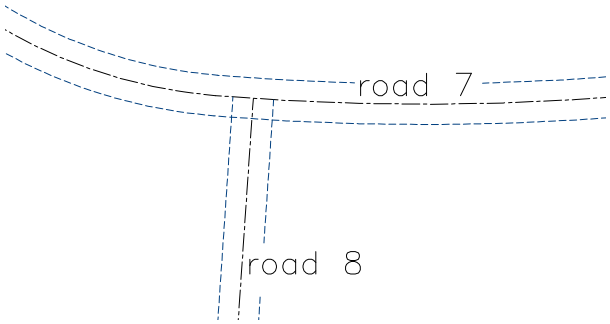
Ground Modelling, Road Design and Land Survey software for Civil Engineering, Environmental and Landscape applications working within CAD.

Junctions

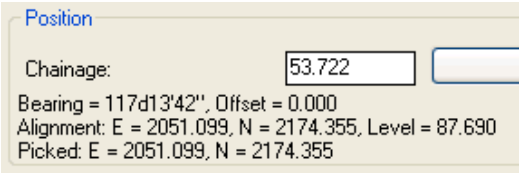
This follows on from the new road design sequence described in the Road Design sequence and starts with "overlapping" 3D Polylines representing the channel lines. The vertical alignment design for road 8 starts by respecting the vertical alignment of road 7 and its cross fall.



Step 1 Vertical design considerations

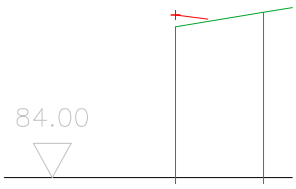
Vertical design for road 7 as described in the Road design sequence.
The vertical alignment for road 8 needs to respect the design level where it starts on road 7.

a. Get the chainage and design level along road 7 where road 8 "ties in" by *Design, Horizontal, Alignment and related points*. Say "Yes" at the Select vertical geometry, select the .vtg file and pick the end of road 8 where it meets road 7. The level at the picked chainage is reported and click Alignment point… to draw a point.



b. Use this level to fix the start (at chainage 0.000 in typical use) of the vertical design of road 8 with menu item *Sections, Fix and Draw features on section*. Mark as a Point at specified Chainage and Level with the level pasted in at the command prompt.

c. Construct the start of the vertical alignment design for road 8. Draw a line starting by object snapping on to the point drawn in b. above and approximately 5 metres to the right. Menu item *Sections, Enquire and fix Gradient of Line* and typical values will be as shown to the right assuming road 7 is 7.3 metres wide and at chainage 53.722 the gradient is 1 in 40 cross fall.



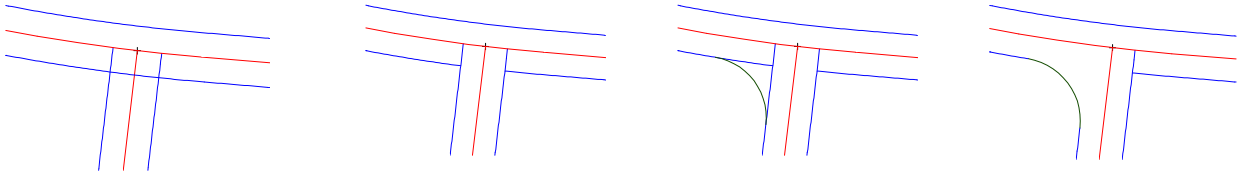
Proceed to design the vertical alignment for road 8 respecting this initial line and represent it as a 2D Polyline. Continue as described in the Road design sequence.

Step 2 Draw the channel lines

Use *Design,Strings,Draw* (or individual String Design methods) to relate channels to the road 7 and road 8 Master Strings. Left and right channels should now be represented as 3D Polylines.

Step 3 2D Junction design

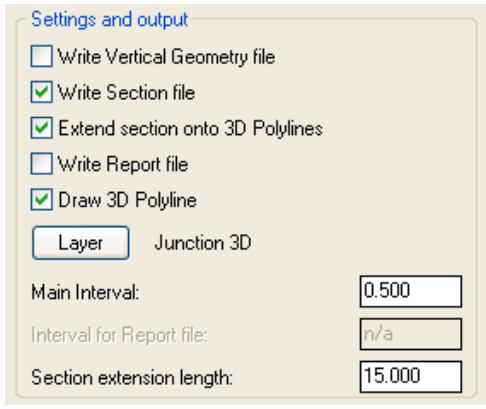
Make a COPY of the south channel of road 7 in the above example (in exactly the same location) and change it to a different layer (for example called “Full channel”) and freeze this layer. TRIM road 7 southern channel using both channel lines for road 8 as cutting edges.

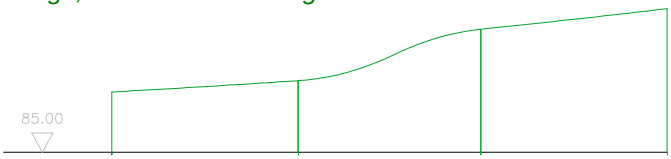


Use *Design, Horizontal, Draw Junction* to locate a 2D Polyline with specified curve geometry as fixed by the tangential conditions along the channels. Use the junction Polyline to TRIM off the “external” channels. If the AutoCAD TRIM fails to cut a channel 3D Polyline (due to a sub millimetre gap) just construct a cut line roughly at right angles to the junction end and use this to TRIM.

Step 4 3D Junction design

We need to consider the vertical design of the junction using *Design, Strings, 3D Junction*. The idea is to make an automatic vertical design with a “curve and straight” or reverse curve geometry but with an option to make an alternative/override vertical alignment design on the long section. When drawing the section use the Start and end marking option. To relate a modified vertical alignment (following *Design, Vertical, Extract geometry*) to the 2D junction Polyline use *Design, Strings, Draw Master String*.



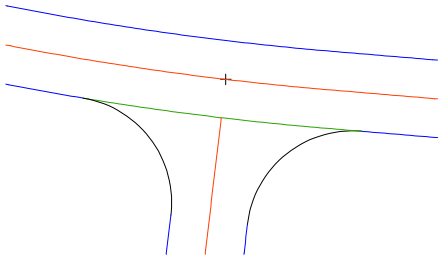


Section showing reverse curve geometry

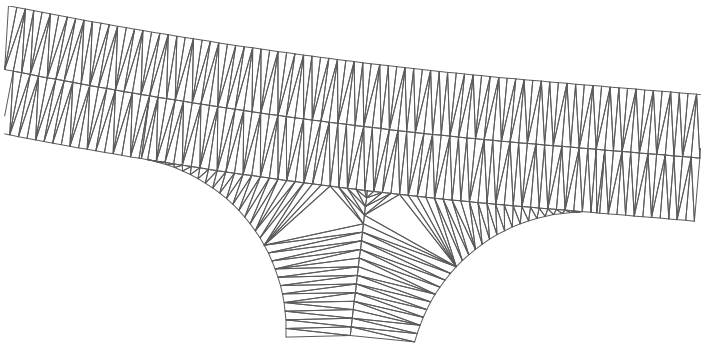
3D viewing can also confirm that the design smoothly links the two channels.

Step 5 3D Junction model

We need to consider which 3D Polylines are to be used to make the model from. Thaw layer “Full channel” and trim the original south channel so that it appears as the green line on the next page or alternatively use the “full channel” 3D Polyline intact and erase the “component” south channel lengths.



Channel, centre and junction 3D Polylines used for model creation



Triangles after assigning active and passive triangles

Introducing ghost crown lines (not illustrated) will improve the triangulation and avoid the occurrence of the two larger triangles. Contouring the model will help identify low spots etc.