NCDOT OpenRoads Designer (ORD)

SS2 to ORD
CADD Conversion Guide

Version 1.0

July 1, 2021

NCDOT ORD Implementation Initiative
CADD Conversion Plan
Version 1.0

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Executive Overview of Document Purpose

North Carolina Department of Transportation is in process of making a major change in the software used for Project design. For the last several years, GEOPAK V8i Select Series 2 (SS2) corridor modeling tools have been used for producing Plans, models and cross-sections. The change underway is a move to OpenRoads Designer (ORD) which is a major change in the evolution of the road design software.

- During the same time frame, Bentley Systems Inc, the producer of GEOPAK and OpenRoads Designer software, has announced end of support for the V8i Select Series 2 product line.
- It is not possible to maintain internal support and training for the V8i Select Series 2 products indefinitely because the software is not available anymore and at present the NCDOT Select Series 2 licensing is maintained until June 2022.
- It is desired to determine strict decision-making guidelines to maintain, convert or “start fresh”, a project designed in V8i Select Series 2 to the newer OpenRoads Designer software.

SUPPORT STATUS	CONTINUOUS SUPPORT	FULL SUPPORT	EXPIRING SUPPORT	SUPPORT DISCONTINUED
CONNECT Edition	■			
V8*i* SELECTseries 10 Refer to *V8i* SELECTseries 10 Applications		■		As of January 1, 2022
V8*i* (Earlier SELECTseries)				■
V8, XM, 2004, ...				■

Considerations to Determine Project conversion

The following items should be considered when determining whether a particular project should be converted from GEOPAK V8i SS2 to OpenRoads Designer (ORD).

- **PROJECT SCHEDULE AND PHASE:** If the project is on a tight schedule or near LET stage, it is advisable to not convert the project in ORD due to expected delays with learning curve and phase complexity. Some delay should be expected during the early transition phase of the software. However, if the designer is well versed with the software, it may serve better to move forward with the conversion.

- **PROJECT COMPLEXITY:** Magnitude of work required to convert Interchanges, Intersections, Driveways, Roundabouts etc.
  - Convert
    - Base-mapping.
    - Design files - re-scale elements and labels.
    - Older generated SS2 3D design models.

Determine Project conversion approach

- **SHORT TERM APPROACH (until Select Series 2 licensing is maintained by Department):**
  - If the project is between the ROW complete phase and end of design phase, decision should be based on the project complexity as explained above to continue in older SS2 version until the department maintains the Select Series 2 licensing or convert to ORD.

  - If the project is between Project Initiation phase and Plans-in-hand phase, then the project should be converted in either of the three levels of conversion explained in this document. It is beneficial to convert a project at an early phase as the CADD complexity will only increase in later phases.

- **LONG TERM APPROACH:**
  - Convert the project in minimum, moderate or full conversion on a case-by-case criteria as shown in the decision flow chart and levels of conversion stages.

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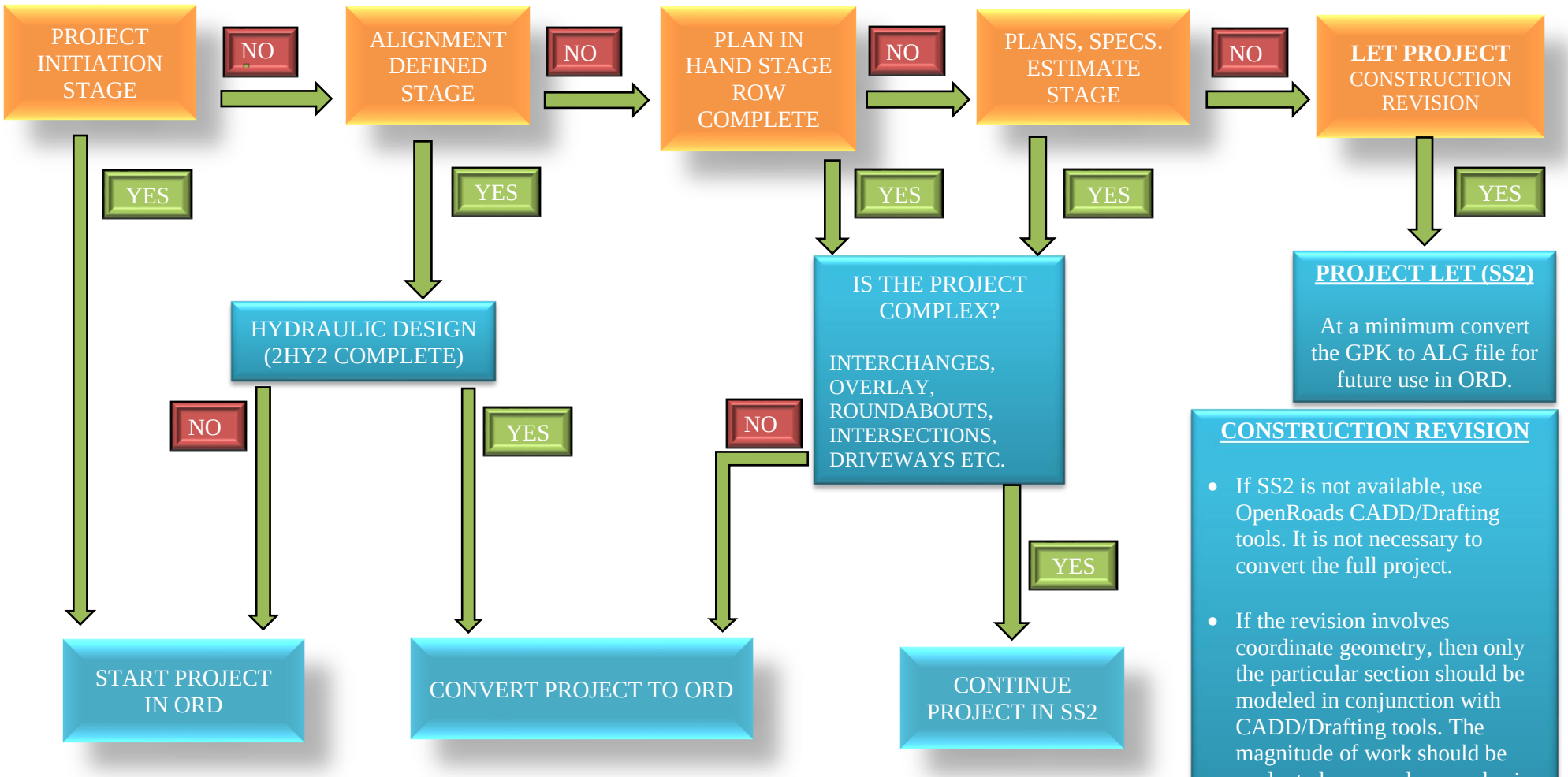
PROJECT CONVERSION DECISION FLOWCHART



Notes:

- Any Project that activates after 2021 or later will begin in ORD due to the termination of SS2 license at some point regardless of the project phase or complexity. It is beneficial to convert a project at an early phase as the CADD complexity will only increase in later phases.
- All Projects will have to be evaluated on a case-by-case basis to make the final determination.

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Levels of Conversion:

MINIMUM CONVERSION

- Import Alignments from GPK into ORD
- Import existing TIN into ORD Terrain Models
- Utilize a minimal amount of data from SS2 generated design files.

MODERATE CONVERSION

- Send files back to ROADWAY to determine import of SS2 model or recreate as new model.
  - IRD
  - ITL
  - ALG
- Import Roadway Alignments
- Import Existing TIN
- Utilize a minimal amount of data from SS2 generated design files.

FULL CONVERSION

- Import Existing TIN
  - ONLY If deemed absolutely necessary, discuss with and send files back to LOCATION & SURVEY / PHOTOGRAMMETRY to convert base mapping and resize annotation scale.
- Import Roadway Alignments
- Import Roadway model
  - IRD
  - ITL
  - ALG
- Convert all design elements to ORD Standards and Feature Definitions.

NOT RECOMMENDED.
In testing projects, full Conversion has proven to be a very cumbersome task involving manual reassignments to ORD standards, software freezes/crashes and careful review for any missed conversion.

Conversion Process:

For any project which will be migrated from V8i Select Series 2 to OpenRoads Designer, there is a certain body of work which must be accomplished within the levels of conversion shown previously. For some projects, the magnitude of this work could be a deciding factor in the type of conversion. The conversion guidelines below will assist the designer to be able to comfortably gauge the required work and be able to come to an informed decision on conversion.

Hybrid Approach

There will be scenarios when a project is close to completion or near LET stage or need construction revision and may not require a significant conversion to complete the plans. One of the benefits of ORD workflow is that the elements can be demoted to MicroStation CADD elements by dropping their "smart" status. This would give the user the ability to manually draft any design elements using ORD Drawing tools similar to the older SS2 format to complete a particular design task using ORD.

Magnitude of Work

This section is a brief introduction to the magnitude of work in each category. The categories are explained in detail in the migration workflow section. For any project which will be migrated from V8i Select Series 2 to OpenRoads Designer, there is a certain body of work which must be accomplished. For some projects, the magnitude of this work could be a deciding factor for whether to migrate the project.

Section 1 Line Style Scales and Cell Scales

Due to the way in which survey files were produced in V8i Select Series 2, the custom line styles in the older final survey DGN files will be too large, by a factor of 600, when these DGN files are referenced into OpenRoads Designer DGN files. For example, a line style produced in V8i Select Series 2 for the edge of pavement uses custom line style named "NCMAP EOP" drawn at a scale of 50.0. Due to changes in the way that scale is handled in OpenRoads Designer, these line style scales need to be changed to 0.083.

Background:

Historically, software which originated and was only sold in the U.S. would assume that imperial unit scales were treated as simple ratio multipliers. Thus, the most common scale of 1" =50' would be treated as a 50 multiplier, ignoring the difference in units of the scale. Further, most organization created CADD support files, such as cells and line styles, based on this simplifying assumption. As CADD software and data sharing became more global than this simplifying assumption became untenable and software handling of scales became more robust. Many organizations, including NCDOT, extended the use of older CADD standard files by customizing the scales definition file. Starting with OpenRoads Designer however, the styles and cell libraries have been adjusted for proper scale definitions in order to produce data which is more universally shareable. As a result, data which needs to migrate to OpenRoads Designer will require adjustment to the scale of line styles produced in V8i Select Series 2.

The following is a summary of known items which will exhibit scale problems:

- All custom line styles, except caution must be exercised on custom line styles which are set to physical dimensions. One example of these are the line styles used for pipes.
- All labels placed with the NCMAP utility.
- The leader lines placed with NCMAP are particularly ugly.

While the final survey file is likely the major challenge in this regard, any DGN file from any of the units will need to be reviewed and potentially corrected.

Required effort: 1-2 hours per file (less than a day per project) using brute force methods. 5± minutes per DGN if a custom utility application has been or can be developed.

Required skill level: Most engineers or CADD technicians can perform this work with minimal (15± minutes or less) training. See Migration Workflow Section 1 .

Section 2 Text Labels Placed with Annotation Scale Lock ON

All DGN files must be reviewed and labels which were placed with annotation scale lock on will need to be adjusted. This is similar to the issue described in Section 1 except applied to text. The annotative scale lock allows the labels to resize in the case of:

- A sheet where the label is used changes scale during the life of the project.
- The label appears on multiple sheets where the scale of the sheets differs.

The problem occurs because of the differences in how scale is defined in V8i Select Series 2 compared to OpenRoads Designer. In V8i Select Series 2 the difference in units in the scale definition is ignored thus a 1" = 50' scale is treated as a 50 ratio. In OpenRoads Designer, the difference in units is recognized and the scale is treated as a 600 ratio. This issue can affect any DGN file created in V8i Select Series 2.
Required effort: 1-2 hours per file.
Required skill level: Low. Most engineers or CADD technicians can perform this work with minimal (15± minutes or less) training. See Migration Workflow Section 2 .

Section 3 Importing Terrain Model (TIN) Files

GEOPAK V8i Select Series 2 stored terrain models in external files with extension of TIN. These must be imported into OpenRoads Designer. The result is an equivalent terrain model stored as a native MicroStation terrain model element in the DGN file.
Required effort: 15-30 minutes per terrain model.
Required skill level: Low. This is a simple and straightforward import action. See Migration Workflow Section 3 .

Section 4 Importing Alignments

Part of the process of migrating a project from V8i Select Series 2 to OpenRoads Designer is to first import the corridor alignments from V8i Select Series 2 to OpenRoads Designer alignments. This is a simple and straightforward process covered in Migration Workflow Section 4
Required effort: Less than 1 hour for even the most complex of projects.
Required skill level: Low.

Section 5 Work Effort for Migration of Corridor Modeler Files

Migrating the V8i Select Series 2 corridor modeler files is the largest bulk of required work for moving a project to OpenRoads Designer. The roadway models in V8i Select Series 2 are stored in a file, external to the DGN, with an IRD extension. The fundamental nature of these files is more or less equivalent to the models produced in OpenRoads Designer, with the primary differences being:

- OpenRoads Designer stores the functionally equivalent data embedded in the DGN file.
- Various enhancements and fixes to these functionally equivalent tools have been made in the OpenRoads Designer version.

Summary of workflow:

- Import alignments from GEOPAK geometry files (gpk or alg) to OpenRoads Designer.
- Use the remap spreadsheet to change names of styles in the IRD to names of feature definitions used in OpenRoads Designer, among other adjustments.
- Import the IRD to OpenRoads Designer.
- Correct and clean up errors in import.
- Clean up model where assumptions made in V8i Select Series 2 are no longer valid in OpenRoads Designer. A major example of this will be intersections. In V8i Select Series 2, intersections were often modeled very rudimentary since the goal was to produce cross-section sheets not complete models. In OpenRoads Designer, these intersections will need to be remodeled, usually for the entirety of the intersection back to the ends of radius returns.

The details of the workflow for this migration are shown in Migration Workflow Section 5 thru Section 12 .

Recommendation:

Many projects (perhaps most) will be decided to migrate based on other criteria besides how much work is required. This recommendation applies only to those projects where the decision relies on how much work must be done to get the OpenRoads Designer model back to the same state as is currently seen in the V8i Select Series 2 model.

It is suggested that, in addition to this guide, projects which are prospects for migration should invest a day of work to migrate select portions of the model to get a better sense of what will be involved in the specific project before making a final determination of:

1. Whether to migrate to OpenRoads Designer at all.
2. Whether to use the IRD import workflow.
3. Or whether to just start over with a new model in OpenRoads Designer.

It should be expected that for some projects that the most efficient path forward will be the third option.

Required effort:
Effort will be highly variable based on complexity of the project. Provided here is estimate of some hypothetical extremes.

Extremely simple project:

- A short project of less than 1-mile length, a simple template, full depth paving (not overlay) and only few intersections.
- For these simple projects, the effort to migrate the IRD file to OpenRoads Designer is likely less than 1-week work. If the project is a bridge replacement, then a little extra time (perhaps 1 day) will be required to model the bridge abutment slopes.
- There is another consideration for this type of project: Although the migration effort is low, the model could probably be generated completely from scratch with the same (or nearly so) effort. Rebuilding the model from the start would also provide designer training benefits which would not be realized by the import IRD process.

Required skill level: High. The migration effort requires a training effort of several hours which is distinct from the OpenRoads Designer training effort generally. For these simple projects it may be wiser to simple rebuild the model from scratch.

Extremely Complex Project:

- There are a few things which can make a project complex:
    - Many intersections or many driveways
    - Multiple Roundabouts
    - Superstreet Design (because the templates will likely be complex)
    - Some overlay projects – Overlay may not necessarily increase the migration effort unless there are lots of changes between full depth and overlay sections or of the overlay meanders

left and right across the existing road. A “well behaved” overlay project which remains on a similar alignment as the existing pavement with widening of some sort is much simpler and straightforward. The difference here between what might be considered simple versus complex is how frequently things changes.

  - An interstate type project, even with interchanges, may actually be simpler than expected. This is because interstate type templates are usually well behaved and even in the ramp Gores, the models are not terribly complex. However, if the interchange includes lots of intersections and roundabouts on the crossing roads, then it is these things which cause the migration to become complex.

- Required effort for migration (assume no use of civil cell technology):
  - Tee Intersections (a cross intersection is counted as 2 Tees)
    - Effort to rebuild intersection model from scratch: 1-2 hours per intersection.
    - Effort where intersections were fully modeled in V8i Select Series 2: 1-2 hours per intersection instead of the 1-2 hours noted above. There is some risk though that the V8i Select Series 2 model will then be found deficient leading to throwing away the imported portion and remodeling from scratch.
  - Roundabouts
    - Effort: 8-16 hours per roundabout
  - Superstreet
    - Effort: Unknown, Theoretically, if the template used in the IRD file is well defined and well understood by the designer then the effort could be very low consisting only of an import phase with minimal cleanup. In many cases, though, the complexities of the superstreet templates caused some designers to “bluff” their way thru the process. In such cases the migration effort could be large.
  - Overlay/Widening
    - Effort for project which does not change very much could be as low as a day per mile.
    - Effort for a project which is highly variable could be more.
  - Interchanges: Treat each gore area as an intersection for purposes of estimating effort, plus the cross-road intersections and roundabouts.

Required skill level: Extremely High. The migration effort requires a training effort of several hours which is distinct from the OpenRoads Designer training effort generally. For these complex projects there is a necessary added skillset for being able to determine when the imported data is sufficient and/or how it needs to be cleaned up.

Section 6 Disposition of sheets

For any project which has been started in V8i Select Series 2, there will be certain sheets which have already been created in MicroStation with a great deal of labeling and such already added. To rebuild these sheets using the OpenRoads Designer tools seems wasteful and inefficient, because of the great work required to reproduce the labels. However, the software is updated at a greater frequency now than before and it would to good idea to check up on the latest development. The following is recommended:

- Retain the sheet DGN files which have been created.
- If desired, replace the sheet borders with the newer ones adopted for OpenRoads Designer.

The added benefit of using this workflow of adjusting sheets rather than making new sheets is that it provides more time for the workspace and plans production tools in OpenRoads Designer to mature.
Required work to accomplish the bulleted items: 1-2 hours per sheet.
Required skill level: Low.

Migration Workflow

In the following exercises, the various tasks which are required for migrating an V8i Select Series 2 design into OpenRoads Designer are described. The designer will note that the steps shown here are necessarily generalized and that any specific project may vary in regard to details. An attempt has been made to note the possible extent of variation where possible.

Section 1 Correct line style and cell scales

Some files which were produced using V8i Select Series 2, will exhibit scaling issues when used as reference files in an OpenRoads Designer design. These scaling issues can occur in any DGN file originally generated in the V8i Select Series 2 product. The problem will manifest as line styles or cells which display at a massive size. The causes of this problem are described in Section 1 thru Section 2 . The first indication that something is wrong is often realized when attaching the final survey file to one of the OpenRoads Designer design files. The first impression is often very dramatic.

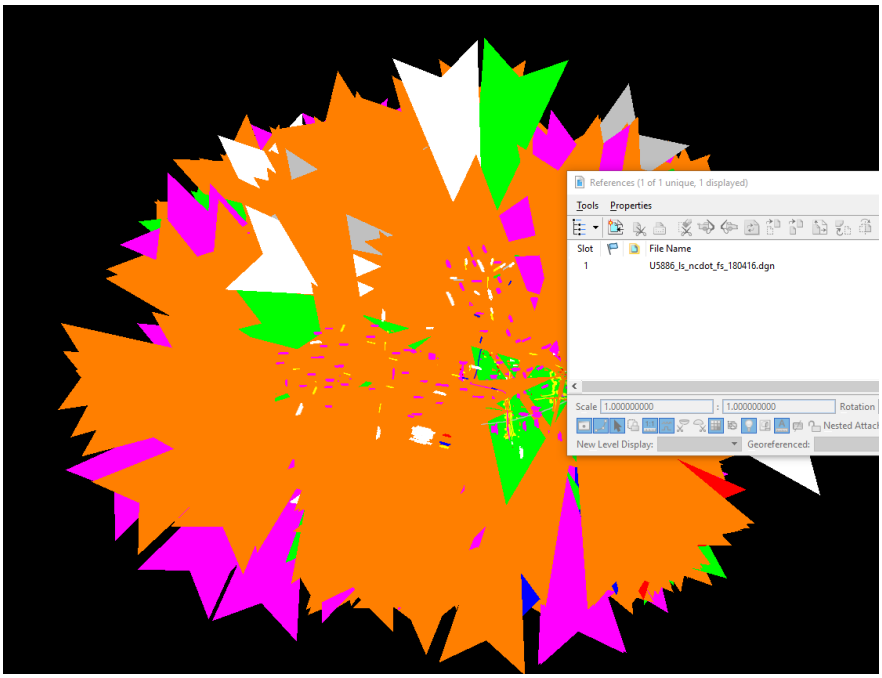


Figure 1 - First indication of scaling errors.

While this image looks very intimidating, once the cause is known then it is not a difficult problem to solve. What we see in this image of a final survey file is all of the hundreds of dimension lines and leader lines which are being displayed 600 times too large because of the differences in how scale was defined in V8i Select Series 2 and how it is now defined in OpenRoads Designer. In many cases, a quick fix is available by simply adjusting a setting when attaching the file as reference. After attaching the reference and seeing the problem than double click the reference file and change the setting shown in Figure 2.

Note: If the designer has experience with the reference file in question, then this setting can be defined during the file attachment process rather than edit afterwards.

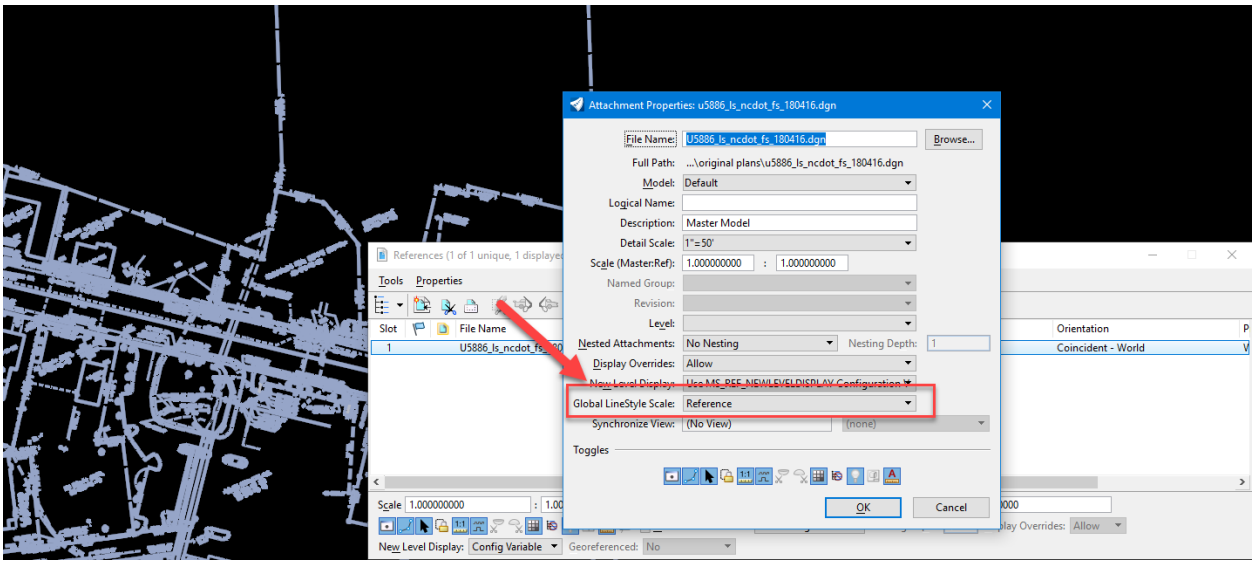


Figure 2 - Change Reference Setting Related to Line Style Scale.

The above-described setting must be applied in every instance that the V8i Select Series 2 file is used as reference. The setting may not prove completely adequate or if a more permanent solution is desired whereby the setting need not be set every time, then an alternative solution is to change the scaling method of the older file. This can be a somewhat lengthy process but may be desirable, especially for larger projects which may be expected to continue for an extended time. First, you would open the older file in OpenRoads Designer and change the model properties to use Annotation Scale for line styles rather than Global Scale.

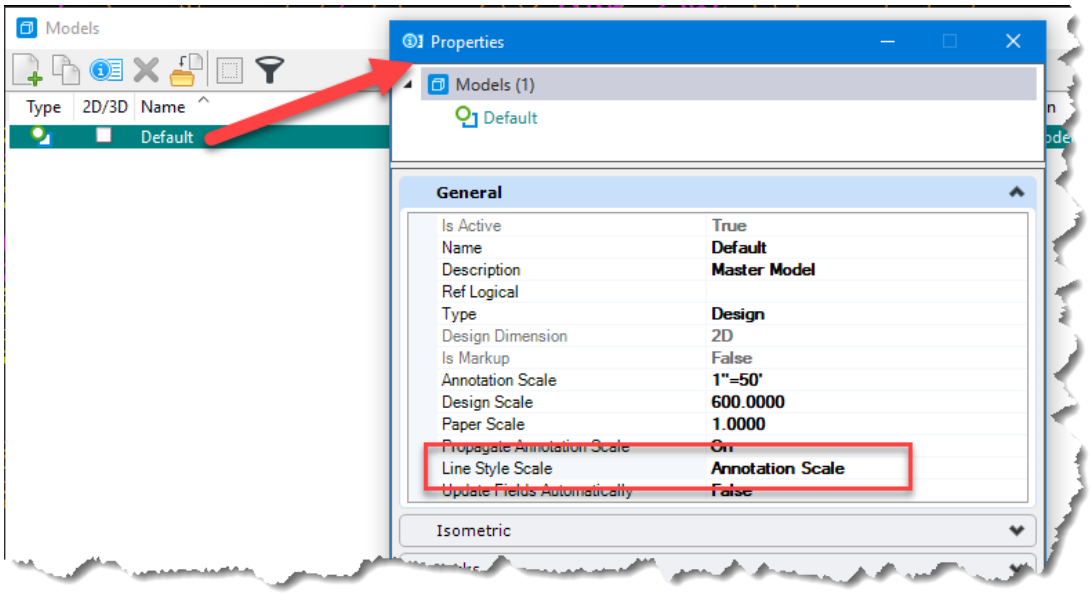


Figure 3 - Changing Model Properties

This will cause the lines in the older file to generate the same mess as shown in Figure 1.
Then, each of the lines which utilize custom line styles must be selected and the scale changed from 50.0 to 0.083333.

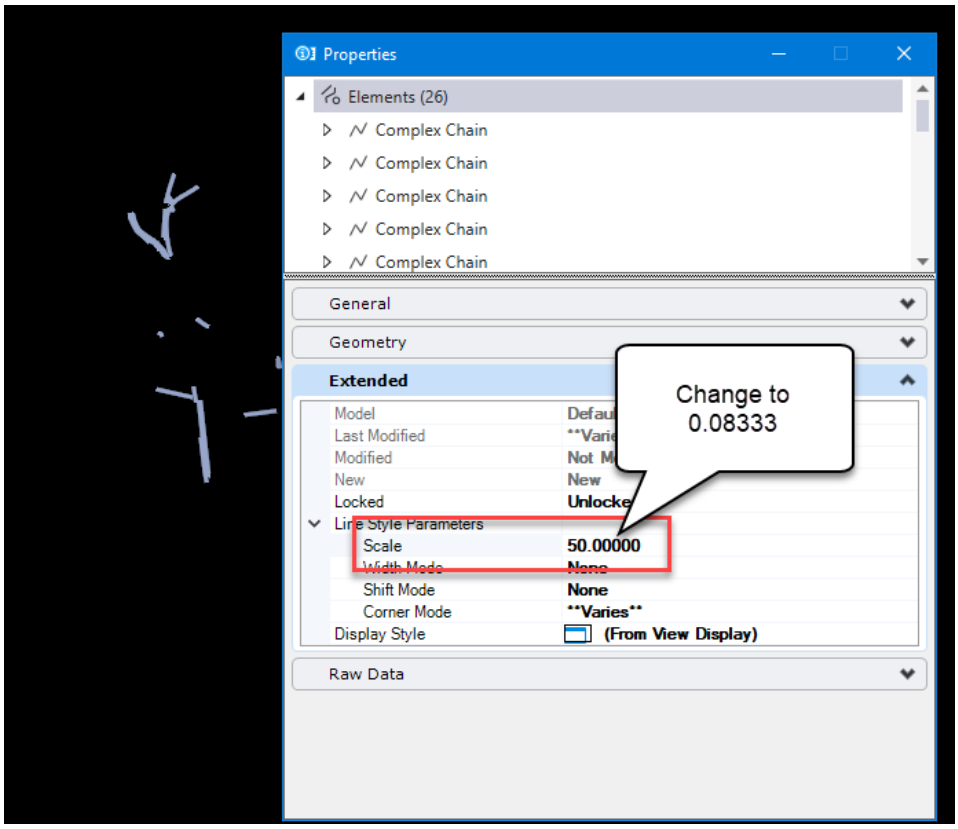


Figure 4 - Line Scale Change

One fairly efficient way of making this change for the hundreds of lines in a file is to first select all the linear elements in the file using the Selector tool, or Select “By Attributes”.

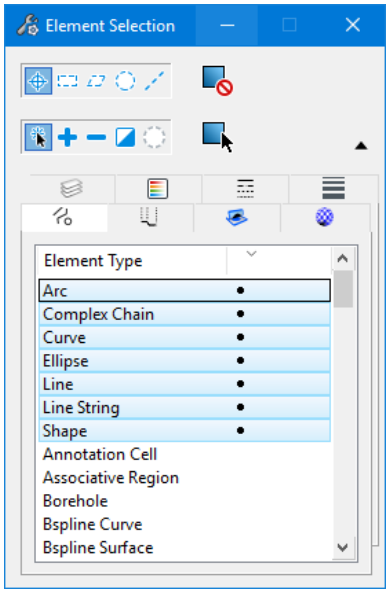


Figure 5 - All linear Elements Selected

Then, using element information, many lines can be adjusted at once.

Note: Be patient since the Element Information tool in OpenRoads Designer is very slow when a large number of elements are selected.

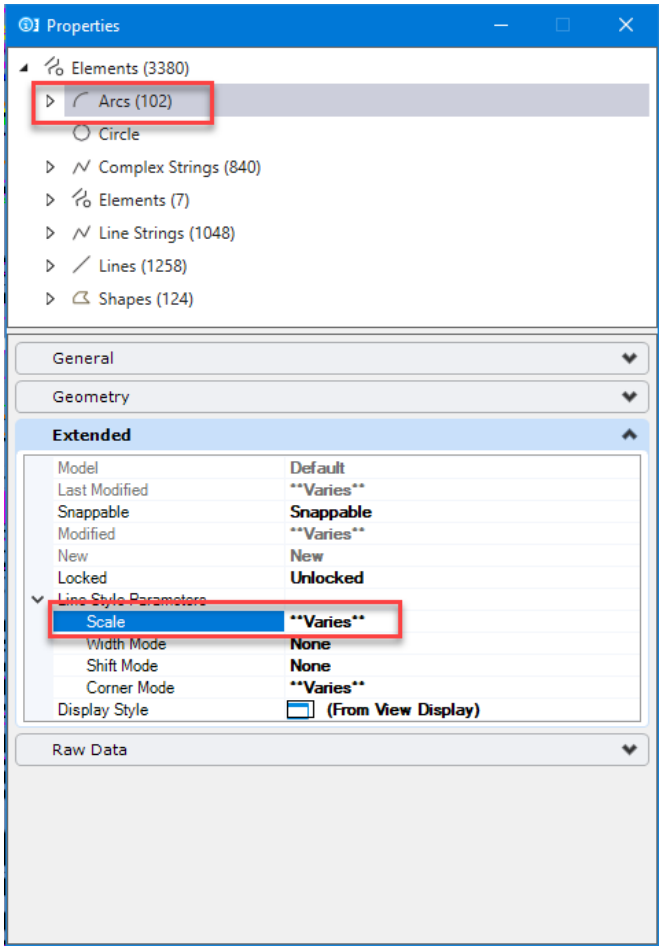


Figure 6 - Changing Line Sale for all Arcs in a File

In Figure 6, you will note that all linear elements have been selected, but it is necessary to make the actual edit one type at a time. Thus, as shown, Arcs are selected at the top of Element Information which allows me to change the scale of all the arcs. Then I would move down to Circles, Complex Strings and so on. This will clean up the vast majority of the lines. This can be accomplished in just 5-10 minutes.

Then, some files have various dimensions placed in them. These dimension lines are actually created using cells. For example, in the final survey file, these cells are used extensively to label the existing right of way width. Each of these cells contains two lines each of which may exhibit the line scaling issue.

At present the only known way to correct these is one cell at a time as follows:
Select all cells using Selector. Then using element information expand each occurrence of the cells and change the scale to 0.08333. In Figure 7, there are 41 occurrences of the right of way width label. For each occurrence expand the cell and change the two lines scale factor.

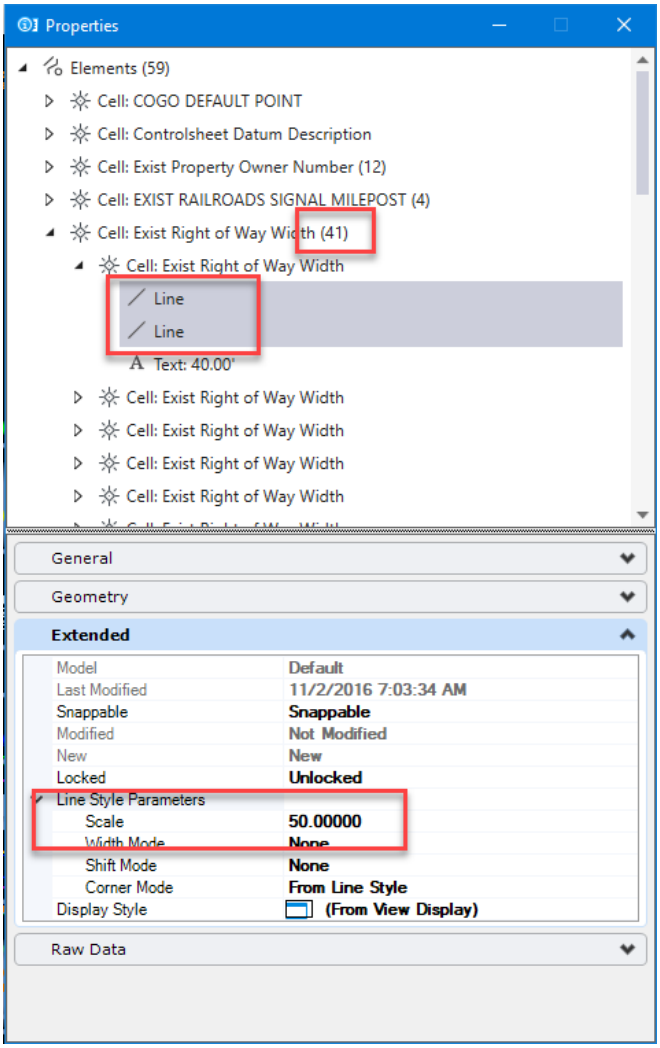


Figure 7 - Cells Used for Dimensions

Changing these 41 dimensions required another 10-15 minutes, which would of course take longer for larger projects. All told, the time required for this more permanent fix to older files is estimated at an hour or so per file. Besides the 20-30 minutes described in above tasks, there will be several more minutes required to simply determine what problems exist. The advantage to these more permanent fixes is that the older file will now behave identically to brand new files created in OpenRoads Designer. This could be important for projects which are expected to extend for more than a few months. Making this change then adjusts the older file to behave in same manner as newer files created in OpenRoads Designer.

Section 2 Correct text labels

Text elements may also be affected by scaling issues similar to what is described in Section 1 . Since text styles and annotative text were not commonly used in V8i Select Series 2, the occurrence of scaling problems in these older files is expected to be uncommon. Any text with scaling issues will also show up as very large text and in the properties for the text elements the property named “Is Annotation” will be set to true as shown in Figure 8

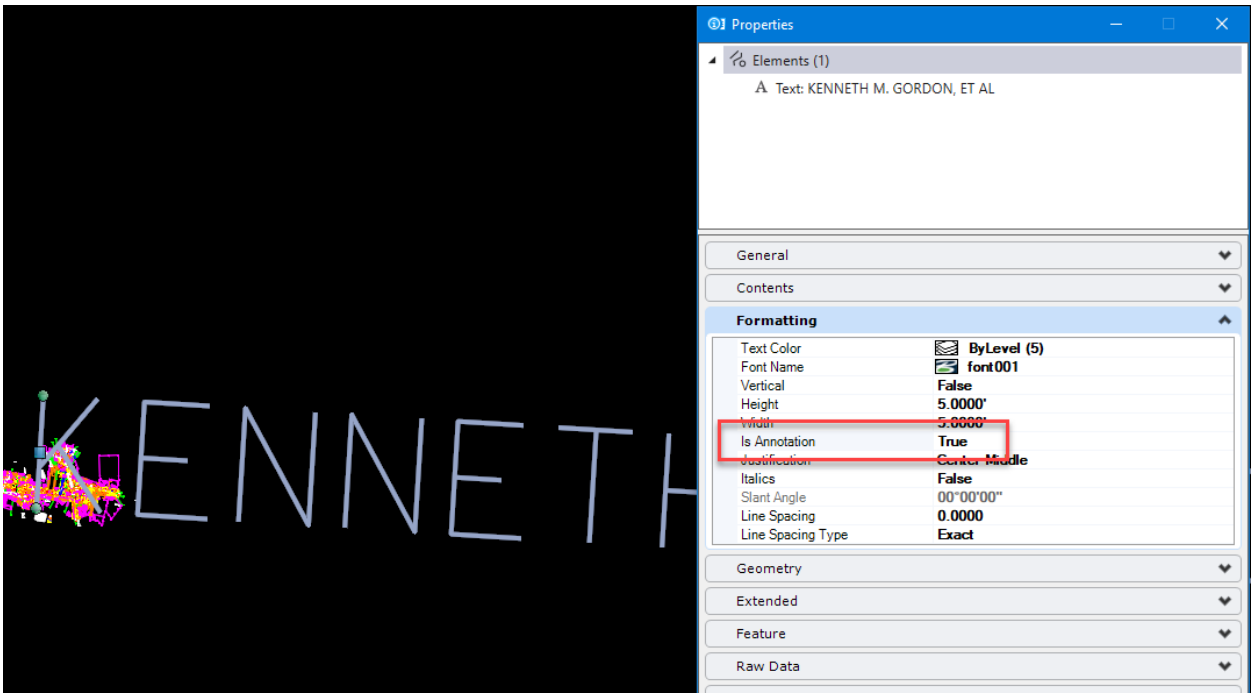


Figure 8 - Example of Annotative Text

To correct these text elements, simply change the sizes downward by a factor of 600. Using the Selector tool for bulk editing in similar fashion as shown in Section 1 can make this much more efficient.

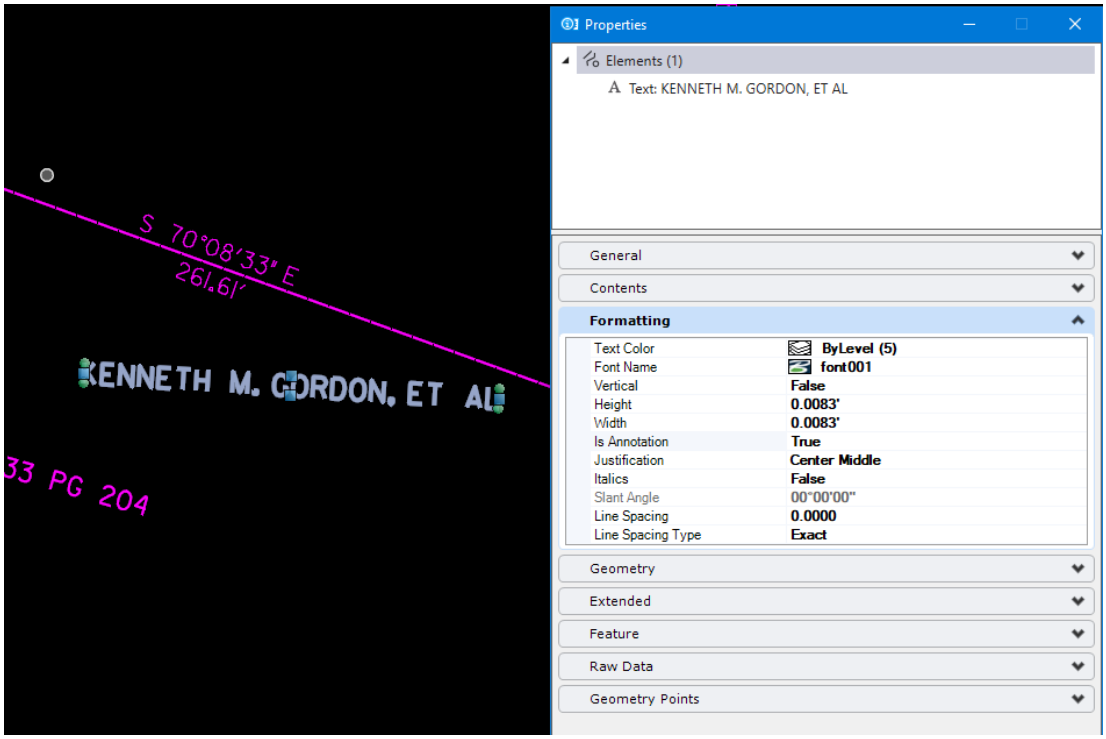


Figure 9 - editing text size for scale change

The time required to change text scale will be nil in many instances but could be an hour per dgn if annotative text was used heavily in the older file.

Section 3 Import TIN Files to OpenRoads Designer

At minimum, the TIN files used for existing ground must be imported to OpenRoads Designer. If there are other surfaces which serve as targets for corridors (rock surfaces for example) these must also be imported to OpenRoads Designer. Also, surfaces which are used by target alias in the V8i Select Series 2 corridors may need to be imported to OpenRoads Designer. If target aliases exist in which one corridor targets a TIN which is the result of some other corridor, rather than importing the corridor TIN, it is better practice to rebuild the target alias in OpenRoads Designer after the adjacent corridor is also imported. The importing of TIN files is very simple. It requires only selecting the TIN file and choose an OpenRoads Designer feature definition which is assigned to the imported surface.

In the following exercise, the primary existing ground TIN will be imported to an OpenRoads Designer 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 Designer terrain model per DGN file.

1. Create and open a new DGN file to contain the terrain model, using the 3D seed file.

2. Set the workflow to OpenRoads Modeling and click on the Terrain tab.

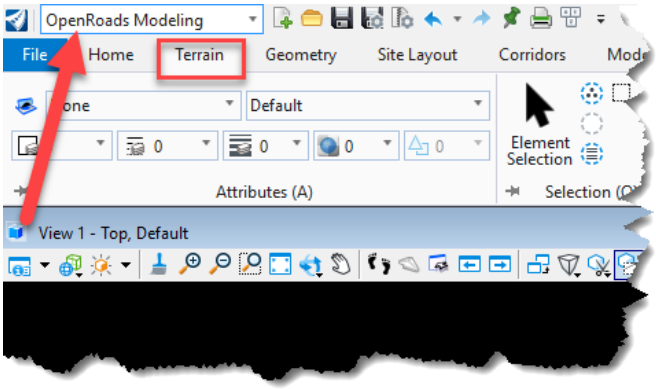


Figure 10 - Terrain Model Tools

3. In the Create Group of commands, click on From File.

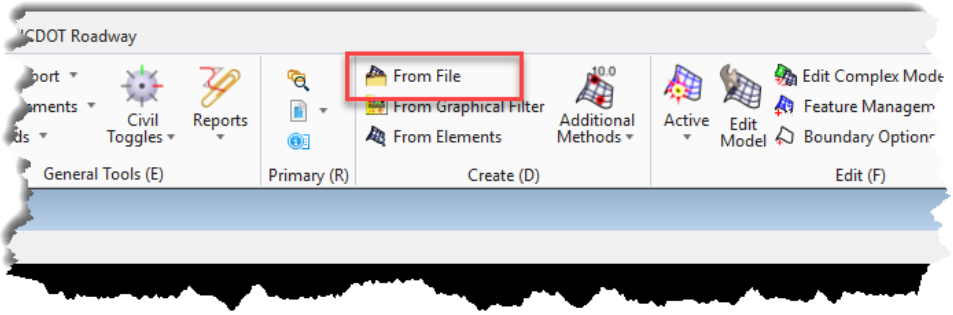


Figure 11 - Terrain Model From File

4. Choose the TIN file.

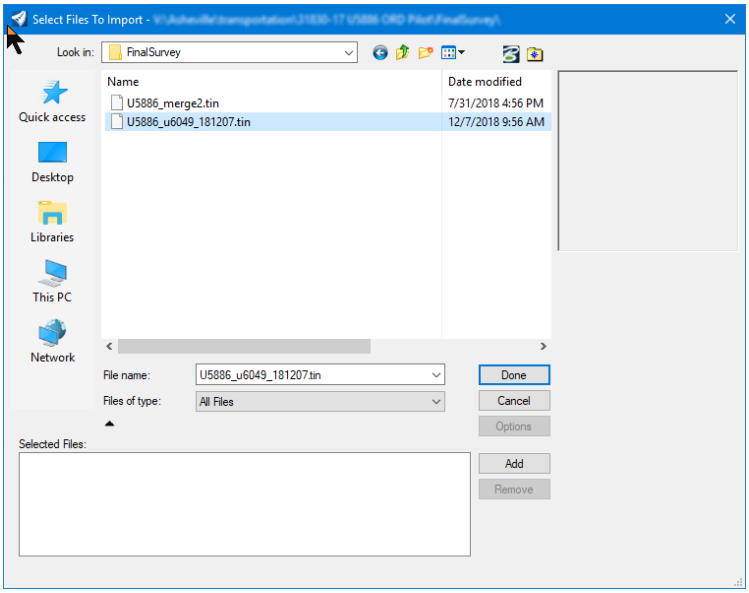


Figure 12 - Selecting TIN file

5. In the import dialog, set the feature definition to /Terrain/Exist/ET_Boundary.

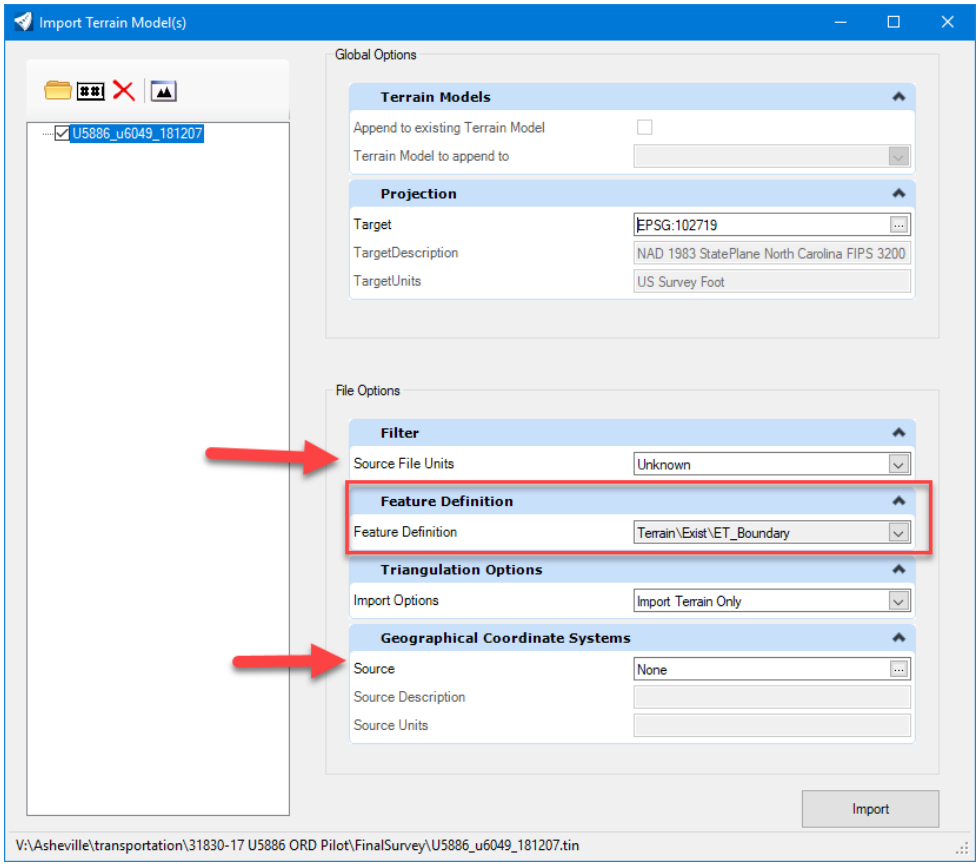


Figure 13 - Import Terrain Settings

6. Set the import option to import terrain only. This imports only the terrain model and not the Features. Normally, it is not required to import the features. Triangles and break lines are automatically created as components of the terrain model element.

7. If the TIN is in different units or coordinate system, then set the appropriate units and GCS in the dialog. This allows OpenRoads Designer to automatically transform the terrain model as it is being imported.

8. Click the Import button.

9. Once processing is complete, close the Import Terrain Model(s) dialog box.

10. **Fit View** to see the imported terrain model.

Figure 14 - Imported Terrain

Best Practices – Import TIN

- Use 3D seed files when starting a new DGN that will contain 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 import the TIN file. This allows transforming the TIN on the fly during the import process, if needed.
- When importing the TIN file, use a feature definition which displays the boundary only to start. Thus, there will be minimal delay in draw time. TIN 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 TIN 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 6 above). Ordinary features, such as triangles and break lines are automatically created as components of the terrain model element.

Potential Errors and Problems – Import TIN

- 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 TIN is very large.

Section 4 Import Alignments

Alignments can be imported from one of two sources:

- The GEOPAK COGO file (gpk).
- The ALG file used by the corridor modeler file. Using this file has two advantages:
  - The proposed profile for each alignment is explicitly linked to the horizontal alignment making import a little quicker.
  - Any plan view graphics (if needed for point controls) can be imported from the same file.

In this section, we are focused on the import of the horizontal and vertical alignments which are roadway centerlines and baselines. The alignments being imported here will serve two purposes; the permanent alignment used for plans production and the alignments used for corridor modeling.

1. Create and open a DGN file for containing the alignments. Use a 2D seed file. In this document all alignments will be imported to a single DGN file. Having each alignment in a separate DGN may be preferred for some projects.
2. Set workflow to OpenRoads Designer Modeling and click on Geometry tab.

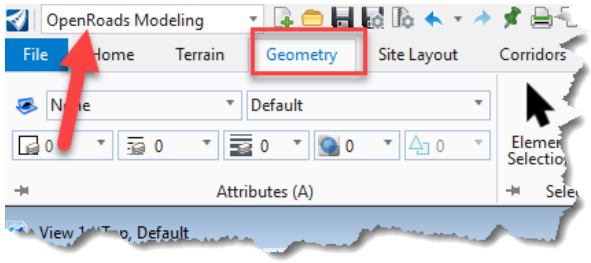


Figure 15 - Geometry Commands

3. In General Tools group click on Import

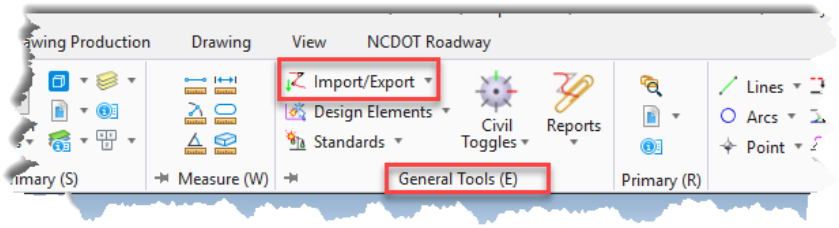


Figure 16 - Import Geometry

4. Choose the GPK or ALG file.

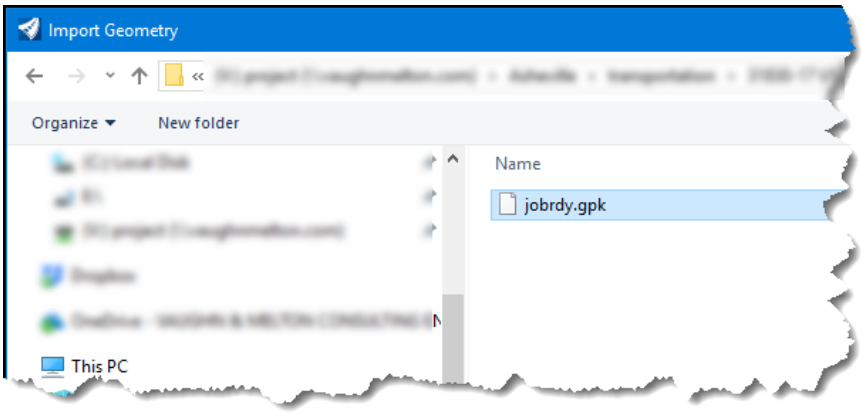
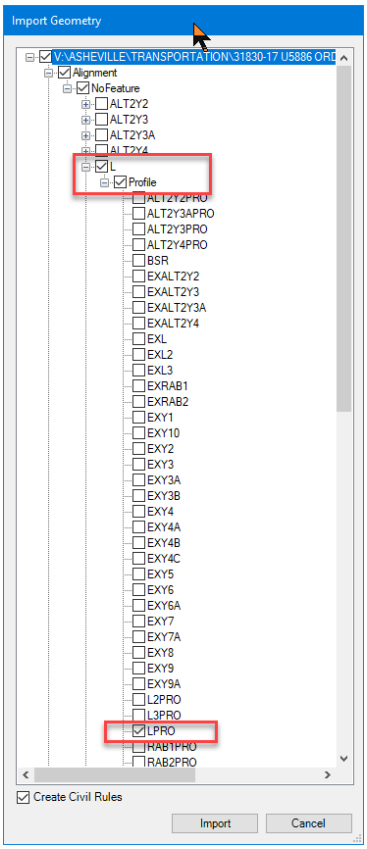


Figure 17 - Selecting GPK file

5. After selecting the GPK or ALG file, the Import Geometry dialog box opens. Expand Alignments then expand No Feature. If you are importing from GPK, then you must expand each alignment and select the profile which matches to the alignments. If you use the ALG file, the profiles are explicitly linked, and this is not necessary.

Figure 18 Select Alignments to Import



6. Select each alignment and matching profile that is desired to import.

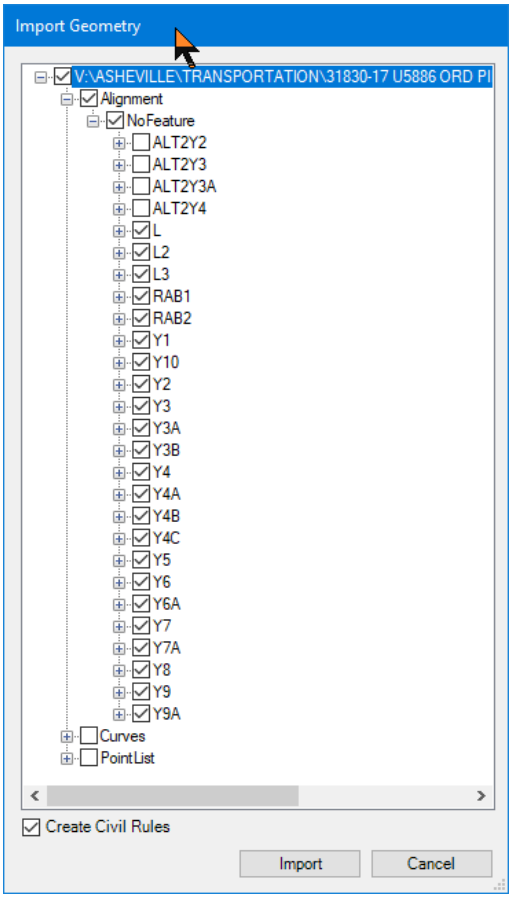


Figure 19 - All Desired Alignments Selected

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

9. 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.

Figure 20 Imported Alignments have No Feature Definitions

10. At this point, you may 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.

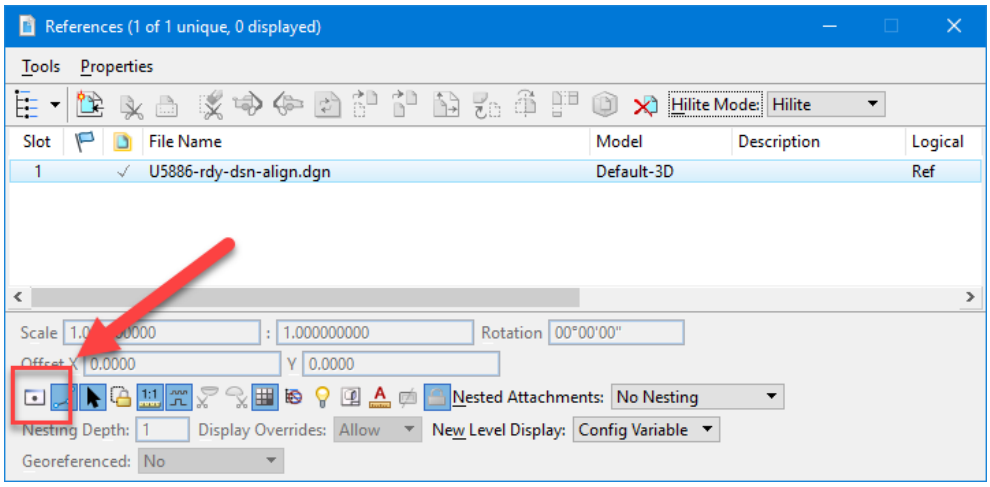


Figure 21 - Turn Off Display of 3D Reference

11. Select one of the alignments and open Element Information.

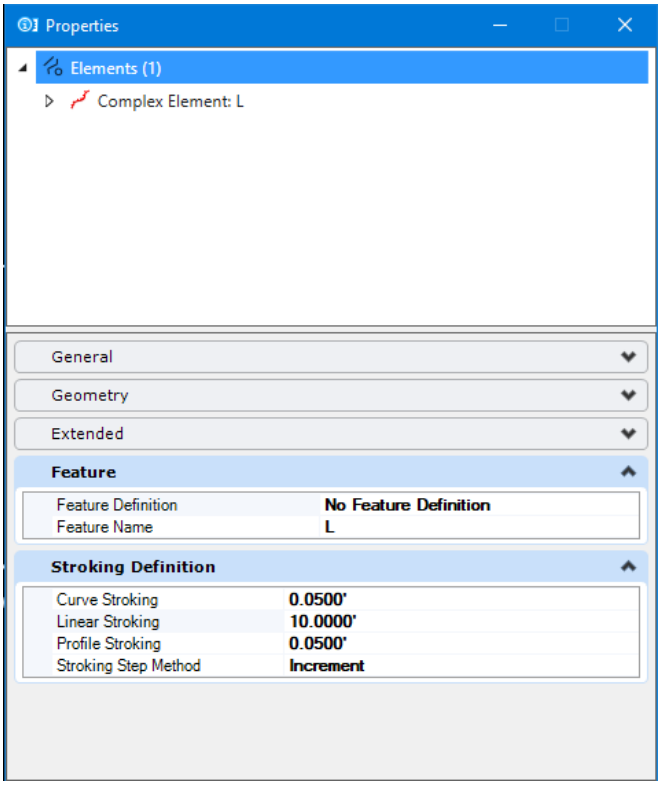


Figure 22 - Alignment Feature Definition

Note that the alignment name matches the name in the GPK/ALG file but the Feature Definition reads “No Feature Definition”. The feature definitions configured for OpenRoads Designer do not match the older DDB or XIN styles used, and this no feature definition is assigned on import.

12. This is easily solved if you select all the alignments, then use element information to change the feature definition for all of them at once.

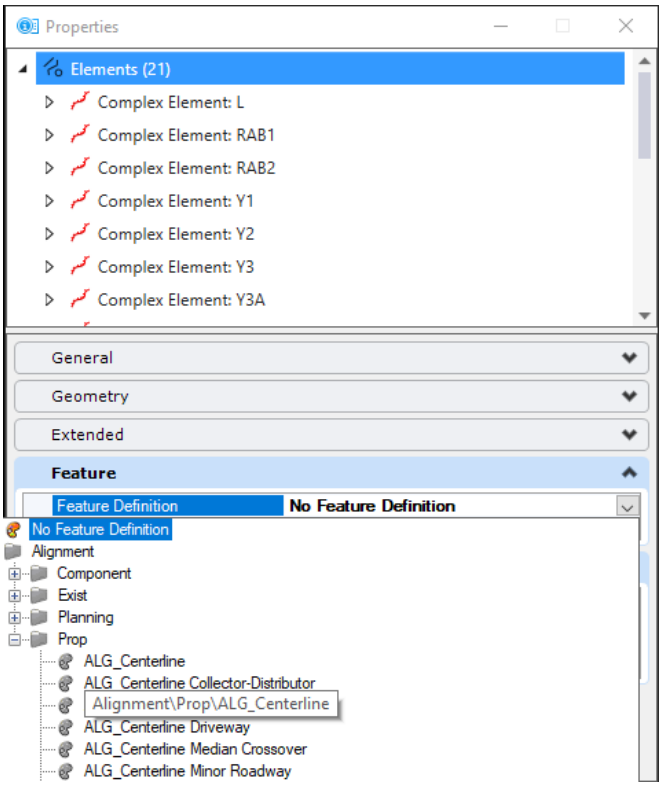


Figure 23 - Changing Alignment Feature Definitions

13. The centerlines will now appear in familiar symbology, although another change for OpenRoads Designer is that the curves in the alignments are now a different color than the tangents.

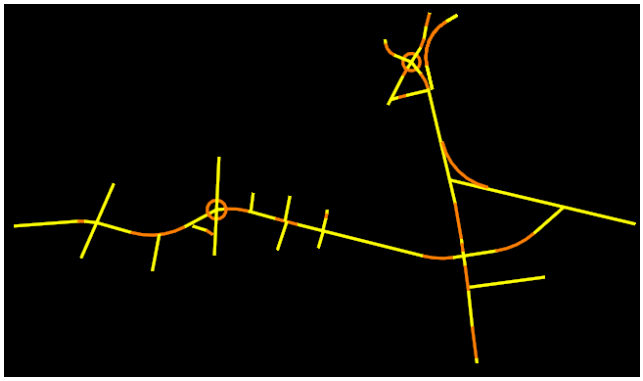


Figure 24 - Alignments with Correct Symbology

14. Select one of the centerlines and hover the cursor on the alignment until the context toolbox opens and click on the **Horizontal Geometry Report** icon.

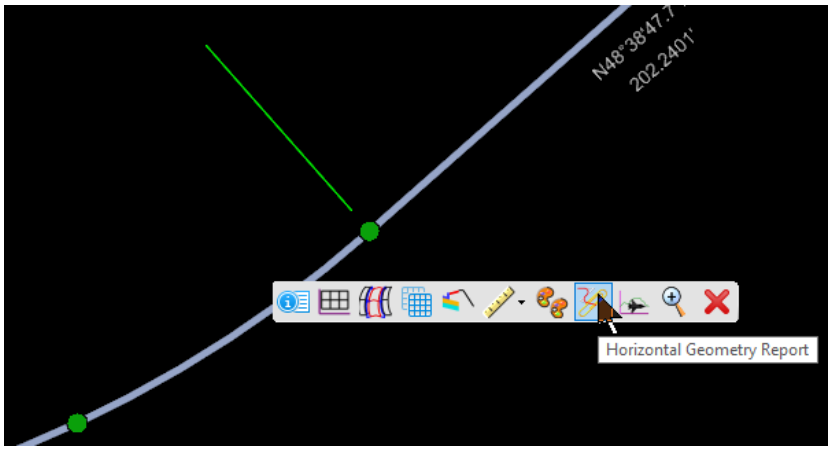


Figure 25 - Alignment Context Toolbox

The report can be used to verify the import was successful.

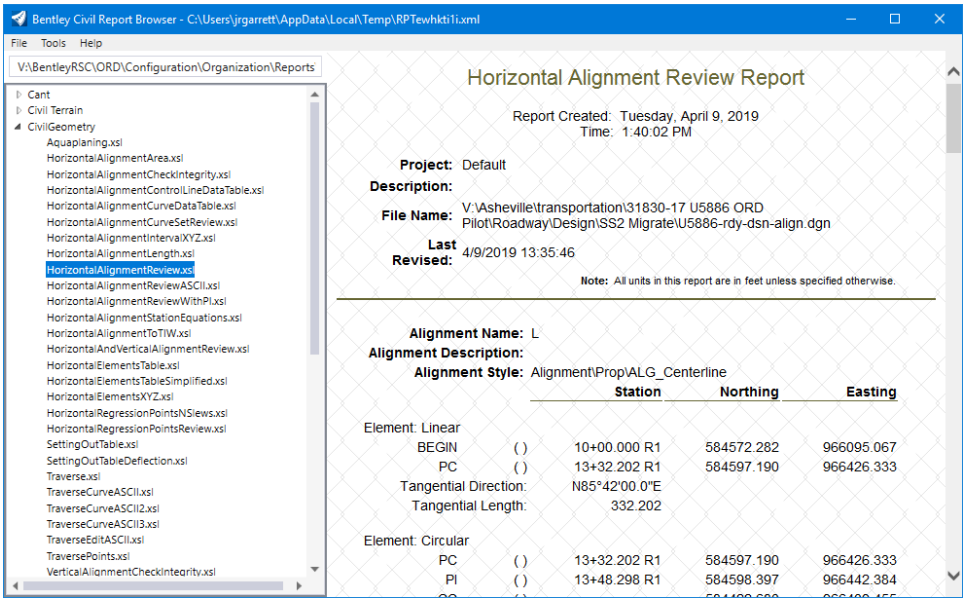


Figure 26 - Alignment Report

15. **Close** the alignment report.

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

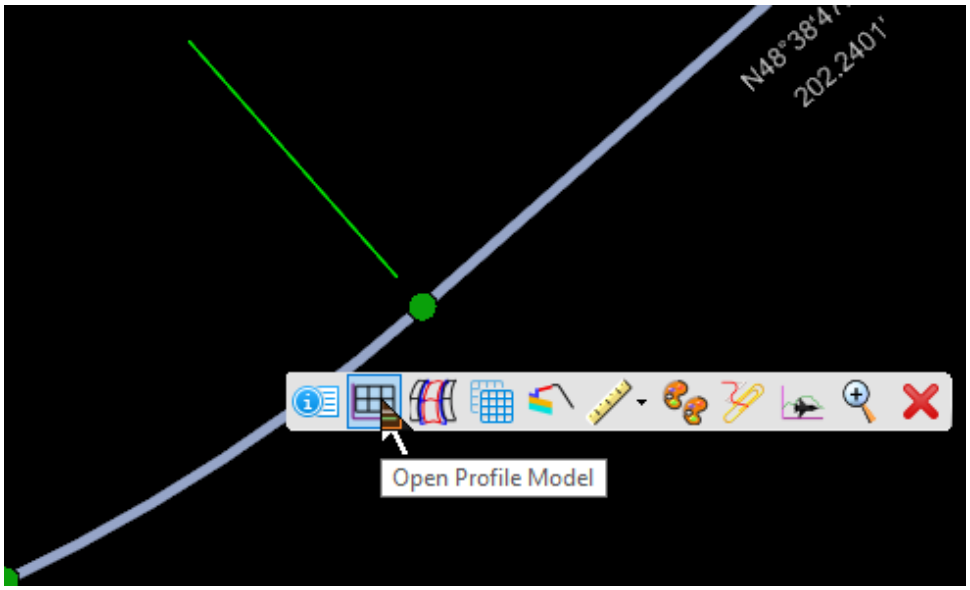


Figure 27 - Opening Profile View

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

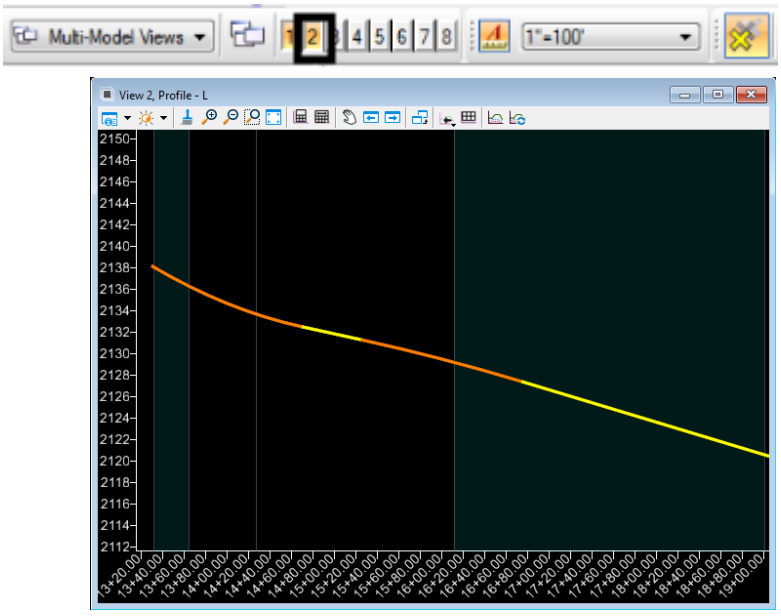


Figure 28 - Profile View

18. In the Profile View (View 2), Select the vertical alignment element and Open Element Information**,** where you can change the feature definition for the profile in similar fashion as you did for the horizontal alignments above.
19. Select the vertical alignment and using the context menu, Open the Profile Report.

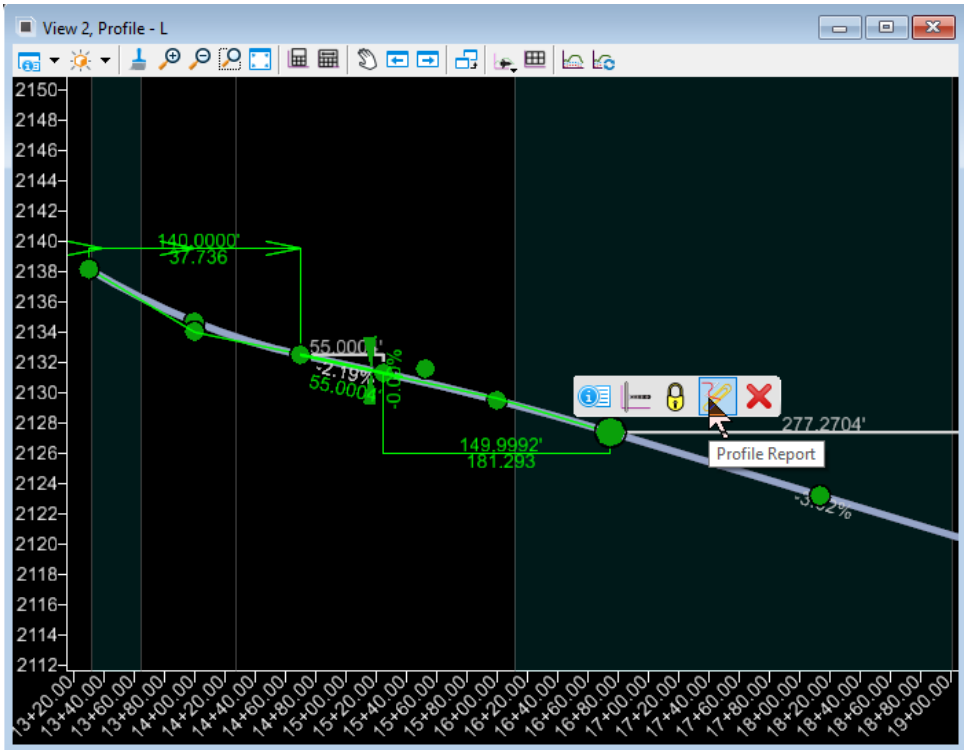


Figure 29 - Profile Context Toolbox

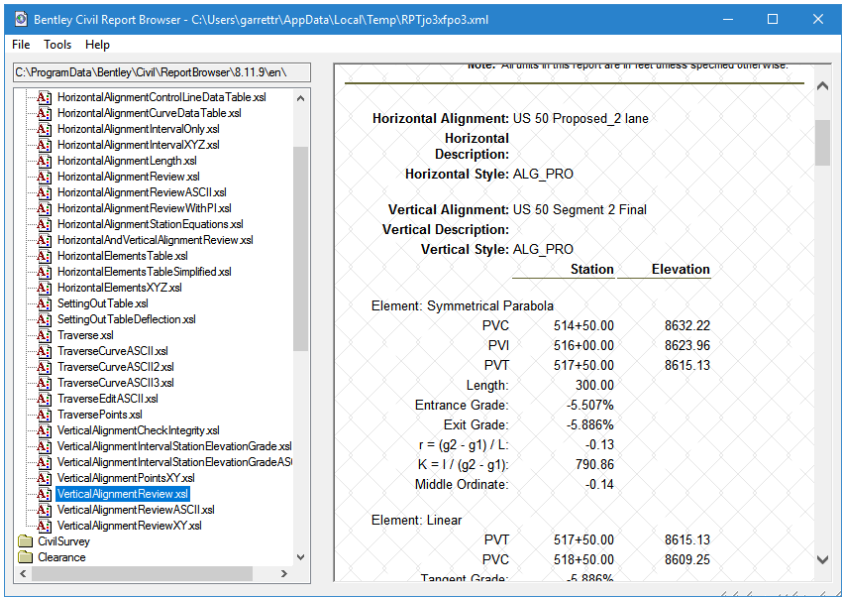


Figure 30 - Profile Report

At this point, we should have all the geometry we need to start migrating the Select Series 2 IRD corridor to an OpenRoads corridor.

Best Practices – Import GPK/ALG

- It is a good idea to generate an alignment and profile report after import to ensure a successful import occurred.
- The alignment for roundabout circles is probably best to recreate sing OpenRoads Designer tools. These circular alignments in GEOPAK were arcs of 360 degrees deflection not true circles. This can lead to problems later when you trying to project slopes from the circle. Using the OpenRoads Designer geometry command for circle produces a true circular element.

Potential Errors and Problems – Import ALG

- Imported geometry will almost never have a proper feature definition assigned after import and will have to be edited.
- 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 in this section to import additional alignments.

Section 5 Check Corridor Dependencies

Before a corridor can be imported from V8i Select Series 2 to OpenRoads Designer, any required dependencies, such as alignments, must be imported and already exist in the DGN file(s).

In this section of the workflow, we will first set up the DGN file for the first corridor to be imported and then check the dependencies required for the corridor.

1. Create and open a new DGN file which will contain the L Corridor, using 2D seed file.
2. The following steps are always needed when making a new corridor DGN so we might as well do them now:
    a. Attach the existing ground and centerline DGN files as reference.
    b. Select the existing ground terrain and set it active using the Context Toolbox.

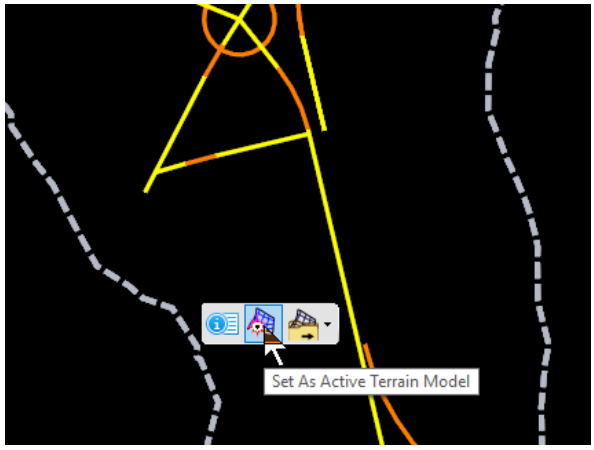


Figure 31 - Setting Active Terrain Model

3. There is no direct method of opening the dependency report, so we will resort to a trick. First select one of the alignments and open the alignment report. We don't really care about the alignment report, this is just a way to get the report browser open.
4. Now on the left side of the report browser, find the **Corridor Dependency Report** and click on it to make it active.

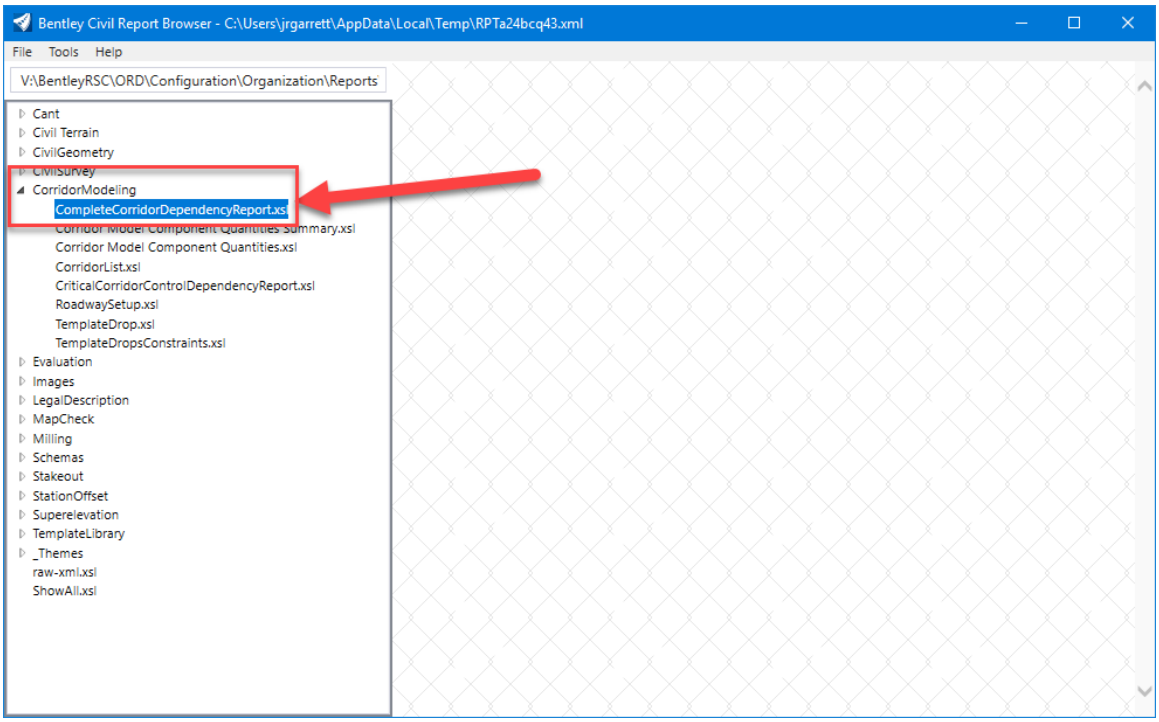


Figure 32 - Corridor Dependency Report

5. Now, in the report browser click on File > Open. Find and open the IRD file containing the V8i Select Series 2 corridor models.

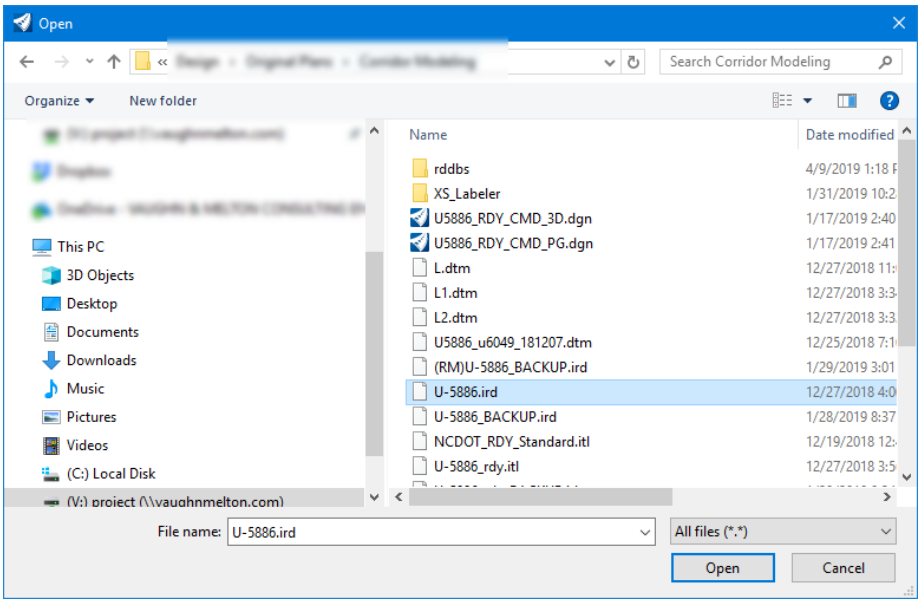


Figure 33 - Selecting IRD File

6. This **corridor dependency report** will be a handy guide for monitoring the import IRD process later on and for ensuring that various dependencies exist for use by the IRD.

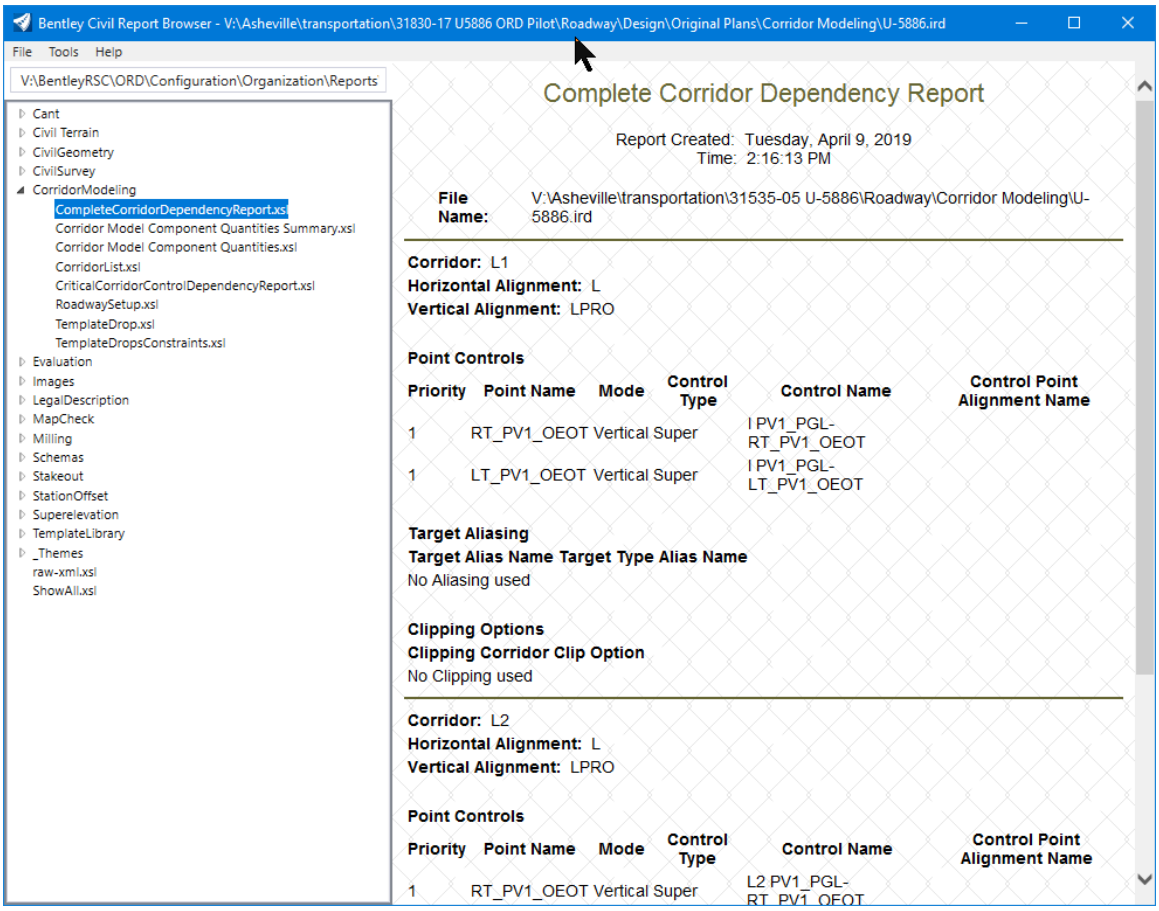


Figure 34 - Complete Corridor Dependency Report

7. The report will list every corridor in the IRD file and the associated dependencies. The corridors are sorted alphabetically.
8. From this report we will want to be mindful of the following which will have been used in V8i Select Series 2 for defining the corridors:
    a. Horizontal alignment names
    b. Vertical alignment names
    c. Any named alignments used for point controls, except for superelevation. Superelevation is handled automatically as we will see later.
    d. Any surfaces needed for target alias

Best Practices – Corridor Dependencies

- When creating new DGN files for use in OpenRoads Designer, always (with exceptions in next note) start with a 2D seed file. OpenRoads Designer will create a companion 3D model as needed. While it is possible to use 3D DGN files for everything, doing so places the 3D models (at proper elevation) together with 2D geometry elements (at elevation zero) which makes it very difficult to manage view rotation. It works much better when the 2D elements and 3D elements are in separate models.
- The exception to previous is terrain model files and survey files, which work best when a 3D seed file is used.
- It may be 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 Select Series 2 and OpenRoads Designer function. In Select Series 2, the proposed surfaces for adjacent corridors would generate a TIN and the TIN could be used as a target alias. In OpenRoads Designer, 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 may occur that the named surface files from the dependency report will not exist in the Select Series 2 data. This can occur because someone renames the TIN file after the corridors are finished.
- Target Aliases will often need to be rebuilt in OpenRoads Designer.

Section 6 Corridor Remapper tool (IRD Remapper)

There are some fundamental changes in the workspace used in OpenRoads Designer as compared to V8i Select Series 2. As implementation of OpenRoads Designer was anticipated, it was determined to take the opportunity to streamline some things and eliminate some of the unnecessary accumulated baggage. Thus, many changes have occurred in such things as the names of feature definitions which do not always match the old XIN styles used in V8i Select Series 2. Additionally, there are some technology changes that suggest better settings for corridors as those corridors move into OpenRoads Designer. One example of this is the template drop interval which was routinely set at 10 ft in V8i Select Series 2 is now preferred at 5 feet in OpenRoads Designer.
To help streamline the conversion of these various changes, a spreadsheet has been developed to update the IRD files prior to import.

1. Locate and launch the IRD Remapper.xlsm file

2. Depending on your security settings, you may have to click on Enable Content to allow the macros to run.

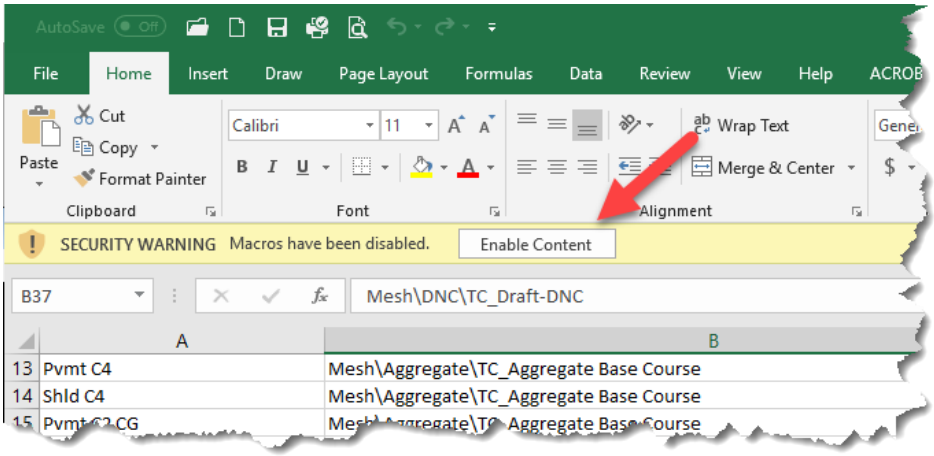


Figure 35 - Security Settings on Spreadsheet

3. On the Add-ins tab, click on Open IRD Remapper

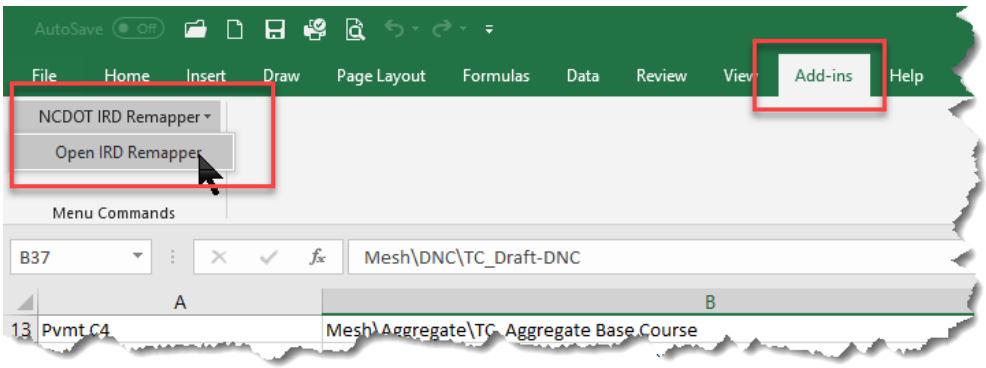


Figure 36 - Starting the Macro

4. A dialog will open, click on Open IRD which will allow picking of your IRD file.

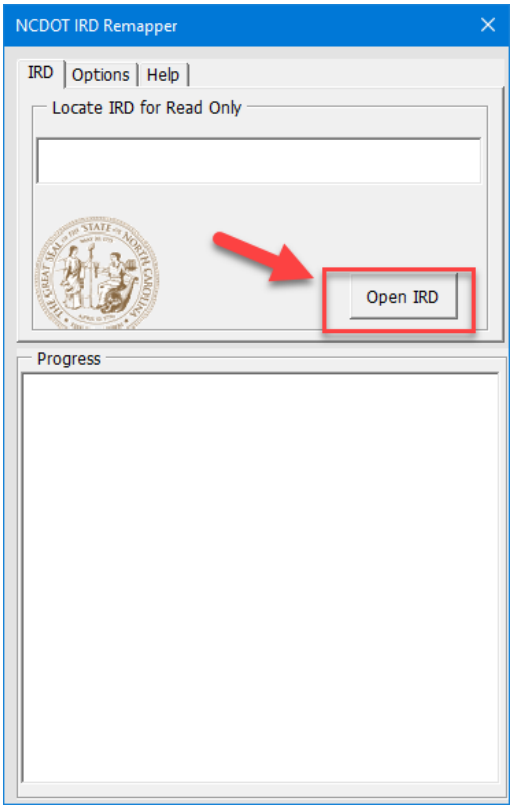


Figure 37 - The Remapper Dialog

5. After the IRD is open, click on the Options tab. These options may be removed or consolidated as the remapper matures.

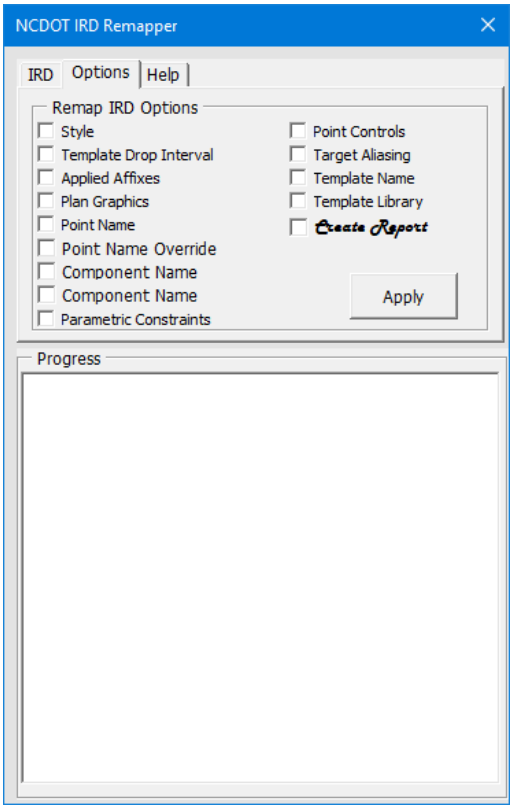


Figure 38 - Remapper Options

6. Select the appropriate options and click Apply.
7. A new IRD with a prefix of "(RM)" is created. It is this new IRD which we will use for importing corridors.

Section 7 Import L Corridors

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 V8i Select Series 2 project may contain many corridors. 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 described in this section multiple times.

In the following steps, we will use the DGN file created for corridor L. For each additional corridor we import, we must first create a new DGN file and then repeat the steps in this section.
Prerequisites:

- All geometry used by the imported corridors as centerlines must exist in OpenRoads Designer geometry, hence the requirements of the previous sections.
- Geometry used for point controls and other corridor adjustments must also exist in OpenRoads Designer. Thus, importing more alignments than just the centerlines and vertical alignments may be required.
- Surfaces used for target aliases must exist in OpenRoads Designer. However, if these are proposed surfaces generated by another corridor, it is a better idea for the continued development of the project to ignore these target aliases to other corridors and rebuild them later using the OpenRoads tools.

1. Continue in the corridor file.
2. Ensure that the OpenRoads Designer Model Workflow is selected and click on the Corridors tab.

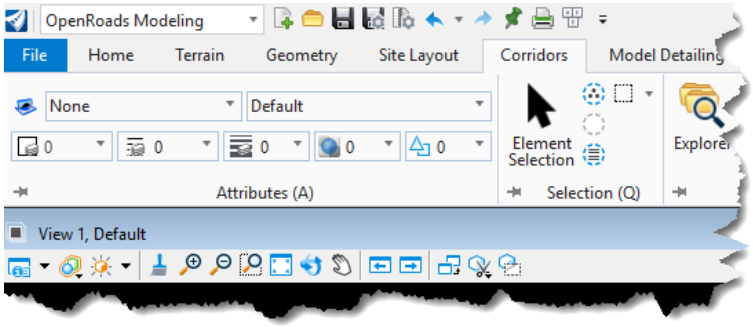
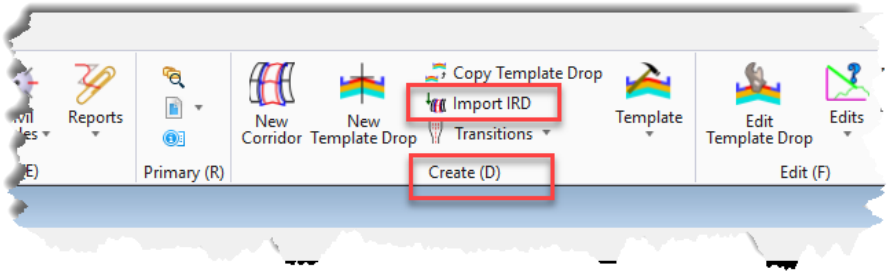


Figure 39 - Corridors Commands

3. In the Create group click on Import IRD.



4.

Figure 40 - Import IRD Command

5. Select the IRD file and Corridor in the dialog which opens.

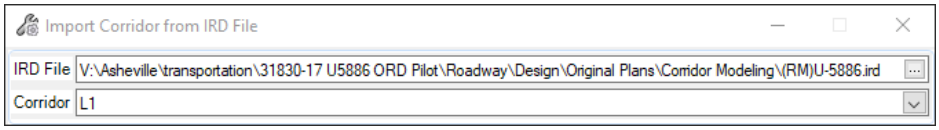


Figure 41 - Import IRD Inputs

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

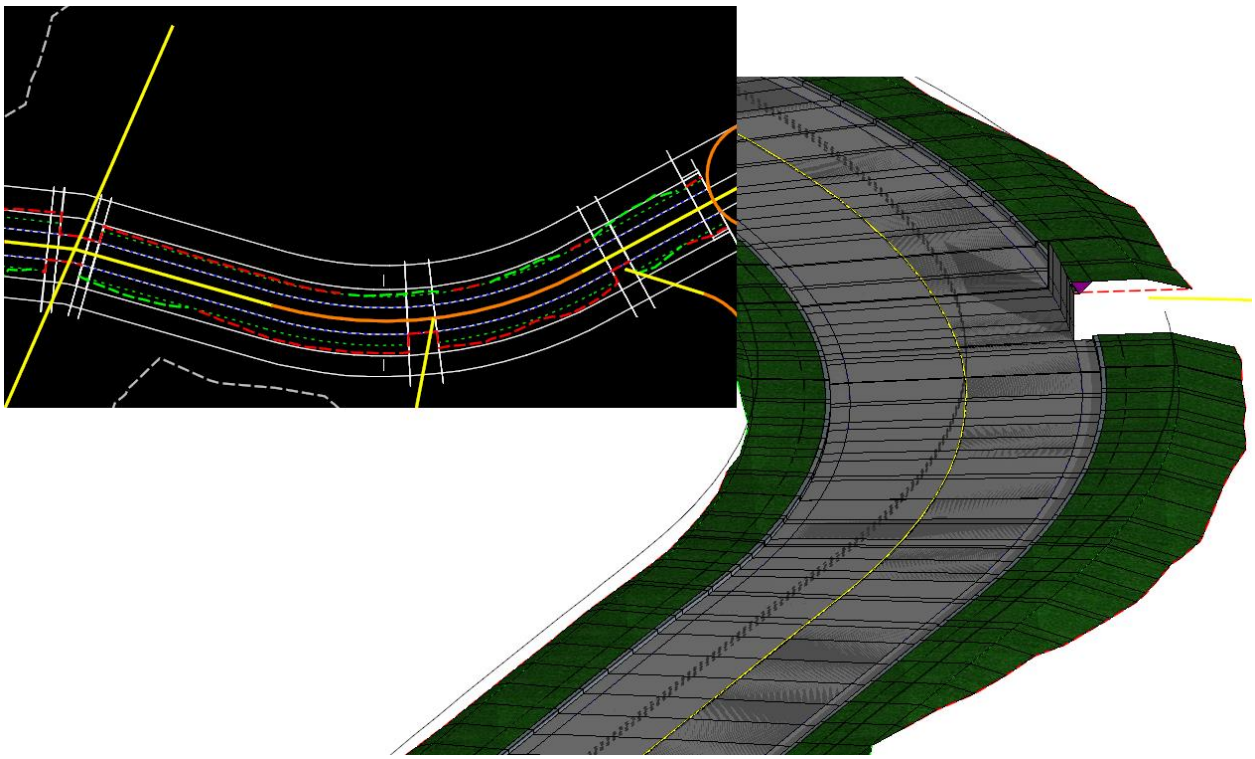


Figure 42 - Imported Corridor L

7. After the import, notice the following:
    a. The OpenRoads Designer corridor object and template drops will display as shapes which parallel the centerline.

b. The superelevation in the Select Series 2 corridor has been imported as OpenRoads Designer superelevation objects. The superelevation section is a very wide shape which parallels the centerline. It is blue in this image for clarity but will match the active color at time of import. The superelevation lanes will display as shapes which resemble lanes and are color coded based on cross-slope.

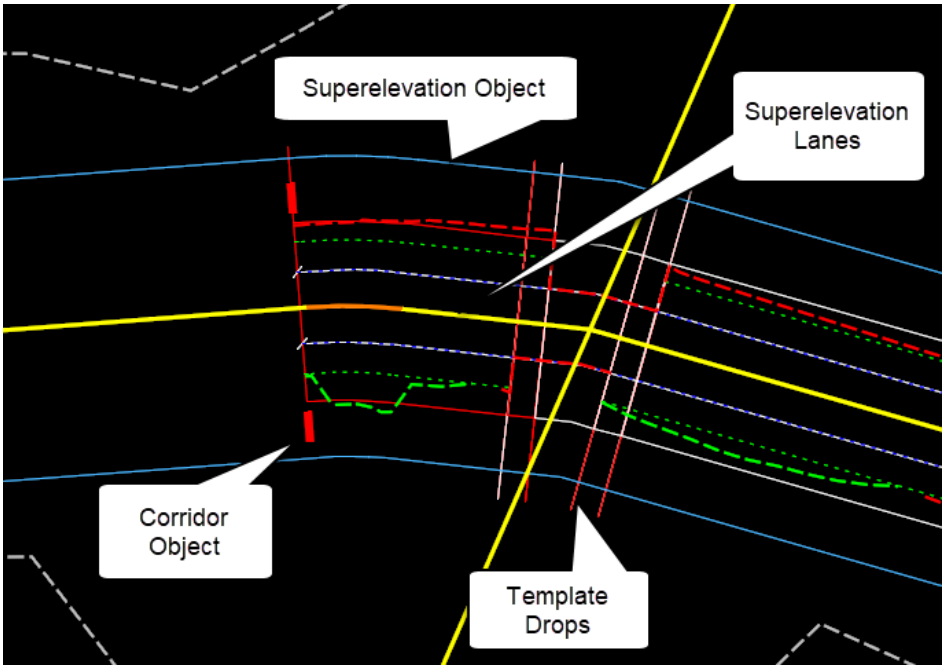


Figure 43 - Corridor Objects

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

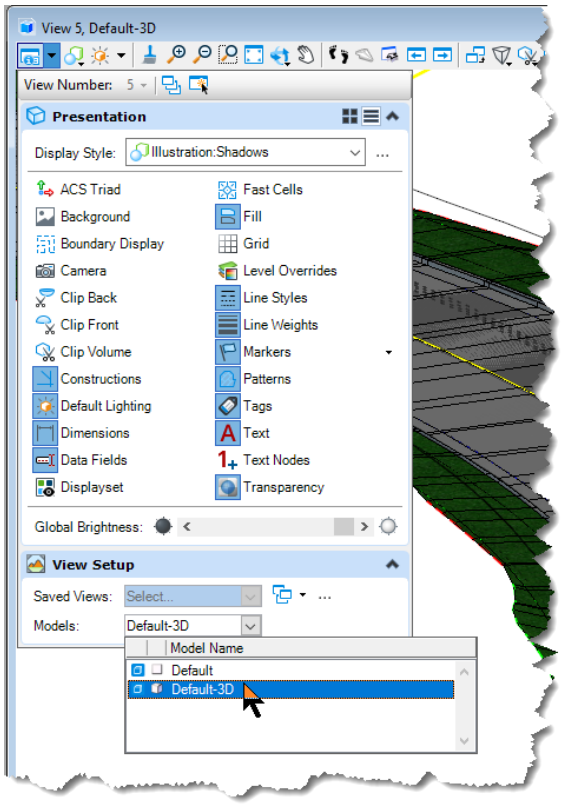


Figure 44 - View Setup in View Attributes

9. 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 with Shadows as the rendering mode.

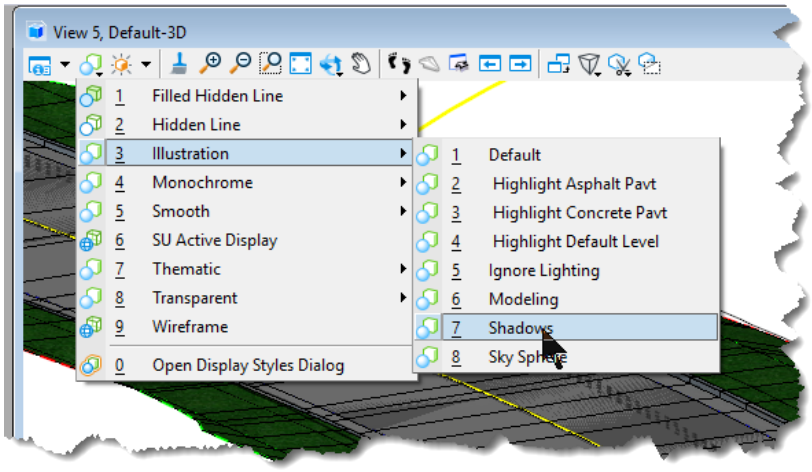


Figure 45 - Setting Rendering Mode

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

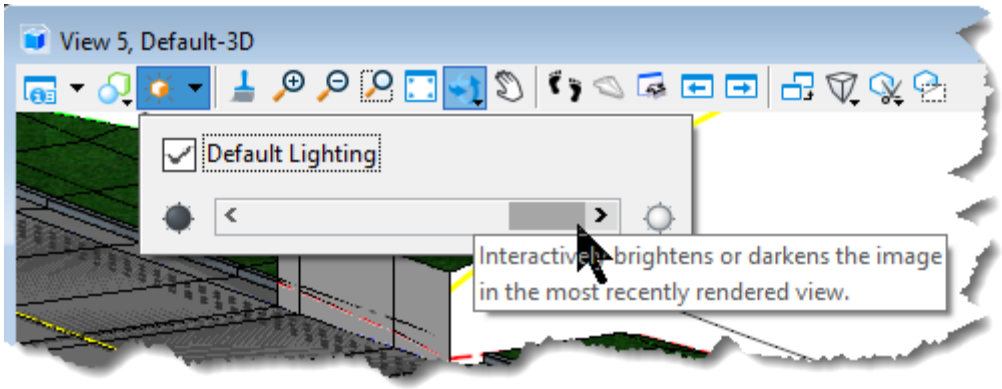


Figure 46 - Setting Lighting

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

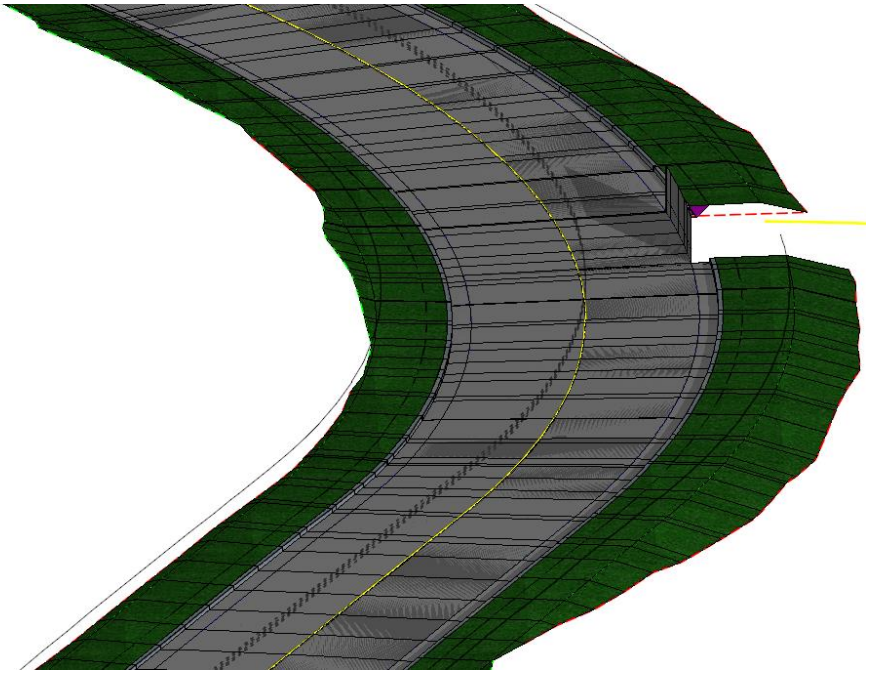


Figure 47 - Visual Review of 3D Model

12. We can also inspect the model using the OpenRoads Designer cross-section view. Select the corridor object and on context toolbox click on Open Cross-section View.

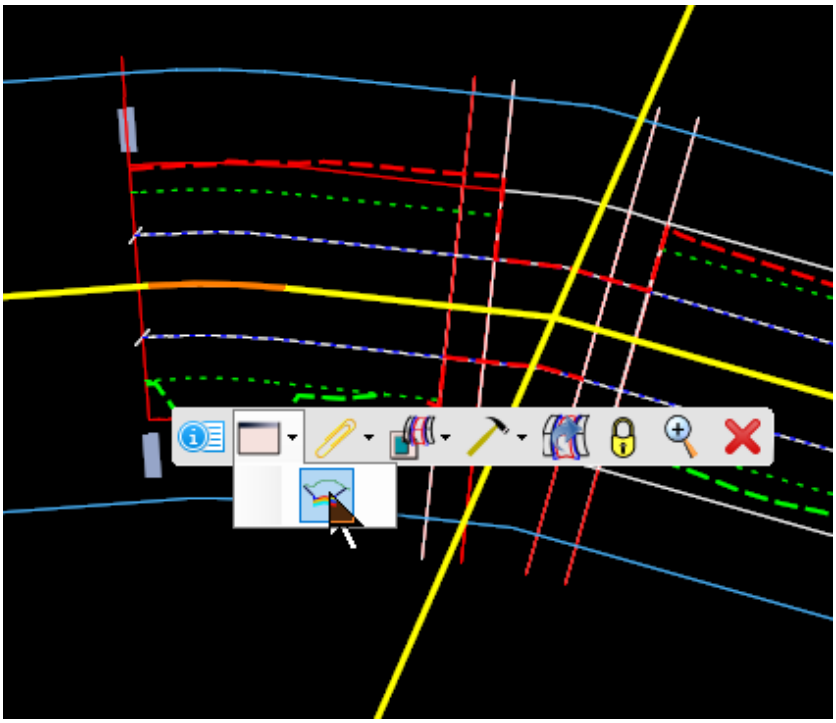


Figure 48 - Open Cross-Section View

13. Click on View 8 in the view toggles to open the view.
14. Then click in the drawing area of View 8 when it opens. Use the arrow at top of window to navigate thru the cross-sections.

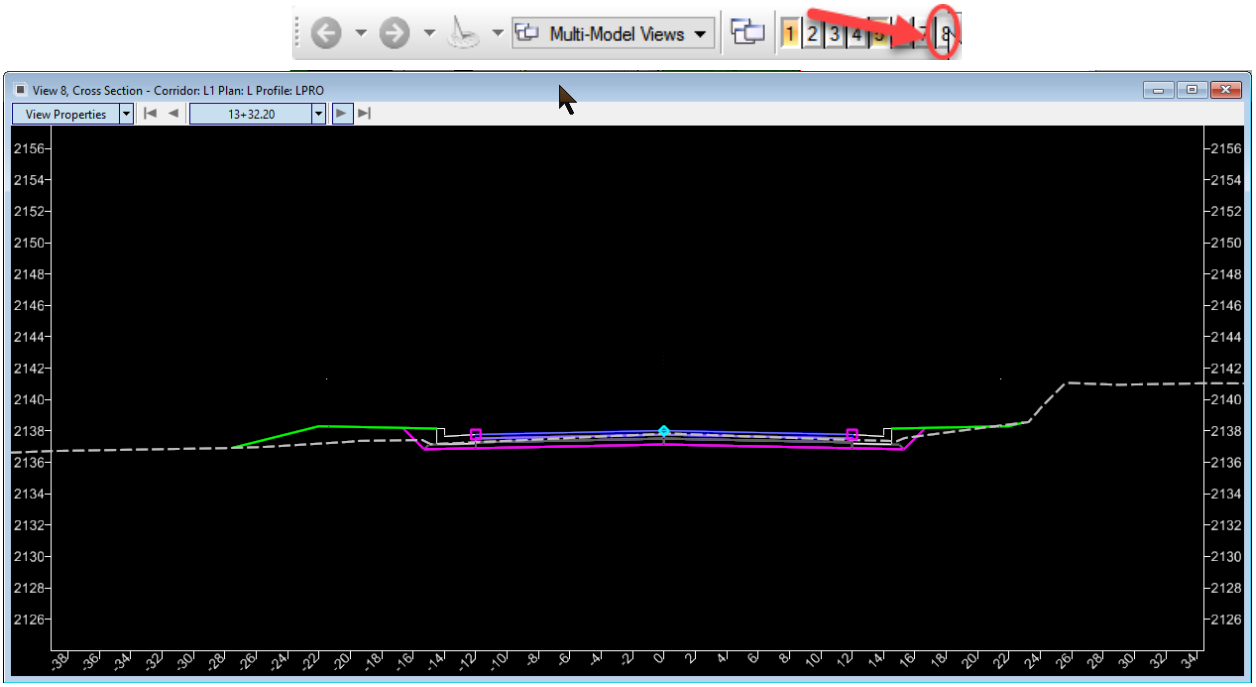


Figure 49 - Cross-Section View

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 Designer if the OpenRoads Designer targets are adjusted after creating the other corridors. While it is possible to import the DTM files which result from the Select Series 2 corridors, these DTM files are a snapshot

of the last state of the Select Series 2 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 Designer.

- Imported corridors should be reviewed in detail to ensure that the same result exists in OpenRoads Designer as was designed in V8i Select Series 2. 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 Designer as exists in Select Series 2. Attached the Select Series 2 surface as a reference file can help in this review.
    - Check/correct clipping and shear lines where one corridor overlaps another.
- As seen in this section target aliases will merit special consideration during the import of IRD files.
- 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 3:1. OpenRoads Designer has newer capabilities for solving these areas than existed in V8i Select Series 2. The gaps will have existed in V8i Select Series 2 as well. A simple solution is to edit the template drops and assign feature name overrides on the end conditions. A more rigorous solution would be to use the OpenRoads Designer capabilities for end condition transitions.

Section 8 Items for Review in the Imported Corridor

The imported corridor should be thoroughly reviewed to clean up any loose ends. The following sections describe the items for review.

Corridor Feature Definitions:

The corridor objects themselves will not have a feature definition assigned when first imported because there is no analogous concept in V8i Select Series 2. So, the imported corridor needs to have one assigned.

Note:
Figure 50 shows the corridor and superelevation objects in red and green. This color was added for clarity in the image. These objects will be in the active symbology when first imported and then the symbology changes when the feature definition is assigned.

To change the feature definition of the corridor, first select the corridor and open element information, where the feature definition can be changed.

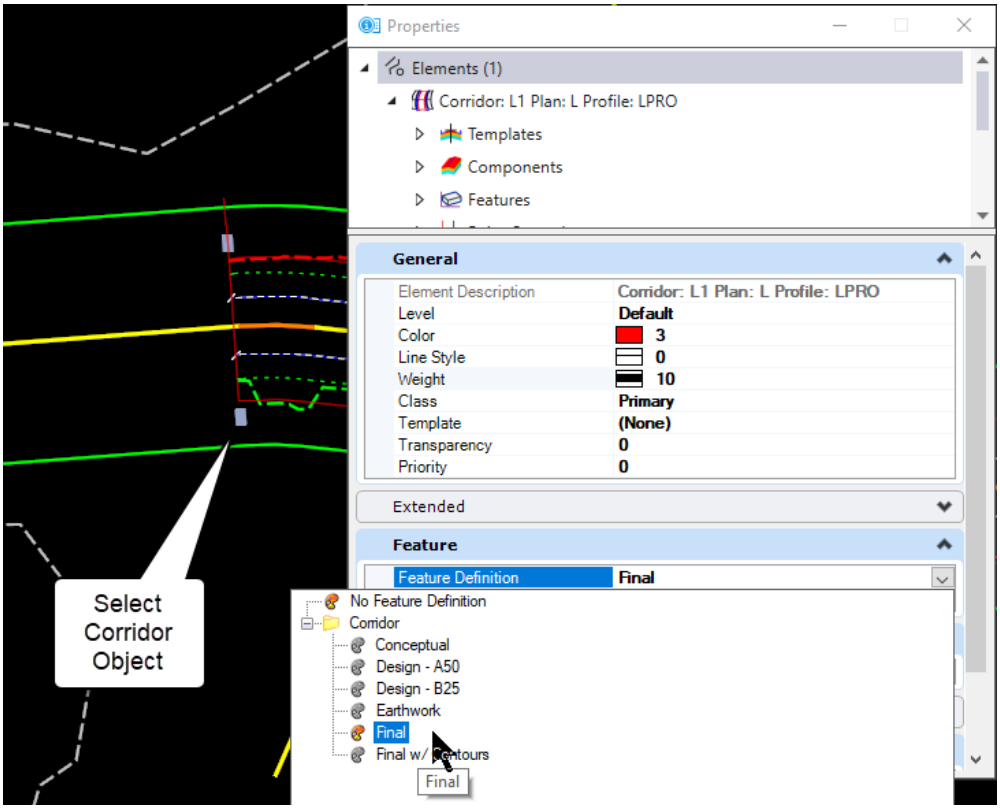


Figure 50 - Changing Corridor Feature Definition

The various corridor feature definitions control the symbology of the corridor object and also the density of the 3D models. Less dense settings will process faster. The least dense settings are "Conceptual" with

increasing density down the list. As children of the corridor, the template drop objects symbology is defined by the corridor. Similarly, select the superelevation section and assign a feature definition

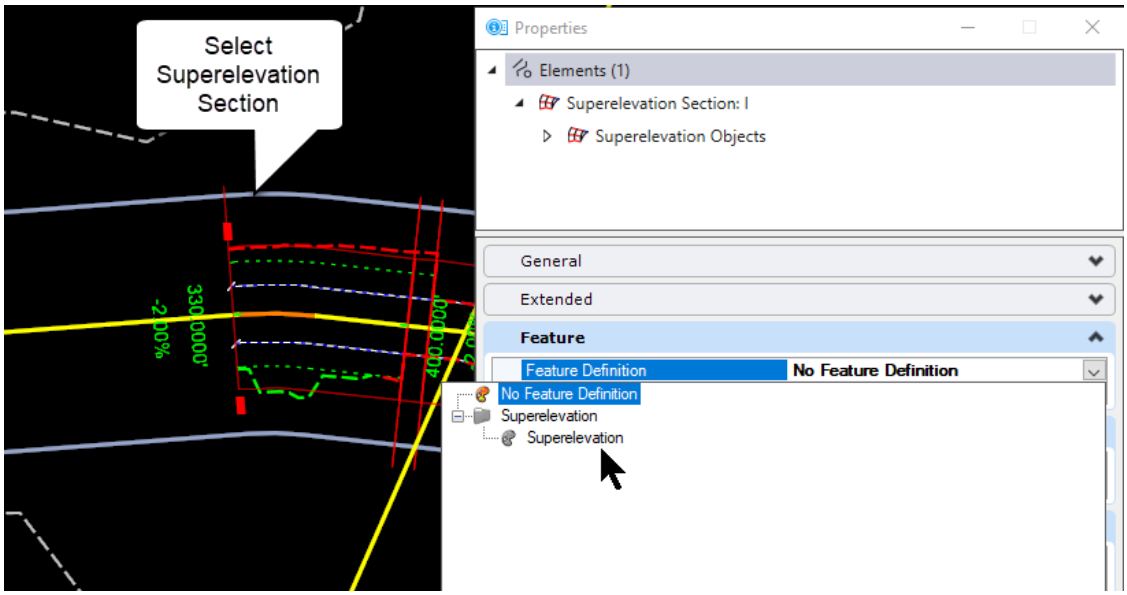


Figure 51 - Changing Superelevation Feature Definition

Superelevation Lanes:

The superelevation in the IRD file is imported as superelevation section objects as described above. The superelevation sections are parents of superelevation lanes. Superelevation lanes are similar in appearance and function to shapes in GEOPAK.
There are two things to check here.

- Proper settings for the lanes.
- Proper symbology for the lanes

In the dataset chosen to write this document the superelevation lanes were imported with a width of zero feet and normal cross-slope of 0%. At present this is not determined whether it is a software error or an error in the original V8i Select Series 2 dataset. In any case, it is worth reviewing and correcting as needed. First, select one of the lanes. This might be challenging when the width is zero because it will be directly on top of the centerline. Review and correct the width and normal cross-slope.
Repeat for all other superelevation lanes.

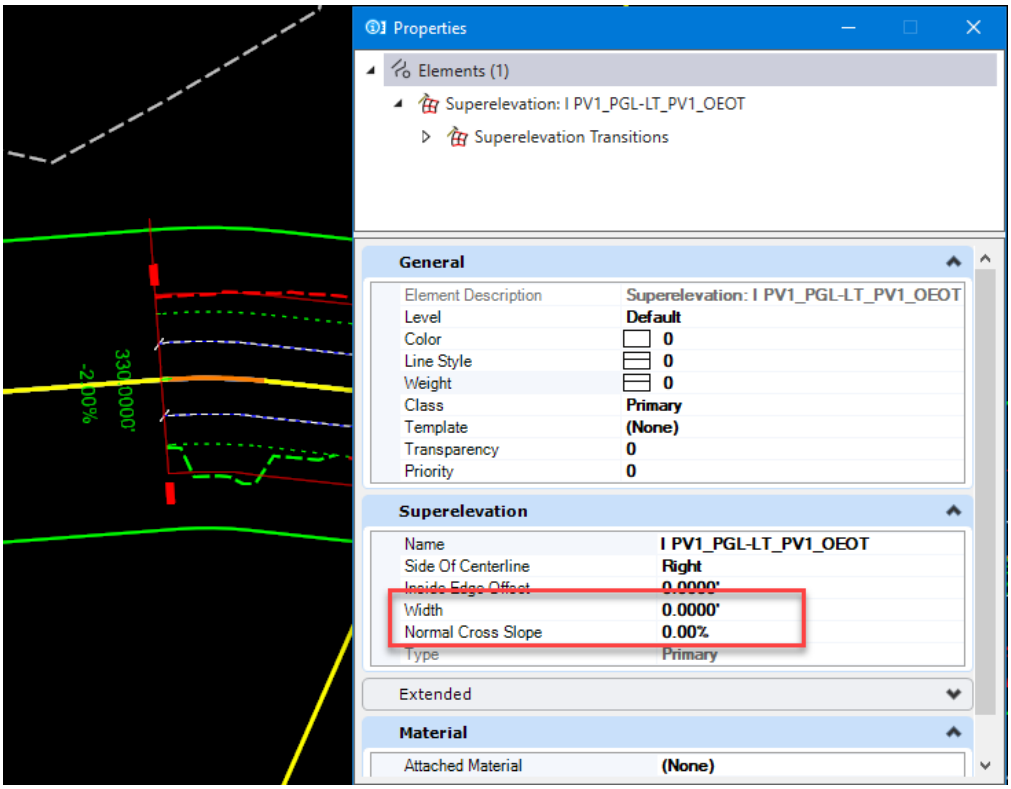


Figure 52 - Imported Superelevation Lanes are in Error

Although we changed the feature definitions for the superelevation shapes, this does not seem to affect the lanes, which will still be on wrong level. Change the level for the lanes to Prop Corridor Graphics Superelevation Right or Left

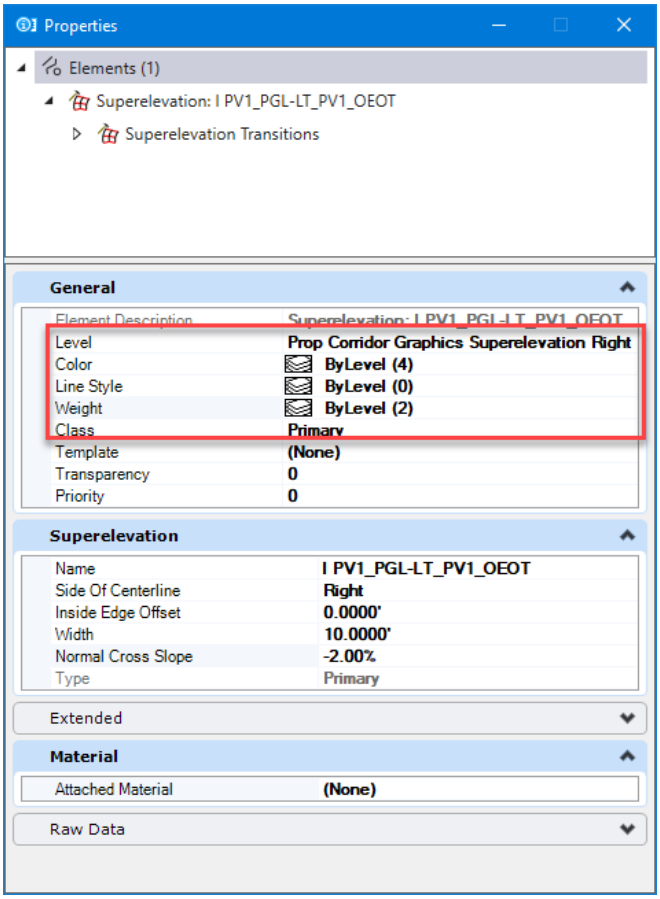


Figure 53 - Corrected Symbology for Superelevation Lanes

When corrected, the lanes should provide feedback using colors to indicate slope.

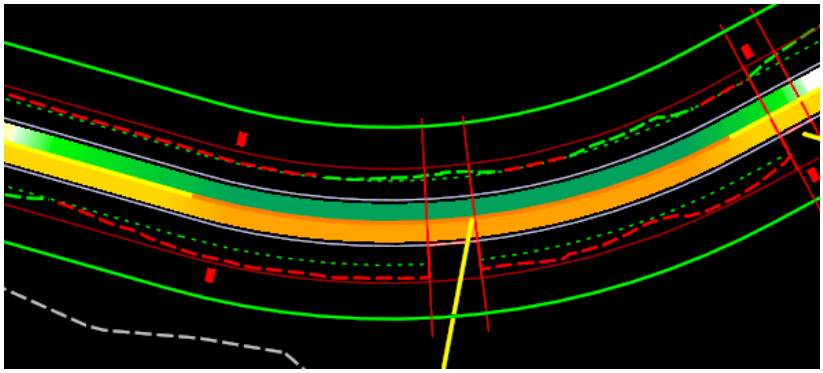


Figure 54 - Corrected Superelevation Lanes

Template Drops and Drop Intervals:

Many corridor items can be reviewed in the corridor objects dialog. To open corridor objects, select the corridor and in the context toolbox, click on Corridor Objects: the icon is shaped like a bucket, so you will often here this referred to as the bucket list.

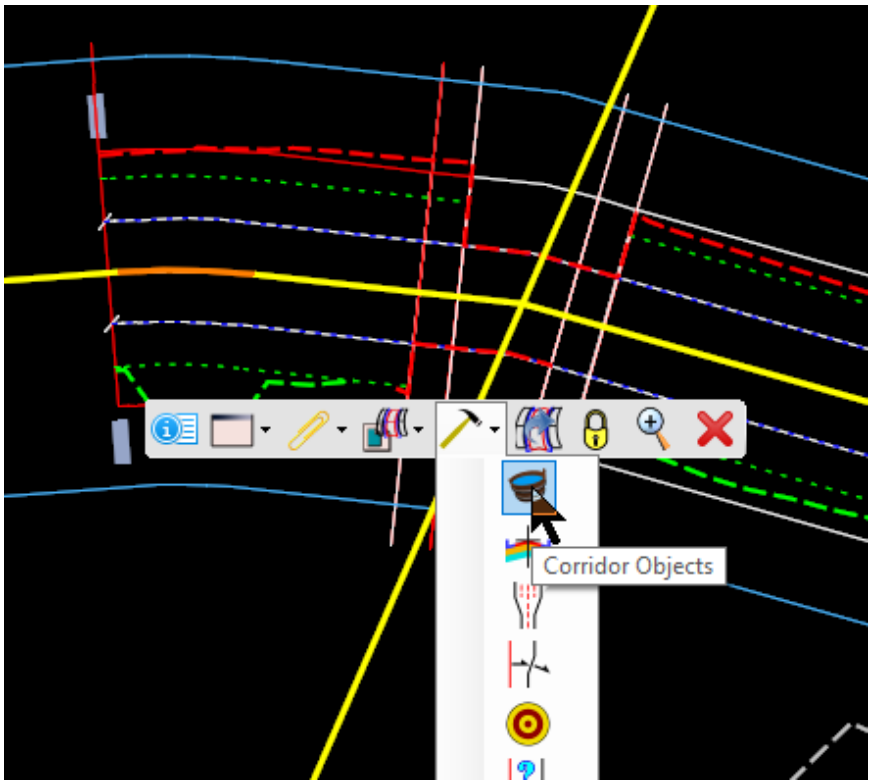


Figure 55 - Corridor Objects

The information contained in the Corridor Objects will look very familiar since it is the same information which existed in V8i Select Series 2 Corridor Modeler. It is arranged differently of course. Instead of menus to open various lists, there is a row of tabs on the left-hand side.

Check each template drop in the list to confirm both the name and the drop interval.

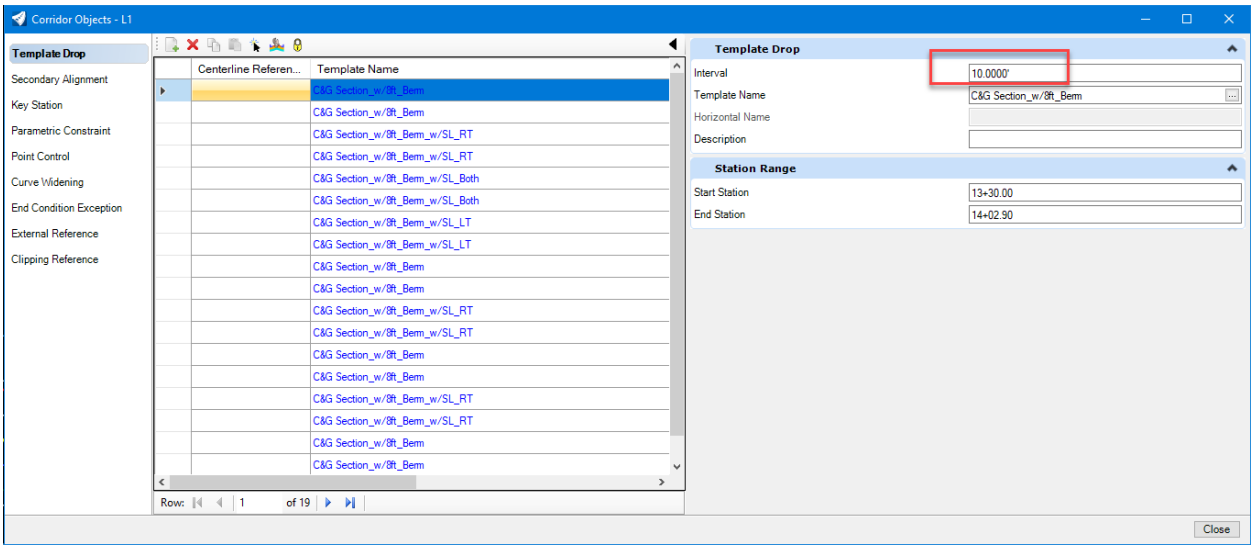


Figure 56 - List of Template Drops

TIPS:

- If all the templates need to change to the same drop interval, select the entire list and edit the interval all at once.
- Every time you make a change to any entry in corridor objects, the corridor will recompute. You can stop this by clicking the lock icon at the top. In the unlocked state, no automatic recalculation occurs, and you force an update when desired.

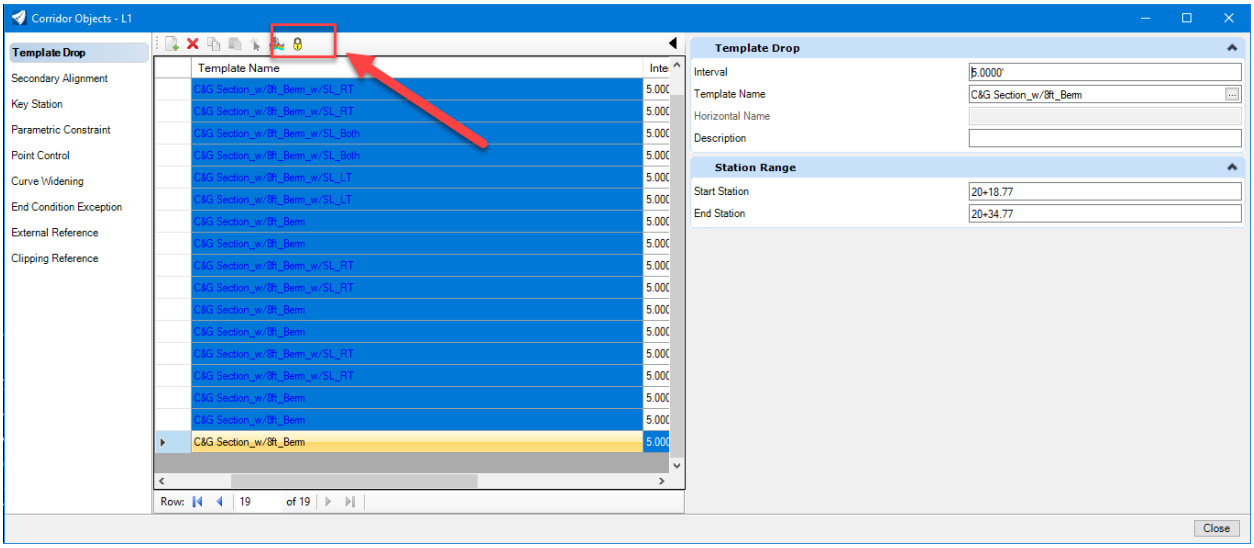


Figure 57 - Bulk Edit Template Drops

Other Items in Corridor Objects List:

Review all the lists shown in Corridor Objects: Secondary Alignments, Key Stations, Parametric Constraints, Point Controls, Curve Widening, End Condition Exceptions, External references and Clipping References.

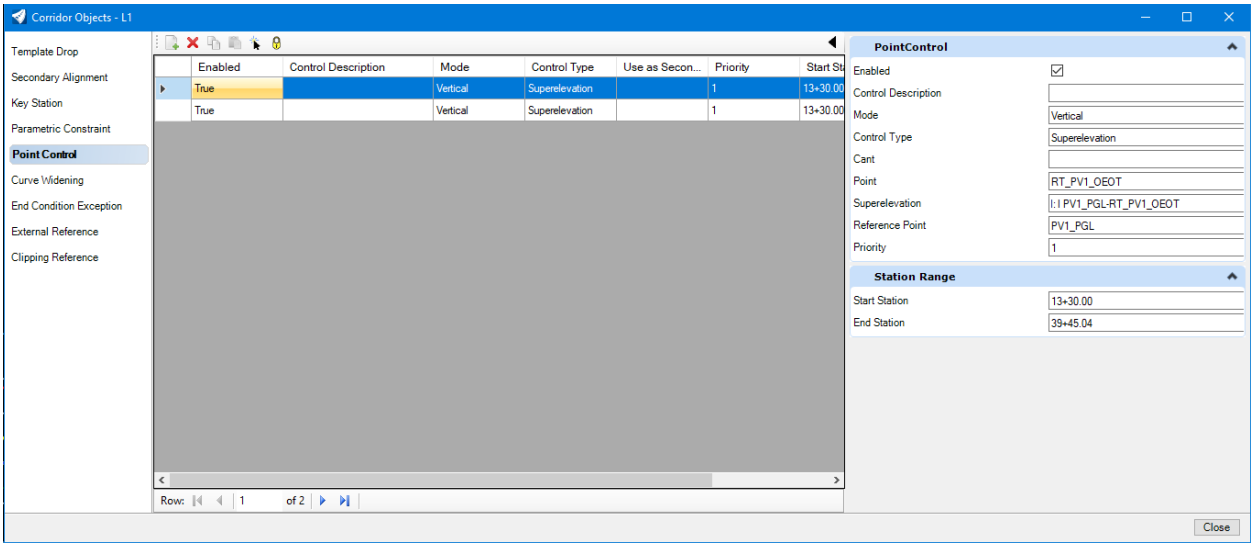


Figure 58 - Review All Items in Corridor Objects

Notice that in this case, the only point controls listed are the superelevation for left and right side of roadway. This is correct for this corridor as the designer tended to NOT rely on point controls and instead used horizontal feature constraints. Replicating horizontal feature constraints in OpenRoads Designer is discussed below.

For the superelevation point controls, make note of the point and reference point. These reference to points in the template drops. Point is the pivot point for the superelevation and reference point is the template point which is rotated. When reviewing the template drops below, you will want to confirm that these points are correct.

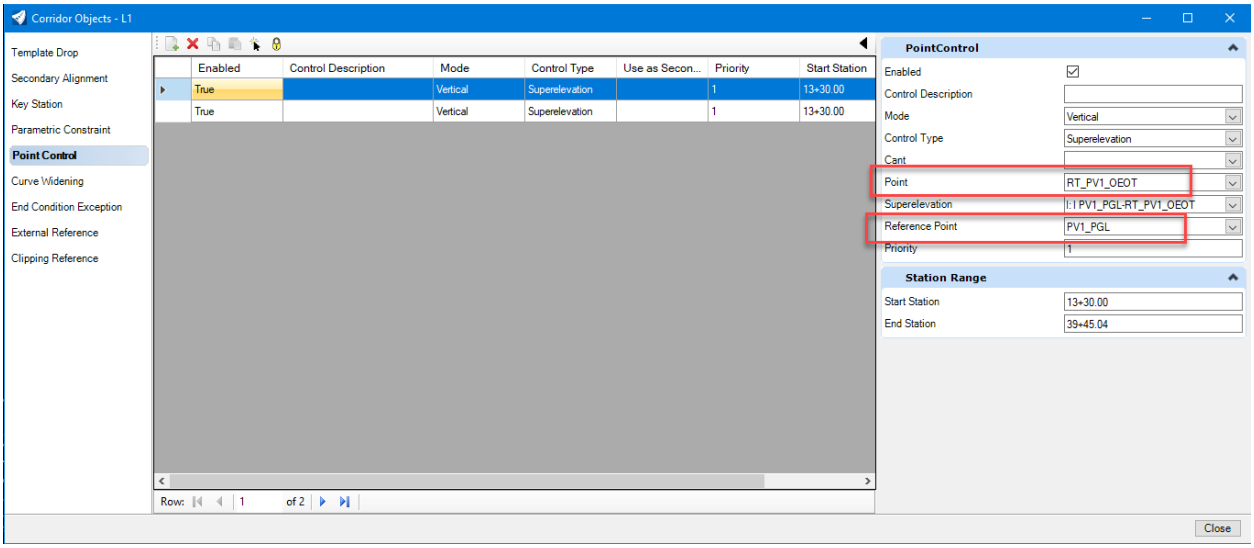


Figure 59 - Superelevation points

Template Feature Definitions:

Even though the Remapper spreadsheet (Section 6) has been used to make adjustments to feature definitions in the template points and components, the templates should still be reviewed and the assigned feature definitions checked. You can review the templates by selecting the template drop object on screen and click Edit Template from the context toolbox.

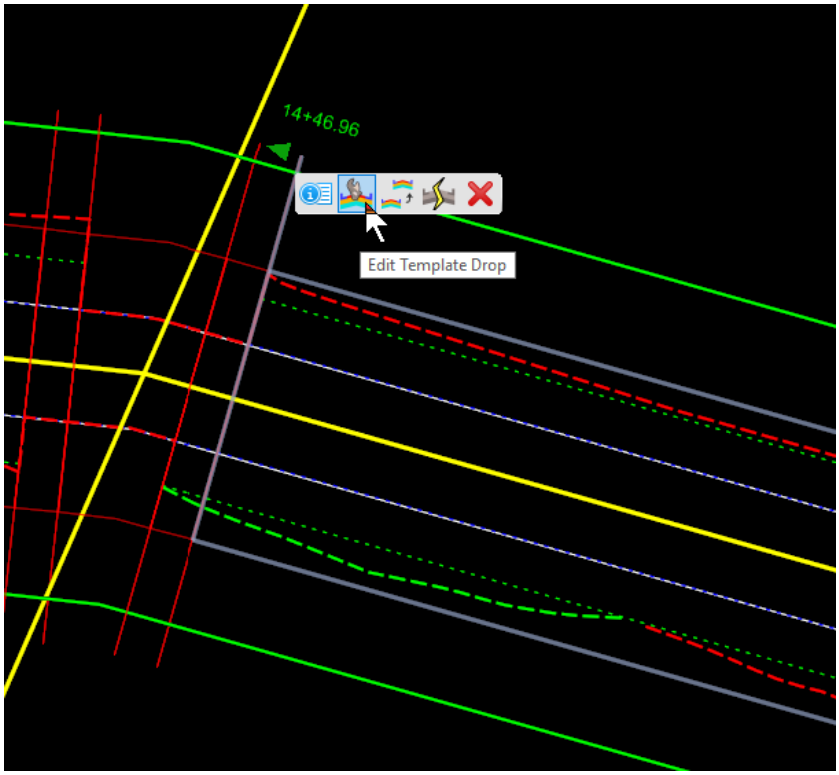


Figure 60 - Editing a Template Drop

This opens the template editor which is almost identical to the one used in V8i Select Series 2.

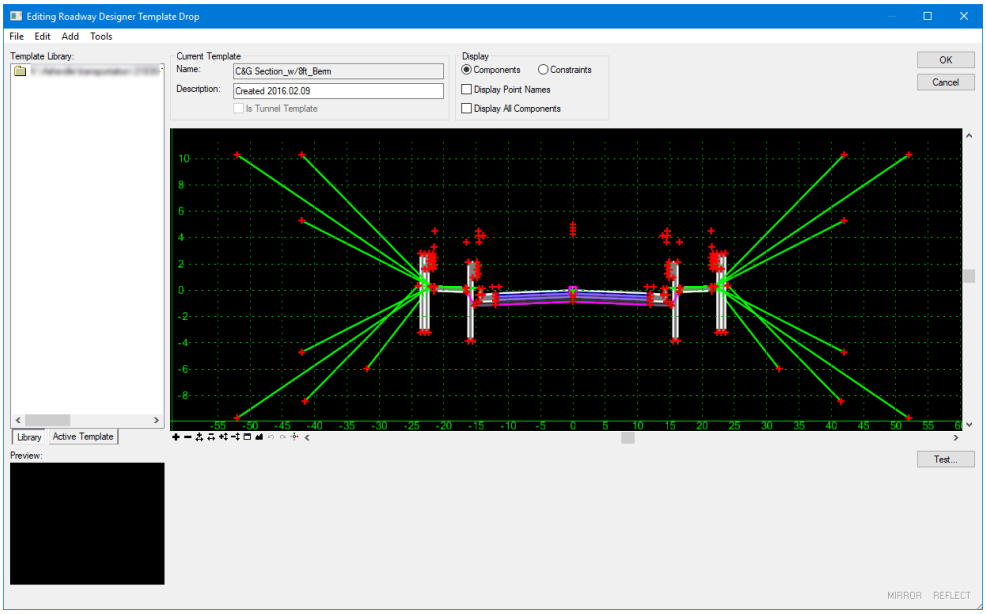


Figure 61 - Template Editor

In the editor you will want to review the points and components to ensure the assigned feature definitions are correct.

Duplicate Components:

In V8i Select Series 2, it was common practice to create duplicate components along the finish grade and subgrade in the templates. These duplicate components are probably unnecessary in OpenRoads Designer. The feature definitions assigned to these components will allow turning them off so they are not in your way in the DGN. Make note of these and consider removing the components at some future time when you are satisfied that they are not needed.

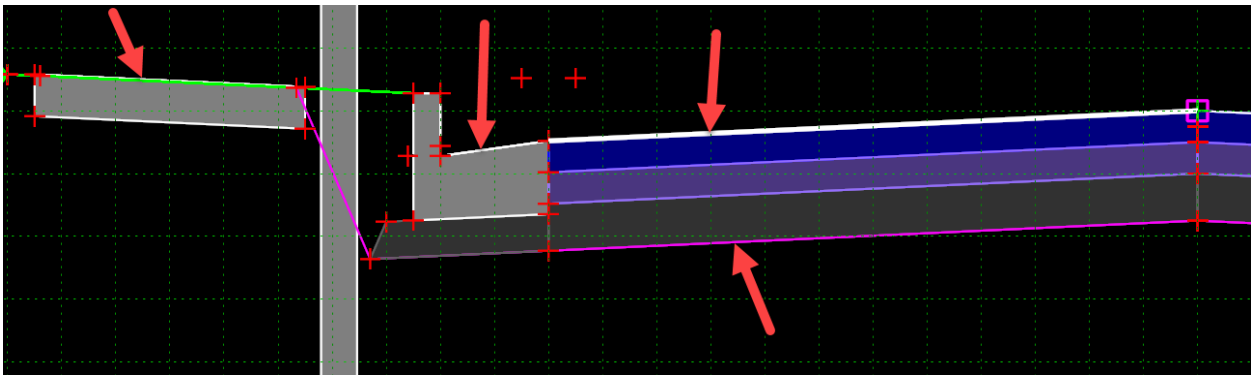


Figure 62 - Top Surface and Subgrade Duplicate Components

Updating Template Library:

Often, the same templates are used across the various station ranges of a corridor or multiple corridors. Rather than making the edits described in 0 and 0 multiple times, it will be more efficient to edit one template, copy this edited template to the project's template library and then update the remaining template drops to use the edited version.

1. First make any required edits to the template as described above.
2. open the template library associated to the project's workset. The Create Template command is found on the Corridor tab.

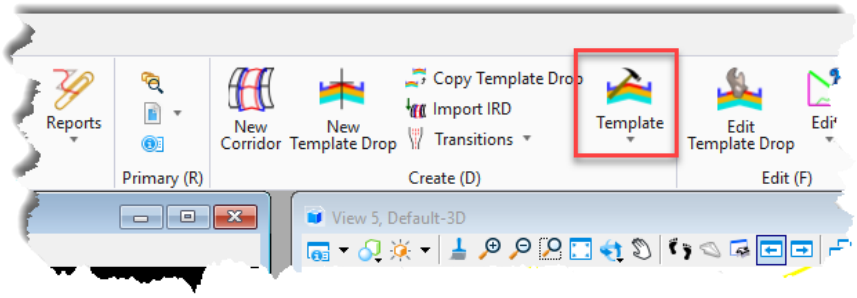


Figure 63 - Open Template Library

3. From the template editor open the template library organizer from the tools menu.

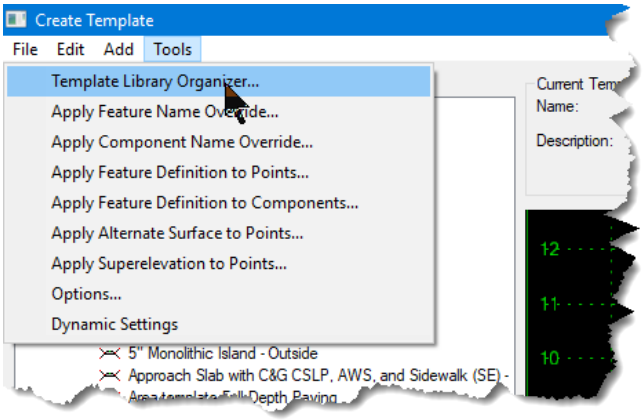


Figure 64 - Open the Template Library Organizer

4. Then drag the edited template from the right side (which are template in the DGN file) to the right side (which are in the library).

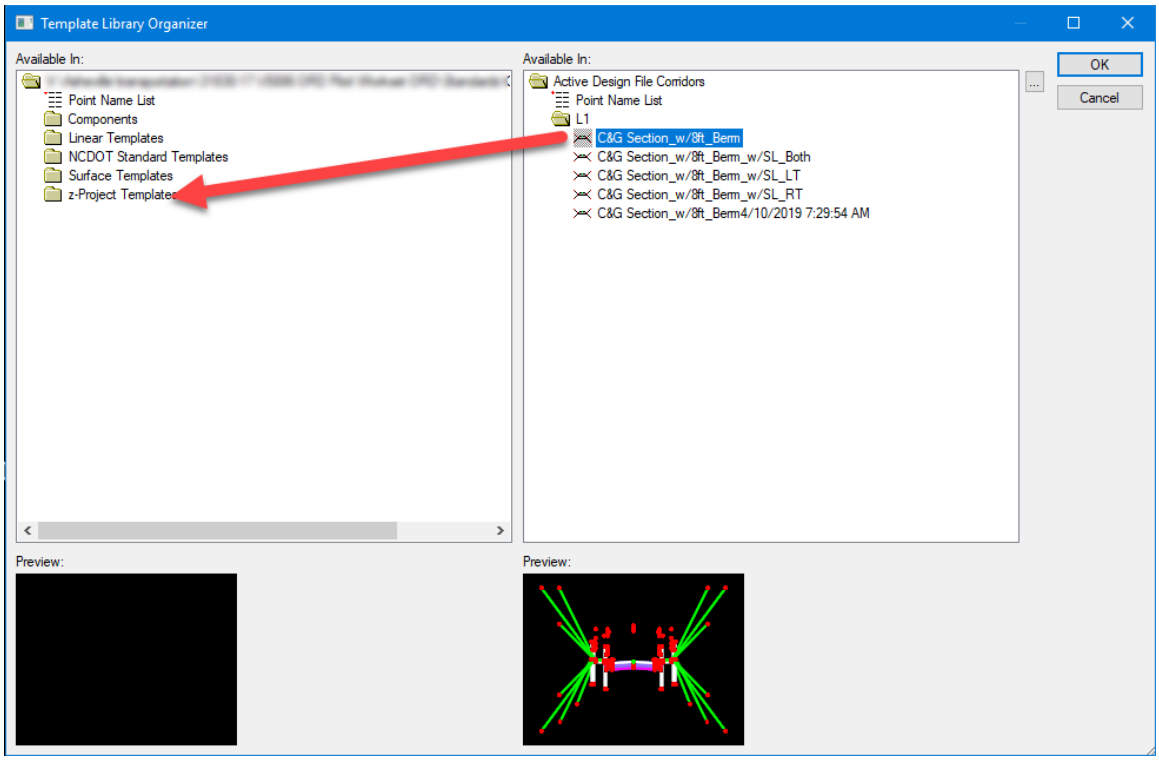


Figure 65 - Copy Templates from the DGN to the Library

5. Then for every template drop which uses the same template, change the assigned template in element information.

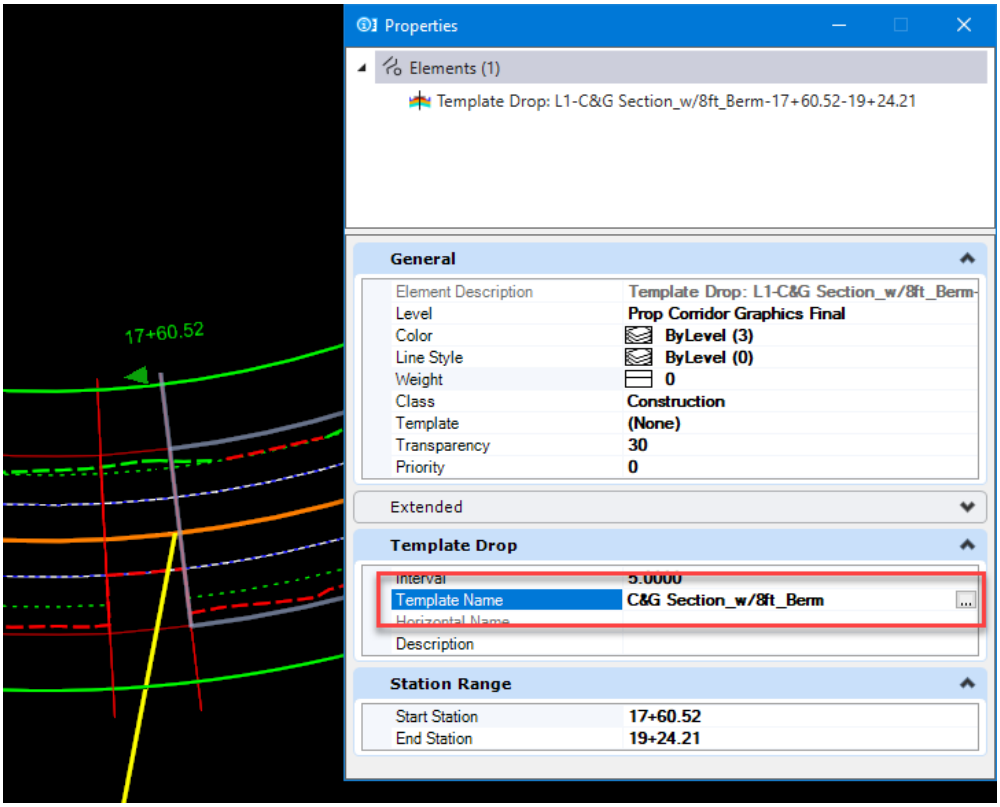


Figure 66 - Changing Template

Section 9 Fundamental differences in philosophy between V8i SS2 and ORD.

In V8i Select Series 2, the primary goal of Corridor Modeler was the production of cross-section sheets with sections at 50 ft interval. The 3D model details between sections and especially at intersections were often ignored. For example, imagine a Y alignment where the last section required for cross-section sheets was 25 feet from the edge of the L EOT? There was no pressing need to fill in the details of the 25 ft gap since the cross-sections had already been satisfied.

As a result, the surfaces and models produced in V8i Select Series 2 are often pretty shaky in some areas, especially at intersections. This is demonstrated in Figure 67, the horizontal feature constraints used for pavement widening have been exactly replicated in OpenRoads Designer.

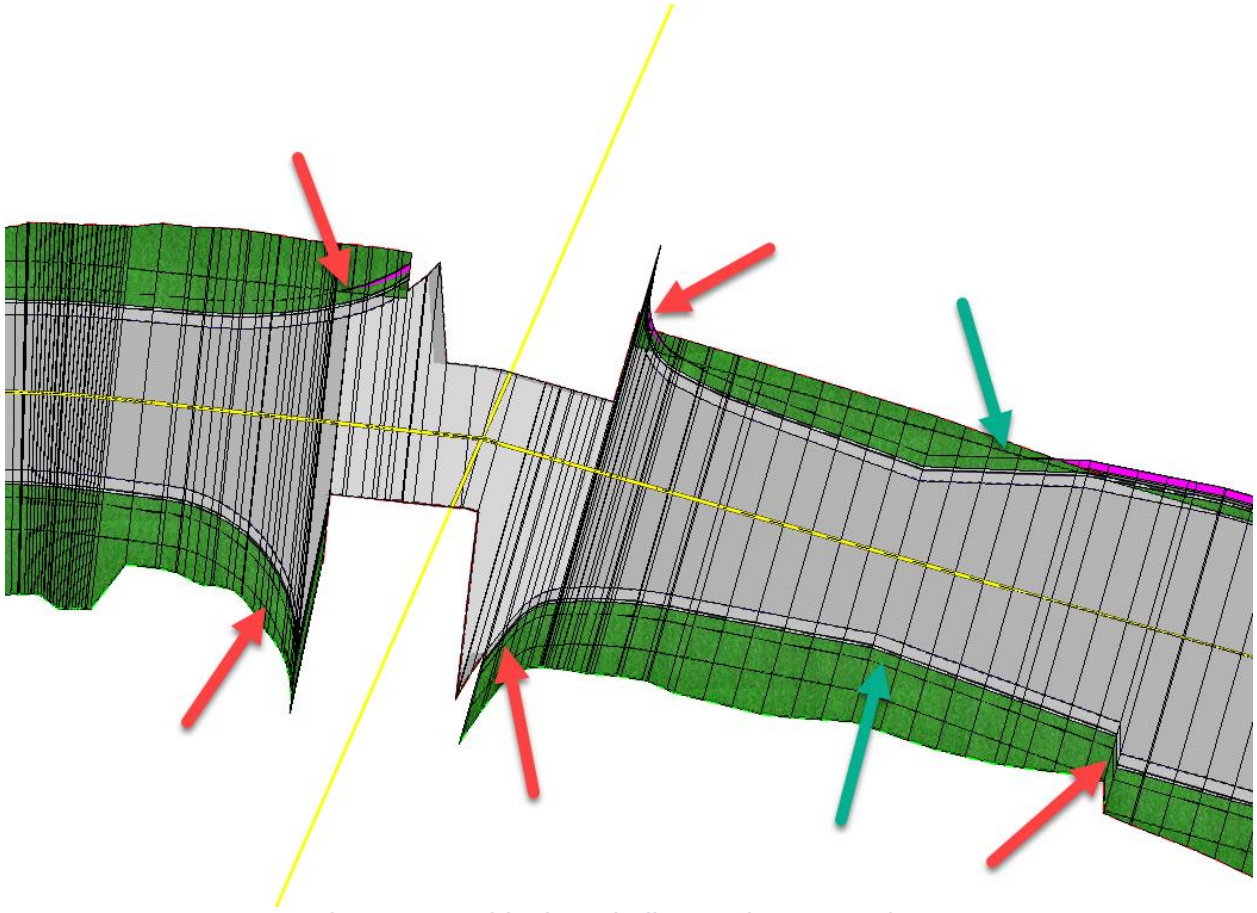


Figure 67 - Widening Challenges in Imported IRD

Notice the areas where the corridor approaches an intersection. The widening has made to follow the proposed EOT into the intersection returns. While this is sometimes feasible when the only goal is a cross-section which is some distance back from the intersection, it is in fact a technically incorrect model, because

it does not consider the need to tie the profile grade of the intersection return radius to the adjacent Y alignment.

All 4 areas in the intersection marked with red arrows (Figure 67) are similarly incorrect when considered in light of the higher density models produced in OpenRoads Designer. See Section 12 for information related to improving the model in these areas.

Notice however, that routine widening such as marked by the green arrows will be adequately and correctly modeled using the same point controls or horizontal feature constraints in the IRD file. The reason these are correct, and the intersections are not, is that these widenings are dependent only on the single corridor which we imported and do not tie to the edges of another corridor like the intersection lines. See Section 10 for information needed to replicate these horizontal feature constraints.

The area marked with red arrow far right is an example of an uncertainty. The widening is very abrupt. At this spot the pavement widens by 5 feet instantly. In the context of a corridor model then there is a short station range to accomplish the widen. The model as shown in the image may be acceptable, or by adding additional key station then the station range can be further shortened.

See Section 10 , Section 11 and Section 12 for related information of how decisions made in modeling methods using V8i Select Series 2 can impact the value of the models imported from IRD to OpenRoads Designer.

Section 10 Horizontal Feature Constraints

In V8i Select Series 2, horizontal feature constraints were used extensively. The idea was that certain points would be configured to search for and target linear elements of defined style in order to accomplish widening of the template components. These were called “Style Constraints” in V8i Select Series 2.
The same techniques can be used in OpenRoads Designer except they are now referred to as “Horizontal Feature Constraints” and there are additional requirements for making them work.

The following is the process for replicating these graphical constraints from the IRD file:

1. Import the alignments, such as EOT, from the ALG file used in V8i Select Series 2. Same import command as shown in Section 4 . Choose the ALG file from the corridor modeler RDDS folder. The GPK file for the project will not contain these alignments.

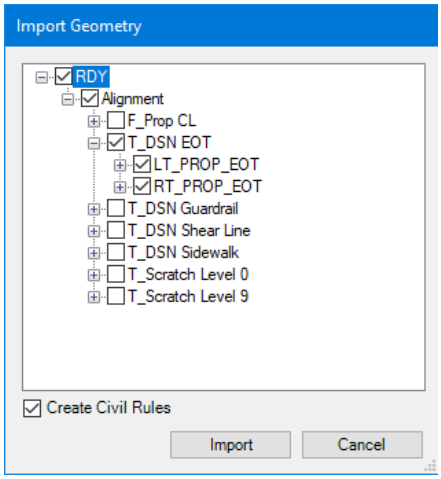


Figure 68 - Importing Plan Graphics from ALG

2. There are several alignments used in this particular dataset, but we will explore only the EOT at this time. Note that the EOT alignments have been marked for import.

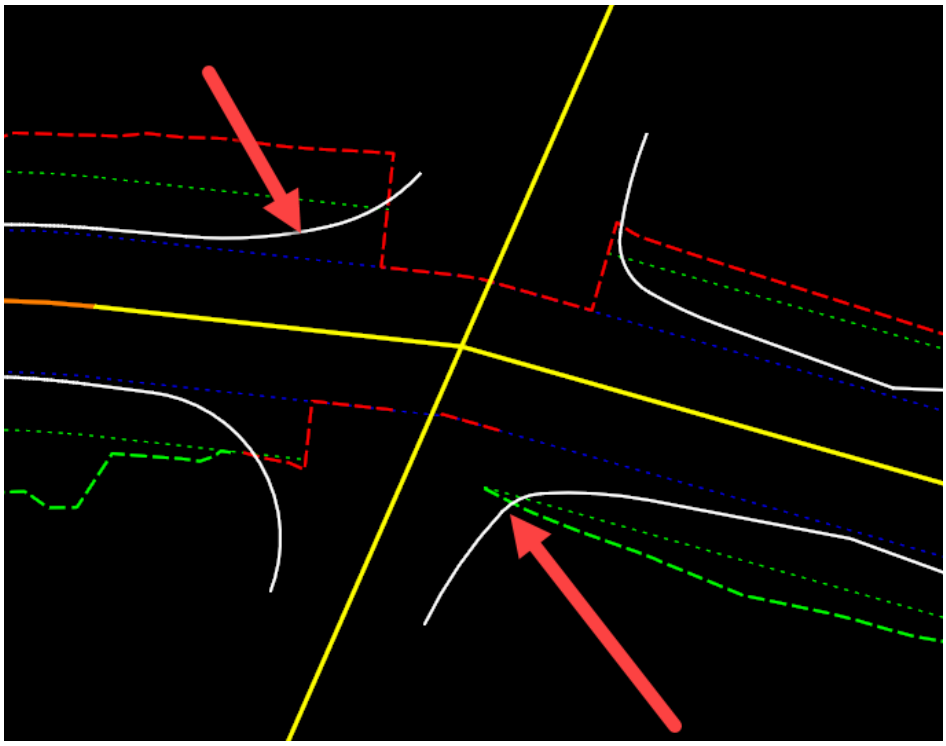


Figure 69 - The Imported Plan Graphics

3. The imported lines will likely have the wrong feature definitions. Select each alignment and change the feature definition in the element information.

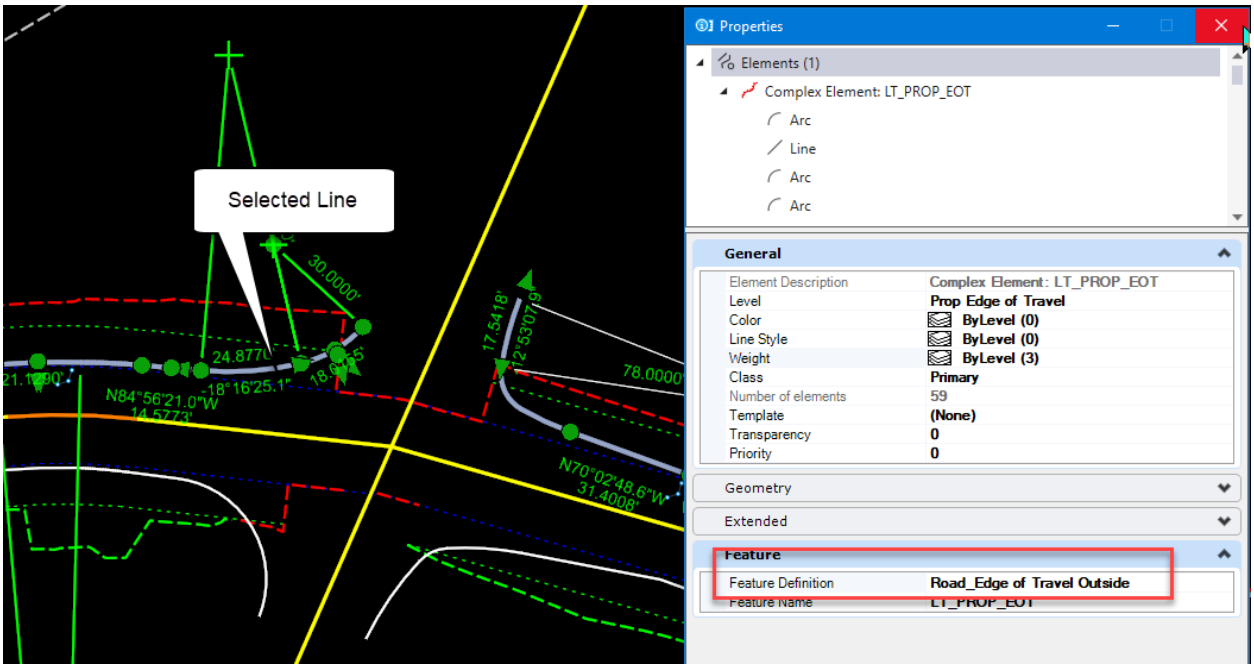


Figure 70 - Change the Feature Definition of Imported lines

4. A couple of items are worth noting here:
    a. Some standard symbology has changed in OpenRoads Designer. One example is seen here where the historically green EOT lines are now white.
    b. These imported lines may not necessarily be used for plans production in the DSN file because these have been created in V8i Select Series 2 to serve the goal of cross-sections. If you think you can use these for plans production, import them to the DSN file instead of the corridor file.
5. Review and edit the templates to ensure the proper feature definition is being targeted. Theoretically, the remapper spreadsheet (Section 6) will have already corrected this but it should be checked and corrected as needed.

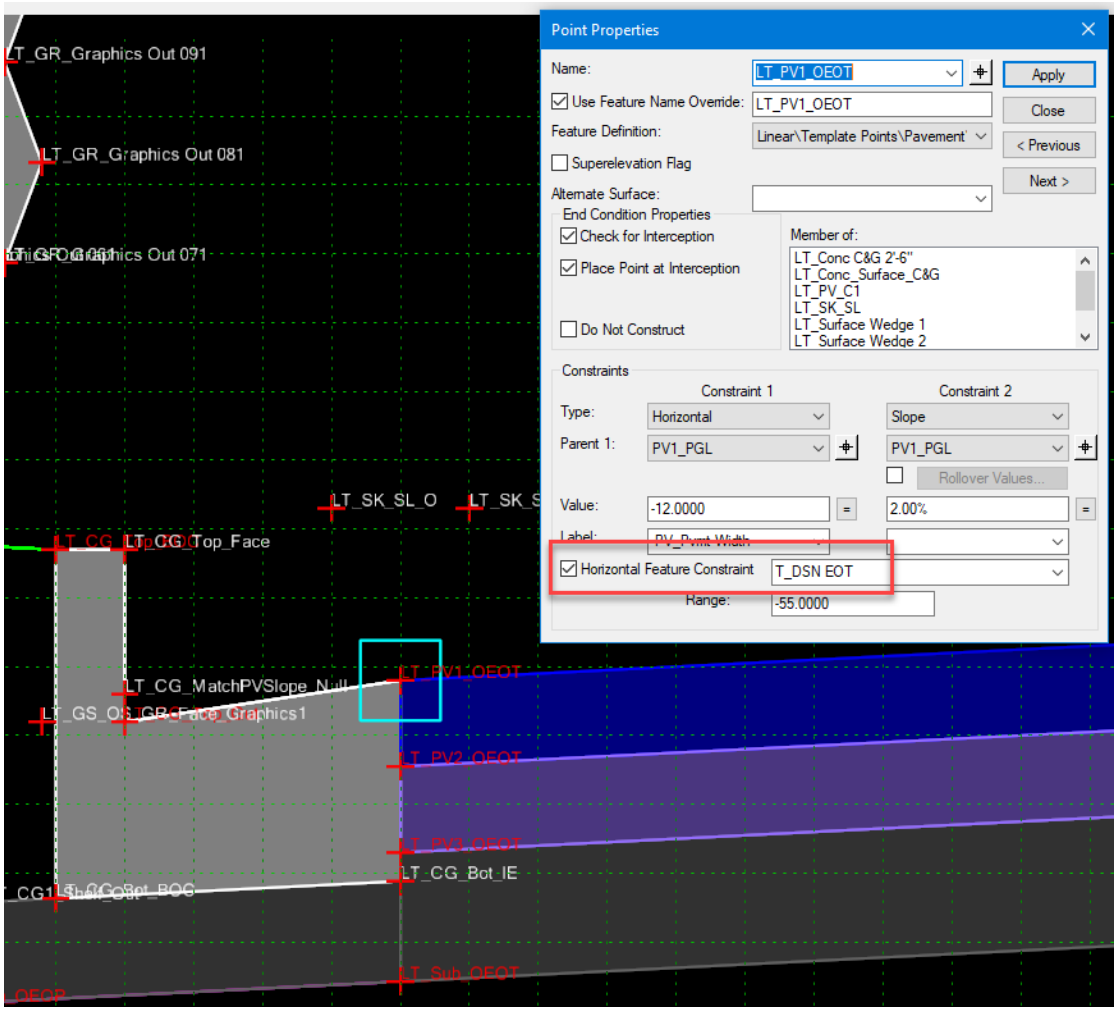


Figure 71 - Incorrect Feature Definition on Horizontal Feature Constraint

6. Select the corridor object and click on Add Corridor Reference in Context toolbox.

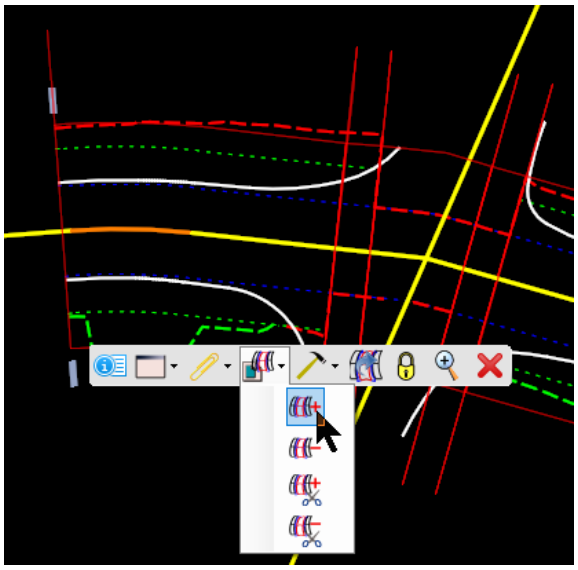


Figure 72 - Add Corridor Reference Command

7. Pick the lines which were imported from the ALG file.

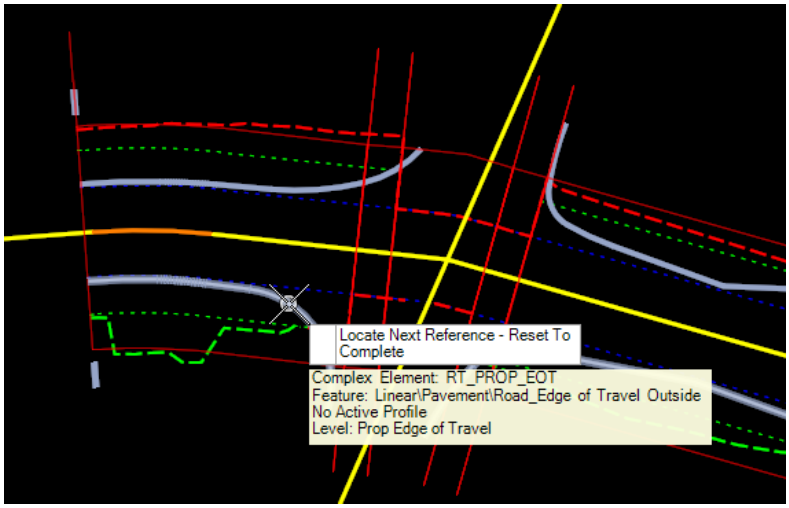


Figure 73 - Picking the Corridor Reference Elements

Section 11 Import Y Corridors

For Y corridors, the process of importing IRD is basically the same as demonstrated above for the L corridor.

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

After which, the designer will need to do the following additional tasks:

- Rebuild any target aliases which reference between corridors.
- Make new models of intersection areas as necessary. These were not always modeled in V8i Select Series 2, since the goal then was cross-section sheets and not a detailed intersection model.

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

1. Repeat from above
    a. Create a new DGN to contain the additional corridor. Each corridor should be in sperate DGN files.
    b. Attach the terrain model and alignments to this new DGN.
    c. Import the appropriate corridor from the IRD file
    d. Review various parts and clean up

In the 3D model, the relationship between the corridors will be seen. Depending on how much detail was built into the V8i Select Series 2 model will determine how messy things look in OpenRoads Designer. In Figure 74 is seen the worst case extreme. In this case, the V8i Select Series 2 designer provided only sufficient detail in the intersection to produce adequate cross-sections. In these worst-case scenarios, significant work will be required to clean up the model. Some of this cleanup is cosmetic only (example: The very tall shear lines) but some is also substantive revisions to the model.

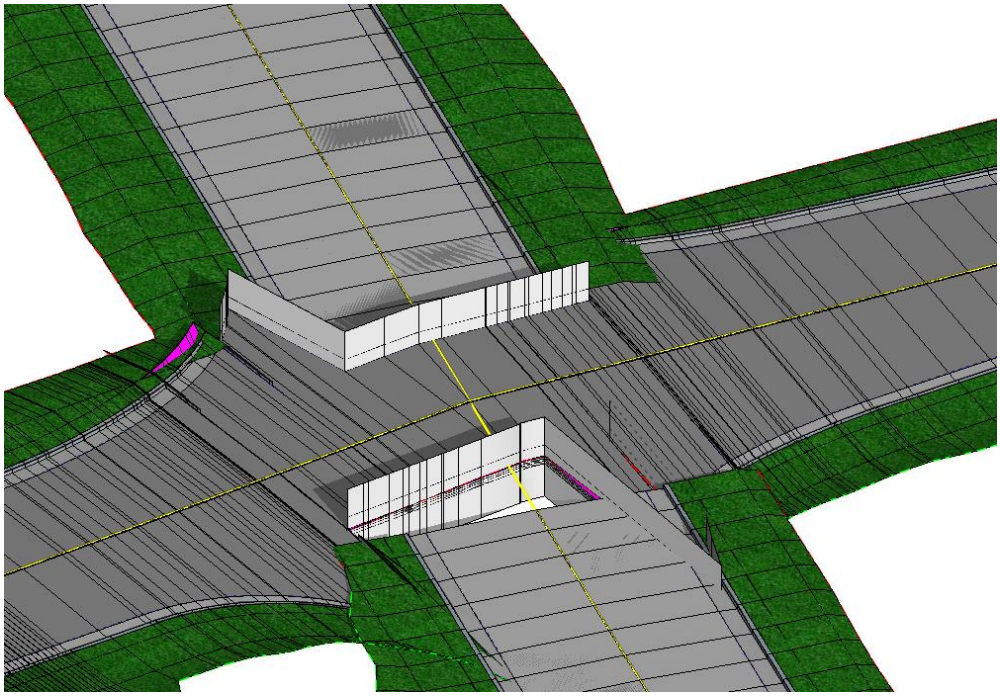


Figure 74 - An Intersection with L and Y Imported

2. If there are any target aliases defined in the corridors, then they must be redefined in OpenRoads Designer. This is required because in ORD we need to define these target aliases to point to the actual corridors, whereas in V8i Select Series 2, target aliases pointed to surface which were derived from the corridors.

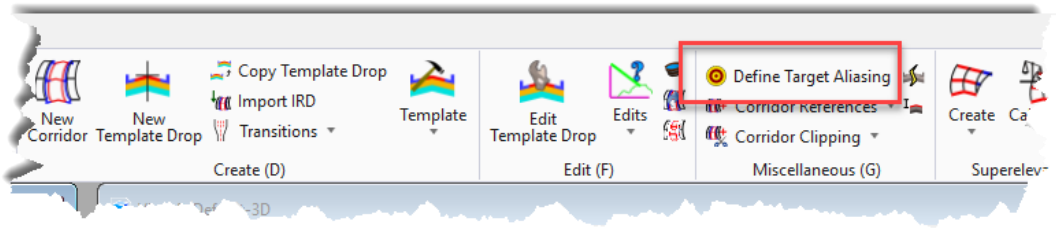


Figure 75 - Target Alias Command in Corridors Tab

3. Don't forget that target aliases may be defined on the L or Y corridors, leading to an iterative process of import additional corridors and circle back to set the target aliases.

Best Practices – Additional Corridors

- As indicated by the previous two sections, migrating a project from Select Series 2 to OpenRoads Designer is a repetitive and iterative process whereby:
    - Corridor 1 is imported and checked.
    - 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

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. A variety of things can cause this such as:
    - The designer makes an error and imports the wrong geometry
    - The V8i Select Series 2 profiles are actually in error. The 3D models will bring to light blunders in computations which could more easily be overlooked in V8i Select Series 2.
    - The intersection return radii are improperly profiled. This will be common in V8i Select Series 2 models. (See Section 12 for more information about intersections)

Section 12 Intersections

If the V8i Select Series 2 models contain detailed intersection design, then there will be multiple corridors which use the curb returns as alignments. These can be imported the same as any other corridor using the steps as defined above in Section 11 . The result in OpenRoads Designer is a very good model of the intersection which can potentially be used intact with minimal required editing. OpenRoads Designer provides more robust tools for modeling of intersections and other non-linear entities.

Therefore, it may be desired to replace the Select Series 2 models in these areas with better OpenRoads Designer models. And, in many cases the intersection will more closely resemble Figure 76 and substantial work will be required to produce a suitable model of the intersection. In these cases, rebuilding the intersection entirely in OpenRoads Designer is probably not optional.

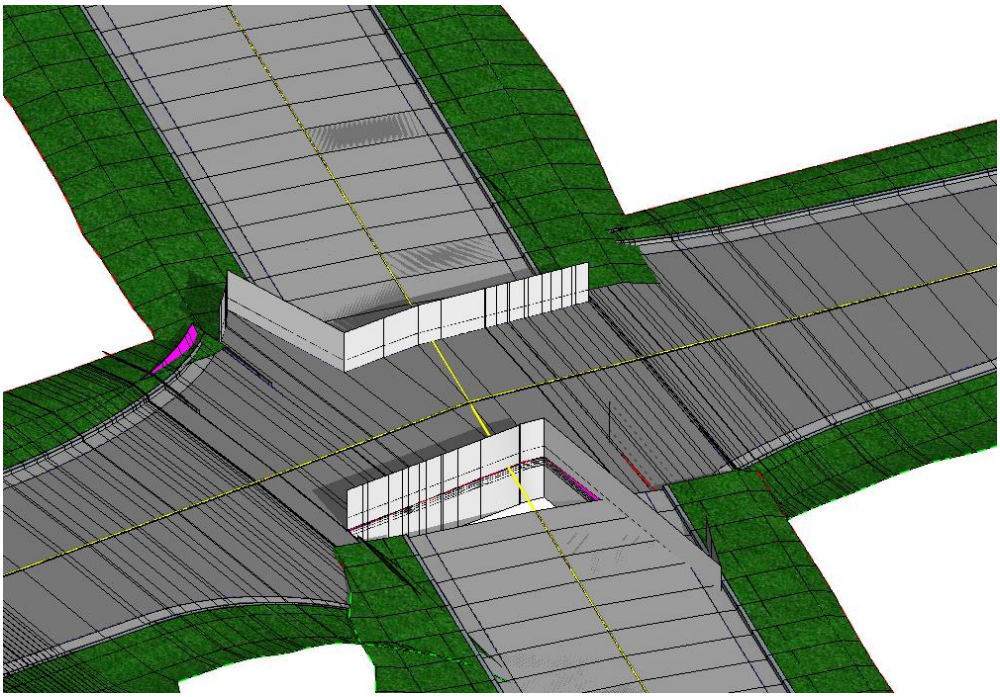


Figure 76 - Intersection as Imported From IRD

The workflow shown in this document shows how to adjust the imported corridors to prepare the area for an intersection design. The designer is then directed to the training document for intersections to complete the model.

In the following steps we will adjust the L and Y corridors in preparation for a new intersection to be designed using OpenRoads Designer tools. Please note that every intersection will be unique and slight variations to these workflows may be required. Not every task described here will be required of every intersection. For most intersections, one of the roads will be designed as the thru road. This is usually the L alignment but the geometry in the area may suggest that allowing the Y roadway continue thru the

intersection is more efficient. Note that for roundabouts, none of the roadway are designed thru the intersection because the roundabout circle becomes the defacto thru road to which all approaches tie.

For this example, L will be the thru road and it is designed as such in the corridors we imported. However, we need to deal with those curb return flares which came by way of horizontal feature constraints.

1. We want to pull back the template drops which include the end conditions to a station where the pavement width is not changing. Do this on both side of the intersection.

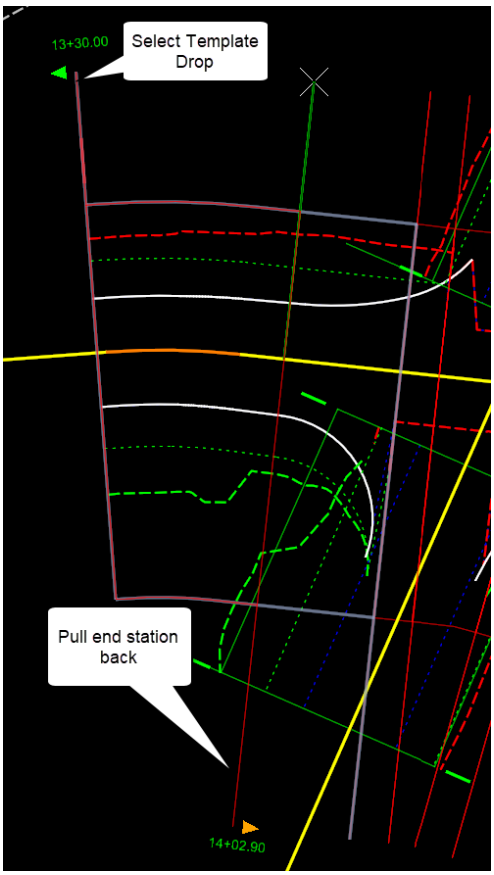


Figure 77 - Adjusted Template Drop Stations on L Corridor

2. Change the station limits of any template with shear lines to cover the intersection area. Note that in the dataset used herein, the designer chose to have separate template drops for areas where a shear line is needed rather than using display rules. Many will disagree with this approach but it is probably common.

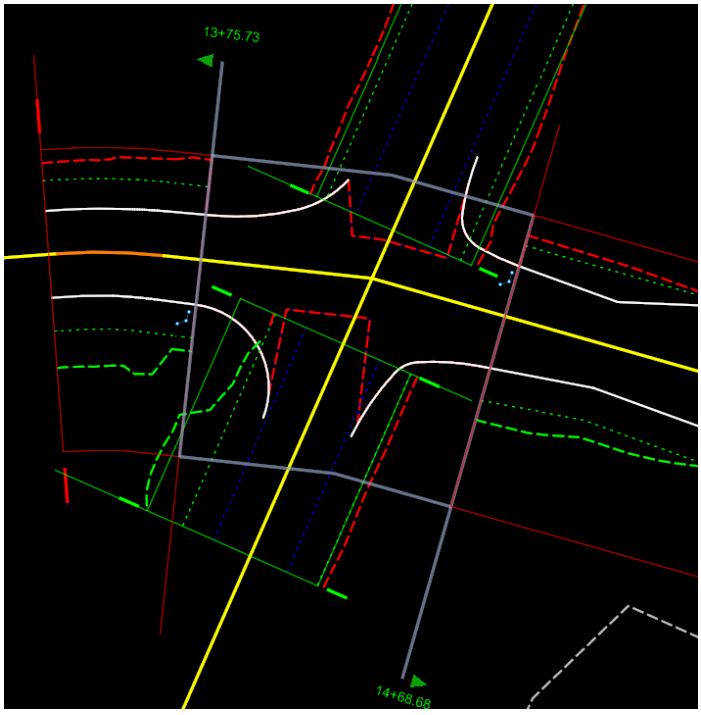


Figure 78 - Adjusting Template Drop Stations on Shear Line Template

3. This will start to look better but the template drop with shear line may also have horizonal feature constraints which need to be removed. Edit the template with shear lines to remove the horizontal feature constraint and also define the width to be the standard lanes which passes across the intersection.

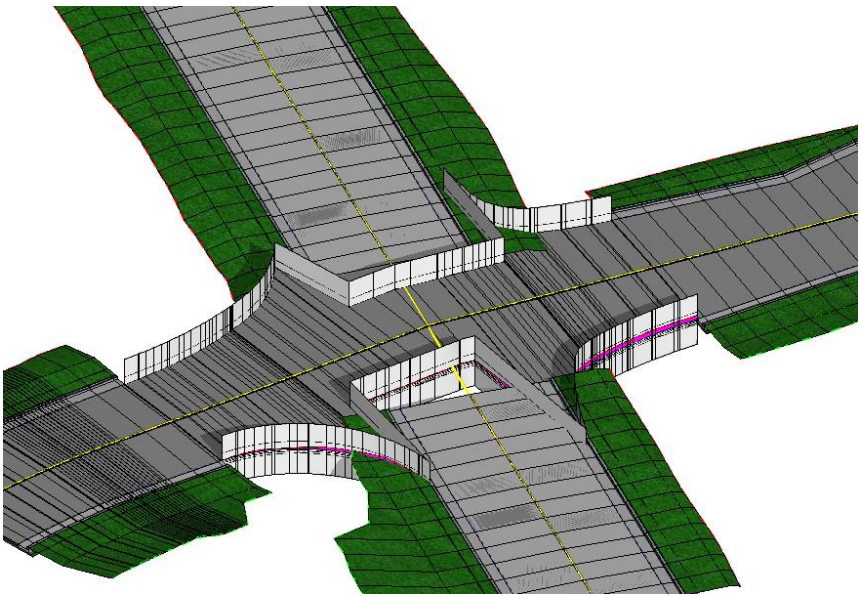


Figure 79 - Model after Adjusting L Template Drops

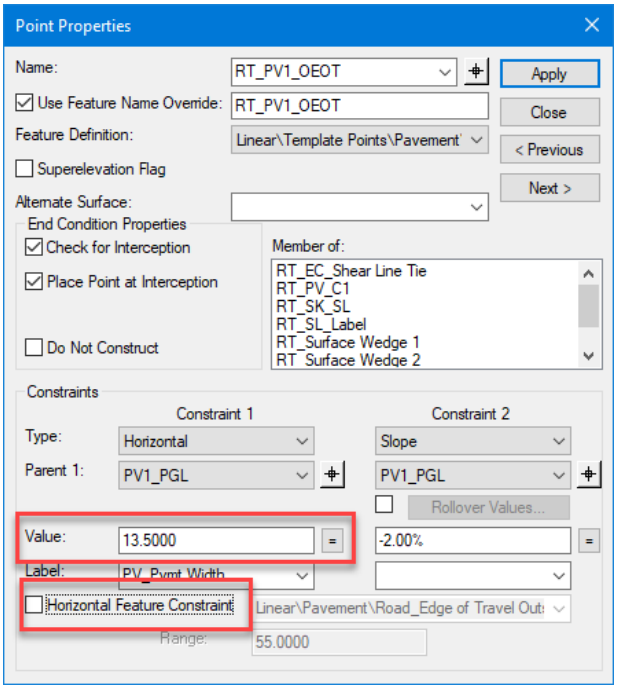


Figure 80 - remove Horizontal Feature Constraints from Shear Line Template

4. Then the side road template drops will also need to be adjusted to make a space for designing the intersection.

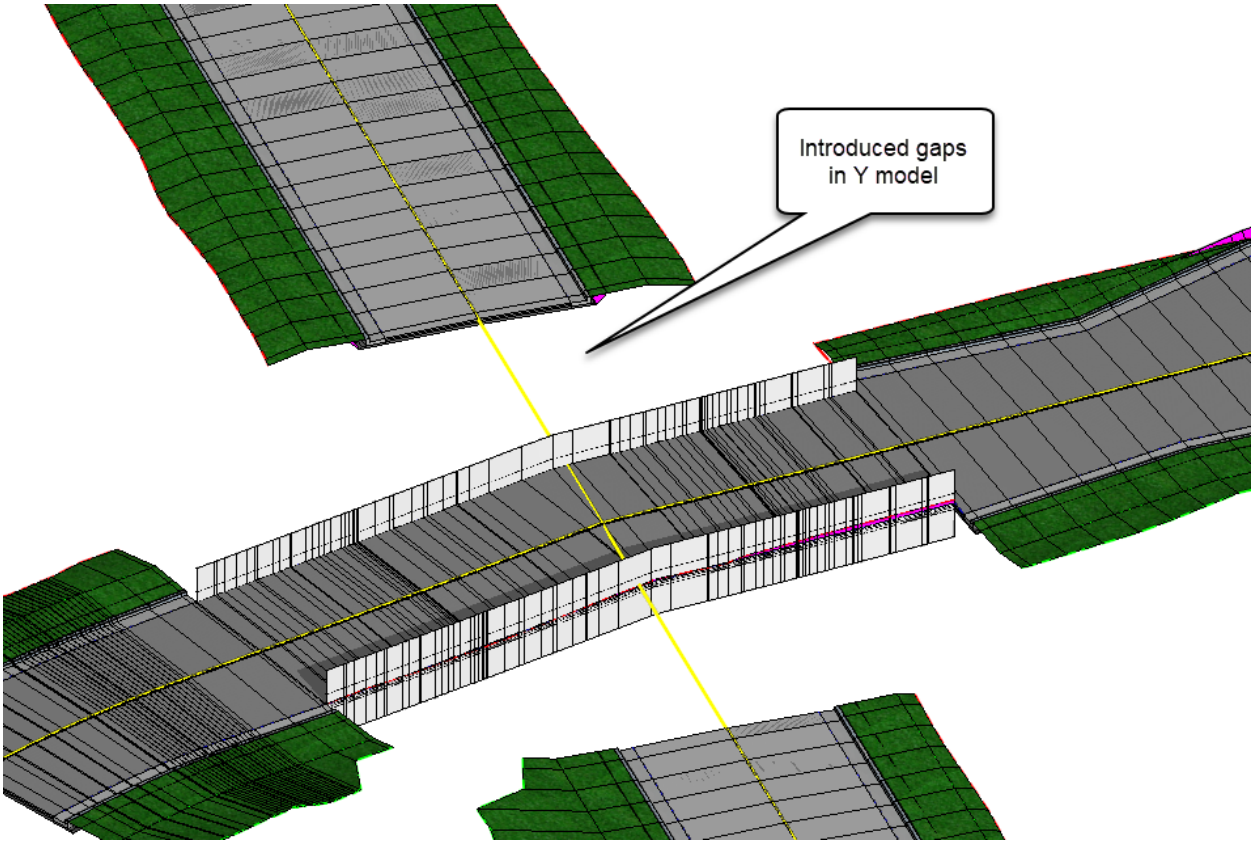


Figure 81 - Model which is Ready for Intersection Design

These gaps will be designed and filled using an intersection design process using OpenRoads Designer tools. See Intersection modeling section of the Roadway training module for detailed instructions.