Building sites with HighRoad

This example shows how you can use HighRoad to create a terrain model of a building site, complete with building pads and access roads or driveways. This terrain model can then be exported for use in Domus.cad or Archicad.

To do this demonstration you will need a copy of HighRoad, on Windows or Mac OS X, and the sample project entitled:

Example Project
constructed.rdd   HighRoad X623

Open HighRoad, click **Open** and open this project. You should see the following terrain model with an existing road. (Choose **Show features** from the Plan menu if features are not visible). Notice in the view below the magnifier cursor with the minus (-) symbol, which is the Shrink cursor. Its handy to remember the shortcuts for Zoom Shrink and Pan. (They are the same as MacPaint... if you can remember that!).

On Macintosh   On Windows
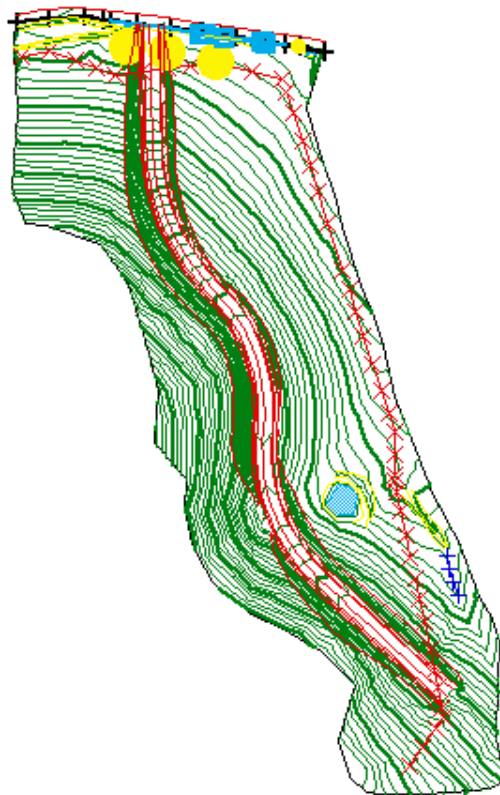For Zoom, press ⌘ and click   For Zoom, press **Alt** and click
For Shrink press **Shift ⌘** and click   For Shrink press **Shift+Alt** and click
For Pan press **Option** and click.   For Pan press **Right Alt** and click.

Our task is to design a single building pad and an access driveway from the road. The same principles can be applied to design many pads and driveways such as may be needed for a medium density development.

Zoom in to the top left of the terrain model — in this area we will place a building pad. Choose **New Control Line** from the Plan menu and in this dialog box choose **Building Pad**, type in the name **house pad** and click OK. (Width 15m, length 25m)

Move the cursor to the approximate location of the building pad (as below) and drag to display the building pad shape. The pad shape will follow the cursor. Release the button to locate the pad. Its batter slopes and full extent will be calculated and drawn so the extent of the pad will be visible.
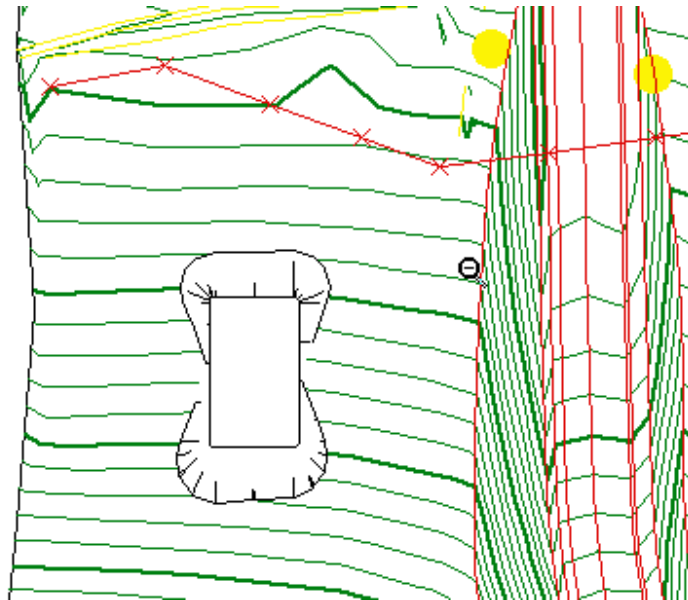
The elevation of the pad will match the ground level at the point where you first clicked.

In the view above, the top of the pad is in fill, as can be seen from the batter rills going from the pad towards to the ground. The bottom of the pad is in cut, as can be seen from the rills going from the ground towards the pad.

Note that the cut batter extends some distance away from the pad and in such a case it may be useful to use a retaining wall. To show a retaining wall you need to change the typical section so that the cut batter is steeper to represent the steep slope of a retaining wall.

Display the typical section window by choosing **Typical Section** from the Window menu. Click the arrow tool.
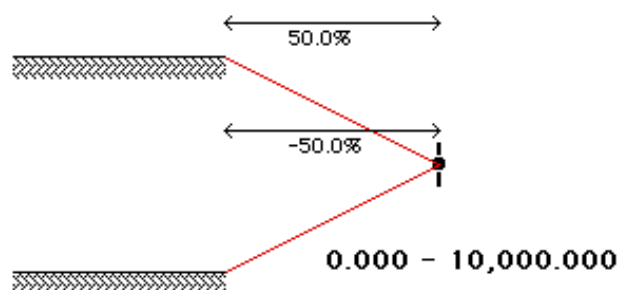
This is a typical section of the edge of the building pad showing both a cut and fill batter slope of 50%, which is the default value. The cut batter needs to be adjusted from 50% to 1000% (that is, 10 on 1).

To do this, click on the text "50%" and the following dialog box will appear where you can change the slope to 1000%. Note also that you should set the offset to -0.5m, just so that the link is visible in the typical section window. (If you leave it at -3.600, this becomes a very tall link and runs off the top of the window).

Select Plan from the Window menu. The plan view now should look like this:

The pad can be dragged around on the terrain. Whenever the cursor is over the pad it changes to a hand shape and at this point it can be dragged. The p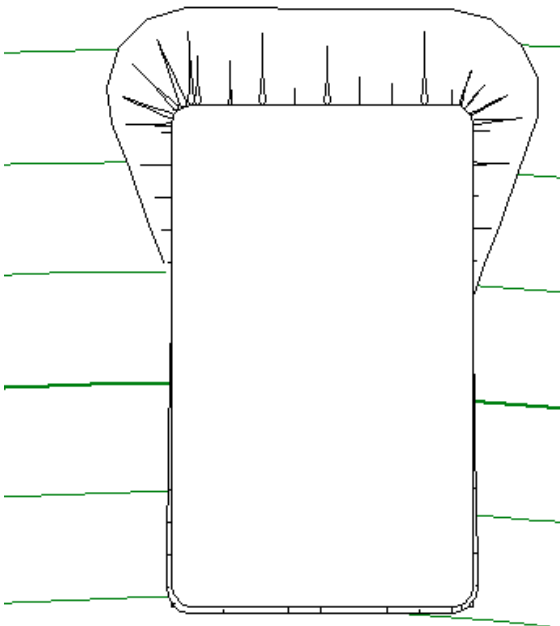ad would be better aligned across the slope rather than as it is... to change the orientation of the pad, double-click and change the rotation to 90 degrees.

To complete the work we also need a driveway or access track from the road to the building pad.

Because we are to connect to the pad, we need to know the elevation of the pad. Double click the pad and the dialog box that appears will show the elevation as below:


The elevation of your pad may be different. Note the elevation because we need to match to this level with the access track.

Start the new driveway by choosing **New Control Line** from the Plan menu. Name it **Access Track** and click OK. Add new intersection points (by choosing **New IP** from Plan menu for each IP) roughly in the positions shown below... start at the road and work around to the pad.
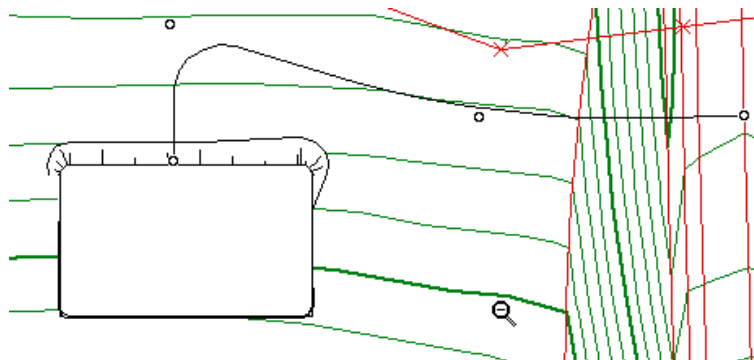
The next step is to design a typical section suitable for an access road. Choose **typical section** from the Window menu. You will draw a typical section similar to that shown below. The width of the track is 3 metres, made up of a 1.5 metre link on each side.
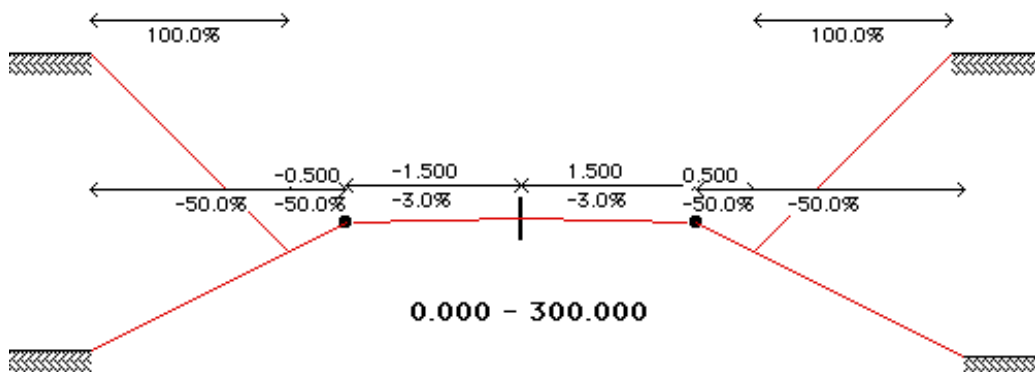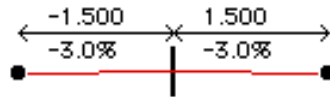
Draw the typical section in this manner:
• Choose the cross tool and the generic surface type and draw the 1.5 metre link each side.

• Click in the dimensions to edit them if necessary.
• Add a split point on each side.
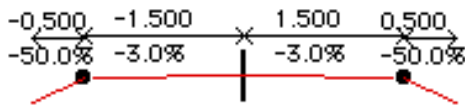

The typical section should now look similar to the one shown below:

• Add a 0.5 metre link each side to make a drain.

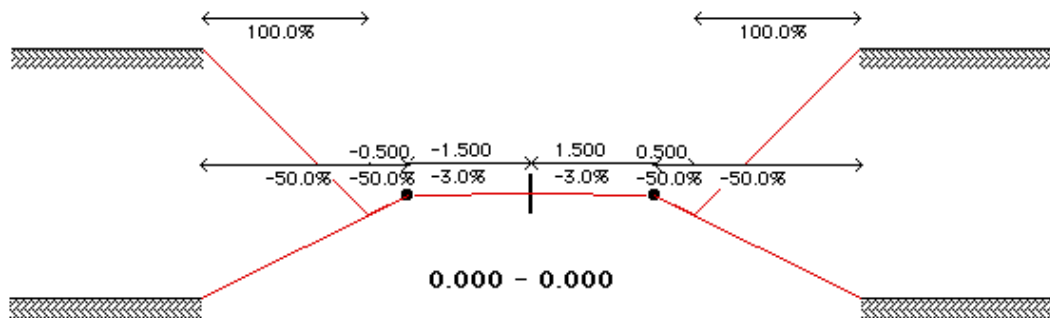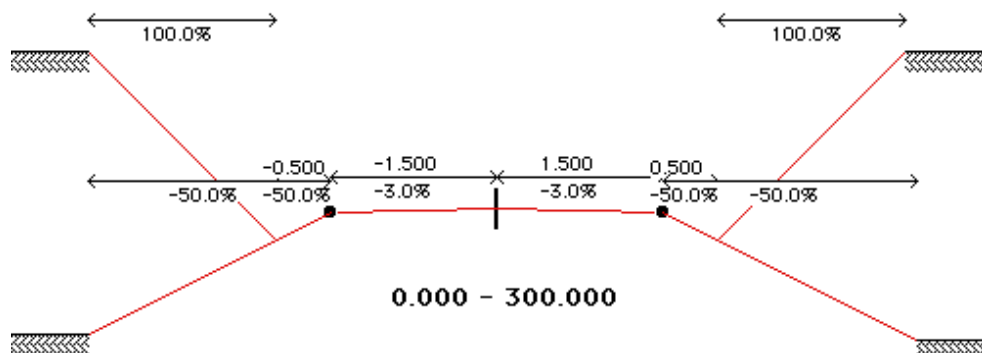• Choose the batter edge type.


• Add a cut and fill batter (in that order) to each side.

• Click on the chainage range it long enough to cover the extent of the track, 0 to 300.00 will be more than ample.

You can now go to the plan and take a look at the general shape of the access track by choosing Show Access Track Details from the Plan menu if you wish. But at this time there is no profile design so the typical section will attach to ground level.

Now go to the profile window and design the grade of the access track. Start at the existing road and go to the pad which will be on the right. The profile should look similar to below.
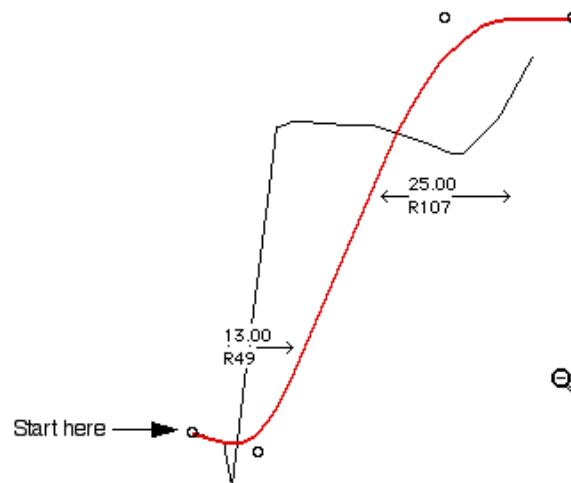

Choose **New IP** from the Profile menu to add the IPs. The last two IPs at the top right should match the elevation of the building pad. Double-click each IP to edit its position. (In our case the elevation was be 14.118)

Now drag the second IP so that the grade down from the road centreline matches the existing road crossfall as shown below:
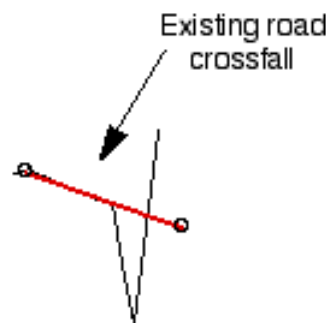
Note: There is a potential problem if the track you have designed is very steep. The gradeline is limited to a maximum slope of 25% (and this is very steep) and you may not be able to position the IP just where you want because of this limitation. You may have to move the third IP to the right to flatten the slope a little. In the wost case you may have to go back to the plan window and adjust the access track so that it is longer, thus allowing for a flatter grade.

You can now display the plan view complete with all details of the access track...
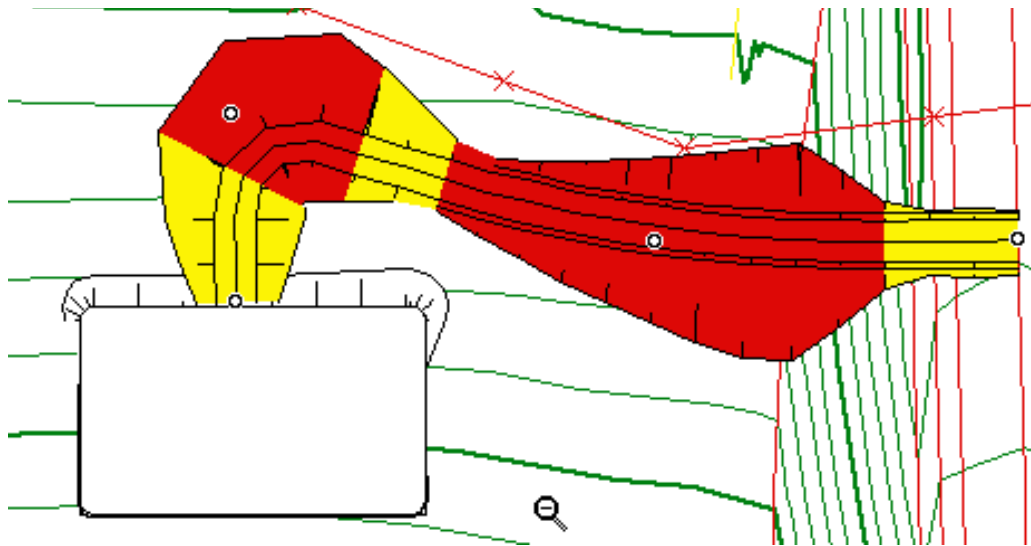
Note: red indicates the curve is substandard for the default design speed. This would not be relevant for a low speed access track such as this and can be ignored.

A problem with this design as it stands is that the access track starts at the centreline of the road, and should start at the edge. So go to the typical section and adjust the start chainage to 6.000 metres, which will mean the access road will start here.

The design can now be adjusted as and where necessary to optimise the design. Quantities can be calculated for both the access track and the building pad. Choose **text window** and **List Quantities** from the text menu for these calculations. If the access road is the active control line, first set the **Quantities Limits** (from text menu) before choosing **List Quantities**. The quantities limits need to run from 6m to about 60 metres. The length will depend on how long your access track is. Set the limits from **6 to 100**, and you will be warned this is out of range, and you will be offered the correct range. Now switch to the other control line and **List Quantities** again. For a real design you would want to refine the design by trying different alternatives to try to minimise the earthworks costs.

Once the design is satisfactory, you can "construct" the pad and the access track. Choose **house pa**d from the active menu so that you construct this first. Choose **Construct house pad** from the Plan menu and the terrain model will be adjusted to show the new design information. Choose **access track** from the Active menu and then choose **Construct access track** from the plan menu.

Now go the plan window and Choose **Contours...** from the Plan menu to redraw the contours according to the new terrain information.

The terrain model should now appear similar to this:
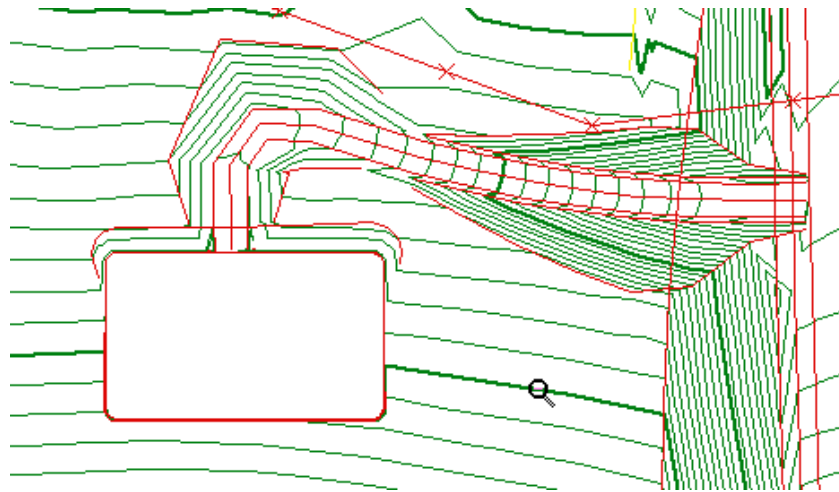
You can now look at the 3D view of the terrain. While still in the Plan menu choose **Fit to Window** from the view menu. Choose **Show Camera** from the plan menu, and a blue line showing the position of the camera and view point will appear. If the full length of the line is not visible, choose **Shrink** from the view menu. The blob is the camera end. Double-click either end to change the coordinates. Drag the camera and view point so that you are looking at the pad. Choose 3D view from the window menu. If you have enough room to show the plan and 3D view windows together, you can adjust the camera location and immediately see the effect.