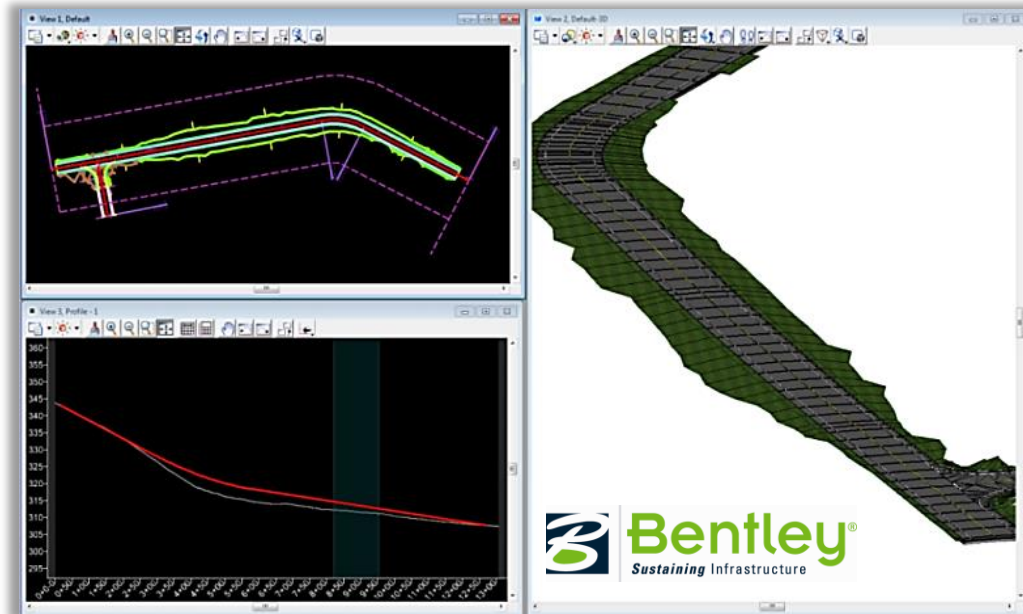




Office of Engineering
Division of Facilities & Transit

ARCHITECTURAL
AEC
ENGINEERING CONSTRUCTION
APPLICATIONS

Version 6
1/15/2019



CTDOT OPENROADS MANUAL FOR DESIGNERS

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Chapter 1 Introduction

The purpose of this manual is to introduce CTDOT users to Bentley InRoads V8i SELECTSeries 4 (SS4) using OpenRoads technology. This manual assumes users will have previous training on, and a working knowledge of, ProjectWise, MicroStation and InRoads. AEC Applications provides an OpenRoads Workspace through the use of both ProjectWise and a network solution. These workspaces provide the standardization users will need to prepare their design. This manual was initially written only for OpenRoads pilot projects in the ProjectWise document management system environment through the use of a Managed Workspaces. Since the initial testing we decided to also pilot a network solution. Throughout this manual you will see the ProjectWise folder structure listed, for network pilots please substitute the network path as shown below.

ProjectWise Workspace Location:

pw:\\ctdot.projectwiseonline.com:CTDOT\Documents\05.0 - Workspace Resources\ 3_Workspace_V8i\

Network Workspace Location:

W:\ 3_Workspace_V8i\

ProjectWise Project Location:

pw:\\ctdot.projectwiseonline.com:CTDOT\Documents\01.0 - Projects - Active\

Network Project Location:

X:\SS4_Pilots

Bentley ProjectWise (PW) is a collaborative environment which allows all parties involved in the project to use live data and to make real time decisions. It also allows CAD support to immediately update or edit any necessary Workspace resource. All CTDOT employees should have a ProjectWise account. If you do not, or if you experience difficulties logging in, please contact Julie Annino via email: Julie.Annino@ct.gov

When starting a new OpenRoads Project do not copy over or open any DGN files that were used on an old project, these files do not use the correct settings. You may reference them in as needed but using them and running OpenRoads will cause problems.

Online Training can be found on [Bentley's LEARNserver Website](#). Select the Orange Find Training button and in the Enter Product Name field type in **InRoads**. Look for the learning paths in the list that say **OpenRoads** and explore. Starting with the InRoads V8i SS3 release, and continuing with SS4, Bentley began incorporating what they call OpenRoads technology, to integrate more functionality of InRoads into the MicroStation interface, moving the commands from the InRoads Explorer menus to the MS Tasks dialog under Civil Tools. This produces significant differences in some SS4 workflows from SS2 workflows, and some new features are available in SS4 that did not exist in the InRoads V8i SS2 version.

DRAFT

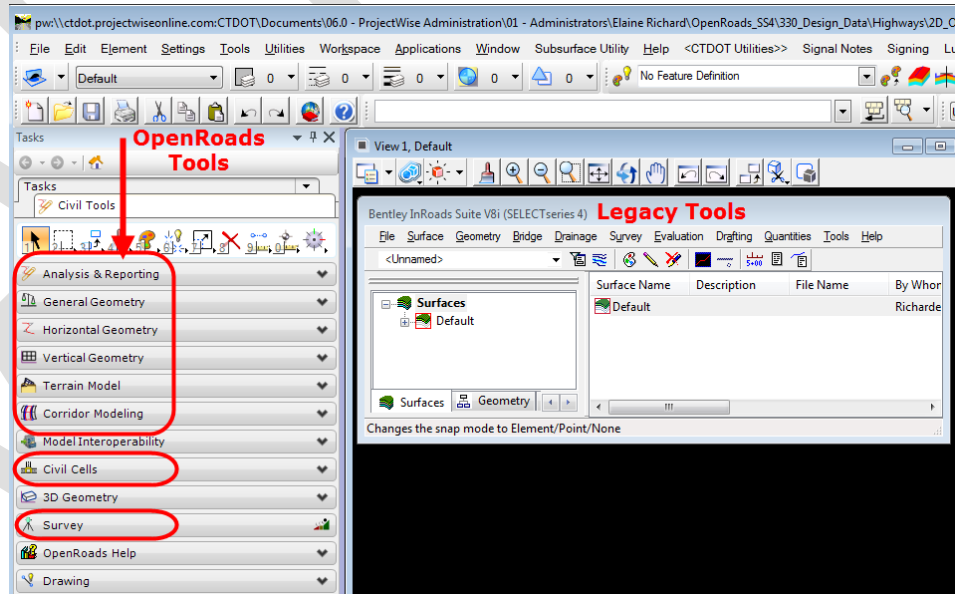
Section 1.1 Civil Tools Workflows versus InRoads Explorer

In InRoads V8i SS4, you use workflows and commands under MicroStation Tasks > Civil Tools to perform many of the functions that were previously initiated using InRoads Explorer. In this manual you will also use Legacy Tools and Workflows. The term legacy refers to tools and workflows in SS4 that still use the InRoads Explorer menus (File, Surface, Geometry, Drainage, Evaluation, Drafting, Quantities, Tools). Legacy procedures will be much the same in SS4 as in SS2, with minor changes that are called out.

1.1.1 Civil Tools

Workflows for which you now use MicroStation Tasks>Civil Tools include:

- General Geometry
- Horizontal Geometry
- Vertical Geometry
- Terrain Models
(alternatives to Surface .dtm files)
- Corridor Modeling:
 - Create Corridor
(formerly under Modeler>Roadway Designer)
 - Create Cross Sections
(formerly under Evaluation>Cross Section)
 - Annotate Cross Sections
(formerly under Evaluation>Cross Section)
 - End Area Volumes
(formerly under Evaluation>Volumes)
- Civil Cells
- Survey



NOTE: that there is no replacement for the Storm and Sanitary Add-In in SS4. For that functionality you must use InRoads V8i SS2. A different Bentley product runs in SS4 named Subsurface Utility Engineering, which includes Subsurface Utility Design and Analysis. SUE/SUDA workflow can be found on CTDOT's website.

1.1.2 Legacy Tools and “Native” Data Types

Some workflows still require InRoads Explorer commands, used in the same manner as in SS2. The CTDOT configuration of InRoads V8i SS4 is set to open the InRoads Explorer window upon launching the application. In this manual and elsewhere, you will see the term legacy used to refer to design approaches that still rely on the InRoads Explorer interface. Some of these are listed below.

- Create and Annotate Profiles
- Drainage Annotation
- Display of Horizontal and Vertical Alignments
- Vertical Alignment Annotation

The term “native” refers to data types, such as styles, used by legacy tools. These data types are stored in standalone files (e.g., .dtm, .alg, .xin), rather than being included in the .dgn.

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Section 1.2 Known Issues

1.2.1 General

- **Slower Launch and Exit**

InRoads V8i SS4 is slower to launch and exit than InRoads V8i SS2. Part of the reason for the slowness is that the Civil Model must be scanned to display the civil data. Another reason is the SS4 interface must always consider which tasks to display based upon the dimensionality of the active model in the .dgn (2D or 3D). In the course of designing a roadway, you will change the active model from 2D to 3D, and back again - many times.

- **Slower Model Changes**

Each time the model dimensionality changes, the interface must reload. Also, each time you change models, the civil data has to be gathered from the active model and its references. Changing models takes time.

- **Input While Command Active Can Cause a Crash**

If you provide input (click the mouse) before InRoads is ready, you will cause a crash. Some of the InRoads V8i SS4 commands do not display a progress bar, so it is difficult to determine when a command has finished and InRoads is ready.

- **Running two applications at the Same time**

Do not run InRoads SS4 and SS2 at the same time. This could lead to issues with your user preference files.

- **AutoTurn**

When using AutoTURN create a new 2D MicroStation file and reference in your OpenRoads file. Do not use AutoTURN in your OpenRoads Modeling File.

- **Auto Annotation Stationing Disappears**

When using the CTDOT feature definition, which is set to auto annotate stationing, you may notice that the stationing has vanished. This is a temporary display issue; the graphics are still in the file. If you fit the view, you may see the stationing displayed miles away to the upper right. To fix this display problem, exit

InRoads and re-open the .dgn file containing the geometry. You may need to slightly adjust the geometry using the manipulators to force the auto annotation to update.

- **CTRL + Z**

Do not use Ctrl + z to undo an action will occasionally change your views and windows and not undo your action.

1.2.2 Crashes

- **What Does a Crash Look Like?**

Three signs of a crash:

- The application may freeze and display "(Not Responding)" in the title bar
- The mouse cursor may turn into the spinning refresh wheel and stay that way for more than 20 seconds
- (After a while) Microsoft, MicroStation or InRoads produces a Problem Notification dialog.
- If you experience any of these signs, look around the interface - if you have a progress bar in the lower right corner, InRoads may just be busy executing your command.

- **How to Avoid a Crash**

If you have just executed a command or changed the active model, and you are not sure if InRoads is ready for more input - move the mouse cursor over the buttons on the task menu. If the buttons highlight yellow and you see tool tips, InRoads is ready for you to click the mouse.

- **How to Recover From a Crash**

Locate the InRoads icon on the taskbar, right-click on it and choose "Close window". You should then be able to relaunch InRoads. Although it also works to cancel the operation of InRoads through Problem Notification dialogs, this method can take a lot of time.

Chapter 2 Set Up

The steps in this chapter will only have to be done at the initial startup and then again if a user gets upgraded software, they receive a new computer, or their computer has to be re-imaged. While the several of the steps in [Chapter 3](#) will need to be completed for every new project a user works on. **If the OpenRoads SS4 Pilot Project you are working on was moved out of ProjectWise to the X drive you should still complete all the steps in this chapter.**

Step 1 Verify Software Installations

Verify that the required software has been installed on your computer by navigating to the Windows Start Menu and typing *Programs* into the search field. Select [Show which programs are installed on your computer](#) from the search results. This will open the Control Panel's Programs and Features which lists the names and versions of the installed programs.

The required software applications are as follows:

ProjectWise Explorer

MicroStation V8i (SELECTseries 4)

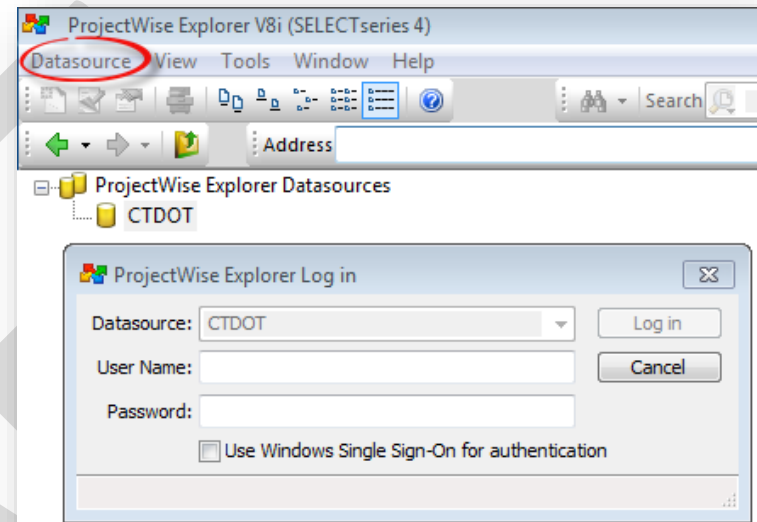
Bentley InRoads Suite V8i (SELECTseries 4)

Create a ProjectWise Desktop Shortcut

1. Select *All Programs > Bentley > ProjectWise*.
2. Right click on [ProjectWise Explorer](#) and select *Send to > Desktop*.

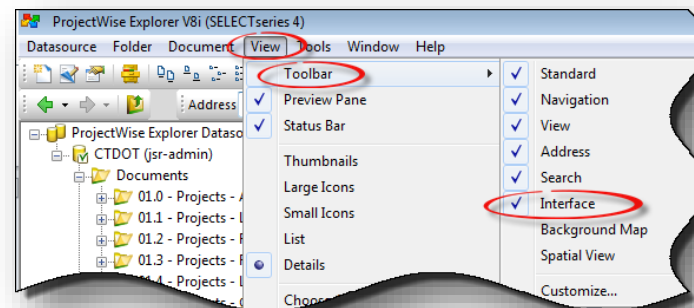
Step 2 Log in to ProjectWise

1. Double click on the newly created **ProjectWise Explorer** Icon as shown above.
2. From the ProjectWise Explorer main menu, select *Datasource > Log in...*
3. Enter your *User Name* and *Password* then select the **Log in** button.
4. Browse to locate your Project under *Documents\01.0 - Projects - Active*
5. Become familiar with the new project folder structure, it is quite different than how the X drive was structured. Two important folders will be the Highway and Survey folders.
330_Design_Data\Highways
500_Pre_Design\03_Central_Survey

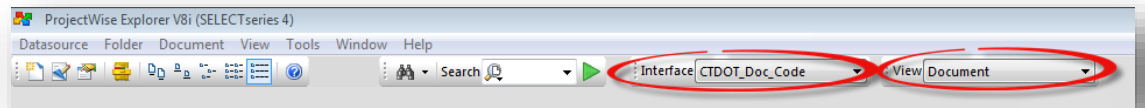


Step 3 Adjust ProjectWise Explorer Settings

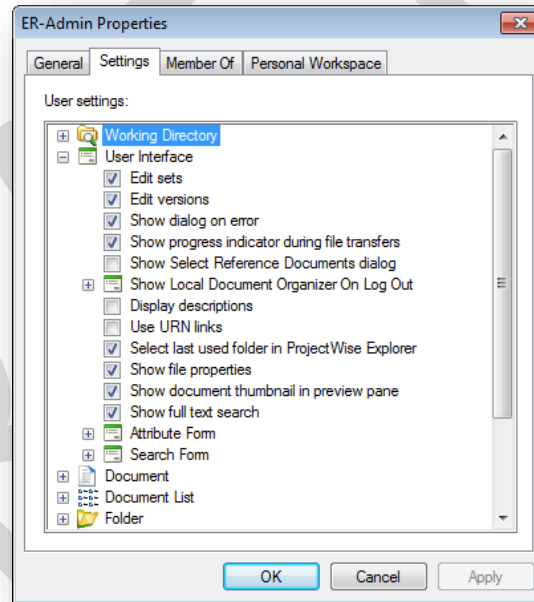
1. If the Interface and View are not displayed, navigate through the main menu select *View > Toolbar* and toggle them on.



2. ProjectWise Explorer has Interfaces and Views to display certain attributes.
Ensure that:
Interface is set to *CTDOT_Doc_Code*
View is set to *Document*



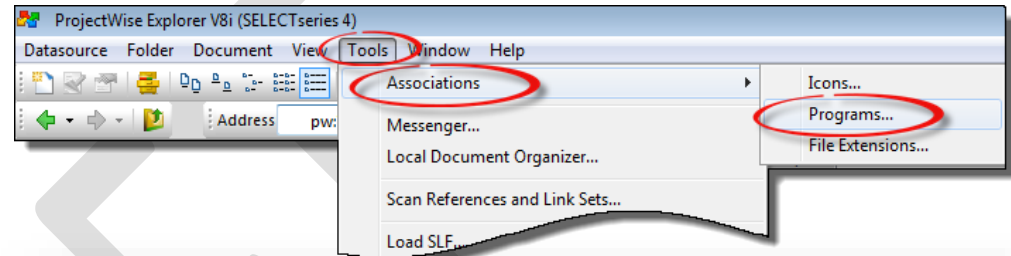
3. On the ProjectWise pull down menu select *Tools > Options*, Select the *Settings* tab and uncheck *Use URN Links*. Click *Apply* and *OK*.



Step 4 Configure ProjectWise Open With

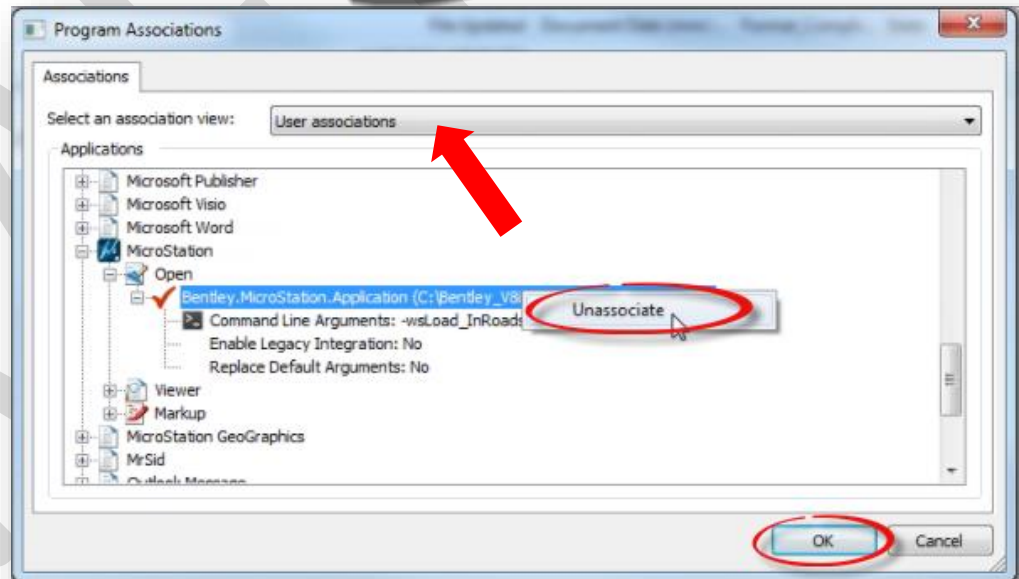
User Program Associations must be removed in order for MicroStation platforms and user workspaces to function properly.

1. From the ProjectWise Explorer main menu, select *Tools > Associations > Programs*



2. From the Program Associations dialog box, change Select an association view to *User associations*. Scroll down to *MicroStation*.

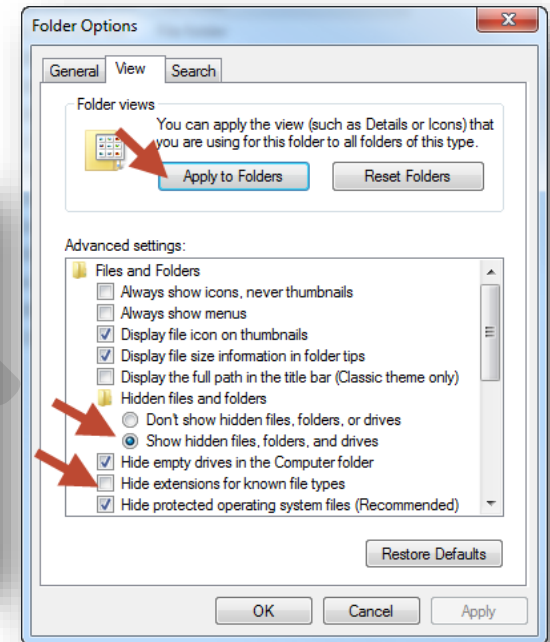
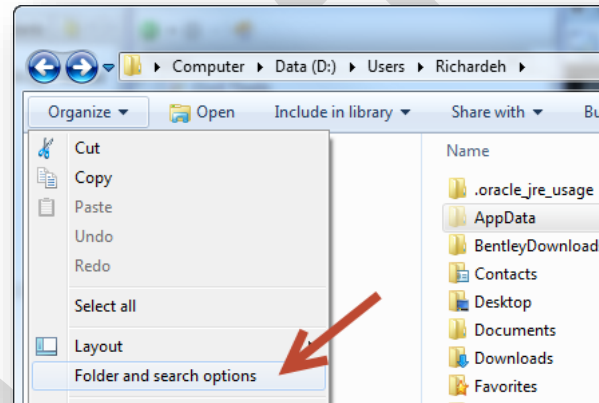
Note: In this case, MicroStation has its own unique icon displayed. (This is not the case for other programs such as MrSid and Outlook Message.) This indicates that there are User associations activated which **must** be removed.



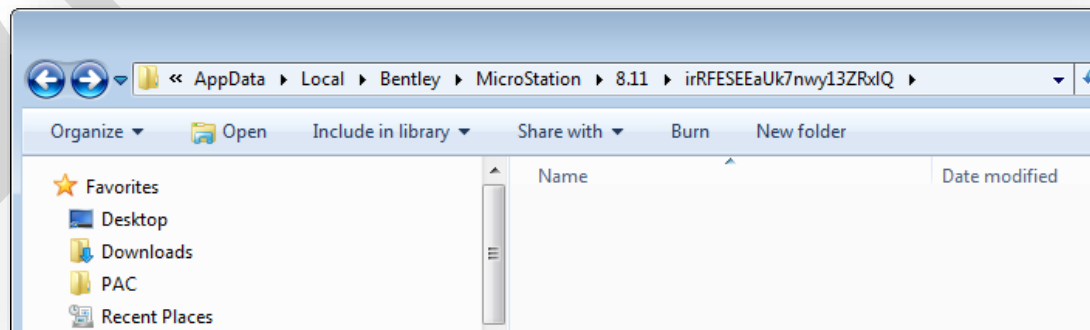
3. Expand the MicroStation tree to display *Open, Viewer, & Markup*. If the MicroStation icon is just a generic icon that looks like a notepad, skip the remaining part of this step.
4. Expand *MicroStation > Open* and right click on the line containing *ustation.exe*. Choose **Unassociate** and **OK**.
5. Repeat for each *ustation.exe* instance under *Open*. Disregard Viewer and Markup.

Step 5 Set up Your User Preferences

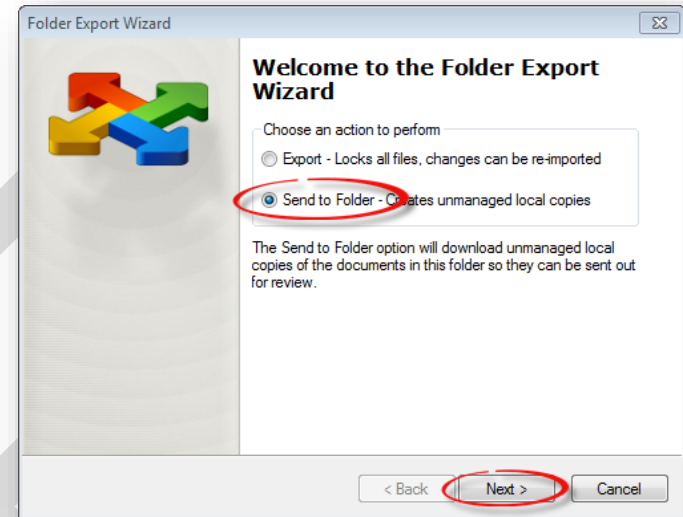
1. Open Windows Explorer, select *Organize > Folder and search options*. Under Hidden files and folders toggle on *Show hidden files, folders and drives*. The *Hide extensions for known file types* box should be unchecked. Select **Apply to Folders**.



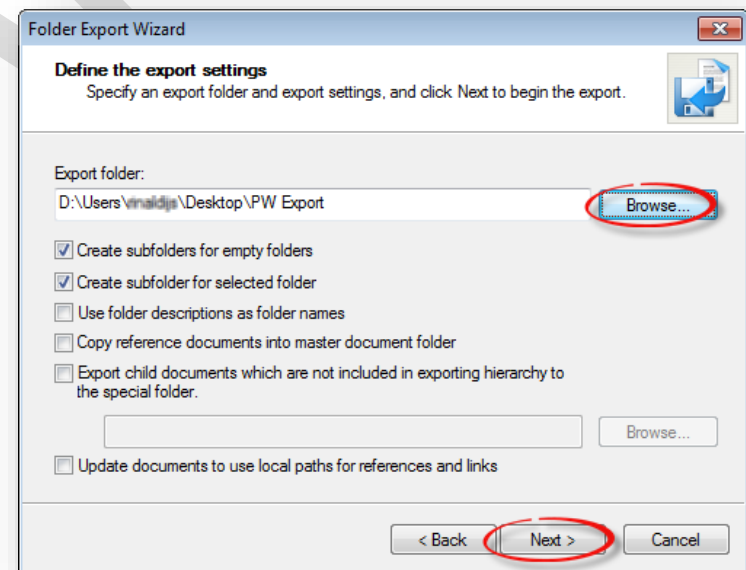
2. In Windows Explorer browse to:
D:\Users\Richardeh\AppData\Local\Bentley\MicroStation\8.11\irRFEESEaUk...,
Delete all of the files and folders under the irRFEESEaUK... folder.



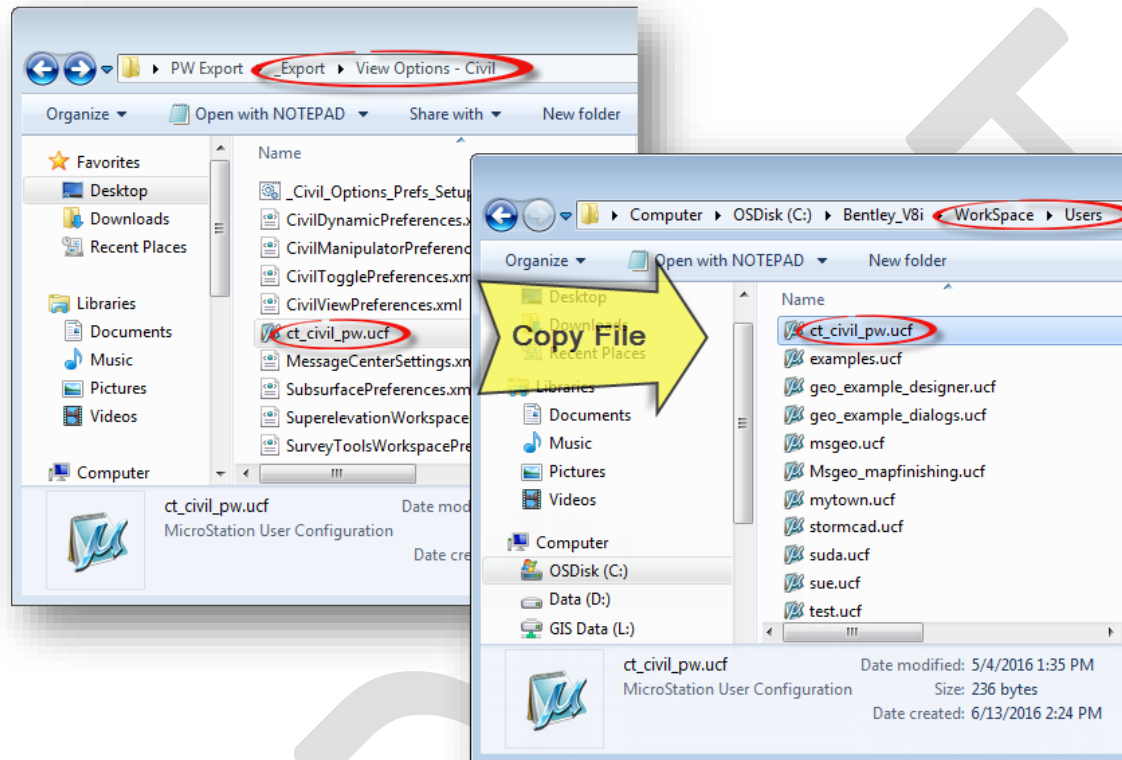
3. On your desktop create a folder named *PW Export*.
4. In ProjectWise browse to *05.0 – Workspace Resources\3_Workspace_V8i\Export*. Right click on the *_Export* folder and select **Export...**
5. Choose *Send to Folder* and select **Next>**.



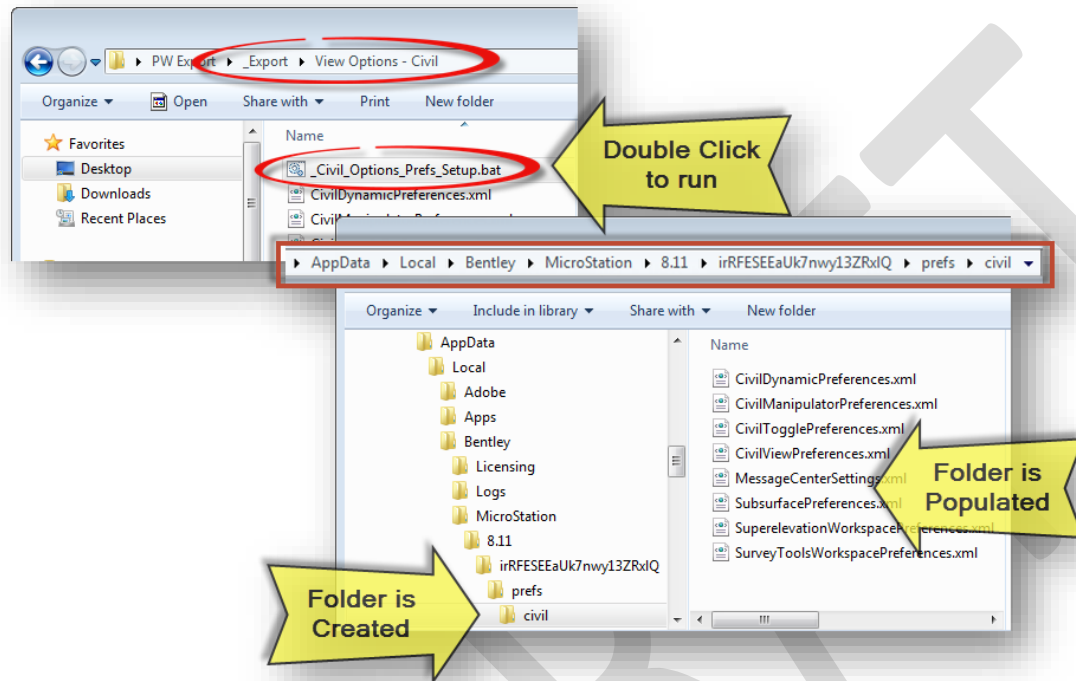
6. Browse to an export folder created in step 1 and accept to overwrite any outdated files if prompted, and **Finish**.



7. On your desk top open the folder *_Export folder\View Options - Civil* and copy *CT_Civil_pw.ucf* and *CT_MSTA_PW* to *C:\Bentley_V8i\Workspacce\Users*.



8. Again go to the *_Export folder* on your desktop, double click on *_Civil_Options_Prefs_Setup.bat* to automatically populate the civil folder with default preferences for Civil Options.

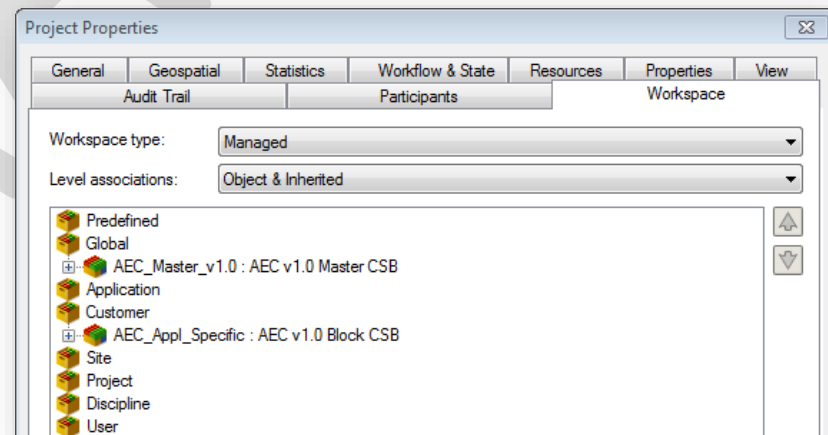


Chapter 3 Project Start up

If the OpenRoads SS4 Pilot Project you are working on was moved out of ProjectWise to the X drive you will skip Step 1. Complete either Step 3 for ProjectWise or Step 4 for the Network.

Step 1 Verify Correct Project Workspace

1. Locate the Workspace location. You will no longer be connected to the old workspace on the W drive, instead you will find the workspace at this location in ProjectWise, *Documents\05.0 - Workspace Resources\3_Workspace_V8i*.
2. Check to make sure your project is configured to the correct workspace. In ProjectWise explorer right click on the project folder and choose **Properties**. All projects using OpenRoads SS4 should use the following Blocks shown in the image below. ProjectWise Configuration Settings Blocks (CSBs) are attached to projects so that CAD workspaces are read when a MicroStation design file is opened.
3. If you do not see the correct blocks please contact AEC applications and they will reset them. Users do not have access to do this.
4. Click **OK** to close the box.



Step 2 Copy Resource Files from the Workspace to your project

The ITL and XIN will need to be copied over from the workspace to your project discipline folder

1. Browse to

In ProjectWise *05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\data\feature_definitions\Civil_Features.xin*

For Network Projects *W:\3_Workspace_V8i\Civil_Standards\data\feature_definitions\Civil_Features.xin*

Right Click and Select **Copy**. Browse to your projects discipline folder right click and select **Paste**. When the Document Wizard appears select **No Wizard** and click the **OK** button.

2. Browse to

In ProjectWise *05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\data\template_library\OpenRoads_Typicals.itl*

For Network Projects *W:\3_Workspace_V8i\Civil_Standards\data\template_library\OpenRoads_Typicals.itl*

Right Click and Select **Copy**. Browse to your projects discipline folder right click and select **Paste**. When the Document Wizard appears select **No Wizard** and click the **OK** button.

Step 3 Create and Open a MicroStation DGN File in PW

NOTE: Seed File Usage

- Use a 2D DGN seed file to start your Design Modeling (OpenRoads will automatically create a 3D model as your design progresses).
- Survey will use one of the 3d DGN seed file to house the Existing Terrain.
- DO NOT Drag and drop DGNs and Point Cloud files in from an external location. These files have different working units and will not scale properly if opened in the ProjectWise environment.
- Always start with new clean seed files.

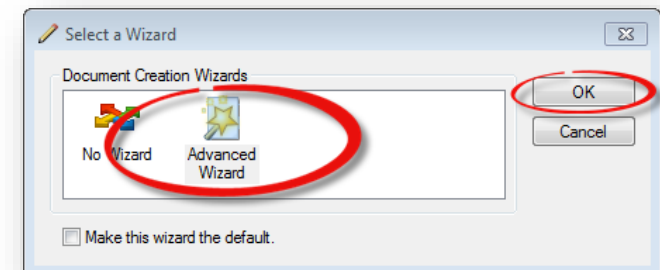
Geospatial OpenRoads seed files

```
\Documents\05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\  
2D_OpenRoads_DesignSeed_83.dgn  
2D_OpenRoads_DesignSeed_27.dgn  
3D_OpenRoads_DesignSeed_83.dgn  
3D_OpenRoads_DesignSeed_27.dgn
```

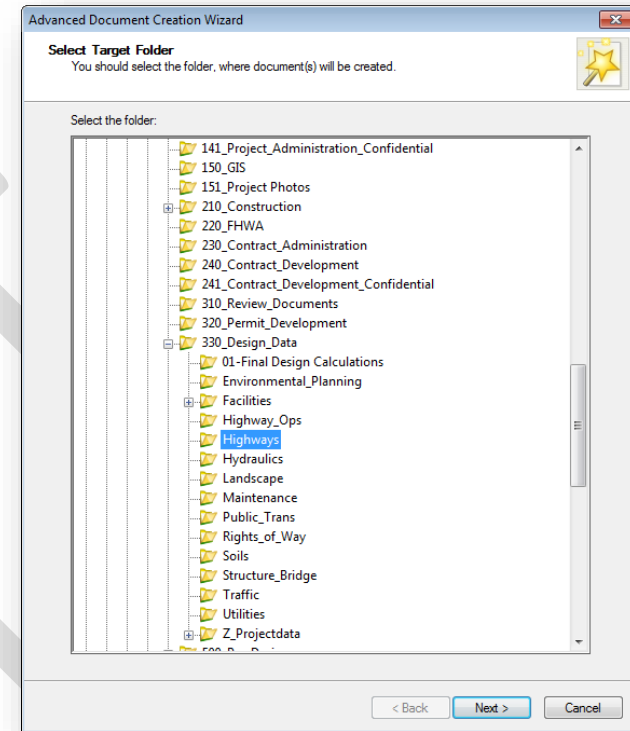
FAQs - NAD & NGVD

<http://www.ngs.noaa.gov/faq.shtml#WhatNAD>

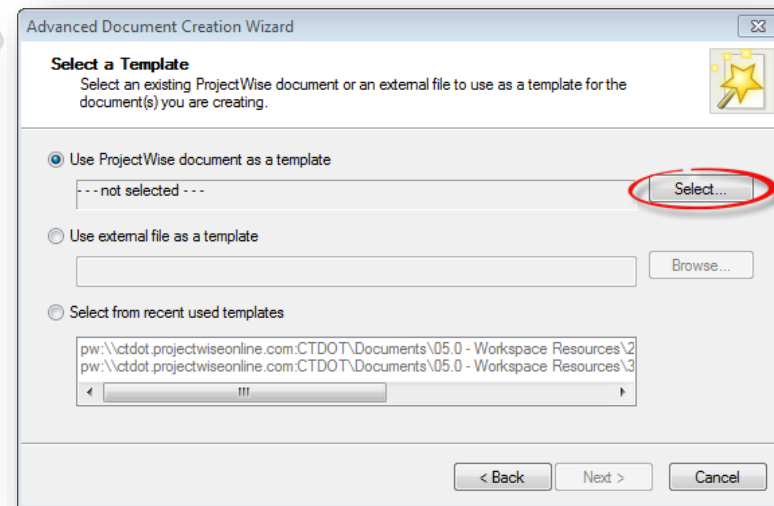
1. Select the project subfolder that you wish to work in.
Example: *01.0 - Projects - Active\1234-1234\300_Design_Data\Highway*
2. From the main menu, select *Document>New > Document...*
3. In the *Select a Wizard Dialog Box*, select **Advanced Wizard** then **OK**.
4. On the *Advanced Document Creation Wizard Welcome* dialog box Select **Next>**.



5. When prompted to Select Target Folder, verify that you are pointed to the correct folder and select **Next>**.



6. From the Select a Template options, toggle on *Use ProjectWise as a template* and click the **Select...** button. If this is not your first time creating a MicroStation file in ProjectWise, you may elect to toggle on *Select from recent used templates* and use a previously selected seed file stored in your file history and skip to the next step.



7. A Select Template Document dialog box will appear. Browse to the seed files location:
...05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed

Choose the 2D seed file that corresponds to your survey NAD year 1983 or 1927.

2D_OpenRoads_DesignSeed_83.dgn

or

2D_OpenRoads_DesignSeed_27.dgn

Select the **Open** button. The template is now populated for Advanced Document Creation. Select **Next**.

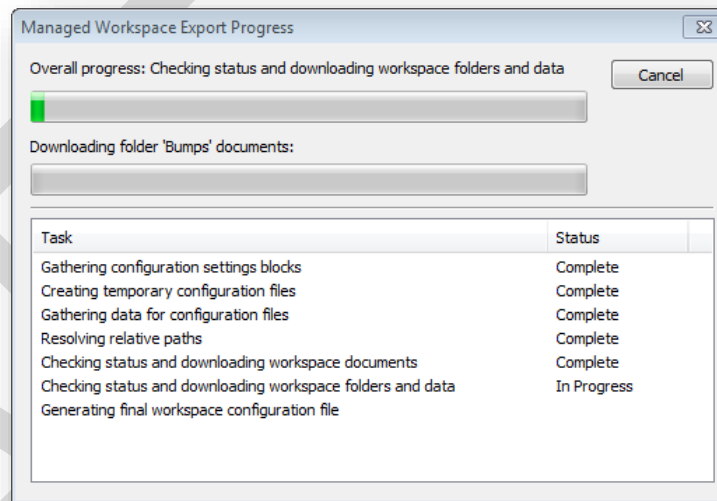
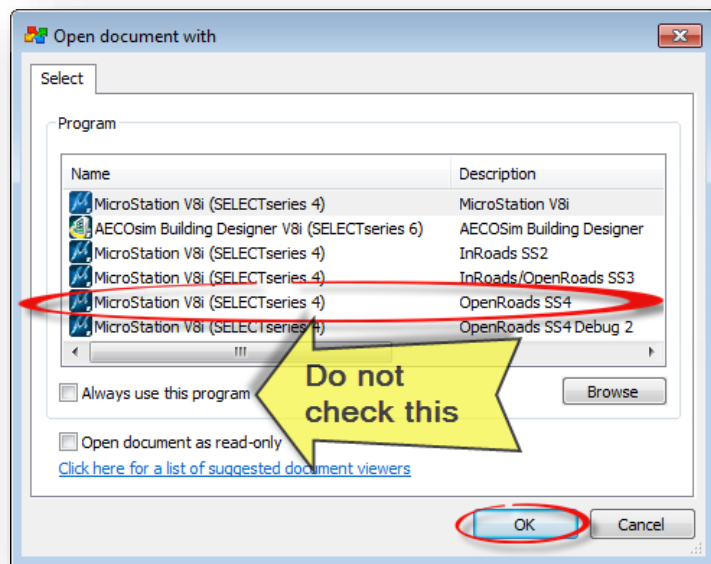
8. Select the fields to Define Document Attributes as shown. Tab to accept each field. The document file name will be built from these fields. Be sure to enter a *Label* and *Description*. These fields will be displayed and used for searching rather than the file name. Select **Next**.
9. On the Document Properties Dialog Box select **Next>**.
10. On the Create a Document Dialog box select **Next >**.
11. Click **Finish** to **Close**. The new file will now appear in ProjectWise.
12. To Update the ProjectWise Explorer Document View *data point in the view* and then select **F5** on the keyboard. This will refresh Label and Description.
13. In ProjectWise Explorer browse to your discipline folder and locate the DGN file you wish to open, right click on the DGN file and select **Open With**. By default MicroStation DGN files will open with MicroStation only (i.e. no InRoads nor OpenRoads) if double clicked on, so selecting open with is imperative if you want to run OpenRoads.

The screenshot shows the 'Advanced Document Creation Wizard' dialog box, specifically the 'Define Document Attributes' step. The title bar reads 'Advanced Document Creation Wizard' and the subtitle is 'Define Document Attributes'. Below the subtitle, it says 'You should define environment specific document attributes.' The dialog is divided into several sections:

- Discipline:** A dropdown menu set to 'HW' and a text field for 'Discipline Description' containing 'Highways'.
- Main Category:** A dropdown menu set to 'CAD'.
- Sub Category:** A dropdown menu set to 'Design' and a text field for 'Sub-Category Description' containing 'CAD Design Models'.
- Project Number(s):** A text field containing '1234_1234'.
- Document Date (mm/dd/yyyy):** An empty text field.
- Label (User Defined):** A dropdown menu set to 'OpenRoads'.
- Description:** A text field containing 'OpenRoads Modeling File'.
- CTDOT Asset Tags:** A section with two columns of input fields, each with a browse button (...):
 - Left column: Bridge No(s), Signal Intersections No(s), Traffic_Structure_ID, Sign Structures No(s), Railroad Crossing Signal No(s).
 - Right column: Building No(s), State Route No(s), Town Road ID(s), Town No(s).

At the bottom of the dialog, there are three buttons: '< Back', 'Next >' (highlighted in blue), and 'Cancel'.

14. In the Open document with dialog box locate the Description column and select **OpenRoads SS4** and click **OK**. This will use OpenRoads SS4 if it is installed and also complete CTDOT configurations. The Managed Workspace will now begin to cache on your computer's hard Drive.



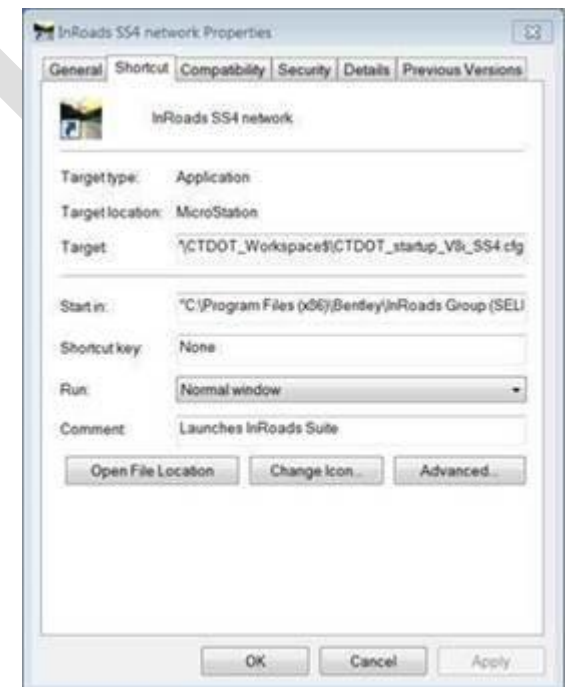
Step 4 Create and Open a MicroStation DGN File on the Network

1. Create a desktop shortcut by right clicking the program from the *start menu > All Programs > Bentley > InRoads Group V8i (SELECTseries 4) > Send to > desktop (create shortcut)*.

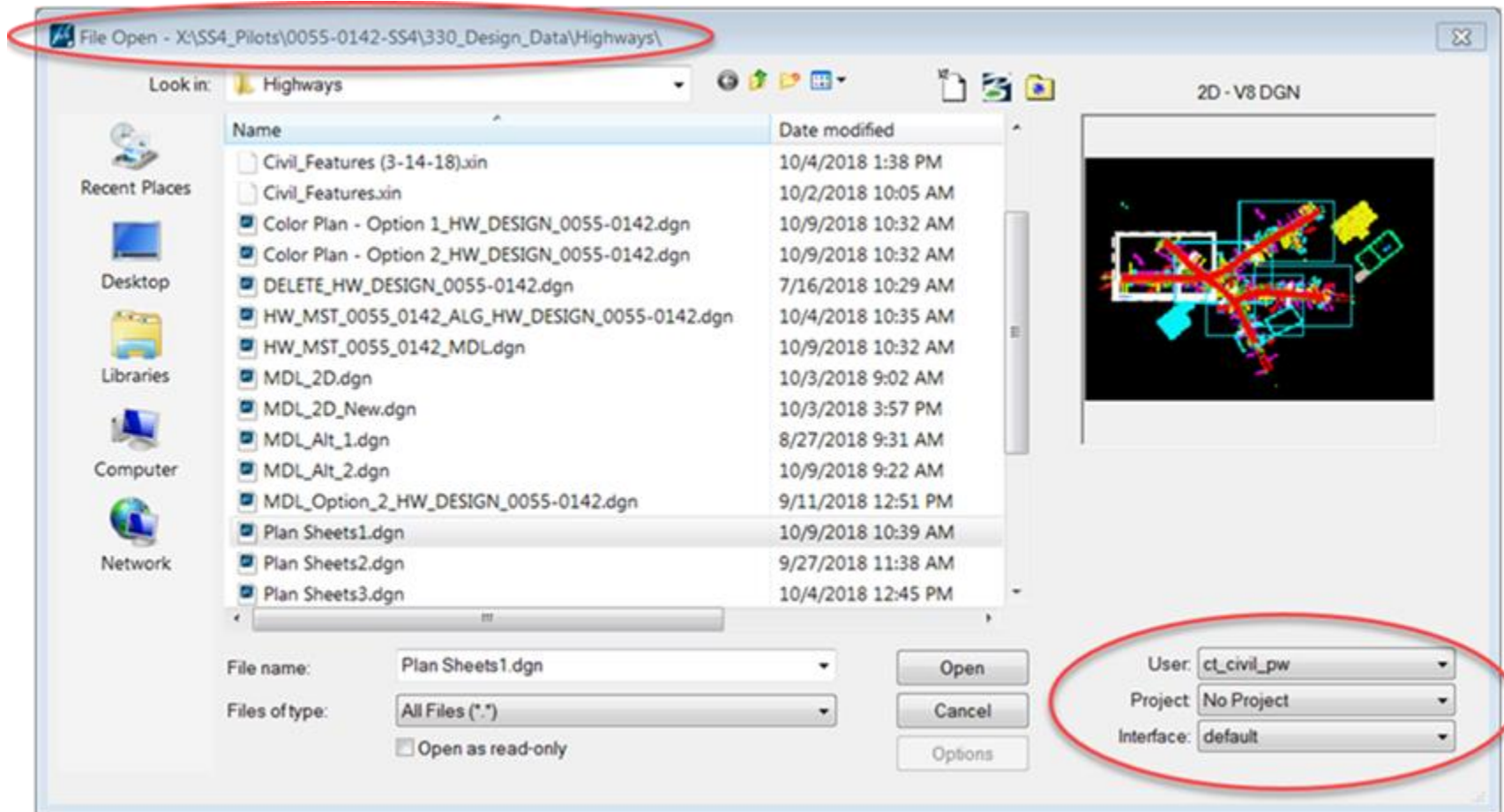
2. Edit the shortcut properties target by copying and pasting this:

`C:\Bentley_V8i\MicroStation\ustation.exe -wc\\DOT SDCENG07V\CTDOT_Workspace$\CTDOT_startup_V8i_SS4.cfg`

3. Double Click on the Icon to open the application, hit the cancel button when the ProjectWise log in appears.



4. Use ct_civil_pw for a User and do not pick a project.



5. Browse to your project folder under the X:\SS4_Pilots folder and create or open a file.

NOTE: Seed File Usage

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- Always start with new clean seed files.

Geospatial OpenRoads seed files

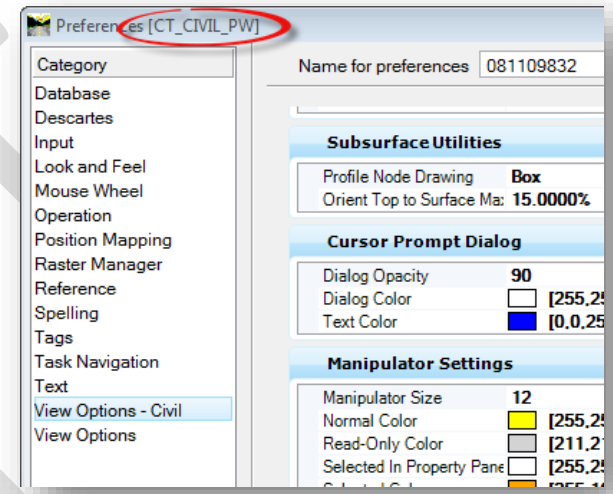
W:\3_Workspace_V8i\Civil_Standards\seed\
2D_OpenRoads_DesignSeed_83.dgn
2D_OpenRoads_DesignSeed_27.dgn
3D_OpenRoads_DesignSeed_83.dgn
3D_OpenRoads_DesignSeed_27.dgn

FAQs - NAD & NGVD

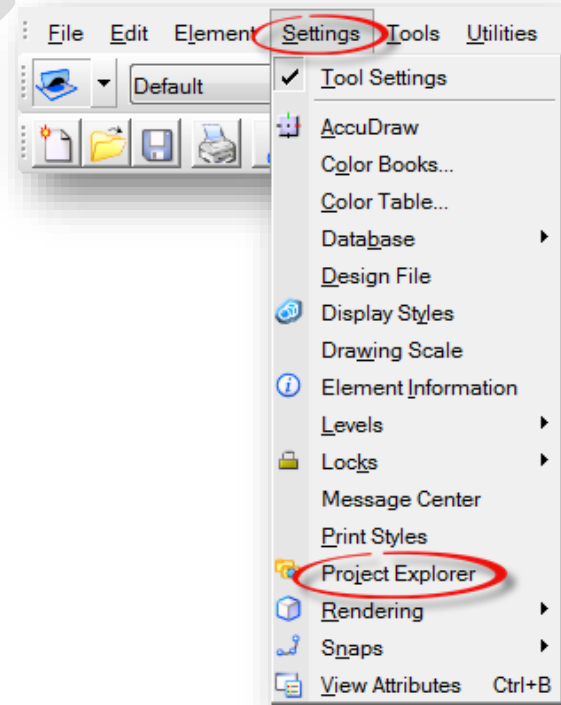
<http://www.ngs.noaa.gov/faq.shtml#WhatNAD>

Step 5 Ensure your User Preferences are working properly

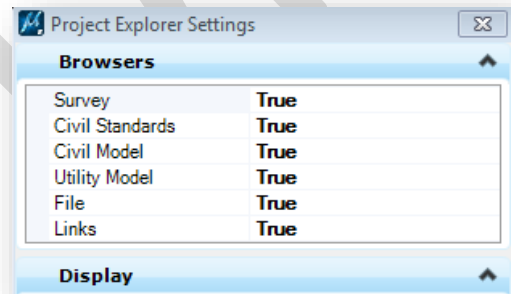
1. Now that your MicroStation File is opened you should check to make sure your User Preferences are properly set. On the MicroStation pull down menu select *Workspace > Preferences*. It should be named *CT_CIVIL_PW*



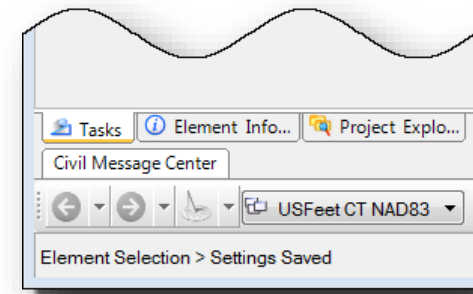
2. Ensure that all MicroStation Project Explorer settings for Browsers are **True** by selecting *Settings > Project Explorer* from the MicroStation menu.



set to



- At the bottom of the Right side of you screen check for docking of the Tasks, Project Explorer and Element Information Tabs. You can move and doc them as desired.

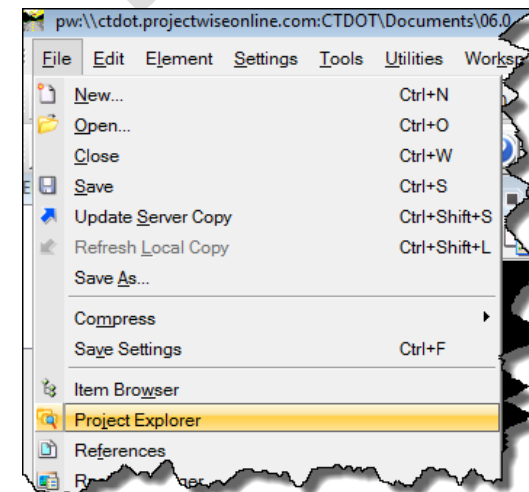
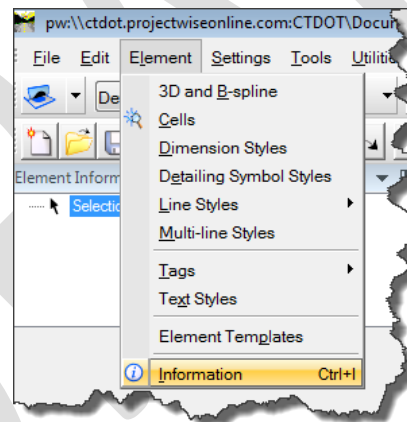
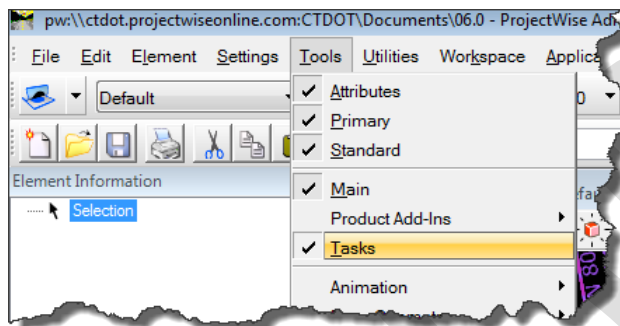


- If the these menu are not visible you can manually turn them on using the MicroStation pull down menu.

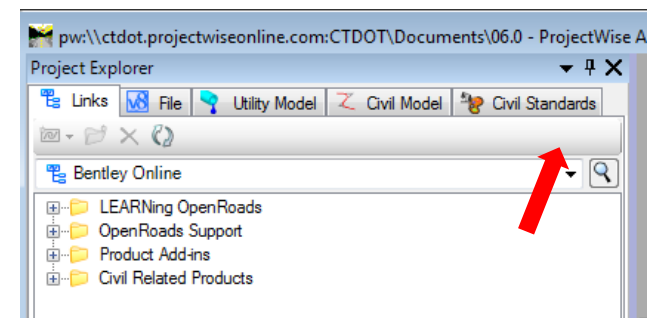
For the Tasks select **Tools > Tasks**.

For Element Information select **Element > Information**.

For the Project Explorer select **File > Project Explorer**.



- Locate the Bentley Online Help Videos, On the Project Explorer there is a Tab named Links. Click on the down arrow and select **Bentley Online**. This will directly link you to Bentley's help and Training Videos.



Step 6 Set up Project Defaults

1. If the InRoads explorer dialog box is not visible you will need to open it. On the MicroStation pull down menu select *Applications > InRoads > Tools > Show/Hide*.
2. On the InRoads Main menu select *File > Project Defaults*. Select the **New** button and type the desired configuration name.
3. In the Preference (*.xin) field browse the XIN file that was copied to your discipline folder.
4. Copy that same path (not the file) in to the **Default Directory Path** for the Geometry Project (*.alg) and the Template Libraries (*.itl).
5. Click **Apply** and **Close**.
6. Open *Project Defaults* again and select **Highway** as your *Preferred Preference*.

Set Project Defaults

Configuration Name: PW_1234_1234

Default Preferences

Preference	Path	Read Only
Preferences (*.xin):	pw:\ctdot.projectwiseonline.com:CTDOT\Documents\01.0 - Proje	<input type="checkbox"/>
Turnouts (*.xml):		<input type="checkbox"/>
Drainage Structures (*.dat):		<input type="checkbox"/>
Rainfall Data (*.idf):		<input checked="" type="checkbox"/>
Bridge Sections (*.bt):		<input type="checkbox"/>
Drafting Notes (*.dft):		<input type="checkbox"/>
Pay Items (*.mdb):		<input type="checkbox"/>

Default Directory Paths

ProjectWise Directory:	
Project Default Directory:	
Report Directory:	
Projects (*.rwk):	
Surfaces (*.dtm):	
Geometry Projects (*.alg):	pw:\ctdot.projectwiseonline.com:CTDOT\Documents\01.0 - Projects - Active\1234_12:
Template Libraries (*.itl):	pw:\ctdot.projectwiseonline.com:CTDOT\Documents\01.0 - Projects - Active\1234_12:
Roadway Design (*.ird):	
Survey Data (*.fwd):	
Drainage (*.sdb):	
Style Sheet (*.xsl):	
Quantity Manager (*.mdb):	

Default Grid Factor
Grid Factor: 1.0000

Export
 Active Only

Preferred Preference
Name: Highway

Chapter 4 Existing Terrain

Section 4.1 Obtain an Existing Terrain

The concept of 2D and 3D files is very important when using OpenRoads. The existing terrain will be created using a seed file with a 3D model while the proposed design will be created using seed file with a 2D model. Keep in mind when using OpenRoads to design the MicroStation file with the 2D model will automatically create a 3D model, so you will be working with one file that had two models. Most of the work a designer does will be utilizing the 2D Model and the 3D Model will get propagated automatically. The 3D views are mostly used for checking the model and visualization. Below are three methods for creating an existing Terrain.

- Create from Fieldbook
- Create from File DTM
- Create from Point Cloud (See the Earth Exploration Toolset workflow located on the [CTDOT's OpenRoads website](#))

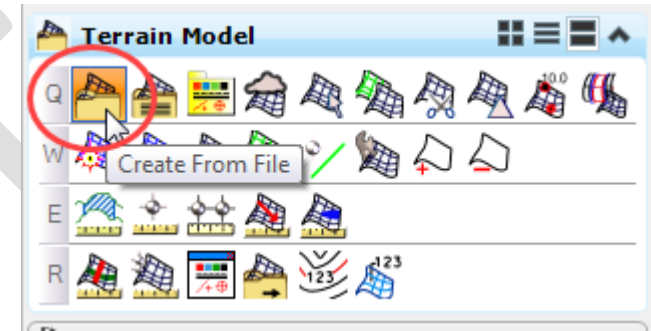
4.1.1 Create from Fieldbook

This will be done with new survey data where a DTM does not exist yet. The Survey Unit will use OpenRoads to process the fieldbook instead of InRoads SS2. Please see the OpenRoads Survey Workflow for further information on this process.

4.1.2 Create From DTM File

Request an existing terrain DGN file from Survey. In OpenRoads Survey will use the Create from File tool to convert the existing DTM to a Terrain. Below are the steps they will use.

1. Create a new 3D Design Model.
2. Open the file and in the task menu select *Civil Tools\Terrain Model\ Create from File tool*.
3. The Select Files to Import dialog will appear. Browse to the location of the **DTM** file to import, highlight it and click **OK**.

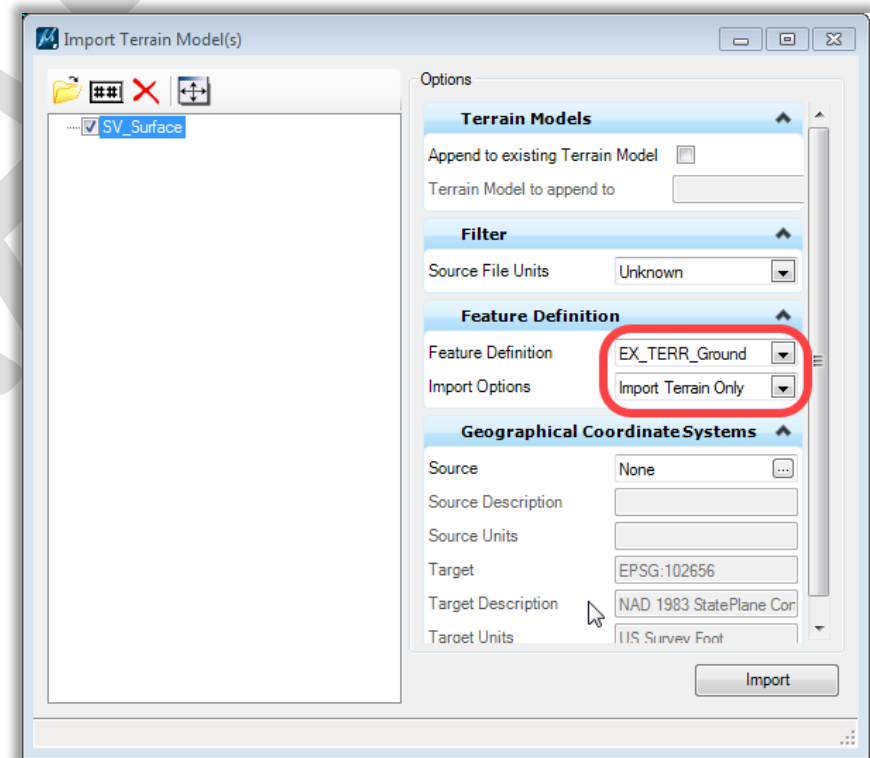


4. Another dialog box should appear. Fill out the fields as shown.

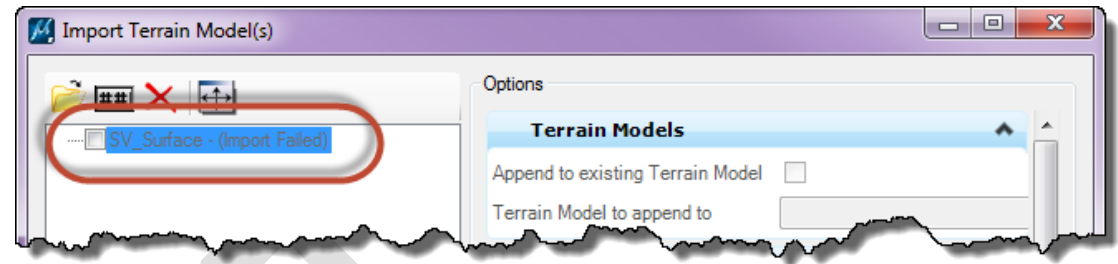
Feature definition: *Meshes/EX_TERR_Ground*

Import Options: *Import Terrain Only*

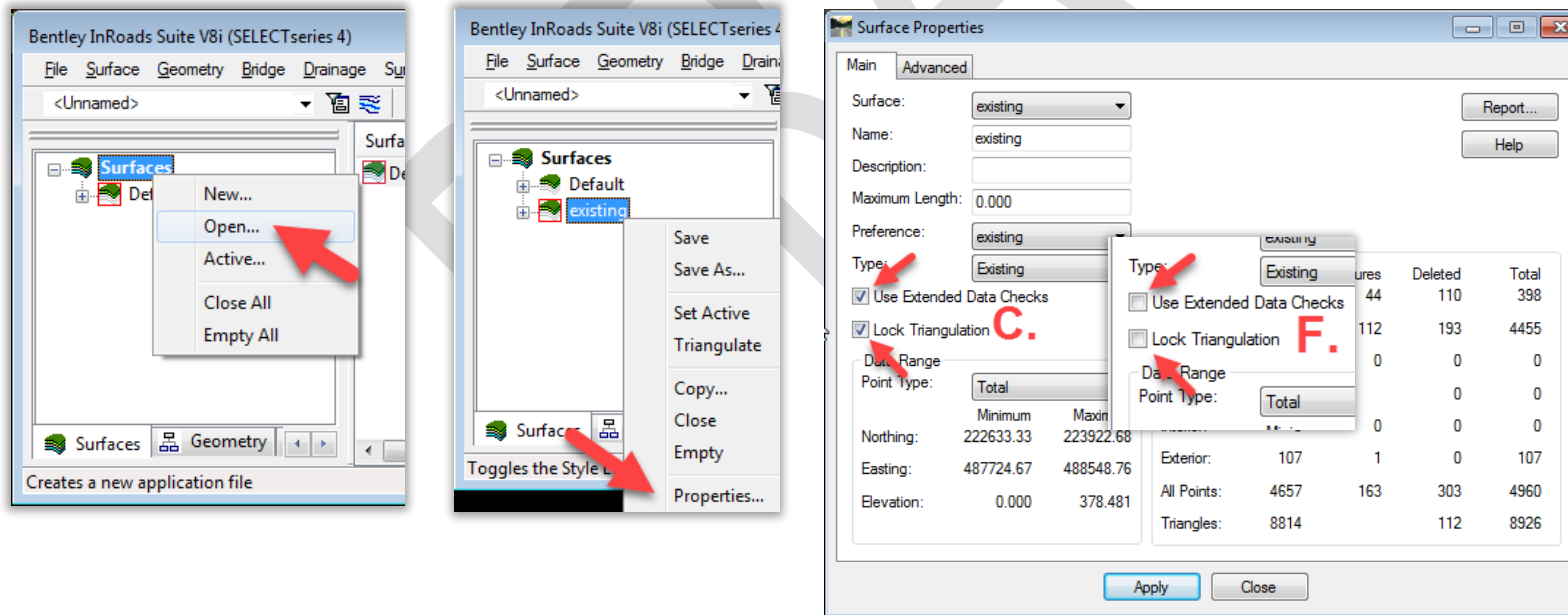
Click **Import**.



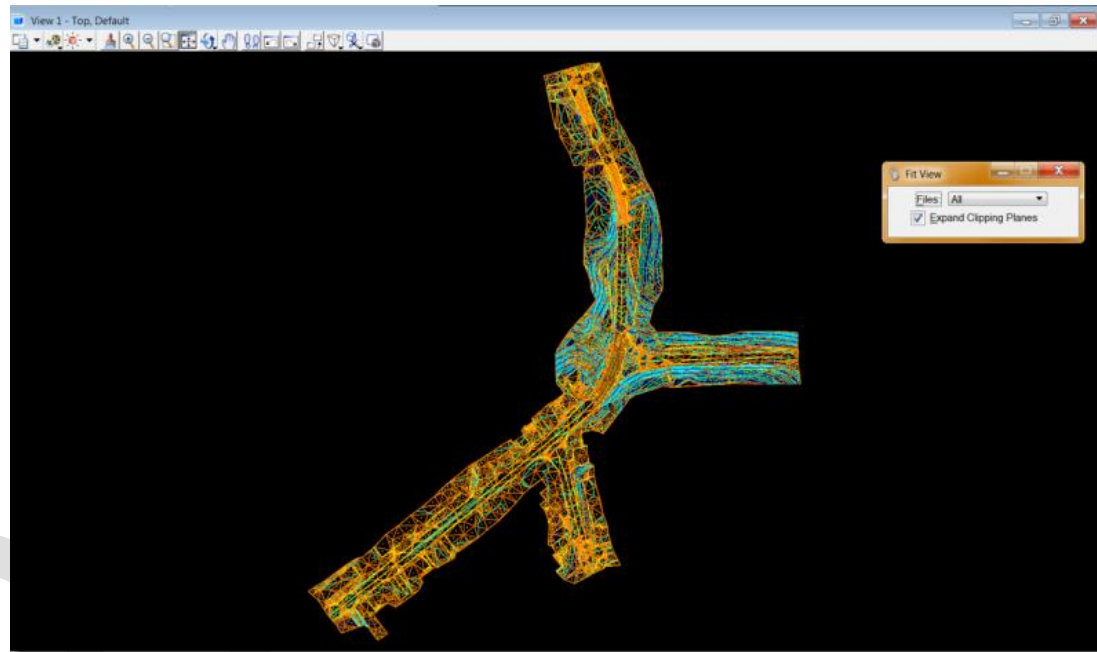
5. If an **Import Failed** error appears the following procedure must be done to the DTM.



- A. On the InRoads Explorer dialog box open the DTM.
- B. Right click on the DTM and select *Properties*.
- C. Toggle on *Use Extended Data Checks* and *Lock Triangulation*, click **Apply** and **Close**.
- D. Right click on the DTM and select **Save**.
- E. Right click on the DTM and select *Properties*.
- F. Toggle off *Use Extended Data Checks* and *Lock Triangulation*, click **Apply** and **Close**.
- G. Right click on the DTM and select **Save**.
- H. Right click on the DTM and select **Close**.

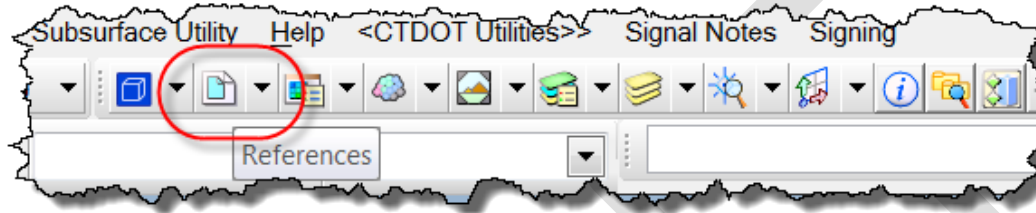


6. Go back and do #3 & 4. Select **Fit View** tool and the terrain should appear in the file.

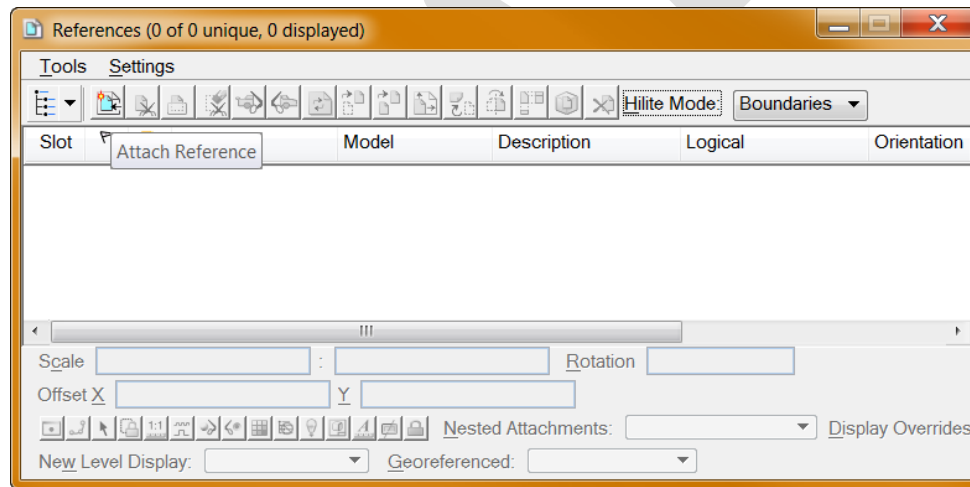


Section 4.2 Reference in the Existing Terrain

1. If you have not done so already create a 2D design file as shown in [Chapter 3, Step 3](#) and right click and select *Open With*, select the *OpenRoads SS4* option.
2. Once in the file go to the **Reference** tool and open the references dialog box.



3. In the references dialog click the **Attach Reference** button.



4. In the Attach Reference dialog box browse to the needed DGN terrain file. If Survey created it, the file will be in the *500_Pre_Design\03_Central_Survey folder*. Highlight it and click **OK**.

5. In the Reference Attachment Settings Dialog Box give the file a logical name, set the options as shown. Be sure that the Nested Attachments is set to *No Nesting* and click **Ok**.

Reference Attachment Settings for ...\\terrain file_AEC_DESIGN_.dgn

File Name: PW_WORKDIR:d0200908\terrain file_AEC_DESIGN_.dgn
Full Path: ...\\sfs-admin\d0200908\terrain file_AEC_DESIGN_.dgn
Model: Default

Logical Name: ground terrain
Description: Master Model

Orientation:

View	Description
Coincident	Aligned with Master File
Coincident - World	Global Origin aligned with Master File
Standard Views	
Saved Views (none)	
Named Fences (none)	

Detail Scale: Full Size 1=1

Scale (Master:Ref): 1.000000 : 1.000000

Named Group:
Revision:
Level:
Nested Attachments: No Nesting Nesting Depth: 2
Display Overrides: Allow
New Level Display: Use MS_REF_NEWLEVELDK
Global LineStyle Scale: Master
Synchronize View: Volume Only

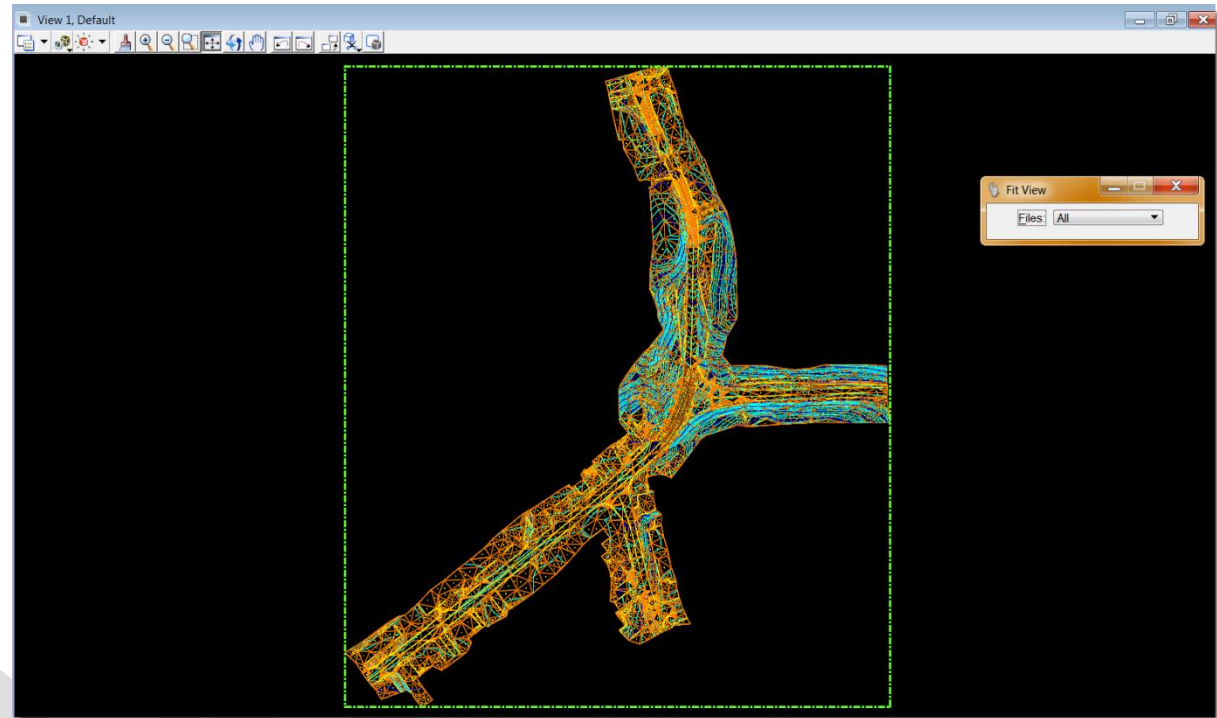
Toggles

Drawing Title

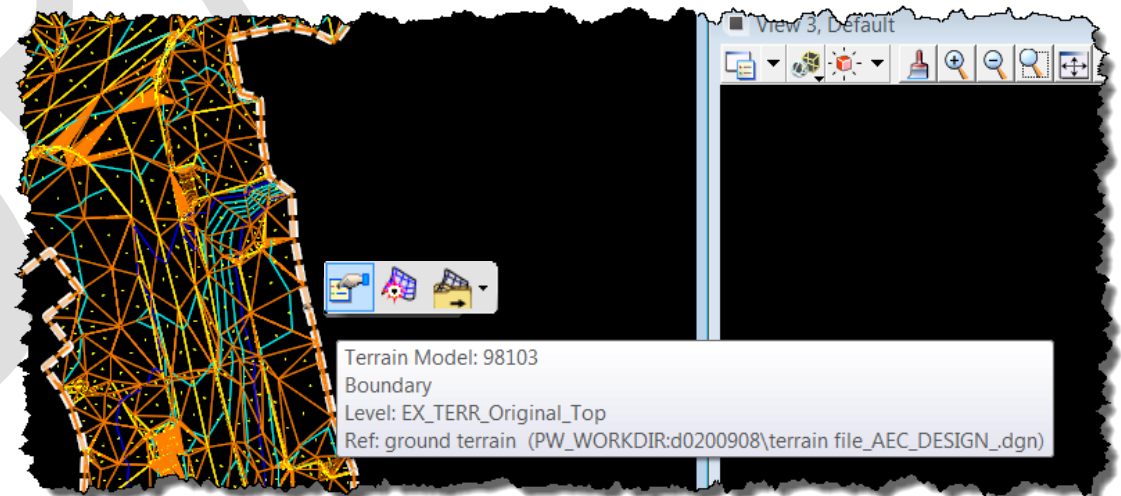
Create
Name: Drawing

OK Cancel

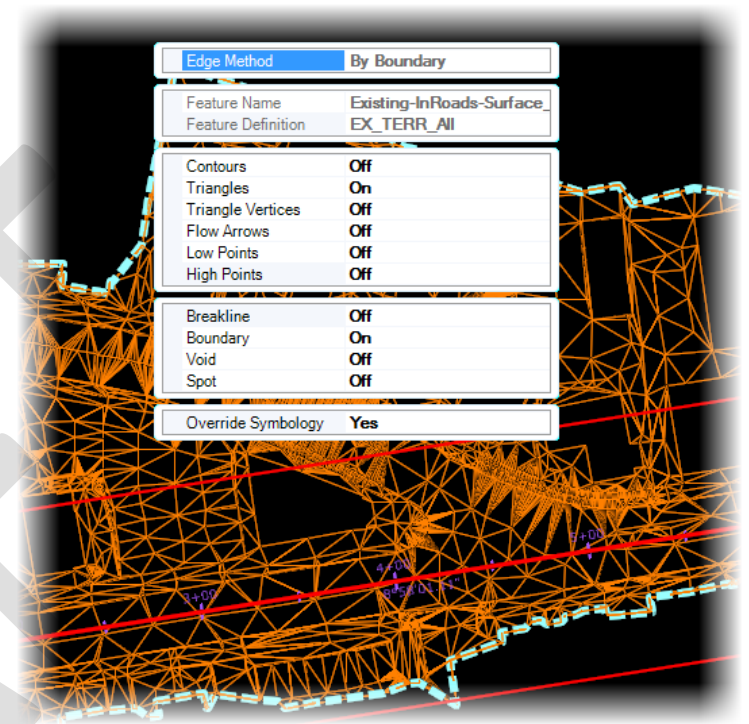
6. Go to your main view and click **Fit View**. The terrain should be displayed.



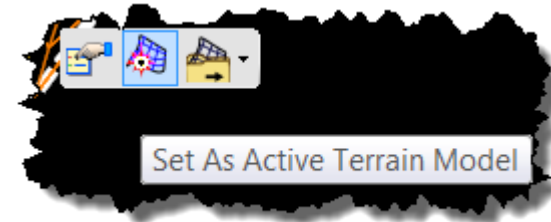
7. To change the display of the view select the **Element Selection Tool** and click and hover over the terrain border (edge) to get the context menu to appear. Click the **Properties** button.



8. In the *Override Symbology field* select *Yes* to be able to change the display of features in the terrain model.
9. Now select *Off* for all of the fields you would like to display off such as flow arrows, low points etc.
10. The terrain model should now display with symbology turned off or on depending on your selected settings.



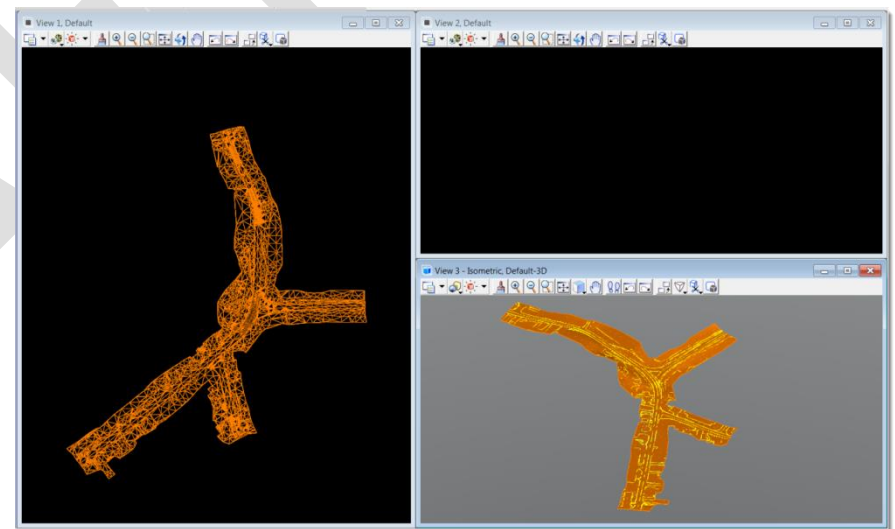
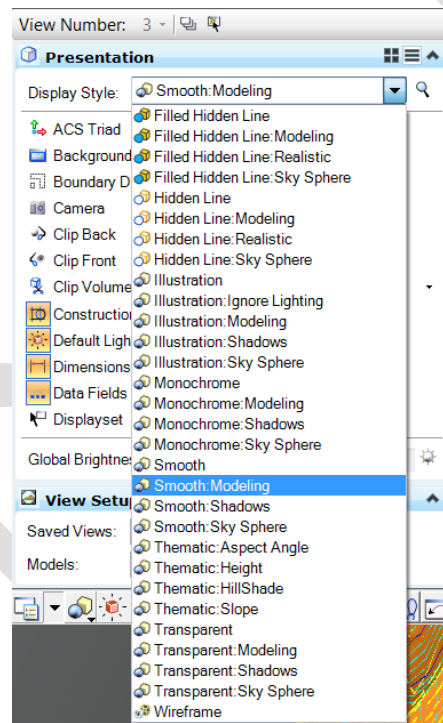
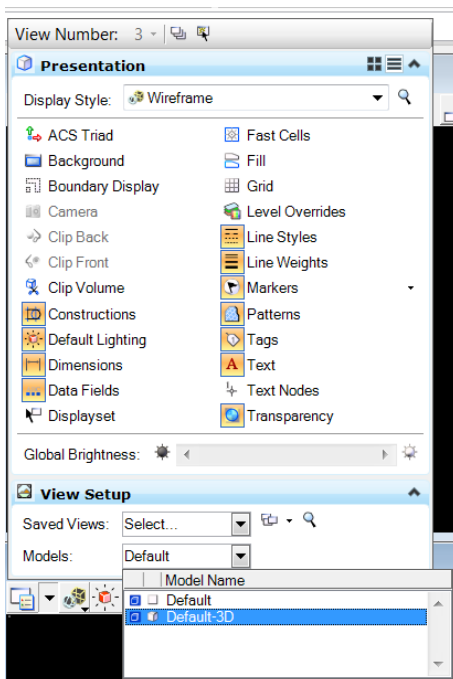
11. Now hover over the terrain model edge again to get the context menu to appear. Click the **Set As Active Terrain Model** button. If you have a file with the Ground features attach it as well. If you select **F10** your reference file colors will appear dithered out.



Section 4.3 View the 3D Features

The quickest way to do this is to select **F9** on your Key board, but it is important to understand how this all happens. Follow the instructions below to view your 2D features and 3D features in the same DGN file.

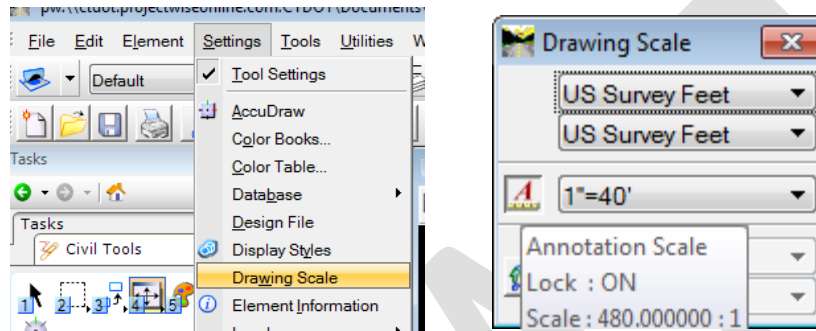
1. Open another view window. In this window open *View Attributes* and select the *default-3D model* from the model field.
2. To make it a bit easier to see, in the display style field select *Smooth Modeling* from the dropdown list
3. Click the **Fit View** button in your view containing the default model and your view containing the default-3D model. Use the Rotate View command see your terrain in 3D. Most of the modeling will be completed in the 2D window, the 3D view is useful for evaluating changes to the design visually.



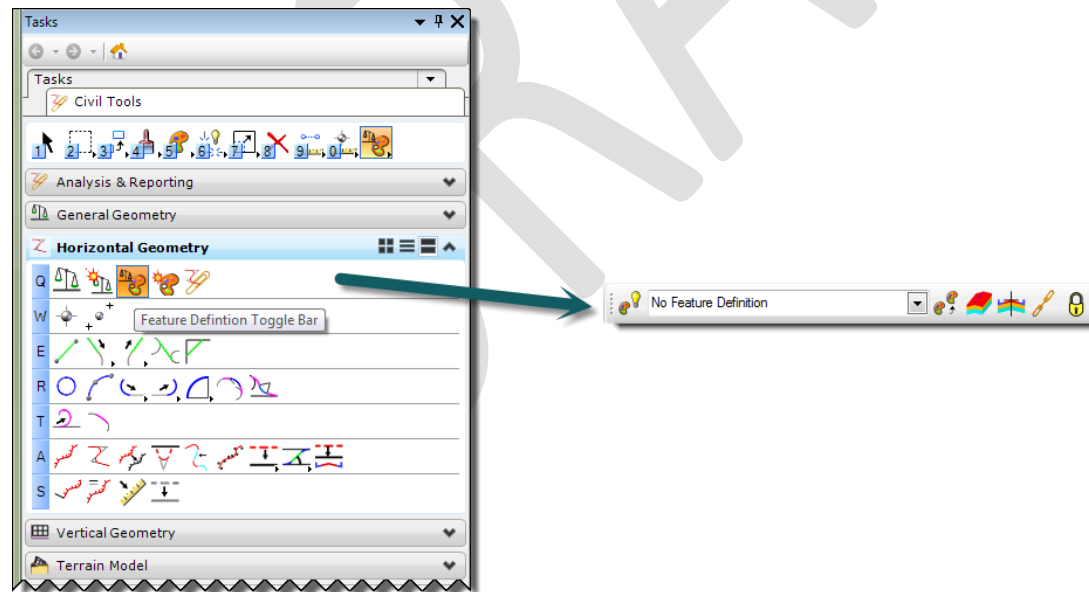
Chapter 5 Geometry

Section 5.1 Geometry Set Up

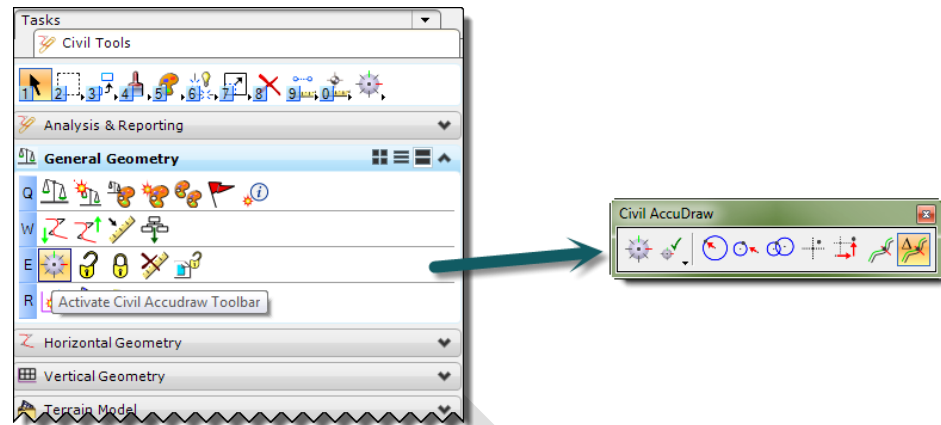
1. To set the Annotation Scale, go to *Settings > Drawing Scale*. Toggle *Annotation Scale* On and set it to $1'' = 40'$.



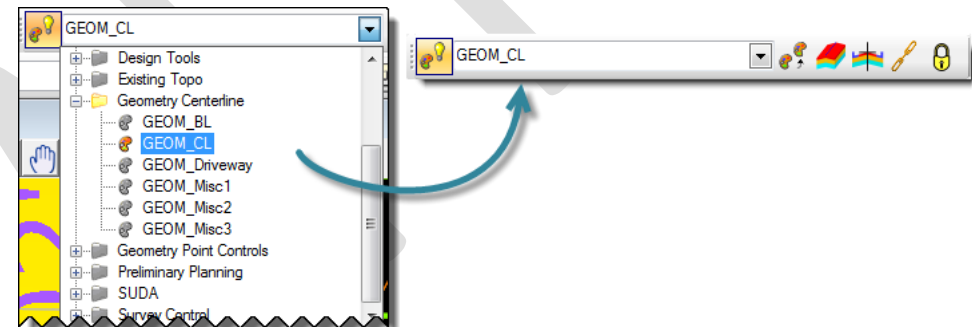
2. On the tasks menu under *Civil Tools > General Geometry* and turn on the *Feature Definition Toggle Bar* (if it is not already on).



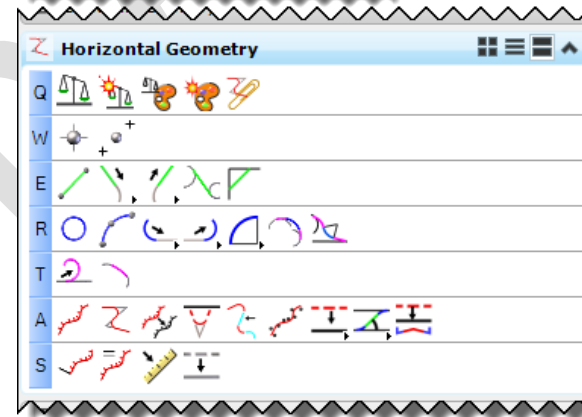
3. On the task menu under *civil tools > general geometry* and turn on the **Civil Accudraw toggle bar** (but do not turn Civil Accudraw on yet).



4. Set the feature definition to *GEOM_CL* and make sure the **Use Active Feature Definition** button is on.



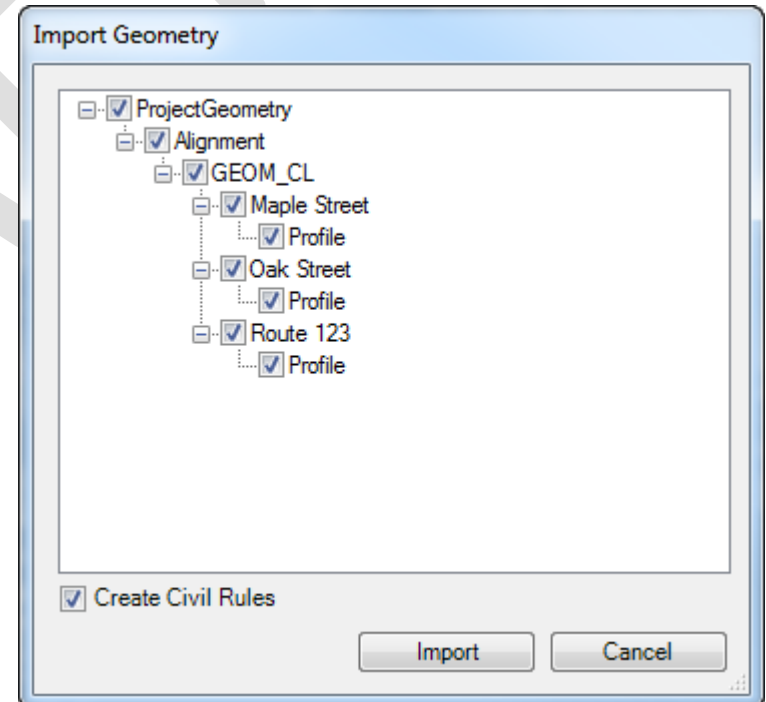
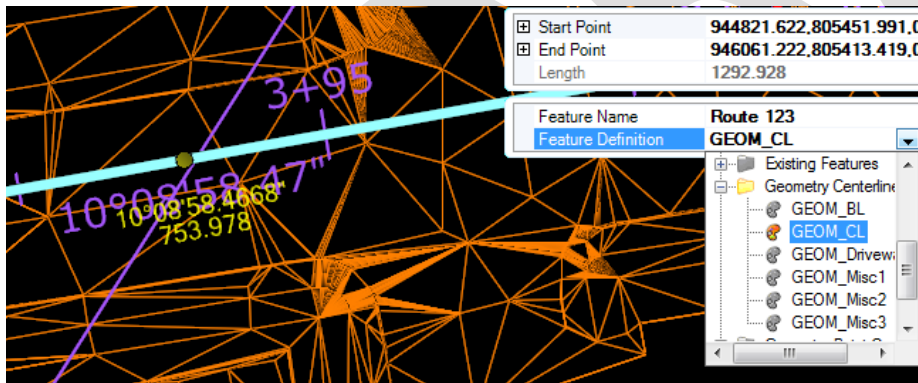
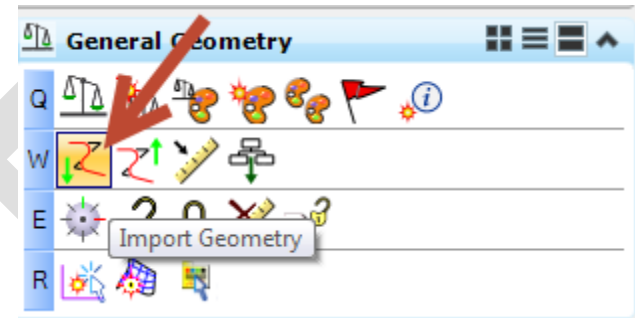
5. Review the horizontal alignment tools.



- General Geometry
- Geometry Point
- Geometry Line
- Geometry Arc
- Geometry Spiral
- Geometry Complex
- Geometry Modify

Section 5.2 Importing Geometry from an InRoads ALG file

1. If you have multiple vertical alignments on one horizontal you will need to open the ALG before importing it into OpenRoads. Make the option that you would like to import is active for each horizontal with more than one option.
2. Select the Task on the General Geometry tools set and select the **Import Geometry Icon**.
3. Browse to the location of the ALG file. Click **Cancel** on the first dialog box if the file is located outside of ProjectWise.
4. The Alignment will come in default grey with no Feature Definition. Select each alignment and set the Feature Definition, for Roadway Centerlines they should be set to *Geometry Centerline/GEOM_CL*



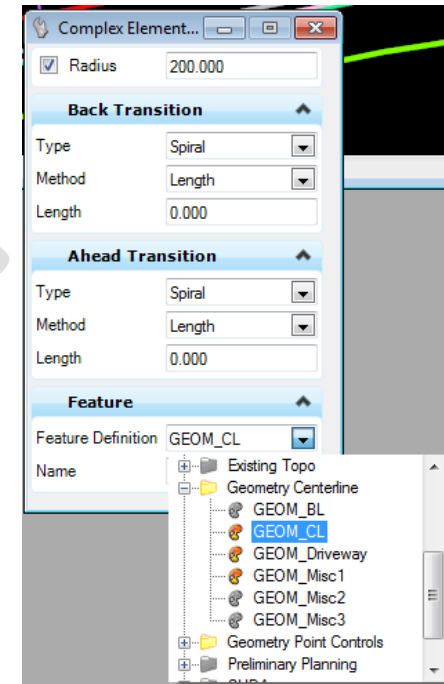
Section 5.3 Creating Horizontal Geometry from PI's



If you use the **Complex By PI** method the alignment will be one element rather than multiple pieces, use the Feature Style *Geometry Centerline/GEOM_CL*. This style will appear with stationing turned on.



To add PI's after laying out the initial alignment use the tool **Horizontal Insert Fillet**

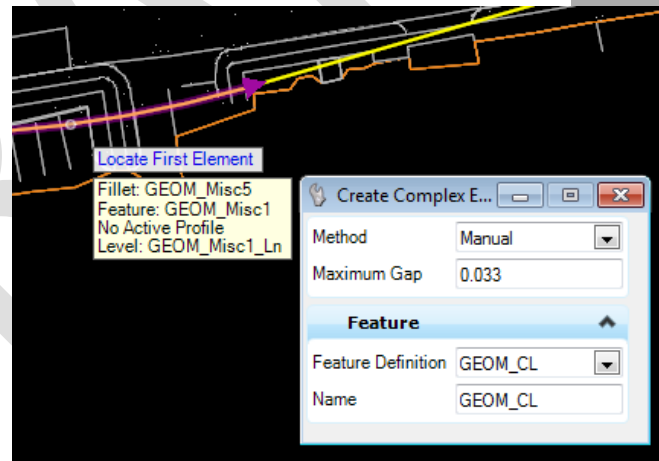
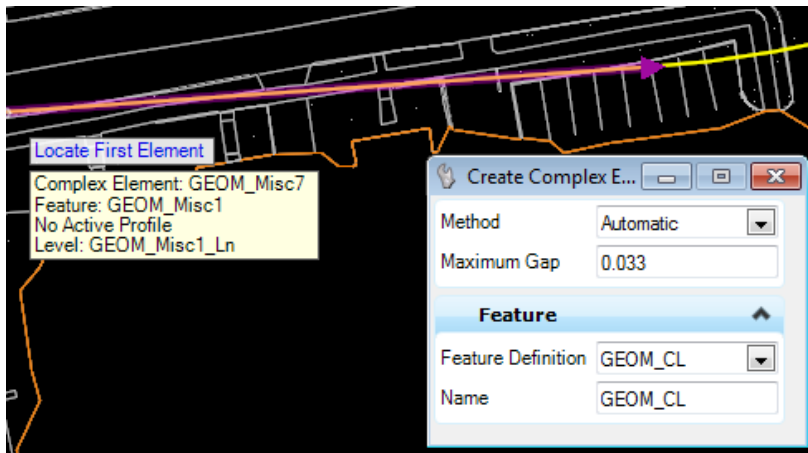
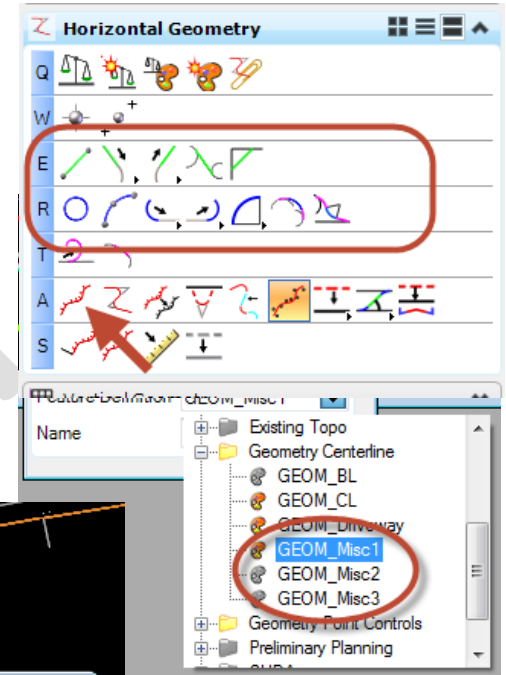


Section 5.4 Creating Horizontal Geometry from Elements

If you choose to use the Geometry from Elements tools you will need to use **Complex By Elements** after to create a single alignment. The issue with this method is if stationing is part of the feature definition annotation (as seen in *GEOM_CL*) the old stationing for the individual elements will display in addition to the new stationing for the complex element. To solve this issue the user can use a different feature definition for the initial layout and then set the *GEOM_CL* feature definition before using the Complex By Elements command.

If using the *Automatic* method select the first element in the alignment and indicate the direction see the *Pink Arrow* below, the rest of the alignment should select automatically. Click to accept the complex.

If using the *Manual* method, select each individual element in the alignment indicate the direction see the *Pink Arrow* (from start location to end). Right click to finish and accept the complex.



Section 5.5 Civil Accudraw

The process for laying out side road elements is similar to main alignments but for added functionality/ intelligence to the elements the Civil Accudraw feature will be used.

Note: Make sure you turn off regular Accudraw when using Civil Accudraw.

When using Civil Accudraw keep in mind which snaps are used and which fields are locked when placing the geometry, both will determine how the second alignment interacts with the first when it is adjusted.

For the regular snaps here are a few examples:

Perpendicular snap will keep the alignment attached to the first at a right angle, if no station is entered in the process it will move around the alignment.

Key Point snap: this will make an element tied to the element that is selected, for example if I draw one line and key point snap my second alignment to this item, no matter where I move the first end point the start point of the line attached will follow.

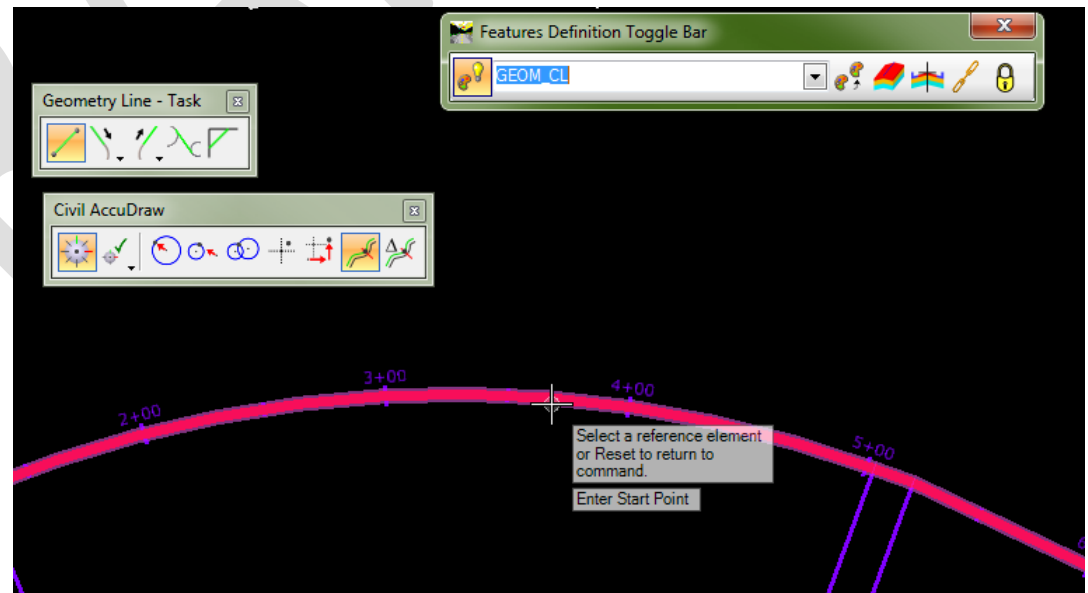
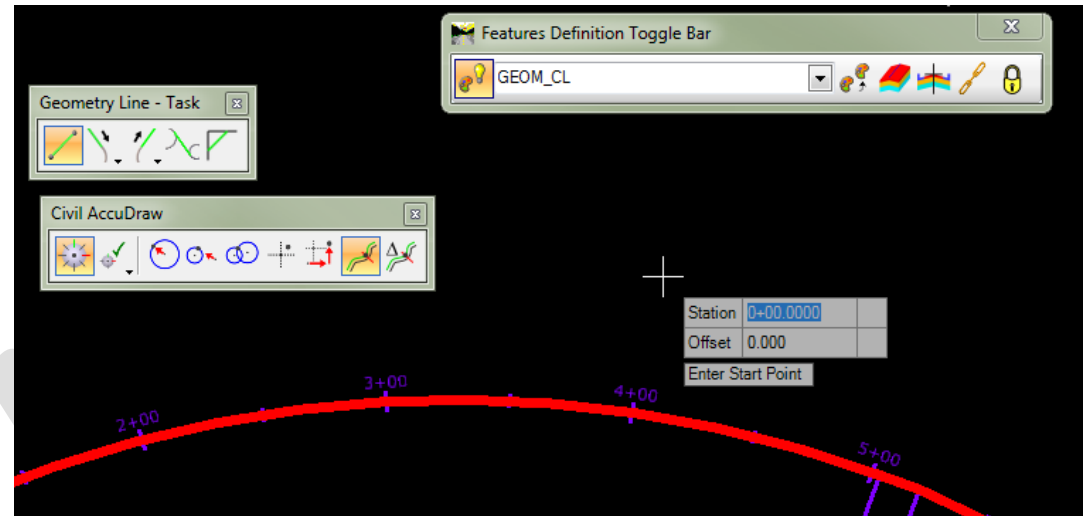
Civil Accudraw "snaps" explained:

- Distance-Direction: a feature end point is located based on a given distance and direction
- Distance Direction Unlinked:
- Distance- Distance: feature is dependent on two defined distances, usually from a specific feature.
- XY: feature is defined and tied to a specific XY location
- Delta XY: feature is defined and tied to a specific point given a X and or Y offset from the given point
- Station-Offset: feature is defined by a start specified by a station and offset from a given feature, and then has an end point defined by station offset or some other snap type depending on the requirement of the designer
- Delta Station Offset: feature is defined by an offset from a chosen Station-Offset as above.

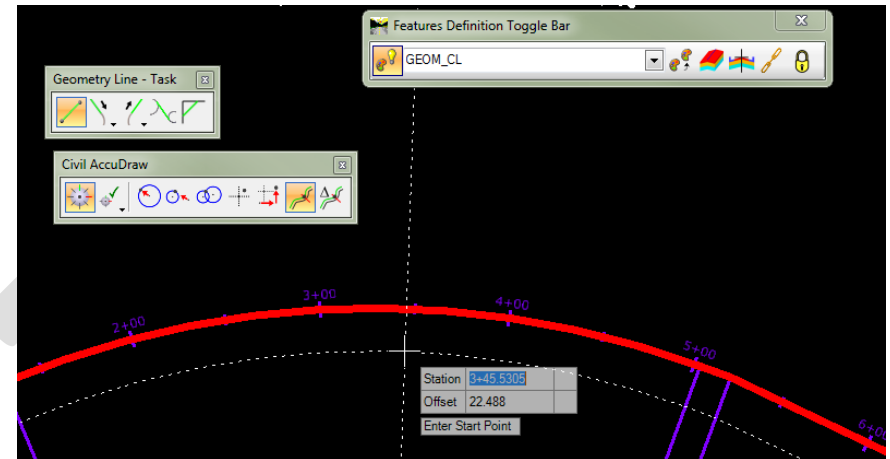
Section 5.6 Creating Side Road Alignments with Design Intent

Try the following method to lock the Secondary alignment to the Main alignment.

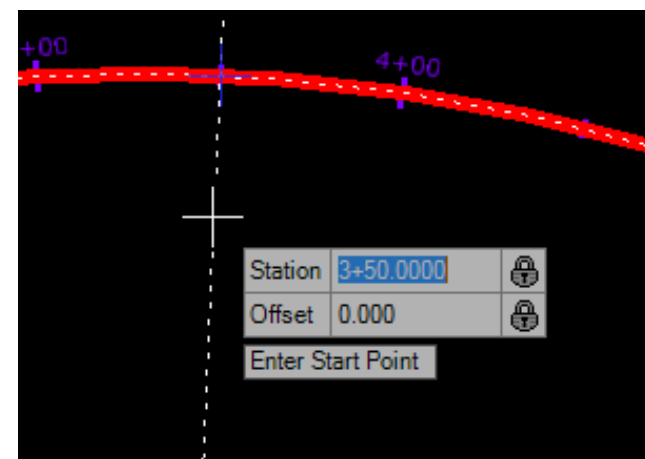
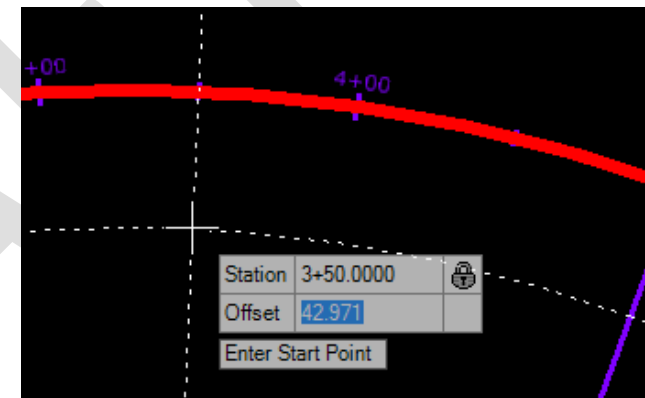
1. Toggle on **Civil Accudraw** and set the Civil Accudraw snap type to **Station-Offset**.
2. Select a geometry tool: **Line, Arc, Complex By PI**, etc. A heads up menu should appear when the cursor is on the screen, prompting for a station.
3. Key in the letter **O**. A prompt to select a reference element should appear. Left click the **Main alignment**.



4. The stationing in the heads up prompt will now be stationing specific to the reference element, i.e. if the stationing runs from 1+00 to 3+00 those will be available, or 500+00 to 600+00 if the stationing was set differently. Key in a *station* on the element and hit enter. A small lock icon should appear to the right of the station field.



5. The cursor should now be in the *offset* field. Key in 0 (zero) and hit **Enter**. The lock icon should appear to the right of this field as well. A small blue crosshair should now be at the intersection of the station chosen and offset distance. This ensures that the start of the secondary alignment will begin at the intersection of the main alignment. Left Click to accept the start point.



Section 5.7 Renaming Alignments

Geometry should be named when created; in the case of complex geometry the final complex element should be named. Individual components of a complex element can be named as well. Proper naming makes finding geometry in the Project Explorer much easier down the road.

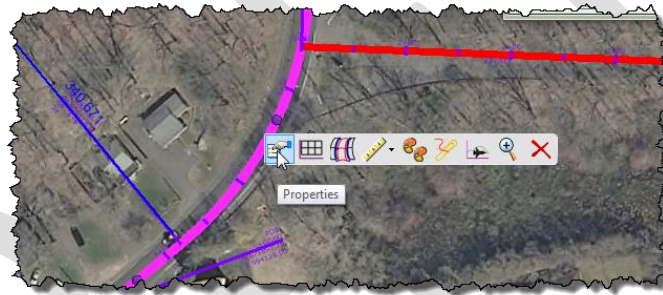
There are multiple methods for naming elements.

1. During element creation:

During element creation a dialog box will appear, a name can be entered into the *Name* field for each element created. This works for single elements and complex elements.

2. Heads up menu:

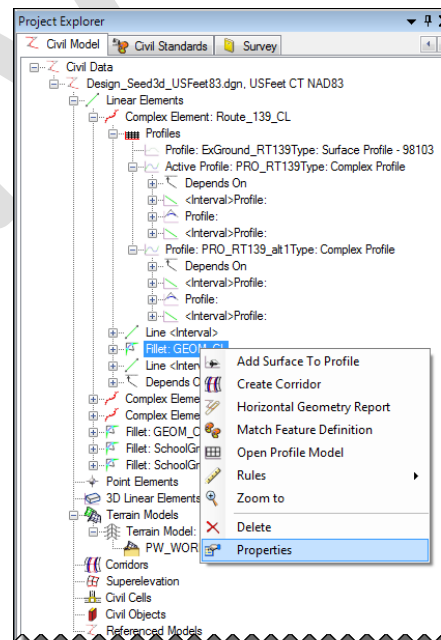
Left click the element and hover over it. A heads up menu should appear. Select the **Properties** command. A *properties table* will appear, change the name in the *Feature Name* field.



Line	
<input type="checkbox"/> Distance	117.963
<input type="checkbox"/> Line Direction	0°
Feature	
Feature Definition	Use Active Feature
Name	Main_CL
Start Point	993518.349,671400.011,0
End Point	994325.232,672568.735,0
Length	1532.651
Feature Name	Route_139_CL
Feature Definition	GEOM_CL
Curve Stroking	0.050
Profile Stroking	0.050
Stroking Step Method	Increment
Linear Stroking	10.000

3. Project Explorer:

Go to the *Project Explorer* > *Civil Model* tab and right click on the element name. Select *Properties* from the dropdown menu. A *properties table* will appear, change the name in the *Feature Name* field.

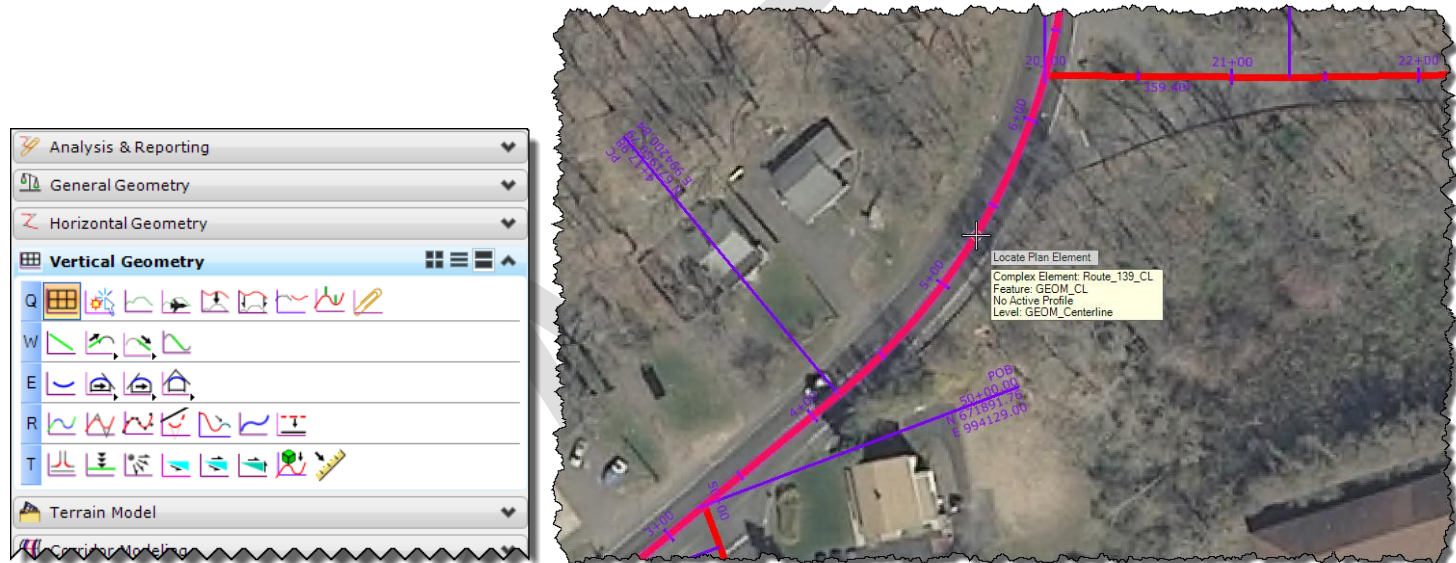


Element Information	
Selection	
Fillet: GEOM_CL	
General	
Description	Fillet: GEOM_CL
Level	Default
Color	ByLevel (0)
Line Style	ByLevel (0)
Weight	ByLevel (0)
Class	Primary
Template	None
Number of elements	1
Transparency	0
Geometry	
Start Point	994197.576,671947.502,0.000
End Point	994325.232,672214.362,0.000
Length	305.870
Total Length	305.870
Arc Sweep Angle	51.1294°
Arc Tangent	163.963
Total Tangent	163.963
Arc Deflection	51.1294°
Total Deflection	51.1294°
Start Direction	38.8706°
End Direction	90°
Feature	
Feature Name	GEOM_CL
Feature Definition	No Feature Definition
Extended	
Model	USFeet CT NAD83

Section 5.8 Creating Vertical Geometry

5.8.1 Displaying the Existing Ground

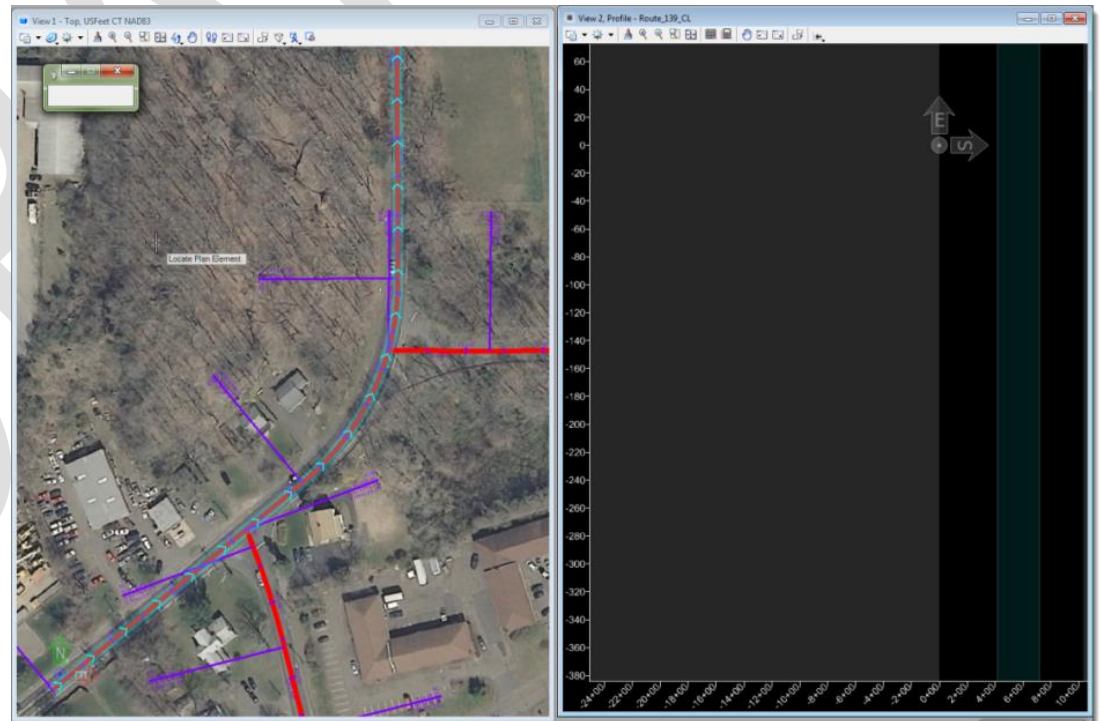
1. Open the profile view for the selected alignment. In *Tasks > Civil Tools > Vertical Geometry* select the **Open Profile Model** command. A prompt will then ask the user to *Locate Plan Element*, Left click to select the Element.



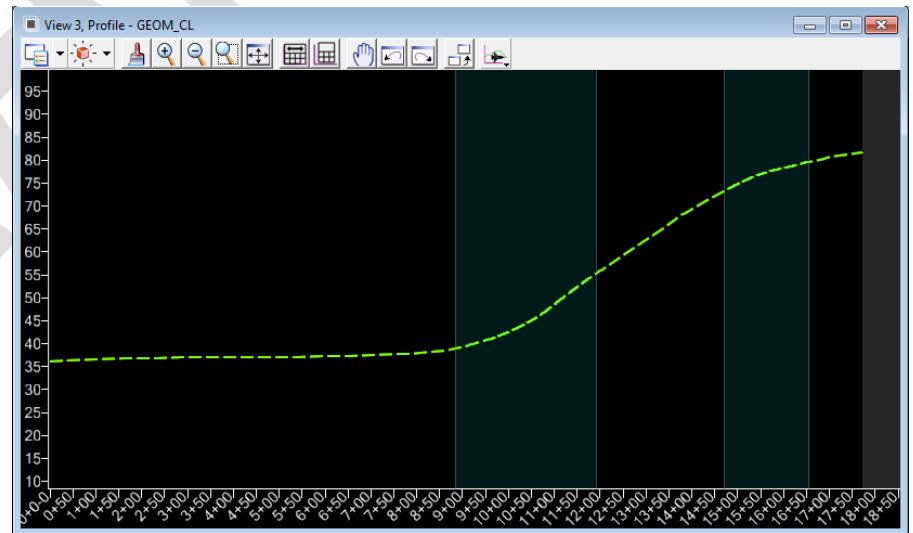
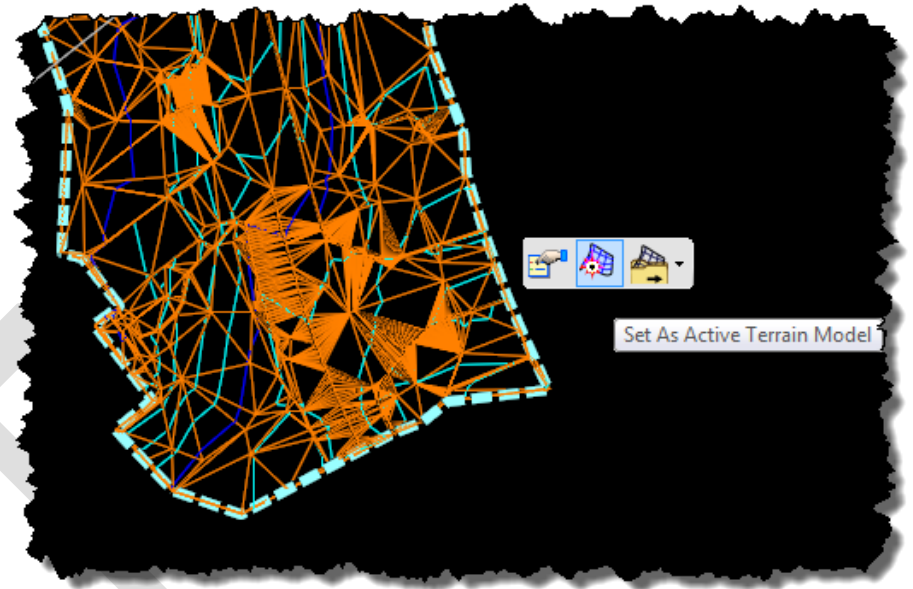
2. A prompt to *Select or Open View* will appear. Select an **unused view** from the view groups box.



3. Once the view opens, left click inside the view. An X and Y axis should appear in the profile view and the alignment will be highlighted blue with chevrons in the plan view. This indicates which alignment is in the active profile view.



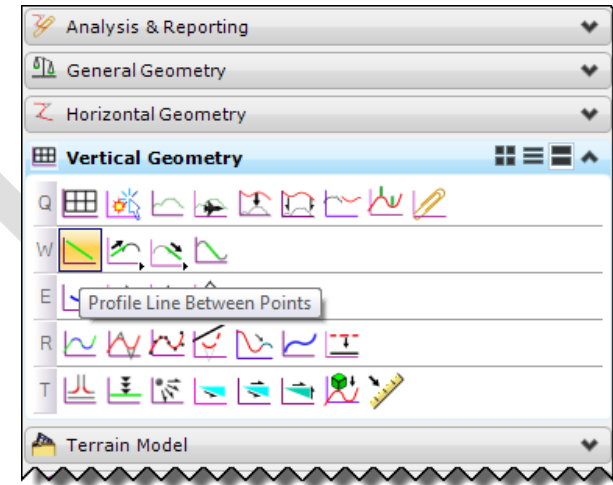
4. Display the existing surface on the profile model. Select the ground terrain model and hover to get the context menu to appear. Click the **Set Active Terrain model** command. The terrain profile should appear in the profile view.



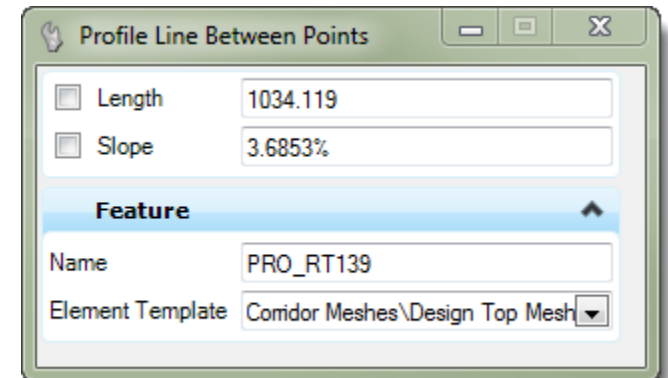
5.8.2 Creating a proposed Profile

This example will show how to create a very simple proposed profile. See the Bentley tutorials for more a detailed explanation of the vertical geometry tools.

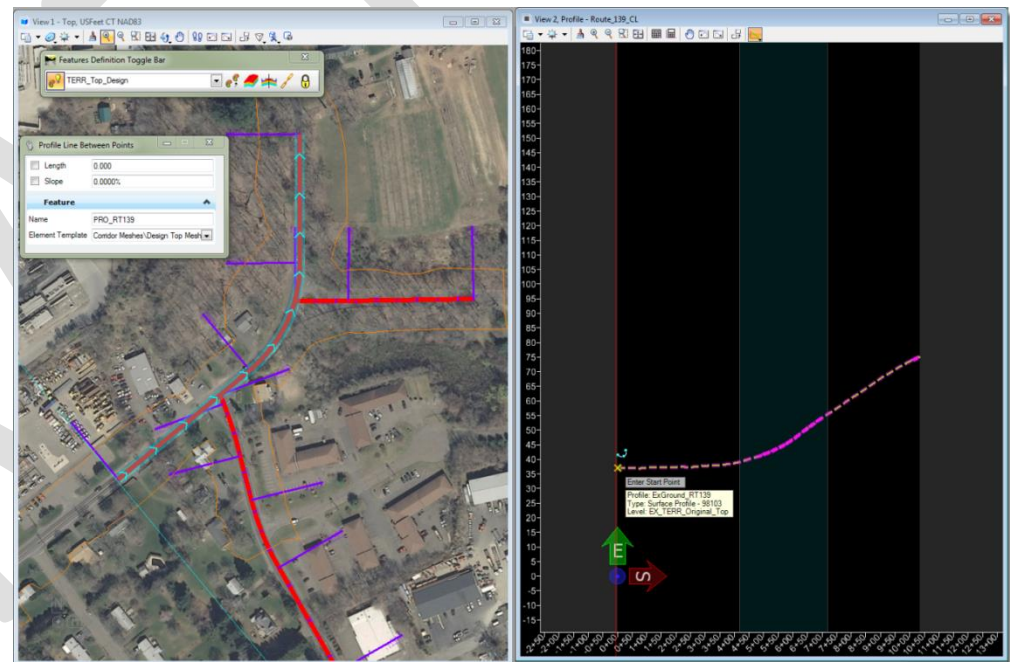
1. Go to *Tasks > Civil Tools > Vertical Geometry* and select the **Profile Line Between Points** command.



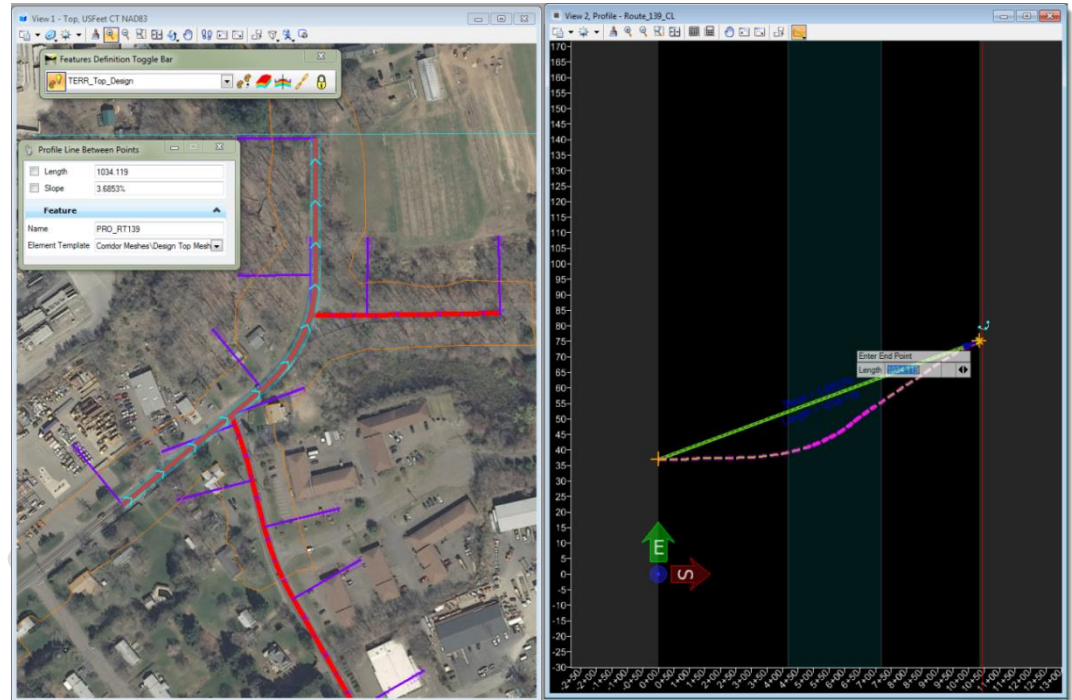
2. The Profile Line Between Points dialog box will appear. Fill in the **Name field** (something that will help identify the profile later).



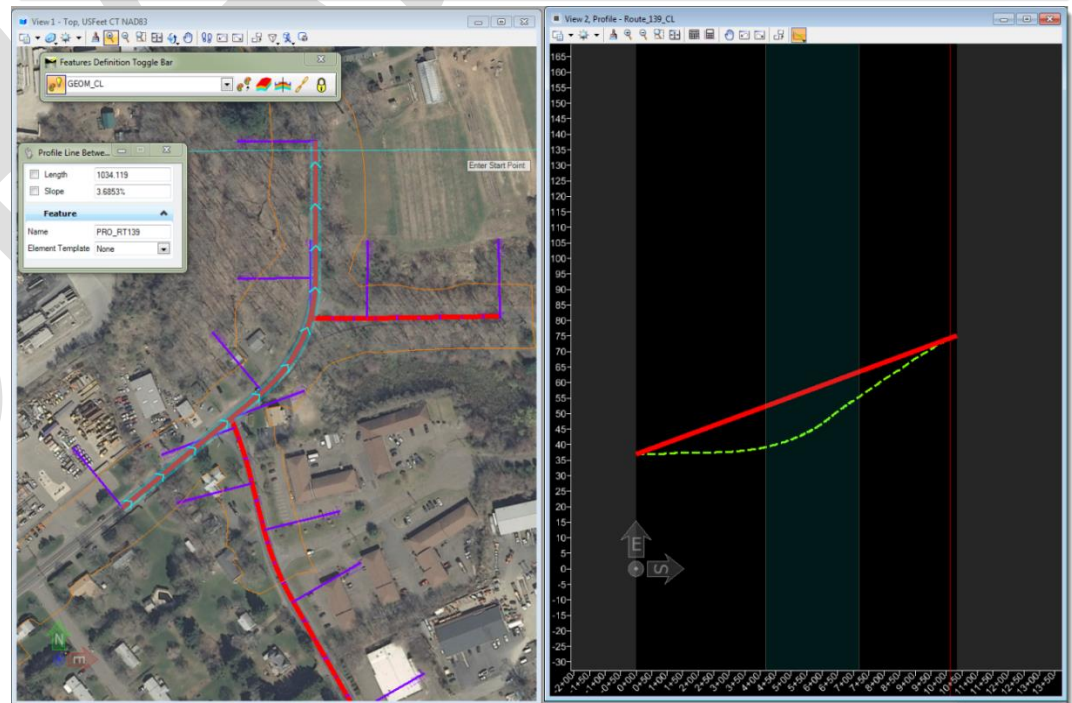
3. A prompt to *Pick Profile View* will appear, left click in the view window with the active profile (the one that has the existing ground displayed). Ther *Enter Start Point* prompt will appear. In the profile view select **your starting point**, a blue perpendicular line in the Plan view shows represents the location of the start point. (In this example the end point of the existing ground was selected to tie the proposed alignment in with the existing ground.)



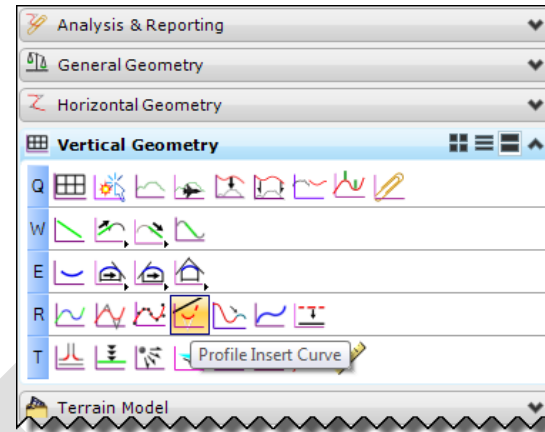
4. The next prompt is *Enter End Point*. In profile view select the **end point**, it will also be displayed in plan view with a perpendicular line.



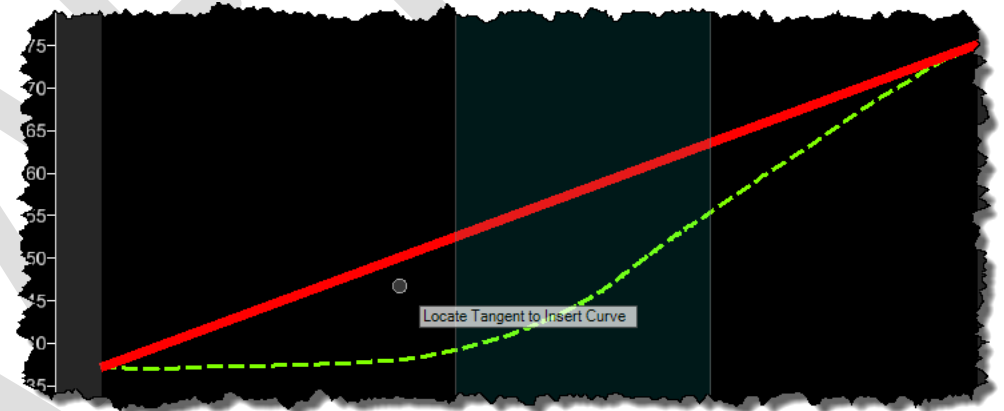
5. The feature definition can be changed to make it easier to distinguish profile alternatives.



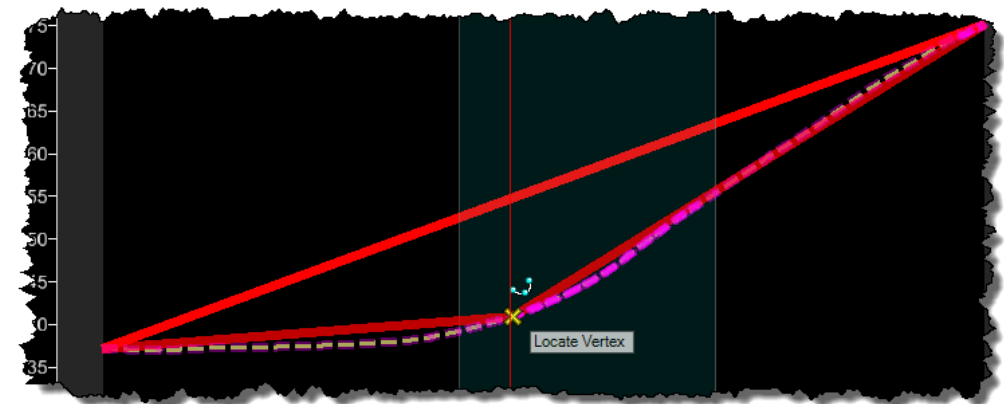
6. Add curves into the profile. Go to *Tasks > Civil Tools > Vertical Geometry* and select the **Profile Insert Curve** command.



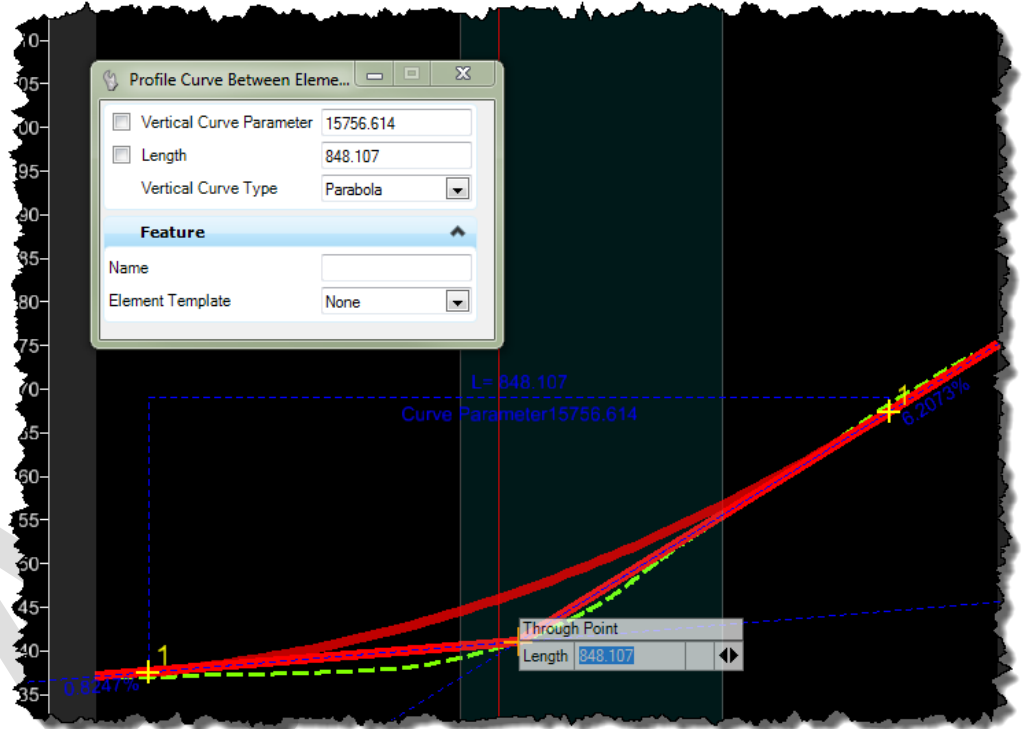
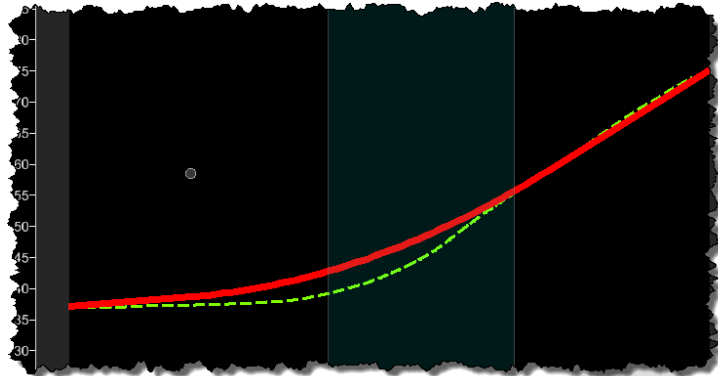
7. A *Locate Tangent to Insert Curve* prompt will appear. Left click to select the **profile line**.



8. The next prompt is *Locate Vertex*. Left click to select a **vertex point** for the curve.



9. It will now prompt for a *Through Point*. Make sure the Vertical Curve Parameter box is unchecked. Select a **through point** on the profile screen or by entering in a **vertical curve parameter or length** and left clicking through the heads up fields to accept. The proposed profile should now be displayed.



Chapter 6 Template Library

Section 6.1 What's Different in New CTDOT ITL?

The Template Library will look very similar to what you were used to with InRoads SS2. The following changes to the points and components in the SS4 template library allow more functionality when assigning superelevation to a corridor and when creating terrain models using graphical filters.

- Superelevation flags
- Rollover locks
- RDWY-Subgrade, -Base, and -Rock feature definitions assigned to points below finish grade

There are also a few additional styles for points that are only found in SS4.

Superelevation Flags

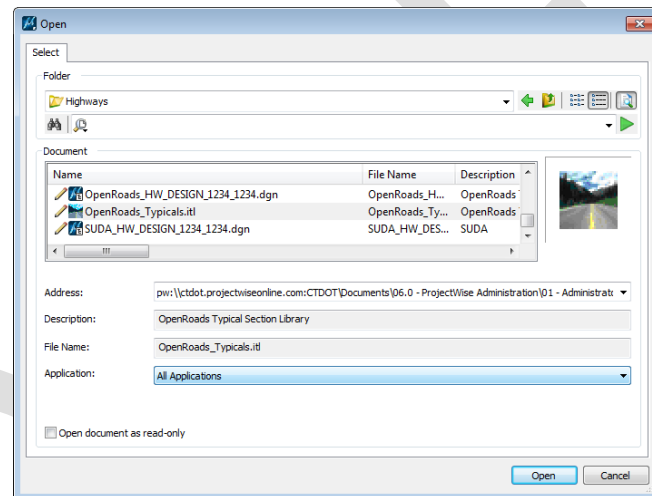
In SS4, superelevation flags are set on component template points at the finish grade from the center line out to the travel lane.

Rollover Locks

You will need to set locks on Rollover Values for points in your assembled templates that are at the finish grade, but outside the edge of the traveled way.

Section 6.2 Working with the Template Library

1. To open the Template library in the Workspace go to *Tasks > Civil Tools > Corridor Modeling > Create Template* or select **F12**. The Create Template Dialog Box will open and the Template Library file on the Workspace will be pointed to as read only.
2. If you would like to make modifications to the Templates select *File > Open* and open the Template Library file that you copied over in the getting started section on this manual. Click on the *ITL* and select **Open**.



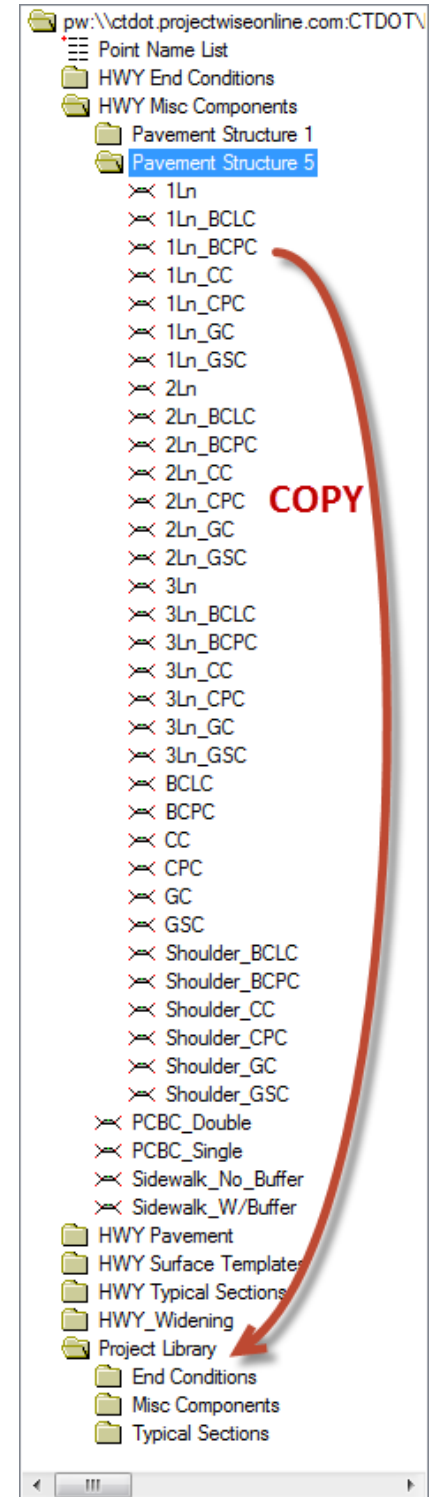
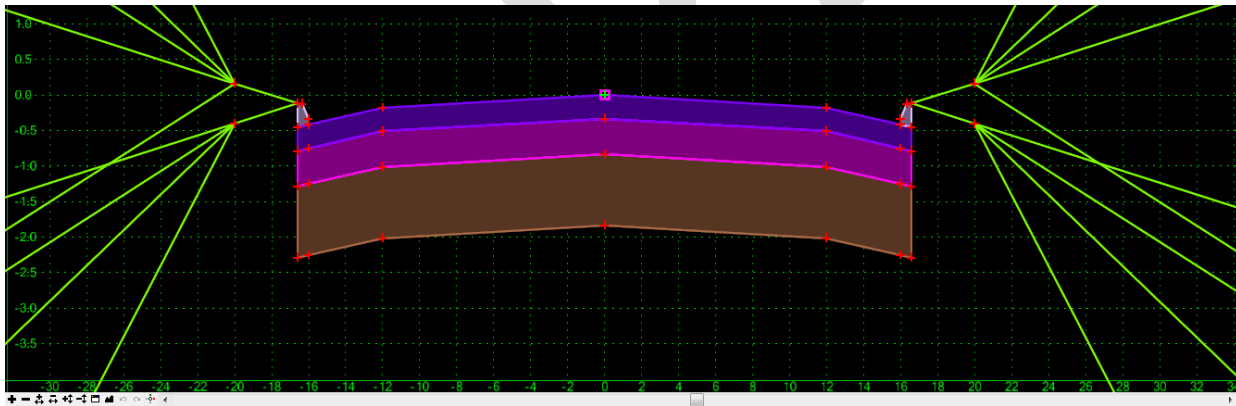
- Use the Project Library Folders as your working area by copying the needed pre-designed templates down from the top folders. This way you always have a fresh copy to use as your build you specific project templates.

If you are going to build your own templates or modify the one supplied you will need to have a vast understanding of which feature styles to use and what settings are specific to different point and component types. Browse to the template *HWY Typical Section > 2Ln_PS5_BCPC*. Double click on the different points, closed shapes and end conditions.

Take note of the following settings.

- Feature Styles
- Feature Name Overrides
- Superelevation Flags (new for OpenRoads)

This template is a two lane road with bituminous concrete curbing using the pavement structure #5. Pavement Structures are found Appendix B of [The State of Connecticut MTG Pavement Design Catalog](#).



A. FEATURE STYLES

Point Feature Suffix....

On the top surface **BKLN_**

Below the top surface **BKLN_Sublayer**

The screenshot shows the 'Point Properties' dialog box for a feature named 'SHDR_t'. The 'Feature Definition' dropdown is set to 'BKLN_Shoulder', which is circled in red. The 'Superelevation Flag' is checked. The 'Member of' field is 'HMA_S5'. The 'Constraints' section shows 'Constraint 1' as 'Horizontal' with a value of '-12.000' and 'Constraint 2' as 'Slope' with a value of '1.50%'. The 'Range' is '0.000'.

The screenshot shows the 'Point Properties' dialog box for a feature named 'SHDR_sg'. The 'Feature Definition' dropdown is set to 'BKLN_Sublayer_Subgrade', which is circled in red. The 'Superelevation Flag' is unchecked. The 'Member of' field is 'Subbase'. The 'Constraints' section shows 'Constraint 1' as 'Horizontal' with a value of '0.000' and 'Constraint 2' as 'Vertical' with a value of '-1.000'. The 'Range' is '0.000'.

Components Suffix...

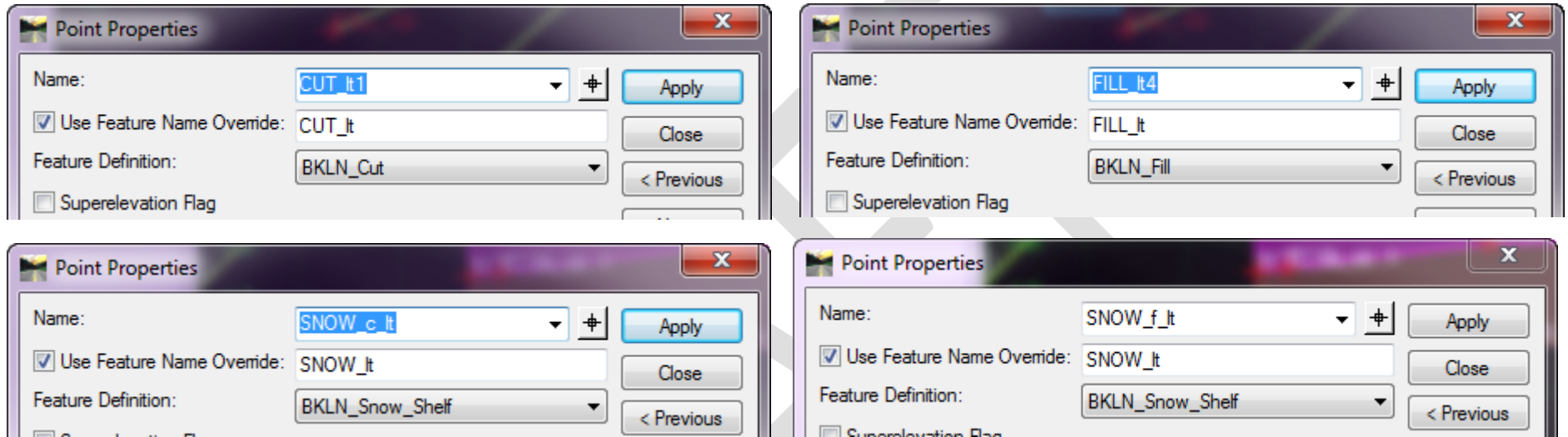
Material_

The screenshot shows the 'Component Properties' dialog box for a component named 'HMA_S5'. The 'Feature Definition' dropdown is set to 'MATERIAL_Pavement_HMA_S.5', which is circled in red. The 'Close Shape' checkbox is checked. The 'Exclude From Top/Bottom Mesh' checkbox is unchecked.

B. FEATURE NAME OVERRIDES

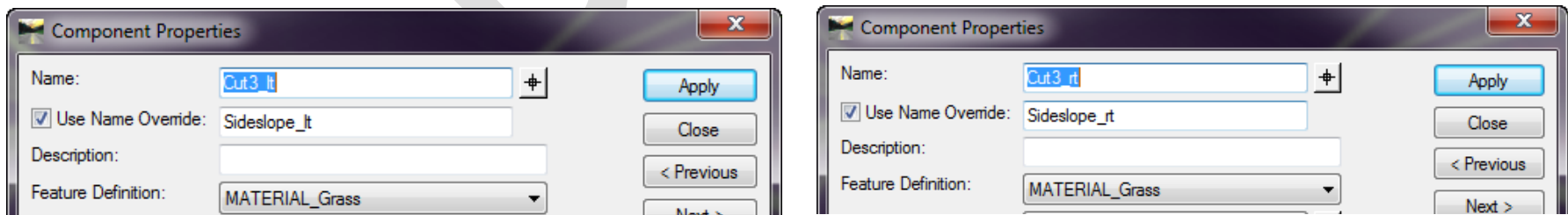
Points on end conditions

Make sure to Use Feature Name Overrides on Cuts, Fills and the Snow shelves.



End conditions components

In the end condition components, the "Use Name Override" needs to be set for like slopes. For example, you have 4 possible ditch backslopes where only one at a time can solve. Setting the feature name override in the component properties assures the model stitching using the same component name. This is similar to what you have done correctly in the point features for the point feature override.



C. Superelevation Flags

Point Properties

Name: SHDR_It

Use Feature Name Override: SHDR_It

Feature Definition: BKLN_Shoulder

Superelevation Flag

Alternate Surface:

Member of: HMA_S5

Constraints

Constraint 1	Constraint 2
Type: Horizontal	Type: Slope
Parent 1: CL	Parent 1: CL
Value: -12.000	Value: 1.50%
Label: <input type="text"/>	Label: <input type="text"/>
<input type="checkbox"/> Horizontal Feature Constraint: <input type="text"/>	<input type="checkbox"/> Rollover Values...
Range: 0.000	

Point Properties

Name: EOR_It

Use Feature Name Override: EOR_It

Feature Definition: BKLN_EOR

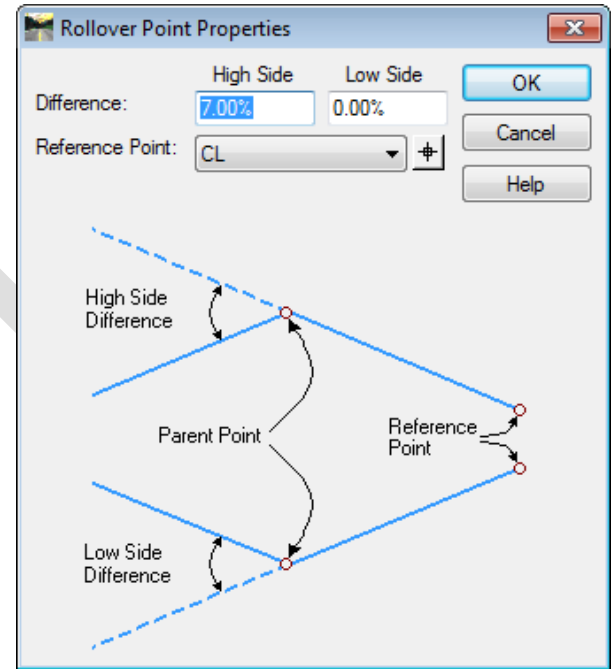
Superelevation Flag

Alternate Surface:

Member of: BCPC_It
HMA_S5

Constraints

Constraint 1	Constraint 2
Type: Horizontal	Type: Slope
Parent 1: SHDR_It	Parent 1: SHDR_It
Value: -4.000	Value: 0.00%
Label: <input type="text"/>	Label: <input type="text"/>
<input type="checkbox"/> Horizontal Feature Constraint: <input type="text"/>	<input checked="" type="checkbox"/> Rollover Values...
Range: 0.000	

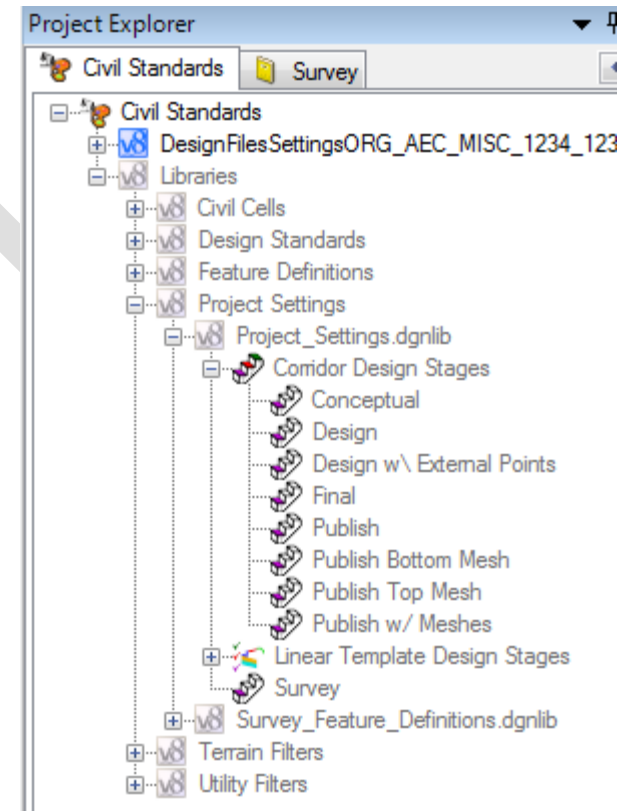


Chapter 7 Corridor Modeling

Section 7.1 Design Stages

Before creating a corridor it's important to understand the Project Settings for Design Stages. A design Stage is selected when first creating a corridor and it modified as the design progresses from conceptual to Final design. Design staging helps users to optimize their computers processing speeds by the managing corridor modeling details to only what is needed for the stage they are in.

Select the **Project Explorer, Civil Standard Tab**. Under Libraries select *Project_Settings.dgnlib\Cooridor Design Stages*. Study at the Properties presets for each stage.



7.1.1 Template Management

Manages the template drops on a straight piece of road.
(Template Drop Interval Multiplier) X (Drop Interval)

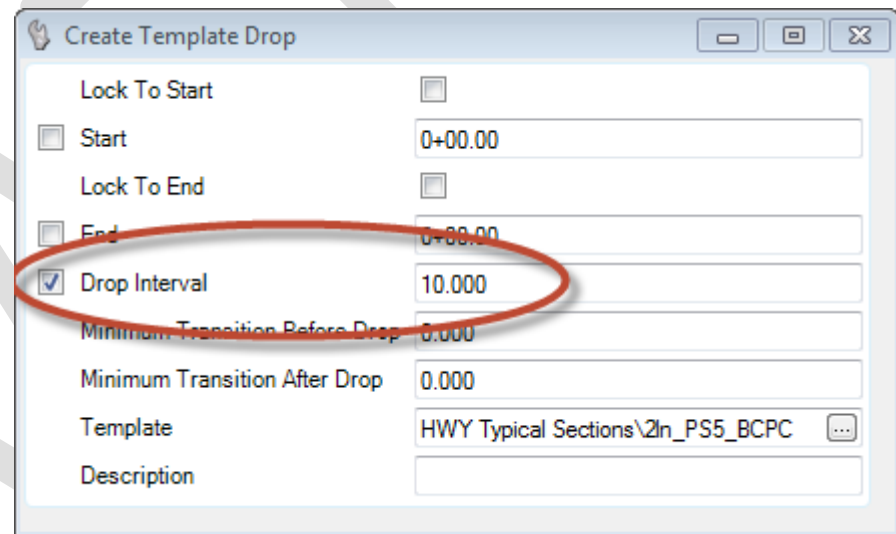
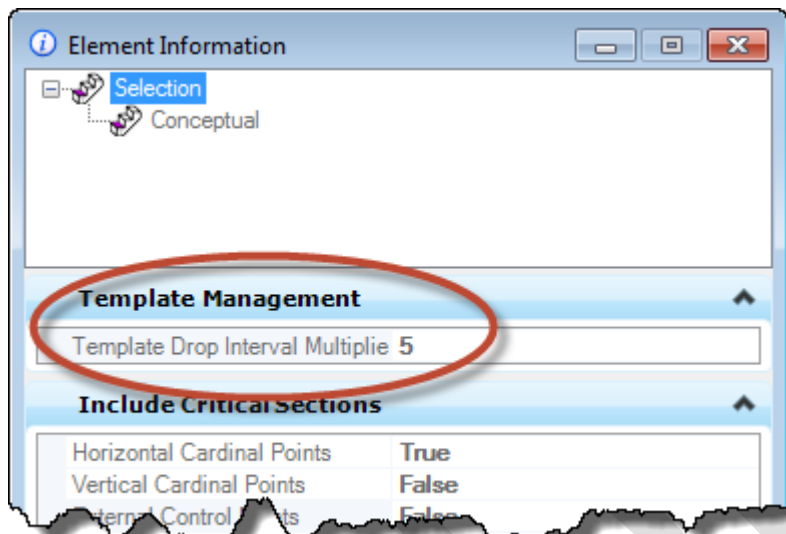
Design Stage

Conceptual Design Stage - 5 X 10 = Template drop created every 50'

Design Design Stage- 2 X 10 = Template drop created every 20'

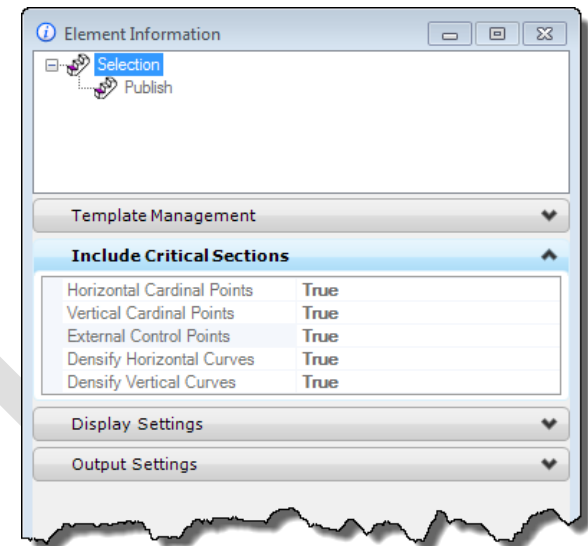
Final & Publish Design Stages - 1 X 10 = Template drop created every 10'

Create Template Drop Dialog Box



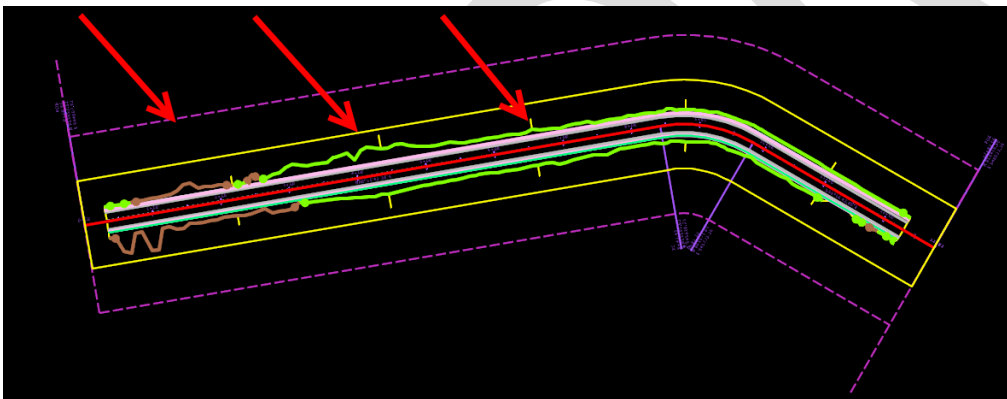
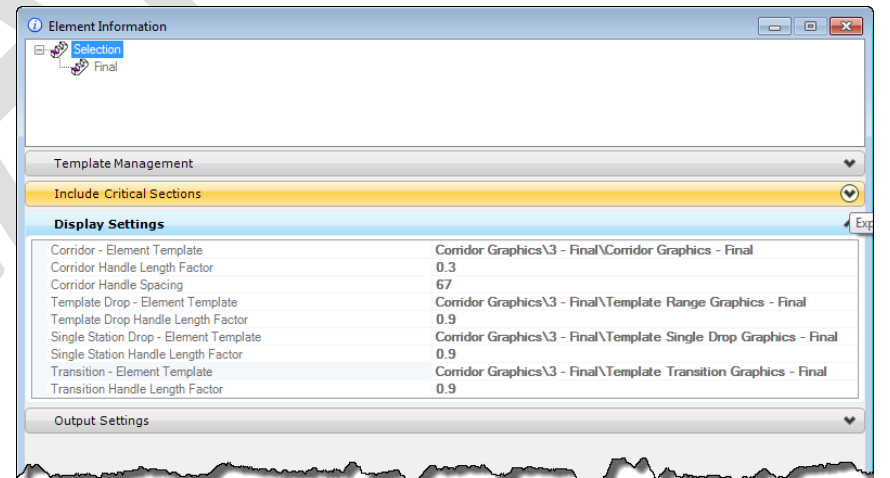
7.1.2 Include Critical Sections

Manages the template drops at critical sections. Publish is set to true for all fields, this level of accuracy will not be needed in Conceptual and Design Stages in turn some of these are set to false.



7.1.3 Display settings

Display Settings point to the look and feel of the graphical representation of the corridor, these are displayed as construction classes as they is not a real world features. Users can easily turn these off by deselecting Constructions in Veiw Attributes.



7.1.4 Output Settings

All the base Design Stages are set the same (Conceptual, Design, & Publish Design) for the Output Settings.

There are separate stages set up for the output of different Mesh surfaces if needed.

The screenshot displays a software interface with three main panels. The left panel is the Project Explorer, showing a tree view of project settings. The middle panel is the Element Information panel, showing a tree view of elements. The right panel is the Output Settings panel, showing a table of settings for different mesh surfaces.

Project Explorer

- Civil Standards
- DesignFilesSettingsORG_AEC_MISC_1234_1234.dgn
- Libraries
- Civil Cells
- Design Standards
- Feature Definitions
- Project Settings
 - Project_Settings.dgnlib
 - Corridor Design Stages
 - Conceptual
 - Design
 - Design w\ External Points
 - Final
 - Publish
 - Publish Bottom Mesh
 - Publish Top Mesh
 - Publish w/ Meshes
 - Linear Template Design Stages
 - Survey
 - Survey_Feature_Definitions.dgnlib
 - Terrain Filters
 - Utility Filters

Element Information

- Selection
- Publish w/ Meshes

Output Settings

Create Top Mesh	True
Top Mesh Feature Definition	TERR_Top_Design
Create Bottom Mesh	True
Bottom Mesh Feature Definition	TERR_Bottom
Create Linear Features	True
Create Component Meshes	True
Include Null Point Linear Features	False

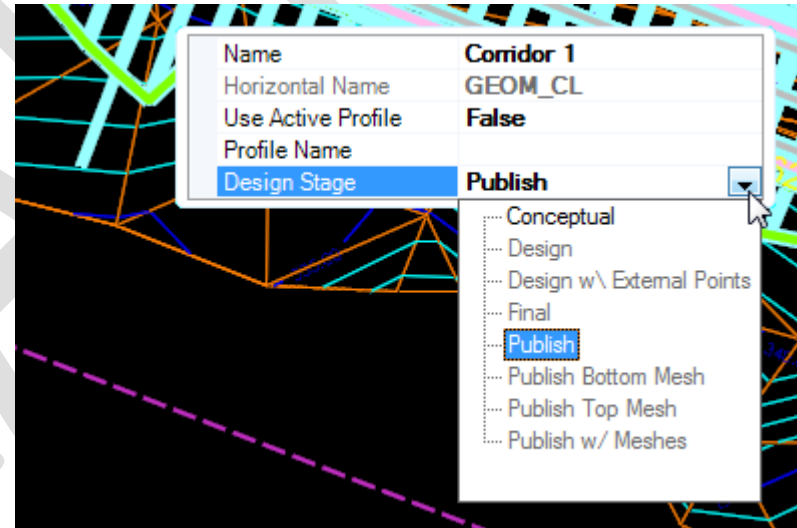
Output Settings (Detailed View)

Create Top Mesh	False
Top Mesh Feature Definition	No Feature Definition
Create Bottom Mesh	False
Bottom Mesh Feature Definition	No Feature Definition
Create Linear Features	True
Create Component Meshes	True
Include Null Point Linear Features	False

Final

7.1.5 Updating the Design Stage

1. Left-click on the corridor (tip: click on a handle, or confirm from the pop up upon clicking that you have selected a corridor).
2. From the context-sensitive commands, select **Properties** (the left-most icon).
3. In the properties table that opens, use the dropdown to select a *Design Stage*.
4. After making the selection, **WAIT** until the properties box goes away. It can take a while for the model to update, and making another selection while it is processing might cause the application to crash.



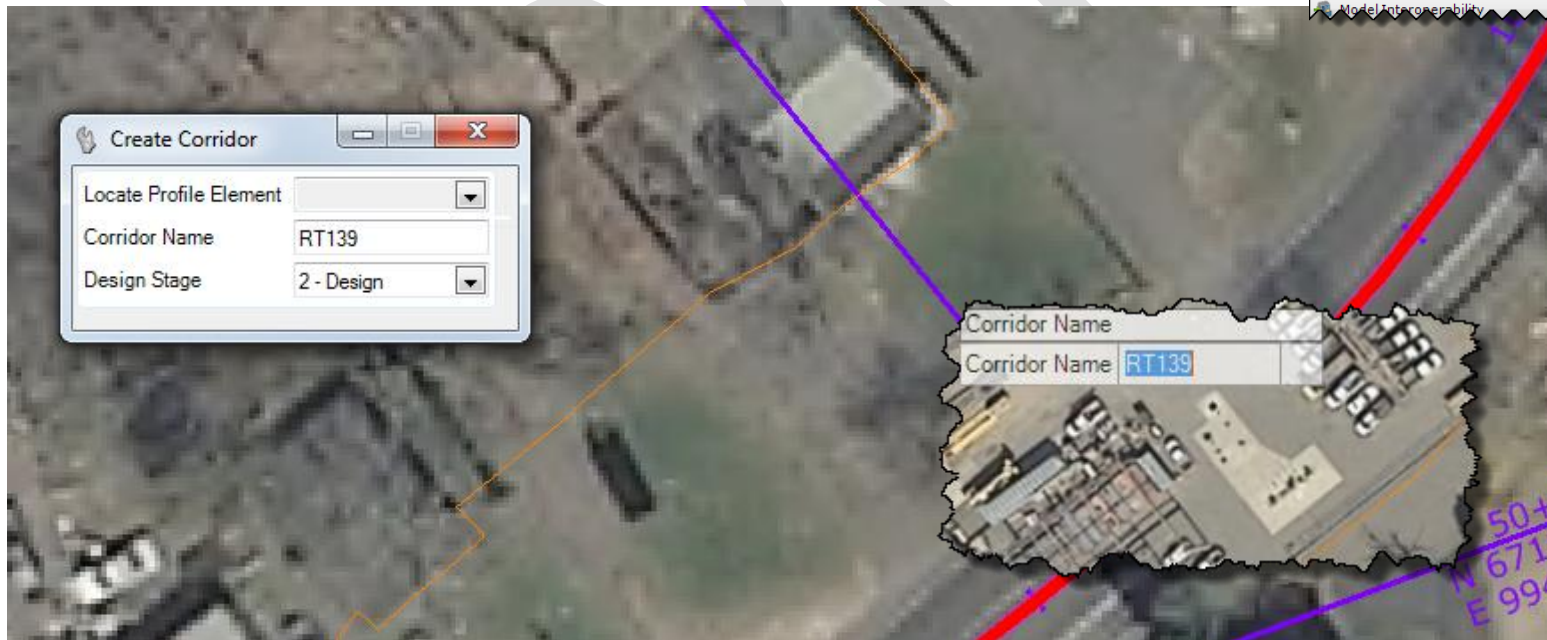
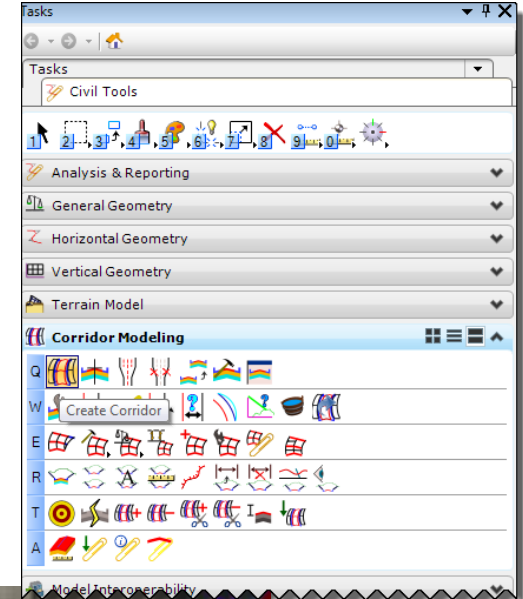
Section 7.2 Corridor Modeling

Corridors and models are no longer created in the Roadway Designer; they are created directly in the MicroStation Screen. The prerequisite for creating a corridor is to have a civil geometry horizontal alignment with a vertical profile, either loaded or referenced.

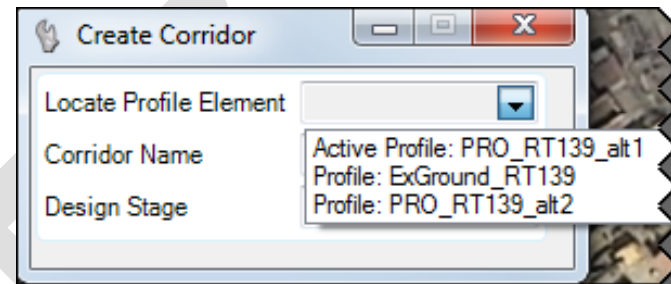
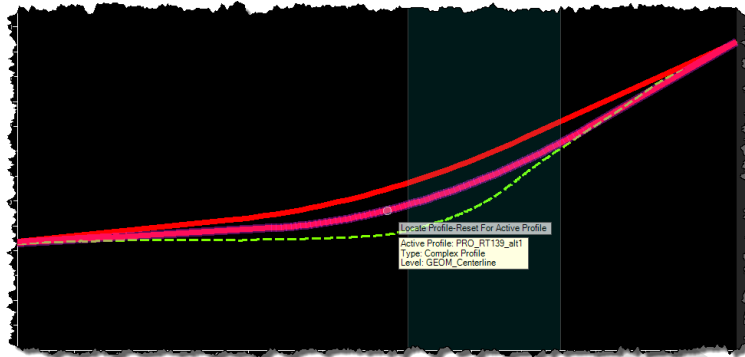
When you create a corridor, a 3D model is automatically created and attached to the 2D model.

7.2.1 Creating a Corridor

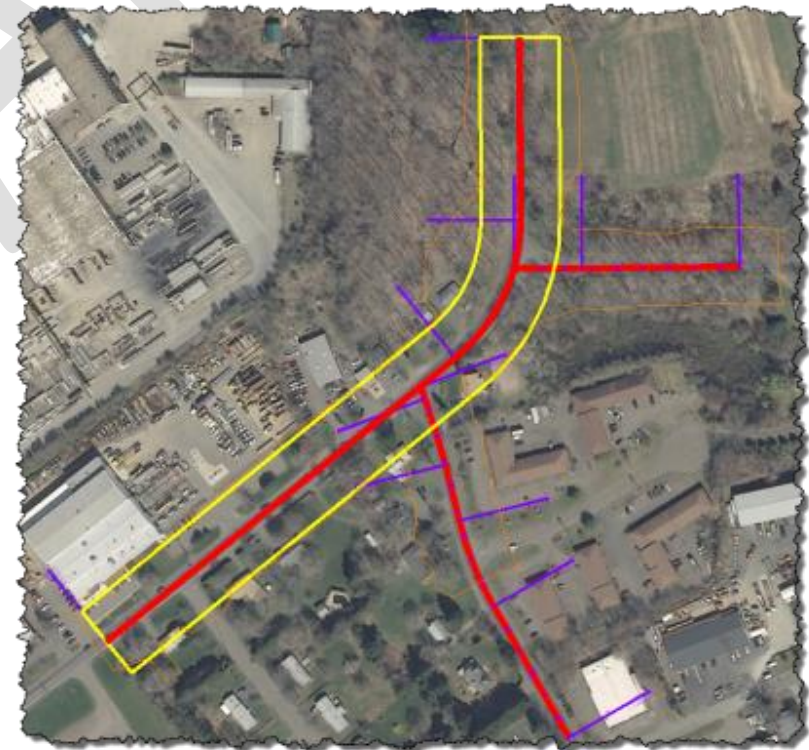
1. Go to *Tasks > Civil Tools > Corridor Modeling* and select the **Create Corridor** Command.
2. The Create Corridor dialog box will appear as well as a prompt to *Locate Corridor Baseline*. Enter in a name in the *Corridor Name* field, select a *Design Stage* and select the *plan element for the corridor*.



3. A prompt to *Locate Profile Element* will appear. Select the **alignment** in Profile view, select a **profile** from the dropdown menu in the dialog box, or right click to **select the active profile**. By selecting the Active Profile option the user can easily switch between profile alternatives and see how this affects the corridor model.



4. Enter a **Corridor Name** and **left click** to accept. A corridor feature should now be displayed around the alignment (the shape may be a different color depending on which design stage was selected when creating the corridor).

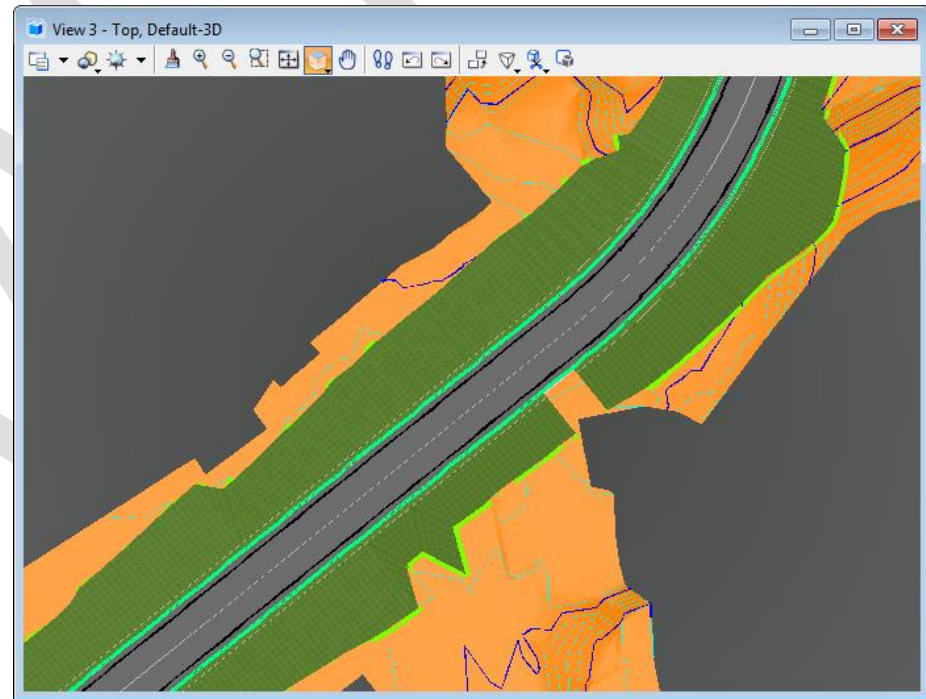
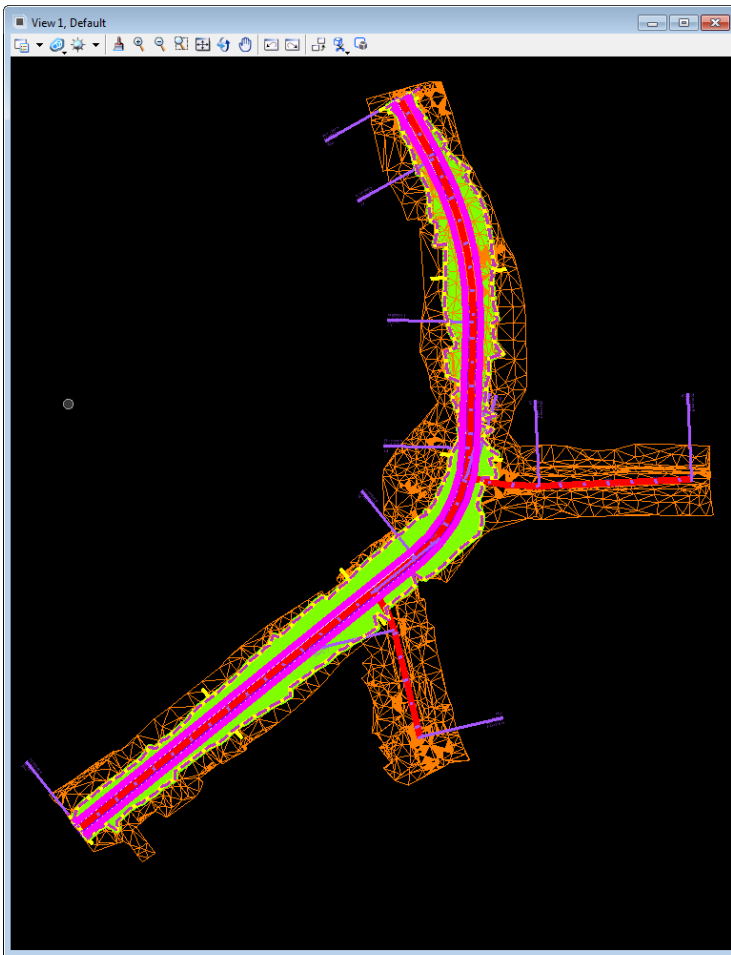


5. The *Select a Template* prompt will appear, click the **ellipses button** or **Alt+Down** to browse the templates. Select a **template** and Click **OK**.

NOTE: If you right clicked off to cancel the command after the corridor was created you will need to select the Create Template Drop Icon to continue. Follow the prompts to select a template.



6. Left click to **accept** and apply the template, follow the prompts for **Start Station**, **End Station**, **Drop Interval**, **Minimum Transition**, **Maximum Transition**, and **Description**. The components of the model should be displayed in plan view as well as the 3D model if it is open.



Section 7.3 Superelevation

Superelevation is calculated and created differently in OpenRoads than InRoads, it uses SRL and SEP files instead of SUP files. Much of the application is done graphically using the heads up menus rather than the templates.

In InRoads V8i SS4, the superelevation may be created in an entirely separate, 2D .dgn file and is not required to be in the same model as the corridor. The superelevation uses the referenced in horizontal alignment geometry to define sections and lanes, and to calculate transitions. When the superelevation is assigned to a corridor, it creates point controls on every point in the templates that are marked with the superelevation flag.

Designers may also create point controls using features or feature definitions from a 3D terrain model referenced into a 2D corridor. See the workflow Using DTM Features as Targets for Point Controls in SS4.

At this point the user should already have the following items:

- Terrain file (existing ground surface)
- Centerline geometry (horizontal alignment)
- Profile geometry
- Corridor
- Template drop(s)

Quick Step Preview:



STEP 1. Create Superelevation Sections



STEP 2. Create superelevation Lanes



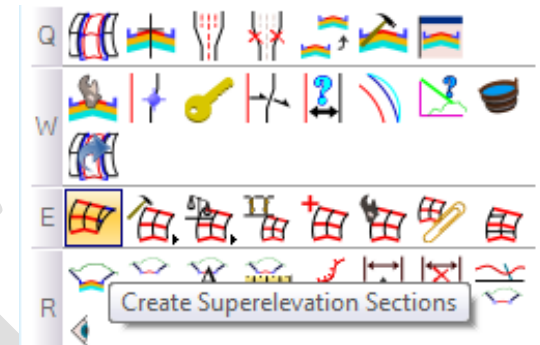
STEP 3. Calculate Superelevation



STEP 4. Assign Superelevation to Corridor

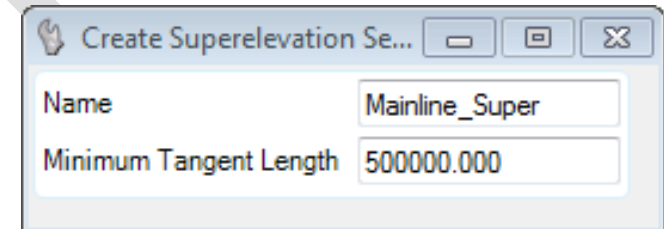
7.3.1 Step 1 - Create Superelevation Sections

1. Open the Level Manager and set the level *CORR_Superelevation* active.
2. The Superelevation tools are located under *Tasks > Civil Tools > Corridor Modeling*. Select **Create Superelevation Sections** and follow the prompts.

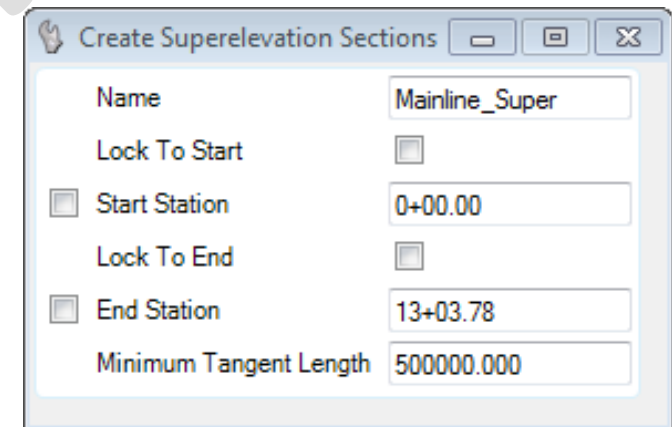


3. Give the Section a *Name* and specify the *Minimum Tangent Length*.

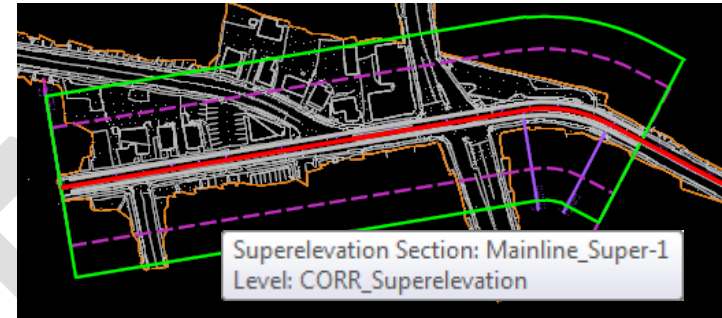
Note: If you do not want to have multiple superelevation sections created set the Minimum Tangent Length to a very large number. This will force the product to create only one superelevation section for your entire corridor. The only reason you may want multiple sections is if your design speed changes within the limits of your corridor.



4. Data point the *centerline alignment* and left click to accept.
5. Another dialogue box should appear, select the *Start and End Stations* and click through to accept.

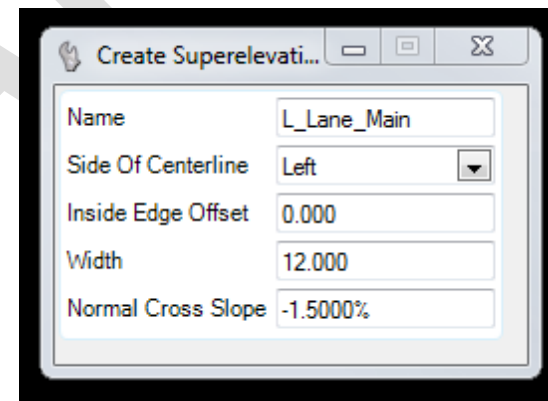


6. A green outline will appear around the Superelevation section that was just created



7.3.2 Step 2 - Create superelevation Lanes

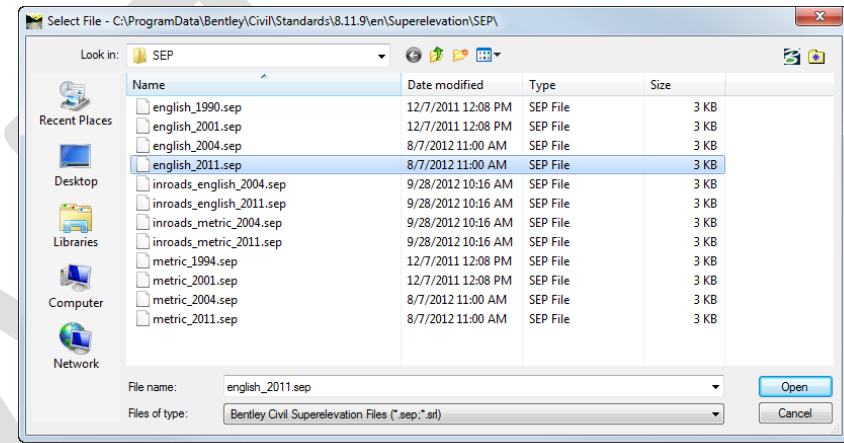
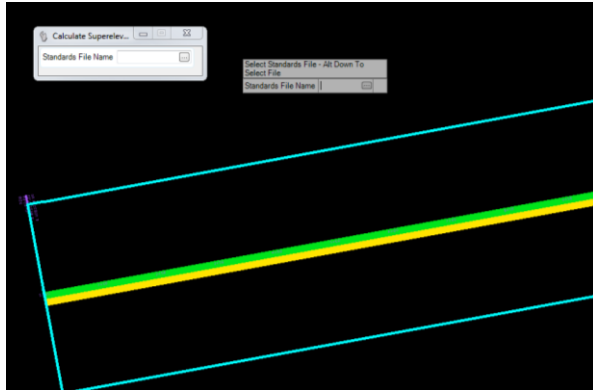
1. The next superelevation task will automatically start, **Create Superelevation Lanes**. This step needs to be done twice, once for the left lane and once for the right lane. For roads with more than two lanes additional super lanes will be required. In this example a two lane road is used.
2. Give a meaningful name to the lane.
3. Select which side of the centerline the lane is on.
4. Determine the inside edge offset (in the case of a two lane road each lane would have an offset of 0. For a multilane road the inside edge offset would be the width from the edge of the lane to the centerline).
5. In this example the normal cross slope is 1.5% because it is a two lane road, for a 4 lane road the outermost lanes would have a normal cross slope of 2%. See the HDM for more information on lane cross slopes.
6. Repeat process for each lane (in this example the **create super elevation lane** command was done twice, once for the left, once for the right)



7.3.3 Step 3 - Calculate Superelevation

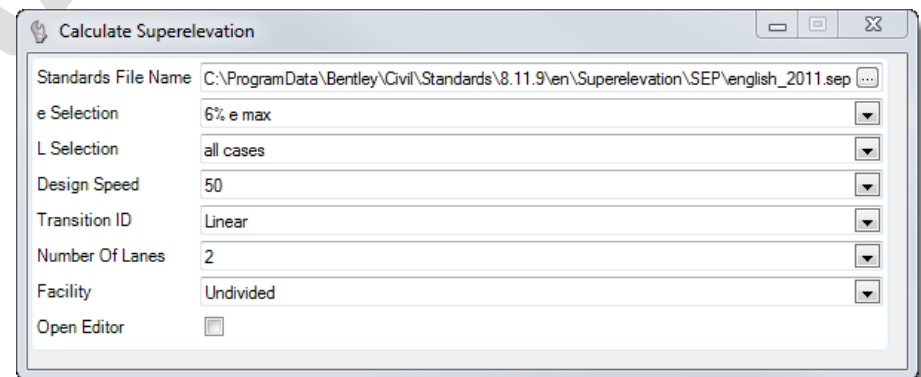
Once the lanes are created, right click to reset and move on to the next tool. The **calculate superelevation** dialogue should appear automatically.

1. Browse to the superelevation resource files and select **File of Type**. The SEP or SRL format can be used, each has multiple AASHTO years, select the most recent year.



2. The next dialogue box to appear will depend on which file type was selected for calculation. For the SEP file method, the dialogue box will ask for the following fields. Data point through the fields to accept the entries.

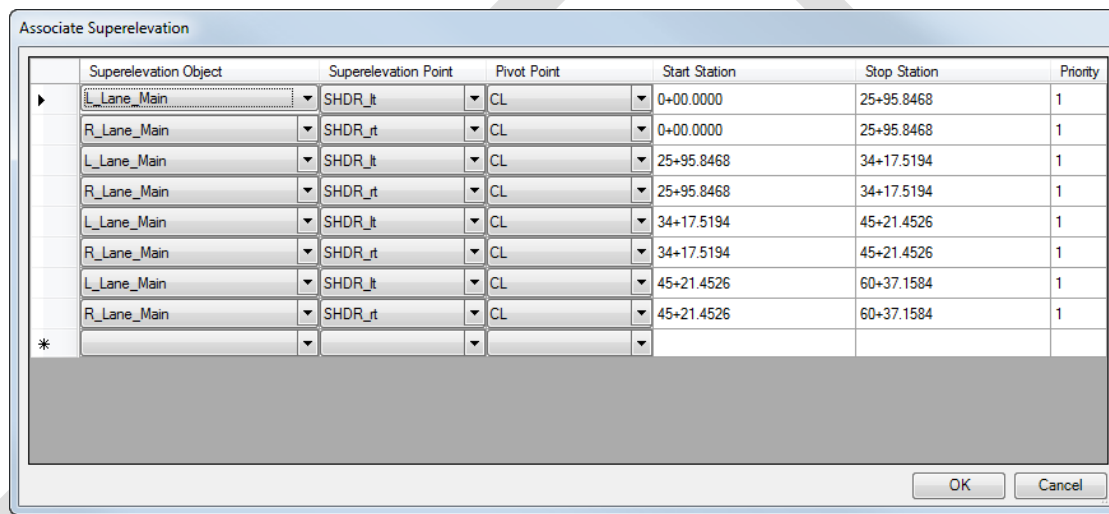
- a. E selection, CTDOT uses an e max of 6% for rural roads and 4% urban roads.
- b. L selection
- c. Design speed
- d. Transition ID
- e. Number of lanes
- f. facility



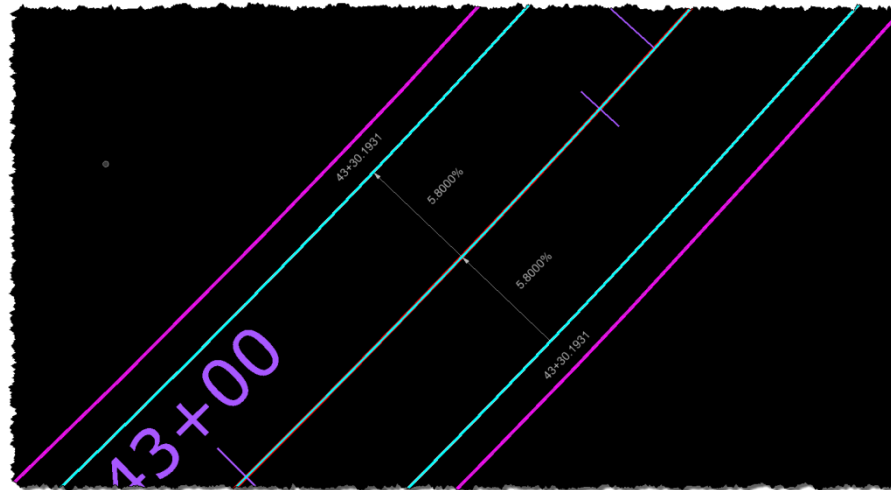
7.3.4 Step 4 - Assign Superelevation to Corridor

The next step is to assign the superelevation to the corridor.

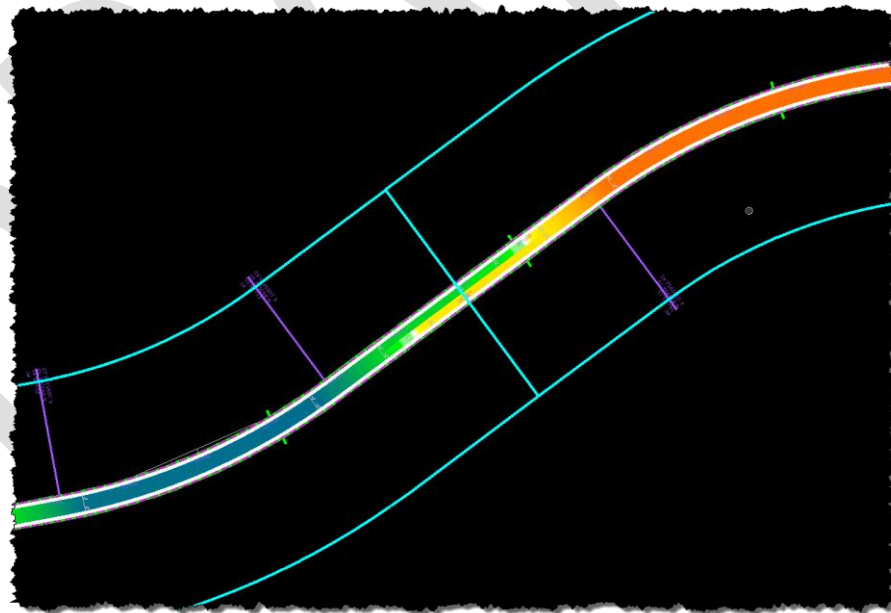
1. Click the **Assign Superelevation to Corridor** Command
2. When prompted, select the **super sections**.
3. When prompted, select the **corridor**.
4. The associate superelevation window should appear. Check over the points to make sure there are no errors and that the superelevation points and pivot points make sense, SHDR_lt with the left super lane and SHDR_rt with the right super lane.



5. Click **OK**, The Superelevation graphics should appear. The normal crown, reverse crown, and full super points should appear with labels as shown below.



To get a thematic visualization of the super grade changes toggle on the fill button in the view attributes window.

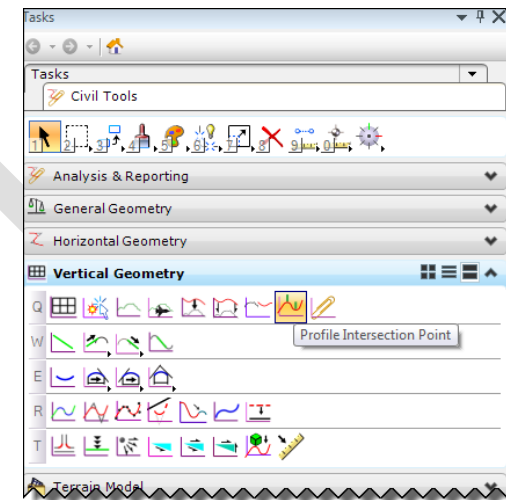


Section 7.4 Modeling Intersections

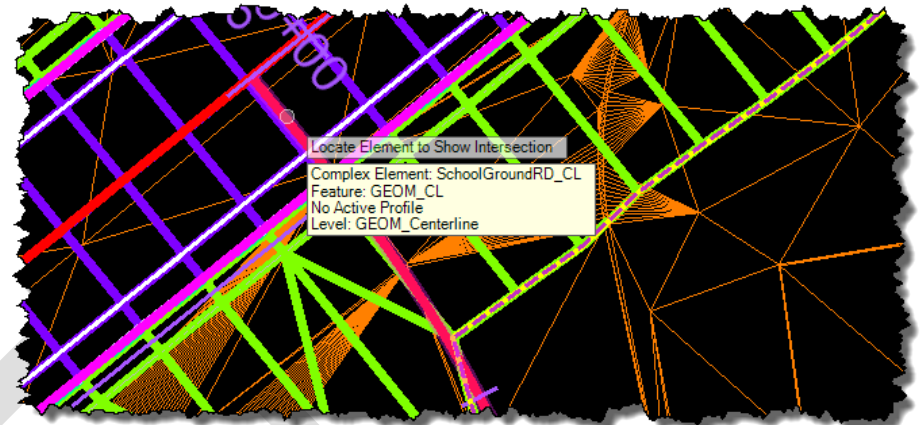
Side alignments are modeled a bit differently because the main line is constraining how the side road behaves. The side road alignments and corridors have to be adjusted to meet into the new proposed mainline.

7.4.1 Creating the Side Road Alignment

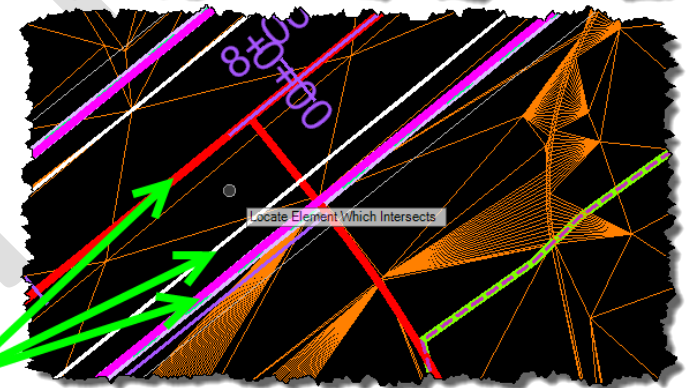
1. Follow the steps in section 3 to create the side road horizontal alignment and vertical profile window.
2. Display the points on the main line which cross the side road alignment. Go to *Tasks > Civil Tools > Vertical Geometry* and select the **Profile Intersection Point** command.



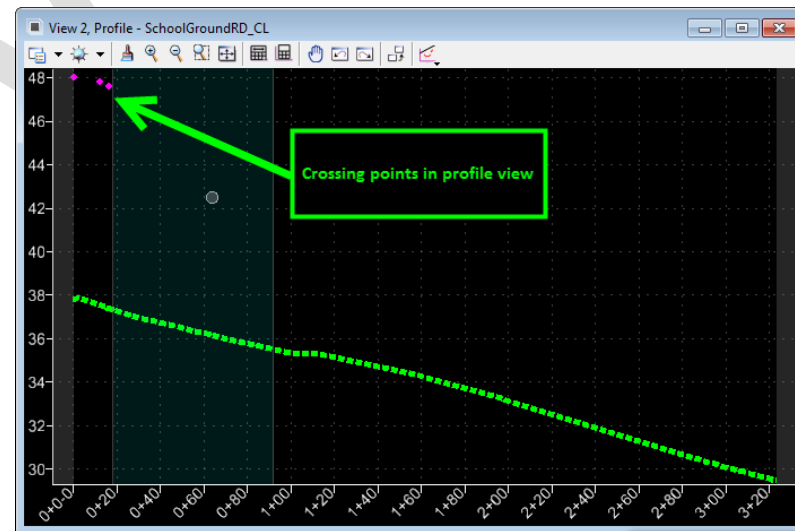
- The prompt *Locate Element to Show Intersection* will appear. Select the **side road alignment**.



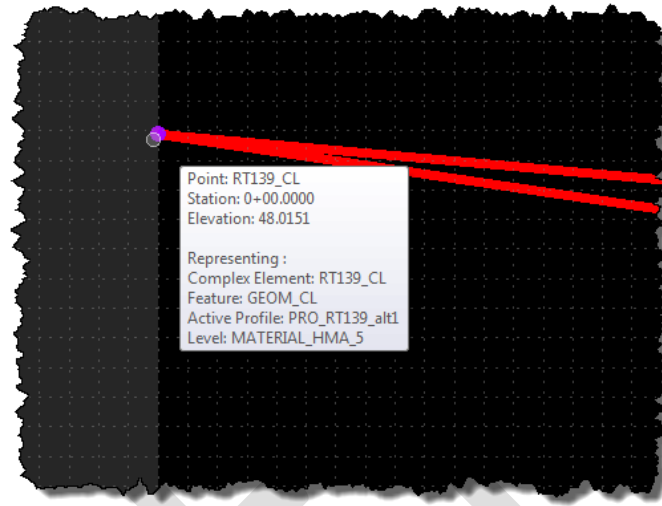
- Another prompt will appear asking to *Locate Element Which Intersects*. This is asking which element crossing points the user wants to appear on the profile. In this example **the Main Road alignment, shoulder line, and edge of road elements** were selected. When finished selecting elements, **right click** to complete the selection.



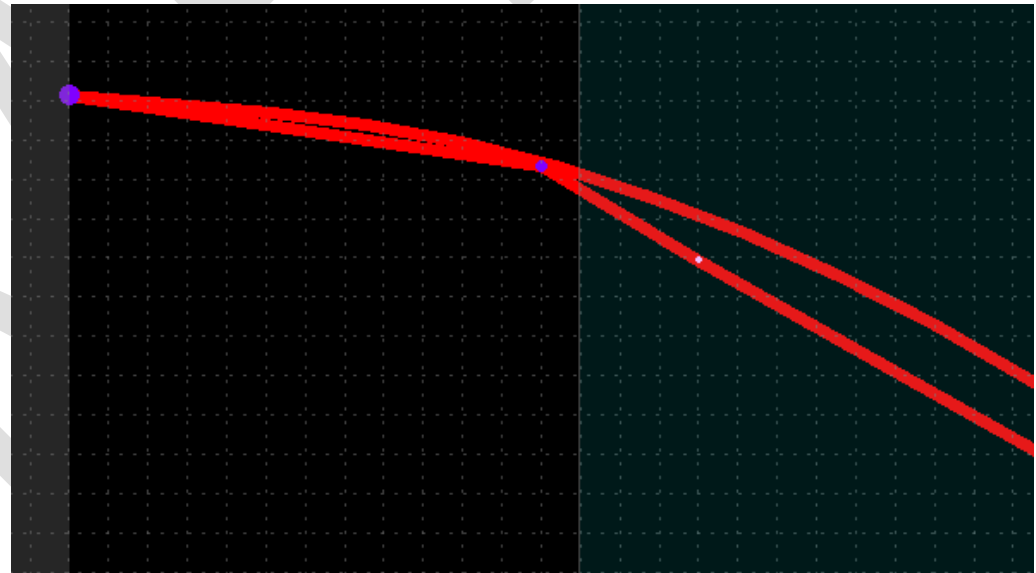
- The crossing points should now be displayed in the profile view. Fit view may be needed to locate the points, and the colors/ line weight may need to be changed to make them more visible.



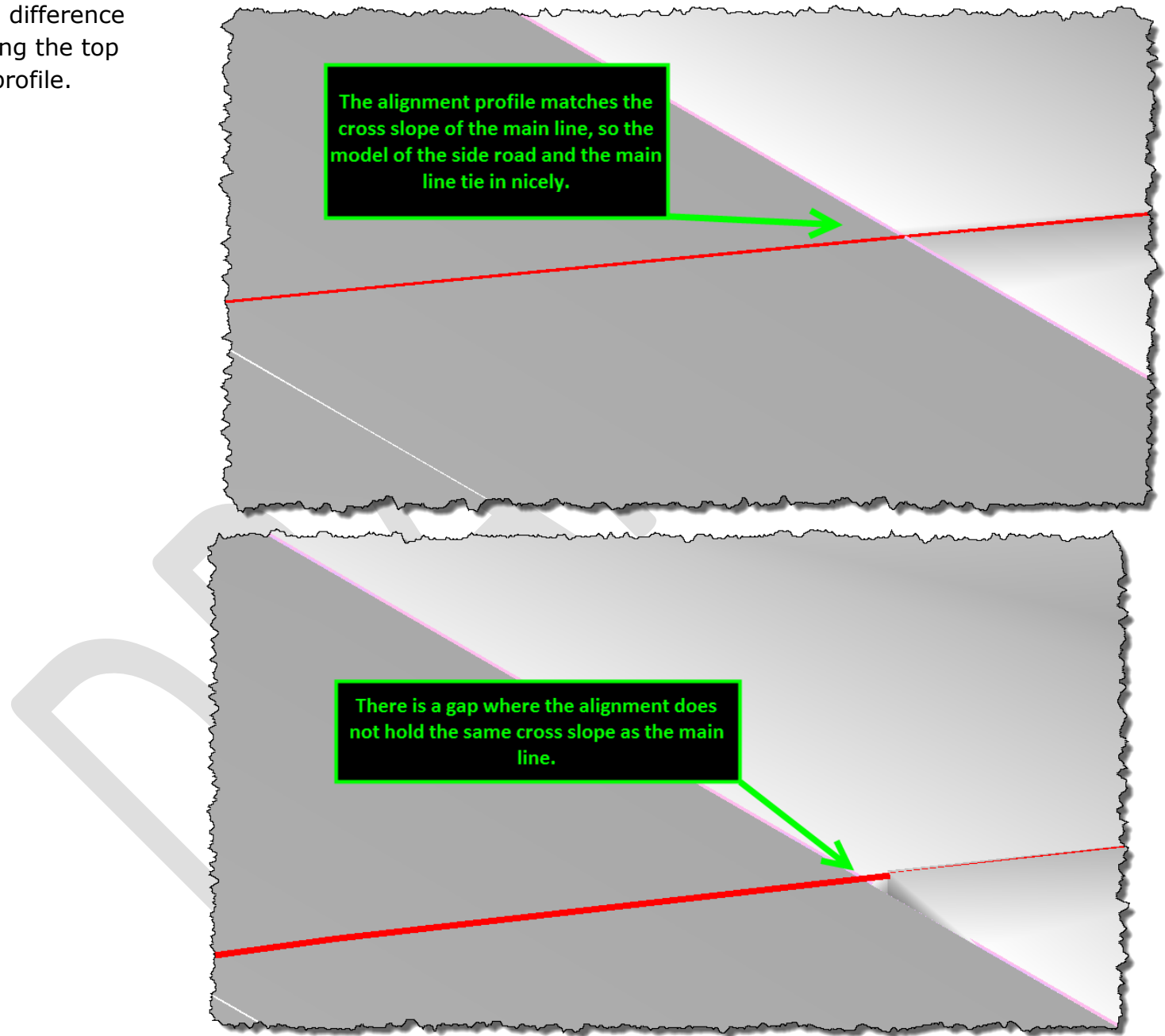
6. Hovering over a point in profile view will tell the designer what feature the point is representing as well as geometric information.



7. Create profile elements for the side road alignment. To maintain the side slope of the road, the side road alignment will need to match in to the main line. The points displayed earlier will help the designer achieve this. Select the *Profile Line Between Points* command and connect the crossing points. In the example shown the top vertical alignment is only connected to one crossing point. The lower alignment is connected to all three of the crossing points. The *Profile Complex By Elements* command can connect individual elements to create a single profile. * Remember to use meaningful names when creating profiles.



8. This example shows the difference between the models using the top profile and the bottom profile.



7.4.2 Creating the Side Road Corridor

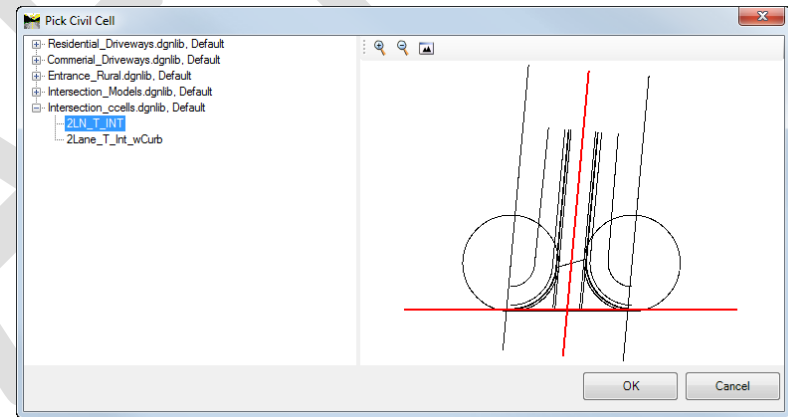
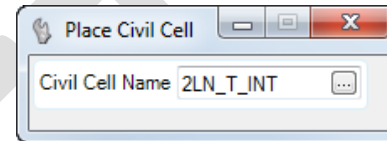
1. Create the Side Road Corridor. Now that the profile is complete, a corresponding corridor needs to be created. *Remember to name the corridor correctly to avoid confusion later.
2. Attach a template to the corridor. The designer can edit the corridor as needed and create alignment elements for the corridors and adjust the template drops as needed, or they can use a civil cell.

DRAFT

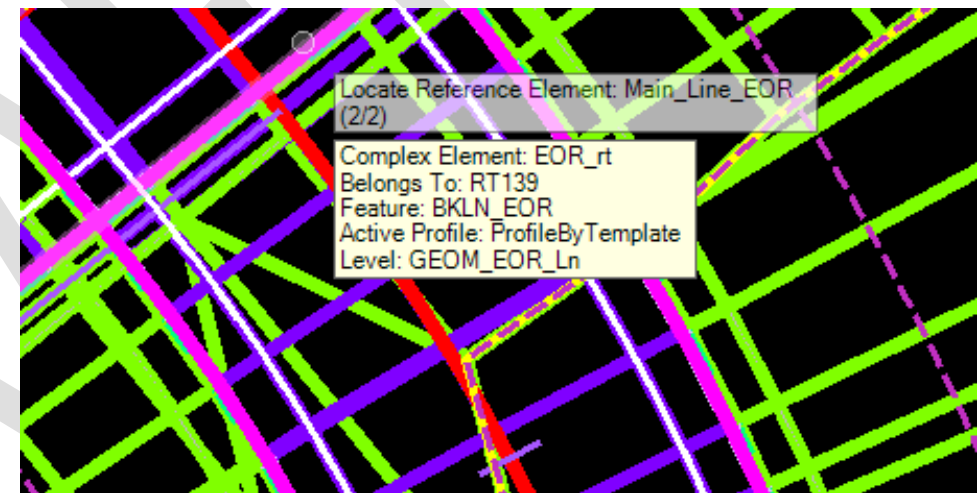
Section 7.5 Civil Cells

There are many different types of civil cells that help automate design tasks. Civil cells use reference elements for placement, meaning you can use the same civil cell in many locations and it will change based on the reference elements used to place it. Civil cells can be edited after placement as well as “dropped” to allow the designer to use pieces of a civil cell if necessary.

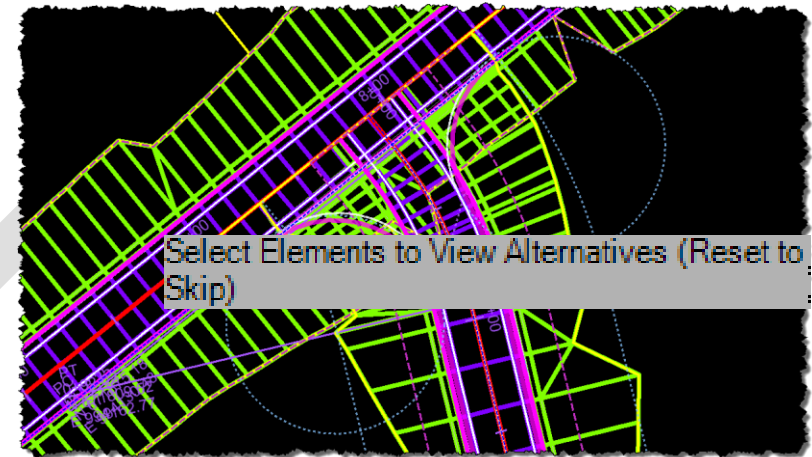
1. To place a civil cell go to *Tasks > Civil Tools > Civil Cells* and select the **Place Civil Cell** command.
2. The Place Civil Cell dialog box will appear, click the **ellipses** button to *browse available civil cells*. When selecting a civil cell preview will be shown to the right of the selection. Click **OK**.



- The prompts that appear with each civil cell vary based on what type of civil cell is being placed or what the creator of the civil cell labeled the references as. The reference prompts are usually intuitive, so be sure to read the prompt. In the example the prompts indicate two reference elements are needed, one for the Side Road Center Line and one for the Main Line Edge of Road.

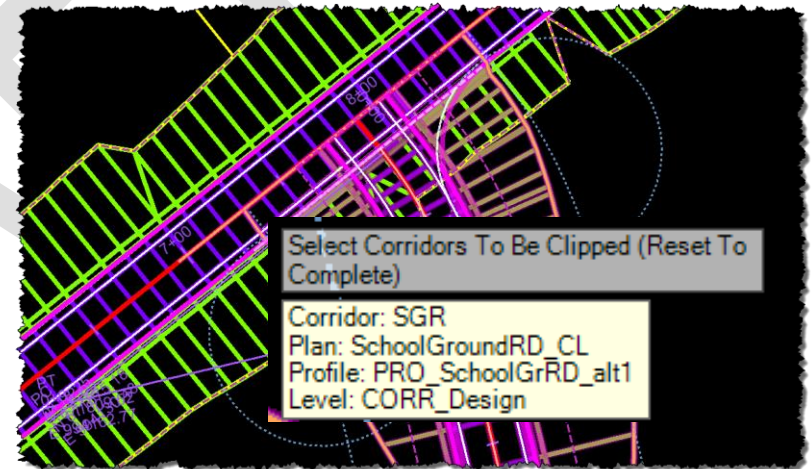


4. Elements of the civil cell should now appear on the screen, if there are alternative configurations you can view them at this point by selecting elements, or you can right click to move to the next step.

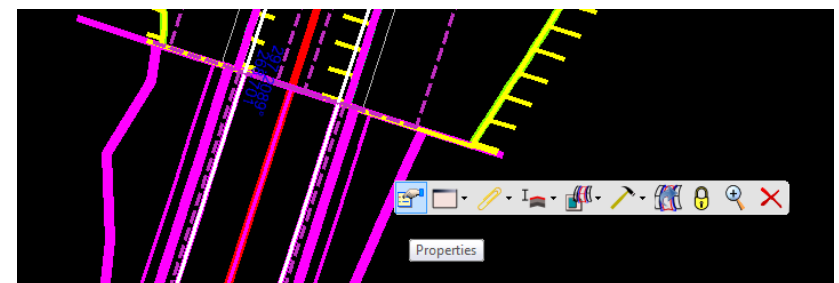


5. The next prompt will ask for the user to *Select Corridors To Be Clipped*.

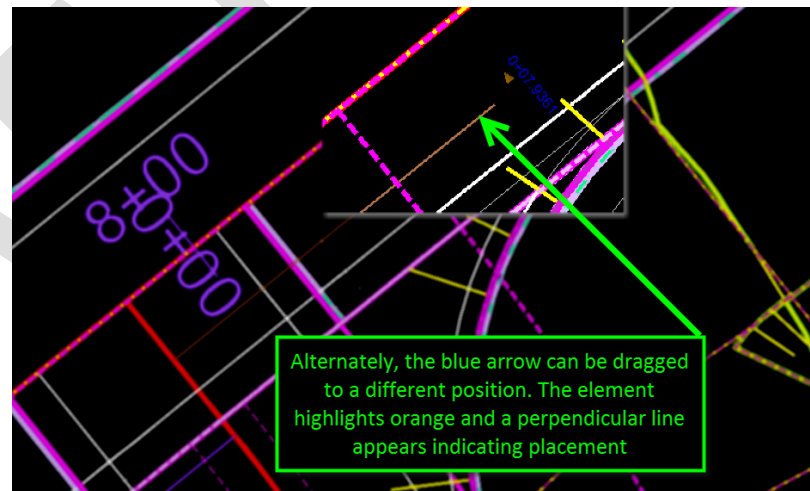
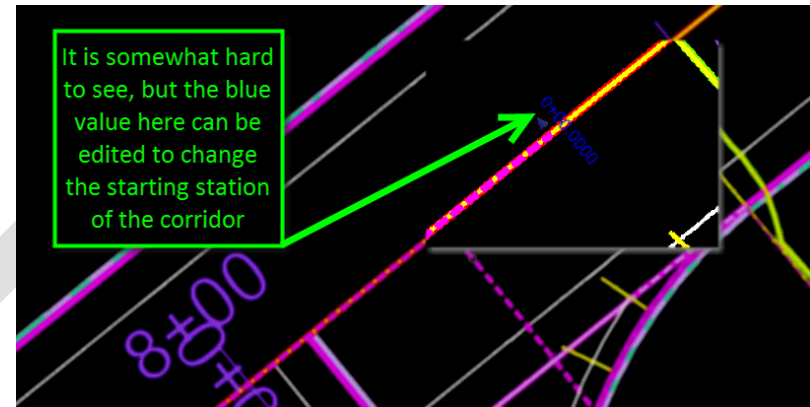
NOTE: this prompt will only appear if a clipping boundary was added to the civil cell when it was created. In this example the main line corridor and the side road corridors were selected. Right click to move on once the corridors (if any) have been selected.



6. Left click to accept civil cell placement. The corridor template graphics are visible on the main line. This will be edited in the next section.
7. Adjusting corridors. Corridors have an outline around them identifying the limits of the corridor; this is similar to the outline in the Roadway designer from SS2.
8. Adjusting a corridor using properties. The heads up menu will appear if the corridor element is clicked and hovered over. From the menu, the designer can open the properties and change the start/ end range of the corridor. The limits should change graphically.



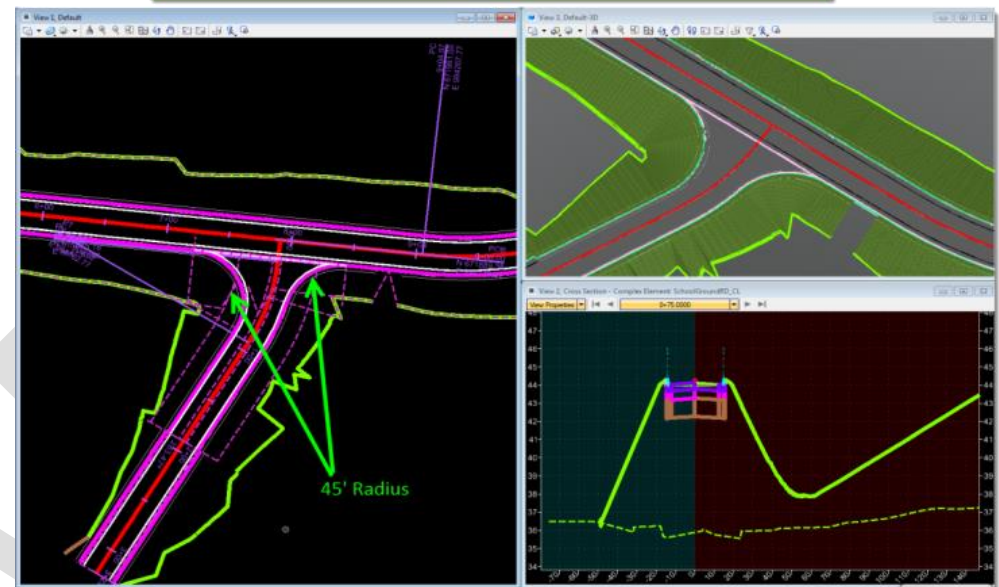
9. Adjusting a corridor using handles. The designer can also adjust a corridor using handles. The lines perpendicular to the corridor graphic are the handles. When selecting a corridor graphic small blue numbers will appear at key points. Clicking on them will give you the ability to edit the number and adjust the value. There are also small blue arrows at some locations. These can be dragged to adjust the corridor dynamically instead, as well as snapped to certain locations if the element is snappable.
10. In this example, the side road corridor has been adjusted to the back of the civil cell corridor graphic. The side road surface is no longer breaking through the main line.
11. Editing geometric elements. Depending how an element is created, the designer can edit and adjust elements without disrupting and breaking apart the model. Many elements which selected will have blue handles appear as well as blue numbers. If there is a handle and number it means the element was created using design constraints. Many handles can be adjusted dynamically or the numbers can be entered manually. In some cases the changes may break an element but the undo command is useful when trying to edit elements.



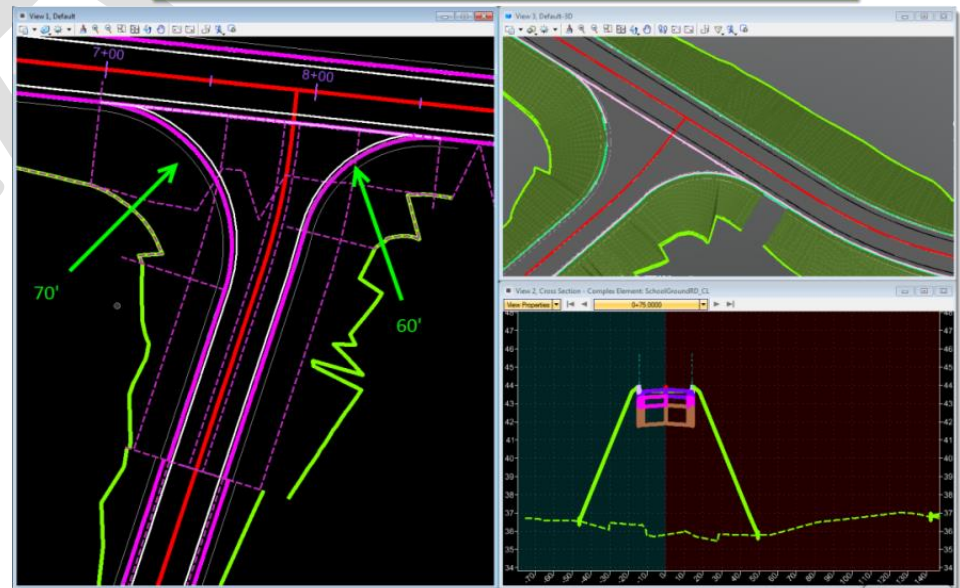
12. In this example there are three stages shown. The plan view, cross section view and 3D view are all visible. The first picture is the original model, the second had the alignment straightened and the third shows the radii of the intersection increased. Only elements in the 2D view were changed. The OpenRoads software automatically adjusts dependent 2D geometry, cross sections, profiles, and 3D models. This means less work for the designer as profiles, cross sections and 3D models do not need to be re-run each time a design change is made, all of these elements adjust automatically.

NOTE: because of the changes the program needs to make to the model, when changing element values, allow the program to catch up and display the changes before moving on to the next edit.

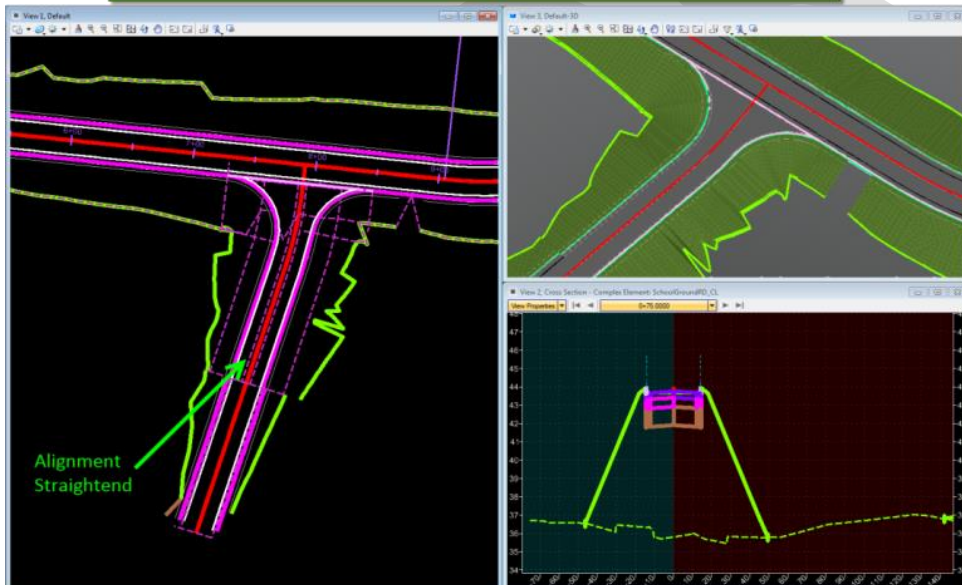
Original Model



Curb Returns Changed from 45' to 60' and 70'



Alignment Straightend



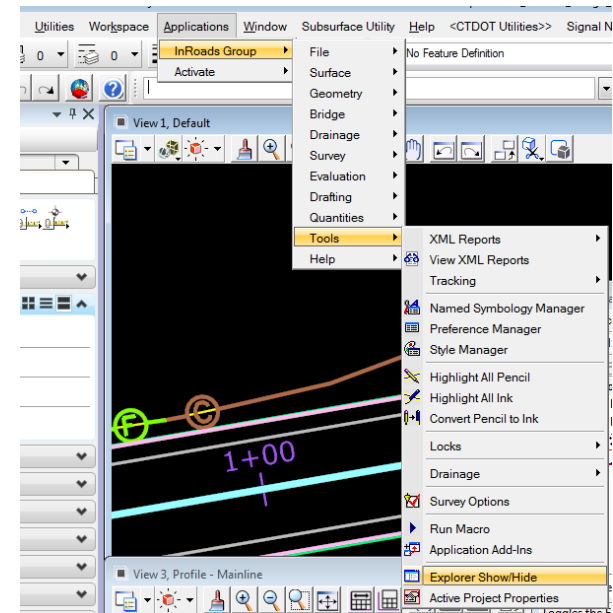
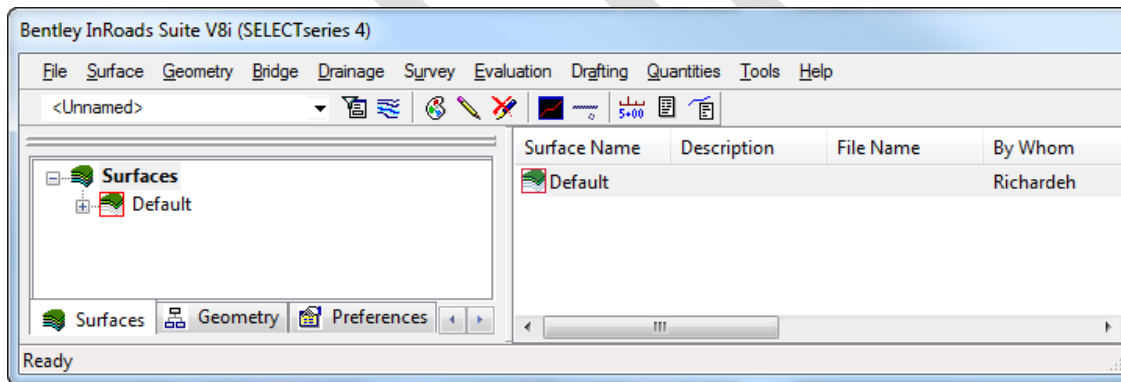
Chapter 8 Plans Production

Within InRoads SS4 the majority of the plan production is done using the native tools and native file formats. In order to facilitate the usefulness of these tools, this section will focus on moving the OpenRoads data (Geometry and Terrains) back to the native data formats. These files can then be used to create plan sheets and profile sheets. Ultimately, OpenRoads Designer CONNECT Edition will have a new set of fully-integrated plan production tools. Today, however, along with the OpenRoads tools, the native tools are also available in the SELECTseries 4 versions.

In this exercise, you will learn how to export an OpenRoads terrain model and Geometry to the native InRoads file formats (dtm and alg). You will need to convert your geometry back to an ALG file type to be able to use the InRoads SS4 Plan and Profile Generator. You will also need to convert your top proposed surface back to a DTM. If you do not have an existing DTM your terrain will need to be converted back to a DTM as well.

If you chose to hide the InRoads dialog box you will need to open it again. On MicroStation top menu bar go to

Applications > InRoads Group > Tools > Explorer Show/Hide

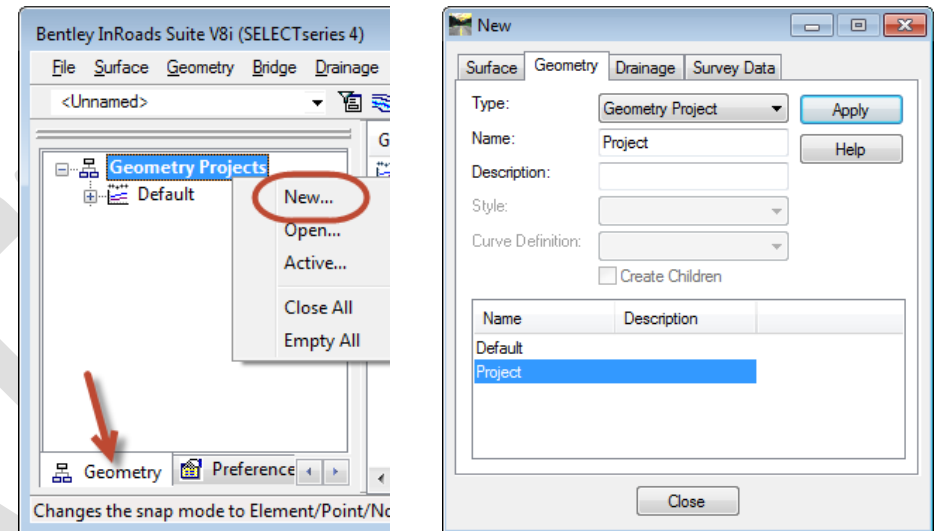


the

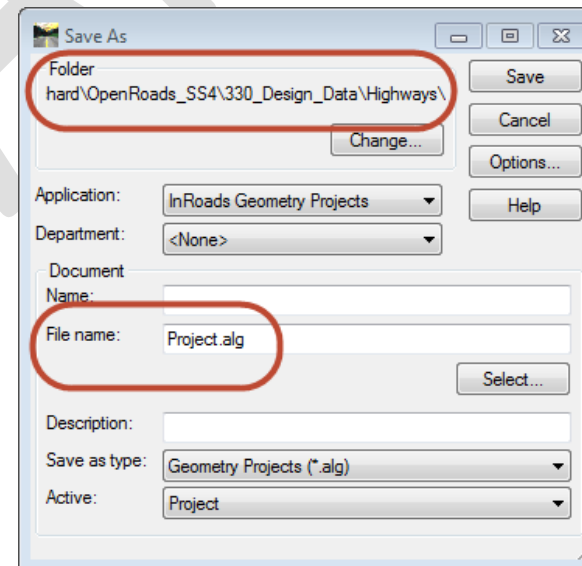
Section 8.1 Exporting Data

8.1.1 Export to an ALG

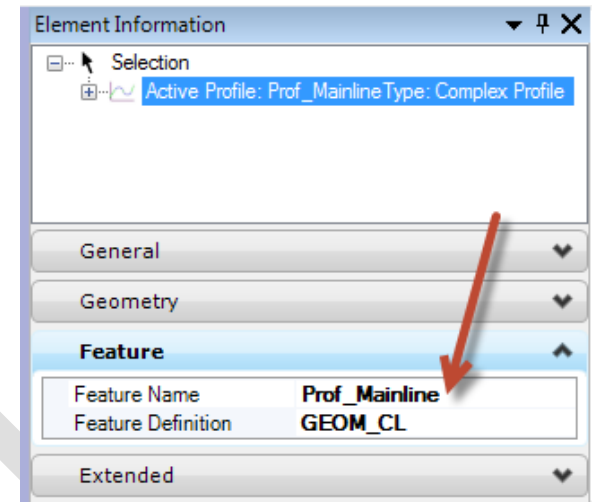
1. In InRoads Explorer select the *Geometry* tab, right click on *Geometry Project* and select *New*. Type in a name in the *Name* field and click *Apply* and *Close*.



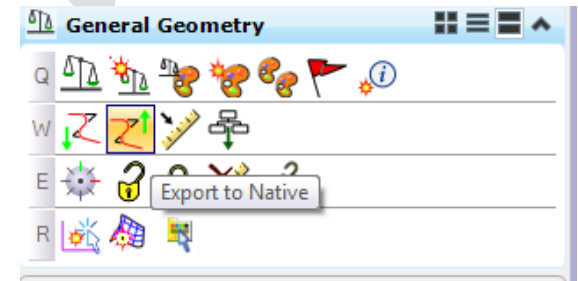
2. Right click on the new Geometry Project and select *Save As*. If you completed [Step 6 in Chapter 3](#) you will see your project path on the top portion of the Save As dialog box. The Internal name you gave will be filled in the File name field. Select *Save* and *Cancel*.



3. Before exporting to the new ALG file make sure all horizontal and vertical alignments have feature names.
 - A. Click on the horizontal alignment in check Element information locate the *Feature Name* field. If it is blank give it a name.
 - B. Click on the vertical alignment in check Element information locate the *Feature Name* field. If it is blank give it a name.



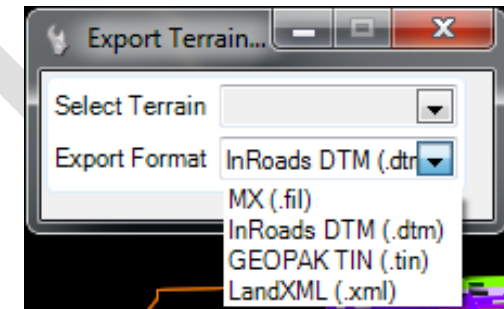
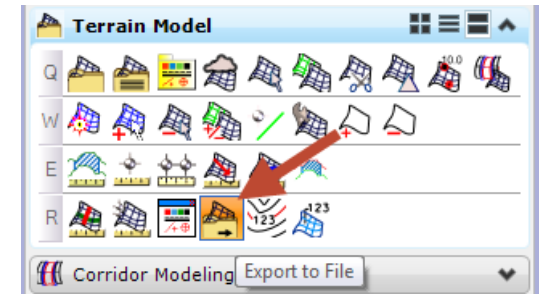
4. Now you are ready to complete the export on the Task menu. On the task menu select the **Export to Native** tool. Follow the prompts and select the Horizontal alignments you wish to export. It is not required to select the vertical alignment because they are children of the Horizontal and will automatically export with the Horizontal.
 - If you do try and select the verticals MicroStation will lock up and you will be kicked out of the application.
 - Check the InRoads Dialog box and confirm everything came over.
 - If you do not see a vertical appear in the alg it's because a Feature Name is missing (go back and do step 3)



8.1.2 Export to an Existing DTM

If there is not an existing DTM, designers will need to call Central Surveys and ask them to do the following in OpenRoads.

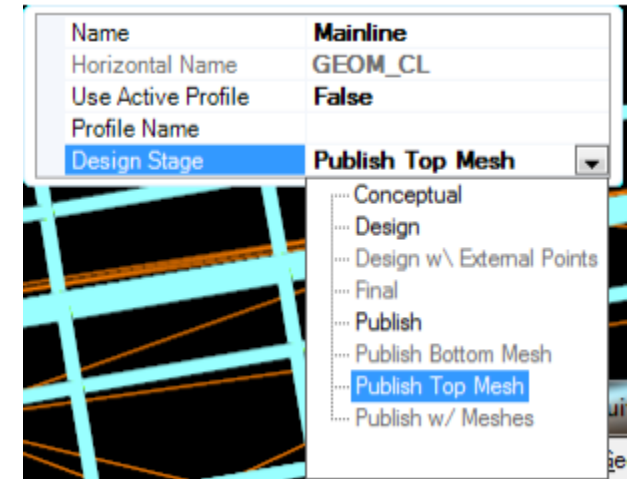
1. Select on Terrain Model on the task menu and select the **Export to File** icon. In the Export Terrain pick box select:
Select Terrain: *Existing*
Export Format: *InRoads DTM (.dtm)*
2. Place the DTM in the ProjectWise project folder under
|500_Pre_Design|03_Central_Survey|



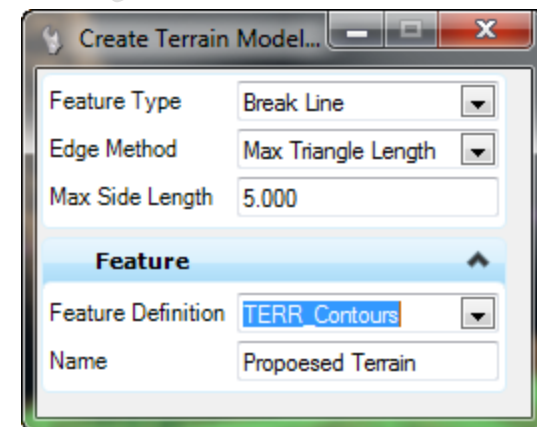
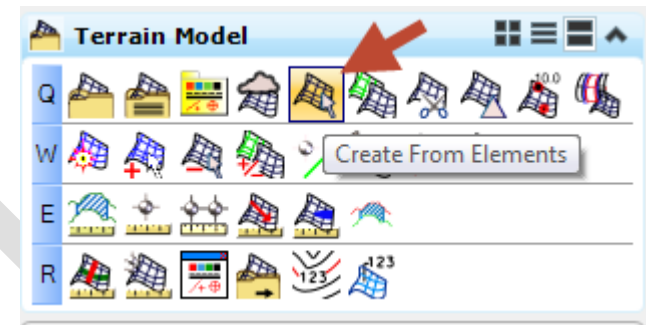
8.1.3 Export to a Proposed DTM

1. Open your main design File.
2. Change the corridor's **Design Stage** to display the top mesh.
 - a. In *View 1*, select the corridor. (Use the handles if necessary)
 - b. From the context menu, select **Properties**
 - c. Change the **Design Stage** to *Publish Top Mesh*.
 - d. The corridor model changes to display a mesh of the proposed top surface.

After creating the top mesh along the corridor, we will create a new dgn in which the proposed terrain model will be stored. The main corridor will be referenced into the new file to be utilized in terrain creation.



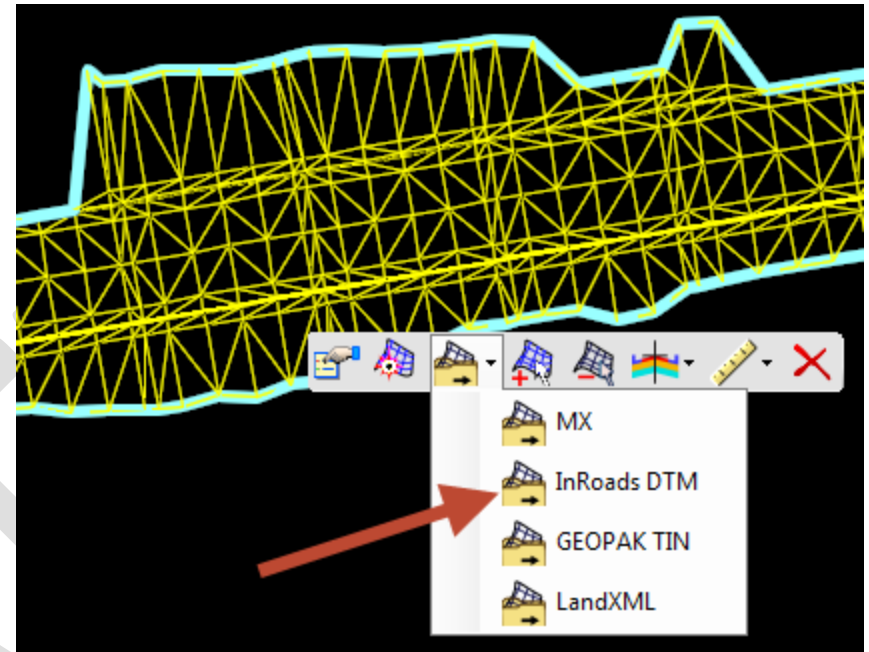
3. Create a new 3D dgn to store the proposed terrain from the corridor and open it.
4. Reference the Main Design File into the Proposed Terrain File. Set Live Nesting to 2.
5. Create a terrain model from the mesh.
 - a. On the task menu, open the **Terrain Model** toolbox.
 - b. Select the **Create from Elements** tool.
 - c. First, on the **Create Terrain Model** dialog box...
 - Set the **Feature Definition** to *TERR_Contours*
 - Name the terrain *Proposed Terrain*.
 - d. Then, following the prompts, locate the elements to add and select the mesh element.
 - e. Click *Reset* when done.
 - f. Set the feature type to *Break Line*.
 - g. For the **Edge Option**, select **Max Triangle Length**
 - h. Set the **Max Side Length** to 5. The terrain model is created.
 - i. Turn off the display of the main file and review the terrain model. Do not detach the reference file.



NOTE: This terrain model is linked or “ruled” to the corridor model in the main file. The terrain model will update when modifications to the corridor are made. If the referenced corridor is detached, the link between the terrain and the corridor will be broken.

8. Export the Proposed Terrain Model to its native file format. The plan production tools rely on the native file format, therefore we will now export the proposed terrain model to its native file format.

- a. Select the **Proposed Terrain** element in the file.
- b. From the context menu, select the **Export Terrain Model** tool.
- c. Select the DTM file format.
- d. Click **Save**. The terrain is saved into the selected native file format.



Section 8.2 Geo-Referenced Plan Cut Sheets

A Geo-Referenced Plan Cut Sheet is composed of a MicroStation sheet model with the existing ground survey file(s) and the proposed design file(s) referenced in geospatially correct. Designers can use InRoads – Plan and Profile Generator to create plan cut sheets or can create plan sheets using just MicroStation tools. Option 2 using the InRoads Plan and Profile Generator is recommended if the project is long, requiring a large number of sheets. Option 1 maybe a better choice for smaller projects.

Regardless of the method used to create the sheets the following should be adhered to:

- The MicroStation view will be rotated, not the reference files.
- Use the MicroStation Tasks for CT DOT Sheet Composition.
- Only one border cell is in each sheet model file (Plan Sheet)
- Call outs for pay items, beginning and end of project, limits of construction will be in the sheet model file.
- General notes, ROW legend and construction notes for small projects are usually included on the first plan sheet model. For larger projects a separate sheet may be required for the notes and legend.

8.2.1 Option 1 - MicroStation Plan Sheet Creation

Attach Reference Files

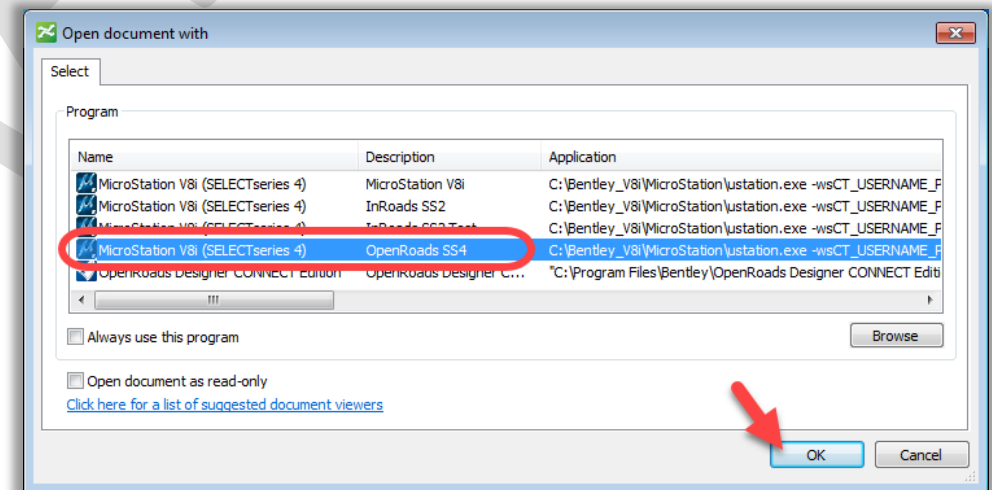
1. In ProjectWise use the Advanced Wizard to create and open a new MicroStation dgn file, use one of the following ProjectWise seed files:

05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_SheetSeed_83.dgn

or

05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_SheetSeed_27.dgn

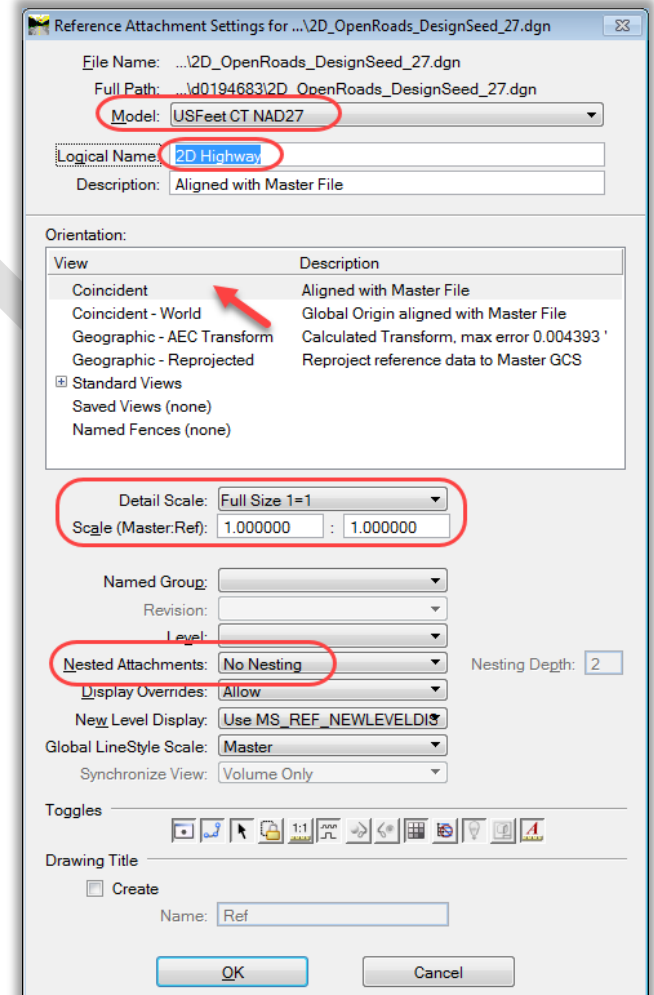
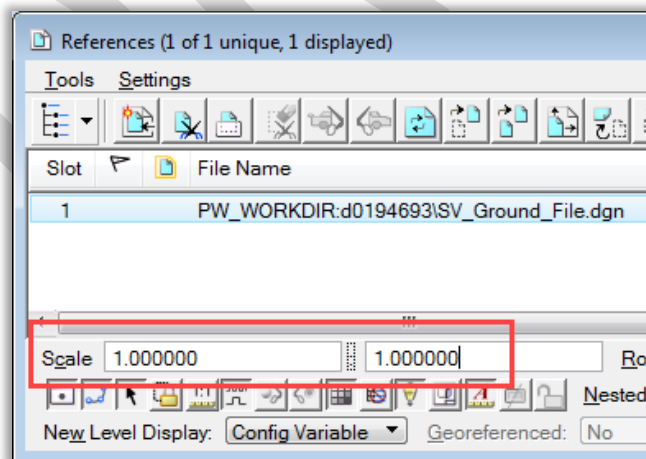
2. If you are already in MicroStation the new file will automatically open after completing the Wizard, if you are creating a file from ProjectWise Explorer you need to do an Open With and in the Open document with dialog box select *MicroStation SS4 OpenRoadsSS4* and Click **OK**.



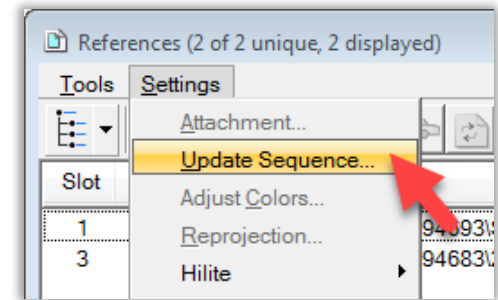
3. Reference in the required Proposed and Existing MicroStation Dgn files
 - a. Select the required model.
 - b. Type in logical names such as 2D Highway or SWW Survey.

Note: The SWW Screening code (Screen With Weights) is used to screen existing survey files. The weights of the line styles within that file will be maintained, but the color will be muted. If you want to screen multiple files, type in SWW1... SWW 2 and so on.

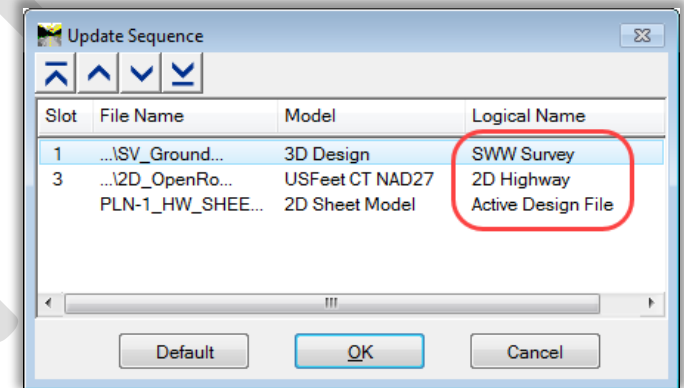
- c. Change the Nesting Attachment Setting as needed.
 - d. Select *Coincident*, Detail Scale *1:1*, and True Scale *OFF*. Click **OK**
4. In your MicroStation view window click on Fit View. Double-check that the survey ground file came in at the correct location, zoom to a coordinate grid cross and snap to it, the XY-axis in the MicroStation command window should display the same numbers as the northing and easting of the coordinate grid cross. If something is incorrect check the Scale of your reference file(s), it should be 1:1. If it is not, select the reference file(s) and change the scale to 1 to 1.



5. Open Level Display, The Level Display box will show you the active and inactive levels for the selected view (active view window); select the All Used Levels display filter. In each reference file click on the levels you want to turn off. You can also right click and use Off By Level and pick the lines / points of a particular level to turn off the level in the view window. You can turn off the levels in just one view or in all open views.



6. Click on the **Reference File** icon. *Select Settings > Update Sequence.* Using the Update Sequence Tools move the files either up or down to the desired location(s). The Active Design File should be the last file in the update sequence, meaning this is the last layer the printer prints. Sequence order for Highway Plan sheets: Survey, Design, Active File.

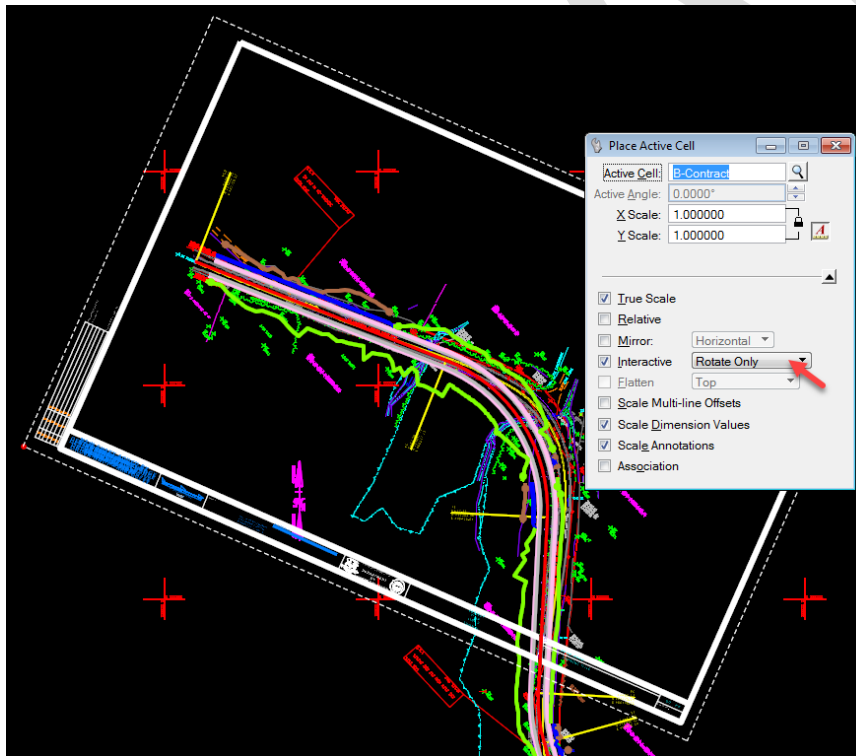
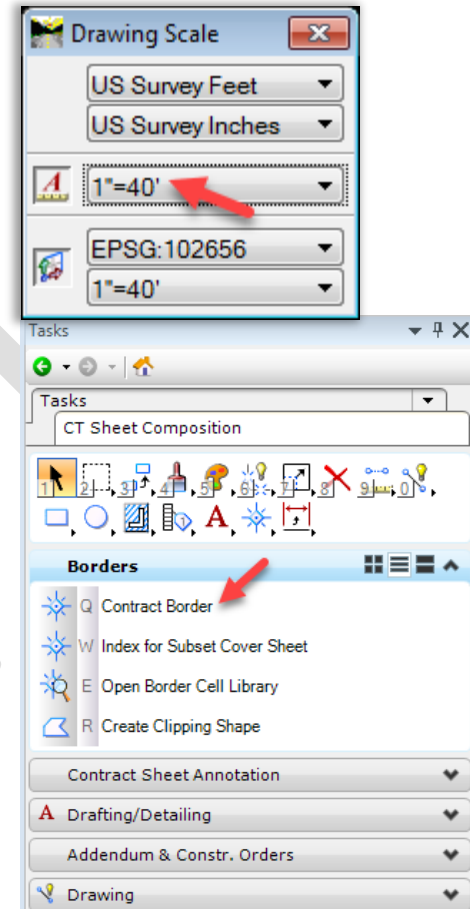


7. On the MicroStation menu bar click *File > Save Settings* to save all the settings you changed, such as all the levels you turned off in the reference files and in what view.

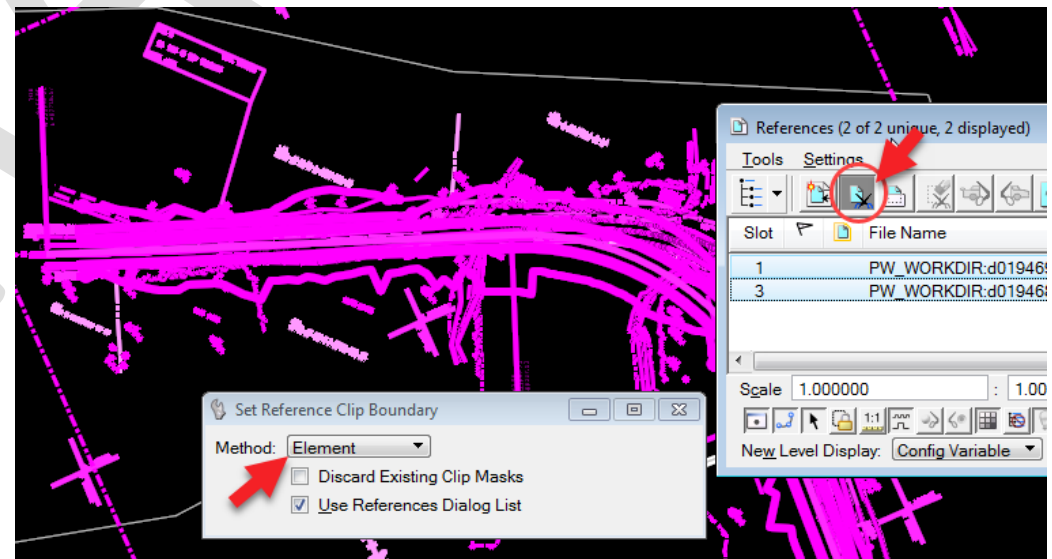
Place the Border and Clip the Reference files Boundaries

The plan border cell and transient shape (sheet boundary) are used to define the layout of the paper for plotting a sheet model and are set to fit onto standard paper sizes (print/pdf sizes). This workspace uses a plan sheet size of 22" x 34" (ANSI D), this is the actual paper size.

1. On the MicroStation main Menu bar select *Settings > Drawing Scale*. Choose **1'=40"**
2. On CT DOT Sheet Composition task menu. Select the Borders task and click **Contract Border**. The Place Active Cell command with the Active Cell: BDR_Plan is activated. Place the plan border cell in your plan sheet model where you want it. Follow the command prompts to rotate and place the border.

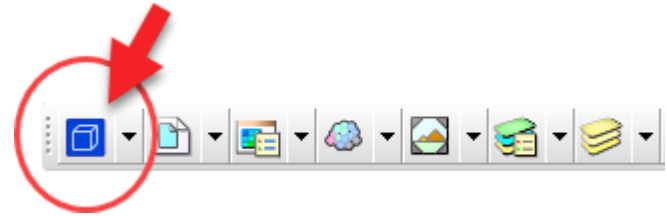


3. Rotate the MicroStation window view. Click on the **Rotate View** icon located on the top or bottom of your view window. Set the method to **2 Points**.
4. Copy the North Arrow from the Survey Ground file into your sheet model (this is the only item/cell you will copy from the survey file).
5. If you are unable to fit the entire design within one border, additional plan sheet models need to be created. Place match mark lines at full stations where the sheets will be split. Match mark lines are perpendicular to the baseline/centerline. On the CT Sheet Composition Task under Contract Sheet Annotation select **Match Mark Line**.
6. On the CT Sheet Composition Task under Borders select **Create Clipping Shape**; this activates the Place Shape command. Place a shape around the reference elements you want within your clipping boundary.
7. In the references dialog box select all of the reference files you want to clip. Select **Clip Boundary** on the References dialog box and select. Choose the Method: **Element**. Data point on the shape (clipping boundary shape).
8. Fit View. Save Settings.



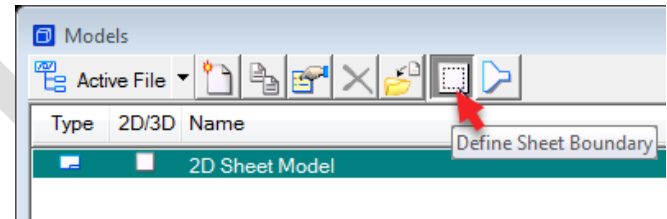
Placing the Transient Shape

1. Click on the **Models** Icon.

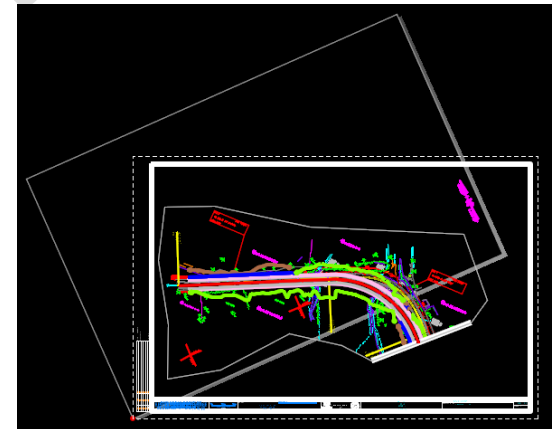
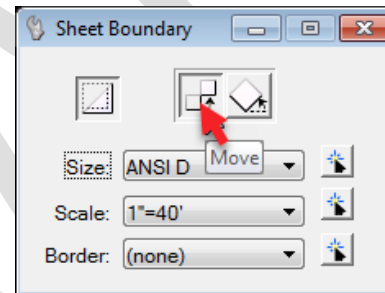


2. In the Models dialog box click the **Define Sheet Boundary** icon.

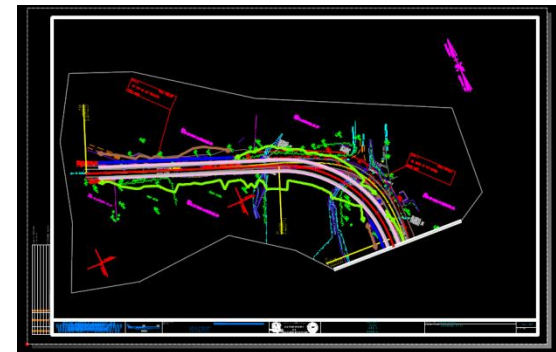
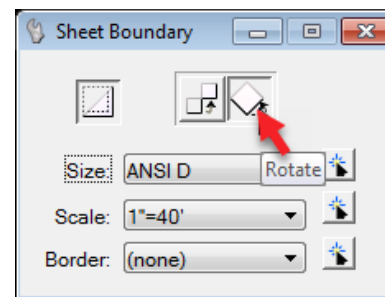
3. In MicroStation window click on **Fit View** to locate the transient shape (cut sheet border definition shape).



4. On the Sheet boundary dialog box click **Move**, click over the transient shape and move it to the desired location. Click to place it at the new location, right-click to release the move command. If you need to rotate the transient shape, click **Rotate** on the Sheet Boundary dialog box, follow the MicroStation command prompts (right bottom) to rotate the transient shape.



5. Fit View and Save Settings.

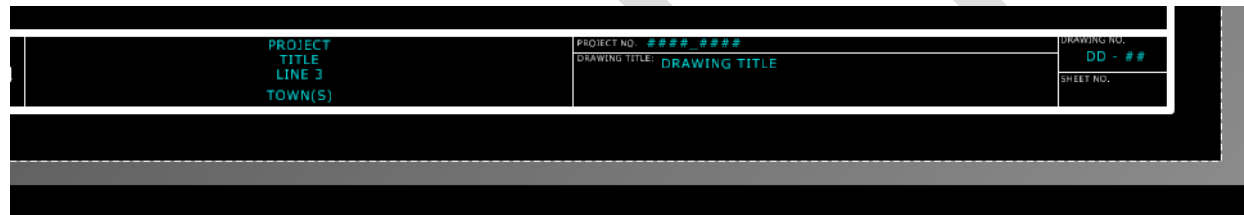


Border Title Block Information

1. The plan sheet's title block needs to be updated and have only the correct designation levels turned on for Design Phase and Scale.



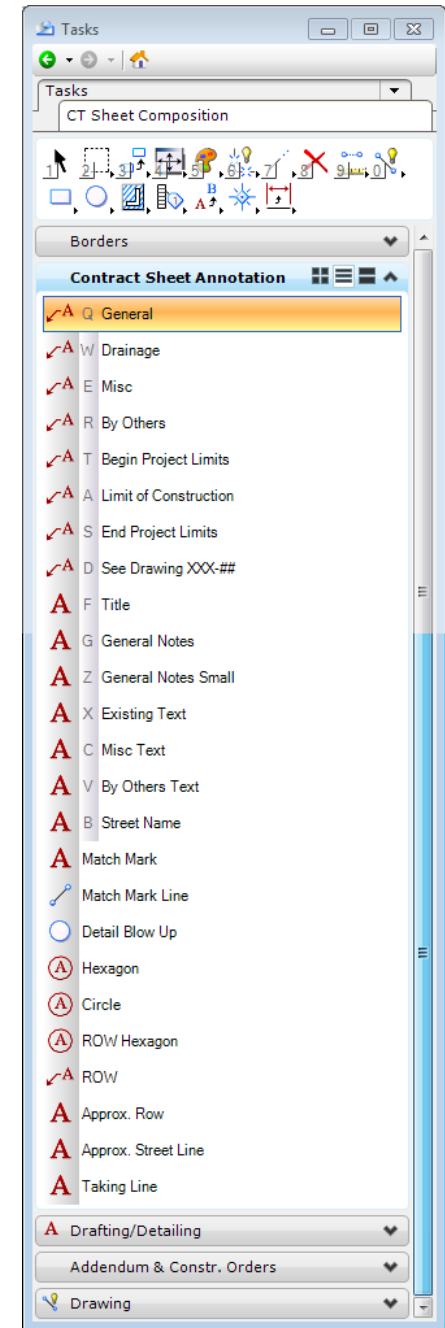
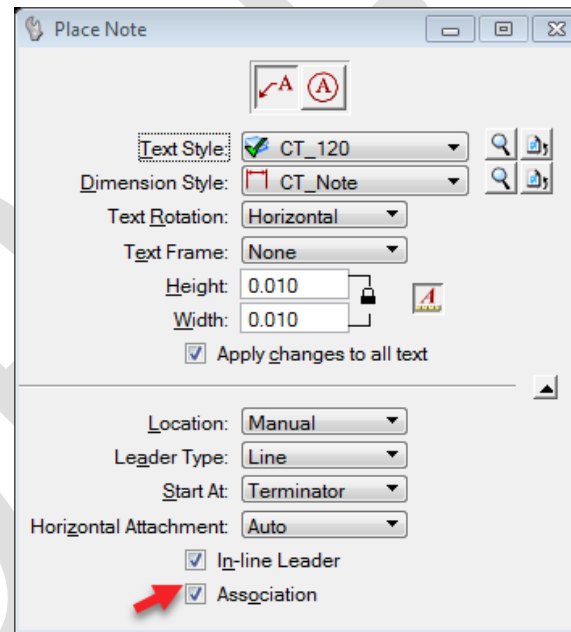
2. Use the Edit Text tool to update the title blocks , Project Title, Town(s), Project #(s), Drawing Title, Drawing #



Contract Sheet Annotation

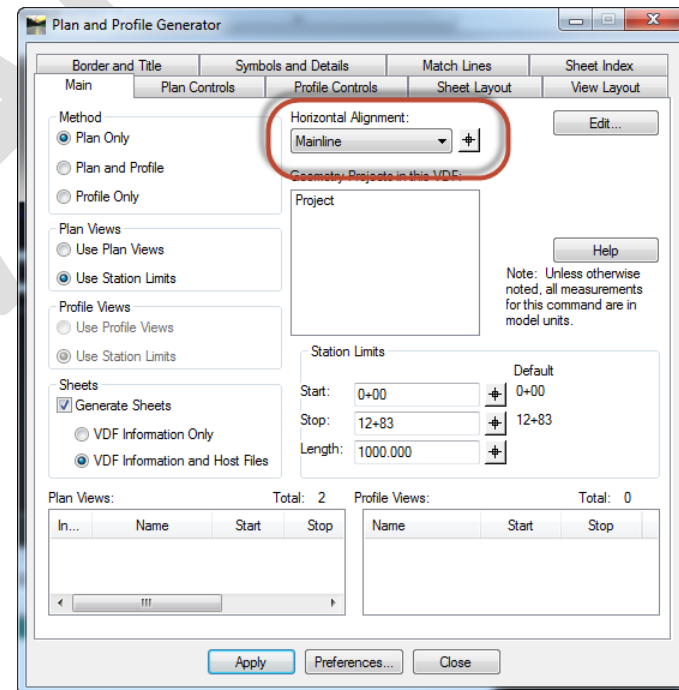
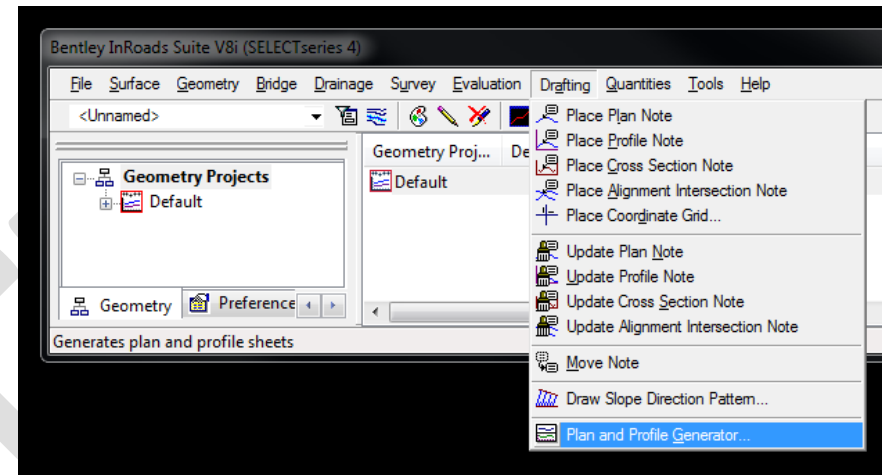
All annotation such as: call outs, labels, notes and dimensions are placed in the sheet models. It is important that the correct tasks and levels are used.

1. Click on CT DOT Sheet Composition.
2. Click on the Contract Sheet Annotation task group.
3. Associate the note with the item on the cut sheet, **turn on Association Lock** and then **toggle on Association** on the Place Note command. With association turned on, the notes can be moved and the terminator will stay/remain at the pay item where it was originally placed. This helps when it becomes necessary to relocate a call out.

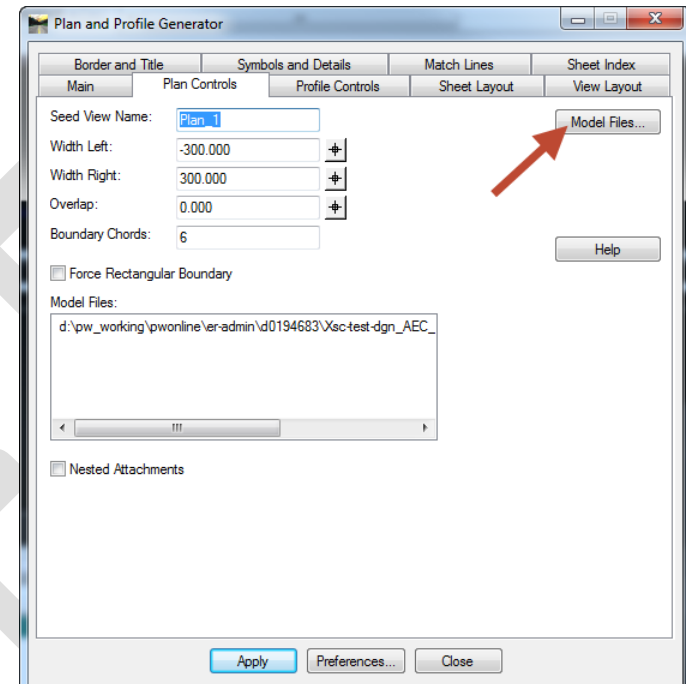


8.2.2 Option 2 - InRoads Plan and Profile Generator

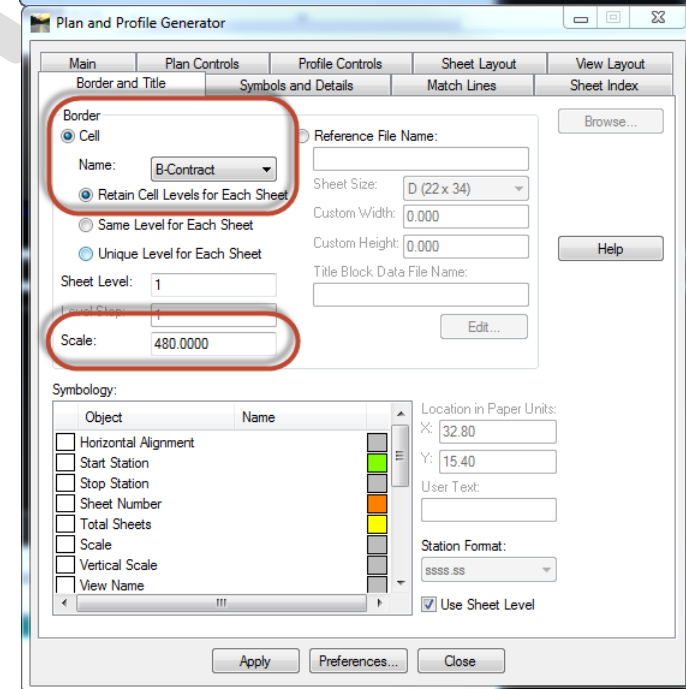
1. Open your main modeling DGN file.
2. Make sure the ALG and Proposed and Existing DTM's are opened.
3. To generate plan sheets select *Drafting > Plan and Profile Generator* on the InRoads Dialog Box.
4. Select the **Highway** Preference and select each tab to edit as necessary (AT THIS POINT DO NOT CLICK ON THE PROFILE CONTROLS TAB, this will mess up your settings "INROADS GLITCH")
5. On the Main Tab select the *Horizontal Alignment*.



6. On the Plan Controls select and browse to the needed *Model Files...*

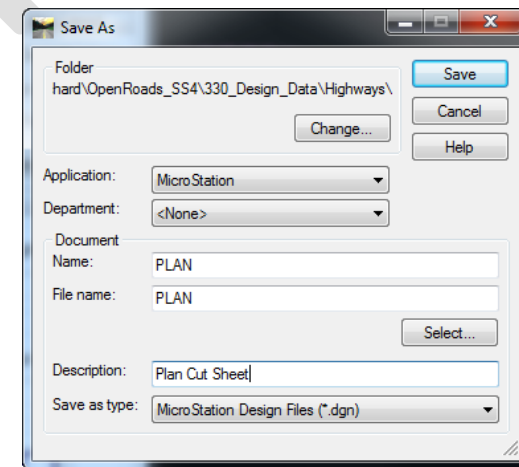
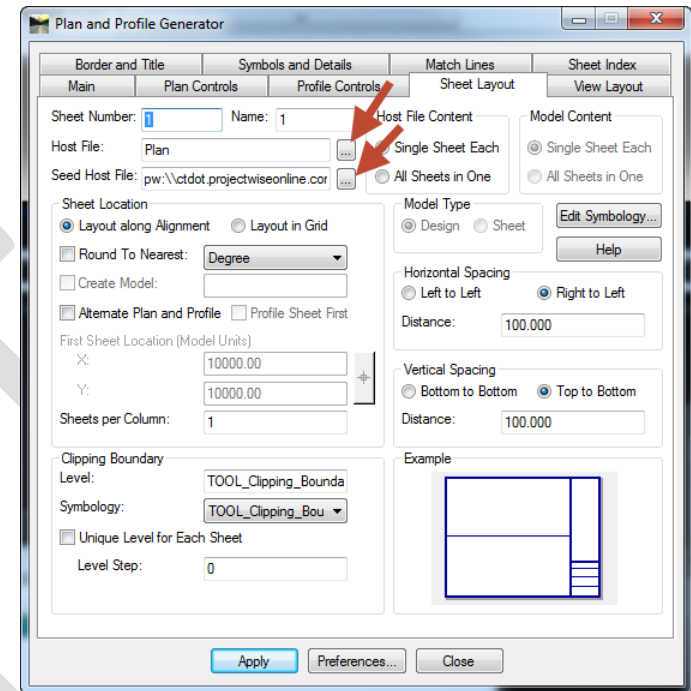


7. On the Borders and Titles Tab the following should be set. Cell toggled on and is set to *B-Contract*. Retain Cell Levels for Each Sheet is on and the Scale is set to *480*.



8. On the Sheet Layout Tab

- a. Select to pick a *Host File*, this will be the name of the newly created Plan Sheet DGN files.
- b. In the Save As dialog box direct your files to be created in the correct ProjectWise folder by clicking on the **Change** button.
- c. Give your Document a Name, File Name and a description and click **Save**.



- d. Select to pick a *Seed File*.

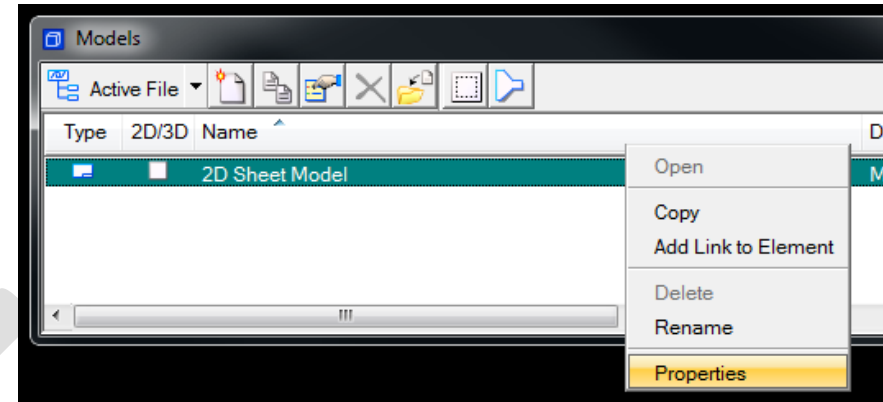
Browse to:

05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_SheetSeed_83.dgn

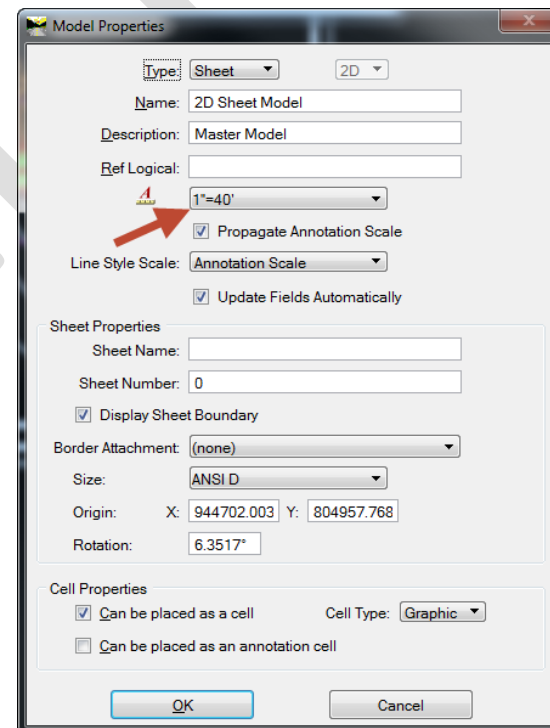
or

05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_SheetSeed_27.dgn

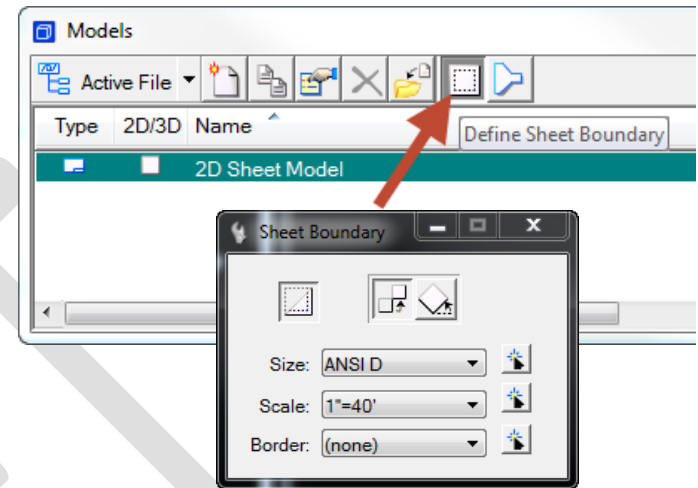
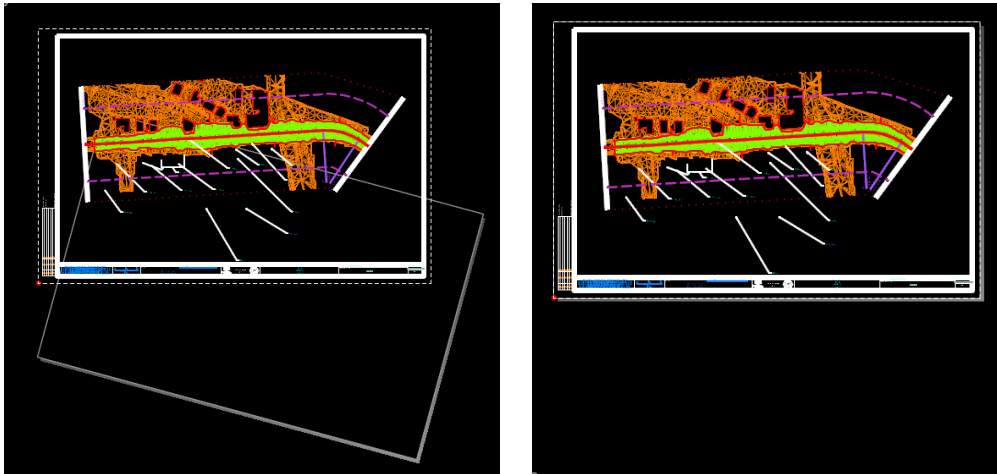
9. Click **Apply** on the Plan and Profile Generator and plan cut sheets will be produced
10. Open each file and modify the Model Properties. Open the Models Dialog box, right click on the Sheet Model and select **Properties**,



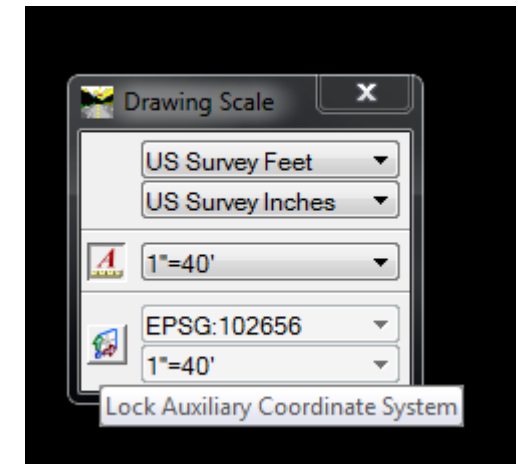
11. In the Models Properties Dialog Box change annotation scale to **1"=40'**. Click the **OK** Button.



12. Back on the Models Dialog box select the Define Sheet Boundary Icon. Adjust the Models Sheet Boundary to line up with the Border. You will need to use both the rotate and move tools to accomplish this.



13. On the MicroStation top menu bar select *Settings > Drawing Scale* and assure the the Lock Auxiliary Coordinate System is NOT on.
14. On the MicroStation top menu bar select *File > Save Settings*.



Section 8.3 Profile Cut Sheets

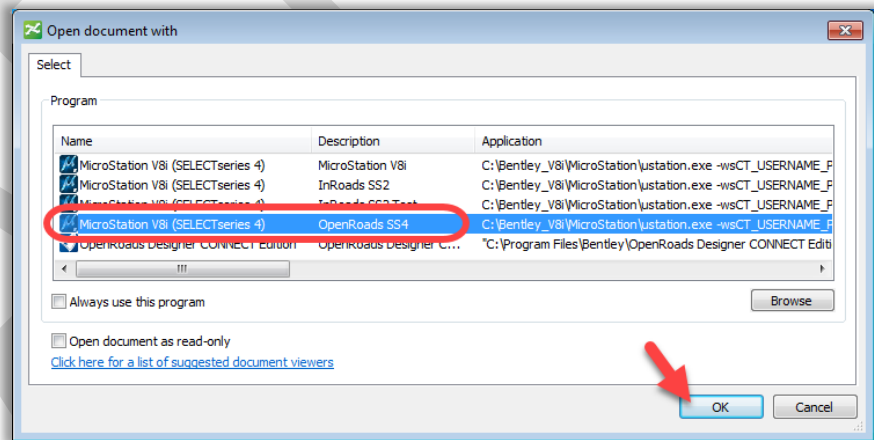
8.3.1 Option 1 - MicroStation Profile Sheet Creation with InRoads Grid

Place Profile Grids

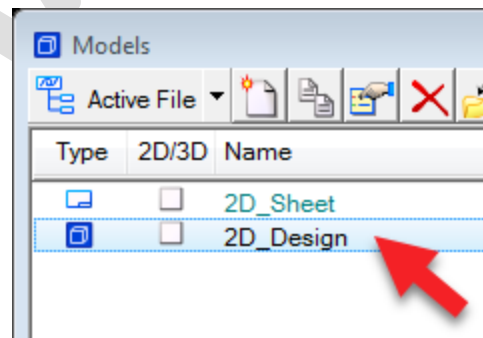
1. In ProjectWise use the Advanced Wizard to create and open a new MicroStation dgn file. Use the Multi Model ProjectWise seed file, this will house 2D Design Model for the Profile Grids and several sheet models for each grid:

05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_MultiModelSeed.dgn

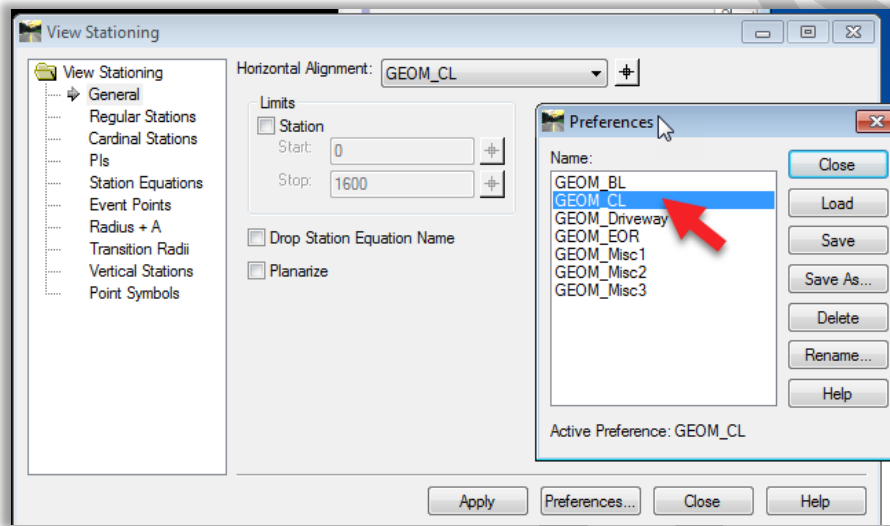
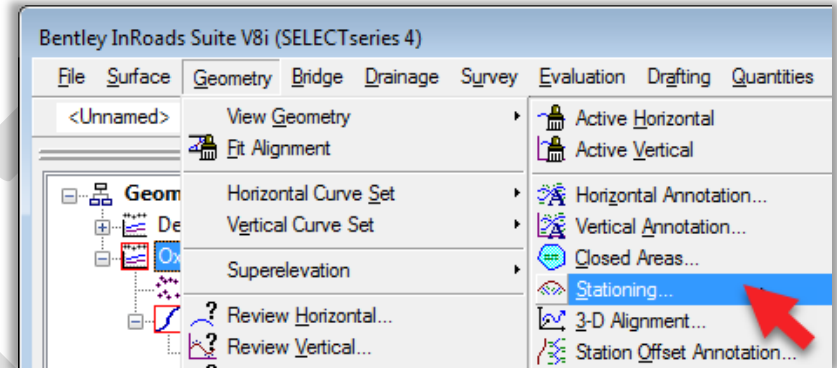
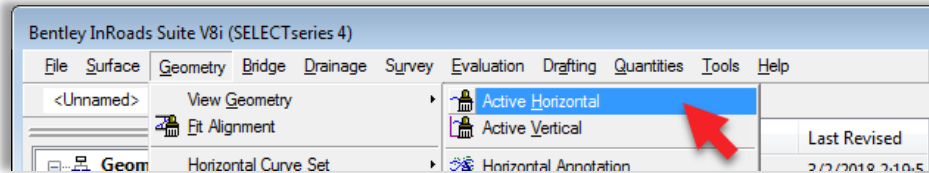
2. If you are already in MicroStation the new file will automatically open after completing the Wizard, if you are creating a file from ProjectWise Explorer you need to do an Open With and in the Open document with dialog box select *MicroStation SS4 OpenRoadsSS4* and click **OK**.



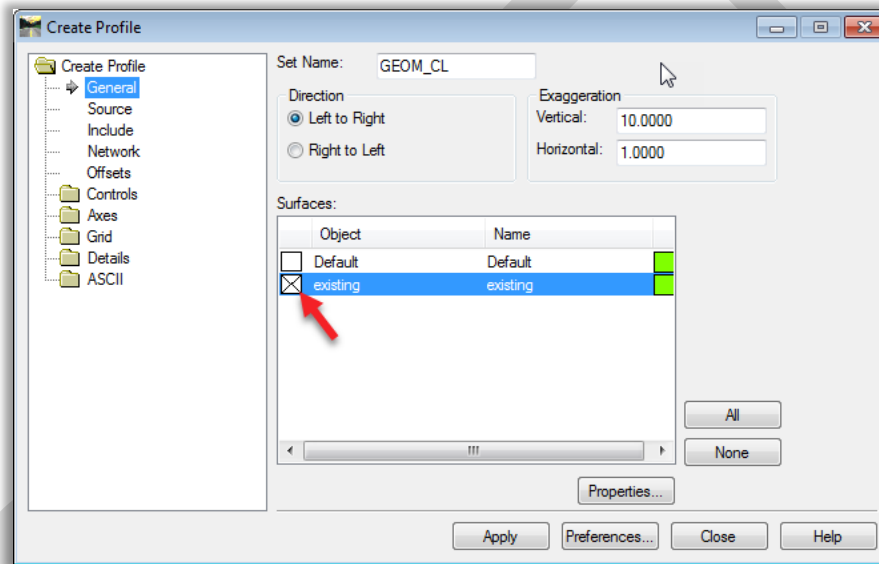
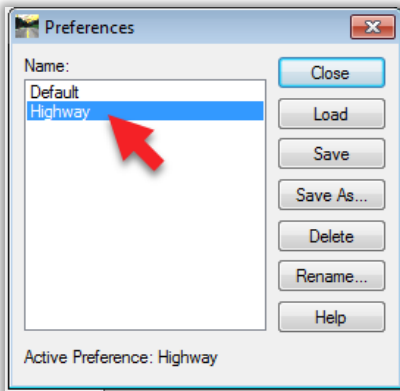
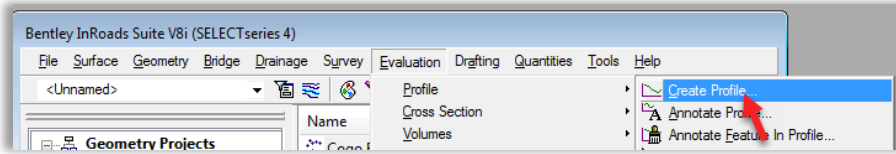
3. When the file opens you will need to start off in the 2D Design Model.



4. Make sure the ALG and Proposed and Existing DTM's are opened. Use the InRoads dialog box to view the active Horizontal Alignment and Stationing. (When viewing the Stationing set the GOEM_CL preference active).



5. Create profile separate grids to match the Plan Sheet Stationing. On the InRoads dialog box select *Evaluation > Create Profile*. Select the Highway Preference and toggle on the Existing Surface.

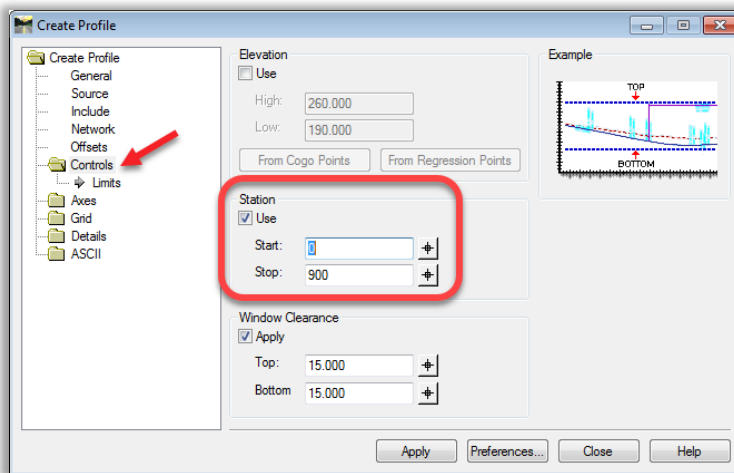


6. These grids will be placed on a sheet so you will need to adjust the Control settings to ensure both the horizontal and vertical limits will fit inside each Border. Click on the controls folder and set the Station to line up with the matching Plan Sheet.

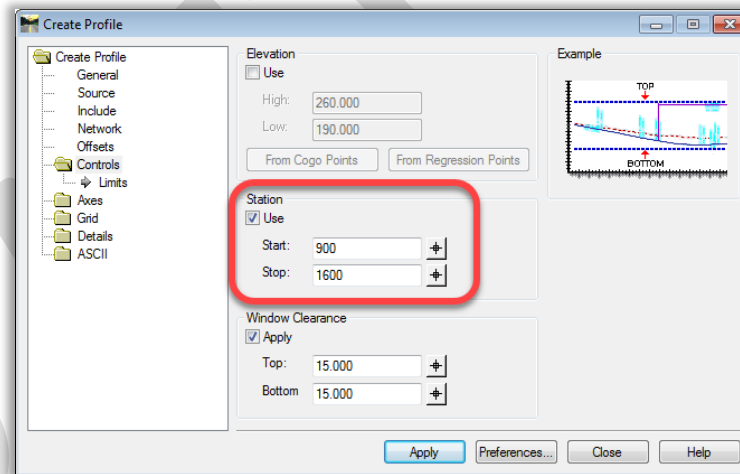
Optional Elevation Settings:

- Control the exact elevations, under the Elevation section toggle on the Use and set as needed.
- The window Clearances can also be adjusted.

7. Click **Apply** and follow the prompts to place each grid.

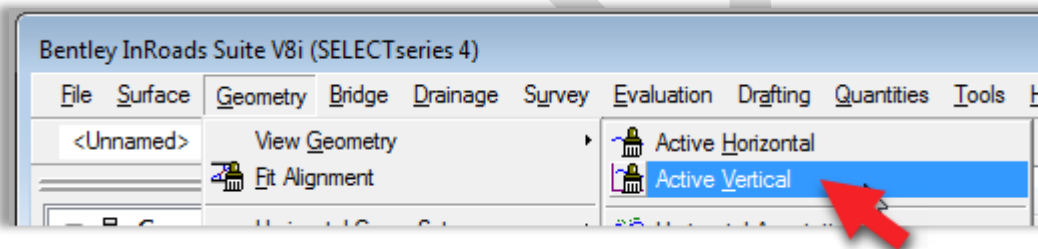


Plan Sheet 1 = Profile Sheet 1

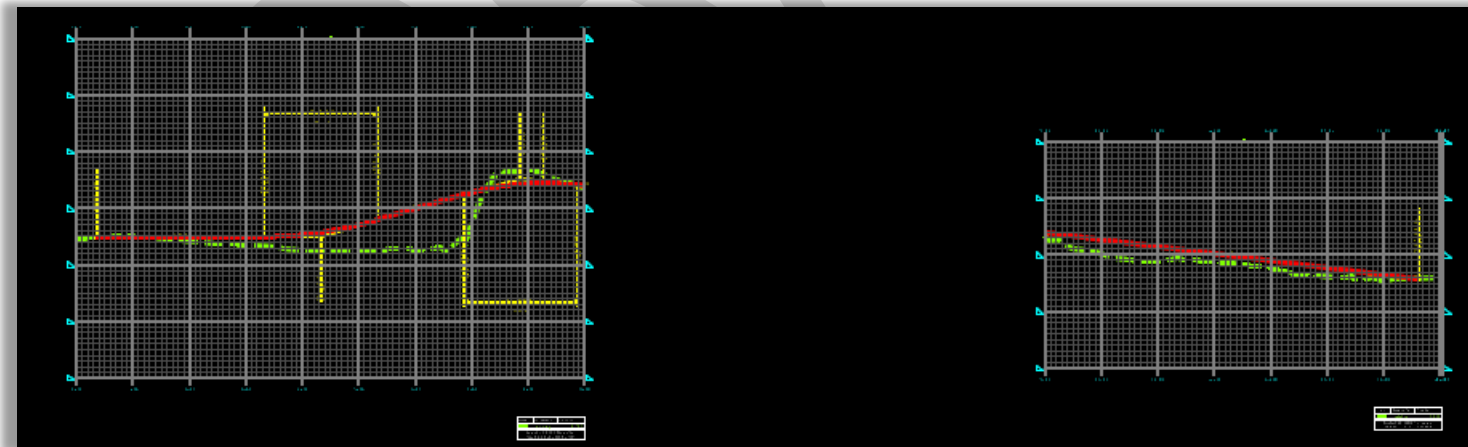
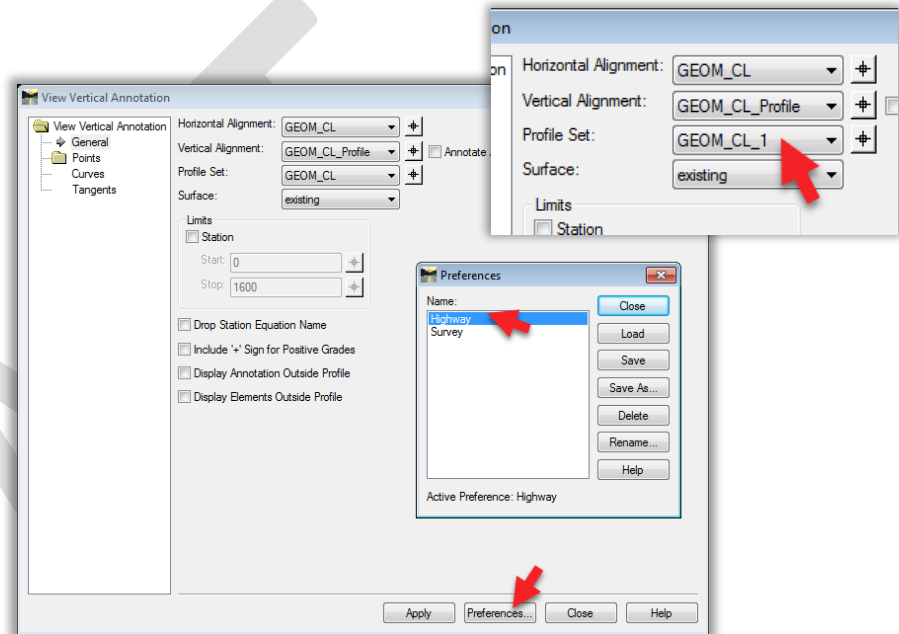
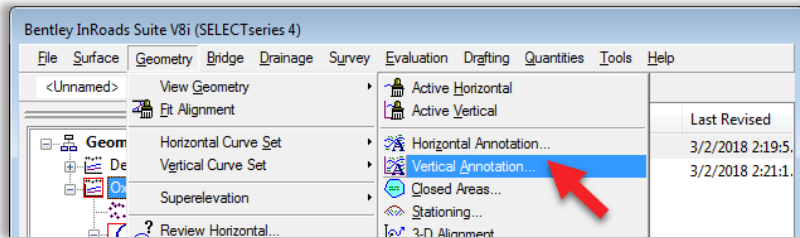


Plan Sheet 2 – Profile Sheet 2

8. View the Vertical Alignment. On the InRoads dialog box select *Geometry > Active Vertical*.

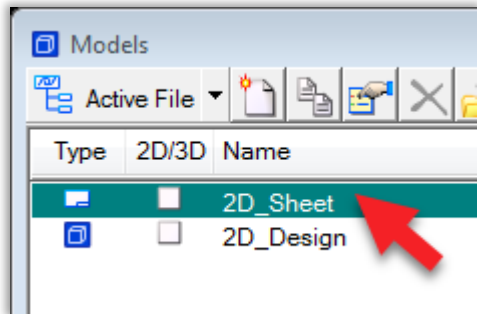


9. View the Vertical Annotation. On the InRoads dialog box select *Geometry > Vertical Annotation*. On the View Vertical Annotation dialog box select the Highway Preference and click **Apply**. Profile 1 will update. Select the next Profile Set and click **Apply**. Do this for each profile.

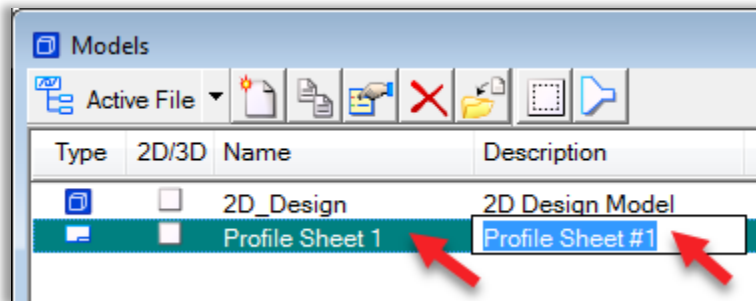


Create Profile Sheet Models

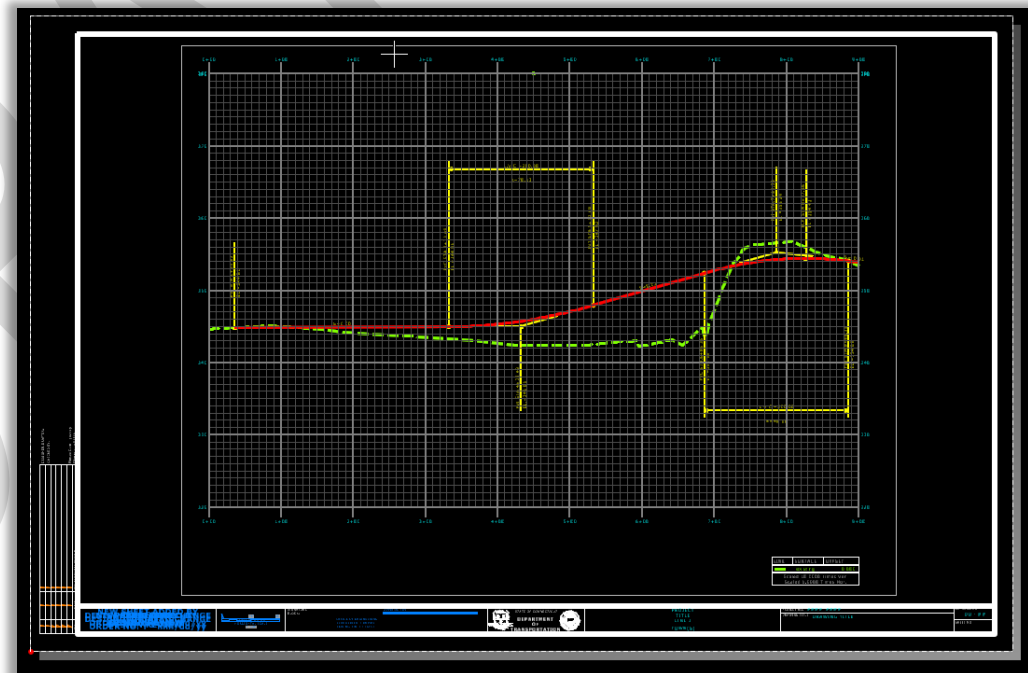
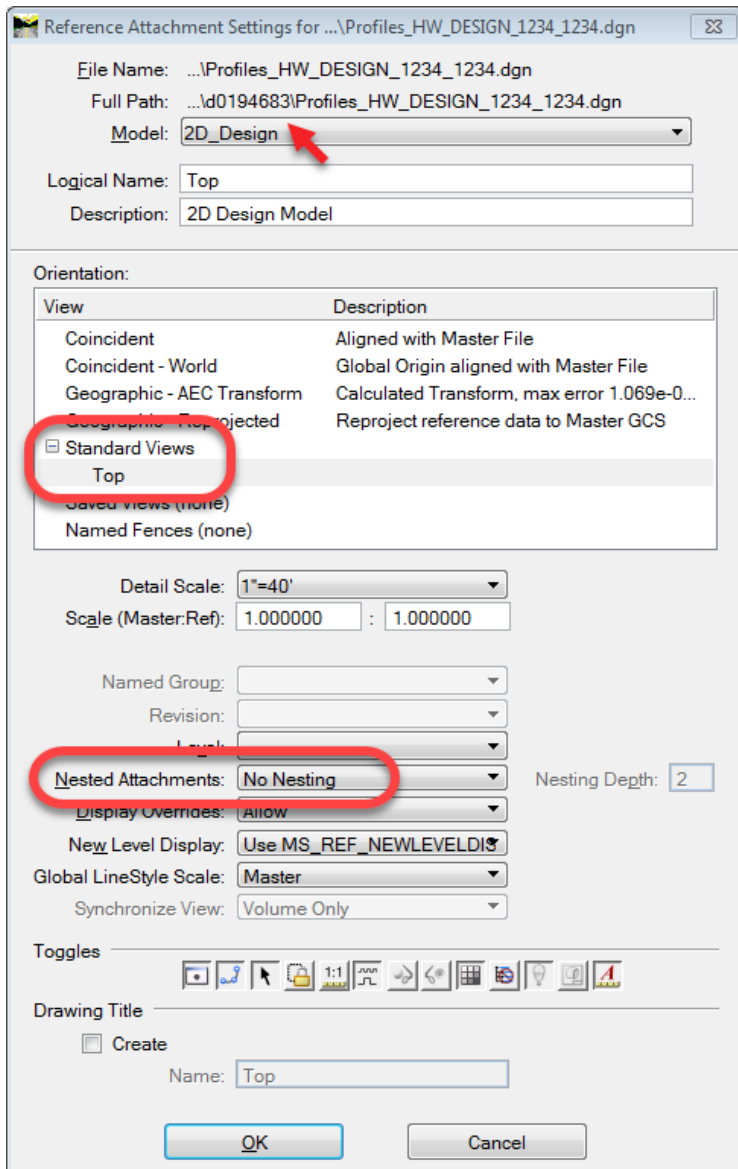
1. In the same DGN file open the 2D_Sheet Model.



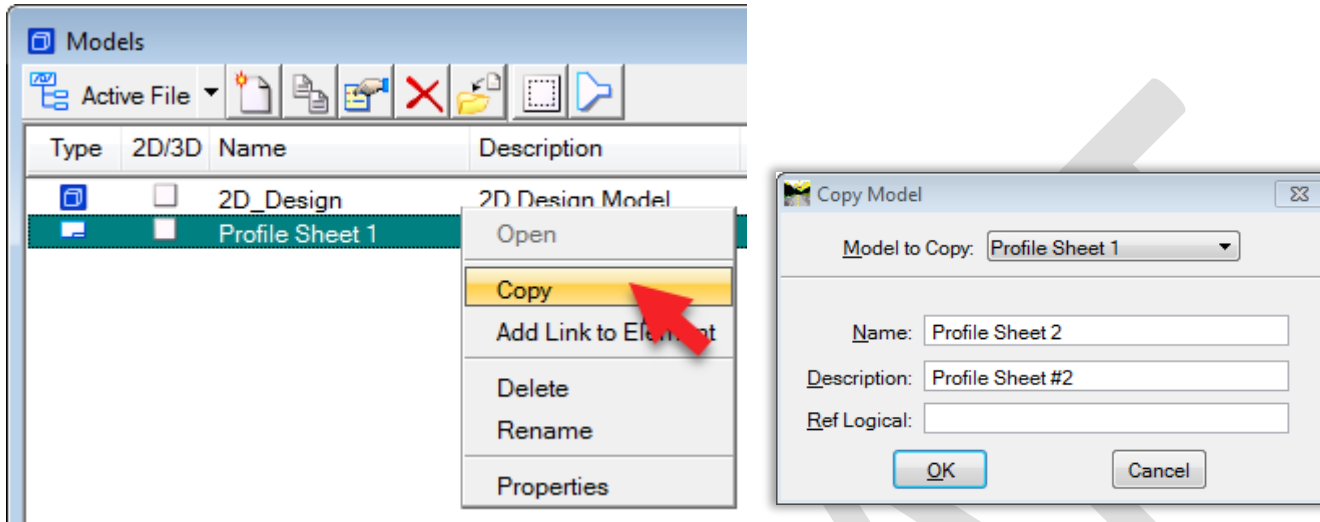
2. Rename the Sheet Model's Name and Description to correspond with the matching Plan Sheet.



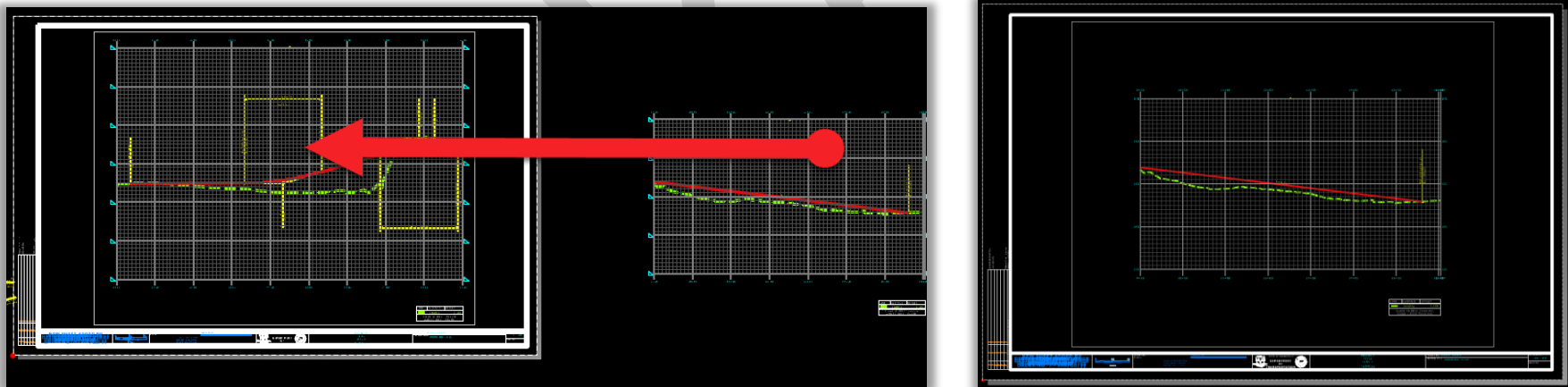
3. Reference in the main Profile *2D_Design* model using the top view orientation. Data Point on near the middle of the border. After the File is attached move is as needed and clip the boundary.



4. Make a copy of the first profile sheet model to house the next profile sheet.

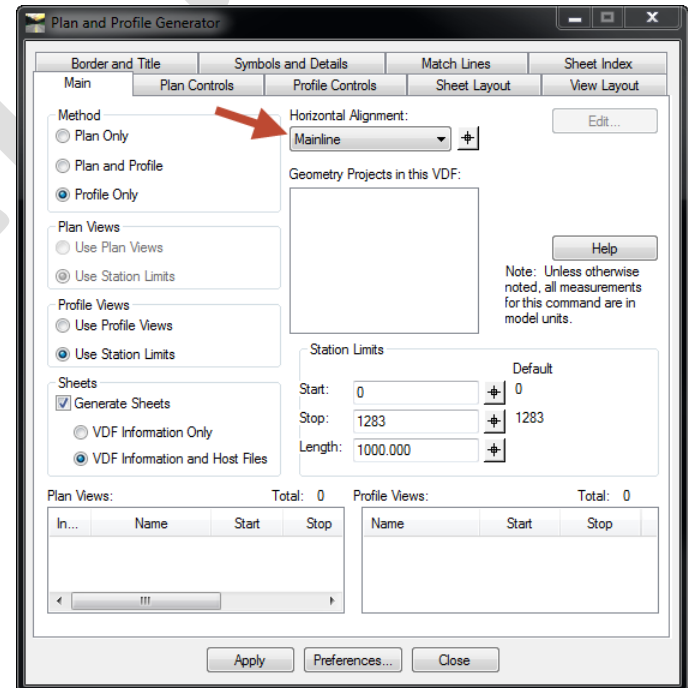
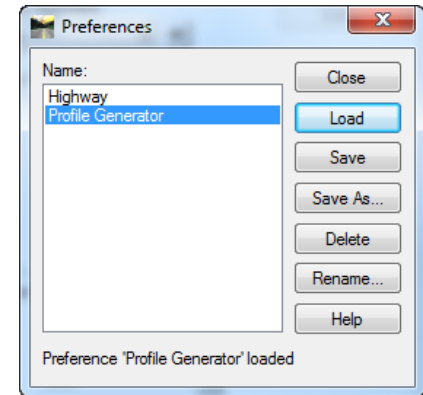


5. Open the new sheet. Select Reference file and Delete Clip Boundary. Move the reference file so the next profile is centered over the border and re-clip the Boundary

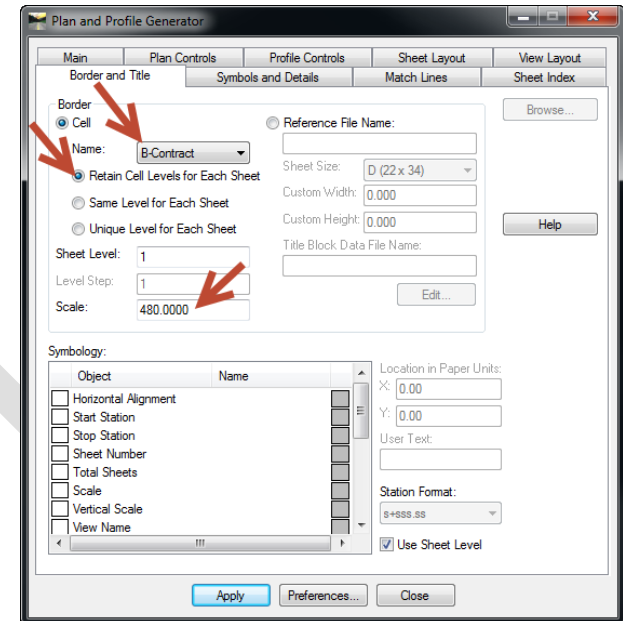


8.3.2 Option 2 - InRoads Plan and Profile Generator

1. Create a 2D Design Model DGN File to house the Profile Grids. Make sure the ALG and Proposed and Existing DTM's are opened.
2. To generate profile sheets Select *Drafting > Plan and Profile Generator* on the InRoads Dialog Box
3. Load the **Profile Generator** Format Preference. Select each tab to edit as necessary **(CLICK ON THE PROFILE CONTROLS TAB LAST. This needs to be done this way to work around an "INROADS GLITCH")**
4. On the Main Tab select the *Horizontal Alignment*.



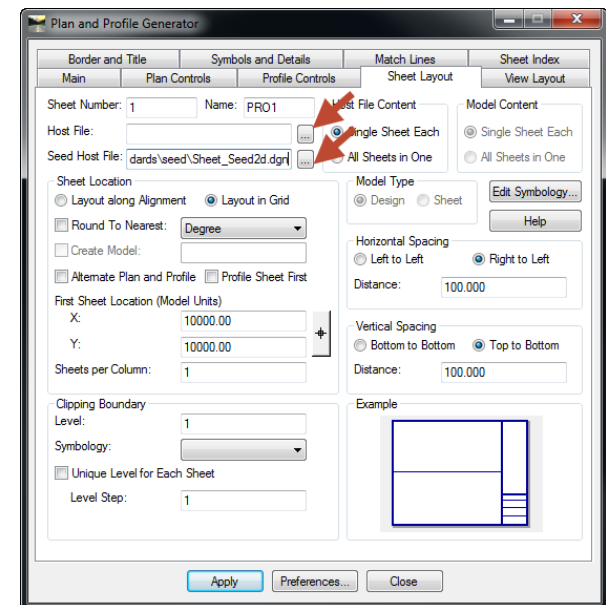
5. On the Borders and Titles Tab the following should be set. Cell toggled on and is set to *B-Contract*. Retain Cell Levels for Each Sheet is on and the Scale is set to *480*.



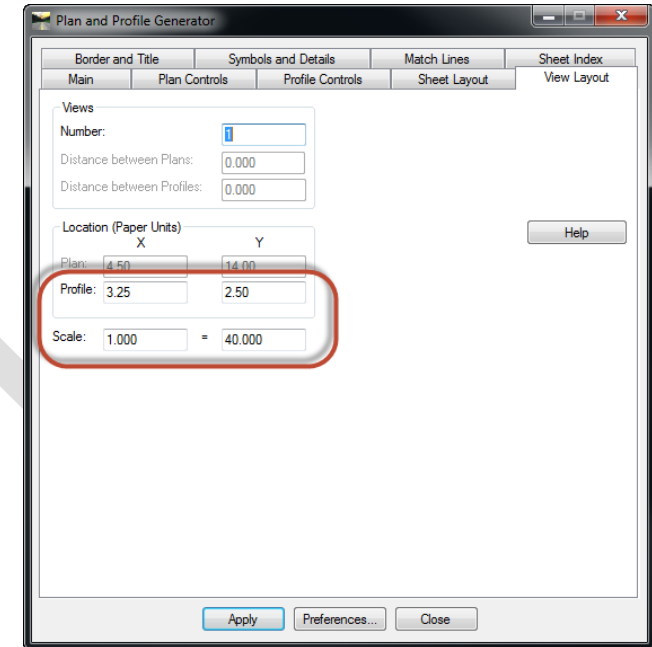
6. On the Sheet Layout Tab

- Select to pick a *Host File*, this will be the name of the newly created Profile Sheet DGN files.
- In the Save As dialog box direct your files to be created in the correct ProjectWise folder by clicking on the *Change* button.
- Give your Document a Name, File Name and a description and click *Save*.
- Select to pick a *Seed File*.

Browse to *05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_SheetSeed.dgn*



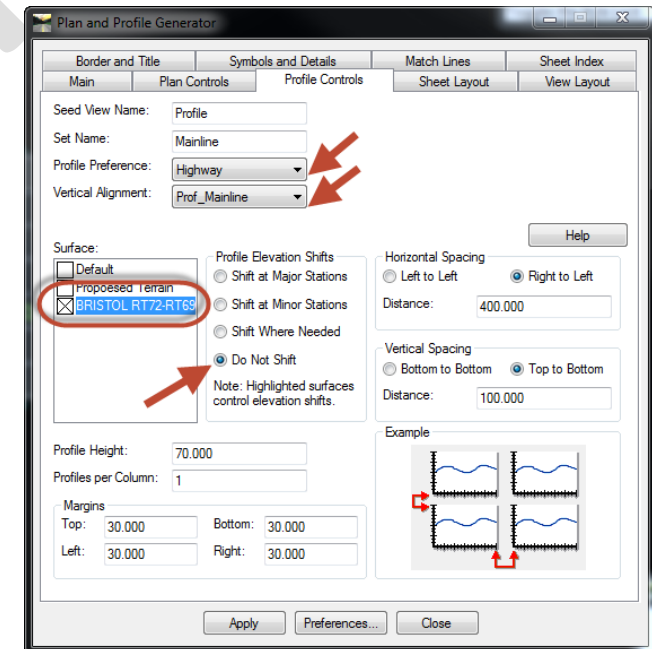
10. On the View Layout Tab the Scale should be set to $1 = 40$.



7. On the Profiles Controls tab

8. Click **Apply** on the Plan and Profile Generator and data point in the DGN to select the starting point for the profile grids. This file will be automatically referenced into the profile cut sheets.

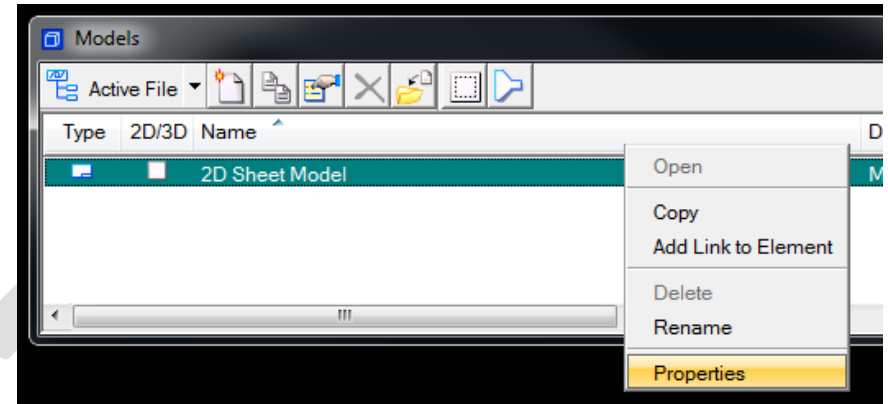
9. Open the profile grid layout dgn. Using the InRoads dialog box view and annotate the vertical alignment.



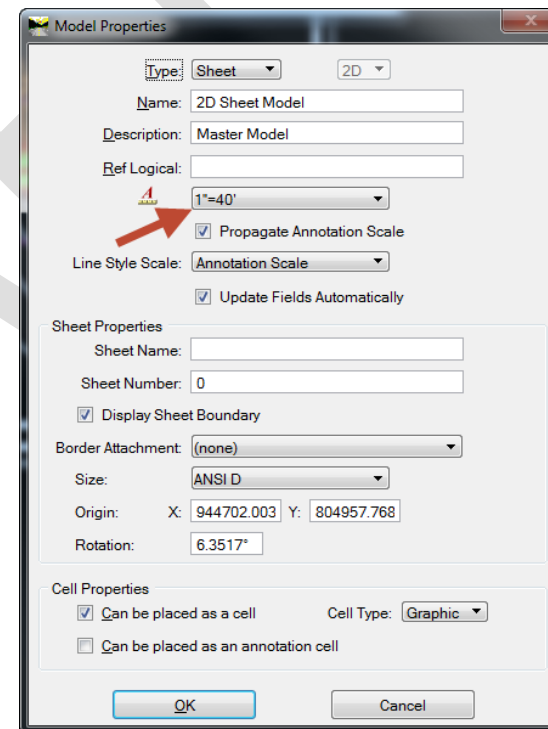
Geometry > View Geometry > Active Vertical

Geometry > View Geometry > Vertical Annotation

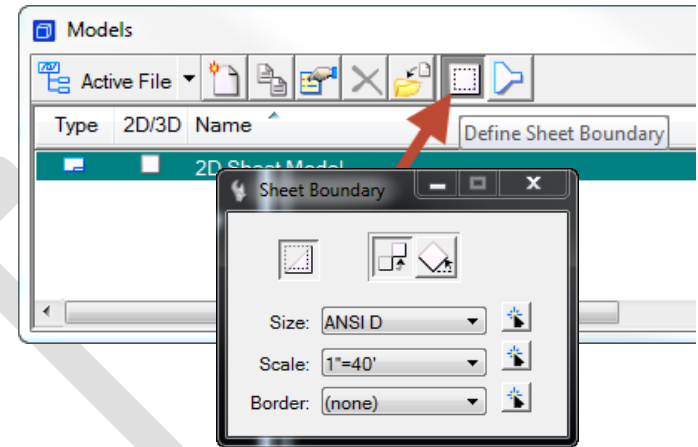
15. Open each file and modify the Model Properties. Open the Models Dialog box, right click on the Sheet Model and select **Properties**,



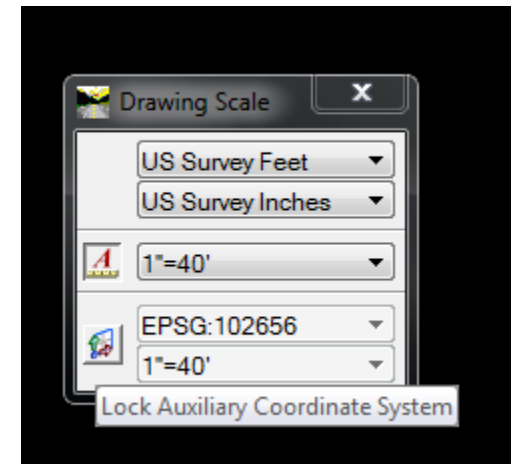
16. In the Models Properties Dialog Box change annotation scale to **1"=40'**. Click the **OK** Button.



17. Back on the Models Dialog box select the Define Sheet Boundary Icon. Adjust the Models Sheet Boundary to line up with the Border.



18. On the MicroStation top menu bar select *Settings > Drawing Scale* and assure the Lock Auxiliary Coordinate System is NOT on.
19. On the MicroStation top menu bar select *File > Save Settings*.

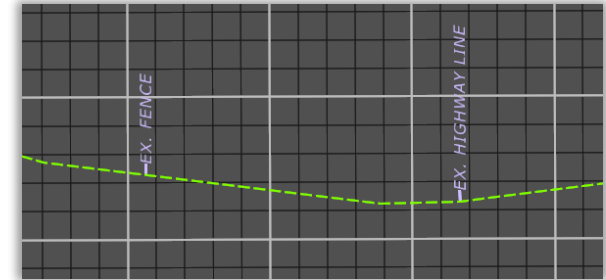


the

Section 8.4 Cross Sections

8.4.1 Crossing Points on Cross Sections

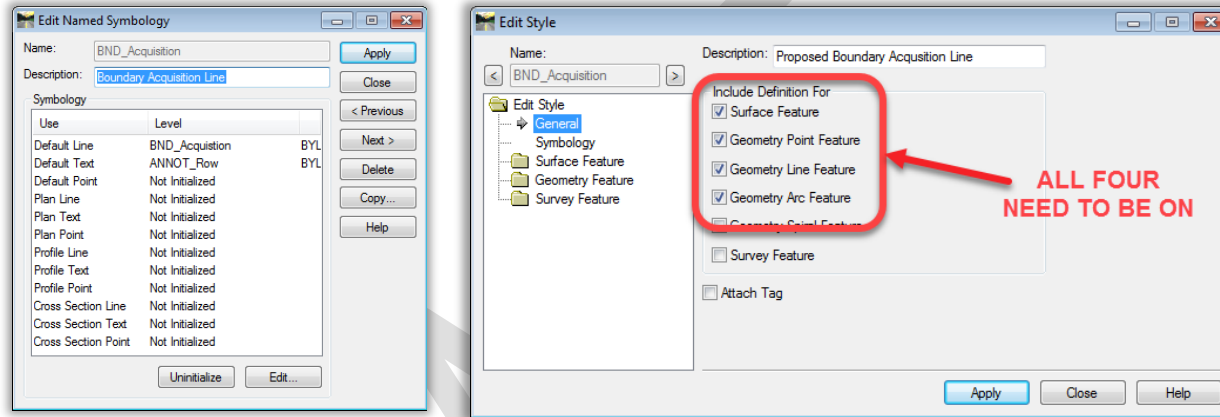
The following Features have been set up to show crossing points on cross sections.



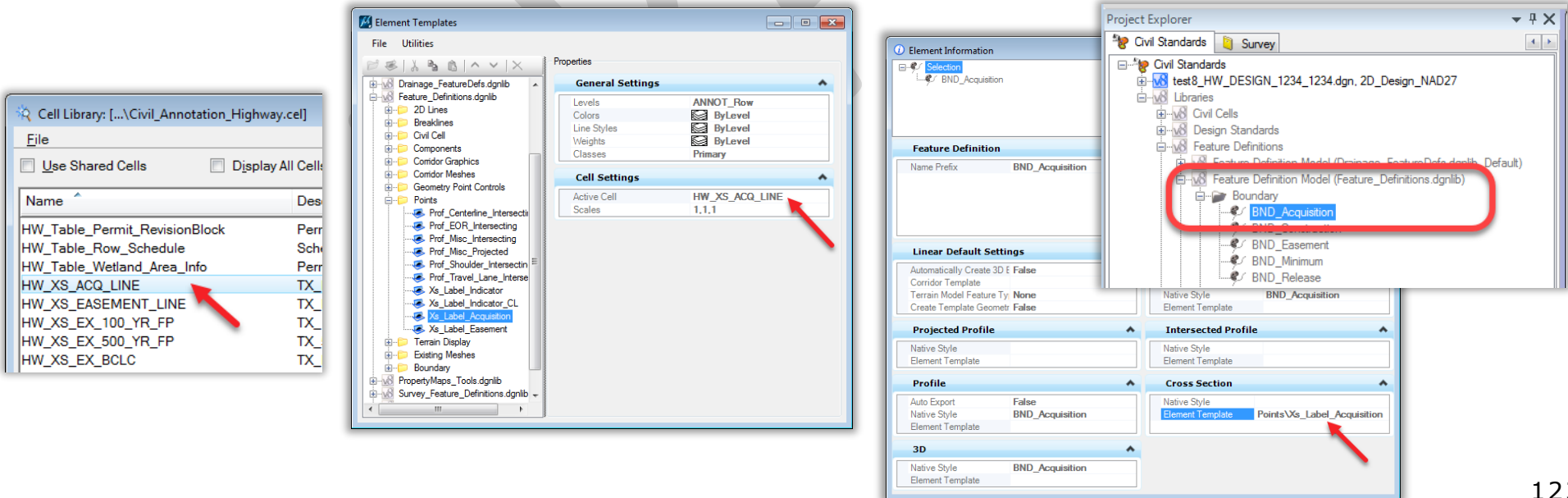
Boundary	Existing Fences	Existing Structures	Existing Walks
BND_Acquisition	EX_BARR_FEBRD <i>Board</i>	EX_STRUCT_BLDG <i>Building</i>	EX_WALK_BC <i>Bituminous Concrete</i>
BND_Construction	EX_BARR_FECHLK <i>Chain Link</i>	EX_STRUCT_BLDGC <i>Building (closed)</i>	EX_WALK_BK <i>Brick</i>
BND_Easement	EX_BARR_FEPICK <i>Picket</i>	EX_STRUCT_RUINS <i>Ruins</i>	EX_WALK_BLU <i>Blue Stone</i>
BND_Minimum	EX_BARR_FEPIPE <i>Pipe</i>	EX_STRUCT_WALLNB <i>Noise Barrier Wall</i>	EX_WALK_G <i>Granite</i>
BND_Release	EX_BARR_FEVARL <i>Virginia</i>	EX_STRUCT_WALLST <i>Stone Wall</i>	EX_WALK_STEPC <i>Concrete Step</i>
			EX_WALK_STEPW <i>Wood Steps</i>

Existing Boundary	Existing Breaklines	Existing Hydraulics
EX_BND_Easement	EX_BKLN_CLINE <i>Centerline</i>	EX_HYDRA_100FLOOD <i>100 Year Flood Line</i>
EX_BND_Hwy_Int_NonAccess	EX_BKLN_CRBBCL <i>BCLC</i>	EX_HYDRA_500FLOOD <i>500 Year Flood Line</i>
EX_BND_LocationSurvey	EX_BKLN_CRBBCP <i>BCPC</i>	EX_HYDRA_EDGEMAR <i>Edge of Marsh</i>
EX_BND_NonAccess	EX_BKLN_CRBCON <i>Concrete Curb</i>	EX_HYDRA_EDGEWTR <i>Edge of Water</i>
EX_BND_UnlimAccess	EX_BKLN_CRBGR <i>Granite Curb</i>	EX_HYDRA_INWETF <i>Edge of Wetlands</i>
EX_BND_Minimum	EX_BKLN_CRBGRS <i>Granite Sloped Curb</i>	EX_HYDRA_SCEL <i>Stream Channel Enc. Line</i>
EX_BND_Street	EX_BKLN_ERDBIT <i>Bituminous Edge of Road</i>	EX_HYDRA_STREAM <i>Stream</i>
	EX_BKLN_ERDCON <i>Concrete Edge of Road</i>	EX_HYDRA_SWAMP <i>Swamp</i>
	EX_BKLN_ERDDRT <i>Earth Edge of Road</i>	
	EX_BKLN_ERDGRV <i>Gravel Edge of Road</i>	

If you copied the XIN to your project before 3/14/2018, you will need to re-copy in the most recent XIN version. Adjustments have been made in Named Symbology Manager and the Style Manager to enable the crossing features to show on the cross Sections.



It is also important to be in a new MicroStation file as the Element Templates and Feature Definitions have been updated on 3/14/2018. The Element Templates point to the correct Cells and the Feature Definitions point to the correct Element Templates.



The workflow below will step through the process of creating a Proposed Right of Way line that will show up on the cross section sheets as crossing points. The same steps can be used to create existing ROW lines and Feature that can also be shown as point features on cross sections.

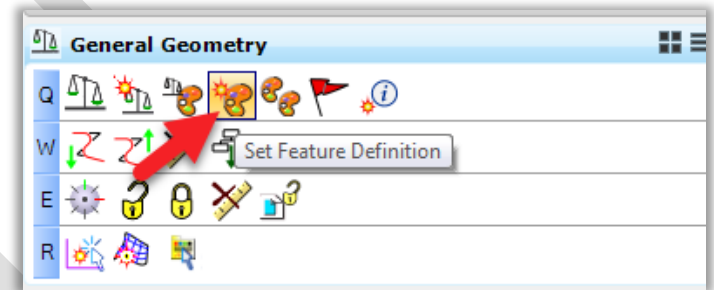
1. Create a new file using a CTDOT 2d Seed file to house the right a way lines and existing features you need crossing points for, we will call this the Controls File.

|05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_DesignSeed_83.dgn

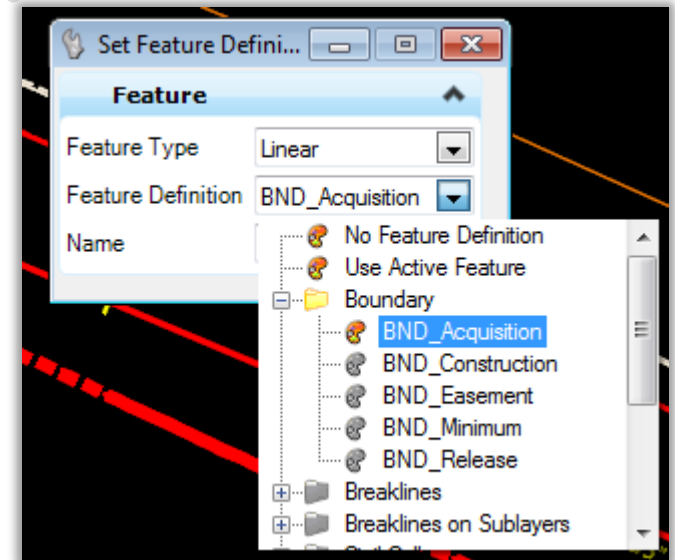
or

|05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_DesignSeed_27.dgn

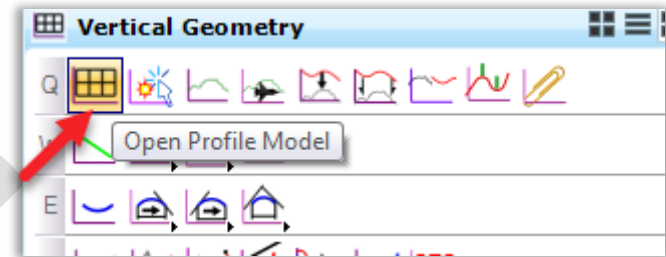
3. Reference in the Existing and Proposed MicroStation Design Files.
4. Reference in the Existing DGN Terrain file(s).
5. Use MicroStation to place a line.
6. Under General Geometry, select the **Set Feature Definition** tool.



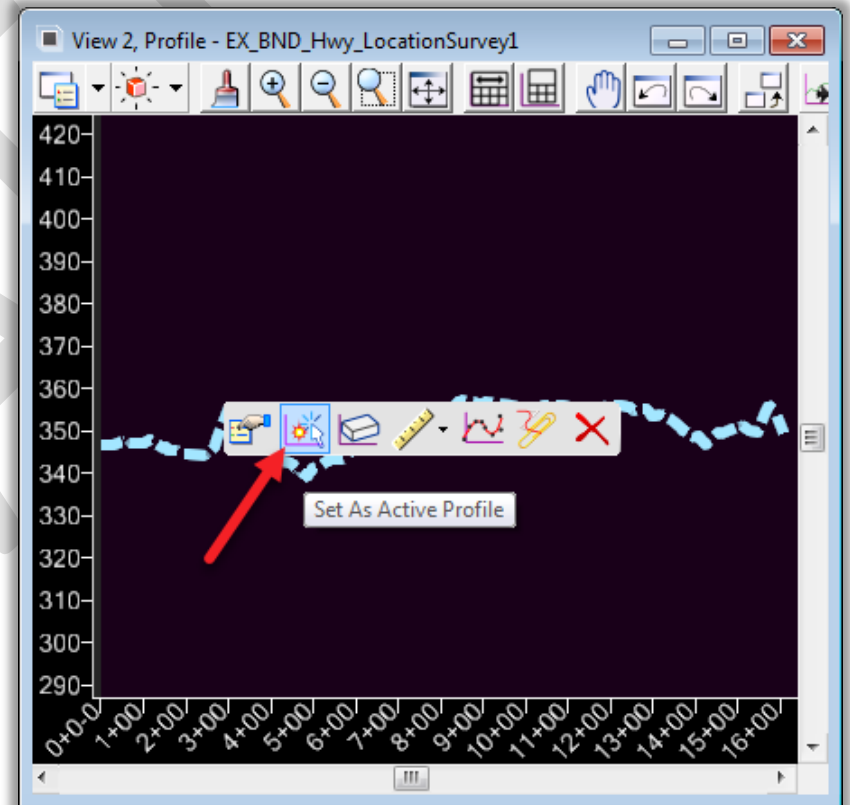
7. Select *Boundary > BND_Acquisition*. Follow the Prompts to assign a feature Definition to a MicroStation Graphic.



8. Select on the vertical Geometry task select **Open Profile Model**.
Follow the prompts to display a Profile Window of the existing ground under the Right of Way line.



9. Hover over the Existing Ground in the Profile window and select **Set As Active Profile**.
10. Open the Main Modeling File and Reference in the Controls file.



8.4.2 Create a Cross Section DGN and Reference the Design

Before moving on to create a new file for your cross sections you will need to verify a couple things in your main design files. The existing ground reference file's display must be turned on in the 3D Model. All the proposed and existing levels, features and components you need displayed in the cross sections need to be on as well. To create cross sections you will need to use Nested Attachments - Live Nesting to attach the main design model to the blank cross section file.

2. Create a new file using a CTDOT 2d Seed file and attribute as shown.

|05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_DesignSeed_83.dgn

or

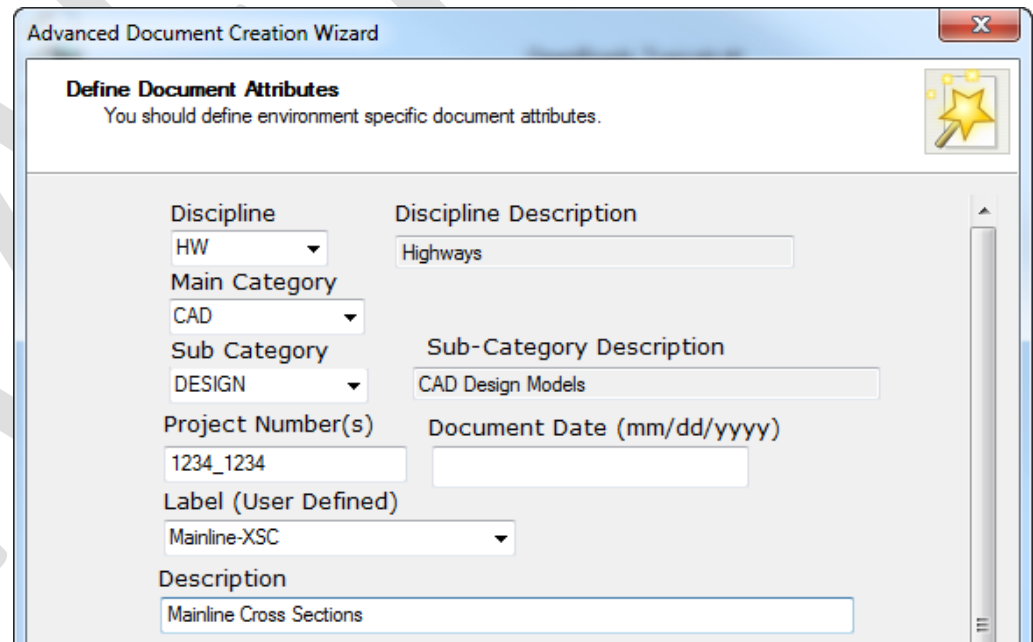
|05.0 - Workspace Resources\3_Workspace_V8i\Civil_Standards\seed\2D_OpenRoads_DesignSeed_27.dgn

3. In the MicroStation pull down menu choose *File > References*.

4. In the References dialog menu choose *Tools > Attach*. Select the file in your main modeling file.

5. Leave the Attachment Method set to *Interactive*.

6. Select **Open** to activate the Reference Attachment Settings dialog.



Advanced Document Creation Wizard

Define Document Attributes
You should define environment specific document attributes.

Discipline	Discipline Description
HW	Highways
Main Category	
CAD	
Sub-Category	Sub-Category Description
DESIGN	CAD Design Models
Project Number(s)	Document Date (mm/dd/yyyy)
1234_1234	
Label (User Defined)	
Mainline-XSC	
Description	
Mainline Cross Sections	

7. Populate the Reference Attachment Settings listed below.

Orientation: *Coincident - World*

Nested Attachments: *Live Nesting*

Nesting Depth: *2*

Hint: Live nesting will automatically give access to the 3D model as well as the existing terrain dgn file.

8. Select **OK** to attach the reference file.

9. Fit View to review the project location.

Hint: Pressing the F8 Function Key will toggle black background to white and toggle on the level override symbology. This is setup as part of the Bentley-Civil workspace. Pressing F8 again will revert back to original settings.

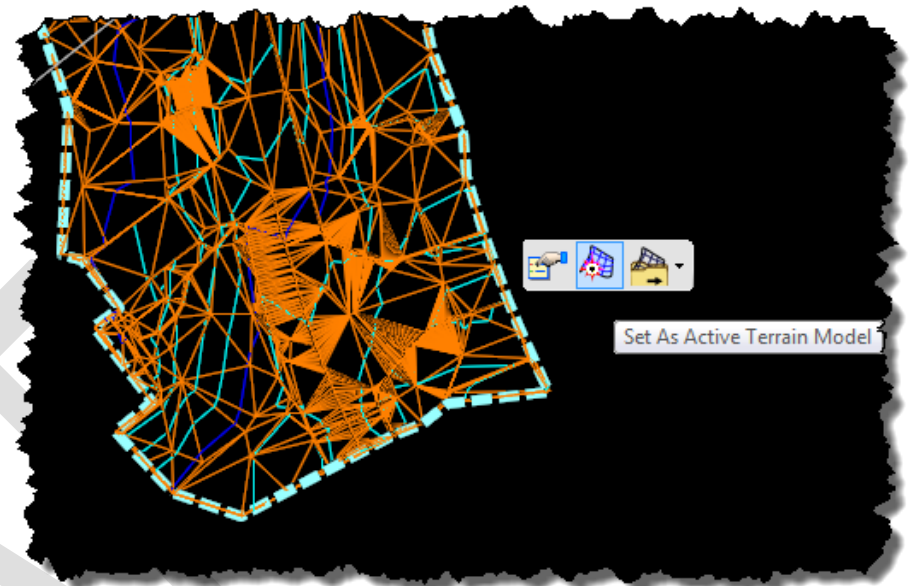
10. Open the Level Display Dialog, Enable the Target Tree, and verify all levels are enabled.

Hint: Turning off a level at this stage will also turn it off in the created cross section Design Model. For a component to be displayed in the proposed cross section Design Model, the level must be turned on in the 3D model before creating the sections.

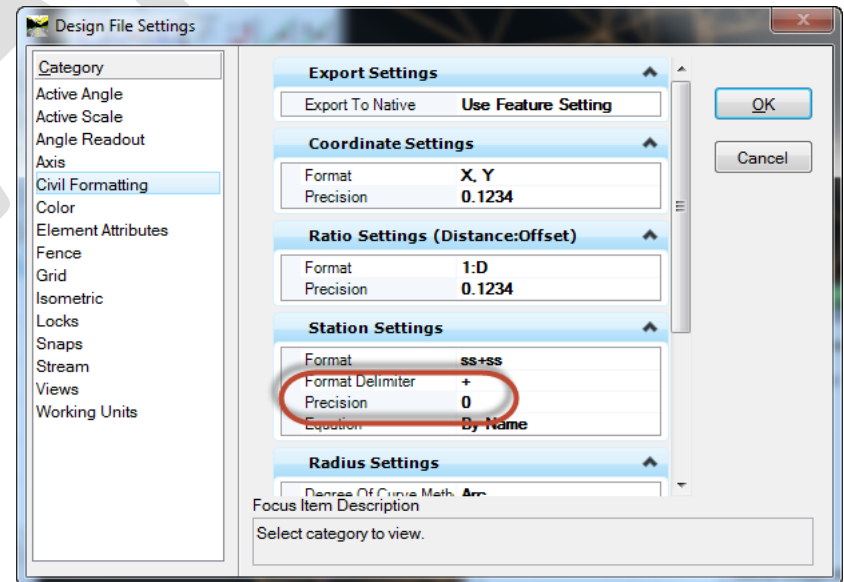
*If any level settings are changed, select *File > Save Settings* so the changes will be remembered when cross sections are created.

8.4.3 Create the Proposed Cross Sections

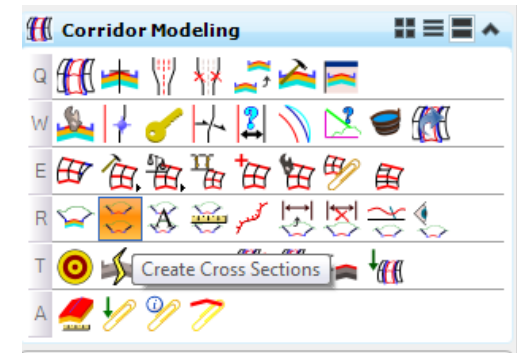
1. From inside the newly created cross section dgn file open the 3D model and select the ground terrain model and hover to get the context menu to appear. Click the *Set As Active Terrain model* command.



2. From inside the newly created cross section dgn file open the 2D model and select *Settings > Design File*, Change Station Settings to a precision of 0.



3. Select the **Create Cross Sections** tool from the Corridor Modeling task menu.
4. Following the heads-up prompt, locate the alignment by selecting the red centerline alignment.
5. Select Preferences button from the bottom of the Create Cross Section dialog.
6. In the **Preferences** dialog select the preference named **Highway**.
7. Select **Load**.

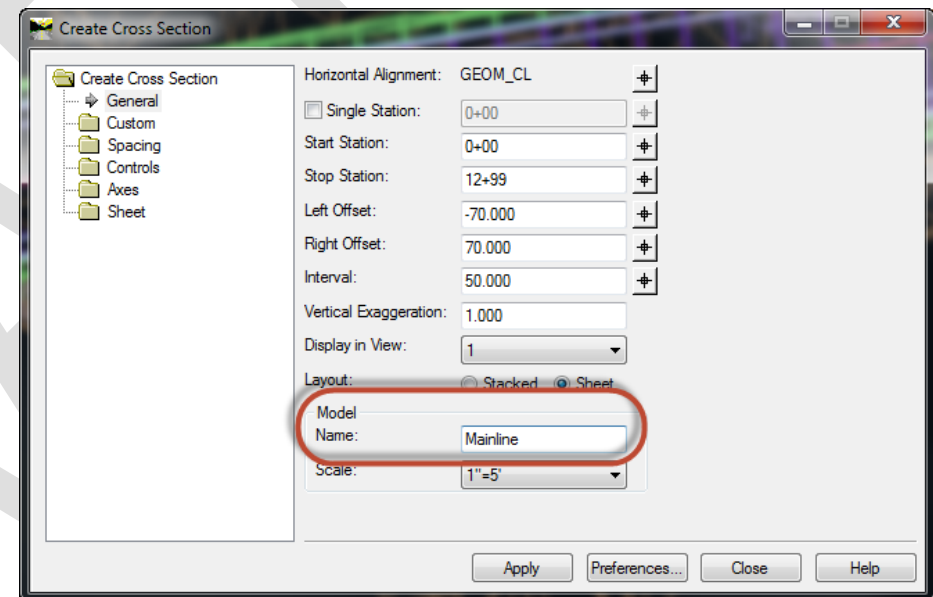


Preferences are predefined settings stored in the active XIN settings file. These preferences will be used for creating, annotating and computing end area volumes on proposed cross sections.

7. **Close** the Preferences dialog.
8. Under Model type in a name
9. Select **Apply** to create the cross sections into a new DGN Drawing Model.

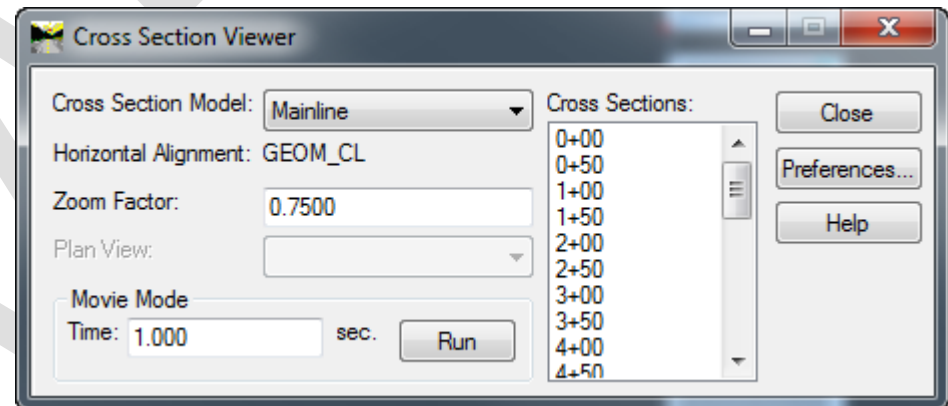
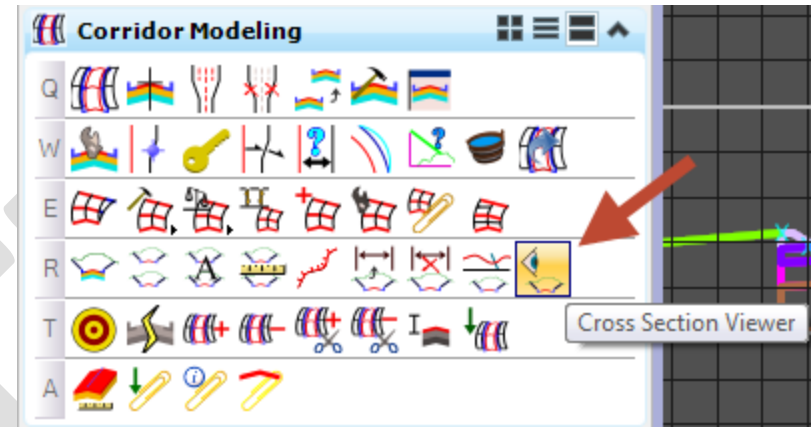
It will take a few moments for the cross sections to be created. A status bar appears in the lower right corner showing the progress.

10. Close the Create Cross Section dialog.



8.4.4 Viewing the Cross Sections

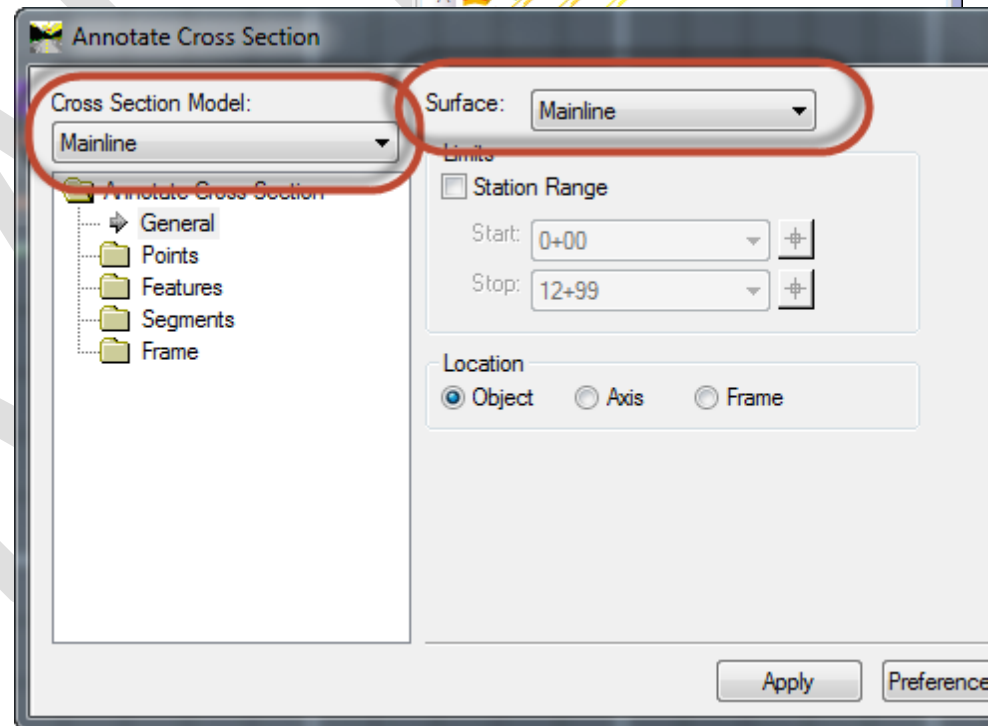
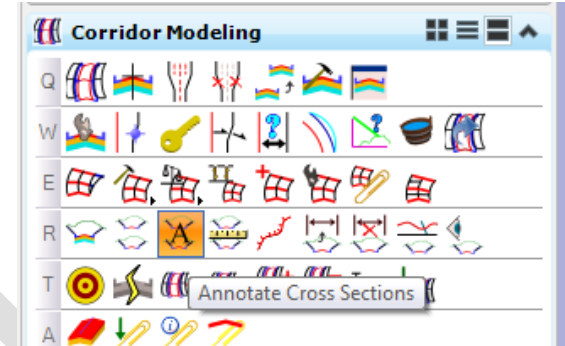
1. Select the **Cross Section Viewer** tool from the *Corridor Modeling* task menu.
2. Verify the Cross Section Model setting is set the correct Cross Section Model.
3. Set the Zoom Factor to *0.75*.
4. Set the Movie Mode Time to *1.0* sec.
5. Select **Run** to automatically scan through the cross sections.
6. Hit the **Esc** key on your keyboard to exit the movie mode.
7. Select a Cross Section station by clicking on it in the list and notice how the view updates to the selected cross section station value.
8. Press the **Up** and **Down** Arrow keys on your keyboard to step through the Cross sections in the list.
9. Close the Cross Section Viewer application.



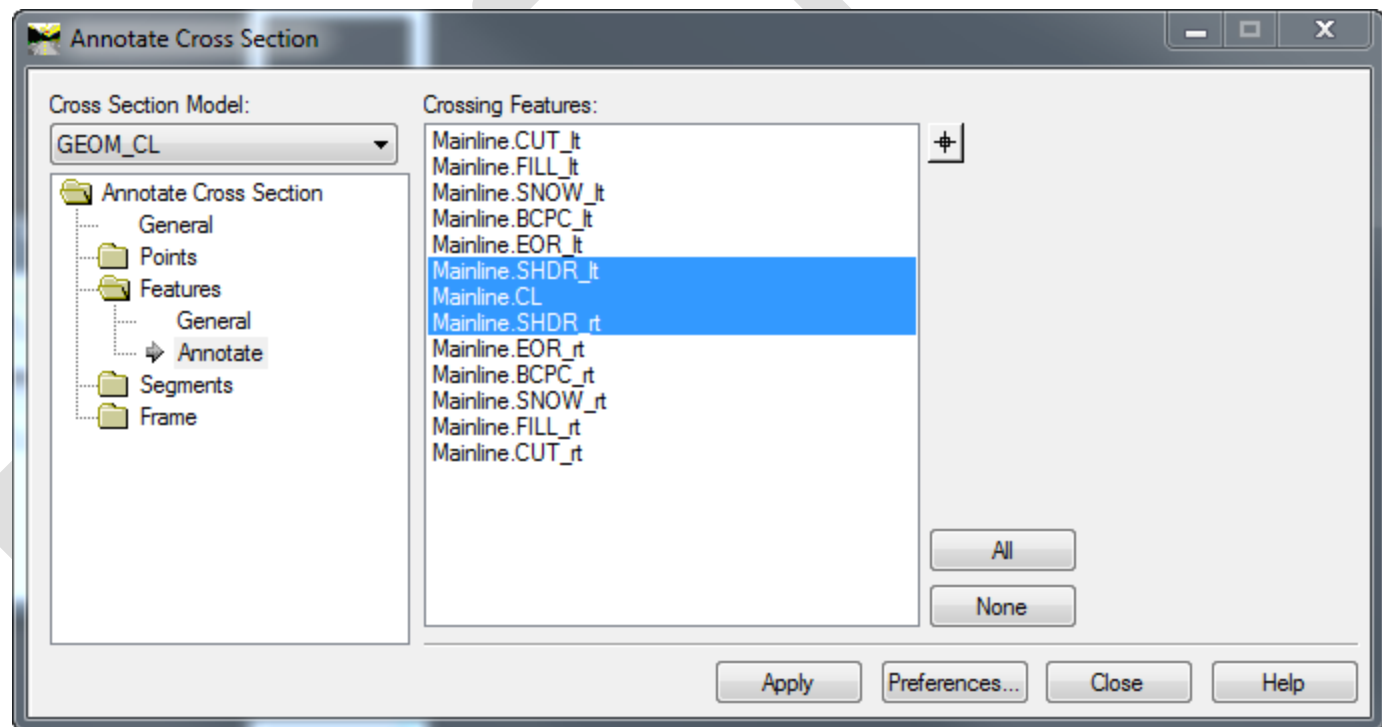
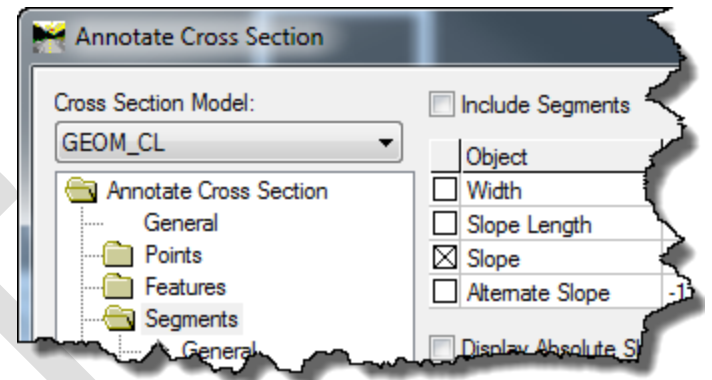
NOTE: that the Cross Sections are displaying an 'X' at each of the Crossing Features such as Centerline and Edge of Pavement. The Features must be displayed for them to be annotated, and are a construction class so they can easily be turn off in View Attributes.

8.4.5 Annotating the Proposed Cross Sections

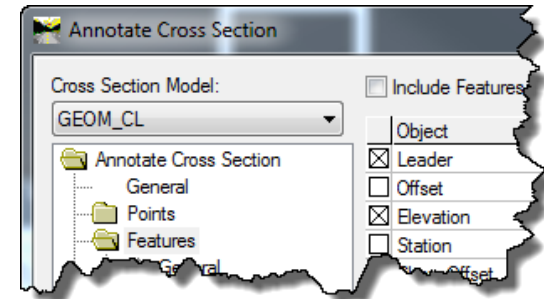
1. Select the **Cross Sections** tool from the *Corridor Modeling* task menu.
 2. Select **Preferences**.
 3. Select the preference entitled **Highway**.
 4. Select **Load**, to utilize the selected preferences in the previous step.
 5. Close the Preferences selection dialog.
- In the Annotate Cross Section dialog, set the General settings. Make sure the correct Cross Section Model and Surface you would like to annotate is active.
 - Select a *Cross Section Model*
 - Select a *Surface*
 - Ensure that the *Location* is set to **Object**.



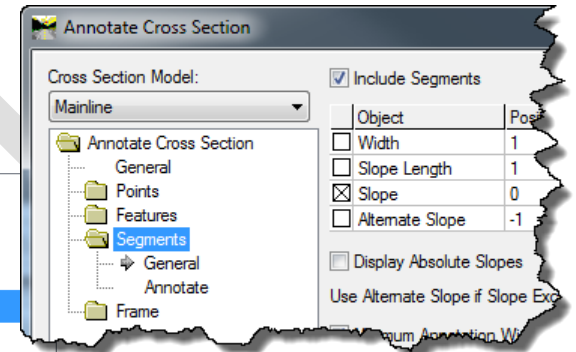
- To annotate the point features. Select the Segments Folder and **turn off** *Include Segments*.
- Select the *Features > Annotate folder* and Highlight the Features you would light to annotate. Click **Apply**.



8. Select the Features Folder and **turn off** *Include Features*.



9. Select the Segments Folder and turn on *Include Segments*. Select the *Segments > Annotate* folder and Highlight the Segment you would light to annotate. Click **Apply** for each segment.



Mainline.CUT_lt
Mainline.FILL_lt
Mainline.SNOW_lt
Mainline.BCPC_lt
Mainline.EOR_lt
Mainline.SHDR_lt
Mainline.CL
Mainline.SHDR_rt
Mainline.EOR_rt
Mainline.BCPC_rt
Mainline.SNOW_rt
Mainline.FILL_rt
Mainline.CUT_rt

Left Side Slope

Mainline.CUT_lt
Mainline.FILL_lt
Mainline.SNOW_lt
Mainline.BCPC_lt
Mainline.EOR_lt
Mainline.SHDR_lt
Mainline.CL
Mainline.SHDR_rt
Mainline.EOR_rt
Mainline.BCPC_rt
Mainline.SNOW_rt
Mainline.FILL_rt
Mainline.CUT_rt

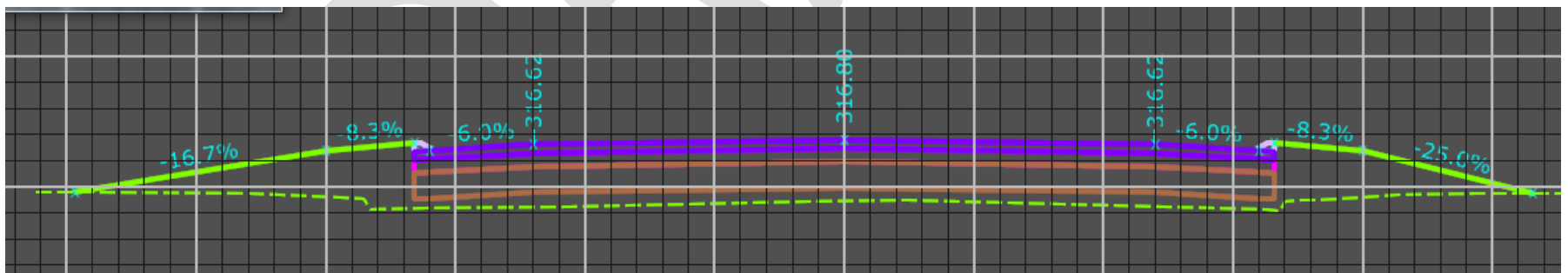
Left Shoulder

Mainline.CUT_lt
Mainline.FILL_lt
Mainline.SNOW_lt
Mainline.BCPC_lt
Mainline.EOR_lt
Mainline.SHDR_lt
Mainline.CL
Mainline.SHDR_rt
Mainline.EOR_rt
Mainline.BCPC_rt
Mainline.SNOW_rt
Mainline.FILL_rt
Mainline.CUT_rt

Right Side Slope

Mainline.CUT_lt
Mainline.FILL_lt
Mainline.SNOW_lt
Mainline.BCPC_lt
Mainline.EOR_lt
Mainline.SHDR_lt
Mainline.CL
Mainline.SHDR_rt
Mainline.EOR_rt
Mainline.BCPC_rt
Mainline.SNOW_rt
Mainline.FILL_rt
Mainline.CUT_rt

Right Shoulder



10. To turn off the X on the crossing Features select *View Attributes* and turn of **Constructions**.

