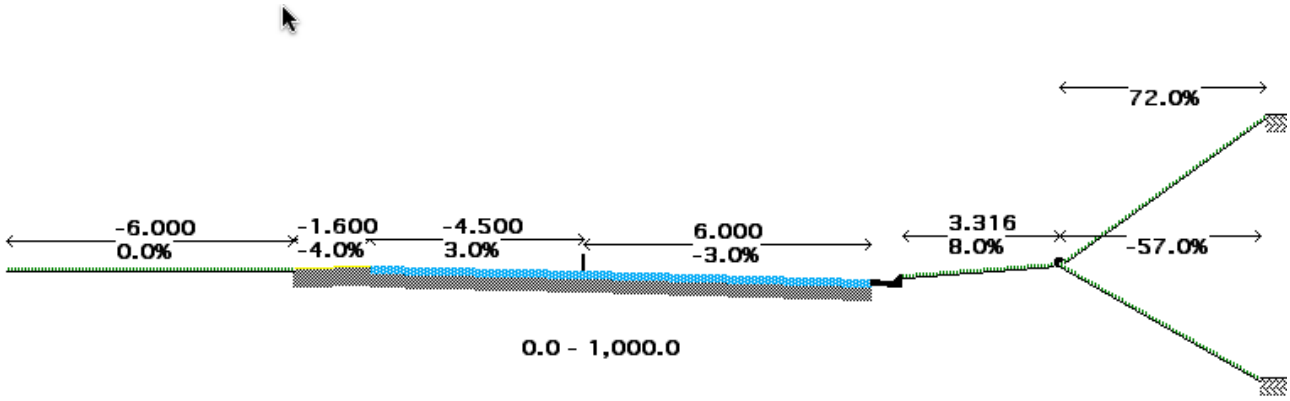


For the right side of the road, create a new control line, and locate the plan IPs in exactly the same position as the left carriageway control line. You'll have to edit each IP to be sure its coordinates match the first control line exactly.

Create a typical section for this side of the road starting on the outer, or right side – that is the pavement, shoulder, and batter treatment. Then the left side which is pavement, shoulder and grassed median strip.

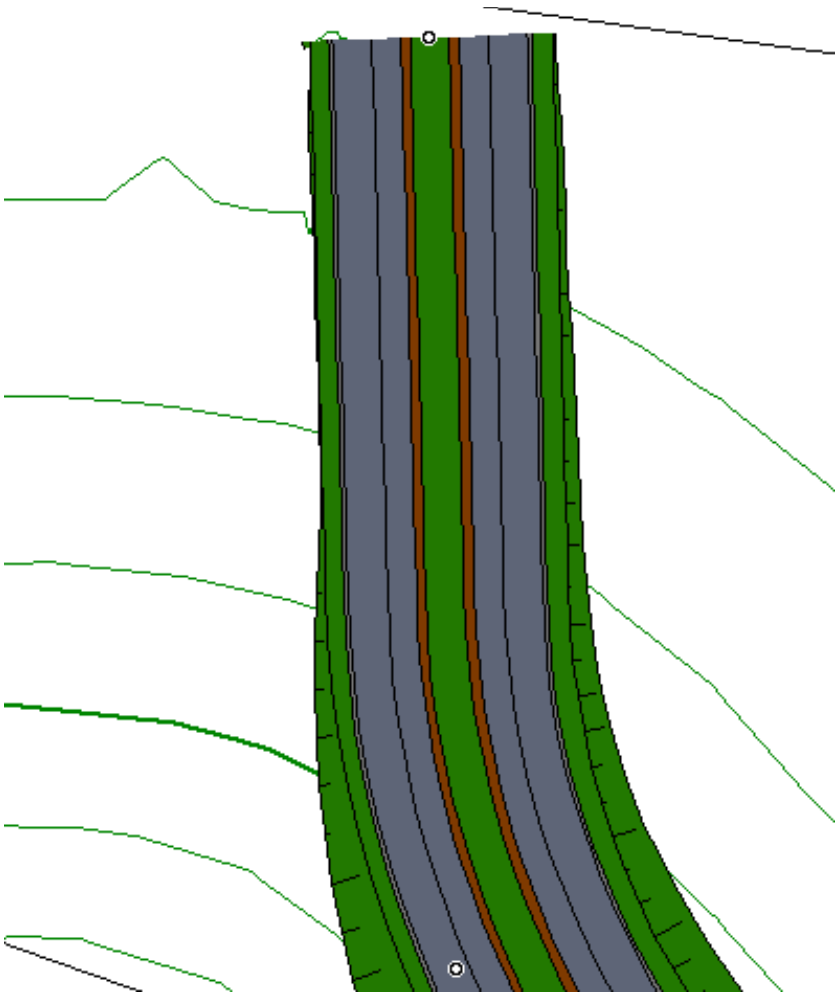
The left edge of the median strip will need to be attached to the right shoulder of the carriageway we already designed.

But first here is how the typical section appears:



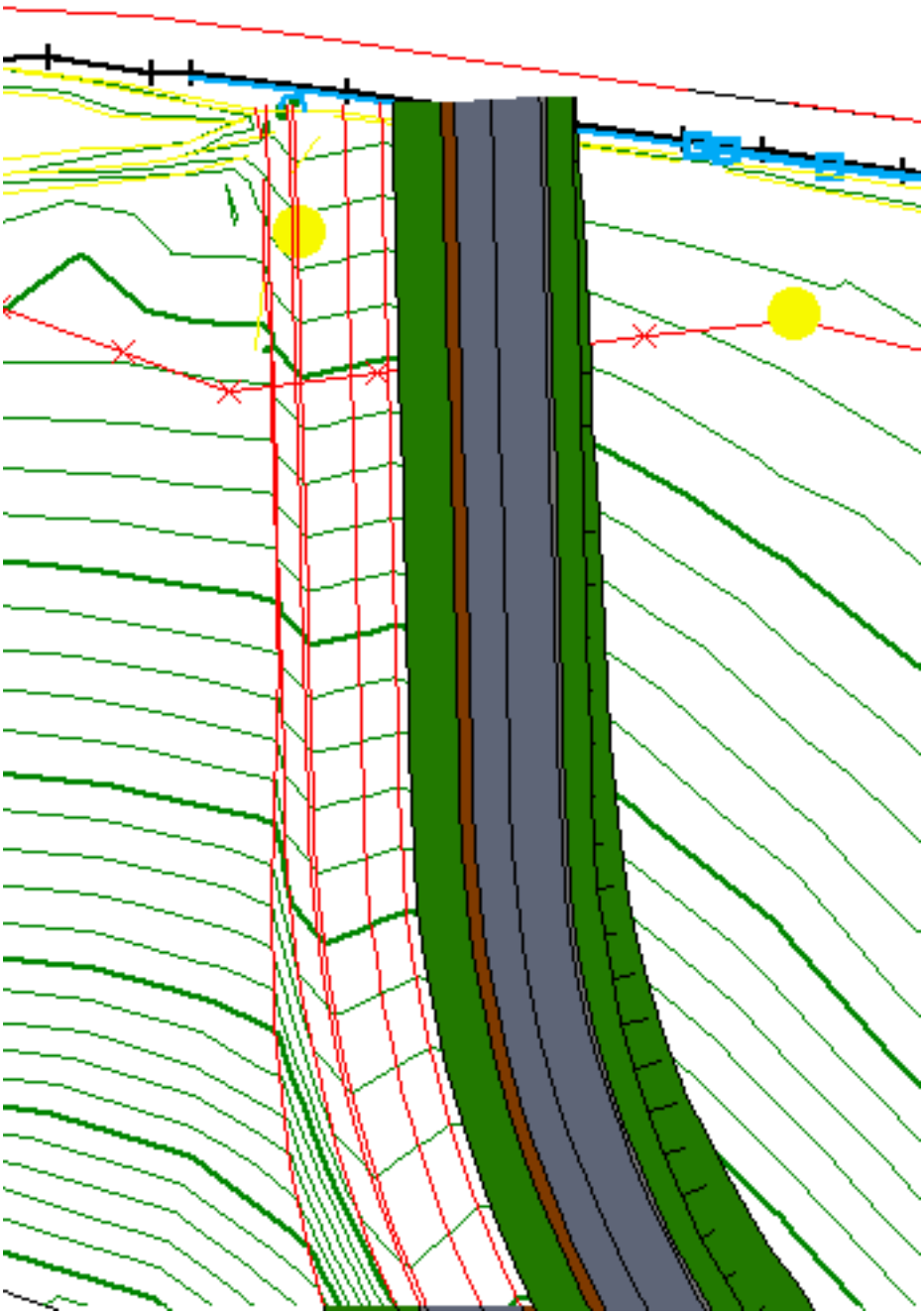
To begin with, as we refine the design, the median strip will be horizontal, as show here. Because the left carriageway is following a different vertical alignment to the right side, the median link will have to float up and down to attach to the other carriageway. For now though it will be horizontal until the design is well refined. For this side, the typical section will offset 9.0 metres to the right.

Here is how the plan looks with both sides being drawn:

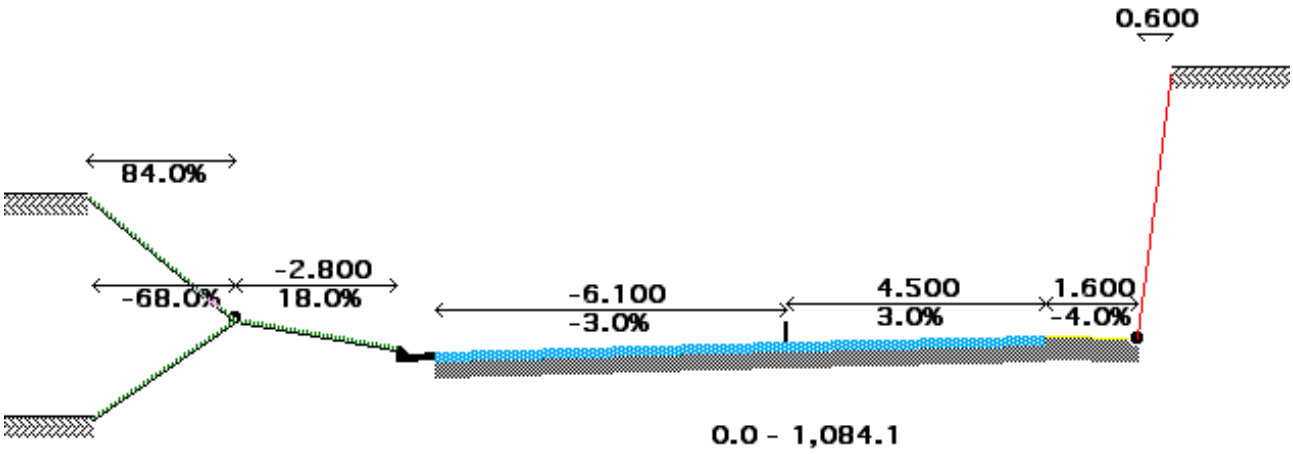


When the design is sufficiently advanced, construct the left carriageway and this will create a feature string that we can use to attach the median to. Before constructing the left carriageway, save this design, and then choose Save As... and name the new file, *My project LHS constructed.* This is important – because you may need to return to the design with both carriageways still "live".

Here is the plan view with the left carriageway constructed. The contours are shown at 1 metre intervals, and the features shown to see more clearly the constructed left carriageway.

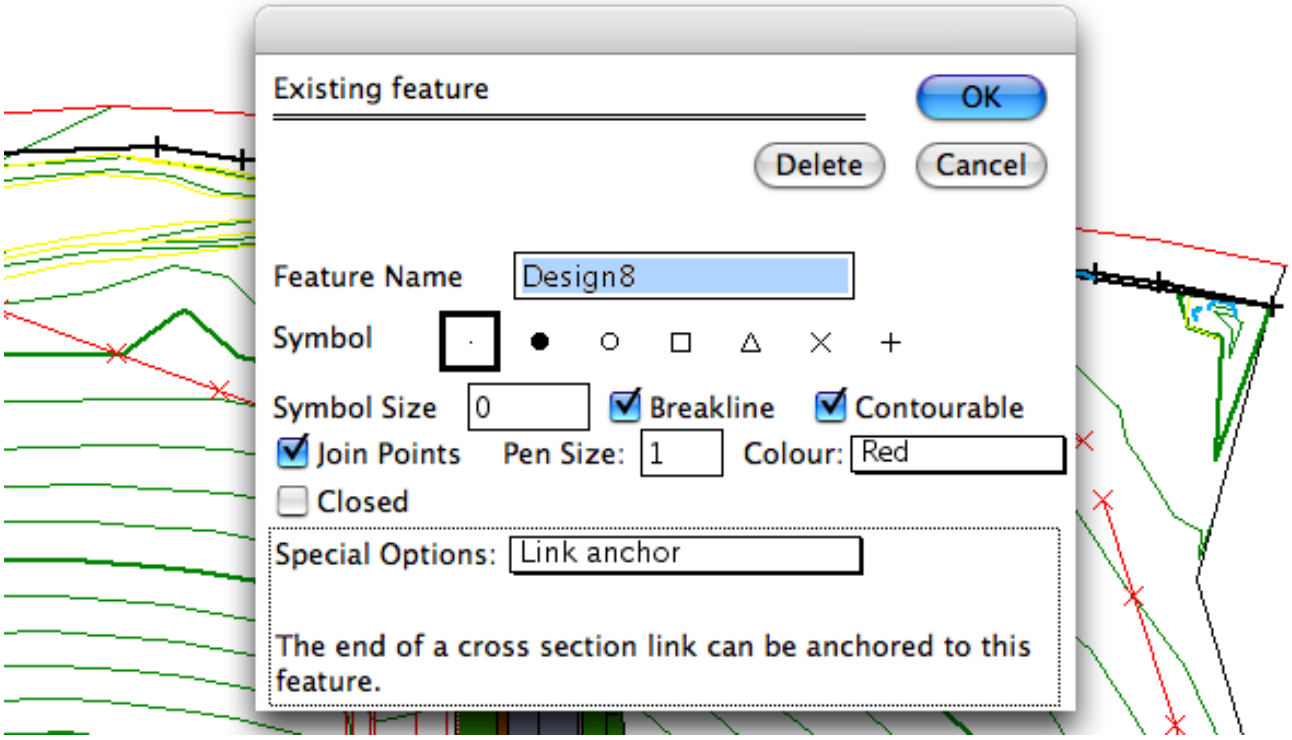


Just before constructing I added batter link with a fixed offset to the left side carriageway thus:

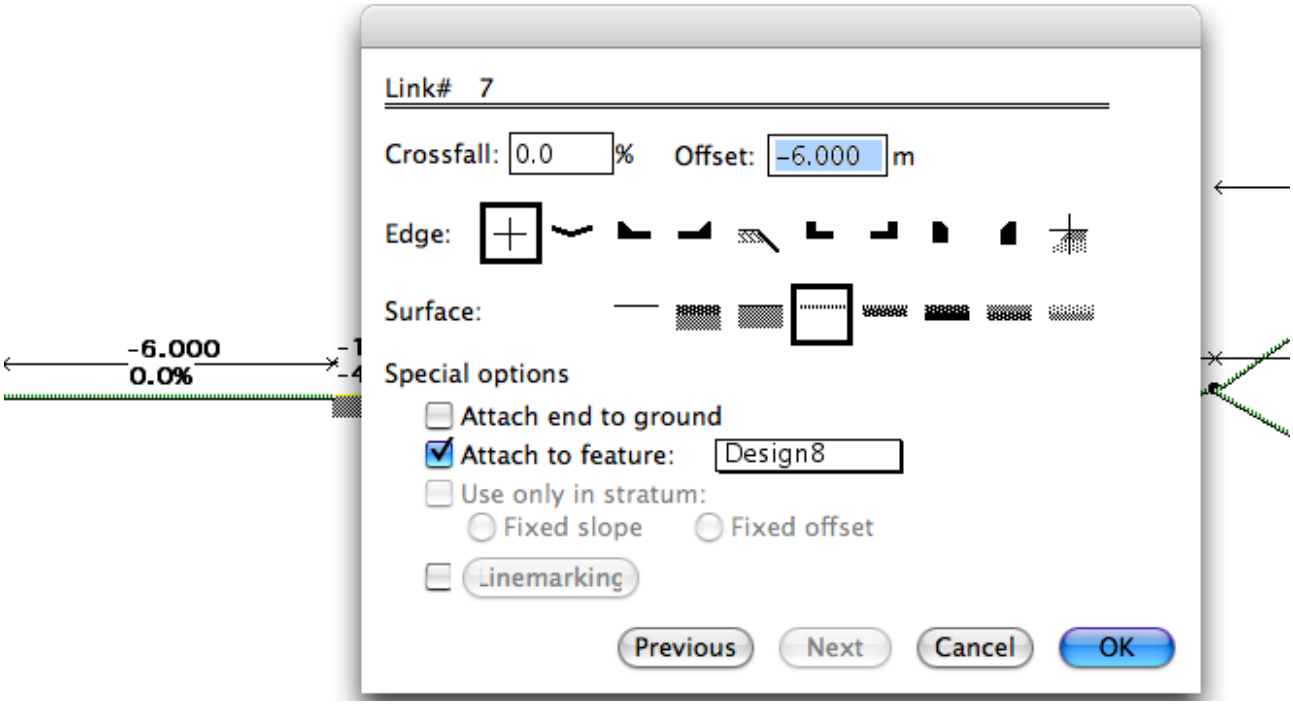


This is done to make a defined edge of the left carriageway so it is clearly visible in the cross sections, for the purpose of showing clearly the constructed portion in this example. It would also be helpful in making a clear delineation of earthworks volumes for the left and right sides.

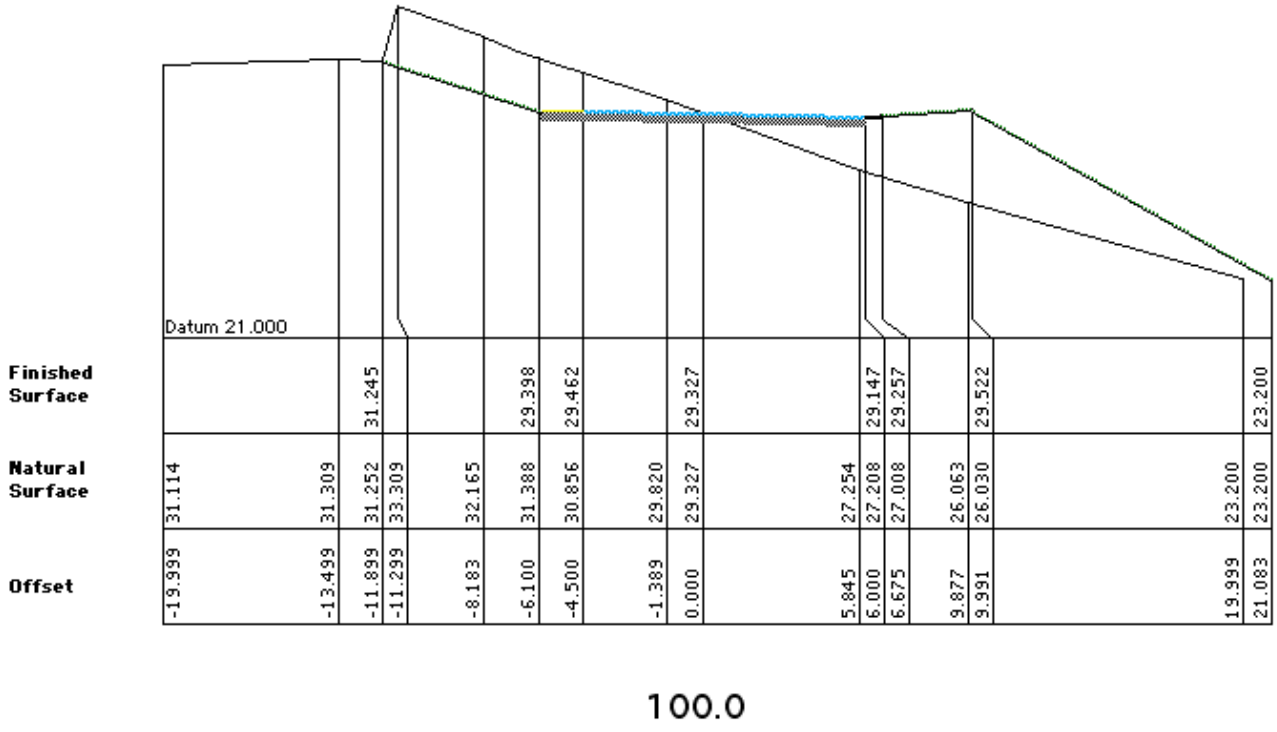
Now that the left side is constructed, double-click the feature string which represents the edge of the shoulder, to which the median strip should attach. Here is the dialog box for that feature, and with the option *link anchor* chosen.



With this feature marked as a link anchor it will show up in the list of options for special treatment of a link in the typical sections. Click on the median strip link to see this option:



With this option selected the median strip edge will now connect to the edge of the constructed carriageway. A section on the right carriageway shows the median strip connecting to the edge of shoulder:



This section immediately shows up another problem, which is median drainage. The median strip link could be changed to include a drainage ditch.

Alternatively a third control line could be added to represent a drainage ditch, which would connect to the shoulder of each carriageway. The technique is similar to what is used for matching the carriageways. Each carriageway would have a typical section similar to the left side. The median strip would not be inclueded on the right side.

A third control line is introduced to represent the drainage ditch, and its links either side would connect to the anchor features of the two shoulders.