CDOT WORKFLOW IR 22 – Migrating Corridors From InRoads SS2 To InRoads SS4

This document guides you through the process of migrating projects whose corridor designs were started in InRoads V8i Select Series 2 into OpenRoads (InRoads V8i Select Series 4).

Overview

The workflow for migrating corridors to OpenRoads follows these steps:

Check corridor dependencies to determine the various building blocks used in the SS2 corridor.
Import terrain models from DTM formatted files to OpenRoads terrain models.
Import required geometry from ALG files to OpenRoads geometry.
Import corridor IRD files to OpenRoads corridors.
Review and adjust imported corridors to insure no data loss.
Perform all remaining corridor design using the Select Series 4 tools.
Maintain synchronized copies of geometry (horizontal and vertical alignments) in the ALG file for 1use in plans production activities.

Also included in this document are recommended best practices for each step of the process and a description of potential errors and pitfalls.

Statement of Need

A variety of projects have been started in InRoads V8i Select Series 2 and these projects currently exist in a variety of stages of development.

In the near future, new replacement computers are expected in Design office and these new computer's operating system will be Windows 10. Bentley has not certified InRoads V8 Select Series 2 for use on Windows 10.

This document describes the process of migrating current InRoads projects from the Select Series 2 version to the Select Series 4 version and what potential challenges or problems may arise from the migration.

Definitions Used in This Document

ALG Geometry – as used in this document, ALG Geometry refers to the traditional InRoads SS2 geometry tools and file formats. Most of these tools are available in Select Series 4.

Civil Cell – Civil cells are used in OpenRoads to store a collection of civil elements (geometry, templates, and terrain models) as a single object which can be placed, repeatedly, as a single object into a design. For example, civil cells can be created which model an entire intersection and then dropped onto a road design.

Corridor Object – the DGN element which is the container for roadway corridors in OpenRoads.

DTM – as used in this document designates the legacy terrain model format which normally has a file extension of DTM.

IRD – the files used in Select Series 2 for storing of road corridor designs. After import, the IRD data becomes an OpenRoads corridor object.

OpenRoads – Since the migration in question here amounts to migrating files from traditional InRoads technology to OpenRoads technology, in the remainder of this document the term "OpenRoads" is used to designate the Select Series 4 files or technology.

SS2 – This refers to the InRoads V8i Select Series 2 version of the software. In the remainder of this document the term "SS2" is used to designate the Select Series 2 files or technology.

Terrain Model – The OpenRoads format of terrain models which are stored in DGN files.

Example Dataset

Project 19495 is used as an example only throughout this document.

Additional Information

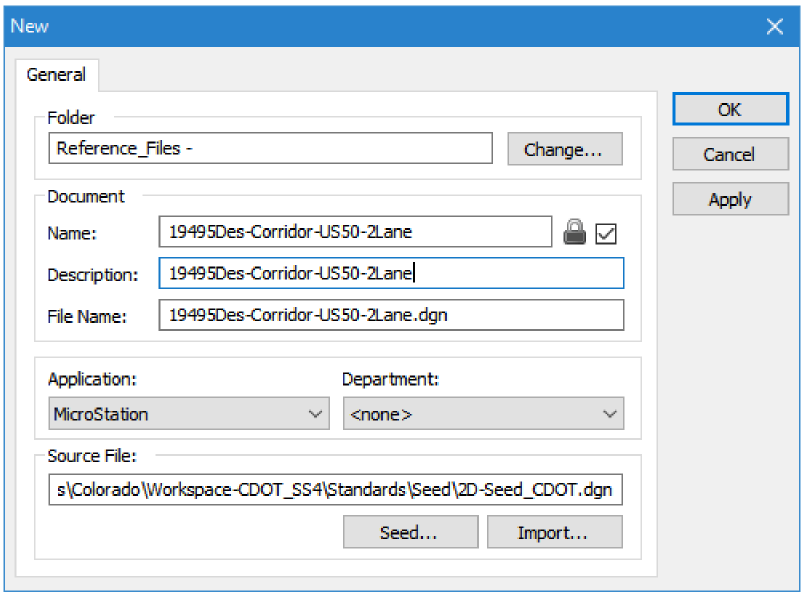
Please refer to the CDOT Workflow IR 18 – Using InRoads SS2 and SS4 with MicroStation SS4 document for more information on how to set up a MicroStation DGN file so that it will open MicroStation by itself, MicroStation and InRoads SS4, or MicroStation and InRoads SS2, as well as setting up Project Defaults for your project.

Section I. Check Corridor Dependencies

Before a corridor can be imported from SS2 to OpenRoads, any required dependencies, such as alignments and surfaces, must be imported into DGN files. In this section of the workflow a DGN file is set up for the first corridor to be imported and then the dependencies required for the corridor are identified.

In this example, the corridor that is to be imported is named “US 50 Proposed 2 Lane”.

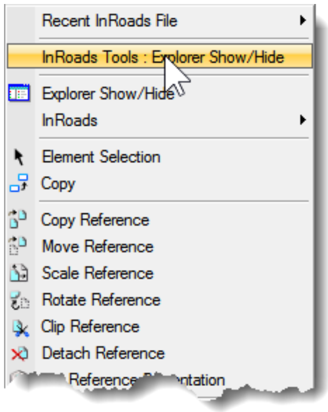
1. Navigate to the **Design\Drawings\Reference Files** for the project.
2. Create and open a new DGN file which will later contain the imported corridor. Use the ***2D-Seed_CDOT.dgn*** seed file. Name the file using the corridor name. In the example shown below, the new file is named ***19495DES-Corridor- US 50 Proposed 2 Lane.dgn***.



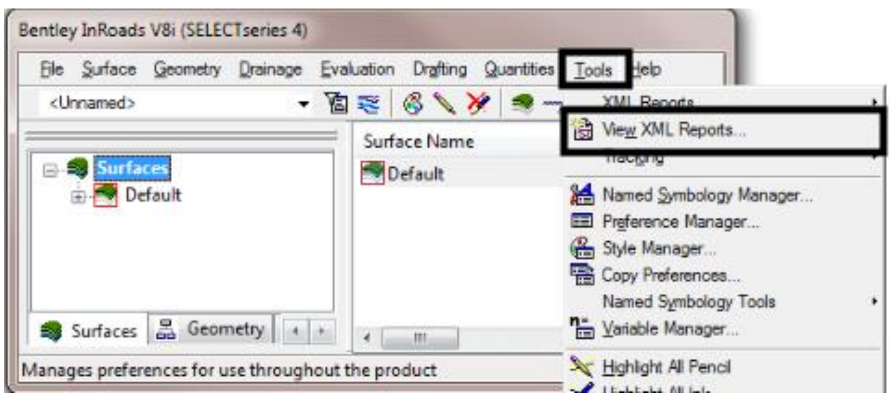
3. If available, assign the project specific geographic coordinate system created by Survey and assigned to the JPC##SURV_Topo01Scale### .dgn file, to MicroStation design files so that files with non-project specific GCS can be properly projected and aligned with project design data. (Menu: **Tools > Geographic > Select Geographic Coordinate System**). See Workflow MS 24 – Assigning A Project Geographic Coordinate System (GCS) for more information on attaching a project geographic coordinate system.

   This file will now be used for reviewing the corridor dependencies in this section and for importing the SS2 corridor in Section IV.

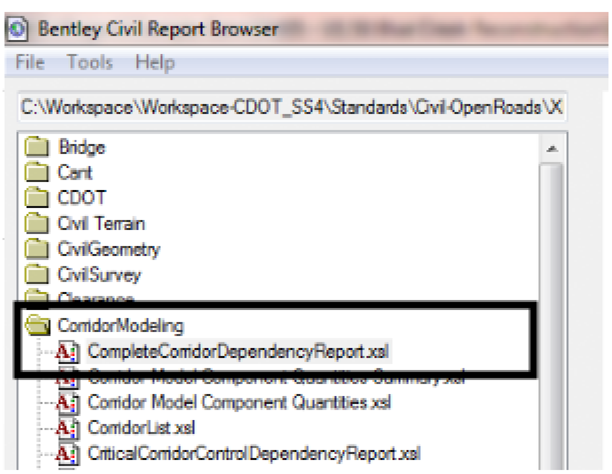
4. If the ***InRoads Explorer*** is not visible then right click and hold in the drawing area until the popup menu opens. Then click on **Explorer Show/Hide**.



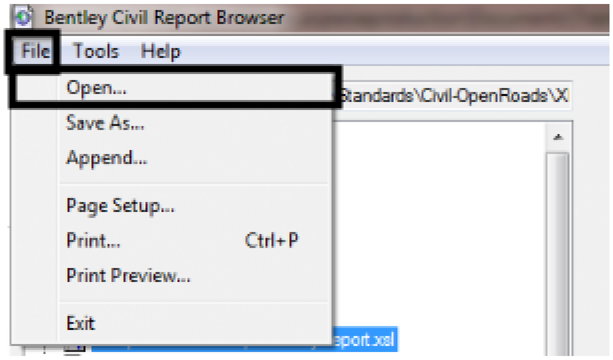
5. Then in InRoads Explorer menu, click on **Tools > View XML Reports**. This opens the ***Bentley Civil Report Browser***.



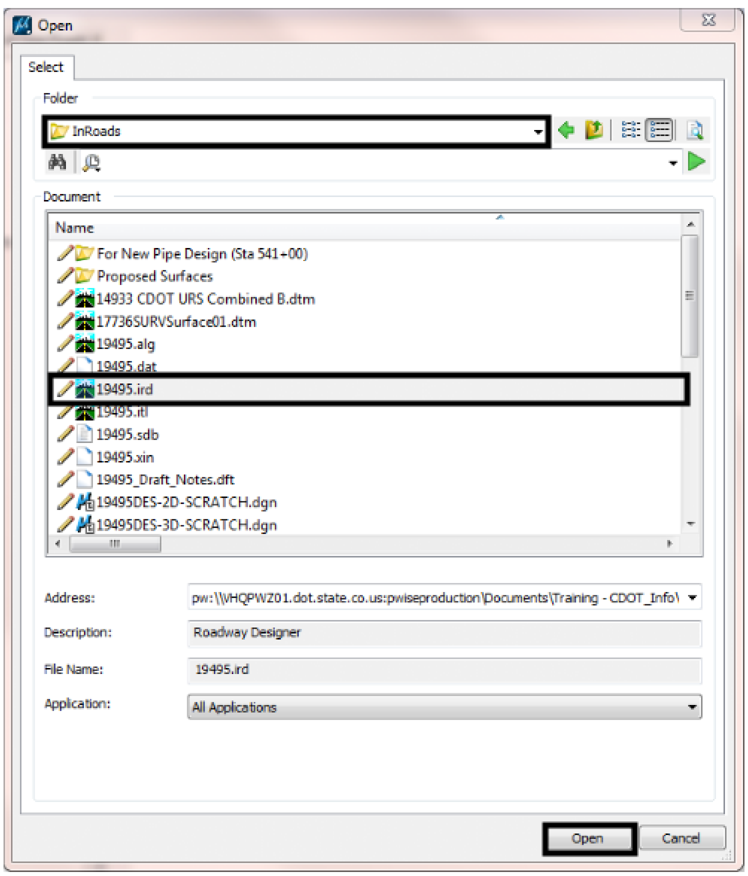
6. In the ***Bentley Civil Report Browser***, expand the **Corridor Modeling** folder in the left pane and left click on the **Complete Corridor Dependency Report.xls**. The report will be blank until an SS2 corridor file is opened.



7. In the report menu, click on **File > Open**. The **Open** dialog box is displayed.



8. In the ***Open*** dialog box, navigate to the folder containing the desired IRD file. This will typically be the project's ***\Design\InRoads*** folder.
9. Left Click on the desired IRD file so that it is highlighted.In this example, the file named **19495.ird** from the ***...\19495\Design\InRoads*** folder.
10. Left Click the Open button. This dismisses the Open dialog box and opens the file in the ***Bentley Civil Report Browser***.



11. After the IRD is opened then the report will list every corridor in the IRD file and the associated dependencies. The corridors are sorted alphabetically. Locate the desired corridor in the report. In this example the corridor named ***US50_Proposed_2 lane*** is used.

From this information we will make note of the following:

a) The corridor *Horizontal Alignment* name. US 50 Proposed_2 lane.

b) The corridor Vertical Alignment name. US 50 Segment 2 Final.

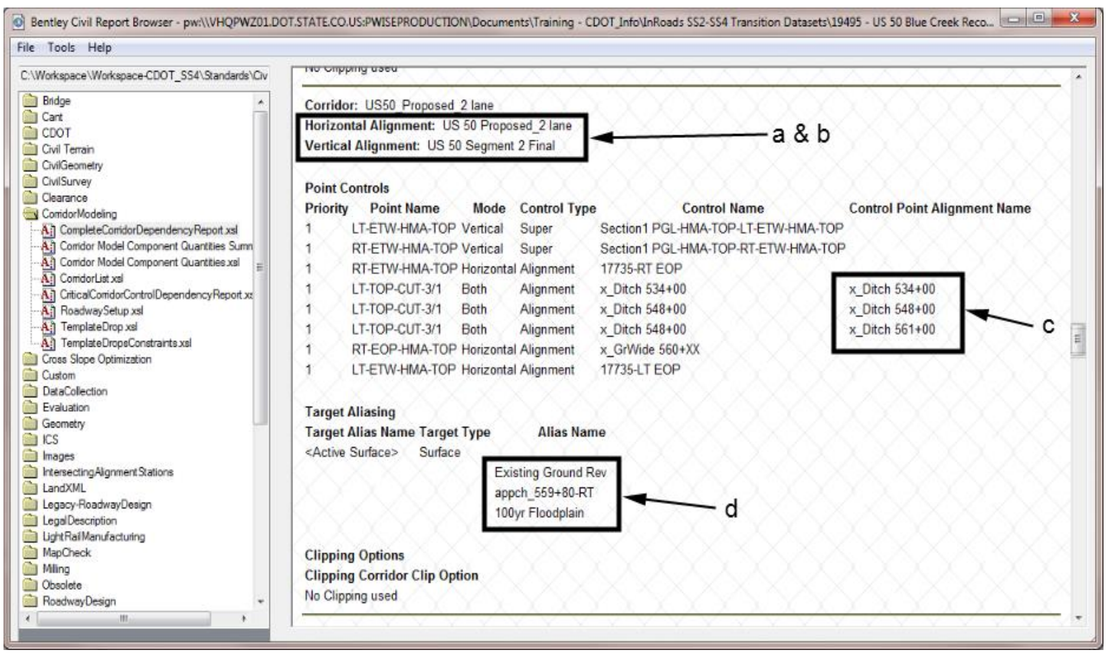
c) All alignments needed for point controls, except for superelevation. Superelevation is handled automatically as we will see later. In this example the following alignments are used for point controls:

   I. **x_Ditch 534+00**
   II. **x_Ditch 548+00**
   III. **x_Ditch 561+00**

d) Surfaces needed for target aliasing. The following surfaces are used in this example:

   I. **Existing Ground Rev** – This is the Active Surface.
   II. **100 yr Floodplain** – A stand-alone surface.
   III. **Appch_559+80-RT** – Created from an adjacent corridor.

The above items are identified in the illustration below.



Best Practices – Corridor Dependencies

- When creating new DGN files for use in OpenRoads, always start with a 2D seed file (with exceptions for terrain model files and survey files). OpenRoads will create a companion 3D model as needed. It works much better when the 2D elements (such as geometry) and 3D elements (such as terrain elements) are in separate models.
- Terrain model files and survey files should be created using a 3D seed file for each dataset.
- It is a good idea to make a print (paper or PDF) of the dependency report to serve as a checklist of sorts. Target aliases in particular can become an iterative process because of the differences in how SS2 and OpenRoads function. In SS2, the proposed surfaces for adjacent corridors would generate a DTM and the DTM could be used as a target alias. In OpenRoads, it is better practice to allow target alias to seek the adjacent corridors directly. Thus, it becomes iterative as additional corridors are added and target aliases are patched up

Potential Errors and Problems – Corridor Dependencies

- It will regularly occur that the named DTM files from the dependency report will not exist in the SS2 data. This can occur because the DTM file was renamed after the corridors are finished.
- Target Aliases will often need to be rebuilt in OpenRoads. More details on target aliasing is outlined in Section IV.

Section II. Import DTMs to Terrain Models

At minimum, the DTM files used for existing ground must be imported to OpenRoads. If there are other surfaces which serve as targets for corridors (rock surfaces for example) these must also be imported to OpenRoads. Also, surfaces which are used by target alias may need to be imported to OpenRoads.

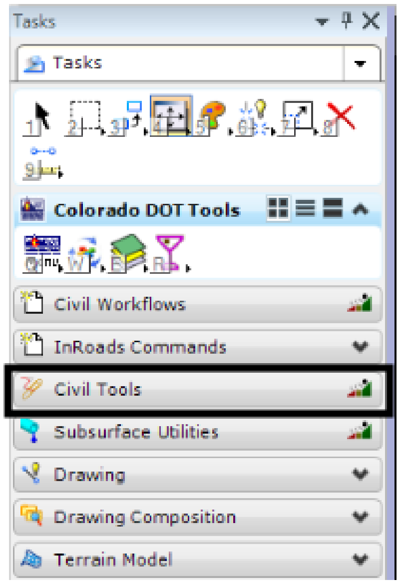
If target aliases exist in which one corridor targets a DTM which was made from another corridor, it is better practice to import the adjacent corridor then rebuild the target alias in OpenRoads to use the corridor instead of the surface. For more information in Target Aliasing see ***Section V. Import the Approach Corridor***.

The importing of DTM files is very simple. It requires only selecting the DTM file and choose an OpenRoads feature definition which is assigned to the imported surface.

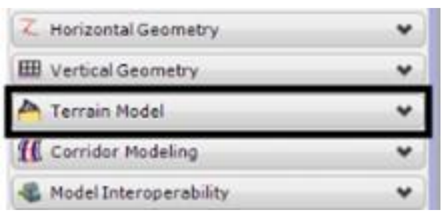
In the following exercise, the primary existing ground DTM will be imported to an OpenRoads terrain model. The import process needs to be repeated for all required surfaces listed in the dependency report. The following workflow shows only one file being imported but the same process is repeated for all required surfaces. When importing terrain models, remember that it is best practice to have only one OpenRoads terrain model per DGN file.

1. Navigate to the **Design\Drawings\Reference Files** for the project.
2. Create and open a new DGN file which will later contain the imported terrain model. Use the ***3D-Seed_CDOT.dgn*** seed file. Name the file ***JPC#* ExistingTerrainModel.*dgn***. In this example the new file is named **19495ExistingTerrainModel.dgn.**
3. Assign the project specific geographic coordinate system created by Survey and assigned to the JPC##SURV_Topo01Scale### .dgn file, to MicroStation design files so that files with non-project specific GCS can be properly projected and aligned with project design data. (Menu: **Tools > Geographic > Select Geographic Coordinate System**). See Workflow MS 24 – Assigning A Project Geographic Coordinate System (GCS) for more information on attaching a project geographic coordinate system.

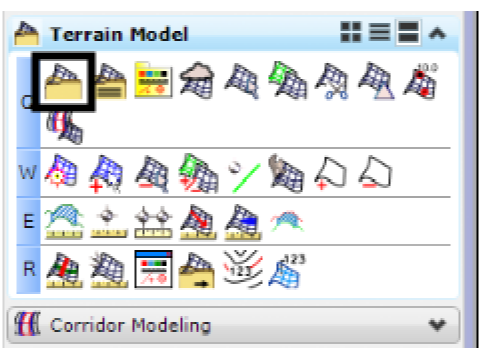
4. From the ***Tasks*** menu, expand the **Civil Tools** task.



5. Under the ***Civil Tools*** task, expand the **Terrain Model** tasks.

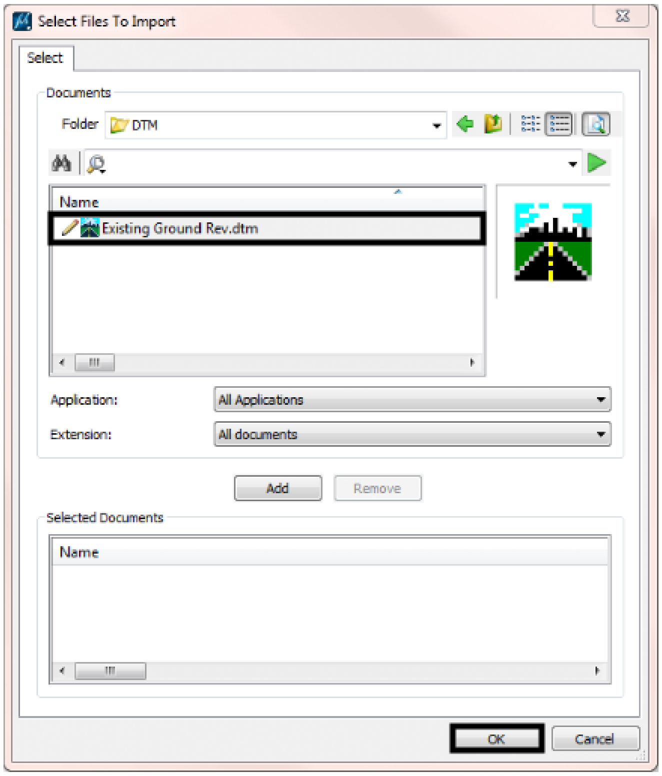


6. In the **Terrain Model** tasks, left click **Create from File** button. This displays the ***Select Files To Import*** dialog box.

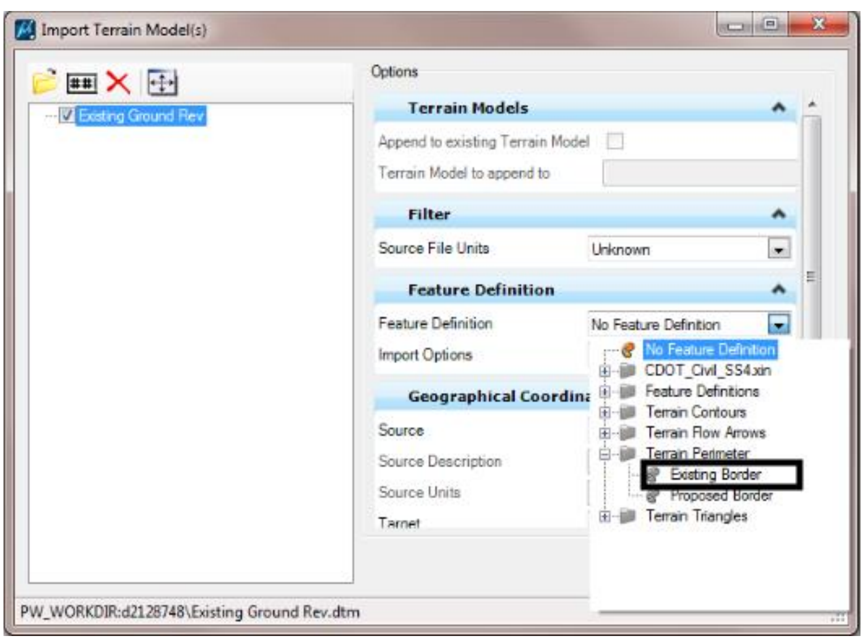


7. In the ***Select Files To Import*** dialog box, navigate to the desired project directory. Typically, this will be the **\ROW_Survey\InRoads\DTM** folder.

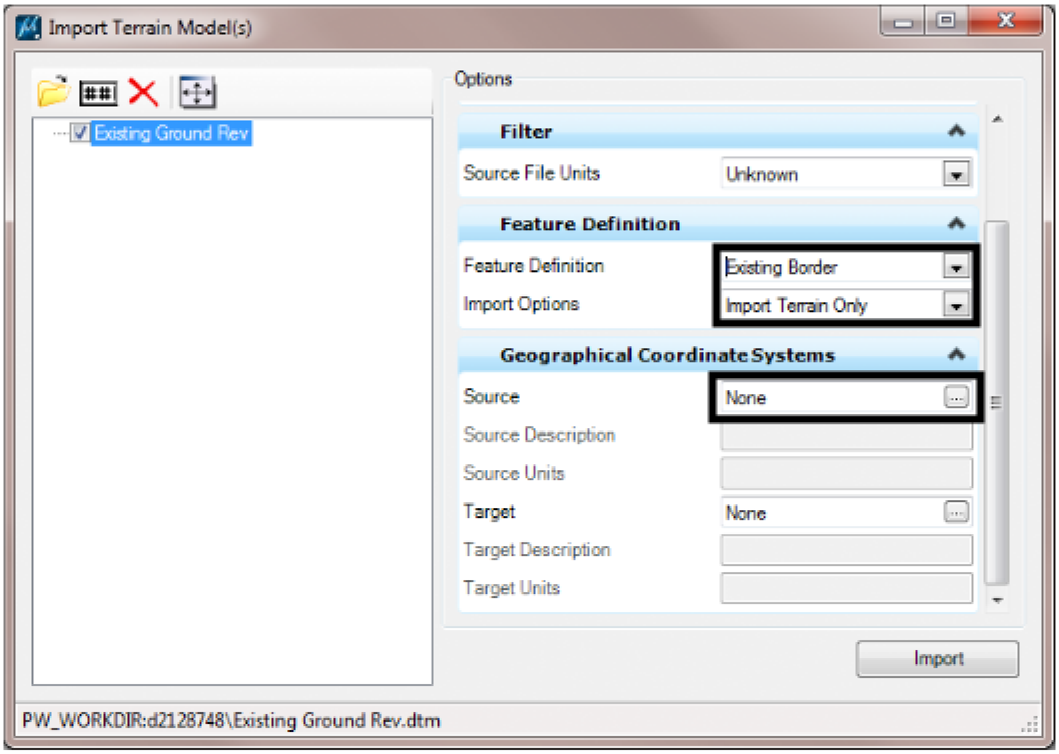
8. Highlight the desired DTM file then left click **OK**. In this example, **Existing Ground Rev.dtm** is used. This displays the ***Import Terrain Model(s)*** dialog box.



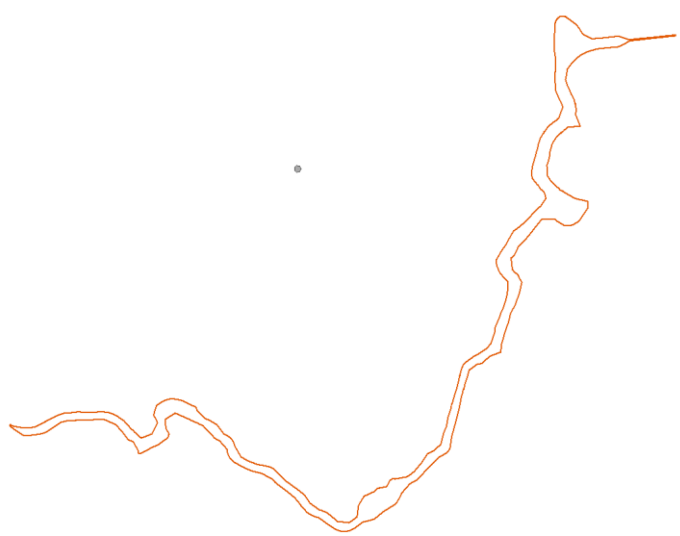
9. In the ***Import Terrain Model(s)*** dialog box, set the ***Feature Definition*** to **Terrain Perimeter > Existing Border**.



10. Set the ***Import Option*** to **Import Terrain Only**. This imports only the terrain model and not the Features. Triangles and break lines are automatically created as components of the terrain model element.
11. In the ***Geographical Coordinate Systems*** area, choose the appropriate ***Source*** coordinate system. In this example there is no coordinate system available.
12. Left click the **Import** button.



13. Once processing is complete, close the ***Import Terrain Model(s)*** dialog box.
14. **Fit View** to see the imported terrain model.



Best Practices – Import DTM

- Use 3D seed files when starting a new DGN that contains a terrain model.
- Generally, store only one terrain model per DGN file, unless they are small. This is for better performance.
- Assign a geographic coordinate system to the DGN file before importing the DTM file. This allows transforming the DTM on the fly during the import process.
- When importing the DTM file, use a feature definition which displays the boundary only to start. Thus, there will be minimal delay in draw time. DTM files which contain very large numbers of triangles or dense contours will take a while to draw if the feature definition shows these by default. After the DTM is imported and the boundary looks OK, then the feature definition can be changed.
- There is usually not a need to import both the terrain model and the features. (step 10 above) Ordinary features, such as triangles and break lines are automatically created as components of the terrain model element.

Potential Errors and Problems – Import DTM

- Picking the wrong feature definition for the terrain model, but this is easily changed in the properties of the terrain model after import.
- Choosing a feature definition at import which displays triangles or contours by default could be slow to draw on screen if the imported DTM is very large.

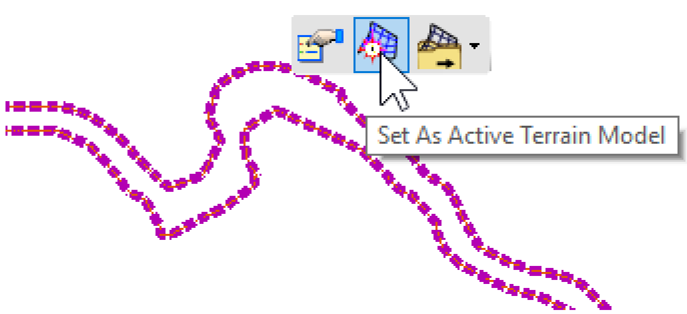
Section III. Import ALG to OpenRoads Geometry

At minimum, the horizontal and vertical alignments used for corridors and the alignments used for point controls for the alignment must be imported from the ALG file to OpenRoads geometry which is stored in a DGN file. The alignments and corridors used to model intersections in SS2 are covered in ***Section V. Import the Approach Corridor***.

There is a slight difference in recommended file management practices when moving corridors forward from SS2 to OpenRoads. When developing an OpenRoads corridor using OpenRoads tools from the beginning it is desired to keep alignments in a separate DGN file(s) from the corridor file. However, when migrating a corridor from SS2, there is a quirk in the software that requires the required alignments exist in the DGN file where the IRD file will be imported. Therefore, in ***Section I. Check Corridor Dependencies*** we created a corridor file and in this section, we will import the alignments to that corridor file.

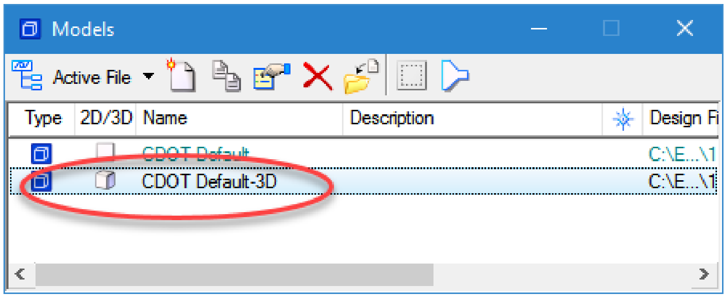
In this exercise, the horizontal and vertical alignments reported in the previous section must be imported first so that the corridor can be imported in the next section. We also need to import the alignments used by point controls.

1. Open the corridor file created previously in Section I, **19495Des-Corridor-US50-2Lane.dgn** for this example.
2. Attach the terrain model DGN file created in Section II as reference file. In this example, **19495ExistingTerrainModel.dgn** is used.
3. Select the attached terrain model and using the context toolbox, set the terrain model as the **Active Terrain**.

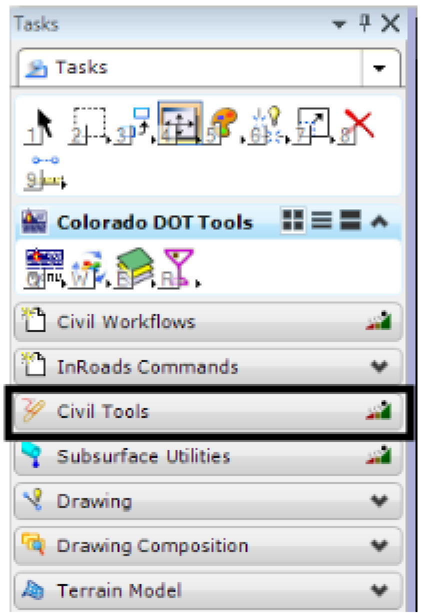


Note: ***IN this exercise, we will only use the existing ground terrain model. Attach all DGN files which contain terrain models listed as target alias dependencies.***

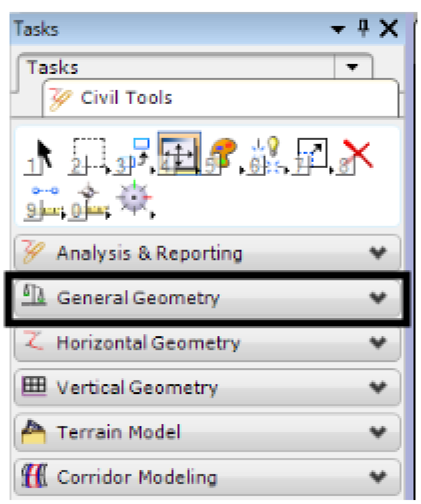
4. After the terrain model is set as active, OpenRoads will automatically create the required 3D model, which can be reviewed in the ***Models*** manager. (**Menu: File > Models**)



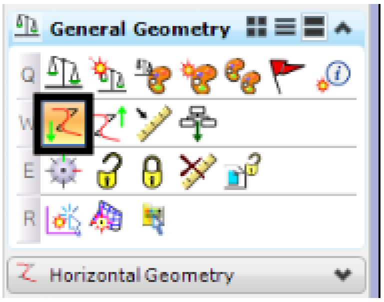
5. From the ***Tasks*** menu, expand the **Civil Tools** task.



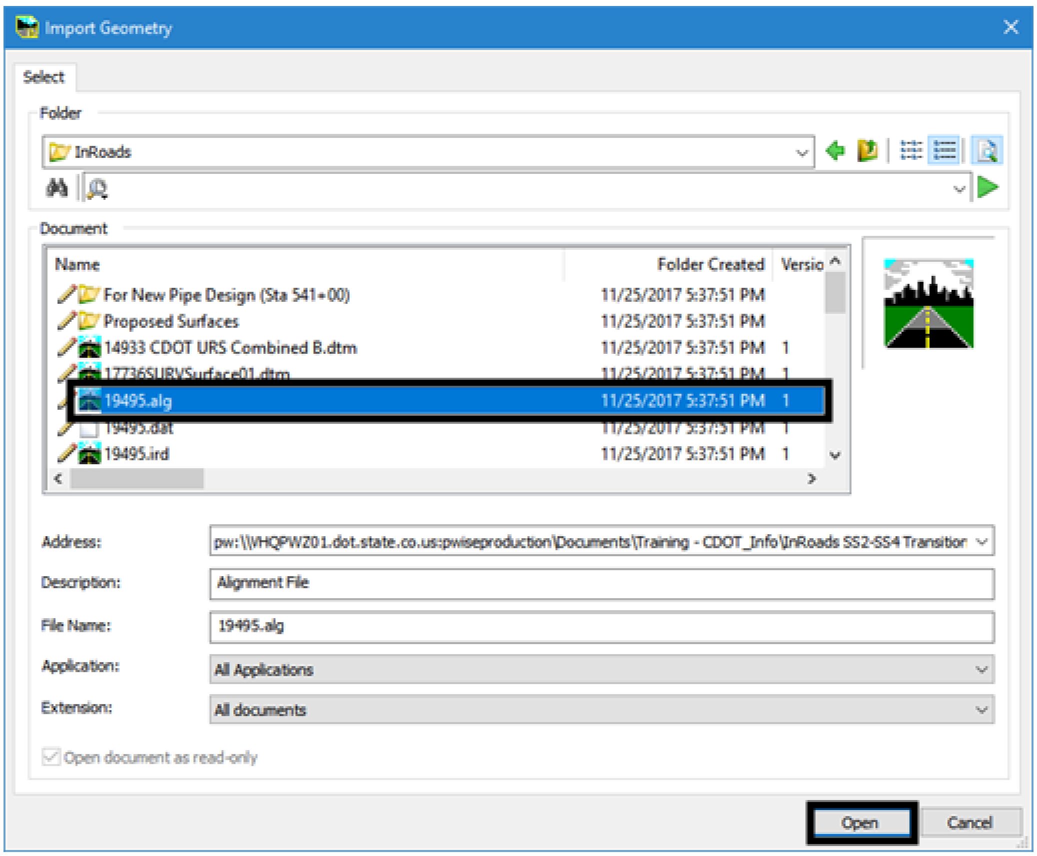
6. Under the ***Civil Tools*** task, expand the **General Geometry** task.



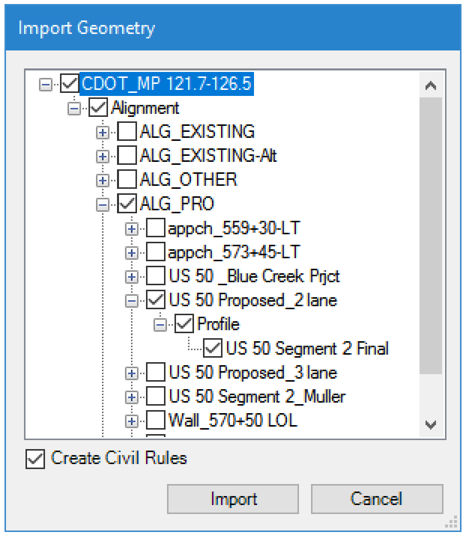
7. In the ***General Geometry*** tasks, left click the **Import Geometry** button. This displays the ***Import Geometry*** dialog box.



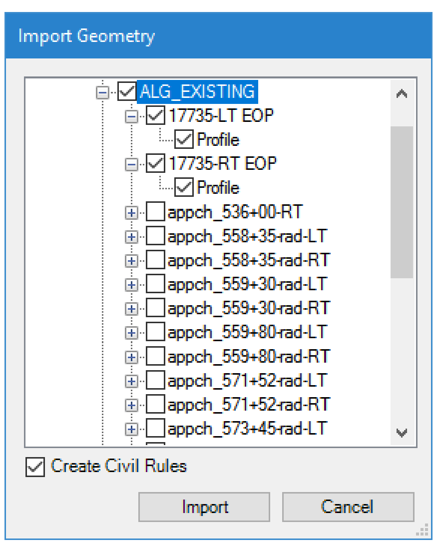
8. In the ***Import Geometry*** dialog box, select the desired ***ALG*** file then left click **Open**. In this example, the **19495.alg** file is used.



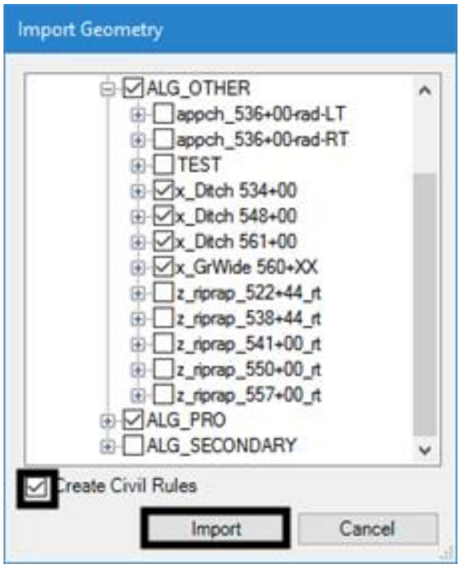
9. After selecting the ALG file, the ***Import Geometry*** dialog box opens. Expand **Alignments** then expand the desired geometry style items. In this example **ALG_PRO** is used.



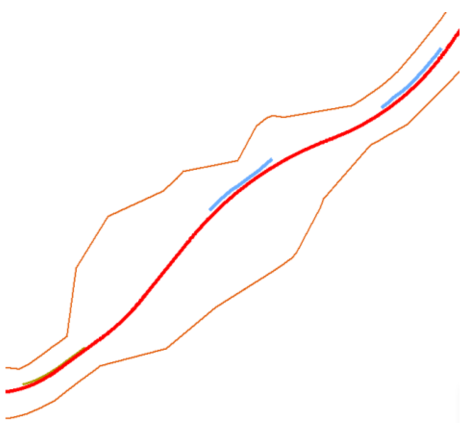
10. Left click the check box for the desired alignments (**US 50 Proposed_2_Lane** for this example). This also toggles on its vertical alignment for importing. This is the horizontal and vertical alignment listed in the dependency report.
11. Repeat steps 9 and 10 for any other geometry required (for point controls, etc.). For this example, the following alignments are used: from **ALG_Existing: 17735_LT EOP** and **17735_RT EOP**, from **ALG_Other: x_Ditch 534+00, x_Ditch 548+00, x_Ditch 561+00** and **x_GrWide 560+xx** which are listed in dependency report as required for point control. Some of these have associated vertical alignments and some do not. Be sure that the vertical alignments are also selected, if there is one.



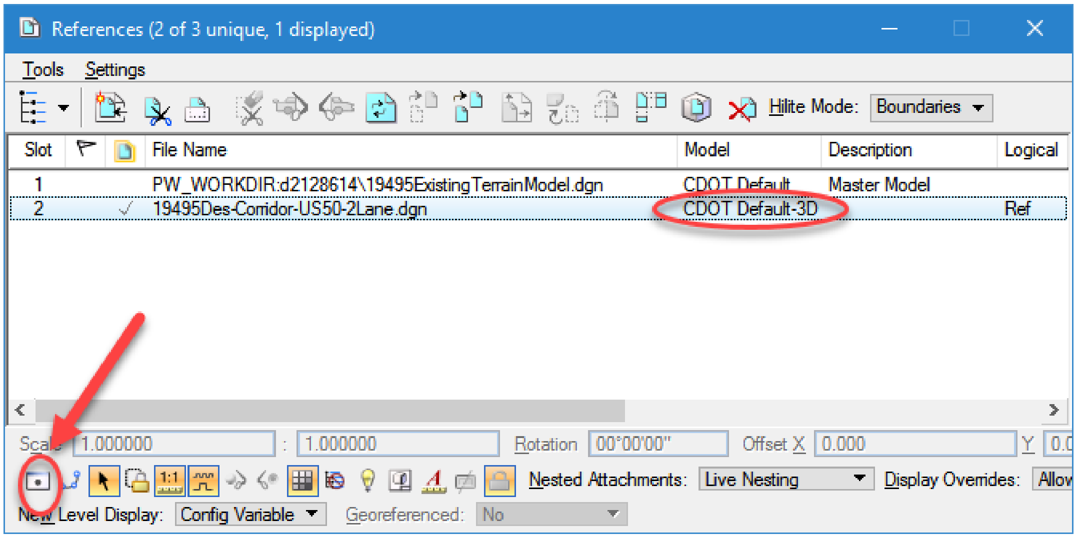
12. At the bottom, make sure that the **Create Civil Rules** check box is toggled **on**. This allows editing of the alignments using the OpenRoads rules mechanisms later if needed. If this box is turned off then the alignments are imported as plain graphic elements.
13. Click **Import**.



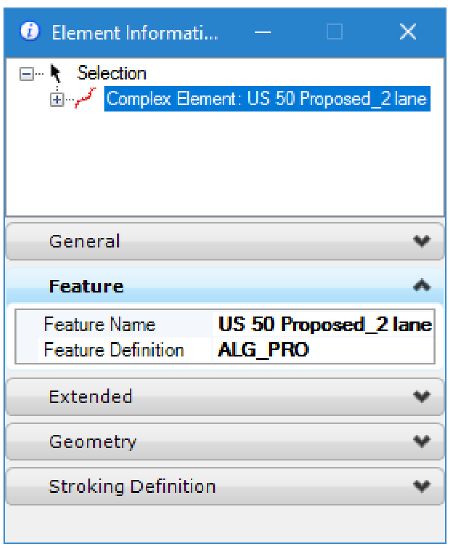
The alignments are imported. The centerline for the roadway is in the middle part of the terrain model and the other alignments are scattered throughout along the centerline.



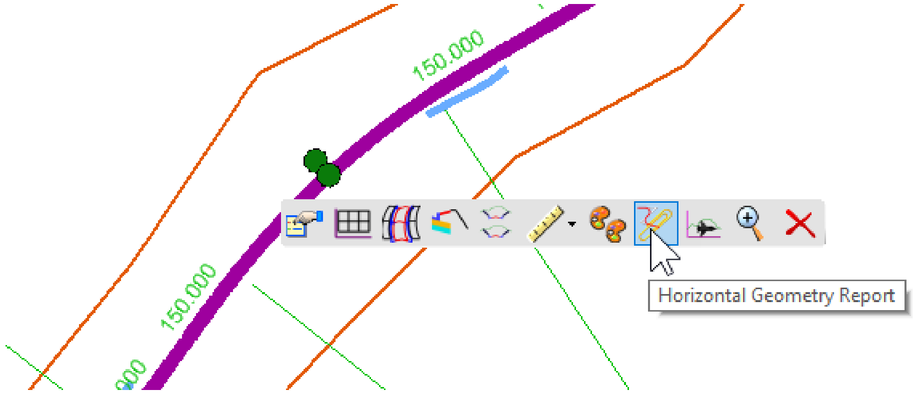
14. At this point, notice that there appears to be duplicate elements shown in the view. This is because the 3D model created by OpenRoads is automatically referenced to the 2D model. In **Reference Manager**, turn off the display of **Default 3D** for better clarity in the view.



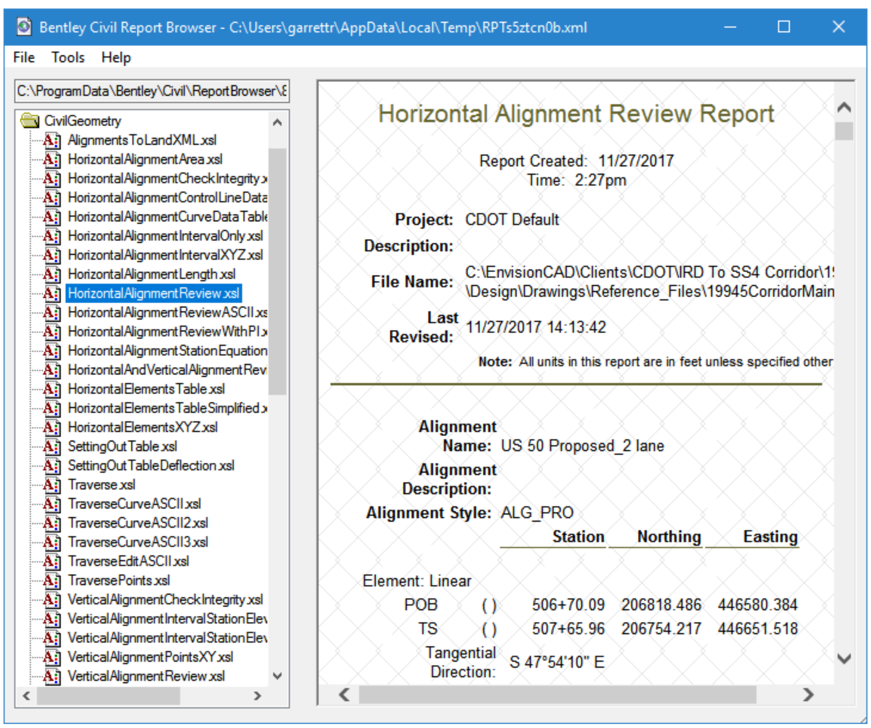
15. **Select** the mainline horizontal alignment element and open **Element Information**.



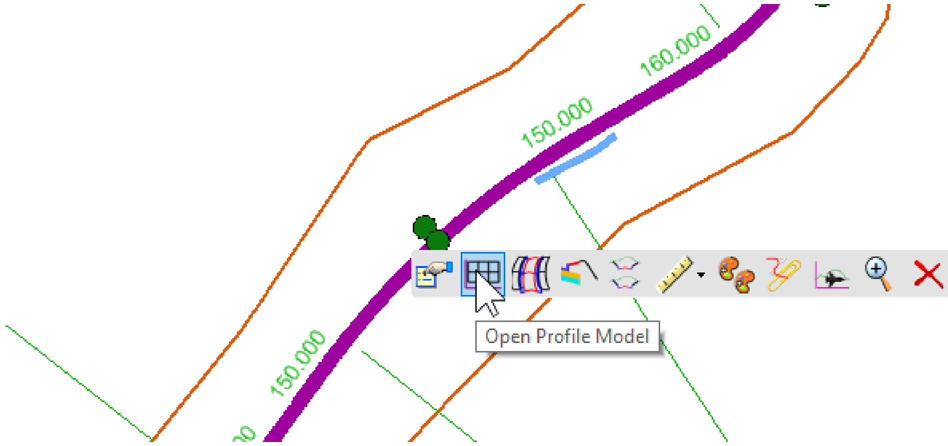
16. Note that the alignment name matches the name in the ALG file and the ***Feature Definition*** matches the style name used in the ALG file.
17. With the centerline still selected, hover the cursor on the alignment until the context toolbox opens and click on the **Horizontal Geometry Report** icon.



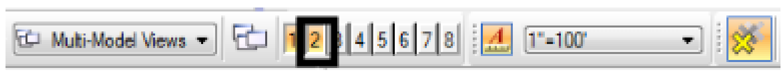
The report can be used to verify the import was successful. Also, a review of the start and end stations shows that the centerline length is about 3.7 miles long. This is fine for the alignment but we will want to be watchful after the corridor is imported to see if it performs well when editing and is stable. Generally, we will want to keep corridor lengths to less than 2 miles for best computer performance. We will keep this in mind when we get to the next section.



18. **Close** the alignment report.
19. With the centerline still selected, hover the cursor on the alignment until the context toolbox opens and click on **Open Profile Model**.

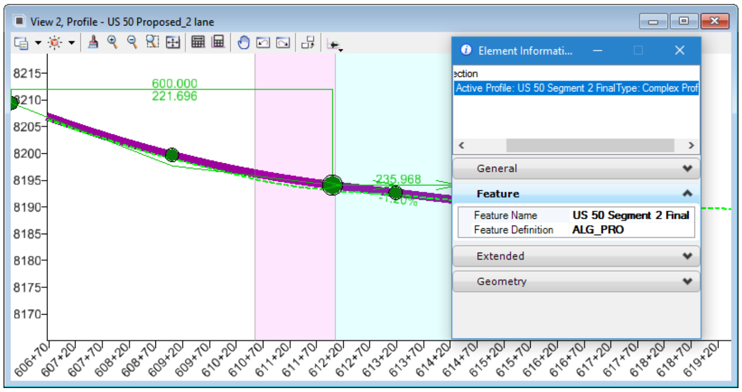


20. The prompt reads ***Select or Open View***. Open **View 2** then left click in that view.



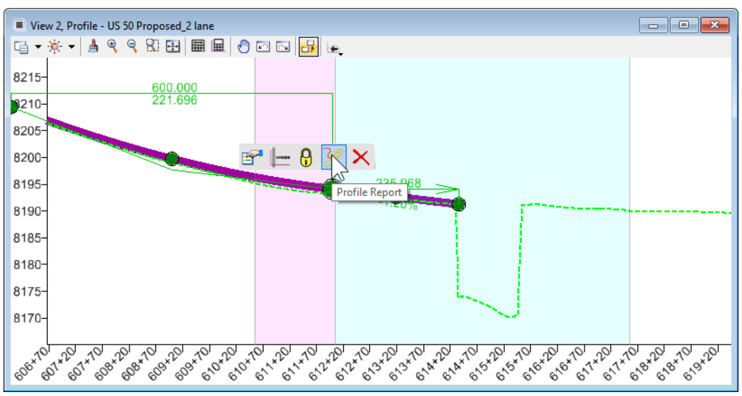
In the profile view, you should see two data lines. One is a solid line style. This is the proposed vertical alignment. The color of the proposed vertical alignment is dependent of the feature definition assigned to the geometry.The other is green and dashed line style. This is the existing ground surface.

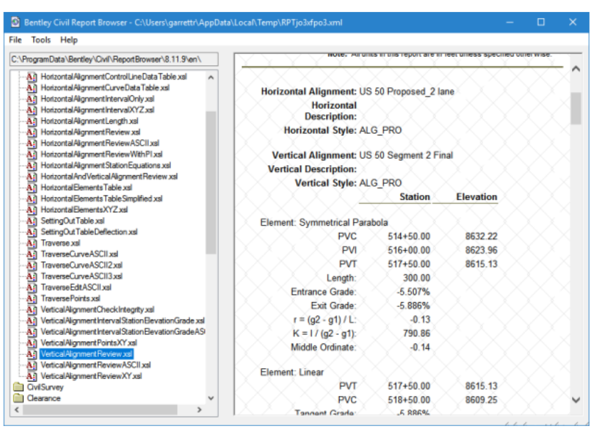
21. In the Profile View (***View 2*** in this example), Select the vertical alignment element and **Open Element Information.**



22. Notice that the ***Name*** and ***Feature Definition*** for the vertical alignment also match the ALG file.

23. Select the vertical alignment and using the context menu, Open the **Profile Report**.





24. At this point, we should have all the geometry we need to start migrating the SS2 IRD corridor to an OpenRoads corridor.

Best Practices – Import ALG

- Once alignments are imported to OpenRoads, make all future edits in OpenRoads. It is possible to continue to use the InRoads ALG geometry tools for centerline geometry and periodically import again to OpenRoads geometry. However, such a process is not recommended because the potential for error is fairly large.
- The ALG file needs to stay in synch with the OpenRoads geometry because the ALG file is later used for plans production purposes (sheeting and annotation). Thus, periodically the alignments need to be exported to ALG (or by using the auto export option in OpenRoads).
- Work on geometry not used in corridor modeling (right of way and such) can be done using ALG geometry tools and traditional InRoads workflow. While designers will eventually need to migrate all geometry to OpenRoads, in the short term, the learning curve can be flattened a bit by continuing to use the ALG geometry for things which do not directly serve as a corridor horizontal or vertical alignment.
- It is a good idea to generate an alignment and profile report after import to insure a successful import occurred. There are no known bugs in the software related to import of geometry but a review is still a good idea.

Potential Errors and Problems – Import ALG

- Imported geometry will exist in the form of a PI based alignment for all imported geometry.
  - This means that the alignment will be defined as a series of PI coordinates and a curve radius at each PI.
  - Thus, geometry which may have been built in the ALG file as a “fixed”, “float” or “free” solution (using the InRoads Horizontal Elements tools) will exist in OpenRoads as a PI rule. Preserving the “fixed”, “float” or “free” rules will require rebuilding the alignments from scratch using the OpenRoads tools. The cost benefit ratio of doing so will not usually make it worthwhile.
- It will often occur that when the designer starts the IRD import in the next section that additional dependencies will be reported because they were overlooked. If that happens then simply stop the IRD import and return to repeat the ALG import. Described above, to import additional alignments.
- Keep in mind that the import process creates a link between the OpenRoads geometry and the ALG file. If Auto-Export is used then all changes to alignments are immediately reflected in the ALG file for later use in plans production. This applies also the deletion. Delete the OpenRoads geometry will also delete the alignment in the ALG file.
- Make sure that the ALG file used to import OpenRoads geometry is loaded before editing the geometry element. This is especially important if the Auto-Export option is used. If the original ALG file is not available, Auto-Export will write to the active ALG file, which will be Default if no other ALG file is loaded.

Section IV. Import Select Series 2 Corridors to OpenRoads

After the horizontal and vertical alignments have been imported from ALG to OpenRoads geometry, and the necessary surfaces have been imported from DTM files, the corridors (IRD files) from Select Series 2 can be imported to OpenRoads corridors.

The process is straightforward for a single corridor but can become complex for an entire project because of the repetitive nature of things and the fact that an SS2 project may contain many corridors.

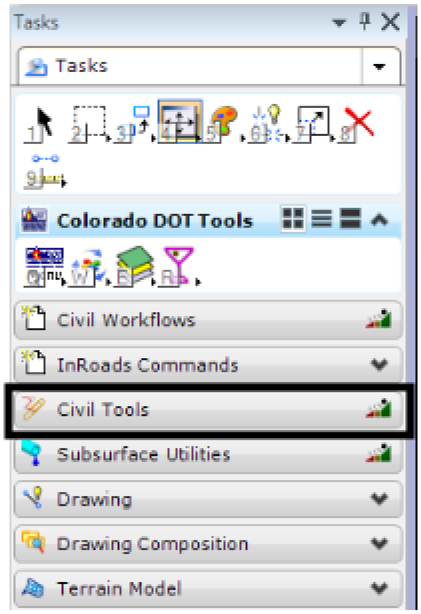
The IRD import can only process one corridor at a time. Files which contain multiple corridors will require repeating the import until all corridors have been processed. Thus, for a complete project, the designer can expect to repeat the workflow starting at Section I multiple times.

Prerequisites:

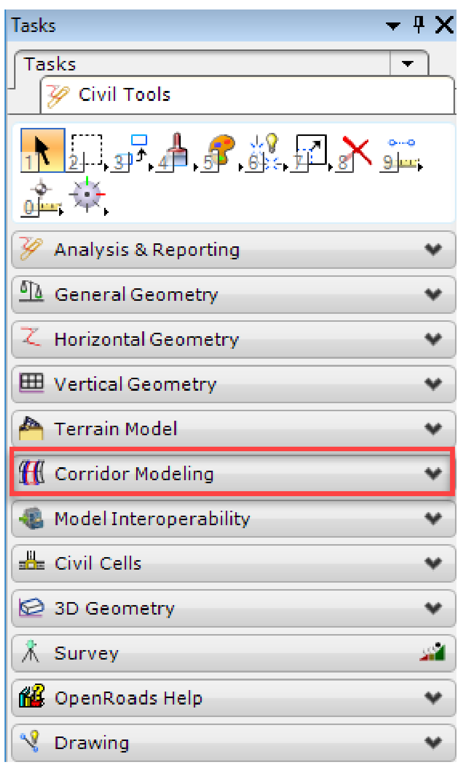
- All geometry used by the imported corridors as centerlines must exist in OpenRoads geometry, hence the requirements of the previous section.
- Geometry used for point controls and other corridor adjustments must also exist in OpenRoads. Thus, importing more alignments than just the centerlines and vertical alignments are required.
- Surfaces (DTM) used for target aliases must exist in OpenRoads. The best practice in SS4 is to use the corridor as a target alias and not the surface created from that corridor.

1. Continue in the corridor file, **19495Des-Corridor-US50-2Lane.dgn,** for this example.
2. Set the **Active Level** to **DES_ROADWAY_Misc**. During the corridor import below, the superelevation elements will be placed on the active level.

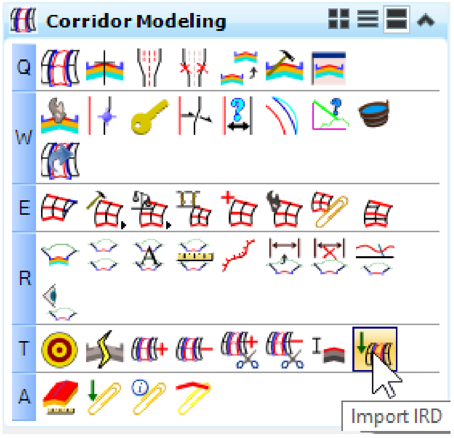
3. From the ***Tasks*** menu, expand the **Civil Tools** task.



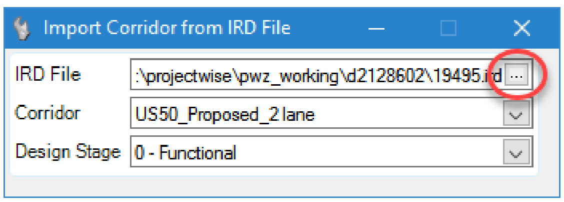
4. Under the ***Civil Tools*** task, expand the **Corridor Modeling** task.



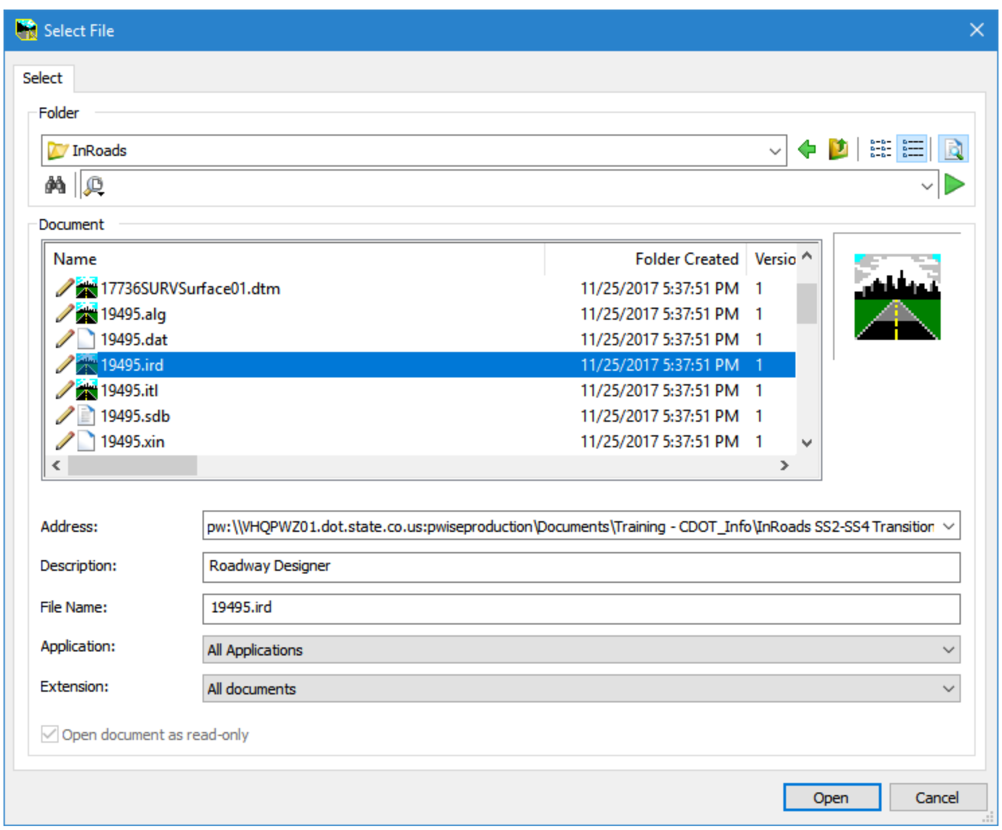
5. In the ***Corridor Modeling*** tasks, left click the **Import IRD** button.



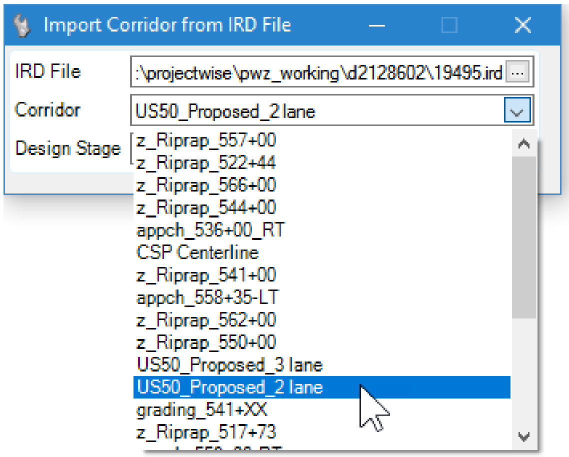
6. **Click the ellipsis** in the dialog to pick the IRD file.



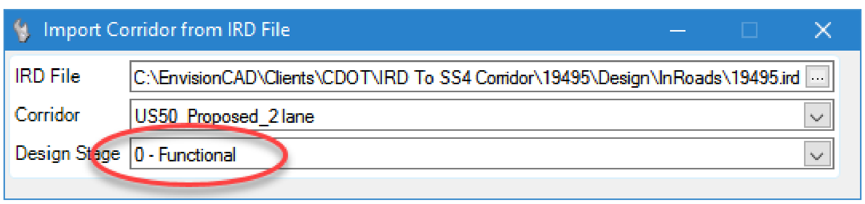
7. Navigate to the project **Design/InRoads** folder, then choose file desired **IRD** file. In this example **19495.ird** is selected.



8. After picking the IRD, click the drop-down arrow for the corridor and **choose the corridor** name to be imported; **US50_Proposed_2_Lane** in this example. (Note: this list is not in alphabetical order.)

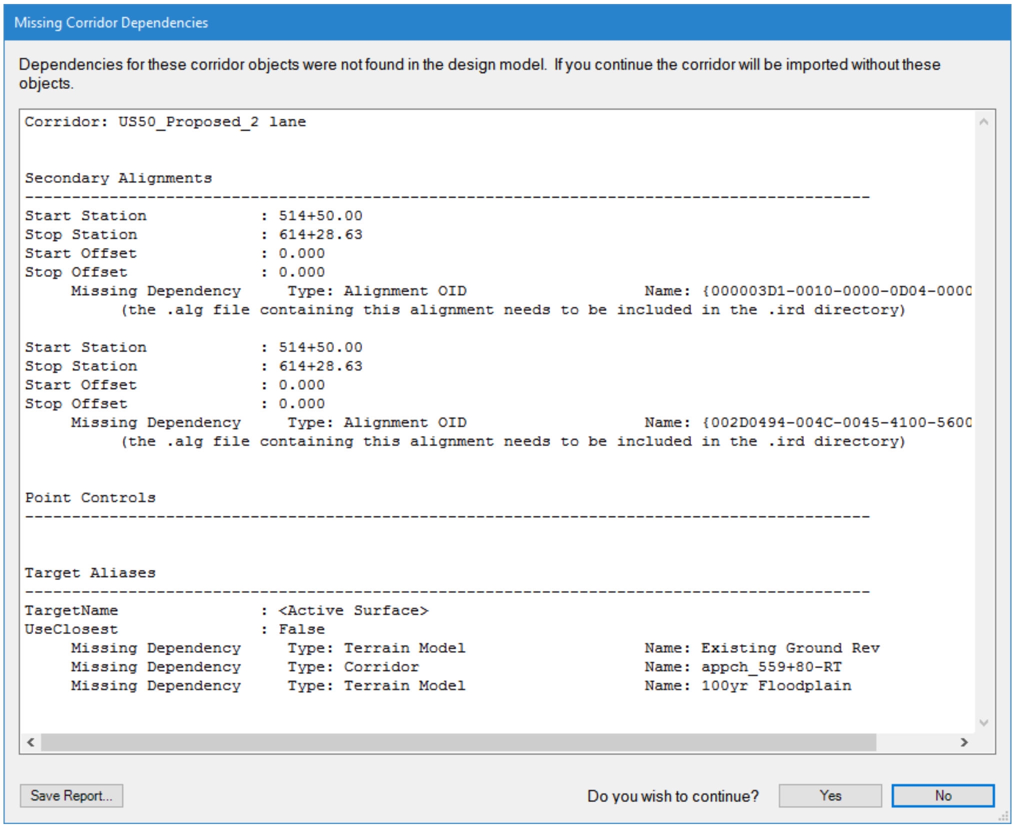


9. Set the **Design Stage** to **0-Functional** as shown below. Note: this can be changed later. Using a low design stage is a good idea since we are not sure how dense the model might be and how well it might perform after importing.



10. After filling in the dialog, click thru the prompts on screen. A list of additional missing dependencies may open. This list will point out any alignments we overlooked when importing as discussed in ***Section III*** as well as any missing secondary alignments or surfaces used for target aliasing which have not been imported.
11. If any ***Point Control*** alignments were overlooked, then click **NO** at bottom right and refer to ***Section III*** to import additional alignments from the ALG file.

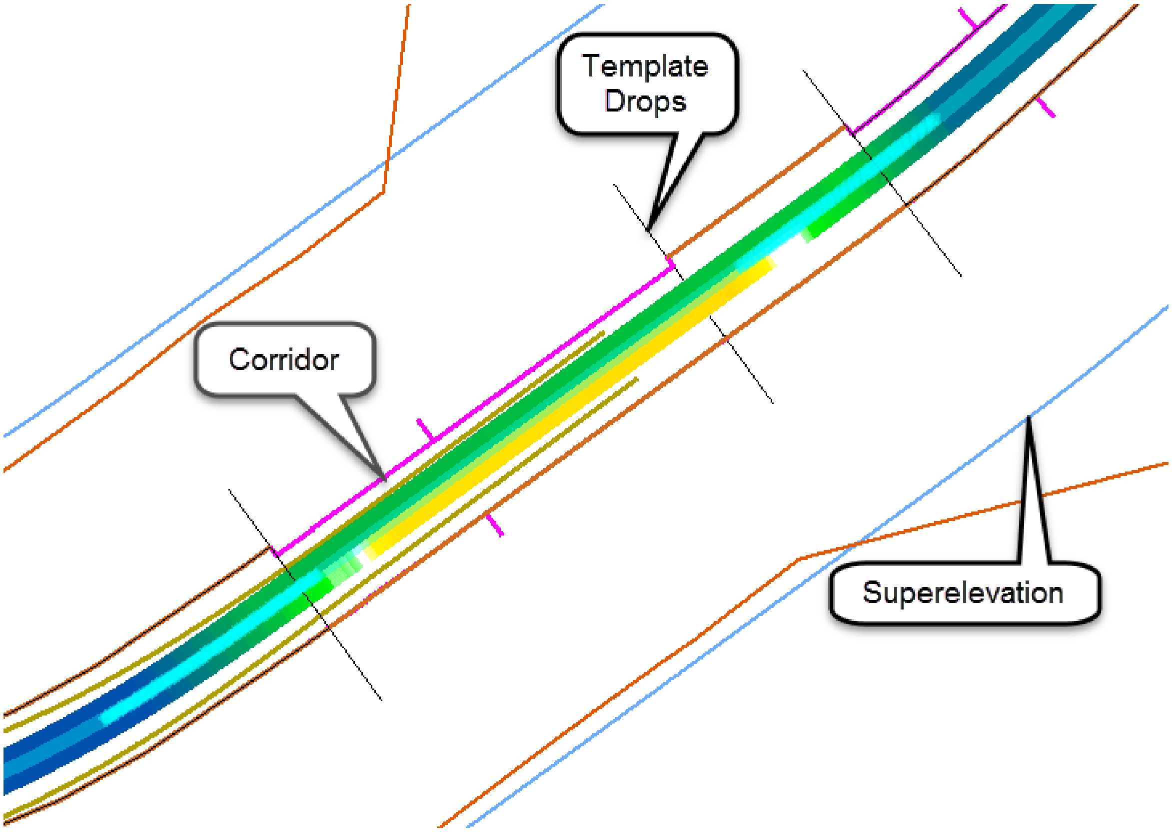
12. As shown in the illustration below, there are two missing Secondary Alignments. These are accompanied by a note which reads “***the .alg file containing this alignment needs to be included in the .ird directory***”. These alignments need to be imported as well.
13. After reviewing the report, add the needed data.



14. **Click Yes** to continue the import.

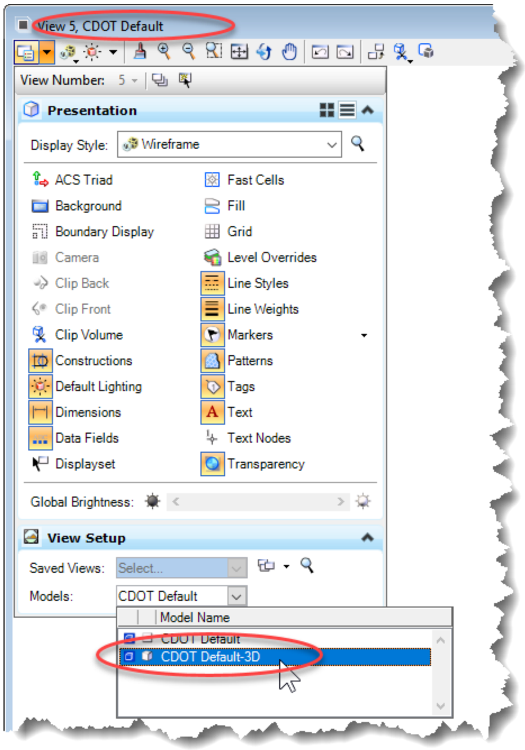
15. After the import, notice the following:

    a. The OpenRoads corridor object will display as a shape which parallels the centerline. The various template drop objects will also show as shapes, and superelevation objects.

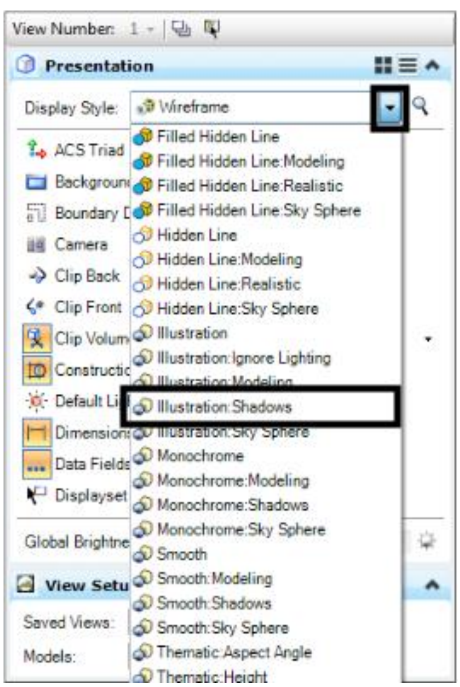


At this point you may wish to turn off the level which contains the superelevation. These will be reviewed later, but for now, they may get in the way.

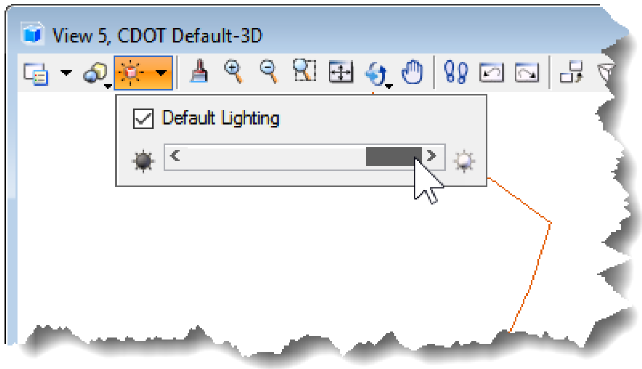
16. Open view ***5*** for display of the 3D model. After the view is open, in **View Attributes**, change the model to **CDOT-Default-3D**.



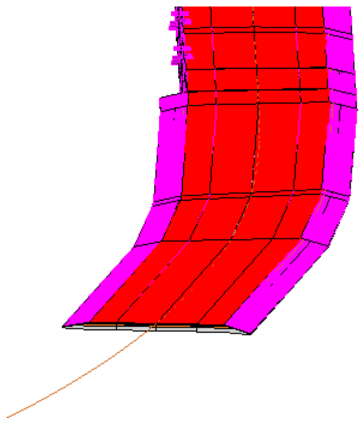
17. In view ***5***, it is often useful to also change the rendering mode from wireframe to a rendered view. **Click the second button** in the view 5 title bar and choose **Illustration Shadows** as the rendering mode.



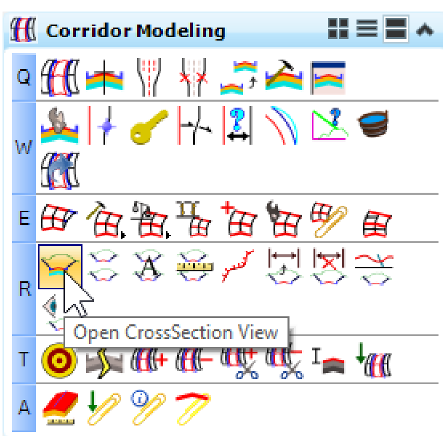
18. It is also useful to turn on the default lighting and adjust the intensity upwards.



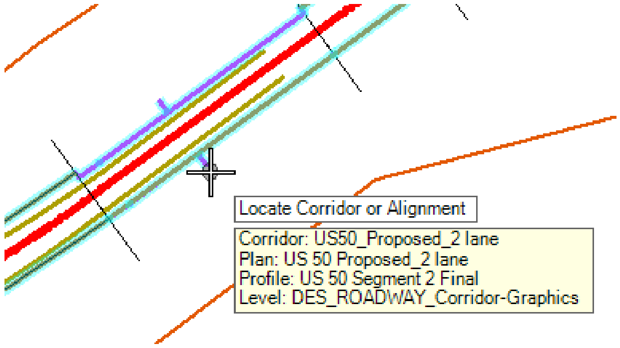
19. **Zoom in and rotate** view 5 to inspect the 3D model.



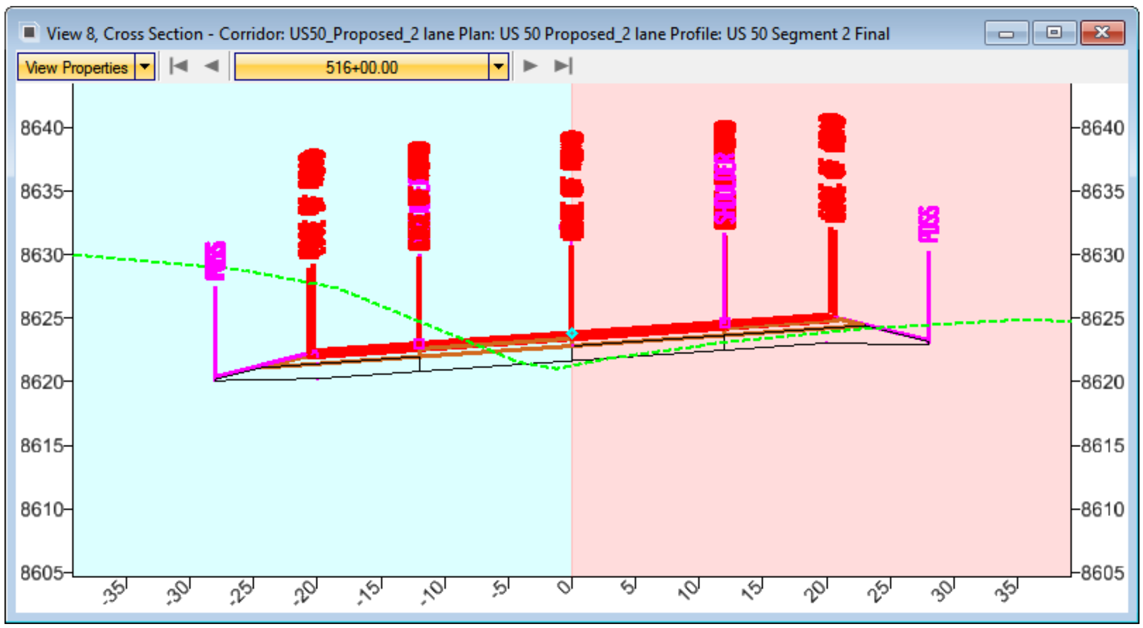
20. The density of the model is fairly sparse. This is a function of the design stage we chose, which purposely degrades the density for better performance. Later, the design stage can be changed to provide maximum density for the final model.
21. We can also inspect the model using the OpenRoads cross-section view. In **Tasks > Corridor Modeling**, click on **Open Cross-section View**.



22. At the first prompt **pick the corridor object.**



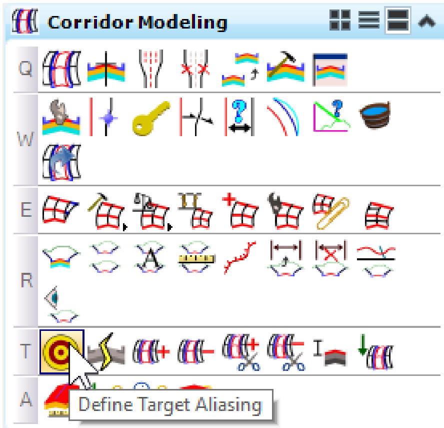
23. Open an empty view then left click in that view. This displays the dynamic cross section viewer.



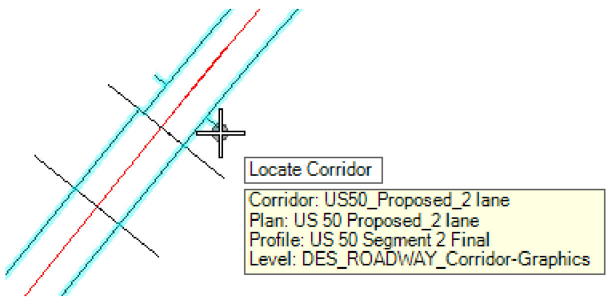
<u>Note</u>: Missing end conditions are caused by Target Aliases to design surfaces. These Target Aliases will be rebuilt to use the corridor. This is explained in Section V below.

If the end conditions are not showing, then follow the steps below:

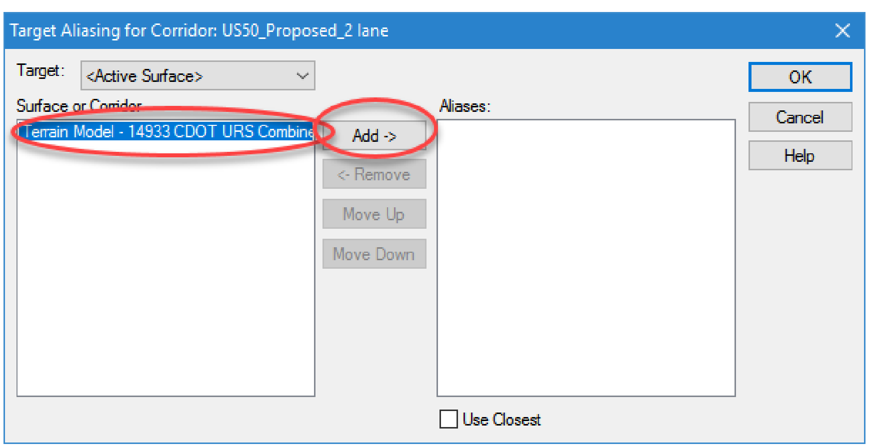
24. In **Tasks > Corridor Modeling**, click on **Define Target Alias**.



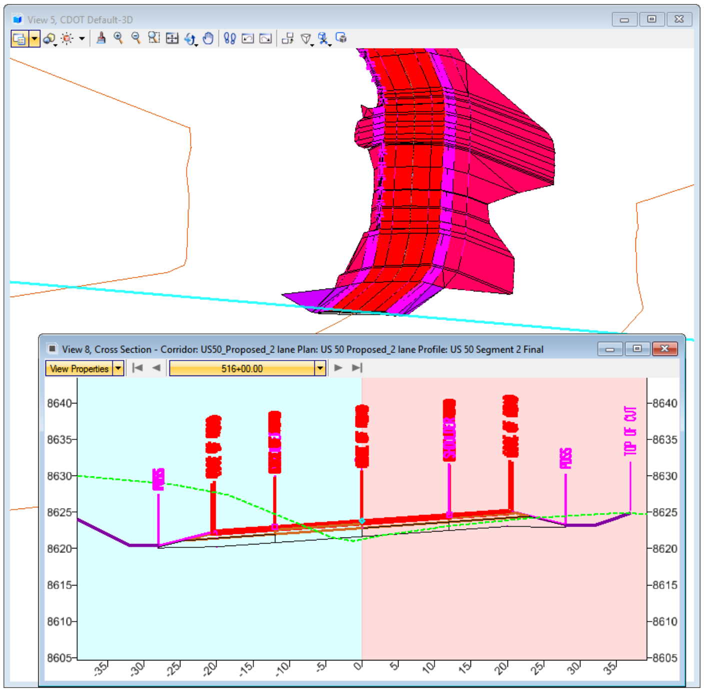
25. At the first prompt, **pick the corridor** in the 2D view (View 1)



26. In the Target Alias dialog, **select the terrain model** we imported earlier and **click Add** button.



27. Then **click OK.** The corridor will update and end conditions will be computed.



Note: The target alias issue should not occur if all the required surfaces are available and have been imported to OpenRoads terrain models. However, it will often be the case that the target alias list will contain targets to other corridors and thus the designer can often expect to need to rebuild the target alias list for most projects.

Best Practices – Import IRD

- Import only one corridor per DGN file.
- Very long corridors may need to be split for better computer performance which is accomplished by:
  - Copy the DGN file containing the corridor after the corridor is imported and verified.
  - In the original corridor DGN, delete some of the template drops at the end or change their station limits so that the total length of the corridor is less than 2 miles.
  - In the copy of the corridor DGN, delete some of the template drops from the beginning, or change the station limits so that the 2nd corridor begins where the 1st corridor ends.
- Target aliases which target another corridor will behave better in OpenRoads if the OpenRoads targets are adjusted after creating the other corridors. While it is possible to import the DTM files which result from the SS2 corridors, these DTM files are a snapshot of the last state of the SS2 design and thus will not be useful if any changes need to be made.

Potential Errors and Problems – Import IRD

The following are ramifications of importing corridors from Select Series 2 to OpenRoads.

- Imported corridors should be reviewed in detail to ensure that the same result exists in OpenRoads as was designed in SS2. The import is generally found to be reliable but minor glitches are often seen. The following are items which will need review and potentially will need to be corrected:
  - Template drops should be checked – the templates are normally fine but some errors have been experienced with single station drops.
  - Review the details for secondary alignments, key stations, parametric constraints, curve widening, end condition exceptions and external references.
  - Review point controls details.
  - Review end condition exceptions details.
  - Review the 3D model to ensure that the same results are found in OpenRoads as exists in Select Series 2. Attached the Select Series 2 surface as a reference file can help in this review.
  - Check/correct clipping where one corridor overlaps another.
- As seen in this section target aliases will merit special consideration during the import of IRD files.
- Note that in the exercise above the corridor was imported using a design stage of "0-Functional" which is the lowest density of model. Such low density will often give an appearance that somethings are not working properly. For example, the point

control at 561+00 left will not solve at all at this low density. The solution is to adjust the design stage to “3-Final” at some point during the review process.

- It is possible that the imported corridors will display gaps when the end conditions change abruptly, for example at the point where slope changes from 4:1 to 2:1. OpenRoads has newer capabilities for solving these areas than existed in SS2. The gaps will have existed in SS2 as well. The solution is to edit the template drops and assign feature name overrides on the end conditions.

Section V. Import the Approach Corridor

As seen in Section IV, there can be dependencies to other corridors which exist in SS2. In the case of the previous exercise there is a dependency to an approach corridor. In this section an OpenRoads corridor is created for the approach. The workflow will be similar to previous exercise:

- Create a new DGN
- Check corridor dependencies.
- Attach the terrain models as reference.
- Import required geometry
- Import the IRD
- Check and correct the OpenRoads corridor as needed.

Once the approach corridor is completed, the designer will need to go back to the mainline corridor to adjust the target aliases.

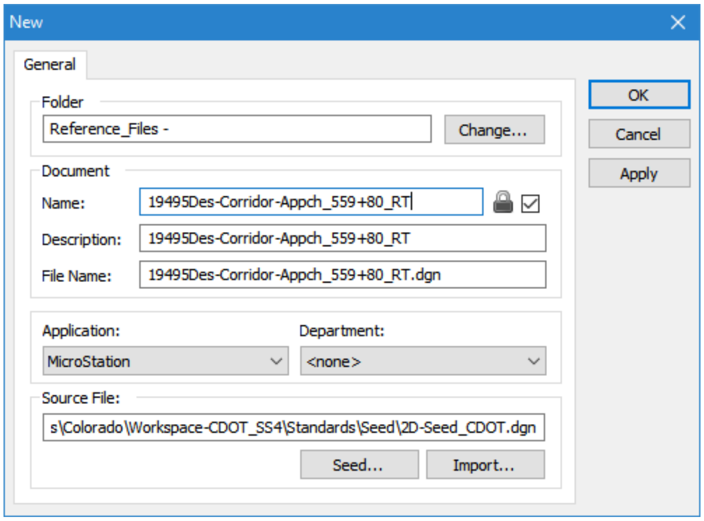
Below are the Dependencies, from the dependency report, for this example:

Horizontal Alignment:	appch_559+80-RT
Vertical Alignment:	appch_559+80-RT
Point Control Alignments:	appch_559+80-rad-LT
	appch_559+80-rad-RT
Target Aliases:	Existing Ground Rev
	US50_Proposed_ML-A
Corridor clipping:	US50_Proposed_3 lane
	US50_Proposed_2 lane

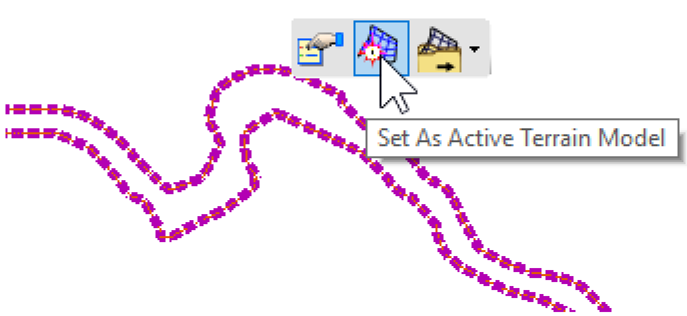
The target aliases will be adjusted after import similar to previous section.

1. First, Create and open a new DGN file which will later contain the imported corridor.
2. Navigate to the **Design\Drawings\Reference Files** for the project.

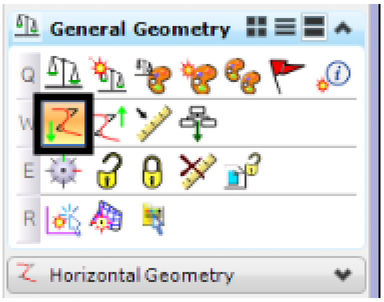
3. Create and open a new DGN file which will later contain the imported corridor. Use the ***2D-Seed_CDOT.dgn*** seed file. Name the file ***JPC#Des-Corridor-*****Appch** ***Corridor-Name.dgn***. In this example the new file is named **19495Des-Corridor-Appch_559+80_RT.dgn**.



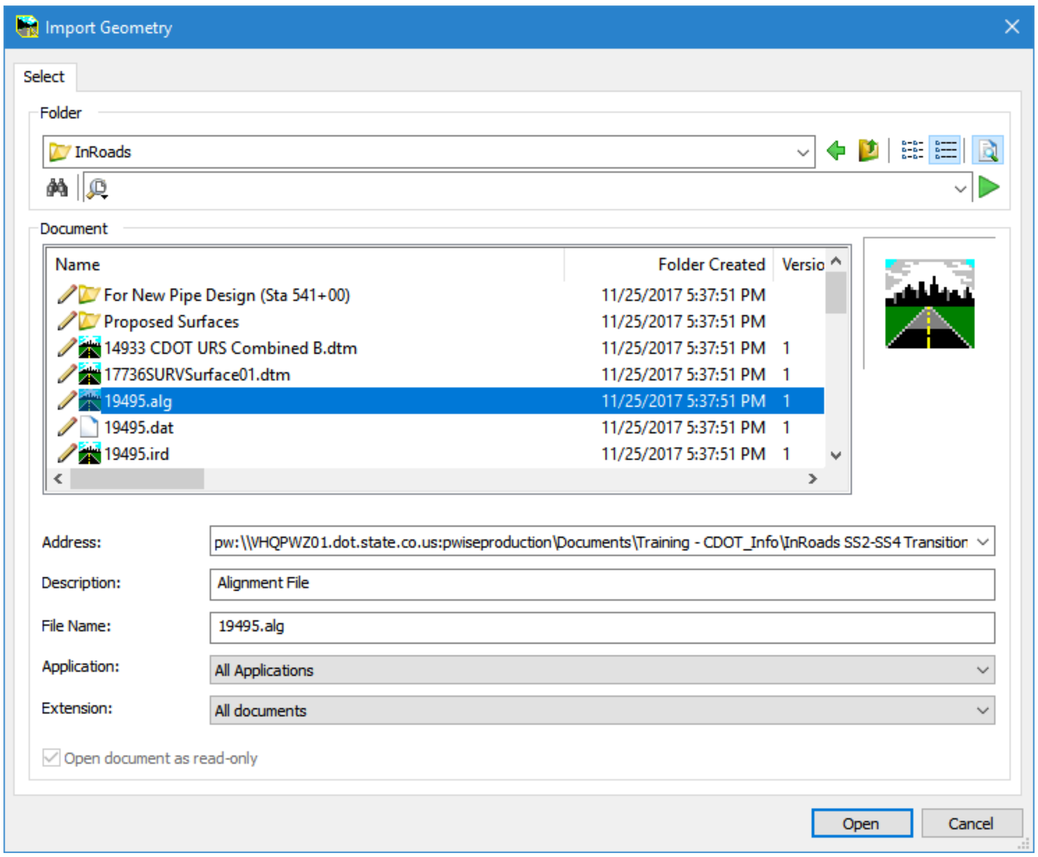
4. If available, assign the project specific geographic coordinate system created by Survey and assigned to the JPC##SURV_Topo01Scale### .dgn file, to MicroStation design files so that files with non-project specific GCS can be properly projected and aligned with project design data. (Menu: **Tools > Geographic > Select Geographic Coordinate System**). See Workflow MS 24 – Assigning A Project Geographic Coordinate System (GCS) for more information on attaching a project geographic coordinate system.
5. Attach the existing ground terrain model DGN file created in **Error! Reference source not found.**Section II as a reference file. In this example the **19495ExistingTerrainModel.dgn** is used.
6. Select the attached terrain model, and using the context toolbox, set the terrain model as the **active terrain**.



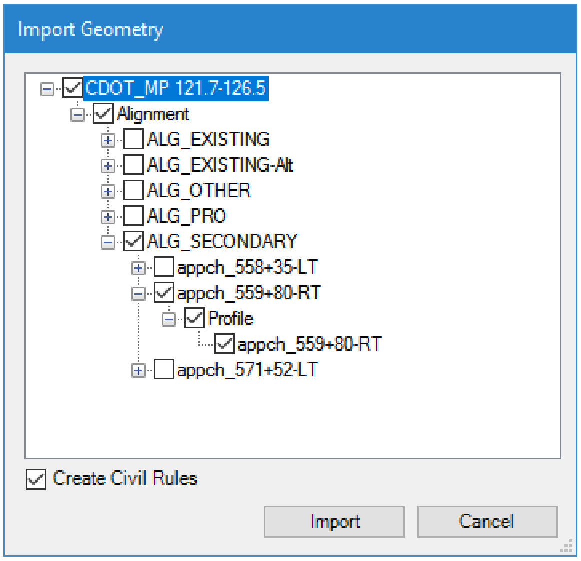
7. From the ***Tasks*** menu, expand the **Civil Tools** task.
8. Under the ***Civil Tools*** task, expand the **General Geometry** task.
9. In the ***General Geometry*** tasks, left click the **Import Geometry** button. This displays the ***Import Geometry*** dialog box.



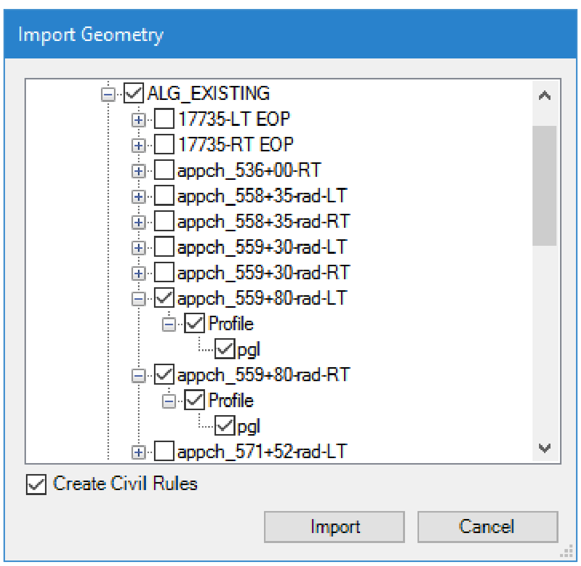
10. In the ***Import Geometry*** dialog box, select **19495.alg** file then left click **Open**.



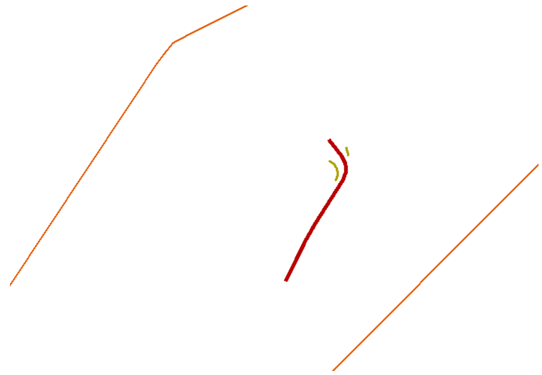
11. After selecting the ALG file, the ***Import Geometry*** dialog box opens. Expand **Alignments** then expand **ALG_Secondary**.



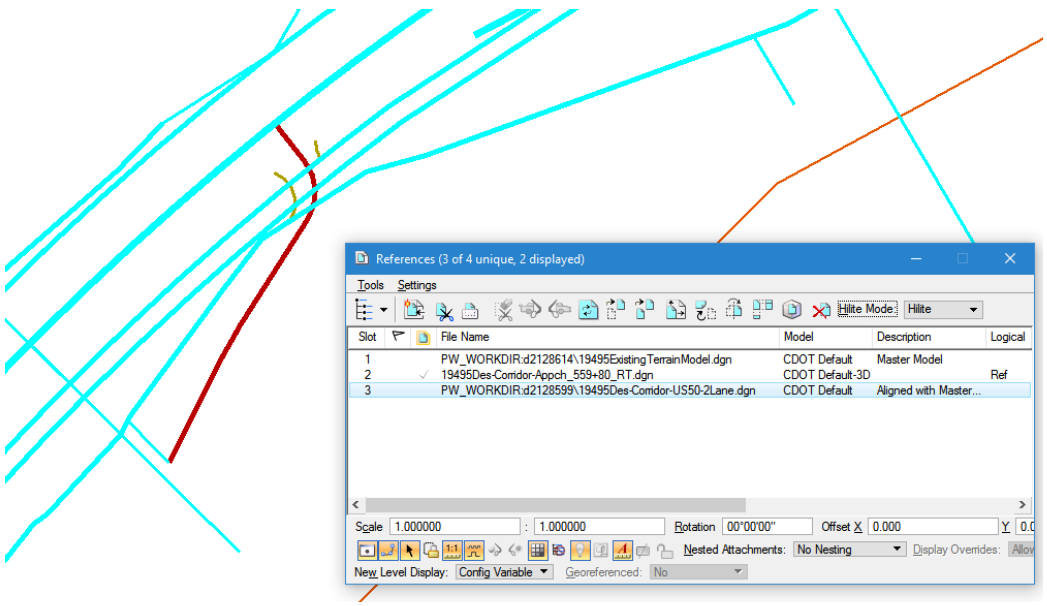
12. Select the horizontal and vertical alignments for the approach; **appch_559+80-RT** in this example.
13. **Expand ALG_Existing** and select the point control horizontal and vertical alignments; **appch_559+80-rad-LT and appch_559+80-rad-RT** in this example.



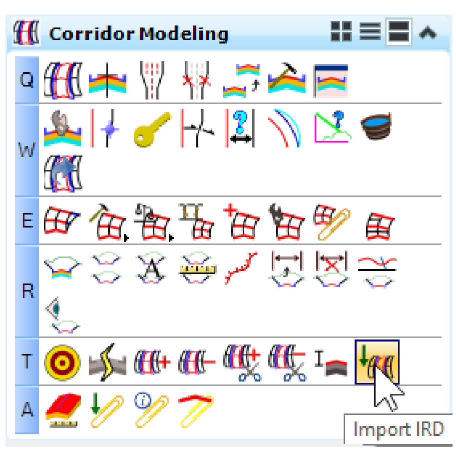
14. Make sure that the **Create Civil Rules** checkbox is toggled on and click **import**.



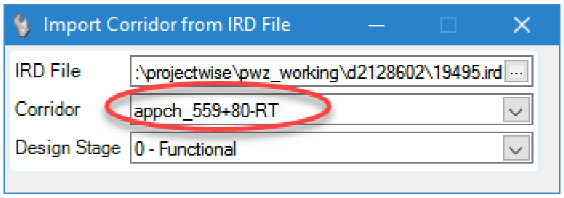
15. This would also be a good time to attach the main corridor **(US 50 2 lane corridor** in this example) as a reference.



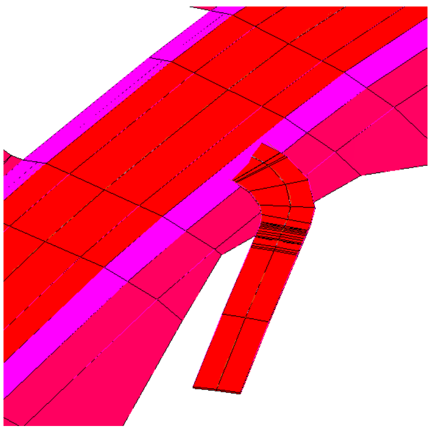
16. In **Tasks > Corridor Modeling** click on the **Import IRD** icon.



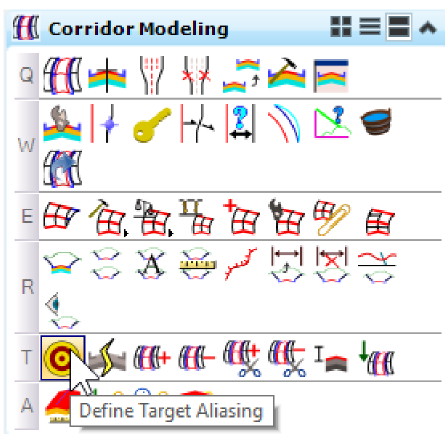
17. Then import the approach corridor from the same IRD we used in Section IV.



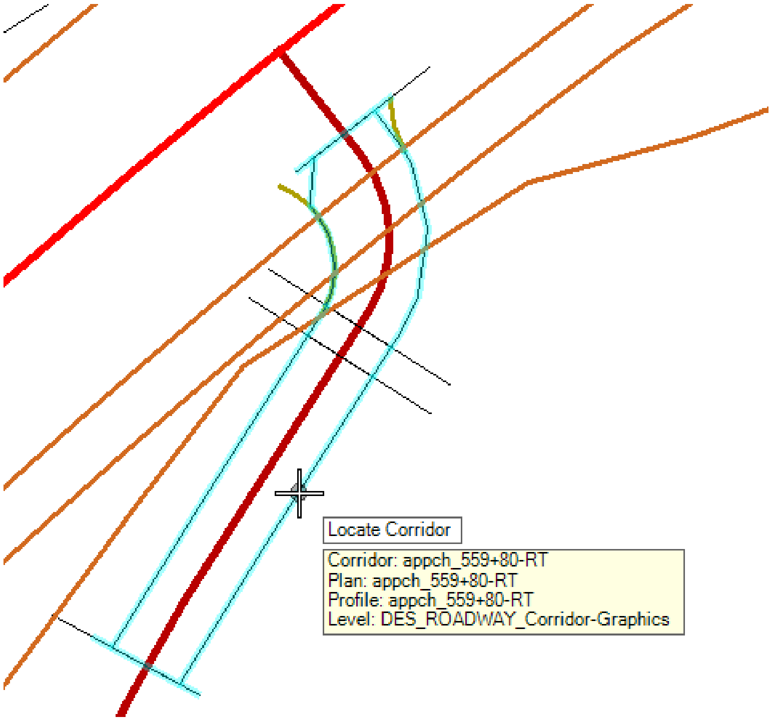
In the 3D model, the relationship between the two corridors will start to become apparent.



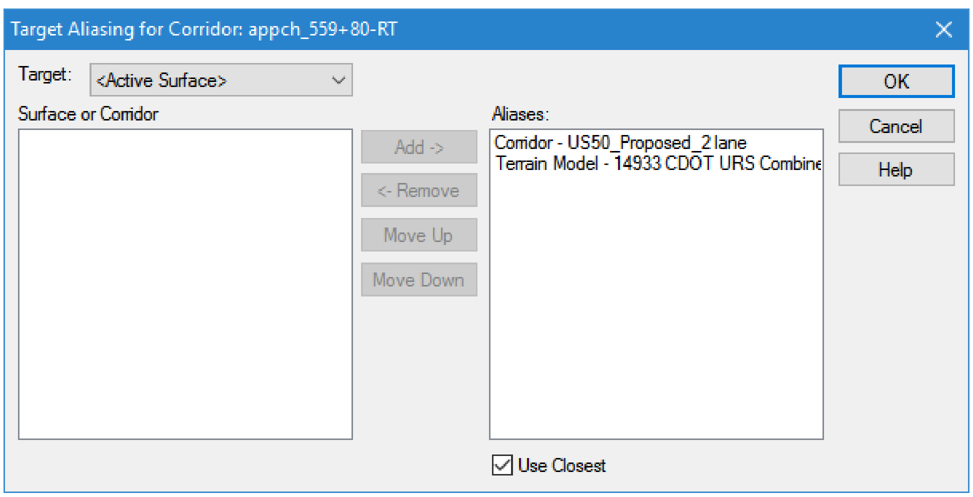
18. In **Tasks > Corridor Modeling**, click on **Define Target Alias**.



19. At the first prompt, **pick the approach corridor** in the 2D view (View 1)

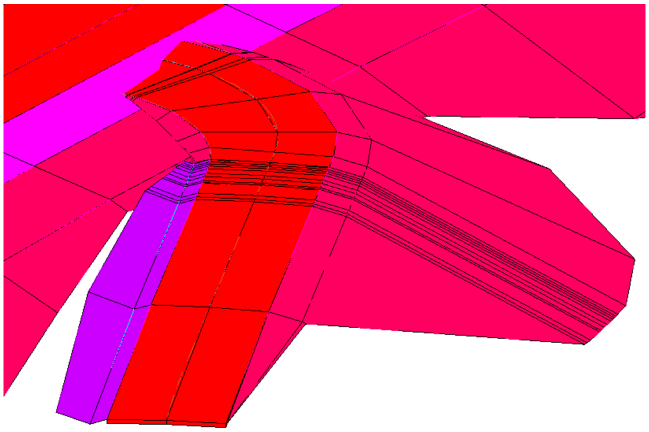


20. In the ***Target Aliasing*** dialog, add the mainline corridor (US50 in this example) and existing terrain model in the order shown below.



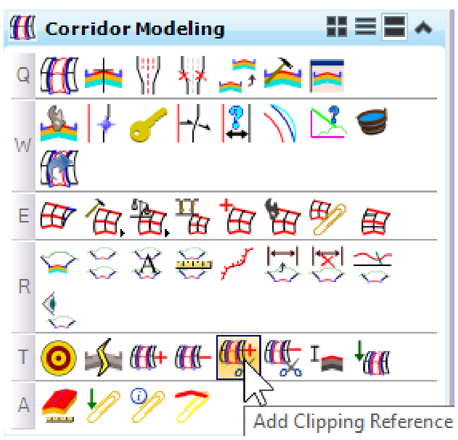
21. Click **OK**

22. This updates the end conditions as in previous exercise.

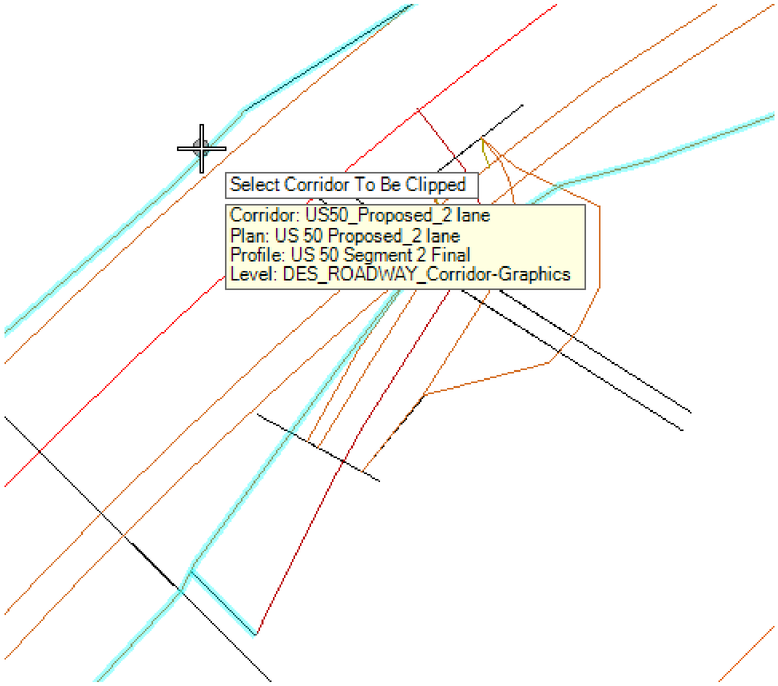


Switch back to the mainline (US 50) corridor to add the clipping references.

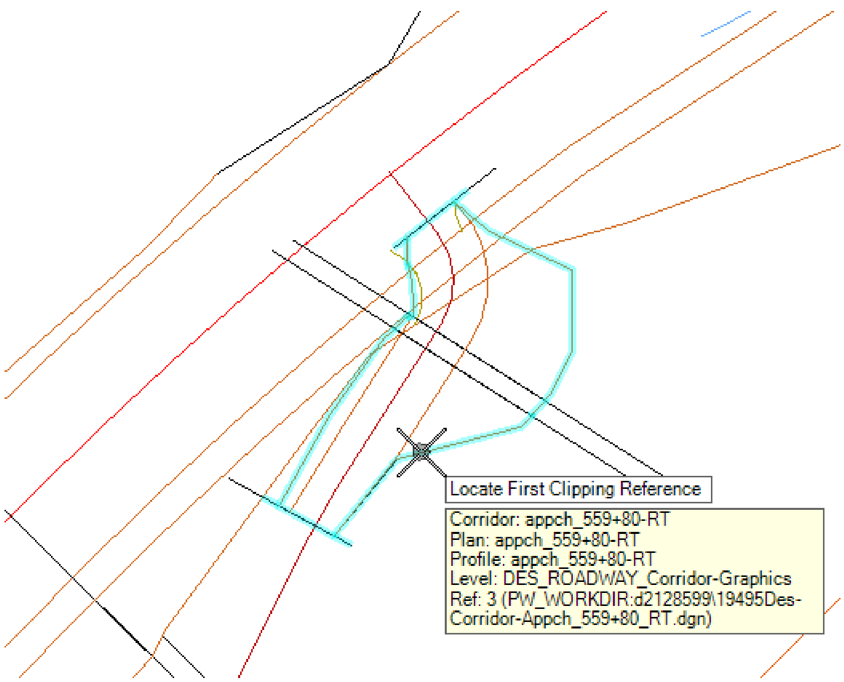
23. Open the mainline corridor file, in this example, **19495Des-Corridor-US50-2Lane.dgn** is used.
24. Attach the approach corridor as reference. In this example, **19495Des-Corridor-Appch_559+80_RT.dgn** is used.
25. In **Tasks > Corridor Modeling**, click on the **Add Clipping Reference** icon.



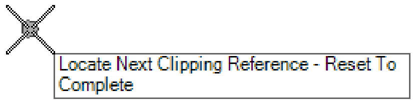
26. At the first prompt, pick the mainline corridor **(US 50)** which is the corridor to be clipped.



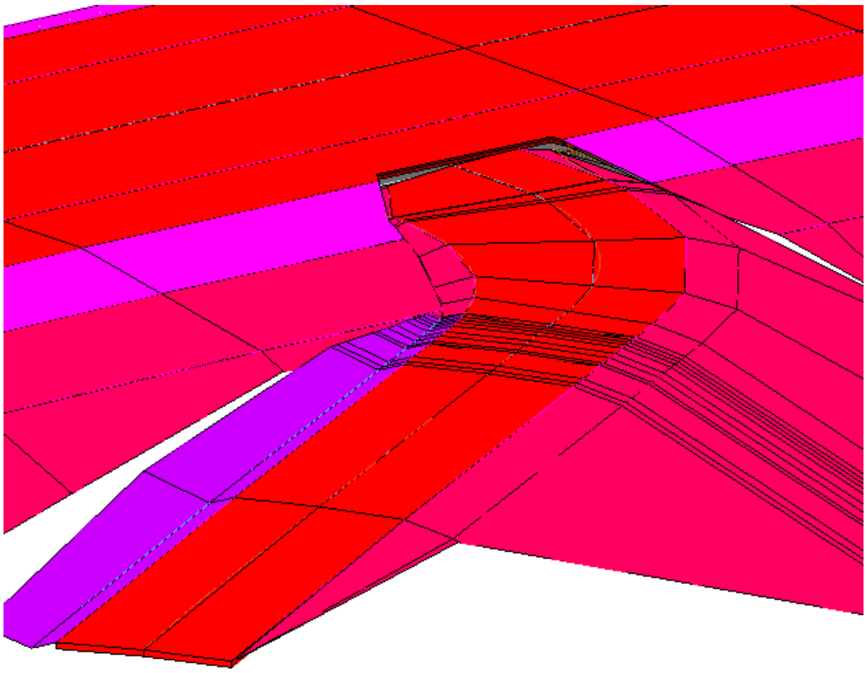
27. Then at the second prompt, pick the referenced approach corridor which is the clipping element.



28. Then Reset (right click) to stop picking. The corridor will be clipped.



29. The corridor will be clipped.



Best Practices – Additional Corridors

- As indicated by the previous two sections, migrating a project from SS2 to OpenRoads is a repetitive and iterative process whereby:
  - Corridor 1 is imported and checked, especially for target aliases.
  - Corridor 2 is imported and checked.
  - Return to corridor 1 to add clipping and target aliases as needed.
  - Corridor 3 is imported and checked.
  - Return to corridors 1 and 2 to add clipping and target aliases as needed and so on…

Potential Errors and Problems – Import IRD

- For corridors around intersections, such as the approach corridor shown in this section, it is possible, perhaps even likely, that inconsistencies in elevation will be discovered between corridors. An example of this can be seen in the last image above. A variety of things can cause this such as:
  - The designer makes an error and imports the wrong geometry (**Error! Reference source not found.**)
  - The SS2 corridors are actually in error.
  - The SS2 corridors are insufficiently dense. This could happen in older projects since the needs of construction plans at the time may not have required a detailed model of the intersection area.

Section VI. Other Considerations

Intersections

Intersections which were modeled in Select Series 2 using the corridor tools and workflows in Select Series 2 are importable as corridors as described in Section V. After import, the resulting OpenRoads model should be expected to match the models created in Select Series 2.

However, OpenRoads provides more robust tools for modeling of intersections and other non-linear entities, such as Civil Cells. Therefore, it may be desired to replace the Select Series 2 models in these areas with better OpenRoads models.

Further, some projects may be in an early stage of development where these non-linear areas have not yet been modeled. In these cases, the OpenRoads tools will provide better results than Select Series 2 and should be used.

The workflow shown in this document will produce an equivalent model as existed in SS2. The quality of the imported model will match the quality as created in SS2. Keep in mind that during the time of the SS2 design usage, the required deliverables for plans were cross-section sheets, not 3D models. The quality of the corridor models needed to satisfy needs of cross-sections may not be adequate to support the needs of rigorous 3D workflows such as Automated Machine Guidance.

Because of such potential inadequacies in the 3D models in intersections, it may be expected that some additional modeling effort will be required in the intersections. These intersection modeling workflows will be covered in a future training document.

Plans Production

Plan and profile sheets

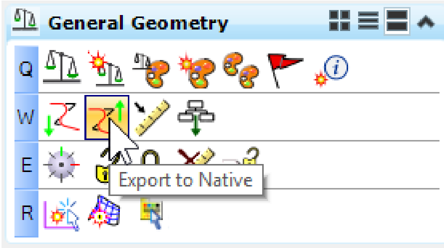
Production of plan and profile sheets will continue to be done using the same workflows as were used in SS2. The InRoads tools needed for these workflows are still included in the InRoads SS4 (OpenRoads) installation.

The only new requirement for supporting these plans production workflows is that any alignments and profiles used in plans production must be exported from OpenRoads to the ALG file and any terrain models which need to be shown in profiles need to be exported to DTM.

This is easy to accomplish as follows:

1. In InRoads Explorer, create or open the ALG file to be used for plans production.
2. Set the ALG file as active.

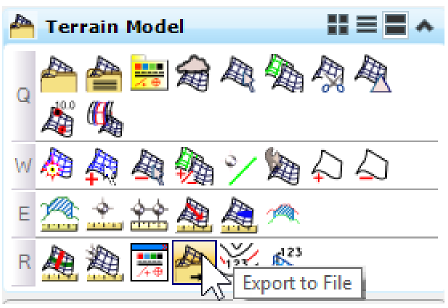
3. Then in **Tasks > General Geometry** click on the **Export to Native** command.



4. When the export command starts, pick the alignments to be exported. The active vertical alignment for the alignment is also exported.

It is only necessary to export alignments which will be used for creating the sheets or need to be annotated as a horizontal or vertical alignment.

5. To export OpenRoads terrain models to DTM, go to **Tasks > Terrain Model** and click on **Export to File**.

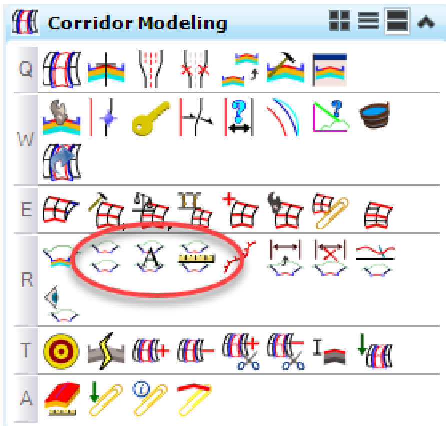


6. Pick the terrain model to be exported and supply a file name.
7. Alternative: If the only need for the terrain model is to show the ground line on profile sheets, then use the export geometry command and export the existing ground profile(s) to ALG.

Cross-section sheets

The only new requirement for cross-section sheets is that the OpenRoads 3D model needs to properly prepared before creating cross-sections. Preparation includes making sure that the appropriate levels are turned off or on and that all required reference models are attached. Whatever is visible (whether active file or reference file) is shown on the cross-sections.

Producing cross-section sheets in OpenRoads uses tools which are very similar to InRoads SS2 tools. The tools are found in **Tasks > Corridor Modeling**. Additional training for these tools is available in other course of study.



From left to right these tools are:

- **Create Cross-sections** – creates the cross-sections (with a sheet border if desired) according to preferences stored in XIN file. The SS2 preferences should work with minimal adjustment.
- **Annotate Cross-sections** – creates annotations on the cross-sections according to preferences in the XIN file.
- **End Area Volumes** – Compute and annotate volumes according to preferences in the XIN file.

Details on cross sections are provided in the ***Roadway Design Using InRoads SS4*** training material.

File Management

It is advisable that designers make some adjustments to the way that files are created and referenced. The following are recommendations which will need to be adopted, if not already:

- Use 2D DGN files for nearly all work. The exceptions are that survey files and terrain model files should exist in 3D DGN files. This recommendation is made because OpenRoads works best when the geometry and 3D models exist in separate dgn models.
- Generally, only one terrain model exists in a single DGN. This is for computer performance purposes.
- Only one corridor should be placed into a DGN file. If a corridor is more than 2 miles long then it should be split into multiple corridors in separate DGN files with no file containing more than 2 miles of corridor length. This is for computer performance purposes.
- In general, DGN files need to be more highly segregated, with alignments existing alone (except as described in Section III), other geometry in separate files, survey in separate files, and so on. The degree of segregation needs to be worked out more or less as a standard which is used as standard operating procedure by all.
- It was a common practice in the past for InRoads users to treating DGN files as disposable, because data was stored in separate files (DTM, ALG, IRD, etc) and the DGN facilitated viewing the data. This is not true in OpenRoads and will require a period of adjustment.