CDOT Workflow IR 20 - Creating Electronic Design Data Deliverables

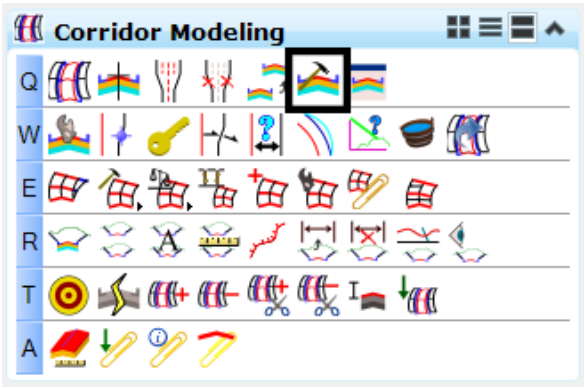
Once the design has been completed, design surface data can be converted into an electronic deliverable format. There are four formats for electronic deliverables; LandXML, DTM, DGN and DWG. This workflow illustrates the processes for creating design deliverables in each of the formats mentioned above. In order to create electronic deliverables, the design model must be converted into a terrain element. The next sections describe two methods of converting the design model into a terrain element. The first option updates the template so that it can be used to create an alternate surface. The second option uses a graphical filter to create a terrain element from the design data.

Updating The Template To Make An Alternate Surface

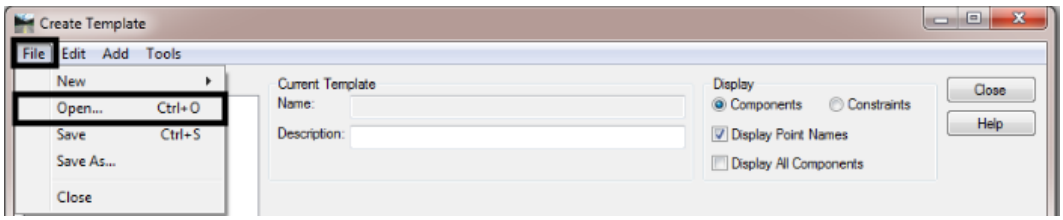
Creating an Alternate Surface is one method for making a terrain element from design data. The terrain element can then be used to create a DTM, LandXML, MicroStation DGN, and DWG file of the data.

Open InRoads using the corridor DGN file. In this example ***14553DES_Corridor-05.dgn*** is used.

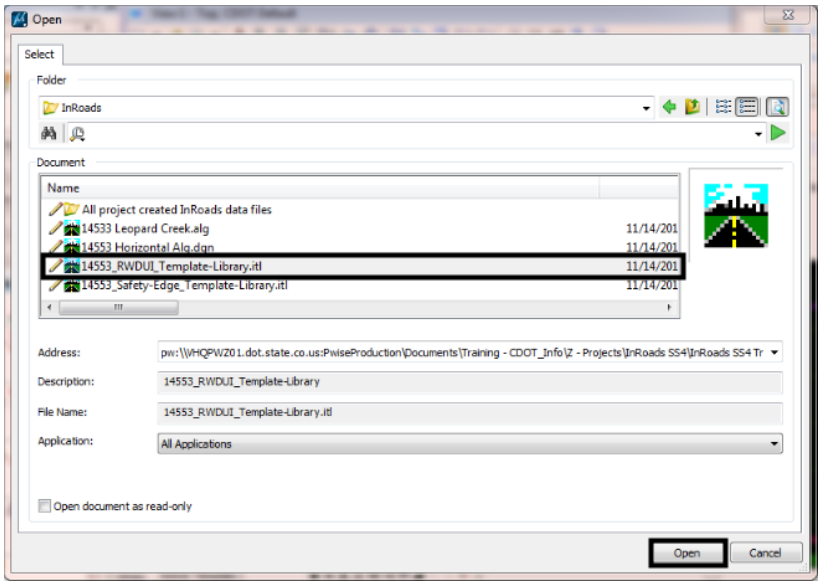
1. From the ***Tasks Toolbox***, Select the **Civil Tools** task.
2. Expand the ***Corridor Modeling*** tab.
3. Left Click the ***Create Template*** icon to open the ***Create Template*** dialog box.



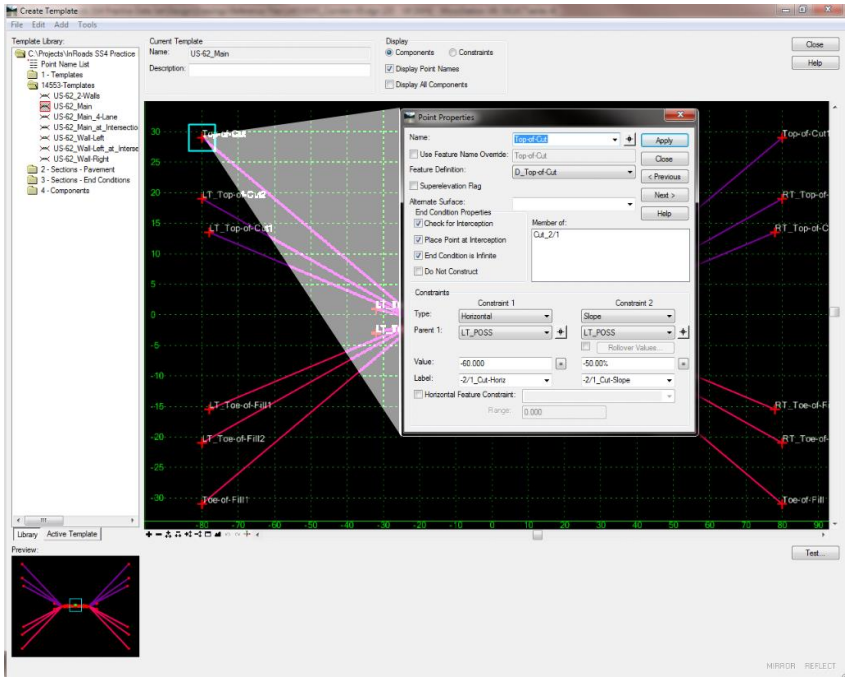
4. In the ***Create Template*** dialog box, select **File > Open**. This displays the ***Open*** dialog box.



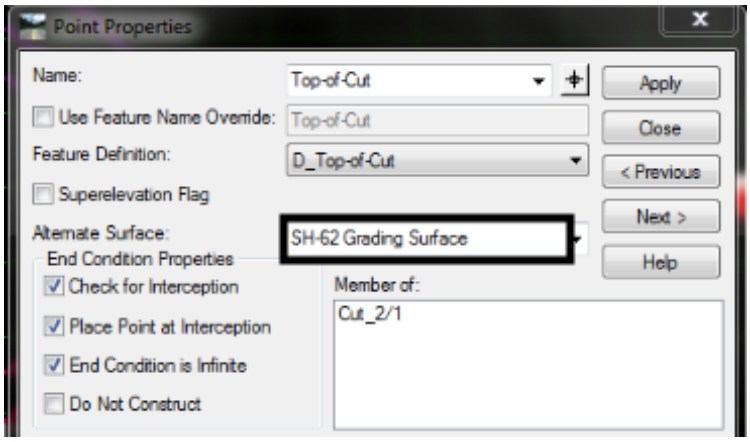
5. In the ***Open*** dialog box, navigate to the project folder containing the ITL file.
6. Highlight the ITL file and **Left Click** the **Open** button. This opens the template library and dismisses the **Open** dialog box. In this example, the **14553_RWDUI_Template-Library.itl** is used.



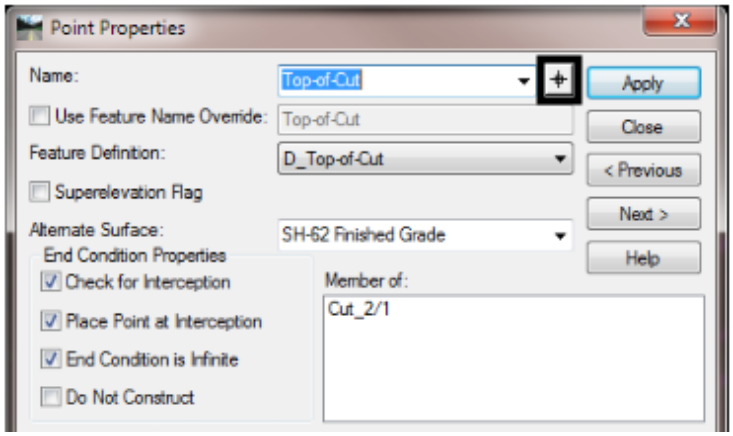
7. Navigate to the desired folder.
8. Double Left Click on the desired template to open it for editing.
9. Double Left Click on the desired point to open the ***Point Properties*** dialog box. In this example, the **Top-of-Cut** point was selected.



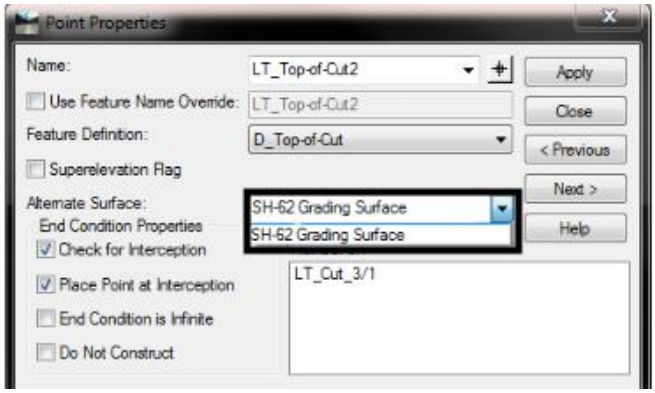
10. In the ***Alternate Surface*** field, key in the alternate surface name. This will be the name of the terrain element that will be created. In this example, ***SH-62 Grading Surface*** was entered.
11. Left Click the **Apply** button to accept the entry.



12. Left Click the locator button next to the ***Name*** field, then left click on the next point to be edited. This shows the properties of the selected point in the dialog box. In this example, **LT_Top-of-Cut2** was selected.

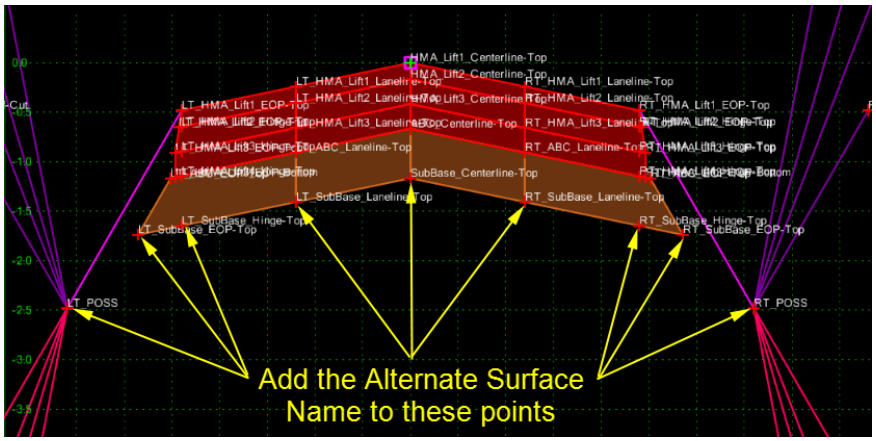


13. In the ***Alternate Surface*** field, use the drop down menu to select the Alternate Surface name. This insures that the same name is used for the alternate surface.
14. Left Click the **Apply** button to accept the entry.

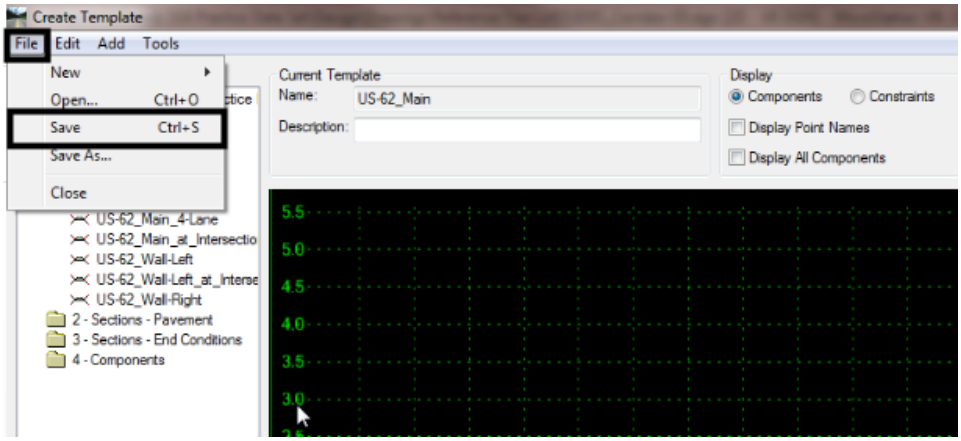


15. Repeat steps 12 through 14 for the remaining points to be used for the Alternate Surface.

If multiple templates are used, each template will need to be updated in this manner.

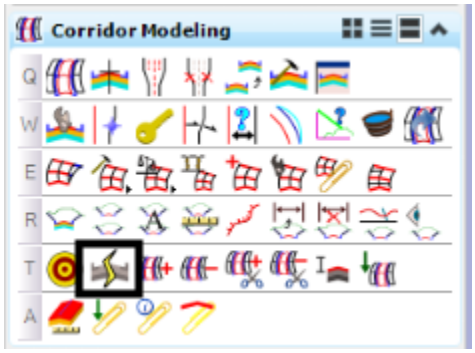


16. After setting the Alternate Surface on each of the required points, select **File > Save** from the menu bar. This commits the changes to the file so that they will be used when creating the corridor.

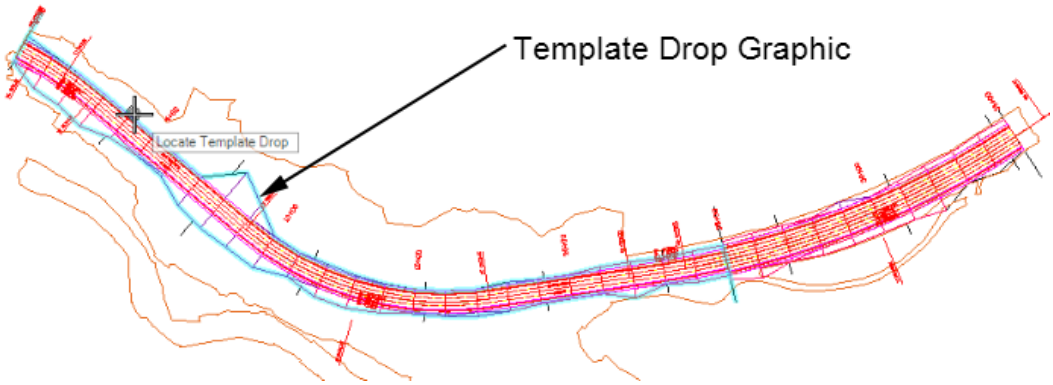


The template is now set up to create an Alternate Surface from design model data. If the corridor has already been created, then the template(s) will first have to be synchronized. To synchronize the templates:

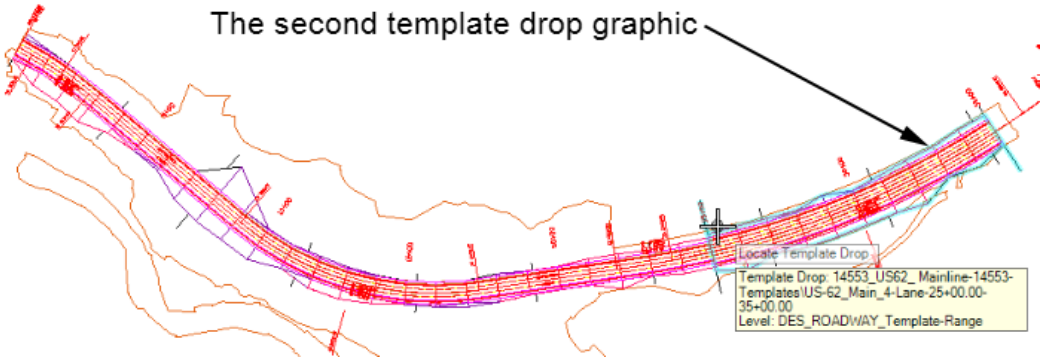
1. From the ***Tasks Toolbox***, Select the **Civil Tools** task.
2. Expand the ***Corridor Modeling*** tab.
3. Left Click the ***Create Template*** icon to open the ***Synchronize Template*** dialog box.



4. The prompt reads **Locate Template Drop**. Move the cursor on to the edge of the corridor. The template drop graphic will highlight. Left click to synchronize the template with the modified template library.



5. If multiple template drops are used, left click on the other template drop graphics so that all templates are synchronized. The illustration below shows the second template drop on the sample corridor.

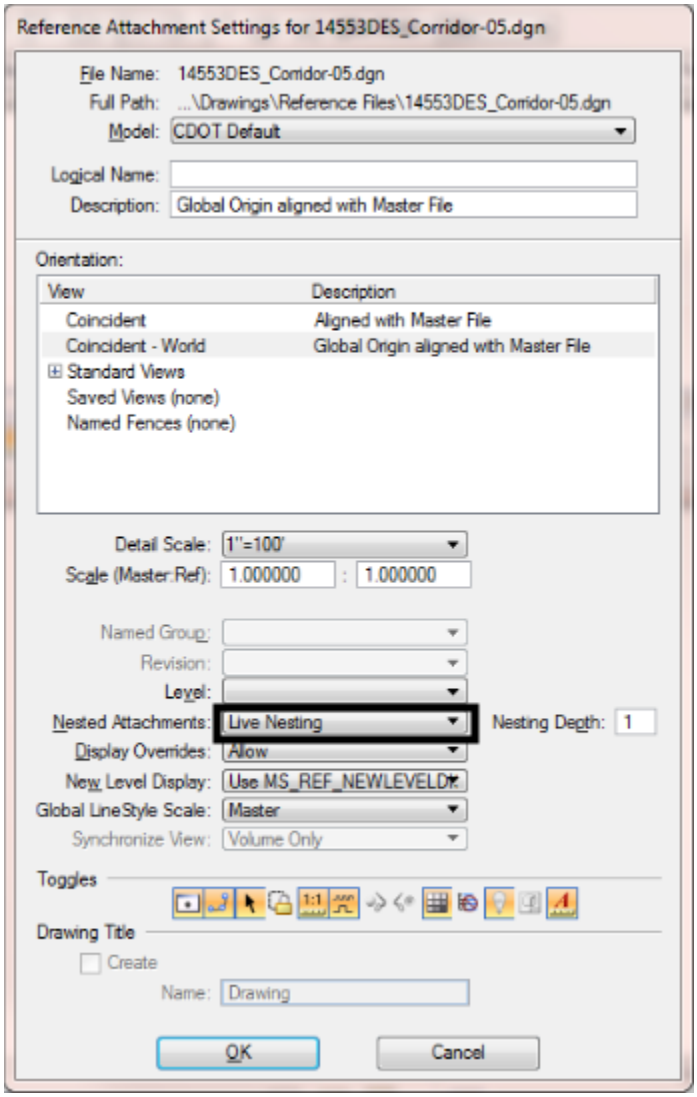


Note: Synchronizing the template drops reprocesses the corridor so that the Alternate Surface name is applied to the corridor features.

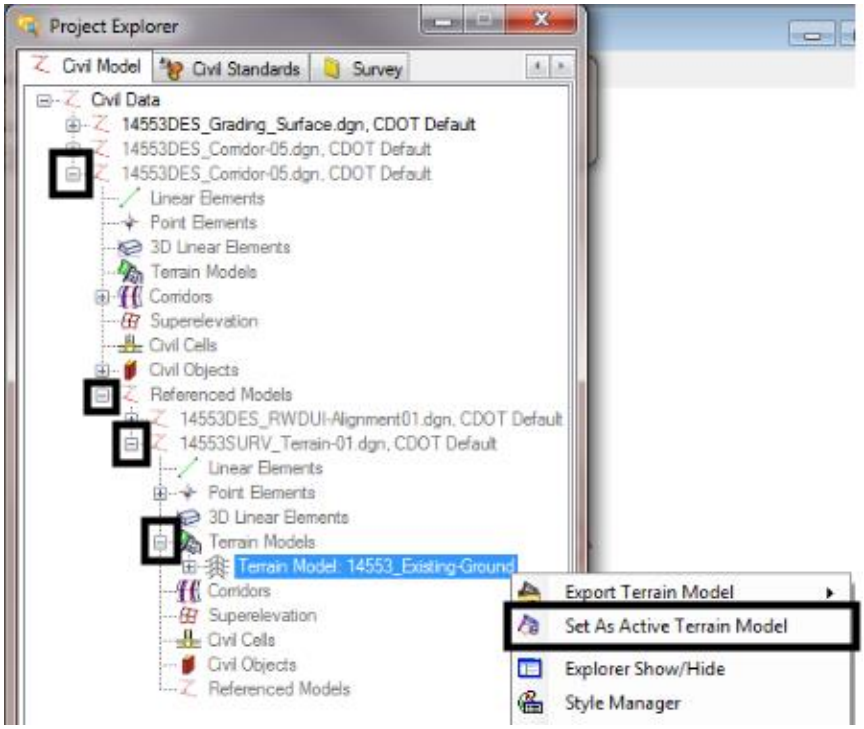
Creating The Alternate Surface

To create an Alternate Surface, the corridor file is referenced to a blank drawing, then the alternate surface is created. This separates the alternate surface data from the corridor, making it easier to access.

1. Open the desired DGN file. In this example the **14553DES_Finished-Grade_Surface.dgn** file is used.
2. Reference the corridor DGN file. Set the ***Nested Attachments*** to **Live Nesting** with a ***Nesting Depth*** of **1**. In this example **14553DES_ Corridor-05.dgn** is used.

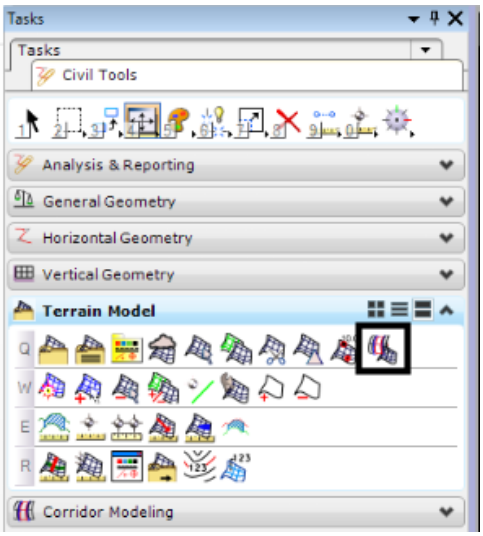


3. Using the Project Explorer, set the desired existing ground Terrain Element **Active**. The corridor is reprocessed to create the alternate surface and if the existing ground is not active, sideslopes will not be included as part of the alternate surface.
   Note: The existing ground DGN is located under the corridor DGN file in the Project Explorer tree. In this example ***14553SURV_Terrain-01*** is set as the Active Terrain.

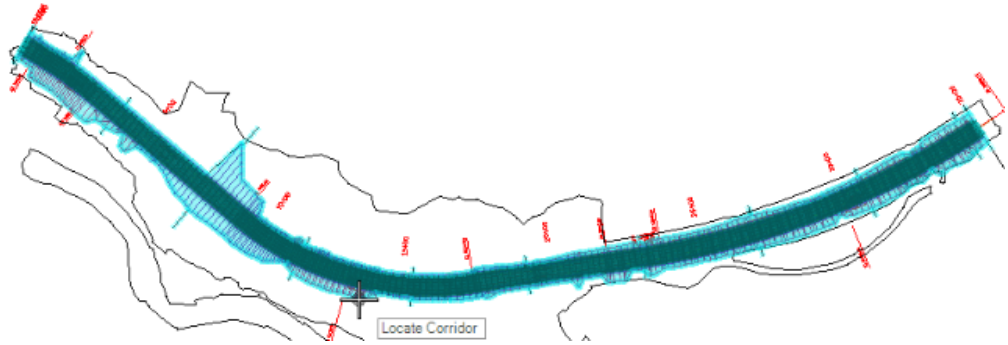


With the corridor attached and the existing ground terrain element active, the alternate surface can be created.

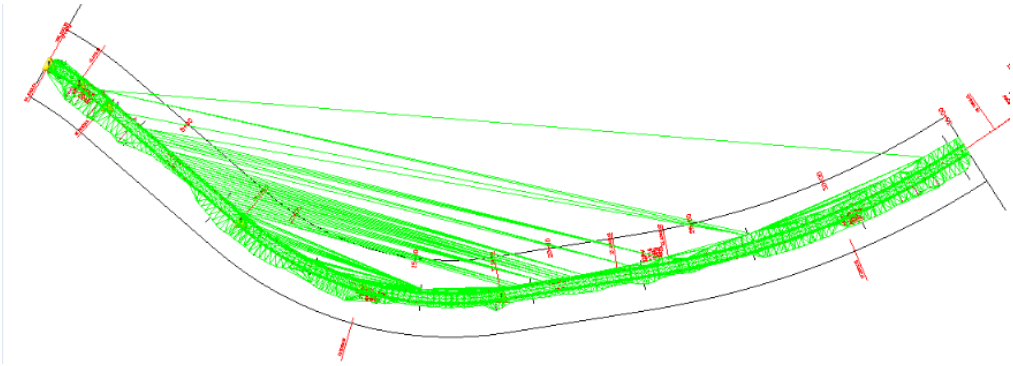
17. From the ***Tasks*** toolbar, expand the **Terrain Model** task.
18. Select the **Create Corridor Alternate Surfaces** button.



19. There is no dialog box associated with this command. The first prompt reads ***Locate Corridor***. Move the cursor on to the corridor and Left Click.

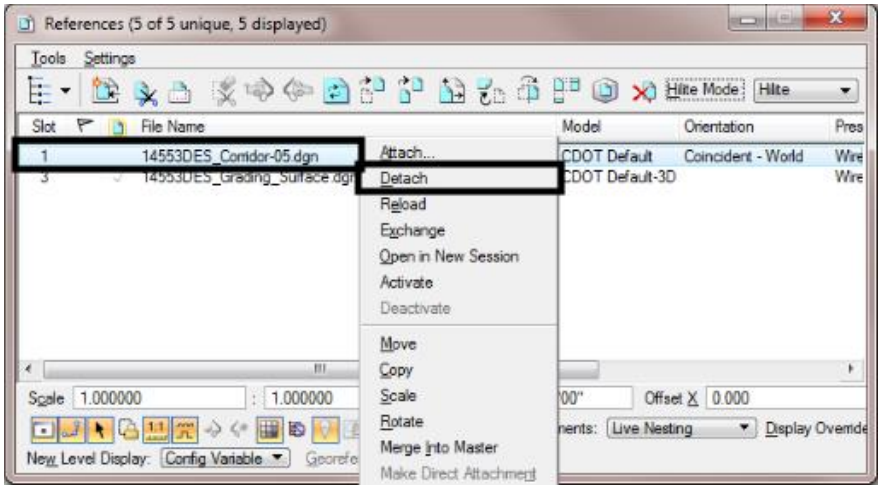


The corridor is processed and the alternate surface is created. The new surface does not have a boundary, but that will not affect the creation of a LandXML file. If a DTM is required, and exterior boundary can be created after the terrain element has been exported.

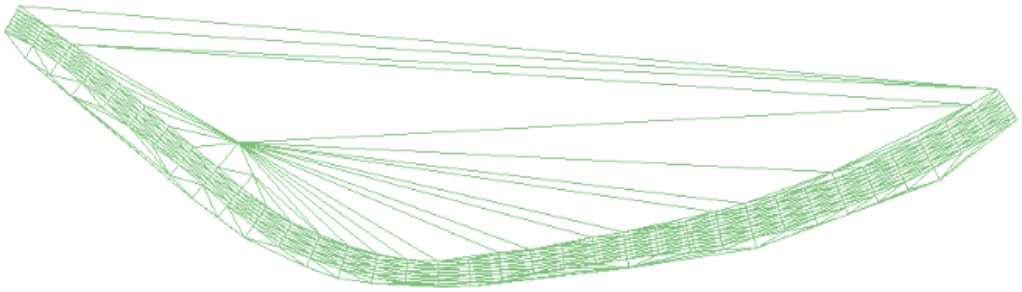


Now that the alternate surface has been created, the reference file(s) can be detached (if desired) and the terrain element saved to a LandXML or DTM format.

20. Open the ***References*** dialog box.
21. Right Click on the corridor DGN file and select **Detach** from the fly-out menu. This removes the corridor reference file, leaving only the finished grade terrain element.



22. Dismiss the ***References*** dialog box. The design terrain element is shown below.

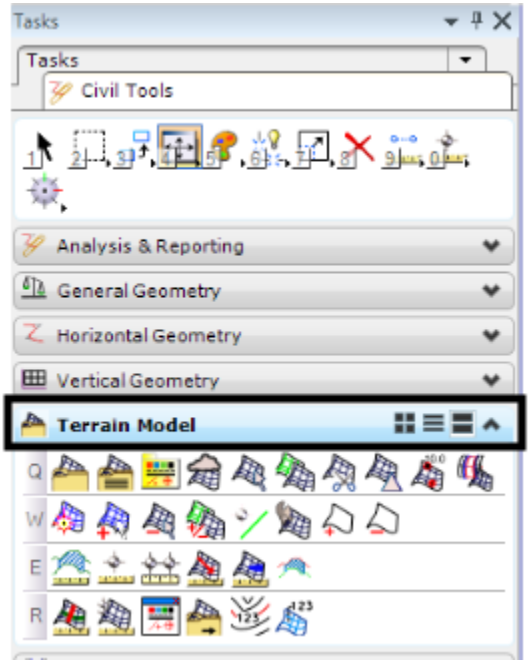


23. Skip down to the section titled **Creating Electronic Design Data Deliverables** to create the deliverable for this surface.

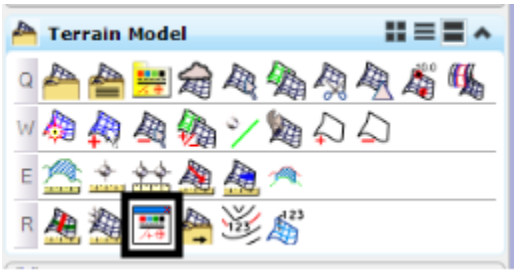
Creating A Terrain Element From A Graphical Filter

To create a terrain element using a graphical filter, the corridor file is referenced to a blank drawing. A graphical filter is defined then used to identify features in the design model for the new terrain element. This separates the design grading data from the corridor, making it easier to access.

1. Open the desired file. In this example the **14553DES_Finished-Grade_Surface.dgn** file is used.
2. Reference the desired corridor DGN file. Set the ***Nested Attachments*** to **Live Nesting** with a ***Nesting Depth*** of **1** as described above. In this example **14553DES_Corridor-05.dgn** is used.
   Note: The existing ground terrain element does not have to be active for this method.
3. From the ***Tasks*** toolbar, expand the **Terrain Model** task.

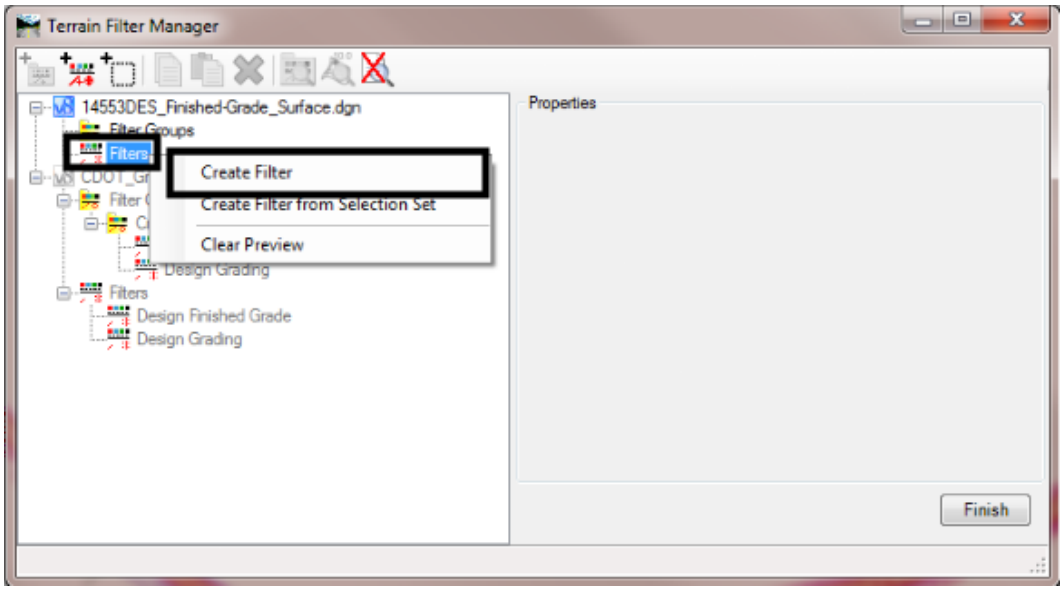


4. In the ***Terrain Model*** taskbar, select the **Graphical Filter Manager** Task. This displays the ***Terrain Filter Manager*** dialog box.

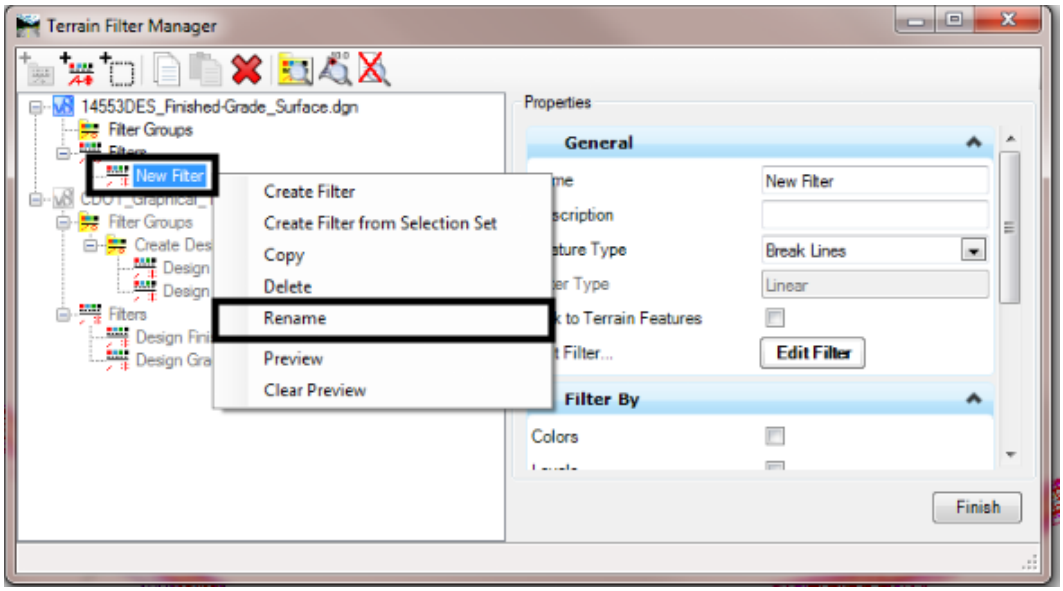


The following steps are used to define a graphical filter. A predefined filter has been created to create the finished grade terrain element. This filter is recreated below to illustrate how to define a filter. If a predefined filter is used, skip to step 15.

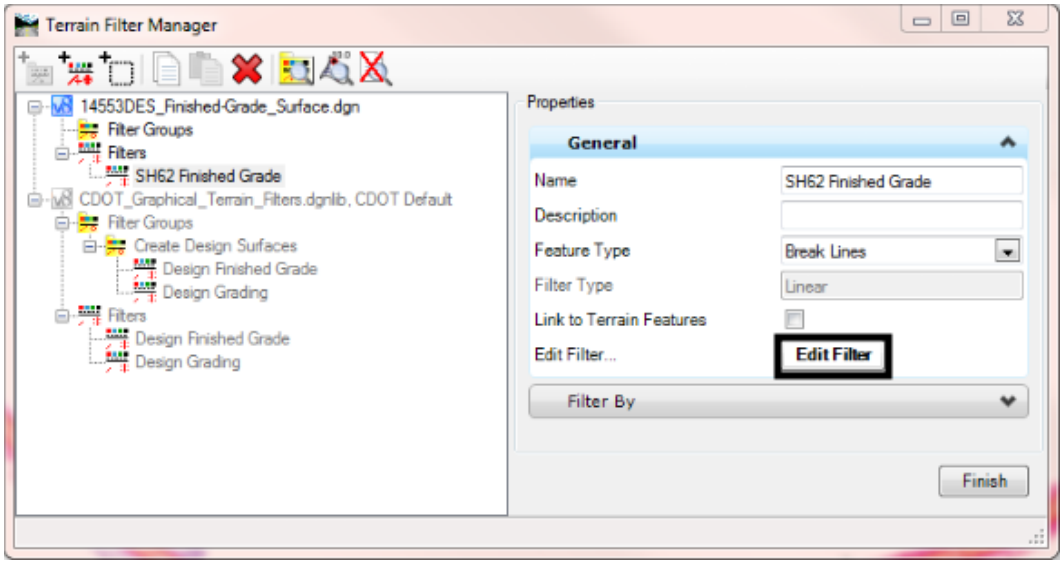
5. In the ***Terrain Filter Manager*** dialog box, in the folder tree on the left, right click on the **Filters** Folder.
6. Select **Create Filter** from the flyout menu. This places a **New Filter** under the ***Filters*** folder.



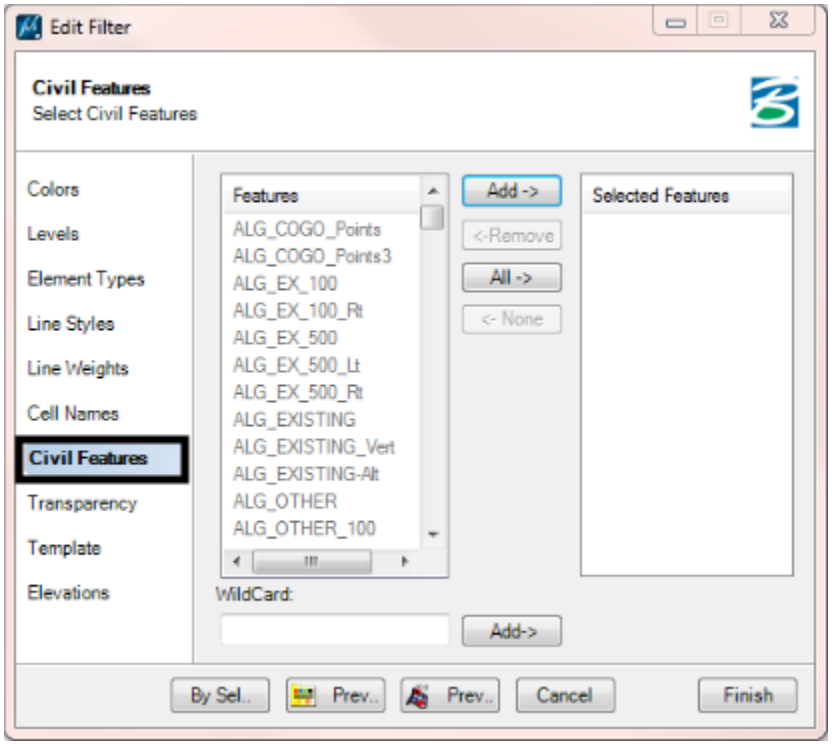
7. Right click on the **New Filter** and select **Rename** from the flyout menu.



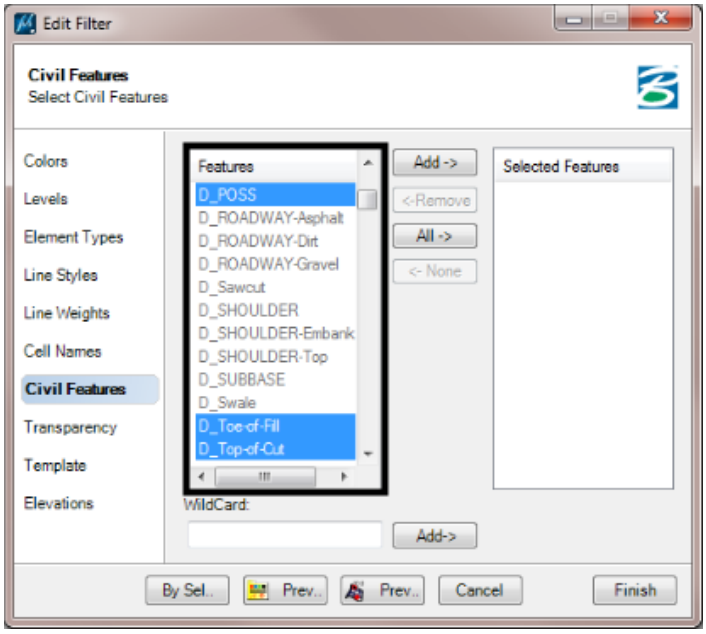
8. Key in the desired name and tap the ***Enter*** key. In this example ***SH62 Finished Grade*** is used.
9. Left click the **Edit Filter** button on the right side of the dialog box. This displays the ***Edit Filter*** dialog box.



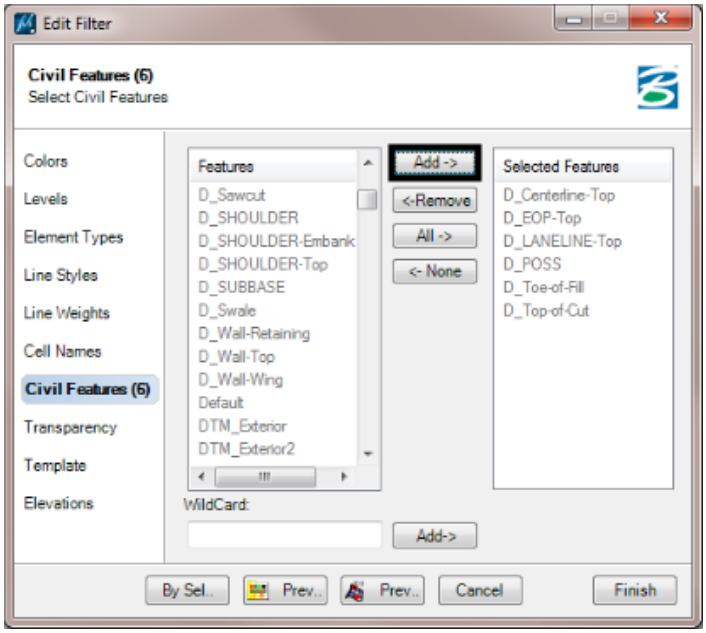
10. In the ***Edit Filter*** dialog box, left click on the **Civil Features** option on the left side of the dialog box. From here, ***Feature Definitions*** used to define the finished grade are selected.



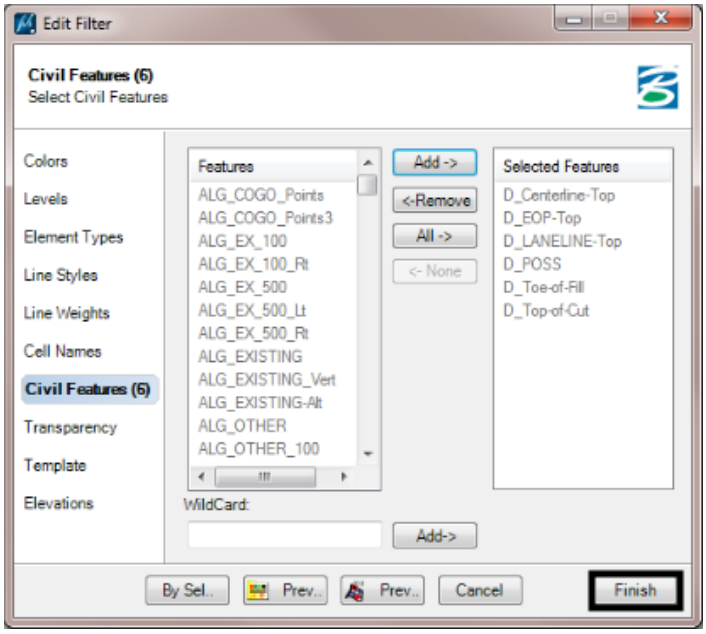
11. In the ***Features*** menu (on the left), highlight the desired feature definition names. (hold down the Crtl key to select multiple items):



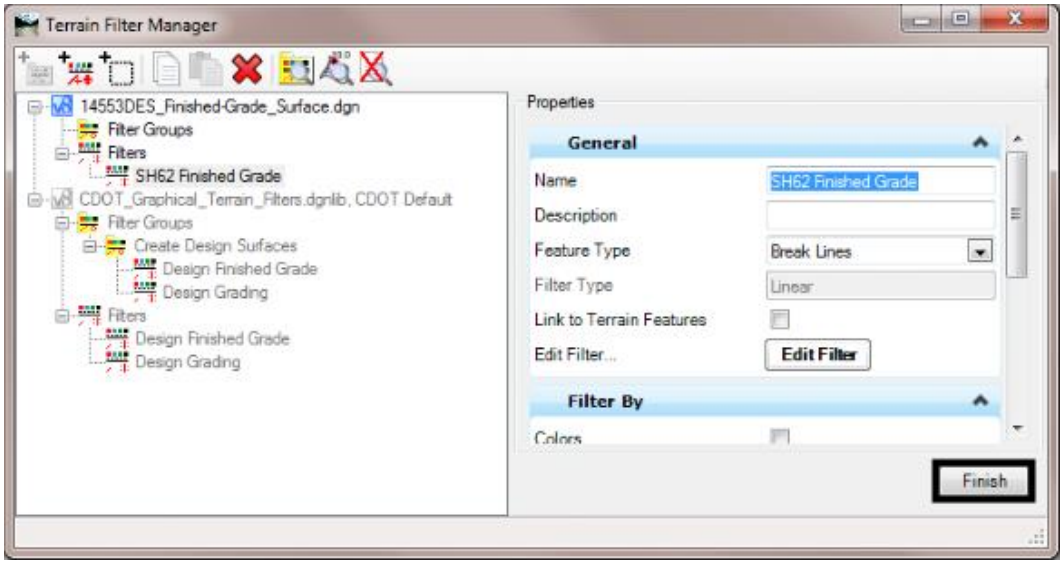
12. Left click the **Add** button to add the selected ***Feature Definitions*** to the **Selected Features** list.



13. Left click the **Finish** button to complete the filter definition. This dismisses the ***Edit Filter*** dialog box.



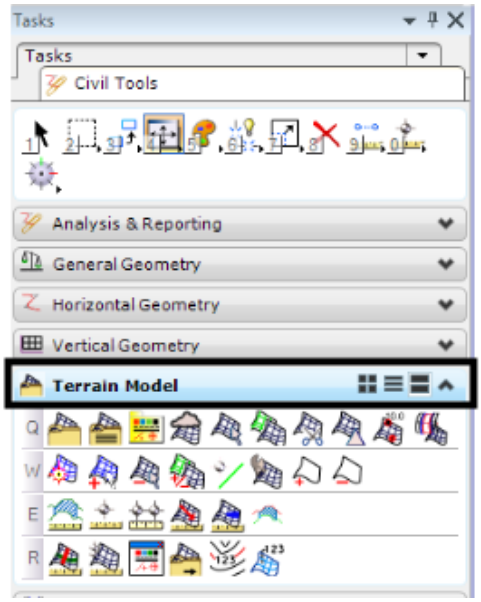
14. In the ***Terrain Filter Manager*** dialog box, Left Click the **Finish** button. This completes the graphical filter.



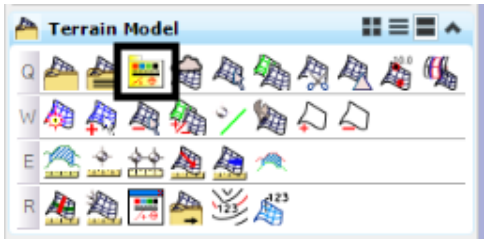
Note: A graphical filter created in this manner will only be available in the DGN file where it was created. Global graphical filters are stored in the ***CDOT_Graphical_Terrain_Filters.dgnlib*** file.

Now that the graphical filter has been completed, the finished surface terrain element can be created.

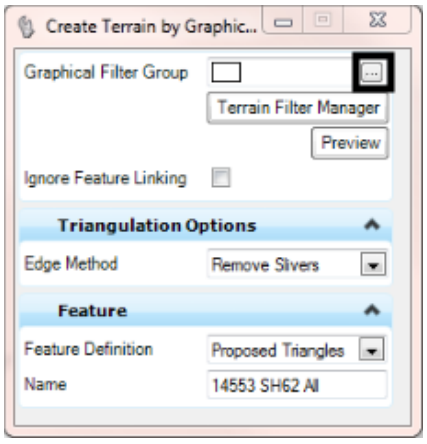
15. From the ***Tasks*** toolbar, expand the **Terrain Model** task.



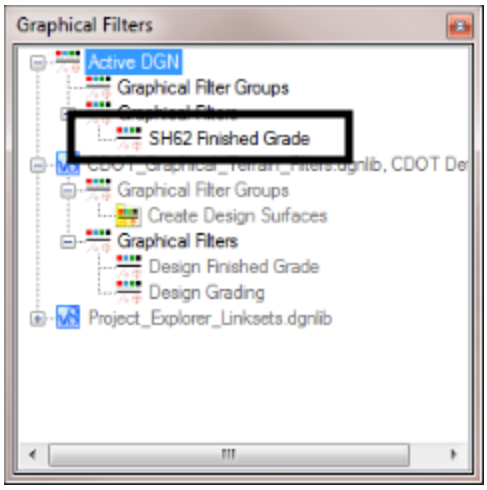
16. In the ***Terrain Model*** taskbar, select the **Create Terrain Model By Graphical** task. This displays the ***Create Terrain Model By Graphical task*** dialog box.



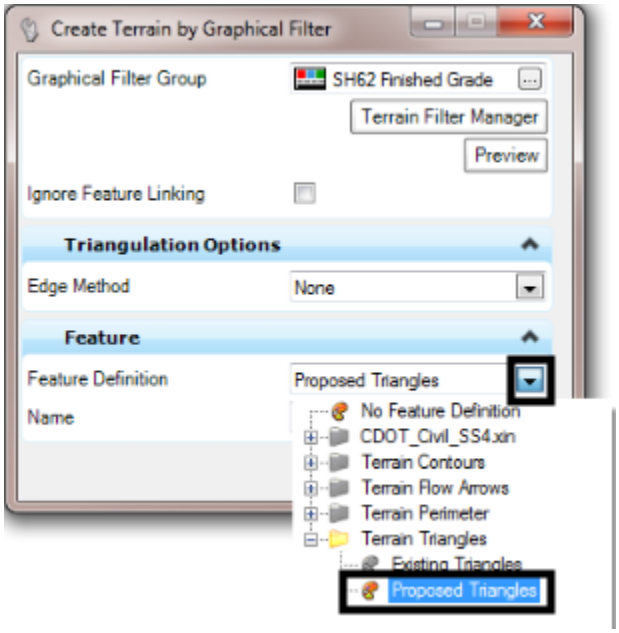
17. From the ***Create Terrain Model By Graphical task*** dialog box, left click the ellipsis button for the **Graphical Filter Group**. This displays the ***Graphical Filters*** dialog box.



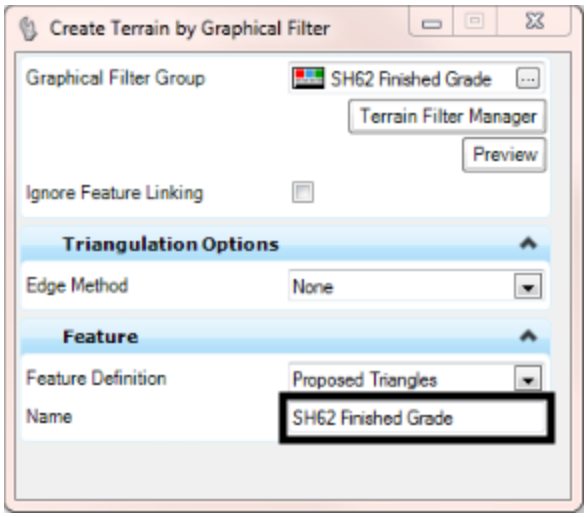
18. In the ***Graphical Filters*** dialog box, Left Click on the desired filter. This selects the filter and dismisses the ***Graphical Filters*** dialog box. In this example, **SH62 Finished Grade** is used.



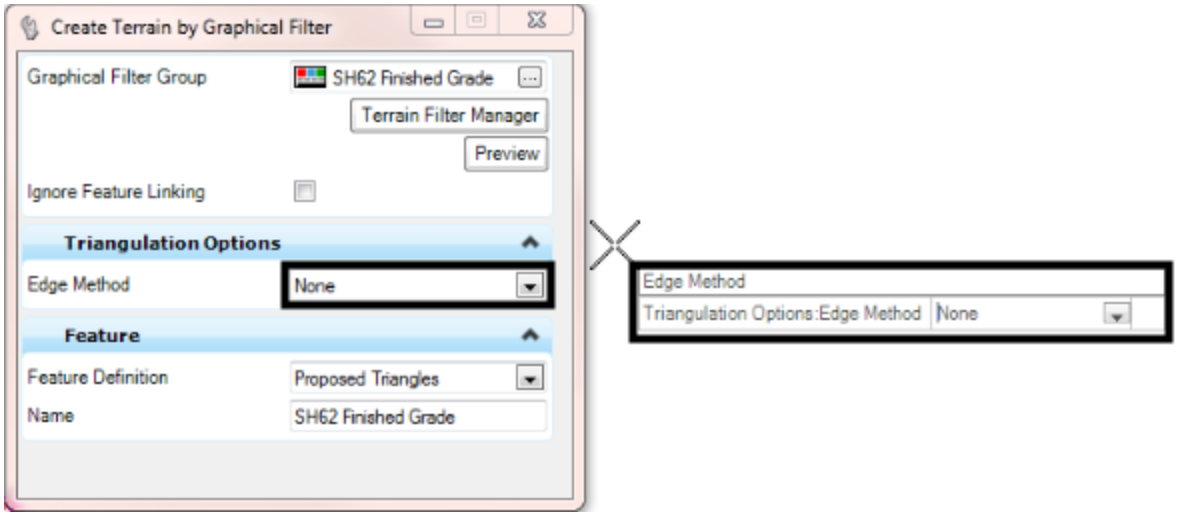
19. In the ***Feature*** area of the ***Create Terrain Model By Graphical*** dialog box, select the desired feature definition from the drop down menu. This sets the display style for the finished grade terrain element. **Proposed Triangles** is used in this example.



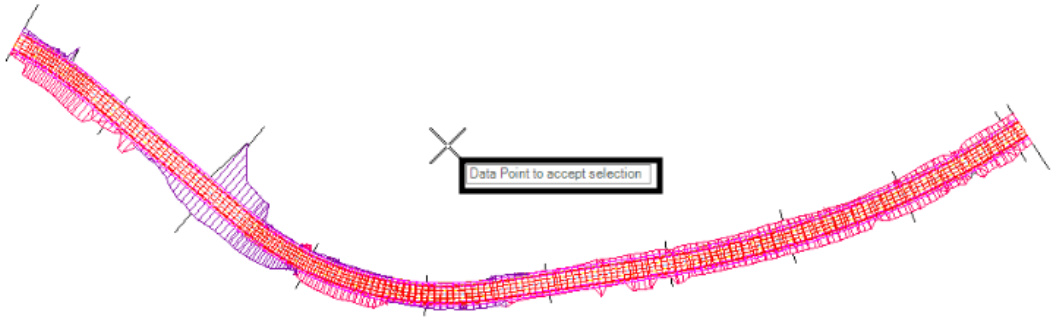
20. In the ***Name*** field, key in the desired Name. This is the name of the terrain element to be created. In this example, ***SH62 Finished Grade*** was entered.



21. The cursor prompt now reads ***Triangulation Options: Edge Method***. Use the down arrow to select the **None** option. This can also be set using the drop down menu on the dialog box. Left Click to accept the entry.



22. The final prompt reads **Data point to accept the selection**. Left Click in a blank area to accept the menu settings and create the surface.



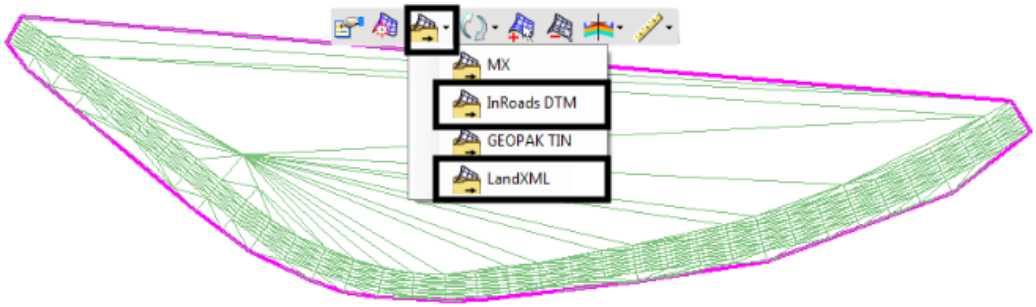
Now that the finished grade surface has been created, the reference file can be detached (if desired) and the terrain element saved to the desired format.

Creating Electronic Design Data Deliverables

Electronic design data deliverables come in two types; digital data for LandXML and DTM, and graphical data for DGN and DWG. The procedures for creating each type of deliverable are described below.

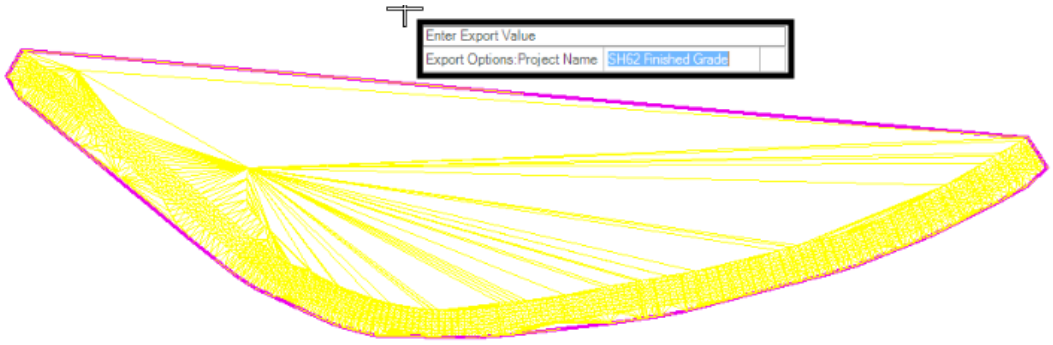
Creating LandXML and DTM data

1. Using the Element Selector, Left CLick on the edge of the new terrain element.
2. From the context menu select the **Export To File** button. From its drop-down menu, select the desired option,either **LandXML** or **InRoads DTM**.

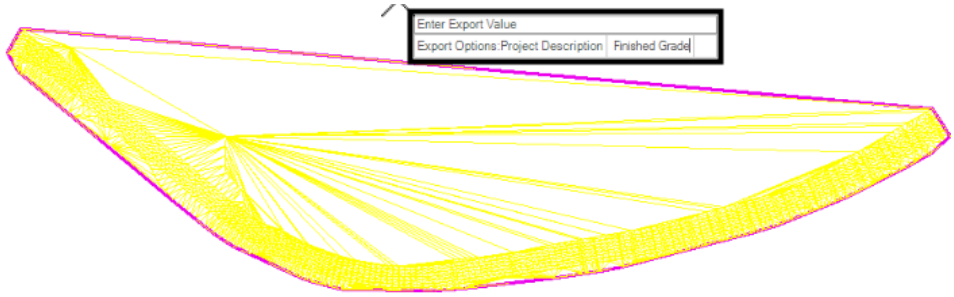


For LandXML Files

3. There is no dialog box associated with this command. The prompt reads **Export Options: Project Name**. Key in the desired Name. Left Click to accept it. In this example was ***SH62 Finished Grade*** entered.

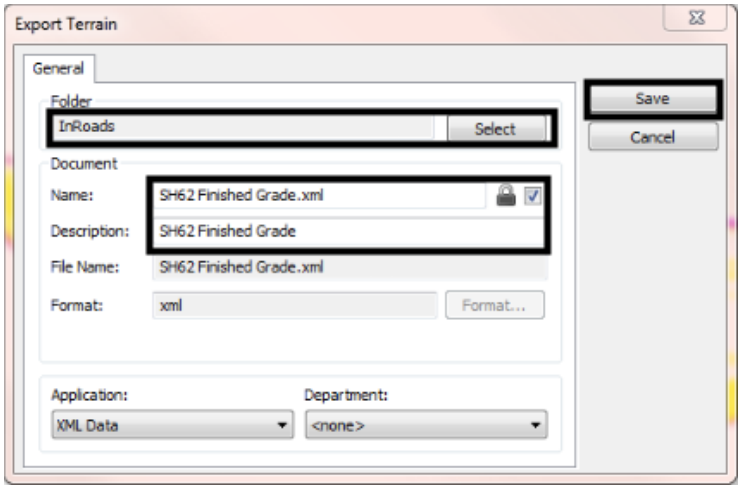


4. The next prompt reads **Export Options: Project Description**. Key in the desired Descriptionand then Left Click to accept the entry. In this example was ***SH62 Finished Grade*** entered



5. The next prompt reads **Export Options: Export Options**. There are three options available; ***Export Features Only***, ***Export Triangles Only***, or ***Export Both***. Select the desired option using the down arrow then Left Click to accept. For this example, **Export Features Only** was used.

6. In the ***Export Terrain*** dialog box, navigate to the desired folder.
7. Key in the desired for the Name and Description of the xml file.
8. Left Click the Save button to accept the entries and save the file.

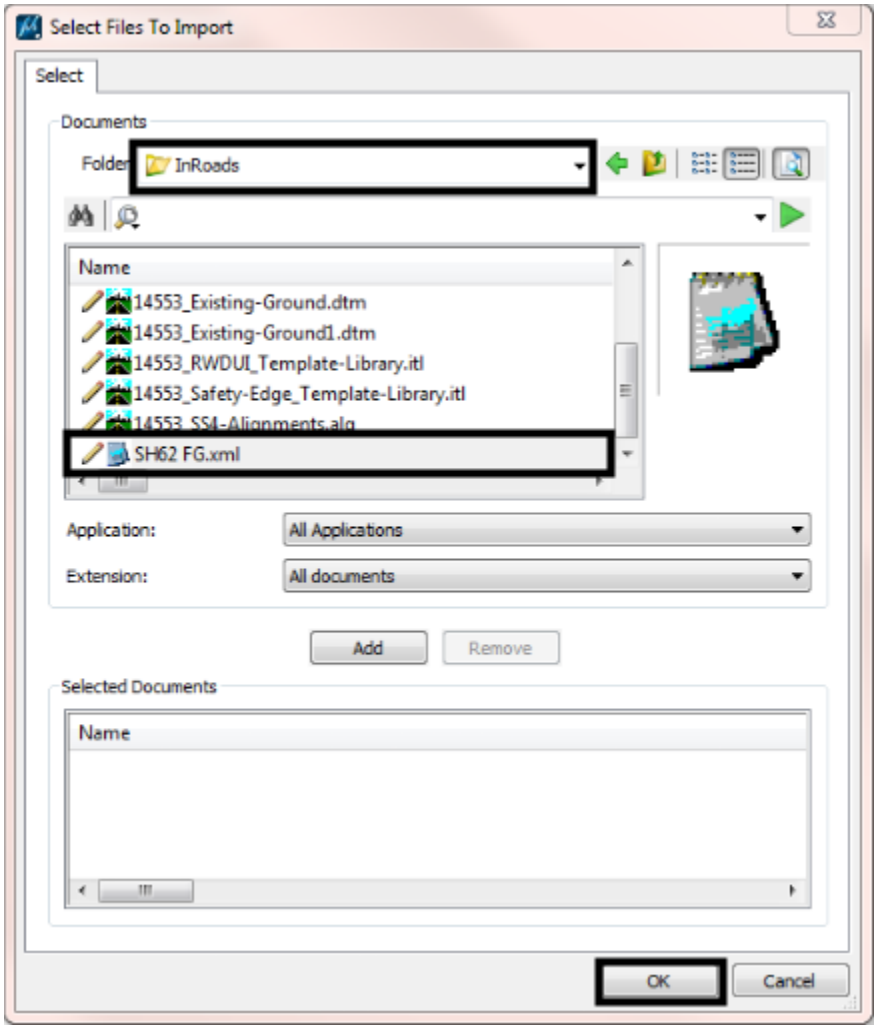


9. Check In the XML file when prompted (if in ProjectWise).

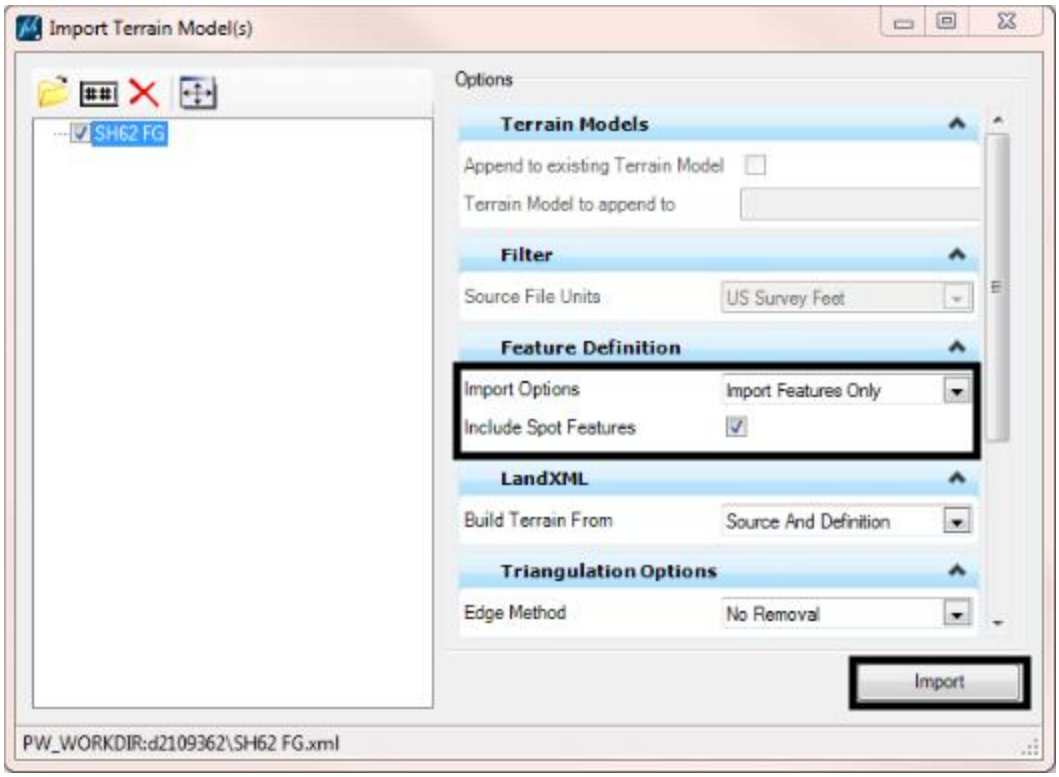
To test the results of the export to LandXML, import the file into a blank 3D file.

10. Open an empty 3D dgn file using InRoads SS4.
11. Expand the **Terrain Model** tasks from the ***Tasks*** toolbar.
12. Left Click the **Create From File** button form the **Terrain Model** tasks. This displays the ***Select File To Import*** dialog box.

13. In the ***Select File To Import*** dialog box, navigate to the folder containing the LandXML file.
14. Highlight the LandXML file.
15. Left Click the OK button. This accepts the file selection and displays the ***Import Terrain Model(s)*** dialog box.

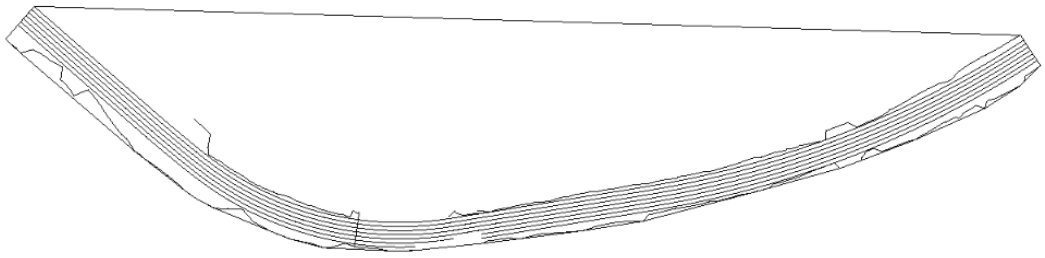


16. In the ***Import Terrain Model(s)*** dialog box, set the ***Import Options*** to Import **Features Only**.
17. Toggle on **Include Spot Features**. All other settings can remain as defined.
18. Left Click the Import button.



The file is processed and the linework defined in the LandXML file is displayed.

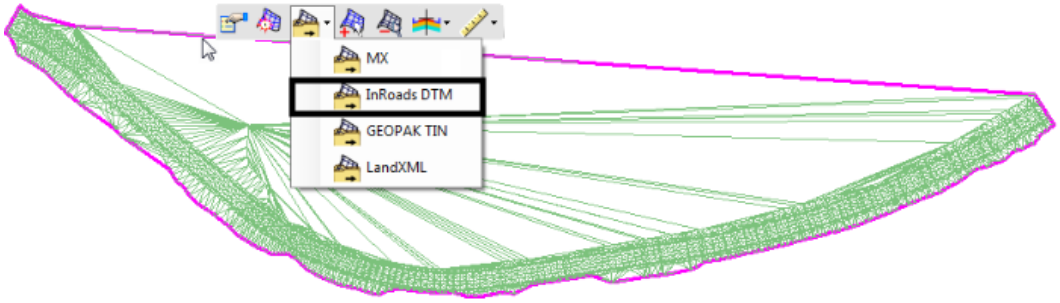
19. Close the ***Import Terrain Model(s)*** dialog box. The illustration below shows the results of the import.



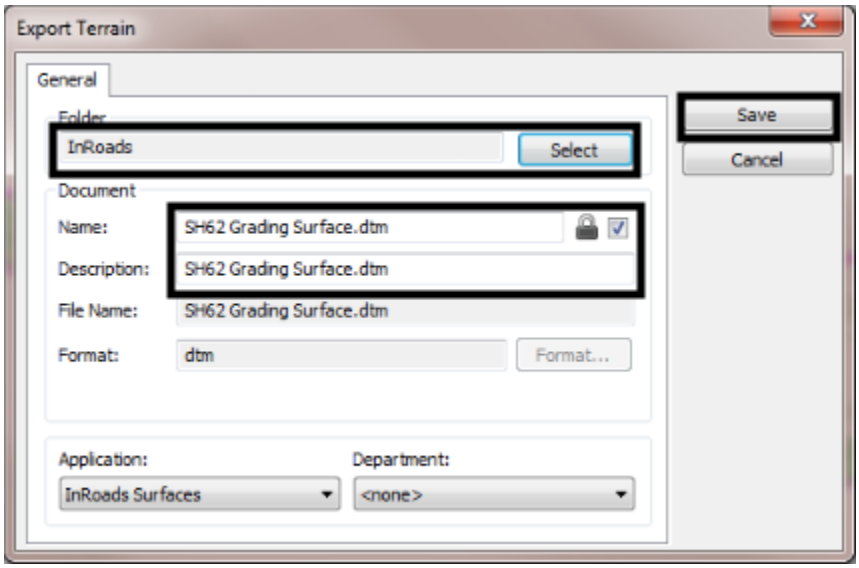
This file can now be compared to the original data to ensure its accuracy.

For DTM Files

20. From the context menu select the **Export To File** button. From its drop-down menu, select the desired export option.



21. The **Export Terrain** dialog box is displayed. Navigate to the desired folder:
22. Key in a Name and Description for the file.
23. ***Left Click*** the **Save** button to accept the entries and save the file.

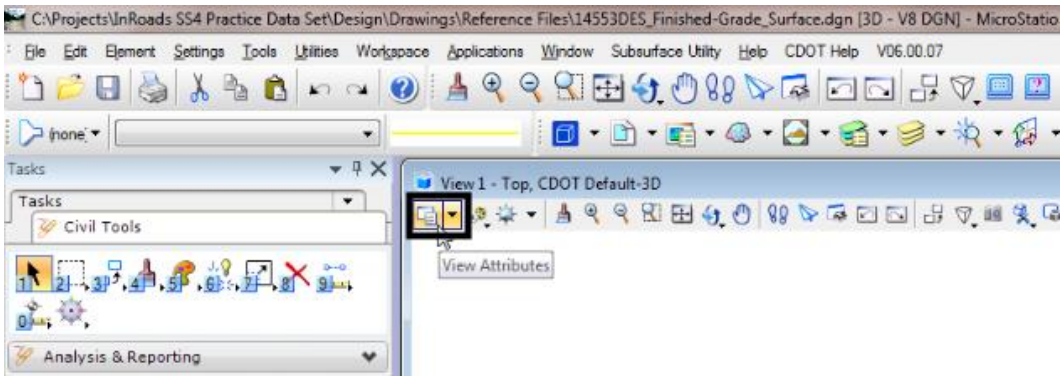


24. Check In the file when prompted.

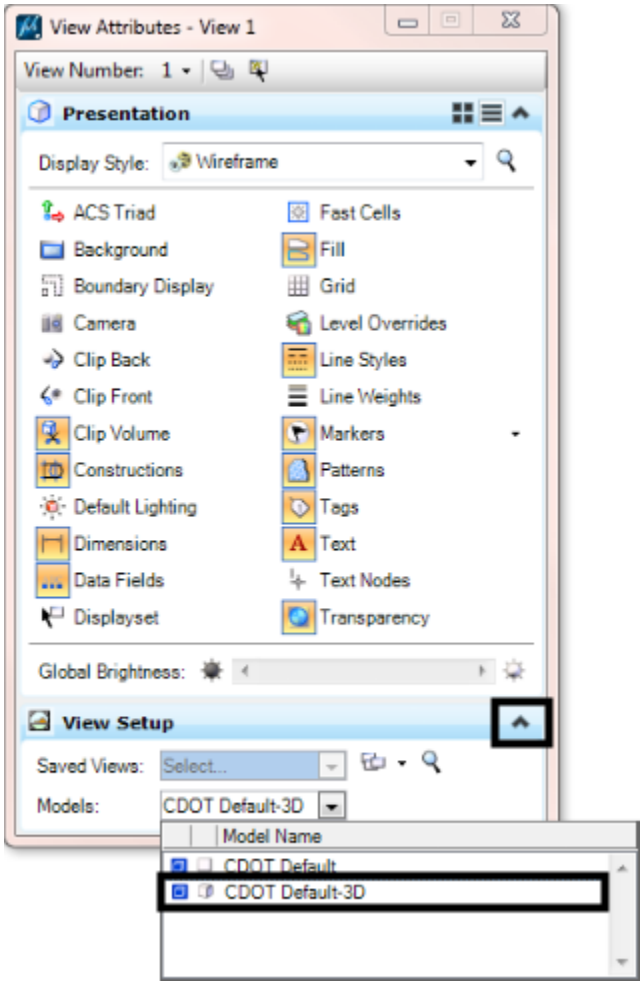
Creating DGN and DWG data

The terrain element is used for the graphics in a DGN or DWG delivery format. The view needs to show the 3D model, as this is the data needed for the deliverable. The display of the terrain element is set to breakline. To change the terrain element display:

1. Left click on the **View Attributes** button. This displays the ***View Attributes*** dialog box.


C:\Projects\InRoads SS4 Practice Data Set\Design\Drawings\Reference Files\14553DES_Finished-Grade_Surface.dgn [3D - V8 DGN] - MicroStatio
File Edit Element Settings Tools Utilities Workspace Applications Window Subsurface Utility Help CDOT Help V06.00.07
(none)
Tasks
Tasks
Civil Tools
Analysis & Reporting
View 1 - Top, CDOT Default-3D
View Attributes

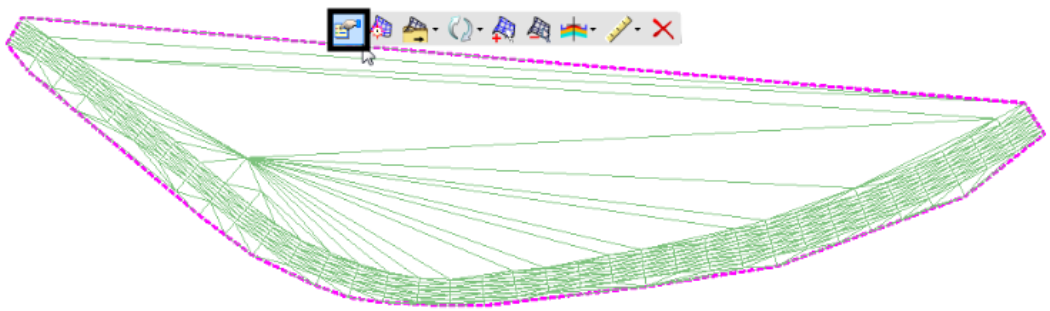
2. In the ***View Attributes*** dialog box, expand the **View Setup**.
3. Set the Models to **CDOT Cefault-3D**.



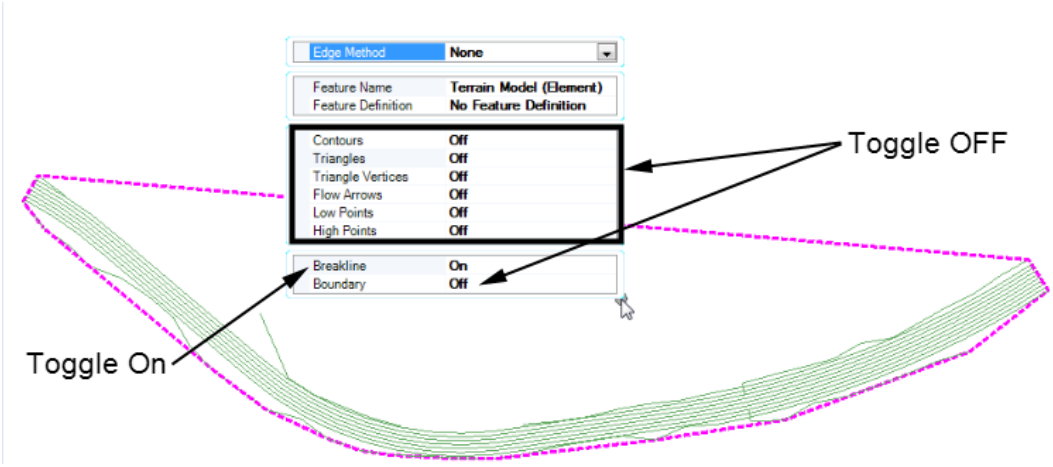
4. Dismiss the ***View Attributes*** dialog box.

Next, the display property of the terrain element is set to show the breaklines.

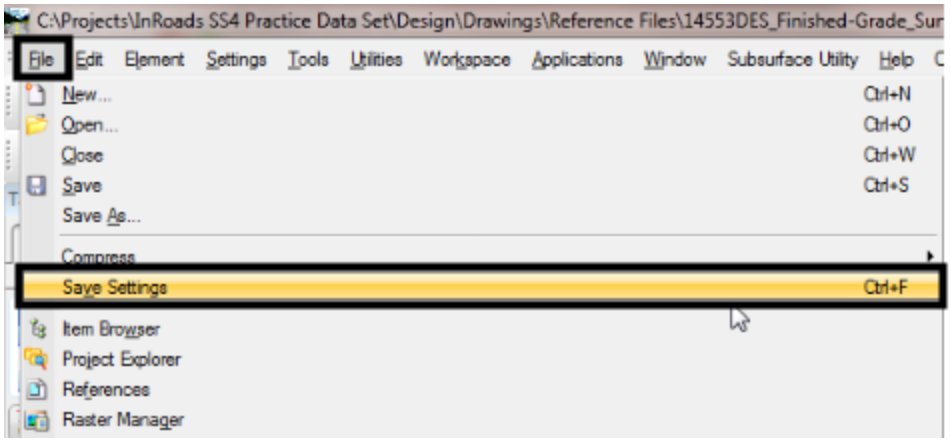
5. Using the **Element Selector**, Left CLick on the edge of the new terrain element.
6. From the context menu select the **Properties** button. This displays the ***Properties*** flyout menu.



7. In the ***Properties*** flyout menu, toggle **OFF** all of the option, then toggle **ON** ***Breakline***.



8. Deselect the terrain element.
9. From the MicroStation menu bar, select **File > Save Settings**.

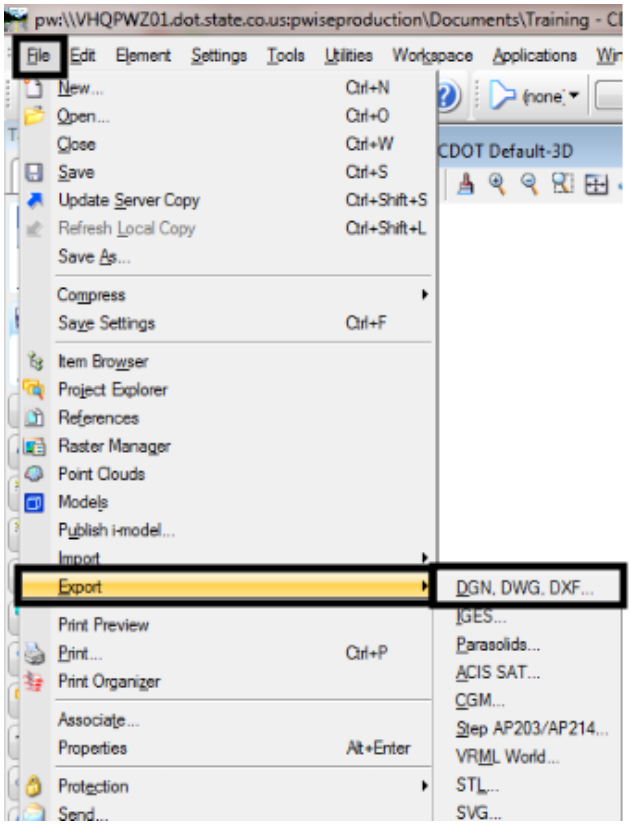


The file is now ready for delivery as a DGN file.

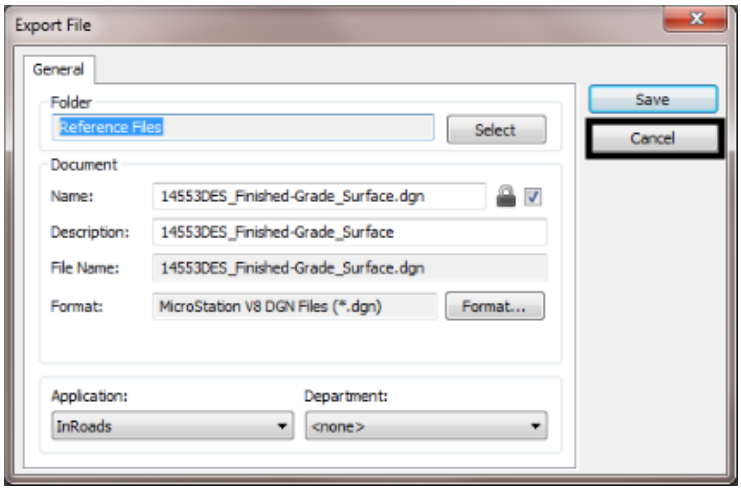
To create a DWG file

Note: Due to the way the file is processed to create a DWG file, the output DWG must be saved to a local directory. Once saved, the file can be moved to ProjectWise.

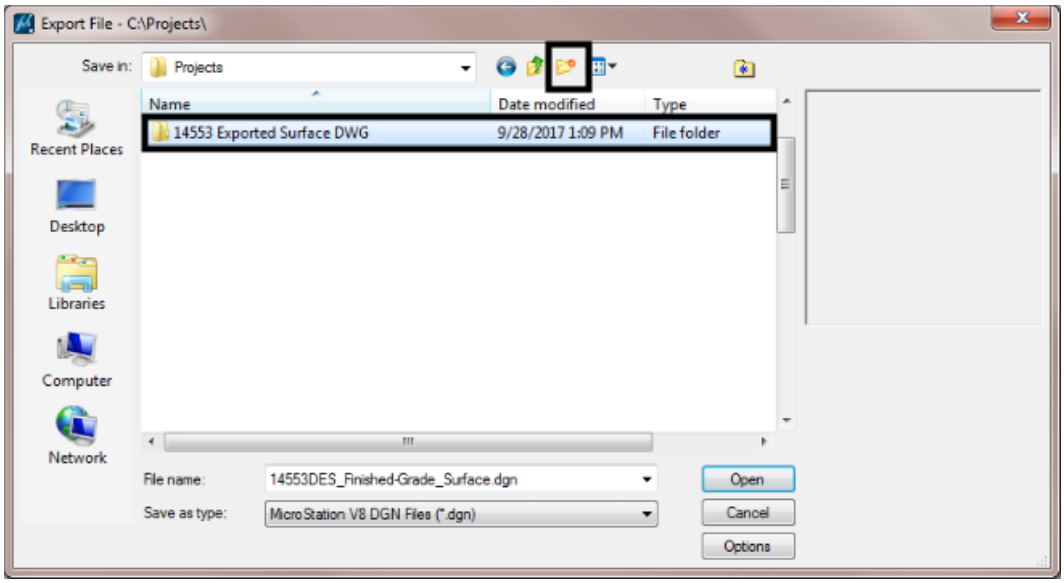
10. From the MicroStation menu bar, select **File > Export > DGN, DWG, DXF**. This displays the ***Export File*** dialog box.



11. In the ***Export File*** dialog box, Left Click the **Cancel** button. This displays the Windows (local) ***Export File*** dialog box.



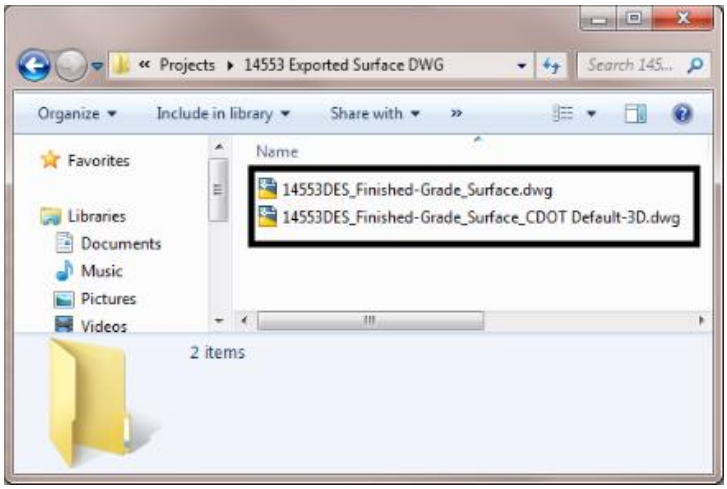
12. Create a folder specifically for the exported file and save the DWG file to that folder. That way the file can be easily found then moved into ProjectWise.



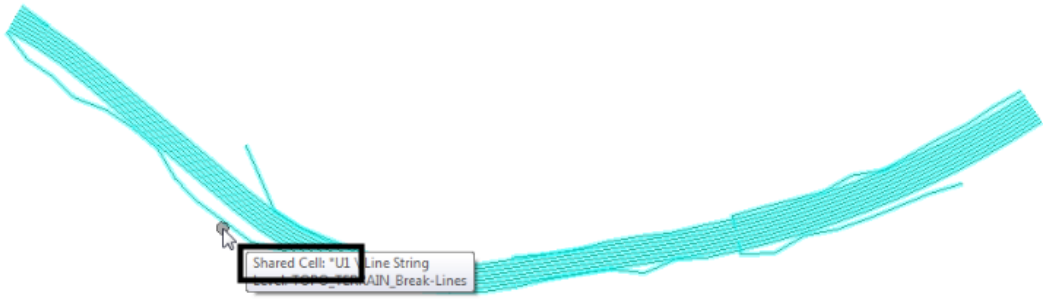
13. Using the ***Save as type*** dropdown menu, select **Autidesk(R) DWG Files (*.dwg)**. Left Click the **Save** button to create the DWG file. This creates a DWG file for each model in the exported DGN file.

    The exported DGN file contained two models; CDOT Default and CDOT Default-3D. The ***CDOT Default*** model was saved to the ***14553DES_Finished-Grade_Surface.dwg*** file. The ***CDOT Default-3D*** model was saved to the ***14553DES_Finished-Grade_Surface_CDOT Default-3D.dwg***.

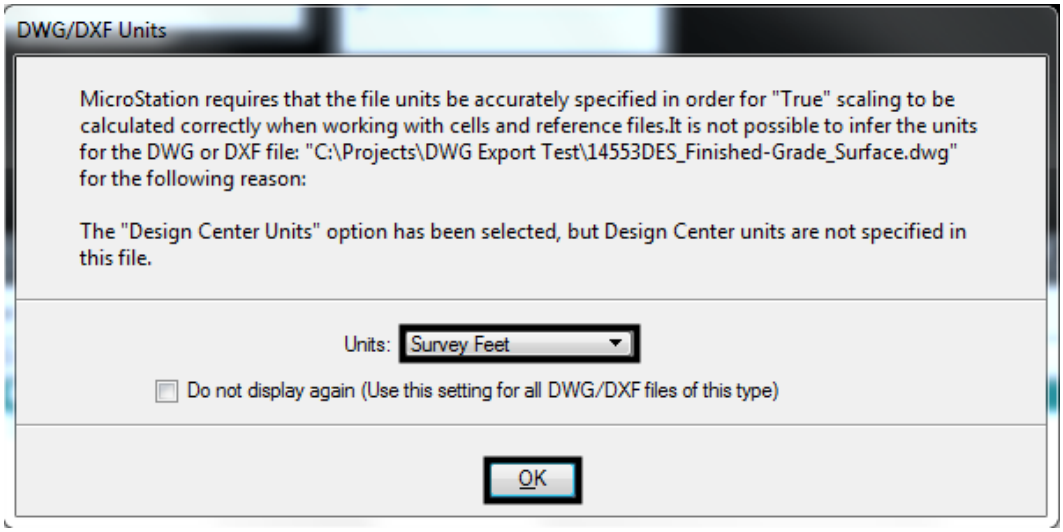
The ***14553DES_Finished-Grade_Surface.dwg*** contains no data, but has the ***14553DES_Finished-Grade_Surface_CDOT Default-3D.dwg*** file referenced to it. The ***14553DES_Finished-Grade_Surface_CDOT Default-3D.dwg*** contains the linework needed for the deliverable.



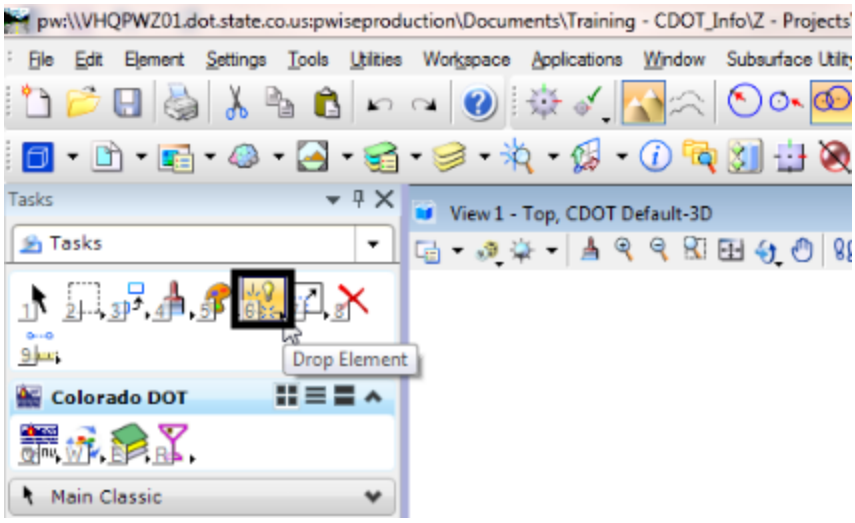
The data in the ***14553DES_Finished-Grade_Surface_CDOT Default-3D.dwg*** is classified as a ***Shared Cell***. This should be dropped so that the data is classified as line strings.



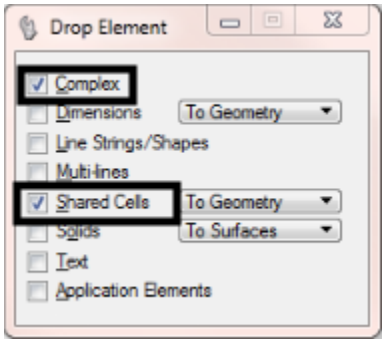
14. Open the ***Filename_CDOT Default-3D.dwg*** with MicroStation. In this example, the ***14553DES_Finished-Grade_Surface_CDOT Default-3D.dwg*** is used.
15. In the ***DWG/DXF Units*** dialog box, set the Units to Survey Feet then click the OK button.



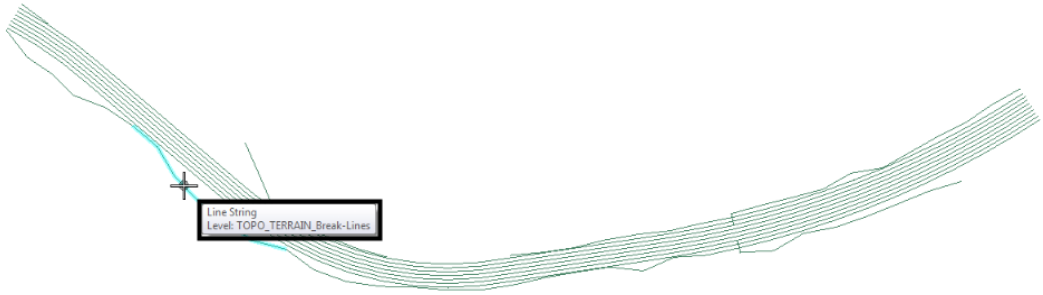
16. From the Tasks toolbar, select **Drop Element**.



17. In the ***Drop Element*** tool settings dialog box, toggle on **Complex** and **Shared Cells**.



18. Left click on one of the elements (All the elements are in a Graphic Group so selecting one element selects all of the elements). Left Click anywhere to complete the command. This separates the data into individual line strings.



19. Copy the ***Filename_CDOT Default-3D.dwg*** to the desired location in ProjectWise.