Volume 12, No. 1
Spring 2004
Double Issue

Civil CAD Consultant

The Information Source for InRoads Users

What's Inside:

Civil CAD Consultant is an independent publication produced by CAD Productivity Incorporated.

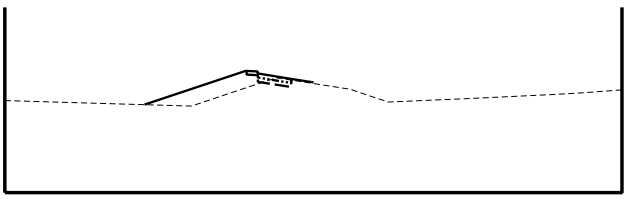
Matching existing conditions
Superelevation

by Sam Nugent

In the real world, you are often faced with more jobs that require upgrading, rehabbing and/or resurfacing than with completely new construction. In these cases, it is sometimes necessary to match existing superelevation rather than to completely reconstruct what's there. The problem lies in how to create your DTM to reflect the current supers while widening or resurfacing, when the typical InRoads superelevation is set up for starting from scratch.

One solution involves discarding InRoads' superelevation and using a more manual method for matching what's actually there. The following

continued on page 6



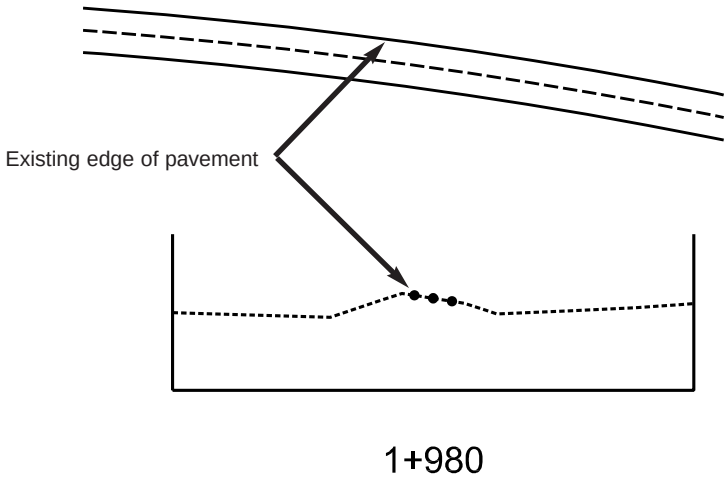
1+980

Superelevation

continued from page 1

workflow illustrates this approach, using a widening project as an example. The process involves creating horizontal and vertical alignments for the new edge of pavement in the widened area, then using them for independent control to match the superelevation. In this case, the existing shoulder area is to be milled to provide the base for the new paved lane, and there is also an overlay.

Prior to using this workflow, you must have a centerline and edge-of-pavement for the existing road (in super) in the form of graphics or features. If instead you have alignments for the edge-of-pavement and the centerline, view them using **Geometry>View Geometry>3D Alignment** and use the resulting graphics when required by the workflow.



1. If your EOP and Centerline are features, toggle on **Locate Features**. If they are graphical, toggle on **Locate Graphics**.

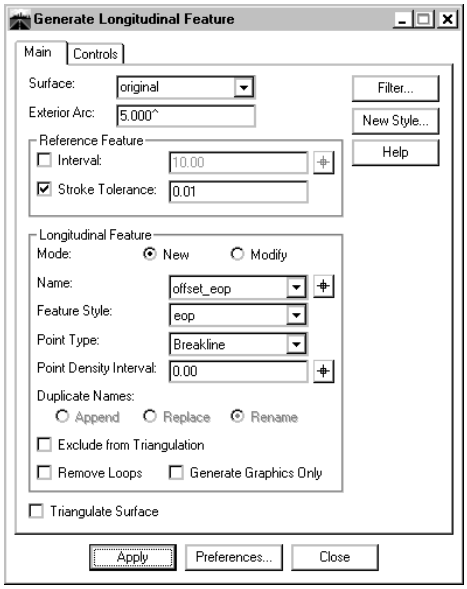
2. Create or load the geometry file, roadway library and template library you are using for the project.

3. Load the DTM that contains the existing road.

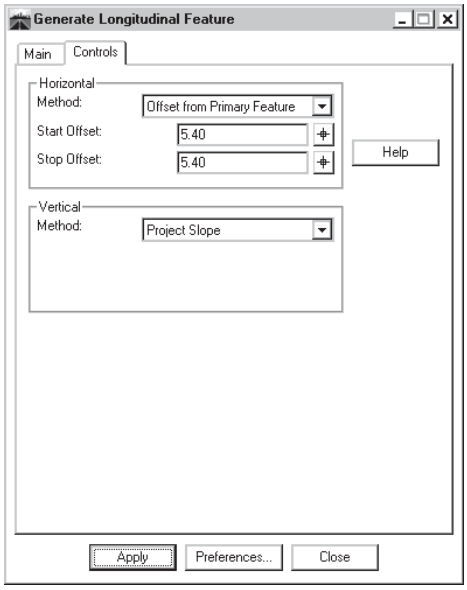
Creating graphics for new edge of pavement

For this example, the first step is to create a 3D linestring for the desired new edge-of-pavement. This is done by projecting the slope from the existing centerline to the existing edge-of-pavement and continuing that slope for the cut-out width. **Generate Longitudinal Feature** will accomplish this. It allows you to mimic the existing slope between the two linestrings or features by recalculating the slope between the two at the specified **Reference Feature Interval**.

4. Choose **Surface>Design**

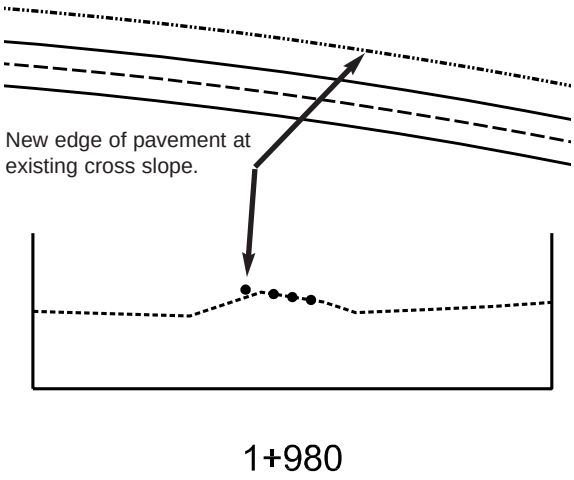


Surface>Generate Longitudinal Feature and set up the dialog as shown. This will create a new edge-of-pavement line for the cutout. In



this example, we are widening 5.4m from the existing edge of pavement.

5. Choose **Apply** and identify the current edge-of-pavement as the **Primary element**. When prompted, identify the centerline as the **secondary element**, and again as the **reference**. (Alternately, you can identify the actual centerline alignment for the reference, which ensures the copy is truly perpendicular to the curve.) **Accept**, then **Reset** to copy the entire linestring. Identify the appropriate side of the feature, then **Accept** again.

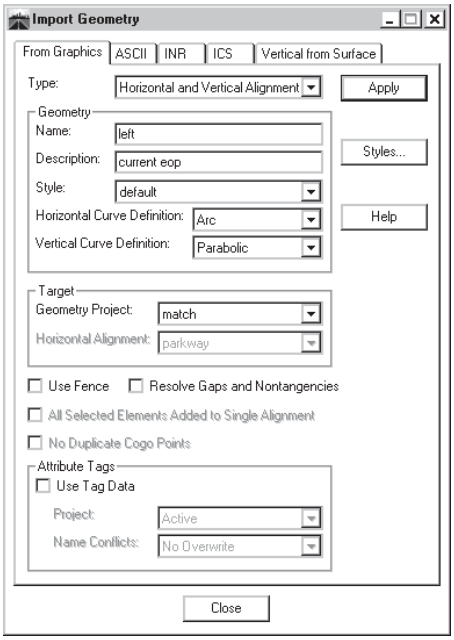


Creating alignments for new edge of pavement

In order to use the existing and new edges-of-pavement with independent control, they must be horizontal and vertical alignments. This is accomplished by importing the graphics.

6. Choose **File>Import> Geometry>From Graphics.**

7. Toggle the type option to **Horizontal & Vertical**, key in the desired name (left, in this example),



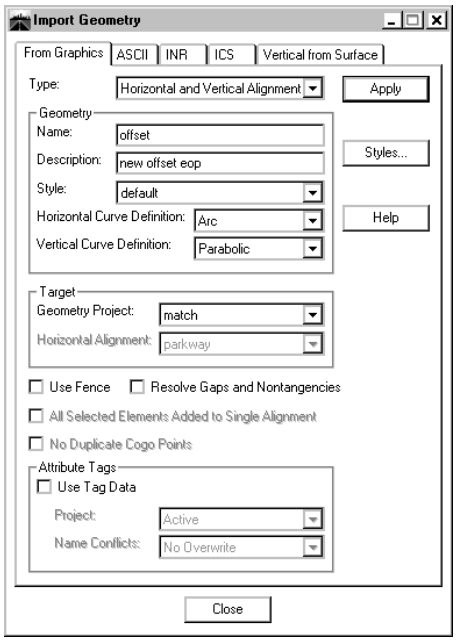
continued on page 8

Superelevation

continued from page 7

Apply and identify the edge of the existing pavement.

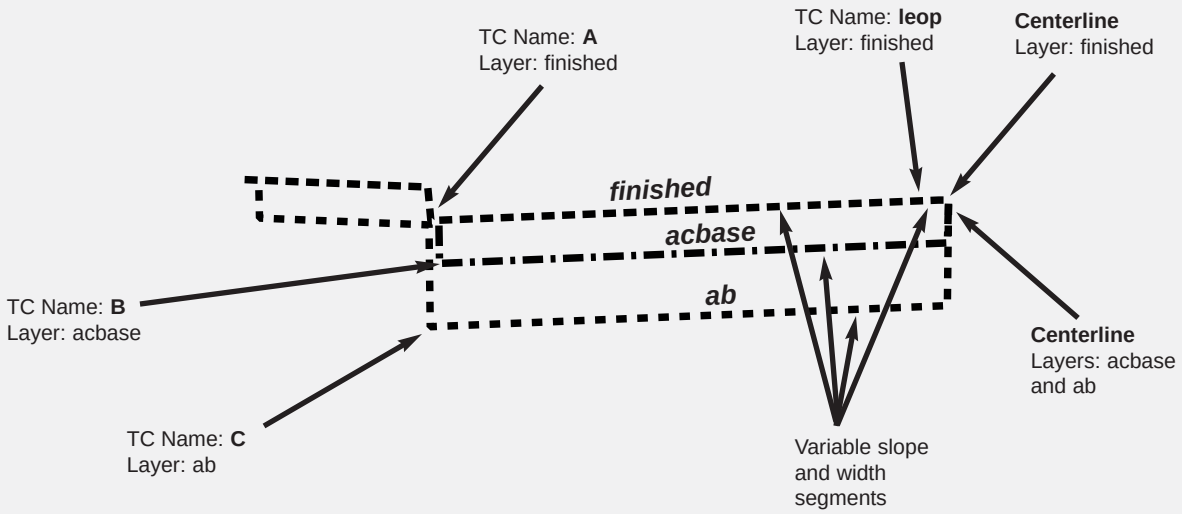
8. Key in a new name (offset, in this example), **Apply** and identify the offset line created in the previous steps.



Developing the template

Once the alignments have been developed, it's time to start on the template. First, you'll need to create a template that contains the layers that you want to model. In this example, the finished grade is modeled, along with two additional layers. Looking at a cross section, the desired result is for the finished grade to start at the centerline, and for the two subgrade layers to start at the existing edge of pavement. You may, in fact, have a

Template as defined



saw cut line that is different from the edge of pavement. If so, use it instead.

9. Choose **Modeler>Define Typical Section**. Highlight the template you are using for the cut-out (or create one if it doesn't already exist) and choose **Edit**.

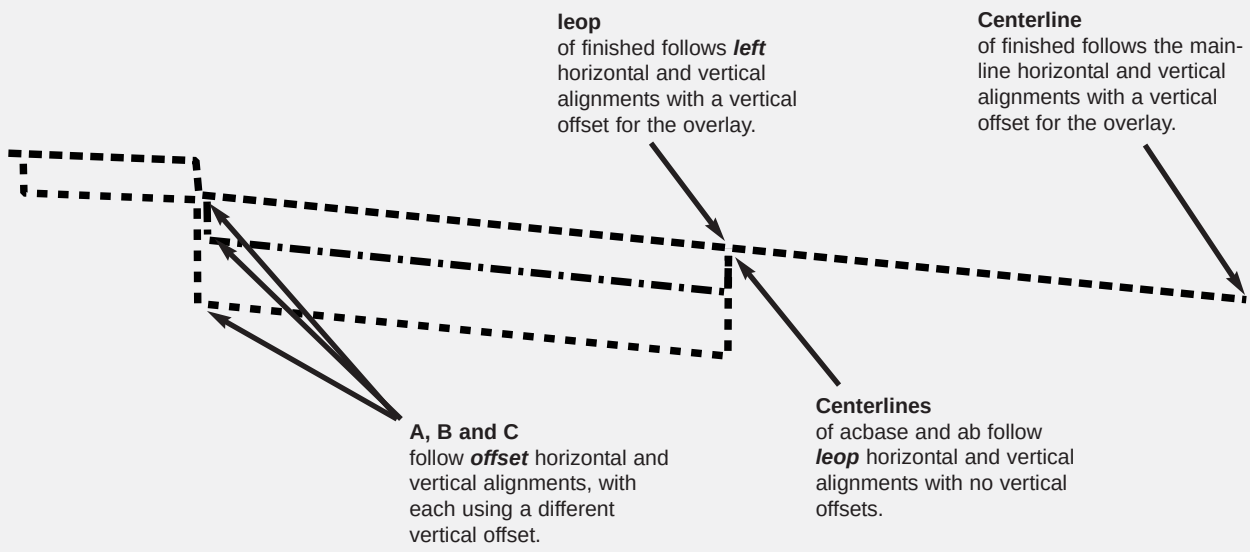
In this case, the finished grade is to be run from the centerline, so the first segment is variable slope and width to meet the existing edge-of-pavement. The second segment follows the new offset, so it too, is variable slope and width.

Also, the centerlines of the subgrades need to start at the existing edge of pavement, rather than at the centerline alignment. This is accomplished by assigning transition control to a TC name that is identical to the layer name. The TC name cannot be assigned anywhere on the template, and when **Modeler** is run, the centerline of the layer is shifted to the control alignment or path, and no segments vary. See Volume 11, No. 1 of *Civil CAD Consultant* for additional information on this somewhat obscure capability.

The outside edge of each layer follows the offset alignment and therefore the segments must be variable slope and width.

continued on page 10

Template as applied

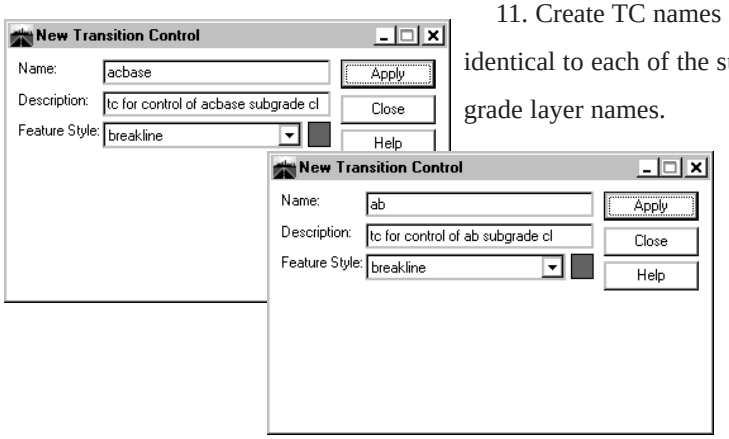


Superelevation

continued from page 9

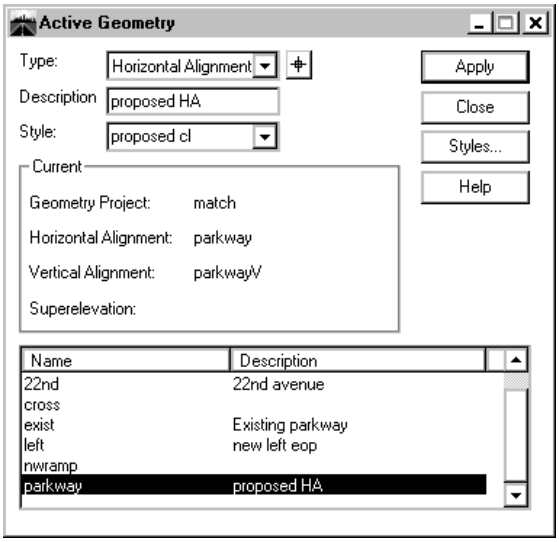
10. Assign **Fixity** and **TC names** as shown in the diagrams on the previous pages.

11. Create TC names identical to each of the subgrade layer names.



Note: Do not assign these names anywhere on the template.

12. Make the mainline horizontal and vertical alignments active.



Assigning independent control

The next series of steps involves assigning the independent control. This example requires six independent control entries:

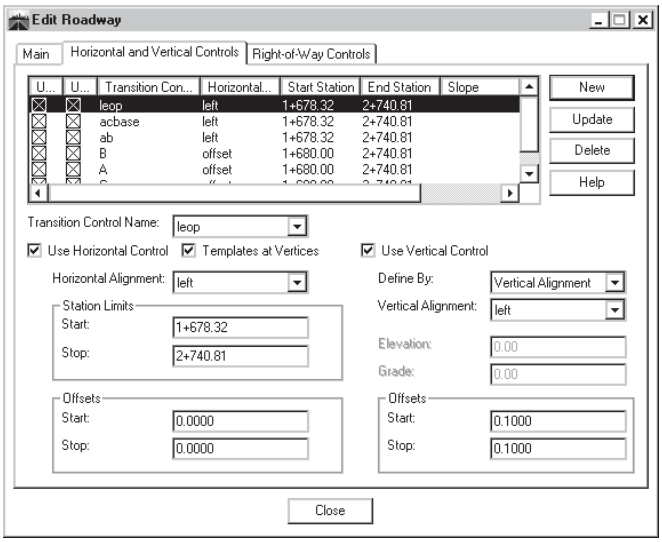
• One for the finished grade to "stretch" to the existing edge-of-pavement, creating the overlay.
• One for the new lane of the finished grade to widen to the offset.
• One for the centerline of the subgrade layer to shift to the existing edge-of-pavement.
• One for the subgrade to widen to the offset.
• One for the centerline of the second subgrade layer to shift to the existing edge-of-pavement.
• One for the second subgrade to widen to the offset.

13. Select **Modeler>Define Roadway**.

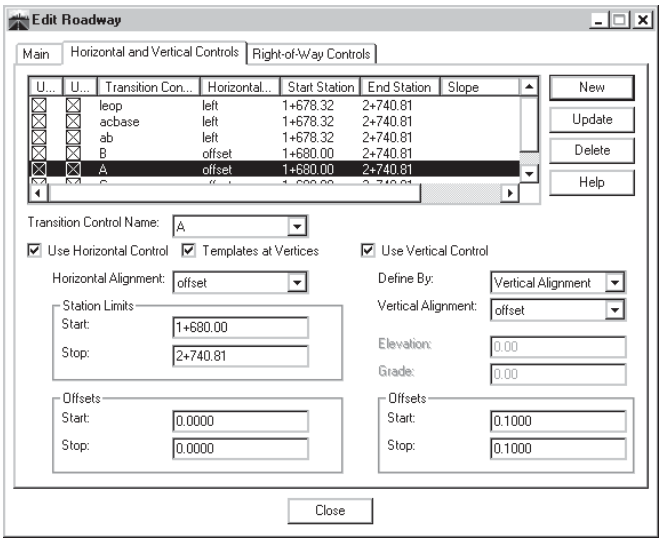
14. **Add** or **Edit** a roadway definition.

15. Choose the **Horizontal & Vertical Controls** tab and create each of the six entries as shown below and described in the following steps.

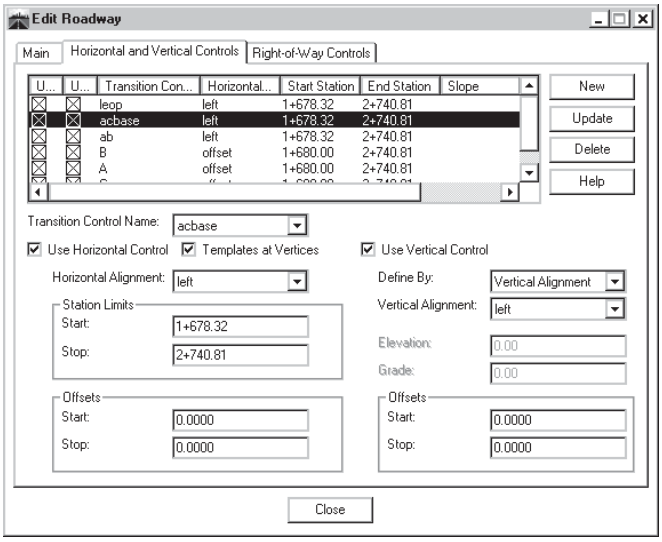
16. This entry assigns the TC *leop* in the finished grade to follow the new *left* alignment. Note the vertical offsets to accommodate an overlay.



17. This entry assigns TC name *A* to follow the new *offset* alignments. Again, note the vertical offsets.



18. This entry assigns the centerline of *acbase* to follow the *left* alignments. Note the use of the TC name *acbase*, even though it does not appear on the template.

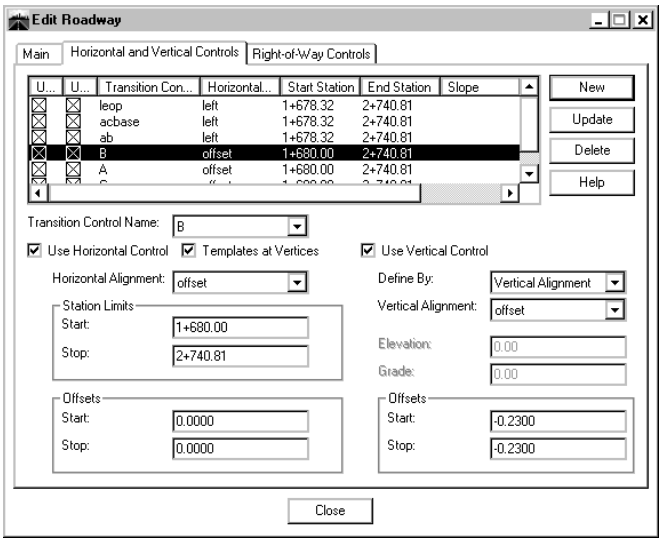


continued on page 12

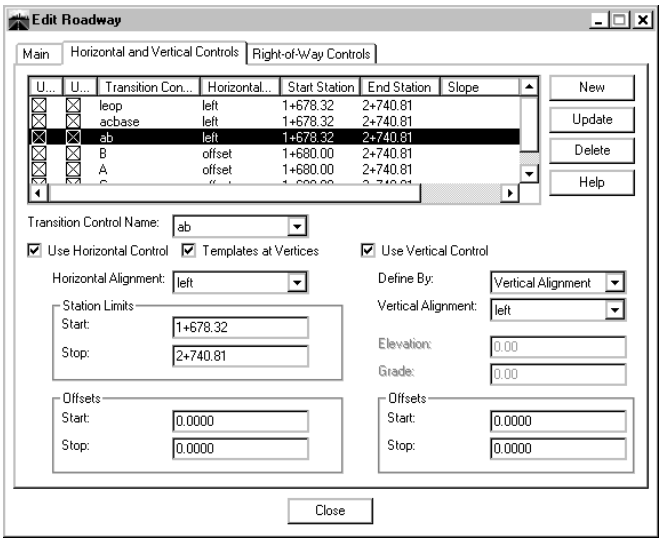
Superelevation

continued from page 11

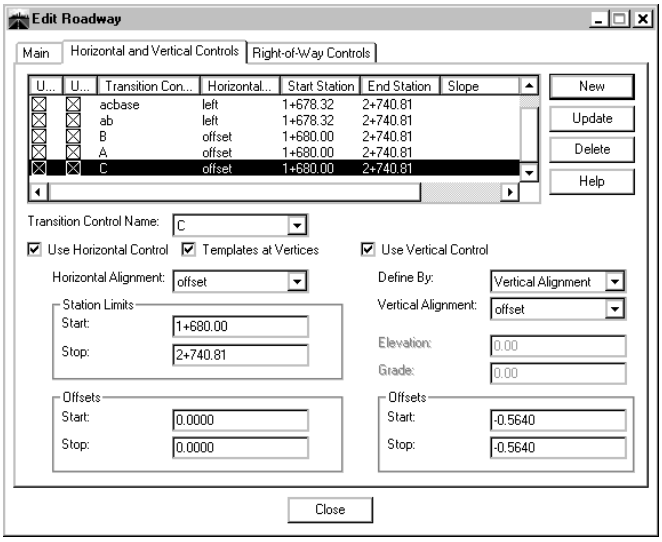
19. This entry assigns the TC name *B* to follow the *offset* alignments. The vertical offsets are to accommodate the depth of the layer (from the alignments).



20. This entry assigns the centerline of *ab* to follow the *left* alignments. Note the use of the TC name *ab*, even though it does not appear on the template.



21. This entry assigns the TC name *C* to follow the *offset* alignments. The vertical offsets are to accommodate the depth of the layer (from the alignments).



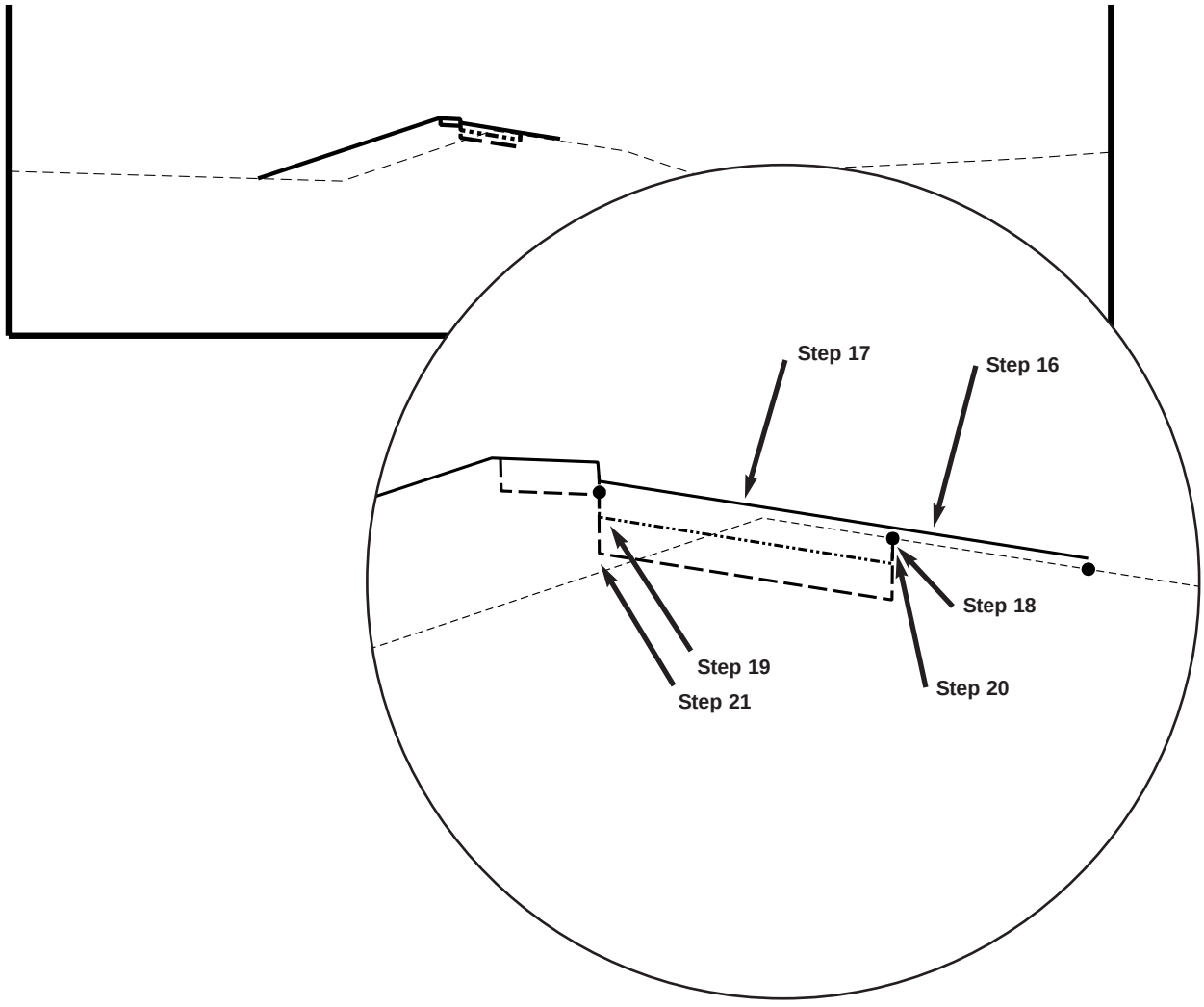
Note: In this example, the existing pavement is being overlayed in addition to the cutout. Therefore, in the roadway definition, a vertical offset is used to raise the entire template.

22. Select **Modeler>Roadway Modeler**.

23. Select the **Advanced** tab and toggle off **Superelevation** and toggle the **Side** option to either **Left** or **Right**. Set the other options as desired.

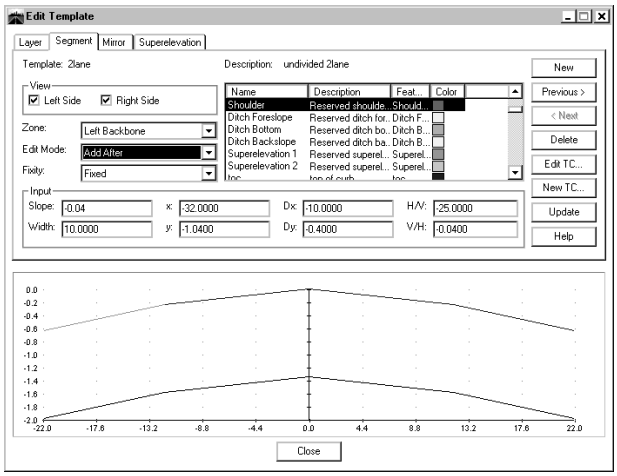
24. **Apply** and the surfaces for each layer of the template are created. Note that it matches the superelevated existing roadway.

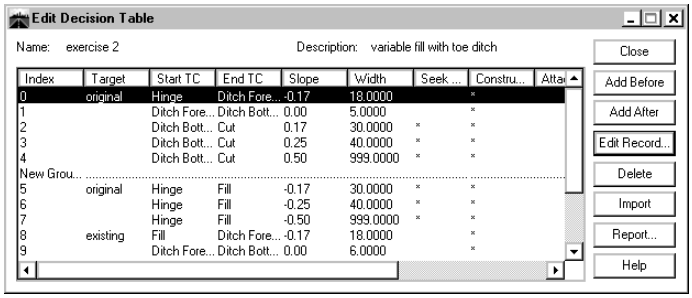
This setup was only for the left side of the roadway. To model both sides, you can repeat these steps for the right, using the same finished grade but new subgrades and transition control names.



Q: Does the hinge point have to have the same transition control (TC) name as the first record in a decision table? If not, which TC name becomes the feature name?

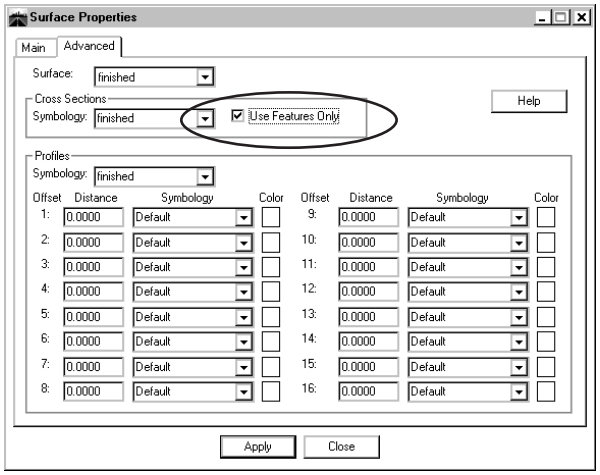
A: No, the TC names do not have to be the same. If they are not, the TC name from the template becomes the feature name in the resulting DTM. On another note, if there are two points in the decision table that end up with two different names, such as when a target block ends with a different name than the subsequent one begins with, the last TC to occupy the location becomes the feature name.



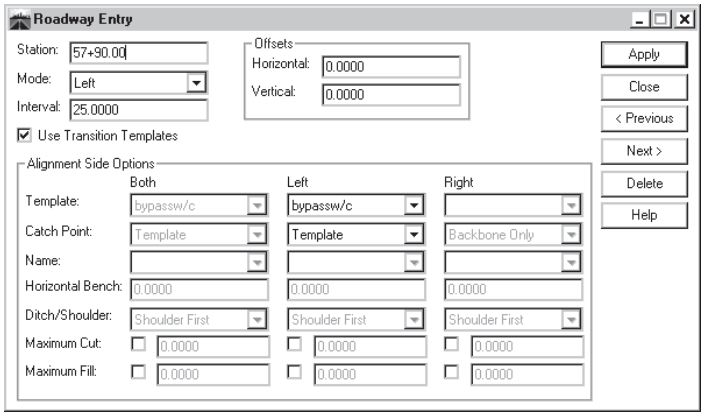


Q: Can a new layer start half-way through a Modeler **run? How about a new TC?**

A: No on the layer, yes on the TC. As an alternate for starting a new layer, you could create the layer in all the templates from the beginning, then after running **Modeler**, you can delete the features in areas where you did not want the layer. (Deleting features in a fence is handy for this situation.) If all you're interested in is cross sections, you can then toggle on **Use Feature Only** for that surface in its **Surface Properties**, and it won't even have to be triangulated. If you need the triangulated surface, you will want to model without an exterior, or delete the one **Modeler** creates and then create your own.



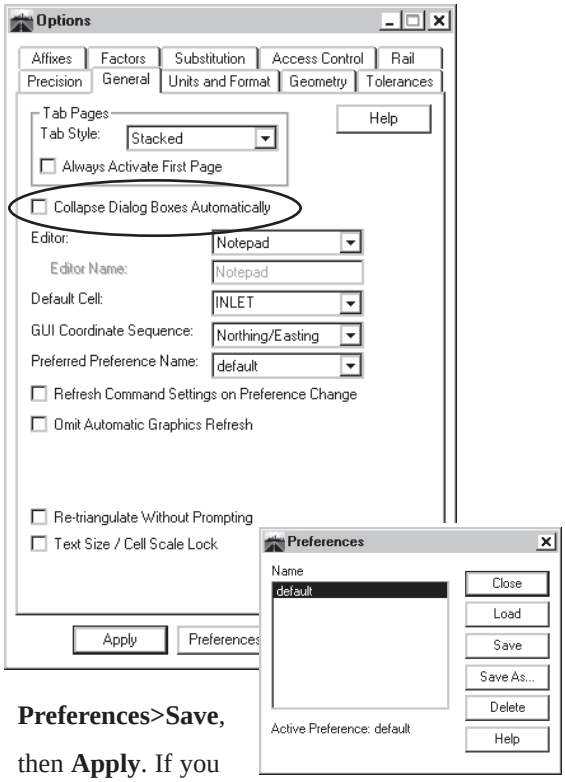
Q: I have a transition that occurs on the left side of my alignment, so I set up the roadway definition to run Left Only **during that area, since the right side is not changing. However, it doesn't model the right at all; what am I doing wrong?**



A: The **Left** and **Right** options in the roadway entries are not set up to be used as you describe. Setting one area to be **Left** indicates to the software that you do not want anything modeled on the right, so it does not even drop a template on that side, and the exterior (if you are creating one) will dip into the centerline through that area.

Q: How can I prevent the dialogs from collapsing automatically when an Apply **button is executed?**

A: In **Tools>Options**, select the **General** tab and toggle off **Collapse Dialog Boxes Automatically**. If you want this to be your default setting, choose



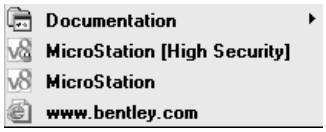
Preferences>Save, then **Apply**. If you only want this setting for the current session, just **Apply**.

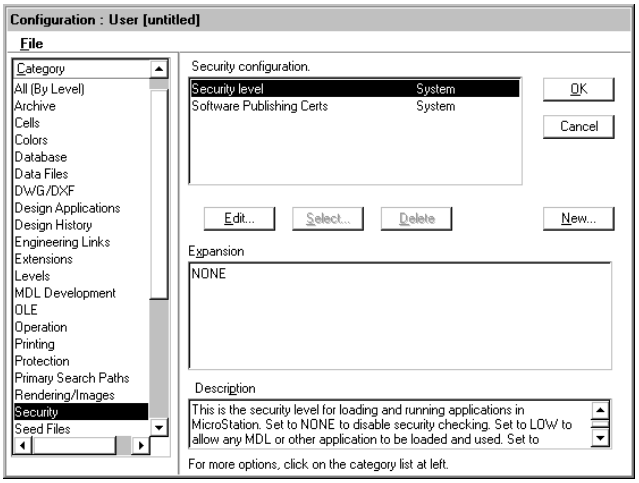
continued on page 20

continued from page 19

Q: Since I loaded MicroStation V8, one of my menu options is MicroStation High Security**. What is it for, and should I use it instead of the regular MicroStation?**

A: The **High Security** option sets a MicroStation variable that allows



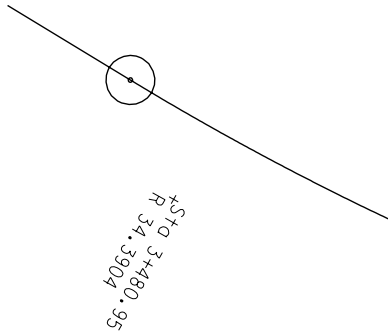


only products that are digitally signed by Bentley to be loaded on top of MicroStation. If you're not using any third-party products, then the **High Security** option would be okay; if you are, then you may want to set the security level under **Workspace Configuration** or just use regular MicroStation.

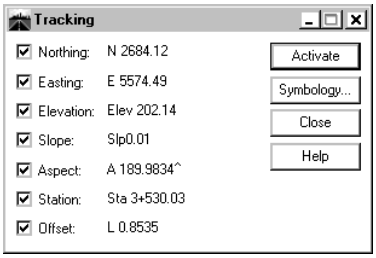
Q: Can I model a cliff or overhang with InRoads?

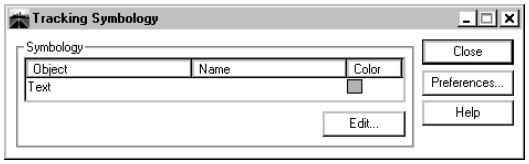
A: No. The DTM limitations require that you do not have any verticals or overhangs.

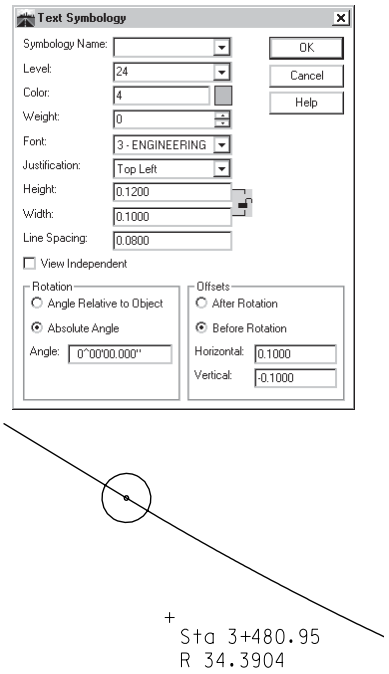
Q: When I use Tracking **for labeling stations and offsets, it always orients that text perpendicular to the alignment. Is there a way to change this?**



A: Yes. In the **Tracking** command, choose **Symbology**, then **Edit**. On the resulting dialog,

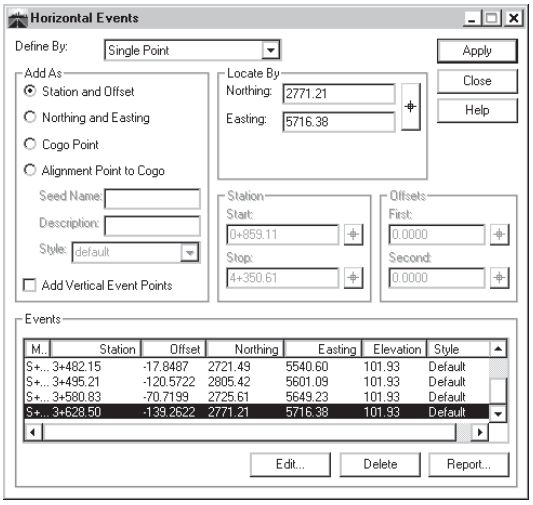




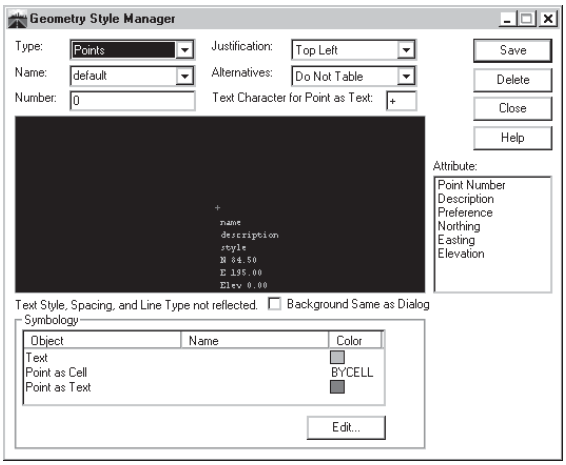


toggle on **Absolute Angle** and set the angle you would like. Be sure to save the preference if you want this setup to be your default.

Q: Where does the Event Points **command get its symbology when it displays points as they are created?**



A: It uses the default Point style in the Geometry Style Manager without annotation.



Q: If I'm running a decision table that seeks a specific DTM, does it matter what I highlight as the original ground surface when running Roadway Modeler**?**

continued on page 22