

Workflow IR 6 - Creating Combined Surfaces

This document explains the procedures for creating an exterior boundary, merging surfaces, and copying features from one surface to another.

An exterior boundary eliminates inaccurate triangles that can occur in concave areas within the data.

The **Merge Surfaces** command can be used to create a single surface from two or more “existing” surfaces, update the “existing” surface with additional data, or to make an “as constructed” surface for the project by combining a proposed surface with an existing surface.

The **Copy Portion of Surface** command copies features (or portions of features) from one surface and places them in another surface. This can be used to create a new surface from elements of one or more other surfaces or to update a surface with data from another surface.

These tools can be used singularly or in conjunction with each other to achieve the desired results. The Creating an Exterior Boundary, Merging Surfaces, and Copy a Portion of a Surface sections will each have their own outline.

Creating an Exterior Boundary

An Exterior Boundary is a closed shape DTM feature that defines the area where triangulation can occur. InRoads will triangulate the surface (without an exterior boundary) across concave areas creating inaccurate triangles that could adversely affect proposed surface models. An exterior boundary will prevent the creation of false triangles outside of the actual data.

An exterior boundary should be created for a surface that does not currently have a boundary or for a surface that has been modified and now has usable data outside the current boundary.

Workflow Outline

The following outline describes the steps needed to create an exterior boundary for a surface along with a brief explanation of what each step does.

Creating an Exterior Boundary - To create an accurate exterior boundary, erroneous triangles are removed, the perimeter of the modified surface is displayed, and the perimeter graphic is imported as the exterior boundary.

Removing Inaccurate Triangles - A surface that does not contain an exterior boundary may contain triangles that do not represent actual data. Removing these triangles is essential to creating an accurate exterior boundary.

- ◆ **Triangulate Surface** - The Triangulate Surface dialog box has settings that allow the user to set the maximum length of a triangle leg. Because most erroneous triangles are long and narrow, setting a maximum length shorter than these triangles will remove many of them.
 - Command Used: View Triangles - Used to display the triangle data so that inaccurate triangles can be identified.
 - Measure Distance - Used to determine an appropriate maximum triangle length.
 - **Triangulate Surface** - Used to set a maximum triangle length, thus reducing the number of inaccurate triangles.
- ◆ **Delete Triangles** - The Triangulate Surface command will get rid of many of the erroneous triangles, but not all of them. The Delete Triangle command is used to get rid of the rest.

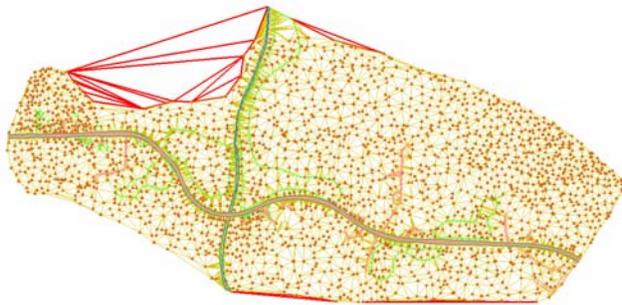
- Commands Used: **Delete Triangles** - Used to remove erroneous triangles.

Creating an Exterior Boundary - Now that the surface triangles are cleaned up, the exterior boundary can be created.

- ◆ **Displaying the Perimeter** - The perimeter of the modified surface will be used as the exterior boundary.
 - Commands Used: **3D/Plan Surface Display** - Used to display the surface perimeter.
 - **View Perimeter** - Used to display the surface perimeter. May be used instead of 3D/Plan Surface Display.
- ◆ **Importing the Exterior Boundary** - The final step is to import the z perimeter as an exterior boundary feature. This will contain the triangles within the area of the data.
 - **Import Surface** - Used to create the exterior boundary feature.
 - **Triangulate Surface** - Use to incorporate the exterior boundary into the triangulated surface.

Creating an Exterior Boundary for a Surface Without One

It may occur that a surface does not include an exterior boundary. If this is the case, an exterior boundary should be created and added to the surface. Adding the boundary will eliminate inaccurate triangles from the surface. Below is an example of a surface with no exterior boundary. The example is representative of what can happen when a boundary is omitted and a maximum triangle length is not defined. In the event of a missing exterior boundary, the software will calculate the inaccurate triangles shown in bold red below.



To create an exterior boundary for this surface three steps are required. One, the erroneous triangles are removed, two, the perimeter of the surface is displayed, and three, the MicroStation graphic representing that perimeter is then imported as an exterior boundary feature into the DTM.

Removing Inaccurate Triangles

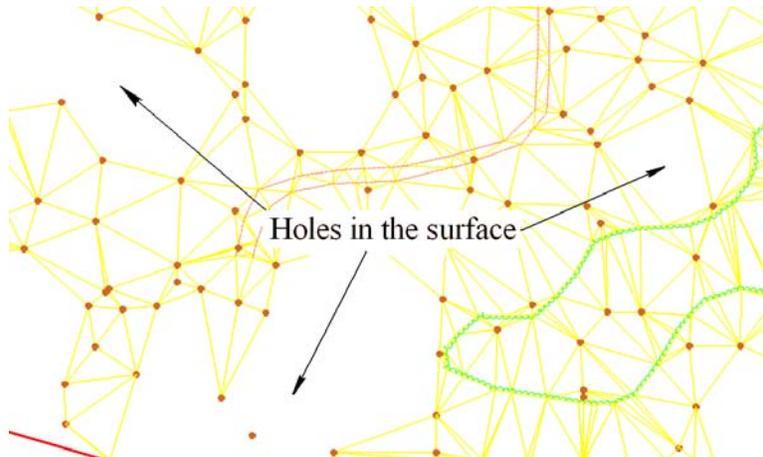
Inaccurate triangles are usually long narrow triangles or those that span concave areas of a DTM. InRoads has two commands that can be used to reduce, then eliminate the number of inaccurate triangles, namely the **Triangulate Surface** and **Delete Triangle** commands.

The **Triangulate Surface** command is used to set a limit on the length of a triangle edge, thereby reducing the number of inaccurate triangles. The **Delete Triangle** command is then used to eliminate the remainder of the inaccurate triangles.

It should be noted that neither of these commands affect the data which was collected for the surface. The commands either modify the computation used to define triangles (in the case of **Triangulate Surface**) or delete specific triangles that have been defined (in the case of **Delete Triangle**).

Triangulate Surface

There is no definitive rule for setting the **Maximum Length** when triangulating a surface. If the length is set too short, triangles will not be defined in areas they should be, forming holes where good data was not used. Below is an example of a surface whose **Maximum Length** is set too short.



When the length is set to long, an undesirable number of inaccurate triangles will remain. A general rule of thumb is to err on the long side. It is better to have the inaccurate triangles that can later be deleted than to lose data.

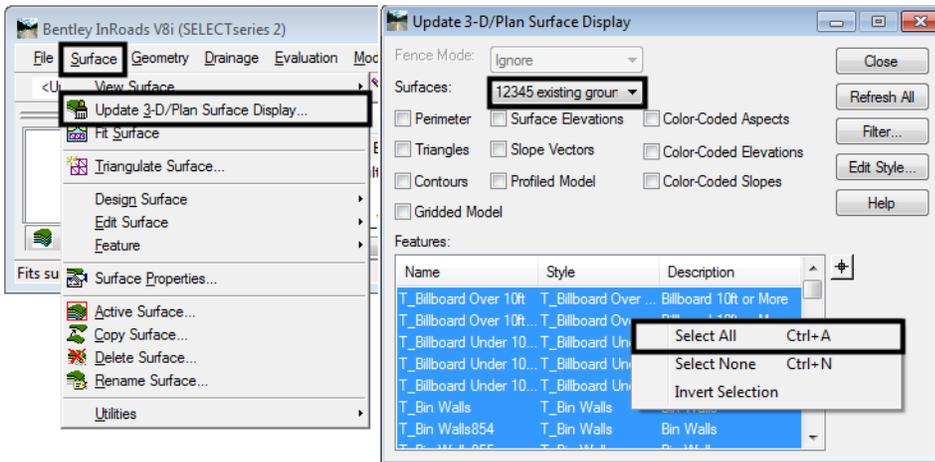
To get an idea of what **Maximum Length** to use, display the surface's features and triangles. Look for the longest triangles that lie within the data area (there is no need to be exact here, the object is to get an idea for the **Maximum Length**). Measure the long side of the triangle and use that as a starting point.

1. Select **Surface > Update 3D/Plan Surface Display**. The **Update 3-D/Plan Surface Display** dialog box is displayed.

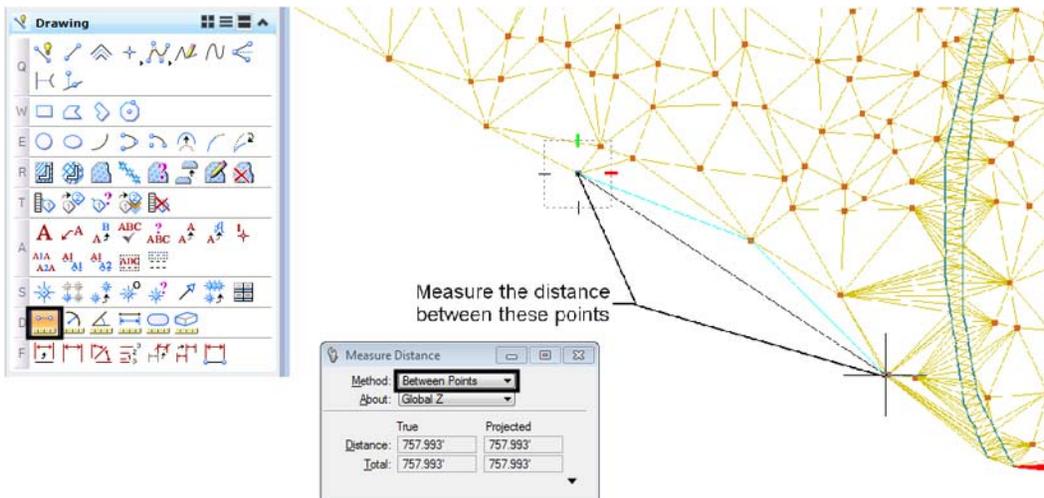
Note: If available, reference files showing the location of survey data can be used to view the DTM features without having to display them.

2. In the **Update 3D/Plan Surface Display** dialog box, set the **Mode** to **Display On**.
3. In the **Surfaces** drop down menu, select the desired surface.
4. Below the **Surface** drop down menu are a number of toggles. Toggle on **Triangles**.
5. Right click in the **Features** list at the bottom of the dialog box and choose **Select All** from the menu.

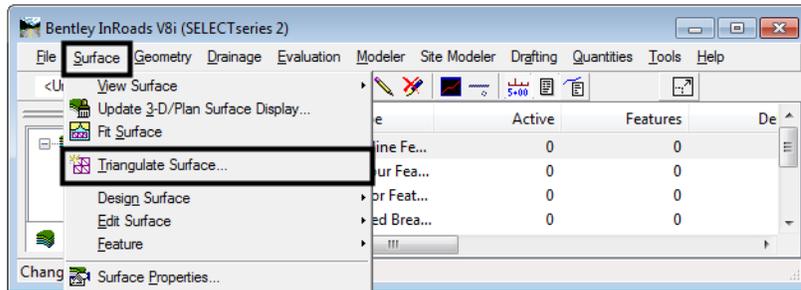
- The items selected are automatically displayed if they were not previously displayed. If some of these items were previously displayed in the dgn file, <D> **Refresh All** to update those existing items.



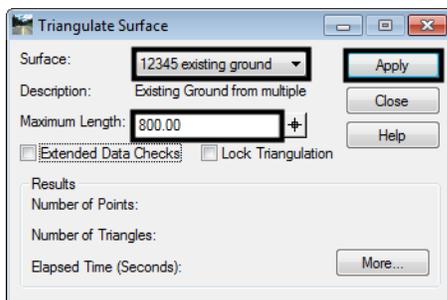
- Scan the triangles displayed and identify a large triangle within the data area.
- Select the MicroStation **Measure Distance** command.
- In the **Measure Distance** tool settings box, set the **Distance** to **Between Points**.
- <D> at one triangle corner then the other. The distance measured will be displayed in the tool settings box.



- From InRoads select **Surface > Triangulate Surface**. This displays the **Triangulate Surface** dialog box.



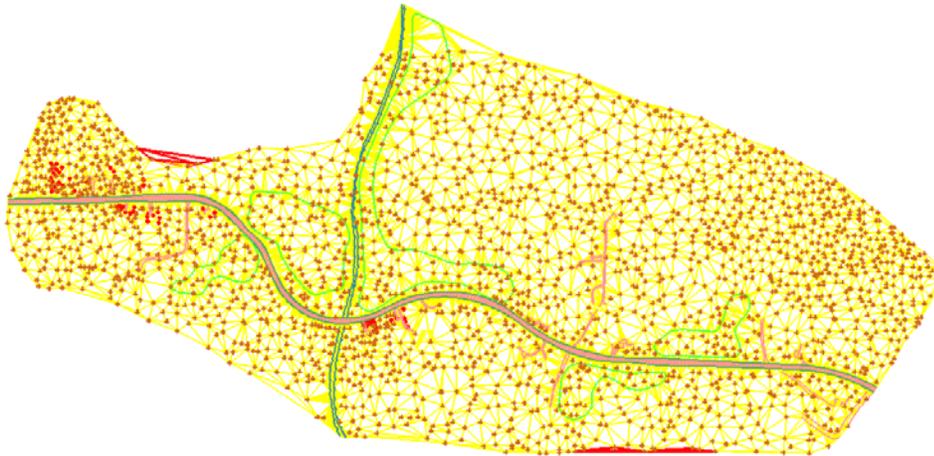
- In the **Surface** drop-down, select the surface.
- In the **Maximum Length** field, **key in** the desired length. Because this length is just an estimate, it is advisable to increase the measured length as a buffer.
- <D> **Apply** to launch the command.



Note: In the example above, the measured distance of the triangle edge was 757.993'. Because this may not be the biggest triangle within the data, 800' is used for the Maximum Length to insure all actual data is included.

- Go back to the **Update 3D/Plan Surface Display** dialog box and <D> **Refresh All** to will re-display the triangles as computed using the **Maximum Length** set above.

- Examine the triangles to be sure no actual data was lost. Look for features not connected by triangles. If good triangles were lost, go back to the **Triangulate Surface** dialog box, increase the **Maximum Length** and **Apply** the new settings. Repeat this process as necessary until the desired results are obtained.

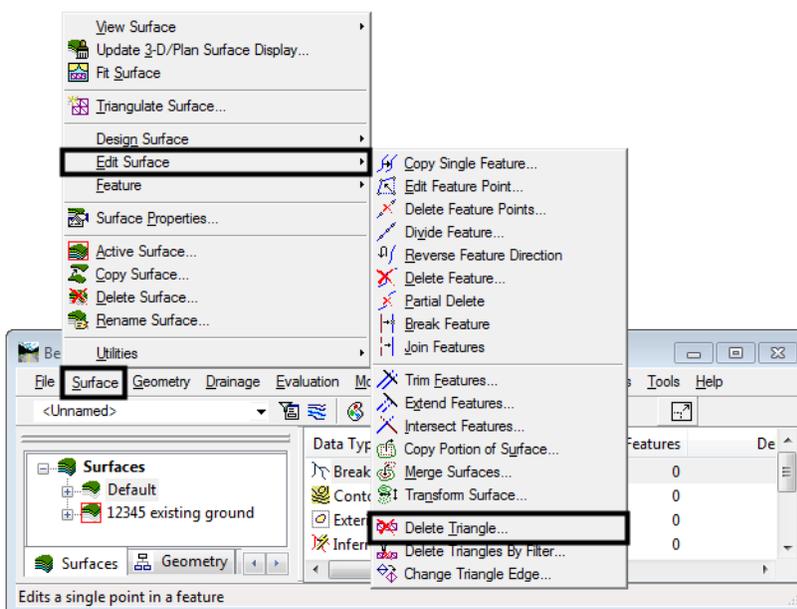


In the example above, most of the inaccurate triangles have been deleted by setting the **Maximum Length** and re-triangulating the surface. The remainder will be eliminated using the **Delete Triangle** command.

Delete Triangle

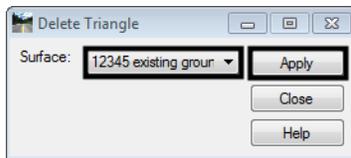
Now that the number of inaccurate triangles has been reduced to a manageable level, the rest can be removed easily with the Delete Triangle command.

- Zoom in on the area where triangles are to be deleted.

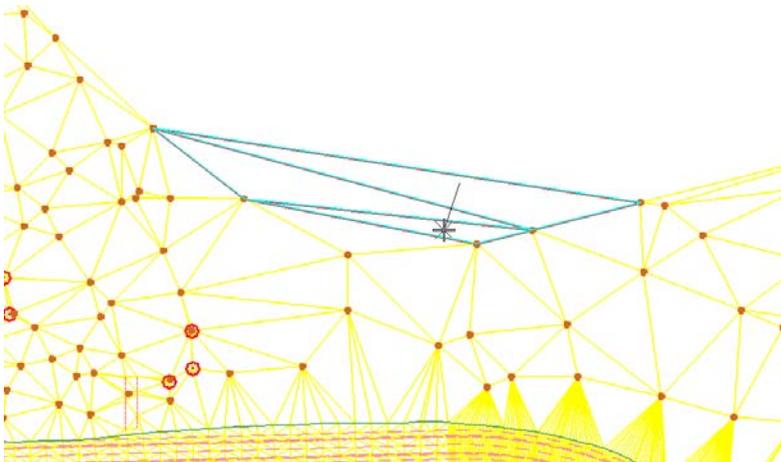


- From InRoads, select **Surface > Edit Surface > Delete Triangle**. This displays the **Delete Triangle** dialog box.

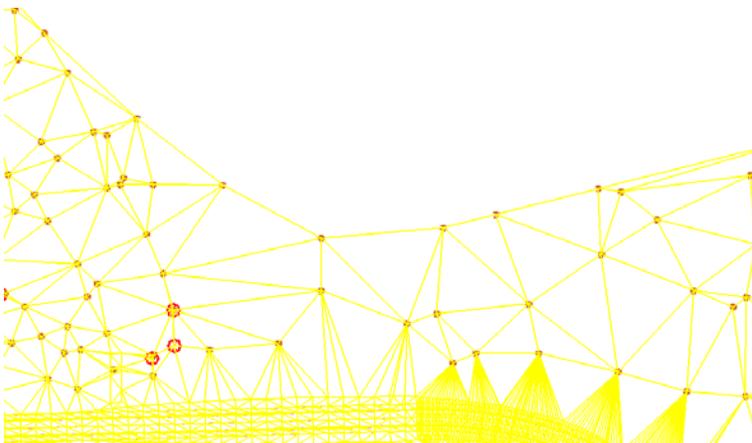
3. In the **Delete Triangle** dialog box, use the **Surface** drop-down to select the desired surface.
4. <D> **Apply**.



5. The **Delete Triangle** dialog box will minimize. <D> inside the first triangle to be deleted, then move the cursor through other adjacent triangles that are to be deleted. Be sure not to pass through triangles you do not want to delete. The triangles will highlight as they are passed through.



6. After the last triangle in the group is selected, release the left mouse button to end triangle selection. The **Accept/Reject** prompt is displayed. <D> to confirm deletion of the triangles, <R> to reject the selection.



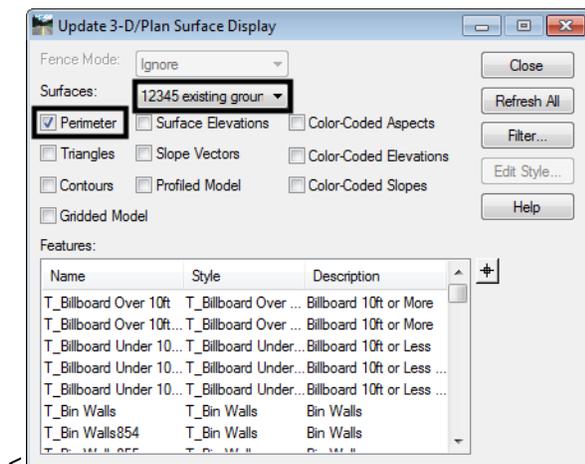
7. Using the same process, delete the remaining inaccurate triangles. After all of the desired triangles are deleted, <D> **Close** to dismiss the **Delete Triangle** dialog box.

Note: Do not re-triangulate the surface until the exterior boundary is added to the DTM. Otherwise all deleted triangles will regenerate.

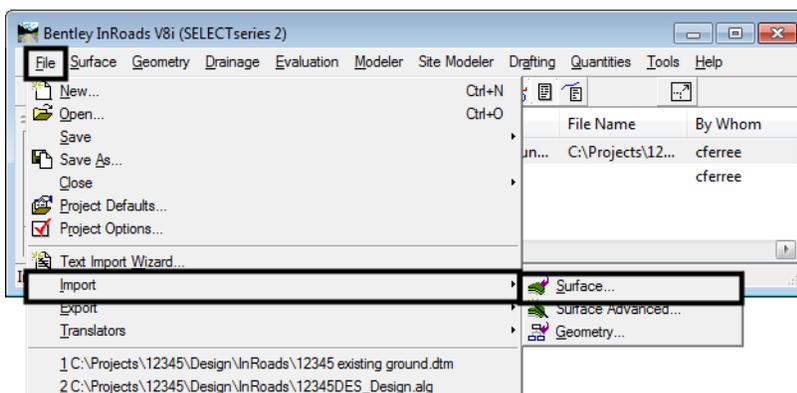
Creating the Exterior Boundary

After the triangles have been edited, the exterior boundary can be created. To create the boundary, the perimeter of the triangulated area will be displayed and that perimeter will be imported as the exterior boundary.

1. From the InRoads dialog box, select **Surface > Update 3D/Plan Surface Display**.
2. In the **Surfaces** list box, select the desired surface.
3. Toggle on **Perimeter**. All other toggles should be off and all features in the list deselected. This will turn off the display of the triangles and the features.

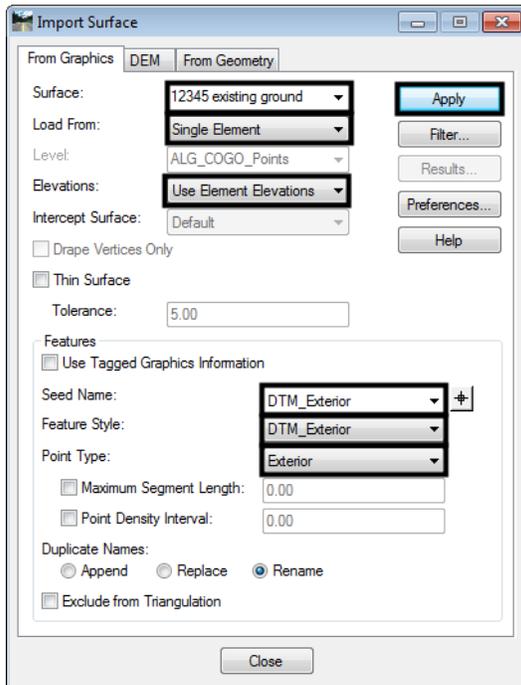


4. To complete the exterior boundary process, the perimeter must now be imported as a feature into the surface.
5. From InRoads, select **File > Import > Surface**. The **Import Surface** dialog box will be displayed.

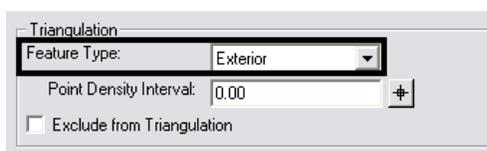
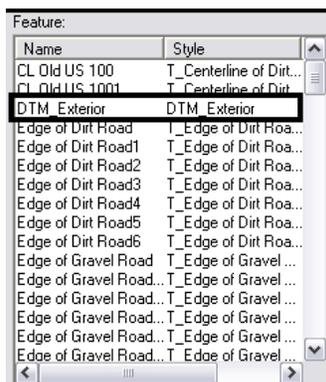


6. Select the **From Graphics** tab. Select the desired surface from the **Surface** drop-down.
7. Select **Single Element** from the **Load From** drop-down.
8. Verify that **Elevations:** is set to **Use Element Elevations**.
9. In the **Features** area of the dialog box, **key in DTM_Exterior** in the **Seed Name** field.

10. From the **Feature Style** drop-down list, select **DTM_Exterior**.
11. From the **Point Type** drop-down list, select **Exterior**.
12. After the specified changes are made, <D> **Apply**.



13. <D> on the boundary shape. The shape will highlight. <D> again in the blank area of the screen to accept the element and add it to the surface. Dismiss the **Import Surface** dialog.
14. To verify that the data was imported, select **Surface > Feature > Feature Properties**. This displays the **Feature Properties** dialog box.
15. Verify that the desired surface is selected in the **Surface** drop-down.
16. Verify that **DTM_Exterior** appears in the **Feature** list box. Also verify that the **Feature Type** is set to **Exterior** in the **Triangulation** area.

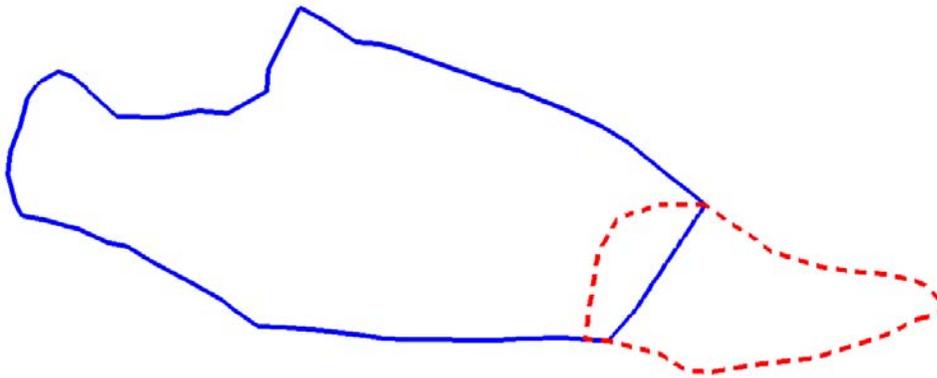


17. To complete the process, the surface must be re-triangulated.

Merging Surfaces

The InRoads Merge Surfaces command is used to create a single surface from two surfaces. The surfaces being merged must be adjacent or overlapping. The merging of surfaces that are not adjacent or overlapping would result in inaccurate triangles between the areas of data.

In the examples below, the original surface is being extended by using information contained in an additional surface. The solid line represents the perimeter of the “Original” surface. The dashed line represents the perimeter of the additional surface to be merged, identified as the “Design” surface in the Merge Surfaces dialog box.



Workflow Outline

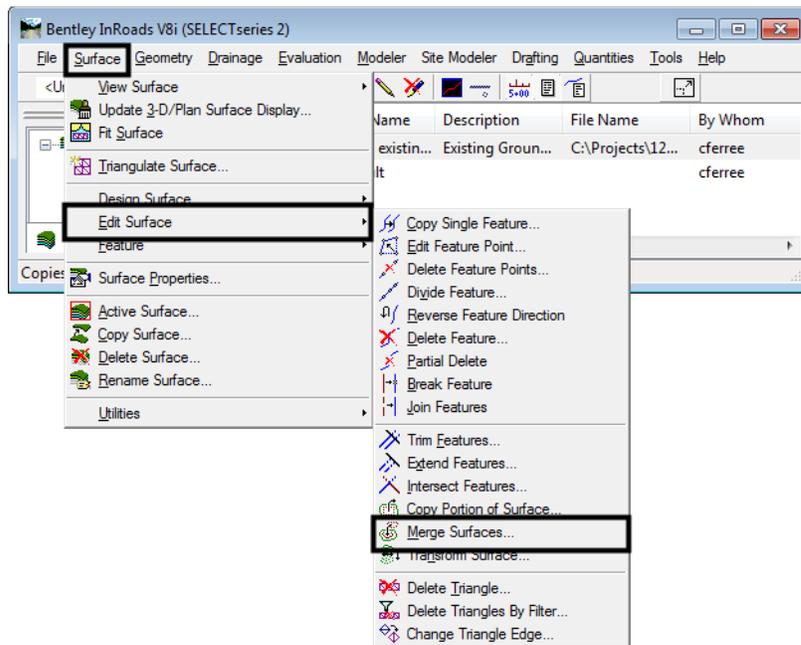
Merge Surfaces - Merging surfaces creates a single surface from two surfaces. If one surface is not fully contained within the limits of the other, an exterior boundary for the merged surface must be built also.

- ◆ **Merge Surfaces** - This combines two surfaces.
 - Commands Used: - **Merge Surfaces** - Used to create the combined surface.
 - **Feature Properties** - Used to identify residual exterior boundary features.
 - **Delete Feature** - Used to remove residual exterior boundary features.
- ◆ **Creating an Exterior Boundary for the Merged Surface** - Once the surfaces are combined a new exterior boundary is required to contain the data. This boundary will be created using the boundaries from the original surfaces.
 - Commands Used: **View Features** - Used to display the exterior boundaries from the two original surfaces.
 - **Place Fence** - Used to define a fence around one of the exterior boundaries. This will be used to clip the other boundary.
 - **Delete Fence Contents** - Used to clip the exterior boundary not fenced.
 - **Partial Delete** - Used to clip the other boundary so that the two clipped lines can be used to create the new boundary.
 - **Create Complex Shape** - Used to combine the two clipped features into a single element that will be imported for the new boundary.
 - **Import Surface** - Used to create the exterior boundary feature.
 - **Triangulate Surface** - Use to incorporate the exterior boundary into the triangulated surface.

Prerequisites

Before two surfaces can be merged, they must both be opened in InRoads.

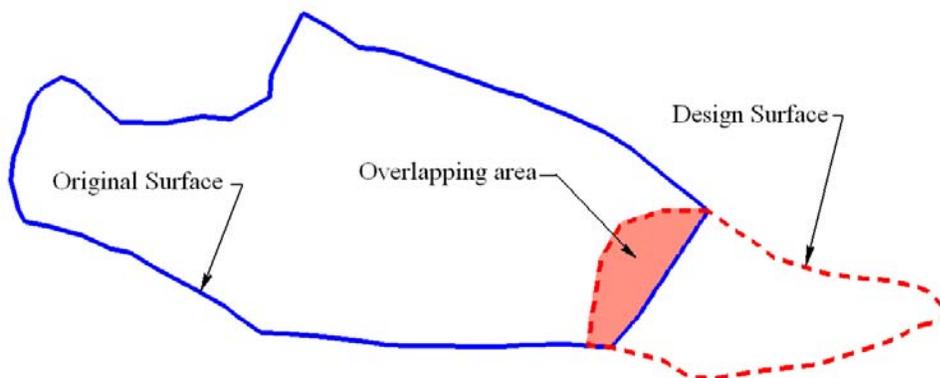
1. From InRoads main menu, select **Surface > Edit Surface > Merge Surfaces**. This will result in the display the **Merge Surfaces** dialog box.



This command operates with three surfaces; the original surface, the design surface, and the destination surface which will be created upon execution of the command.

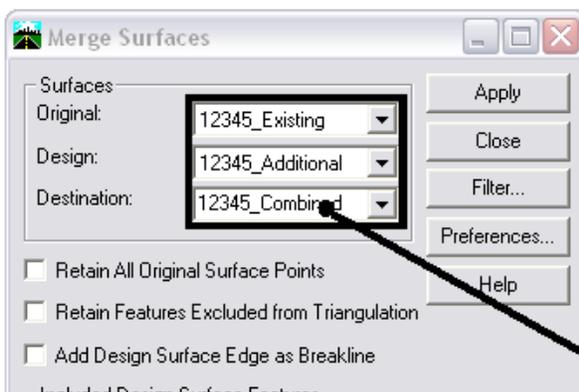
- ◆ **Original Surface**- This is the surface whose features can be deleted or partially deleted in areas that overlap with the merging (Design) surface. Typically, this will be the Existing surface received from ROW/Survey, however it can be any surface. If the original and design surfaces overlap, the common area between the two will be occupied by data from the Design Surface and data from the Original Surface may be removed, depending on the toggle settings described below.
- ◆ **Design Surface**- This surface usually contains additional existing surface data or the Finished Grade surface generated from Roadway Modeler. **Design Surface** data can either replace or supplement the **Original Surface** data in areas where they overlap depending on the toggled setting **Retain All Original Surface Points**. In the illustration below, the shaded area shows the overlap between the original and design surfaces. The data from the **Original Surface** in this area will be deleted and only the **Design Surface** data will remain unless **Retain All Original Surface Points** is toggled on.

Note: The **Original Surface** and the **Design Surface** remain intact. The **Retain All Original Surface Points** setting only affects the creation of the **Destination Surface**.



◆ **Destination Surface**- This surface stores the results of the **Merge** command.

- Use the pull downs in the **Surfaces** area of the dialog box to select the desired surface for **Original**, **Design**, and **Destination**. If a destination surface has not previously been created or loaded, it can be created “on the fly” by typing the desired name in the **Destination** field.



A Destination surface name can be keyed in here to create the surface “on the fly”.

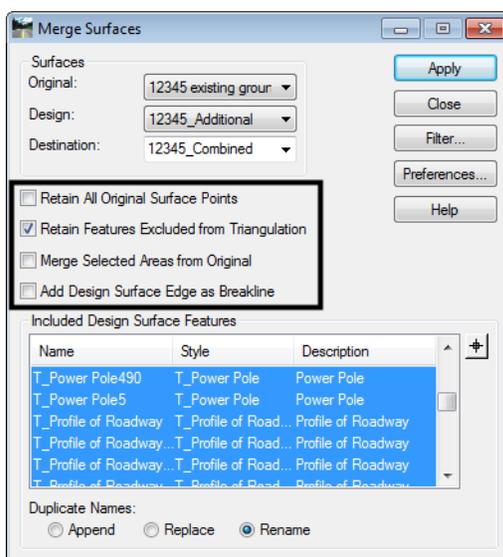
- The next area of the **Merge Surfaces** dialog box contains four toggles: **Retain All Original Surface Points**, **Retain Features Excluded from Triangulation**, **Merge Selected Areas from Original**, and **Add Design Surface Edge as Breakline**.

◆ **Retain All Original Surface Points**- When checked on, all of the original surface’s features will be stored in the destination surface. When checked off, the original surface features that cross into the design surface’s perimeter will be clipped at the perimeter leaving only the design surface’s features in that area. By default the option is checked off.

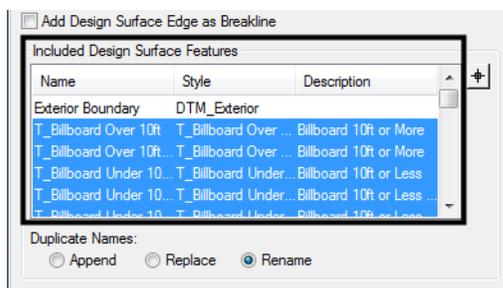
◆ **Retain Features Excluded From Triangulation**- When checked on, features excluded from triangulation from the original surface, like underground utilities, will be stored in the destination surface, regardless of their relationship to the design surface. When checked off, features excluded from triangulation will be treated as any other feature in the original surface. Un-triangulated features from the design surface by default are always included in the destination surface.

- ◆ **Merge Selected Areas from Original** - When toggled on, Merge Surfaces scans the active selection set for closed shapes (these are MicroStation elements selected with the Element Selector tool). Data from the original surface inside the shape is used to replace any data from the design surface in that area. If **Add Design Surface Edge as Breakline** is turned on, boundary features are added for each selected shape.
- ◆ **Add Design Surface Edge as Breakline**- When checked on, the perimeter of the design surface is added to the destination surface as a breakline. This will ensure that the design surface maintains its original triangle structure. When off, the perimeter is not added and the design surface’s triangle structure can be modified by the original surface data. This option should be turned **on** when creating an “as constructed” surface. It should be turned **off** when extending or modifying the existing surface.

4. Turn on or off the toggles as desired.



5. The **Merge Surfaces** dialog box contains an area for including and excluding design features from the destination surface. In the **Included Design Surface Features** area, highlighted features will be added to the destination surface and un-highlighted features will not. By default all features are highlighted.

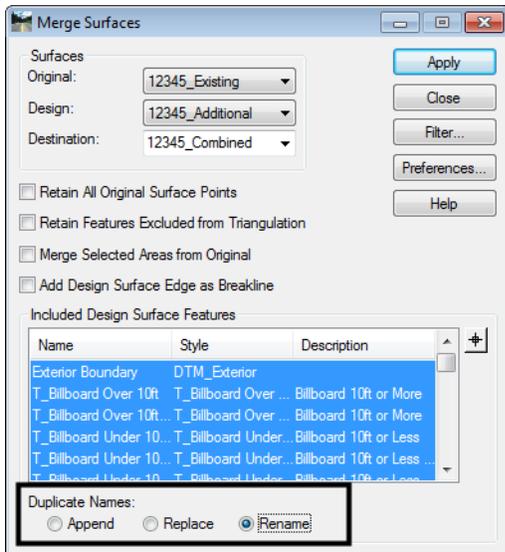


Note: Because this is an example of extending a surface, the Exterior Boundary of the design surface is not highlighted. When creating an “as constructed” surface leave all the features on.

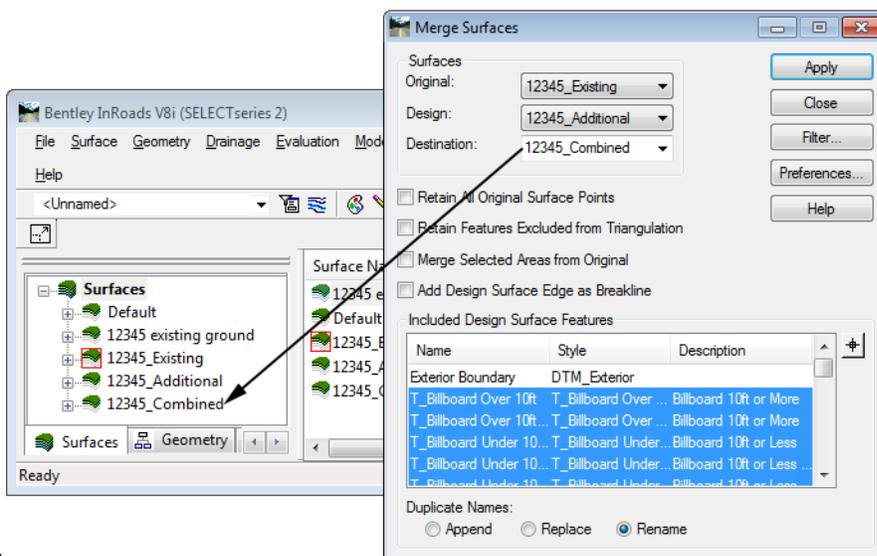
6. Options for resolving feature naming conflicts are located at the bottom of the settings box under **Duplicate Names**. The options are:

- ◆ **Append**- This adds the points from the new feature to those of the existing feature, making one feature out of the two. The combined feature will have a discontinuity (a gap) from the last point of the existing feature to the first point of the new feature.
- ◆ **Replace**- The existing feature will be deleted and replaced by the new feature with this option.
- ◆ **Rename**- The new feature will be renamed by appending a ‘1’ to the end of the name.

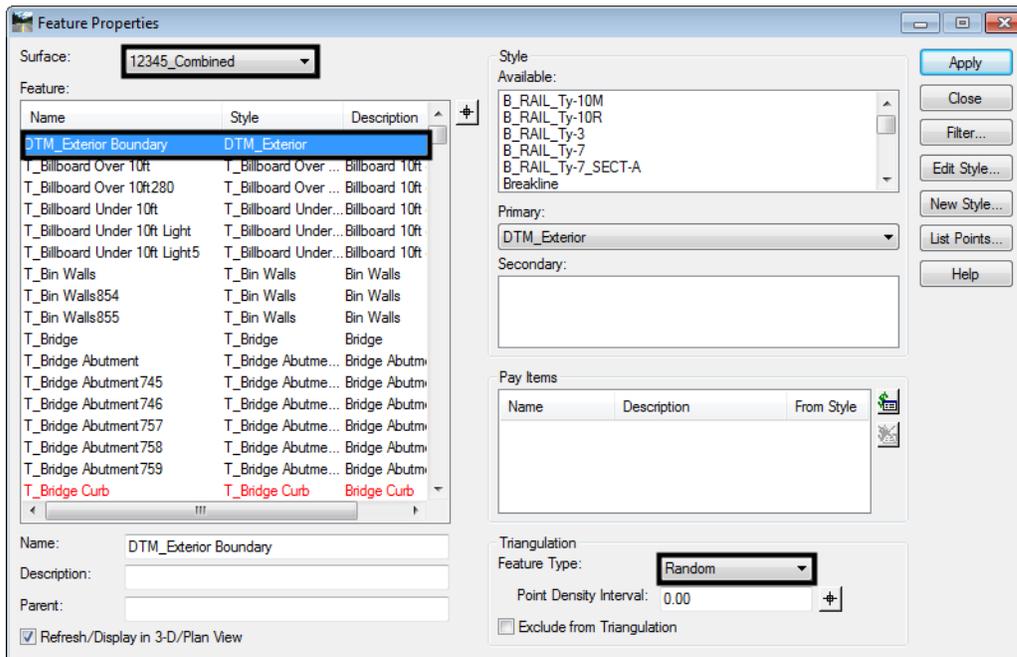
7. By default the **Rename** option is selected.



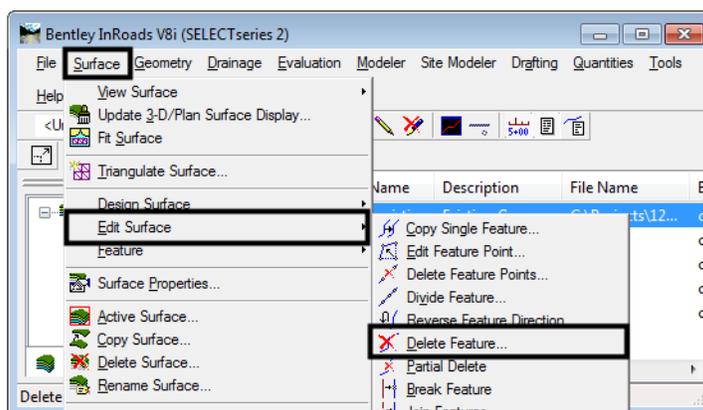
8. Once the desired settings are made, <D> **Apply** to execute the command. If the destination surface did not exist when the command was launched, it will be created now. After the command has been run, the destination surface will be added to the file list in the main InRoads interface. The **Merge Surfaces** dialog box can now be dismissed.



- If the design surface was at least partially outside the area of the original surface (as is the case in this example), a random feature will be created in the combined surface using the original surface's exterior boundary name. This feature should be deleted prior to creating the new exterior boundary. To determine if the random exterior boundary feature was created, look at the **Feature** list in the **Feature Properties** dialog box (**Surface > Feature > Feature Properties**).

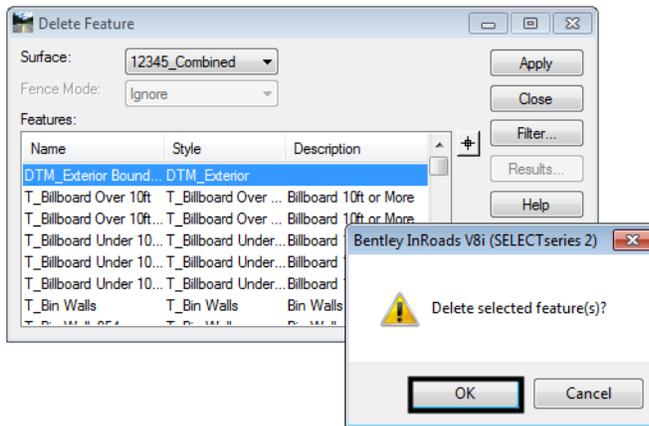
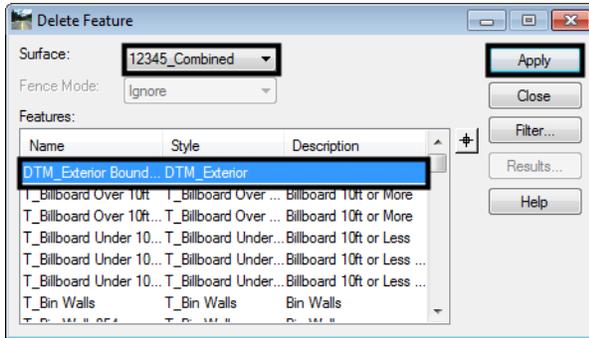


- If the design surface is entirely within the area of the original surface, the original surface's exterior boundary should be retained.
- To delete the random feature that uses the original surface's exterior boundary name, select the InRoads command **Surface > Edit Surface > Delete Feature**.



- The **Delete Feature** dialog box will be displayed. Use the **Surface** drop-down to select the merged surface.
- From the **Features** list, highlight the exterior boundary feature (this will usually be named **DTM Exterior**).

14. <D> **Apply**. A **“Delete selected feature(s)?”** warning message will display. <D> **OK** to complete the deletion. The **Delete Feature** dialog box can be dismissed. It is advisable not to re-triangulate the surface until a new exterior boundary is added.

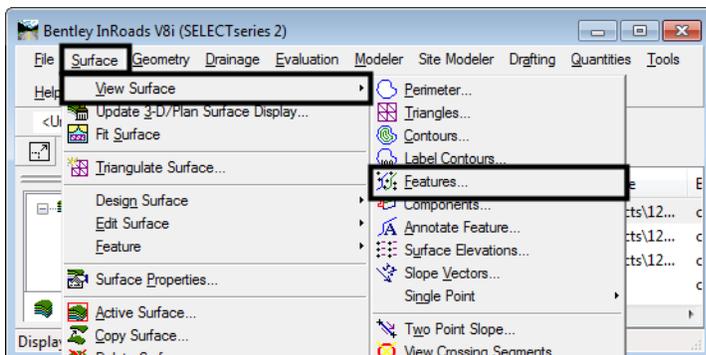


15. The combined surface is now ready for a new exterior boundary.

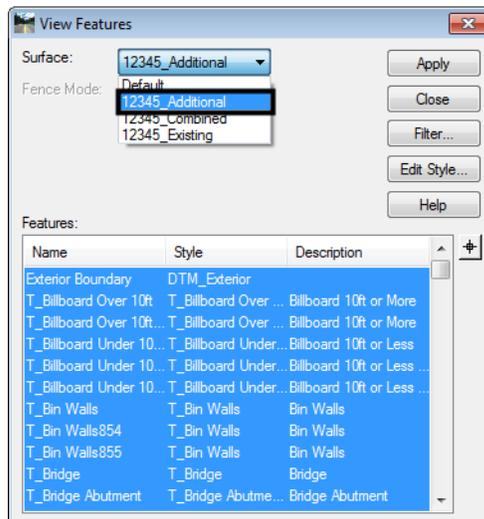
Creating an Exterior Boundary for the Merged Surface

To create the exterior boundary for the merged surface, the exterior boundaries of the source surfaces will be used. This will only be required if the design surface used in the Merge Surfaces operation lays at least partly outside the area of the Original surface. If the design surface is entirely within the area of the original surface, the original surface’s exterior boundary will be retained and this process can be omitted.

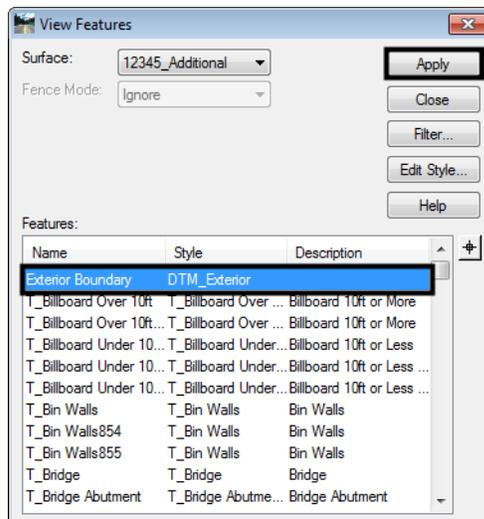
1. Select **Surface >View Surface > Features** from the InRoads dialog box.



- This will result in the display of the **View Features** dialog box. From the **Surface** drop-down, select the **Design** surface, **12345_Additional** in this example, see [Merging Surfaces](#) Step 2.

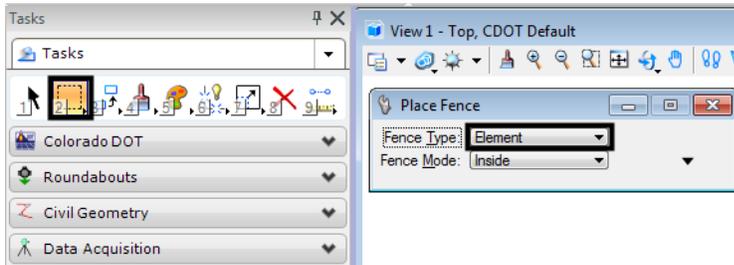


- By default, all of the features are highlighted. <D> on the exterior boundary feature (Exterior Boundary in this example) so that only the exterior boundary feature is highlighted.
- <D> **Apply** to display the exterior boundary feature. Do not dismiss the **View Features** dialog box yet, as it will be used again.

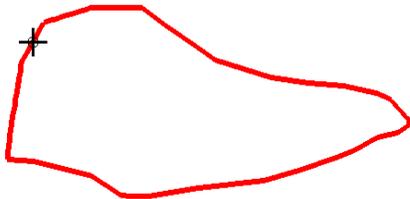


Place a fence using the exterior boundary of the design surface as the fence shape. By placing the fence, the exterior boundary of the original surface can be displayed clipping out the overlapping area so that less editing is required to finish the new exterior boundary.

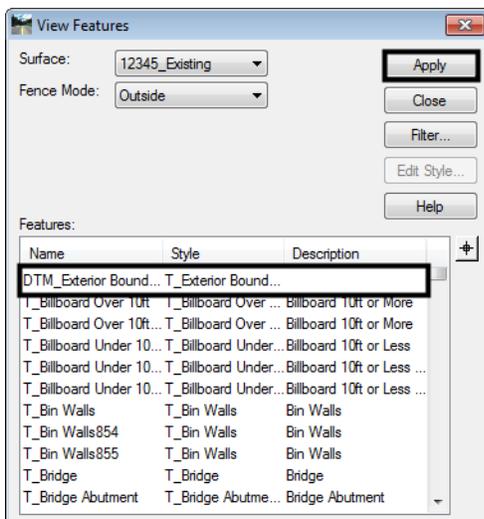
5. Select the **Place Fence** command from the MicroStation Main toolbar. Set the **Fence Type** to **Element** and **Fence Mode** to **Inside**.



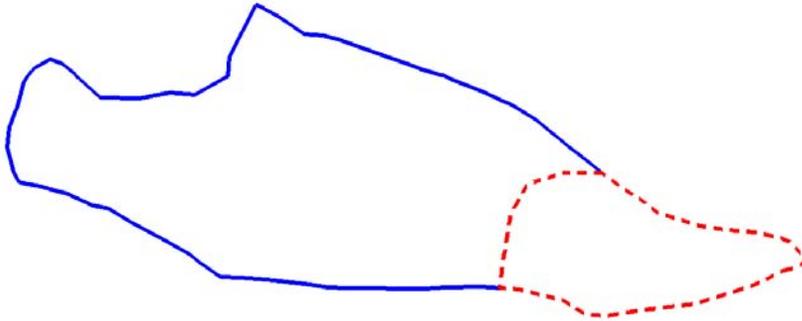
6. Select the design surface's exterior boundary displayed in Step 3 above. Left click again, anywhere in the view to accept the element. This places a fence on the element.



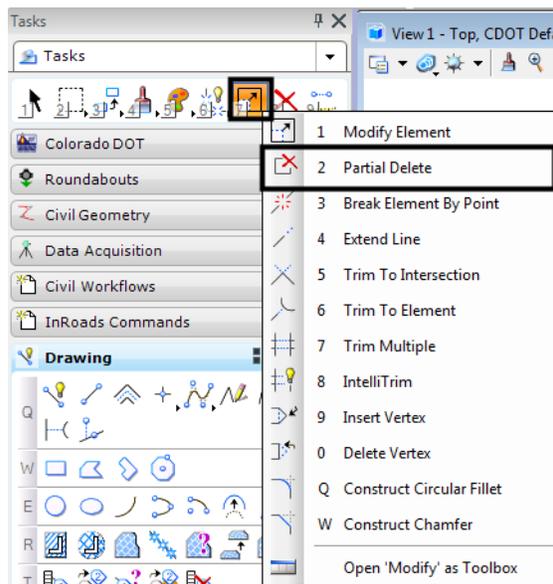
7. Go back to the **View Features** dialog box. Set the **Surface** to **12345_Existing** (the **Original** surface from *Merging Surfaces* step 2).
8. Using the **Fence Mode** drop-down, select the **Outside** option. This will only display the part of the original exterior boundary that is outside of the design exterior boundary.
9. Highlight the **DTM Exterior** boundary feature only. <D> **Apply** to display this feature. The **View Features** dialog box can now be dismissed.



10. Dismiss the fence by selecting the **Place Fence** command again. The results of this operation will look similar to the example below:

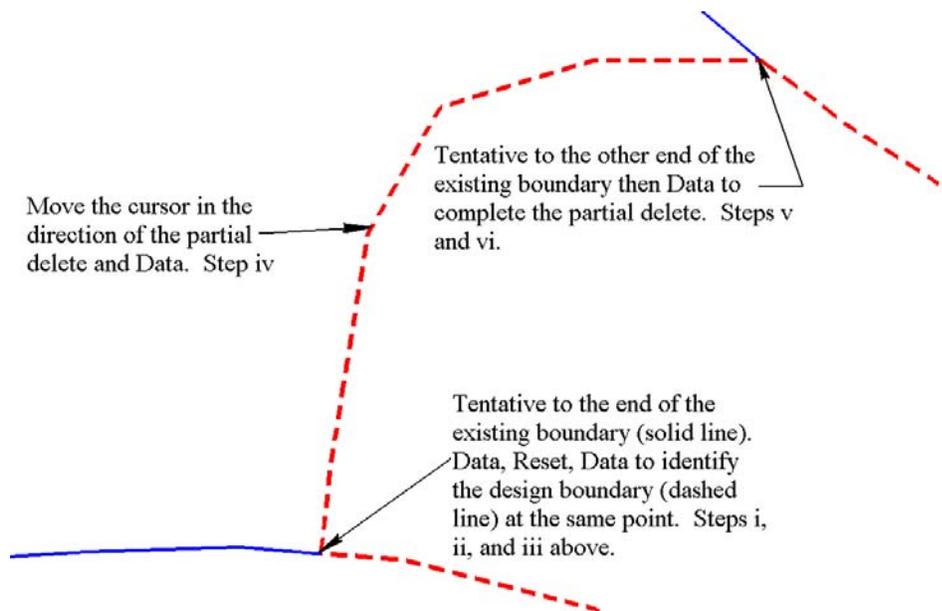


In order to get the element ends to match properly, use the following procedure, starting with selecting the **Partial Delete** command from the MicroStation Main Task toolbar:

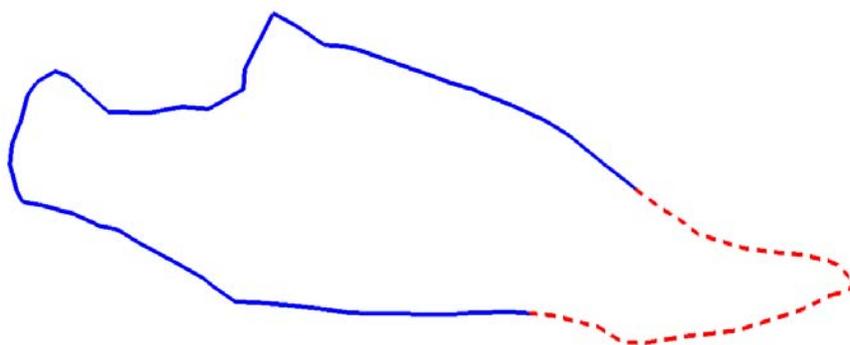


11. Move the cursor near the end of the original exterior boundary (solid line) and <T> (left/right cord or middle mouse click, depending on the mouse settings).
12. <D> to accept the snap. The original boundary will be highlighted.
13. Next, <R> (right mouse click). This will un-highlight the original boundary and highlight the design boundary (dashed line) where the two meet.
14. To identify the direction of the partial delete, move the cursor along the part of the element to be deleted and <D>.
15. <T> to the other end of the original exterior boundary.

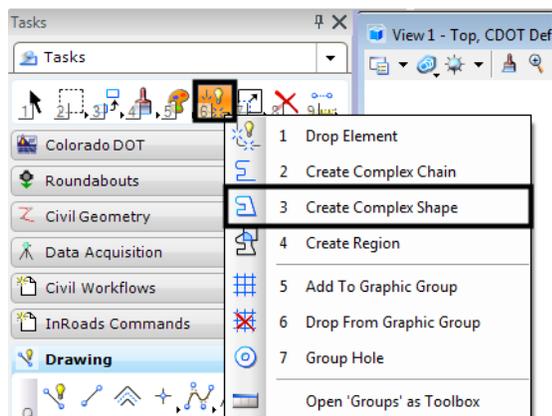
16. <D> to accept the snap and complete the partial delete.



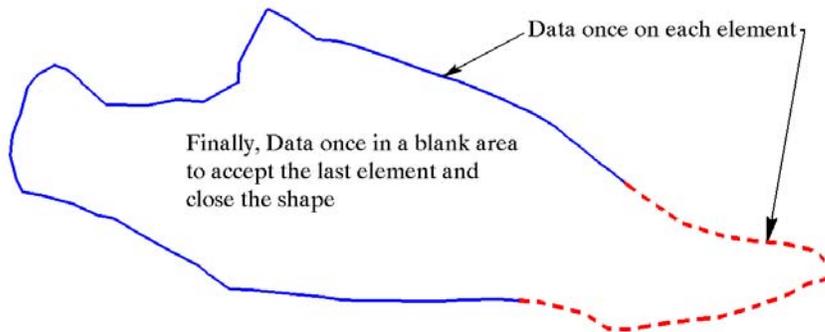
The result will be two elements that represent the desired extent of the exterior boundary of the merged surfaces.



17. Next, a closed shape must be made of the two elements. Select the **Create Complex Shape** command from the MicroStation Main toolbar. From the **Method** drop-down list select **Manual**.

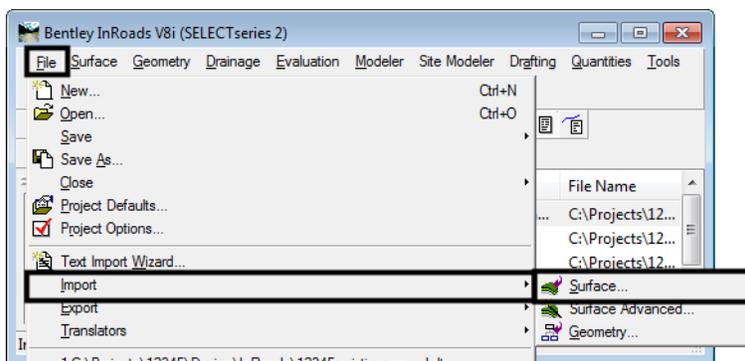


18. <D> on element one (solid line) then <D> on element two (dashed line). <D> once more in a blank area on the screen to finalize the command.



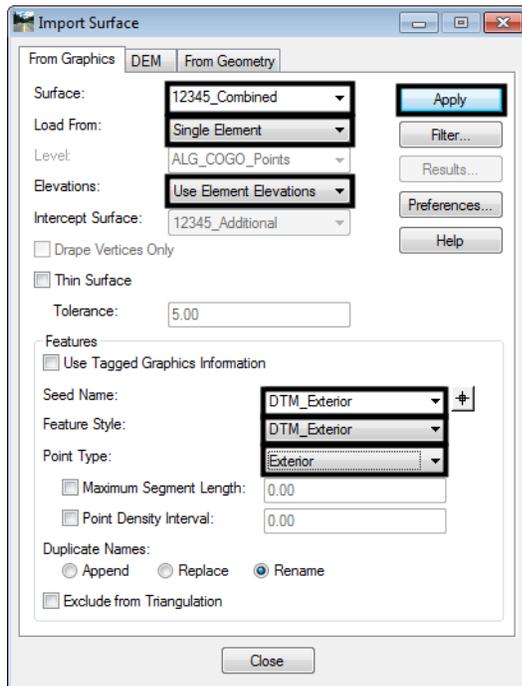
The shape is now ready to be incorporated into the combined surface as an exterior boundary.

19. From InRoads, select **File > Import > Surface**. The **Import Surface** dialog box will be displayed.



20. Select the **From Graphics** tab. Select the combined surface created with the **Merged Surfaces** command (*Merge Surfaces* step 2 above) from the **Surface** drop-down.
21. Select **Single Element** from the **Load From** drop-down.
22. Select **Use Element Elevations** from the **Elevation** drop-down.
23. In the **Features** area of the dialog box, key in **DTM_Exterior** in the **Seed Name** field. This will not appear in the drop down list because the original exterior boundary features were deleted from the surface.
24. In the **Feature Style** drop-down, select **DTM_Exterior**.
25. Using the **Point Type** drop-down, select **Exterior**.

26. After the above settings are made <D> **Apply**.

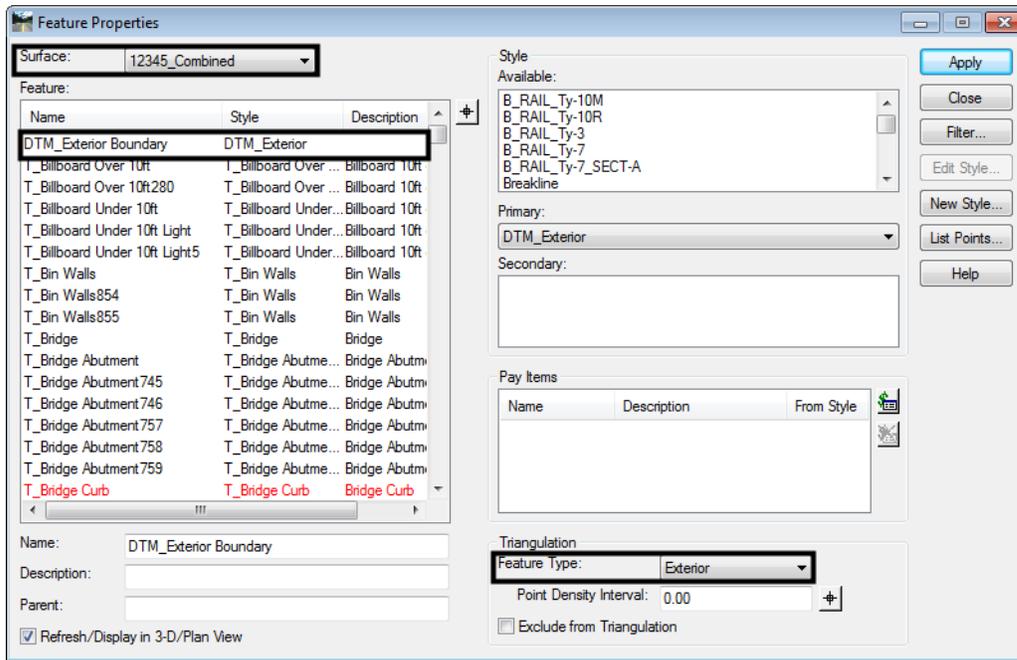


27. <D> on the complete boundary shape created earlier. The shape will highlight. <D> again in a blank area on the screen to accept the element and add it to the merged surface. Dismiss the **Import Surface** dialog box

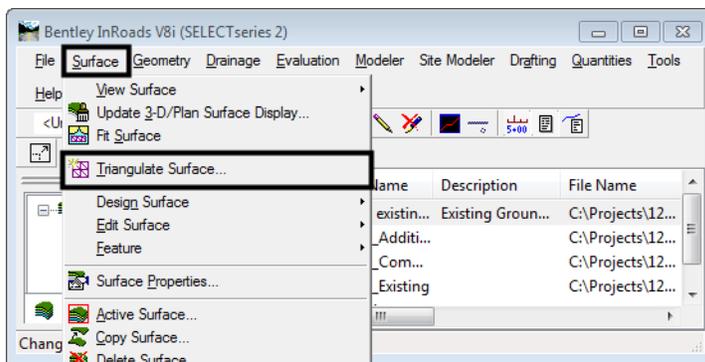
28. To verify that the data was imported, select **Surface > Feature > Feature Properties**. This displays the **Feature Properties** dialog box.

29. Verify that the merged surface is selected from the **Surface** drop-down list.

- Verify that **DTM_Exterior** appears in the **Feature** list box. Also verify that the **Feature Type** is set to **Exterior** in the **Triangulation** area.

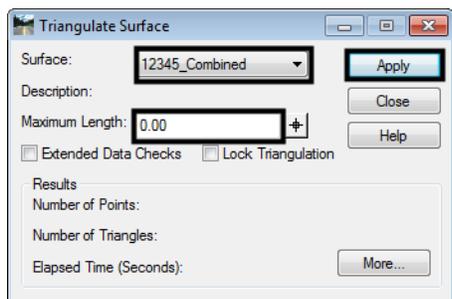


- To complete the process, the surface must be re-triangulated.
- From InRoads select **Surface > Triangulate Surface**. The **Triangulate Surface** dialog box is displayed. One could also right click on the surface name in the InRoads Explorer and select **Triangulate** from the menu.

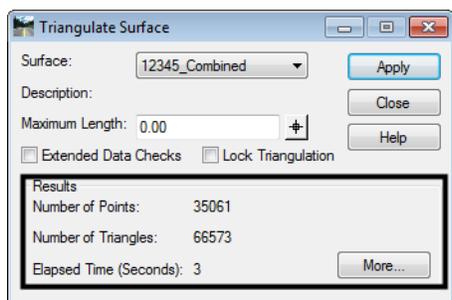


- From the **Surface** drop-down list, select the merged surface.
- In the **Maximum Length** field, key in the desired length. This option will automatically remove any triangles that have at least one edge longer than the specified distance. Zero indicates no restriction to length. Because the surface has an exterior boundary, '0' should be used to ensure that all of the data is included in the triangulated surface.

35. <D> **Apply** to execute the command.

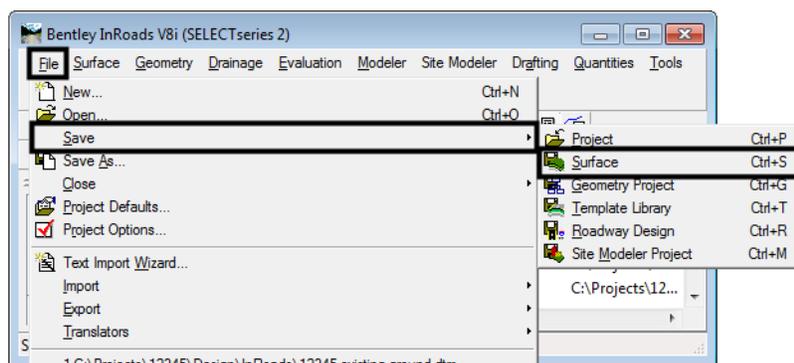


36. When the command has finished processing, surface information will be displayed in the **Results** area of the **Triangulate Surface** dialog box. The exterior boundary is now part of the surface and the **Triangulate Surface** dialog box can be dismissed.



37. Now that the merged surface is complete, it should be saved.

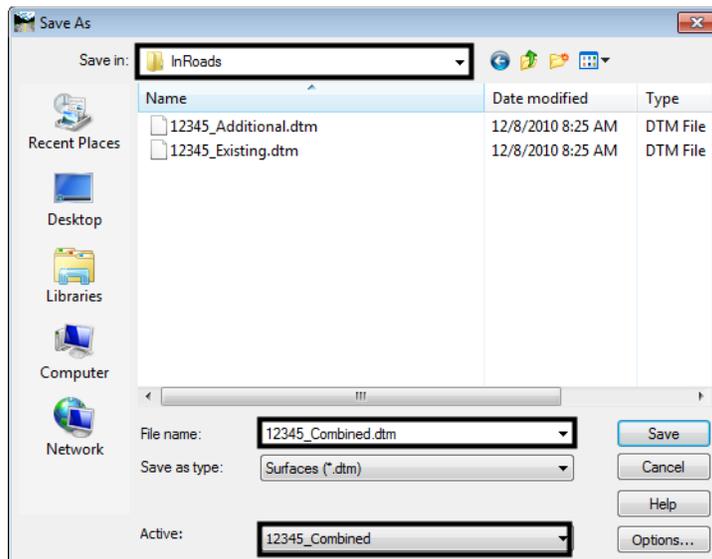
38. From InRoads, select **File > Save > Surface**. If the surface has been saved previously, the updated data will be written to the DTM file. If the surface has not been saved before, then a new DTM file will be created. One could also right click on the surface name in the InRoads Explorer and select **Save** from the menu.



39. The **Save As** dialog box will display. Use the **Save In** drop-down to specify the desired folder for the DTM.

Next the file name must be specified. There are two ways to do this; one, by keying in a filename (not recommended), or two, by selecting the surface from the **Active** list at the bottom of the dialog box. Selecting the surface from the **Active** drop-down will ensure that the DTM has the same name in InRoads memory as it does on the hard drive.

40. Select the down arrow on the **Active** drop-down then highlight the desired surface. This should be done even if the desired surface is already displayed in the **Active** drop-down. Selecting the surface in the **Active** drop-down will auto-populate the **File Name** field with the surface name.
41. <D> **Save** to add the file to the 'Save In' directory. After the file has been saved the **Save As** dialog box can be dismissed (<D> **Cancel**).



Copy a Portion of a Surface

There may be occasions when only a portion of a surface is needed. For example, one might wish to extend their existing DTM with a few hundred feet from an adjacent project or perhaps specific features from one surface are required in another. Both copying an area of a surface, and copying whole features can be accomplished using the **Copy Portion of Surface** command.

Two examples will be used to illustrate the **Copy Portion of Surface** command. In the first, all of the features within a given area will be copied into a new surface. In the second example specific features will be copied into a new surface.

Workflow Outline-

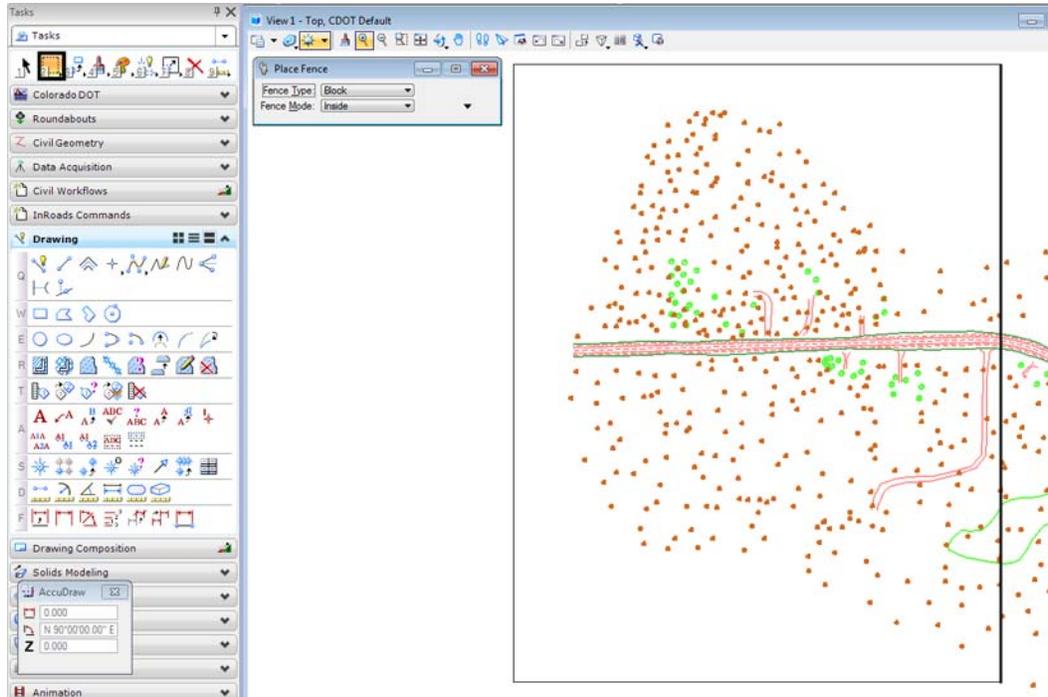
Copy a Portion of a Surface - This command can be used to copy part of a surface, either an area or individual features, to a new DTM file.

- ◆ **Commands Used:** Copy a Portion of a Surface - Used to create a new surface from part of another surface. The new surface can come from a region of the original surface (defined by a fence or shape) and/or by selected features.

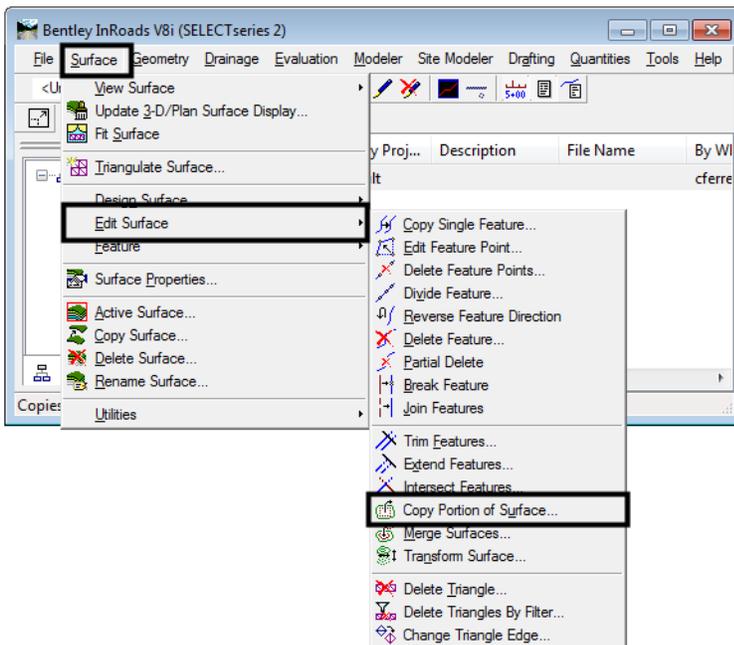
Example 1 – creating a subset of a DTM

In this example, all of the surface data in the box will be copied to create a new surface.

1. A MicroStation fence is used to identify the data to be copied. Select the **Place Fence** command from the MicroStation Main toolbar. Place the fence around the area to be copied. The blue box in the illustration below shows the location of the fence.

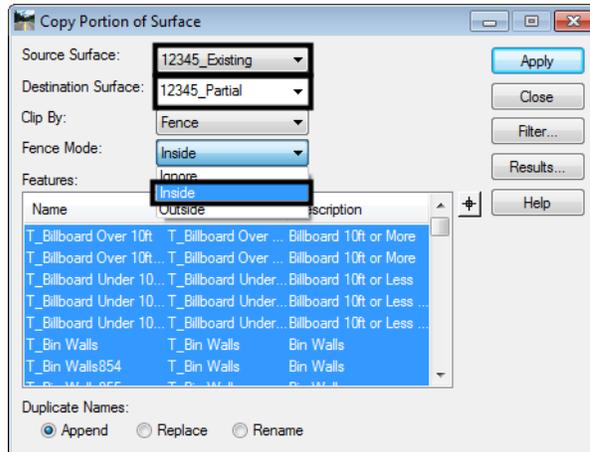


2. From InRoads, select **Surface > Edit Surface > Copy Portion of Surface**. The **Copy Portion of Surface** dialog box is displayed.

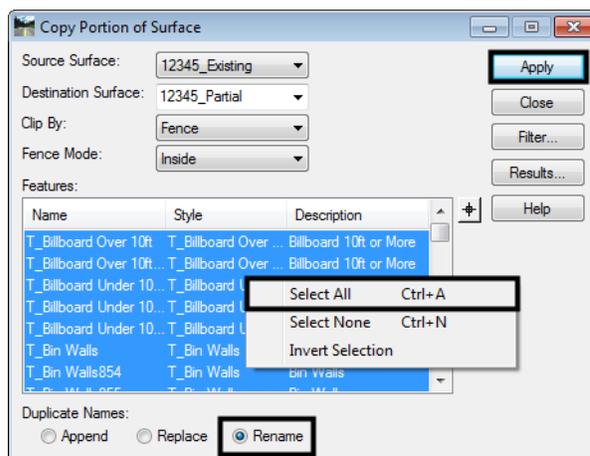


3. In the **Copy Portion of Surface** dialog box, from the **Source Surface** drop-down list select the surface to be copied from.

- From the **Destination Surface** drop-down list select the surface to be copied to. If the surface does not exist, the name for the new surface can be keyed in here.
- Select **Inside** from the **Fence Mode** drop-down.



- To select all the features from the **Features** list box, right click in the Features list box and choose **<D> Select All**.
- For **Duplicate Names**, toggle on the **Rename** option.
- <D> Apply** to initiate the command. The **Copy Portion of Surface** dialog box will minimize then reappear when the process is completed. Dismiss the dialog box.



- From the InRoads dialog box, select **File > Save > Surface** and save the surface. The newly created surface is now ready for use once it's been triangulated.

Example 2 -Copying a single element or multiple elements

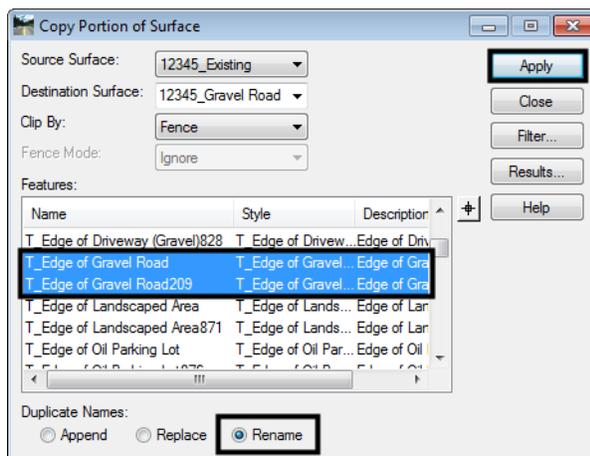
In this example, the Edge of Gravel Road features will be copied into a new surface. The fence will not be used in this example because the whole feature is to be copied.

- From InRoads, select **Surface > Edit Surface > Copy Portion of Surface**. The **Copy Portion of Surface** dialog box is displayed.

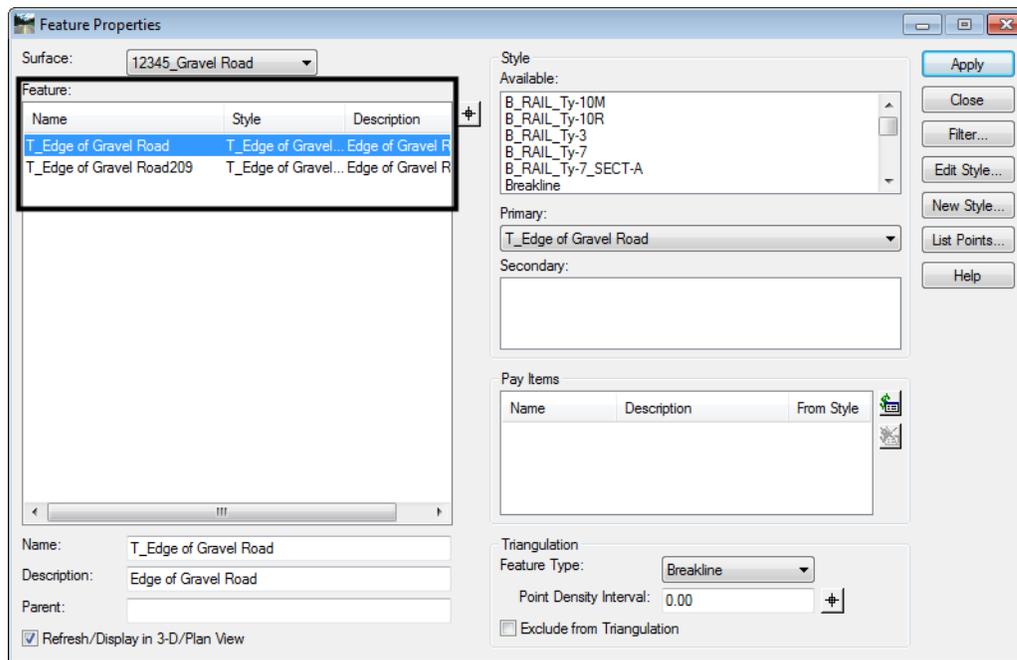
- In the **Copy Portion of Surface** dialog box, use the **Source Surface** drop-down to select the surface to be copied from.
- Use the **Destination Surface** drop-down to select the surface to be copied to. If the surface does not exist, a name to be used for the new surface can be keyed in here.

Note: The **Fence Mode** drop-down is grayed out because no fence is present. If a fence is present, select the **Ignore** option to copy the whole element. If the fence is defining an area to be copied or not to be copied then set the **Fence Mode** as needed.

- In the **Features** area, find the desired features in the list and highlight them individually. Hold the **Ctrl** key down to select a group of individual features or hold the **Shift** key to select a block of features.
- For **Duplicate Names**, toggle on the **Rename** option.
- <D> **Apply** to initiate the command. The **Copy Portion of Surface** dialog box will minimize then reappear when the process has completed. Dismiss the dialog box.



7. To verify that the data was copied, select the InRoads command **Surface > Features > Feature Properties**. The copied features should appear in the **Feature** list box.



Note: The destination surfaces in the above examples were empty, newly created surfaces. However, the same process will work to copy portions of a surface into another preexisting surface. This, along with **Creating an Exterior Boundary** can be used to merge two adjacent, non-overlapping, surfaces.)

Note: The **Parent** field in the **Feature Properties** dialog can be populated on a feature level in their respective DTMs prior to the merging or copying of features. Doing so allows the user to track where data originated. Any changes made require the surface to be saved for those changes to be retained for subsequent use.

