

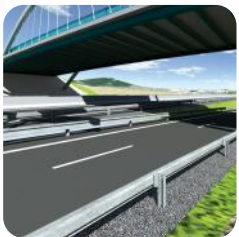
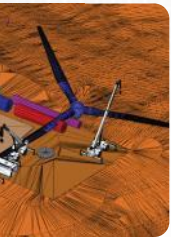


OpenRail SELECTseries 4 - Managing Geometry and Corridor Modeling

Robert Nice – Senior Application Engineer

Agenda:

- Why work in SELECTseries 4?
- Moving to SELECTseries 4
- Project Data
 - Terrain
 - Geometry
 - Corridors
- Q&A



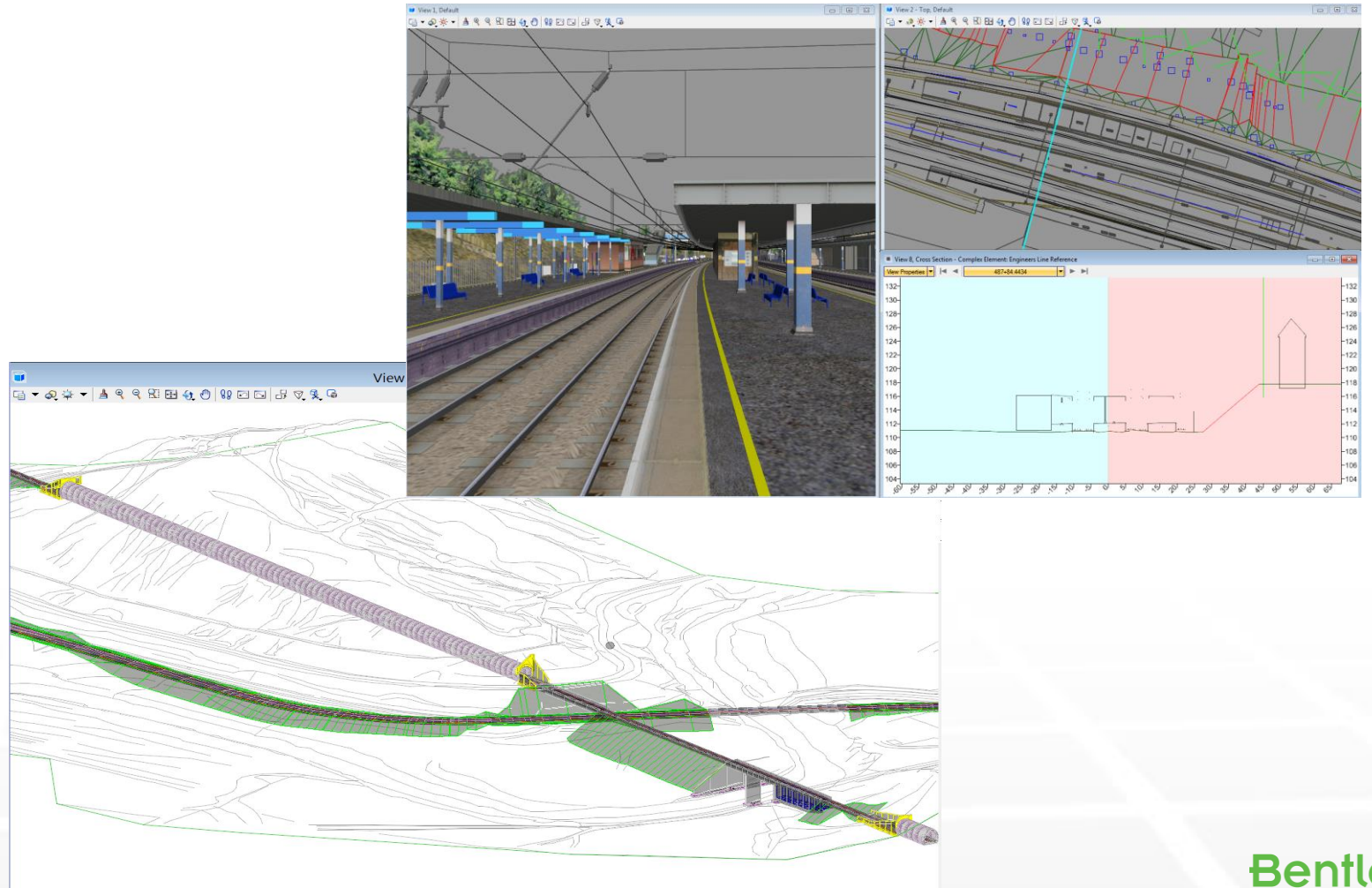
Why work in SELECTseries 4?

The 3D model is no longer a byproduct of the Design

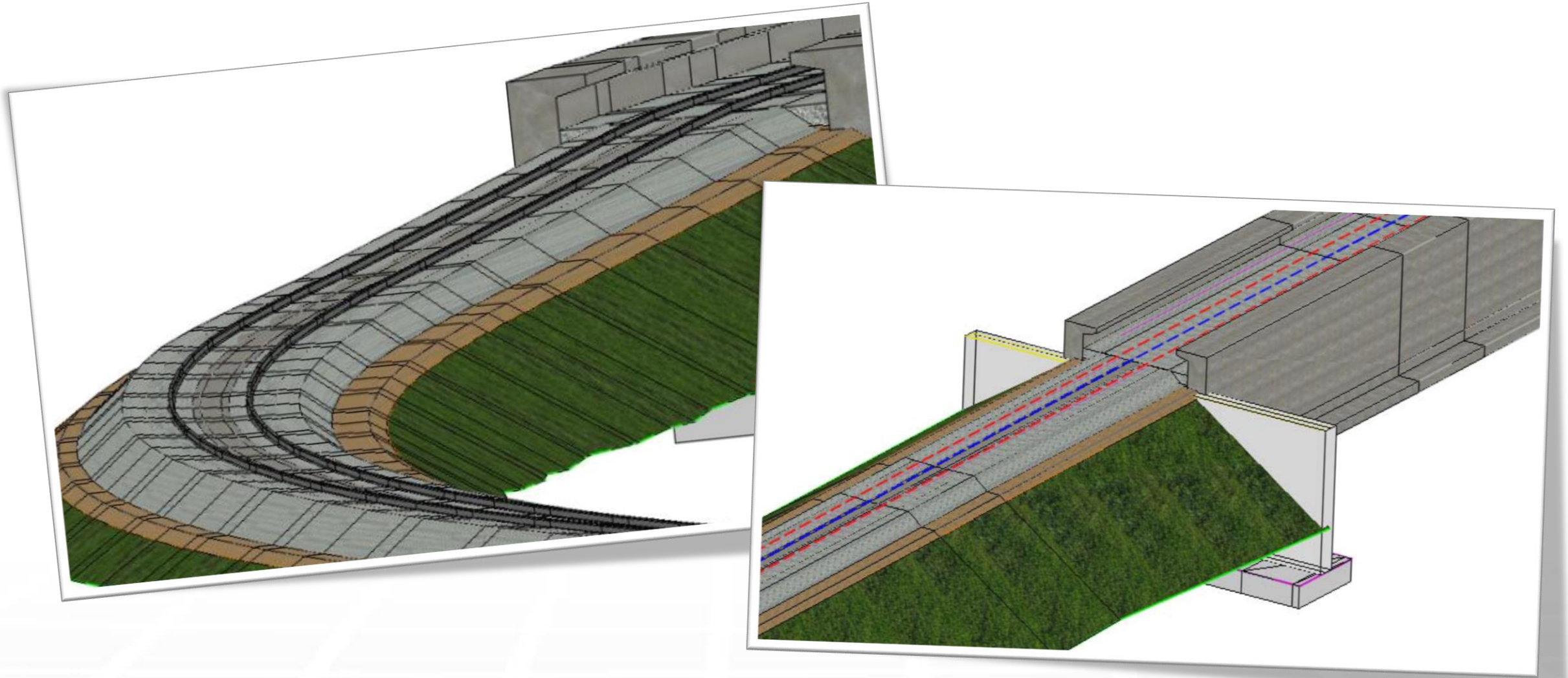
It is the Design

Allows Design Time

- Visualization
- Clash Detection
- Engineering Sanity

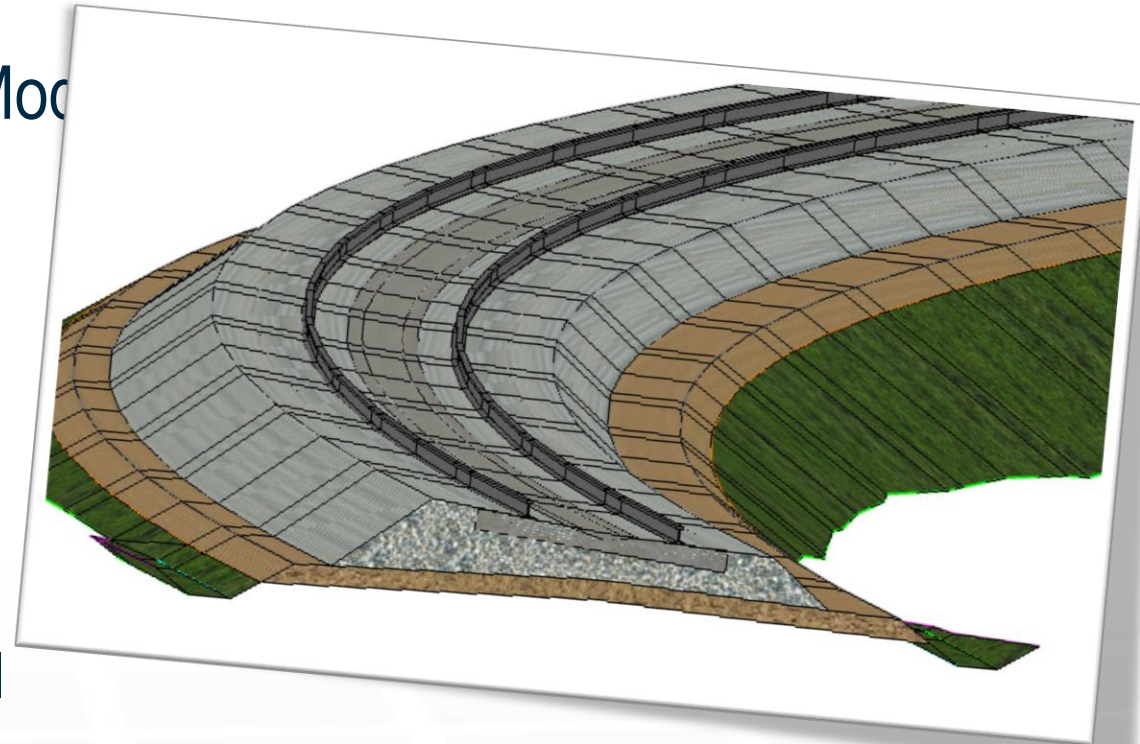


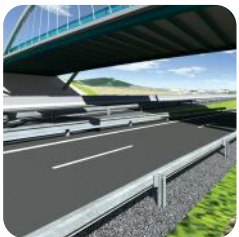
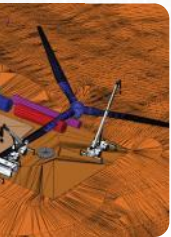
The 3D model is no longer a byproduct of the Design



The 3D model is no longer a byproduct of the Design

- Corridor Resides in the DGN
 - Work in 2D, 3D Model Automatically
- Integrate Corridor and Non-Corridor (Site) Model
 - Everything works in same model
 - Use the tools that best fit the situation
- Target MicroStation Elements
- WYSIWYG
 - Use Reference Files to Control Display of Model
 - Drainage, Bridges, Signage, etc..





Moving to SELECTseries 4

Workspace

Data

Workspace/DGN Libraries

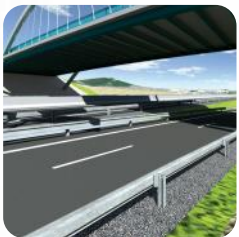
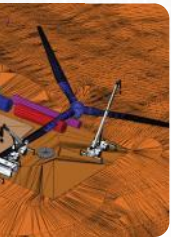
Standards

- CAD Standards
- Feature Definitions
- Element Templates

Project Data/DGN

Project Data

- Terrain
- Geometry
- Corridor
 - Point Controls
 - Target Aliasing
 - Clipping Reference



Workspace

Bentley-Civil Workspace

- Delivered with Software
- Quick to Deploy

Upgrade Your Workspace

- Use Bentley-Civil Workspace as Foundation

Transitioning to Bentley Rail SELECTseries 4

Reuse:

Levels, Fonts, Cells, Line Styles

XIN, PSS, DDB

XSL style sheets

Template Library (ITL)

Geometry (ALG, GPK, FIL)

Upgrade:

Custom Turnout Library

Create:

Feature Definitions

Element Templates

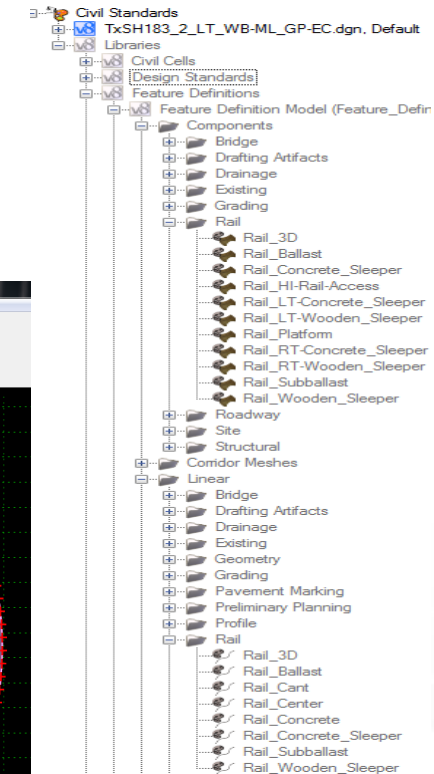
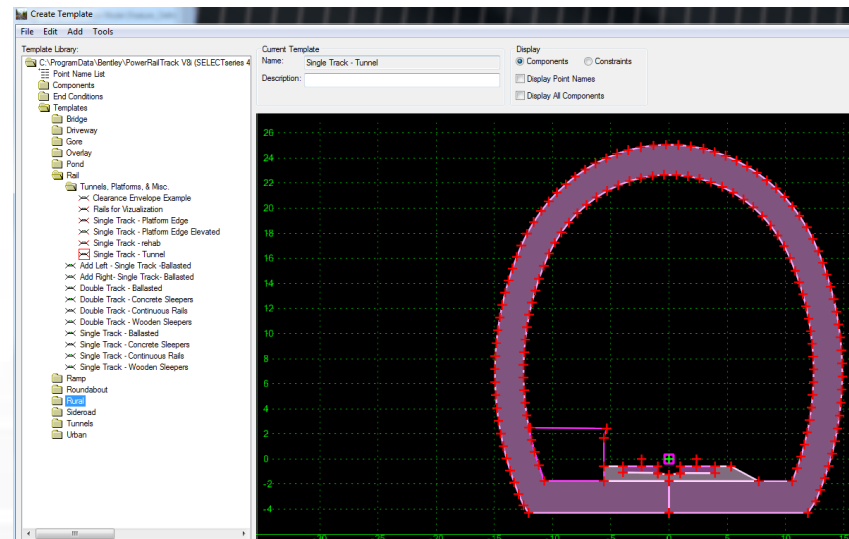
Graphical Filters

Project Settings

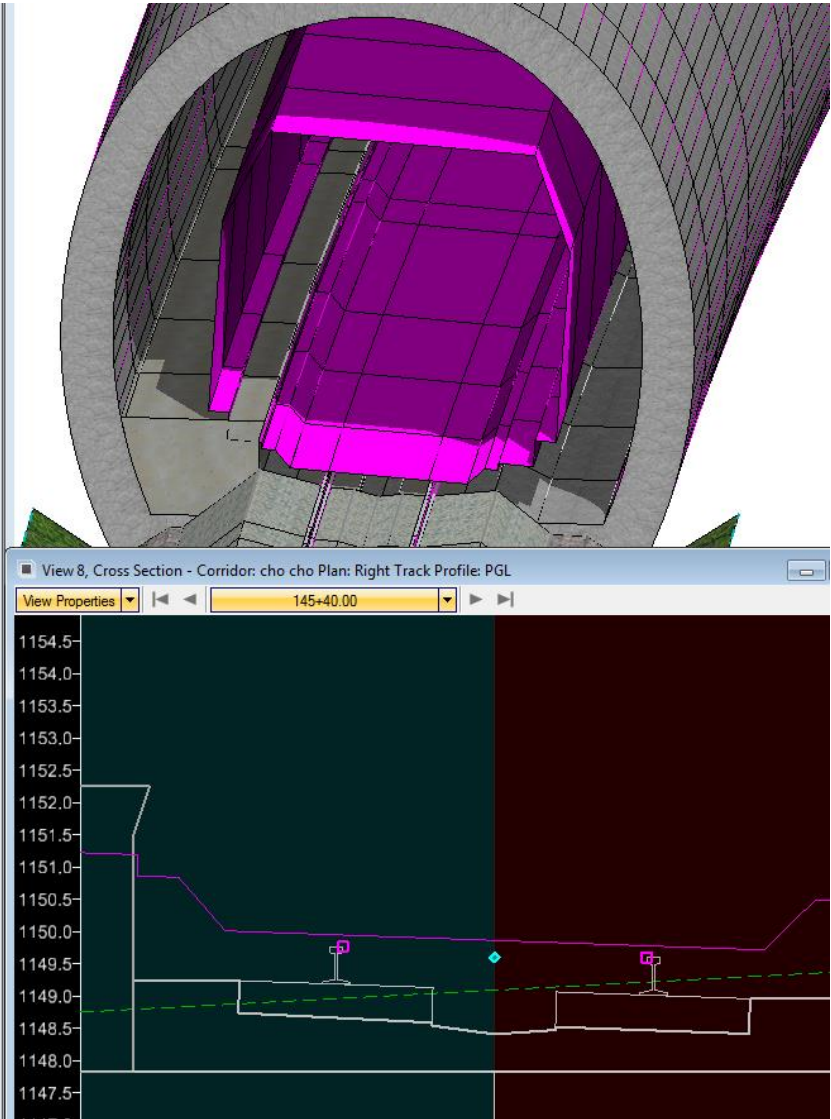
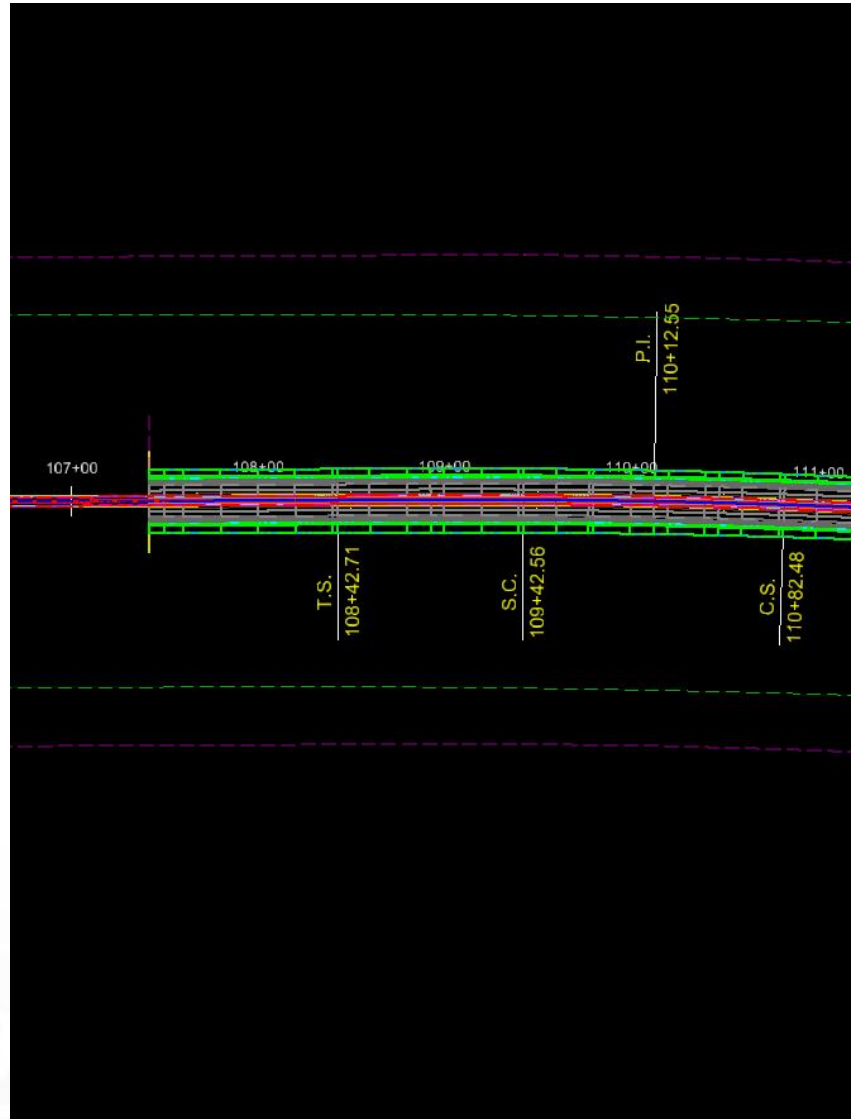
Civil Cells

Rail Workspace Additions

- Included in Road = We have one Imperial and one Metric
- Addition Feature Definitions, Levels, and Element Templates
- Design Stages – Null Points Set to True
- Template Library



Rail Workspace Additions



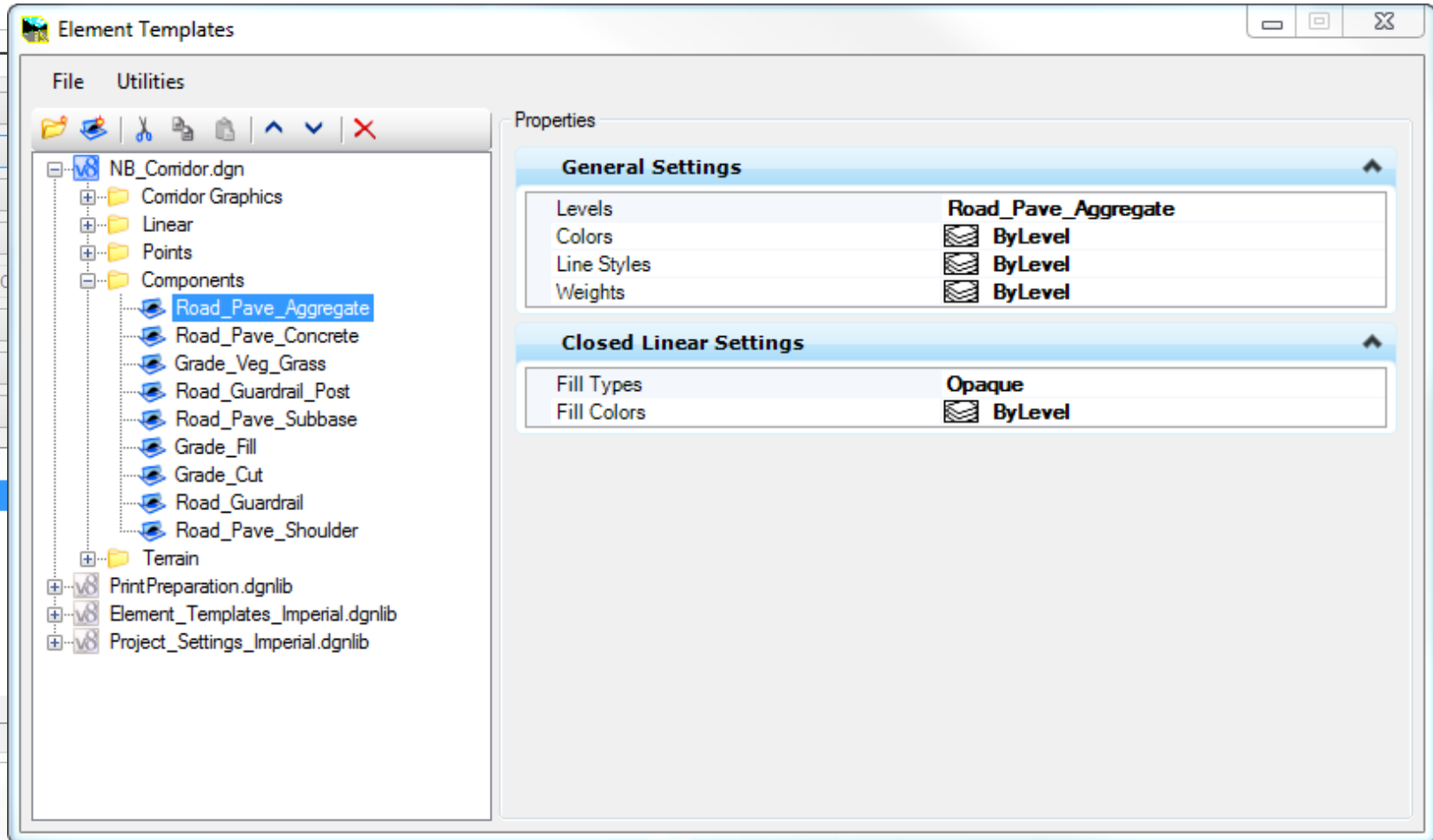
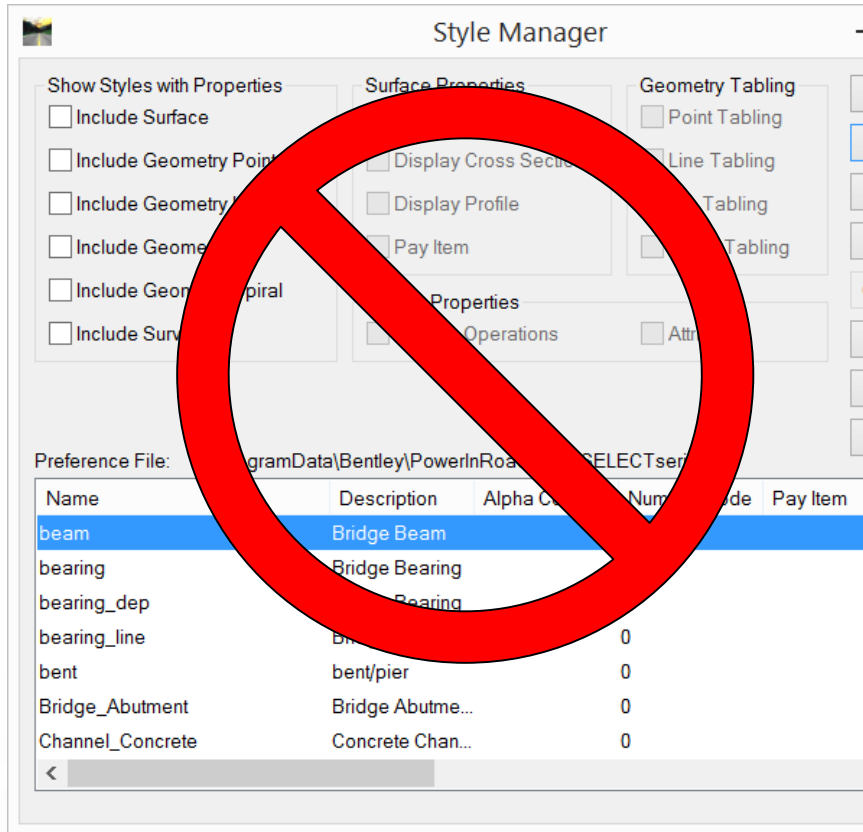
Legacy Preference Files

- XIN and ITL
- Still Required in SELECTseries 4
- XIN Dictates Drafting
 - How it looks
 - How is it annotated

Format Unchanged in SELECTseries 4

What is no longer controlled by the XIN?

Component Style (SS2)  Component Feature Definition (SS4)

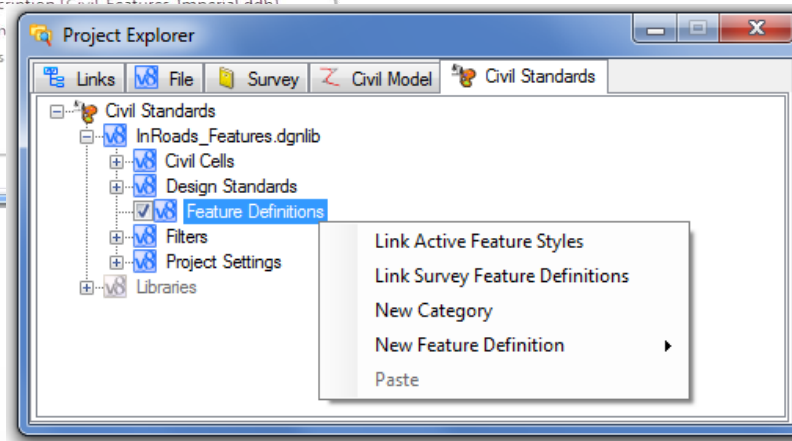
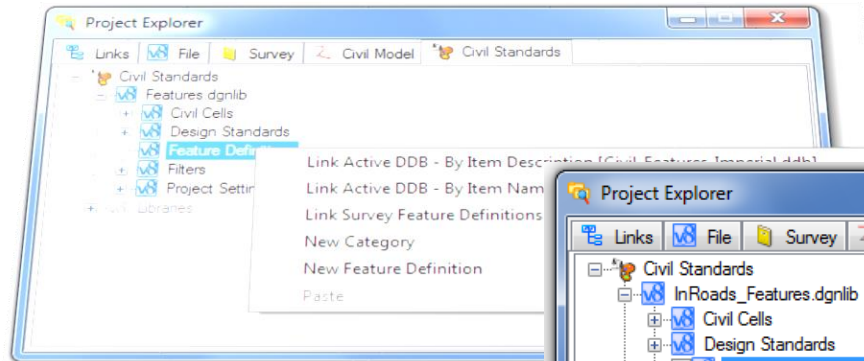


“Link” Legacy Styles to OpenRoads Feature Definitions

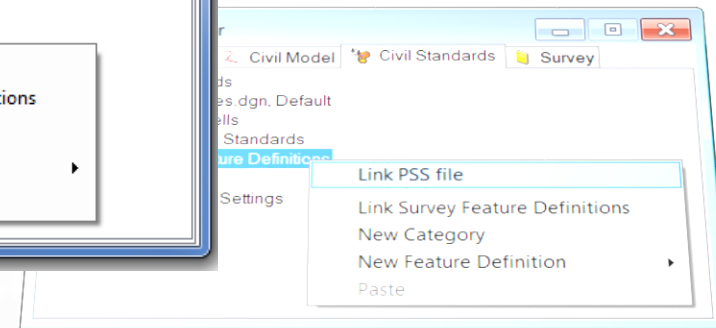
GEOPAK

InRoads
Rail Track
PowerCivil

Stored in dgnlib



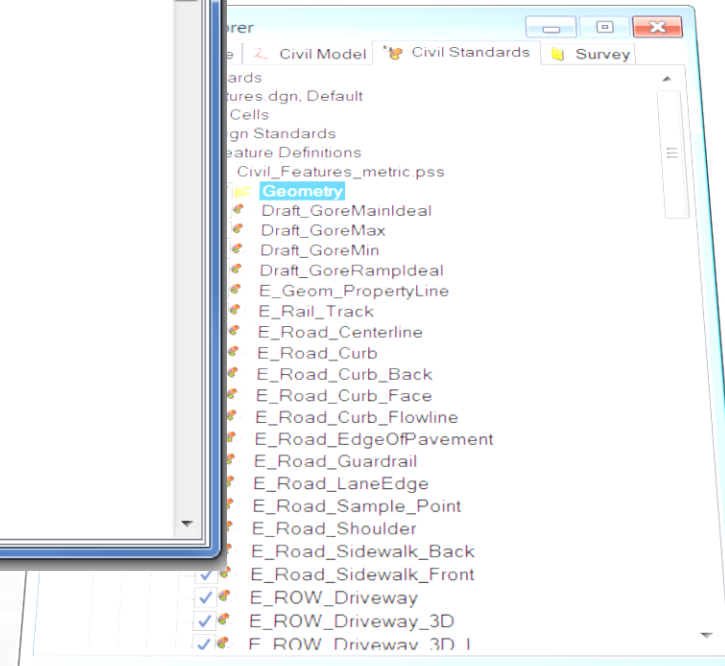
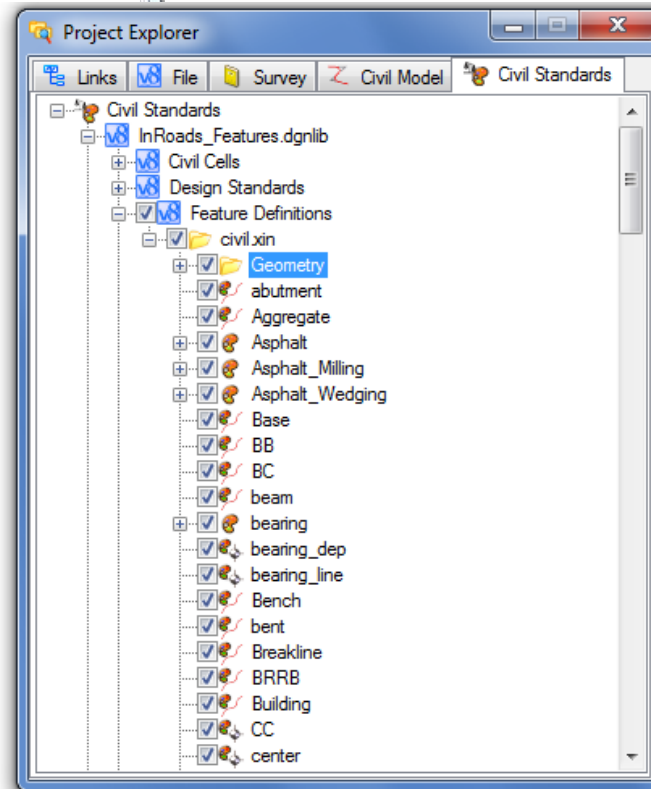
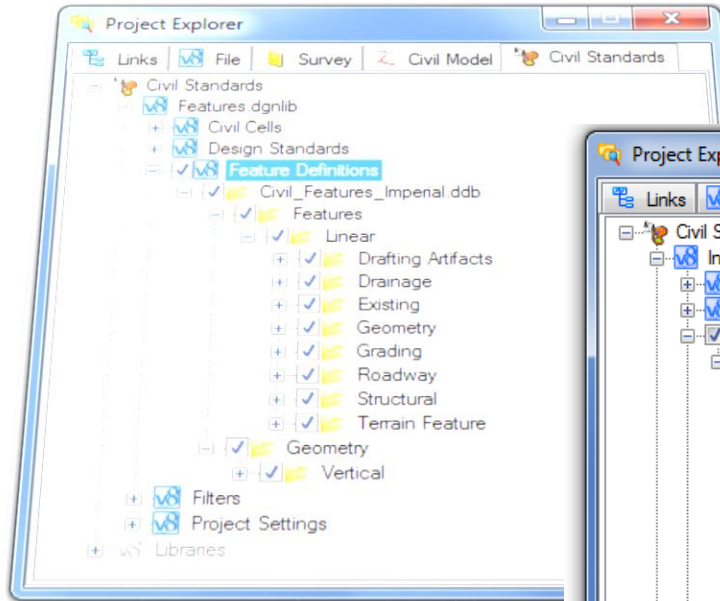
MX



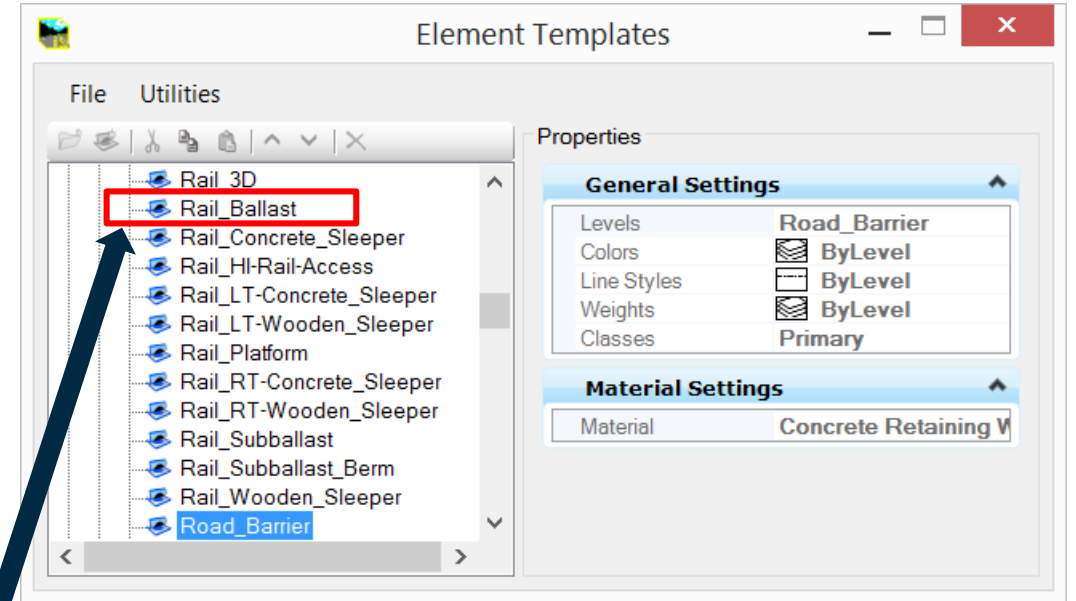
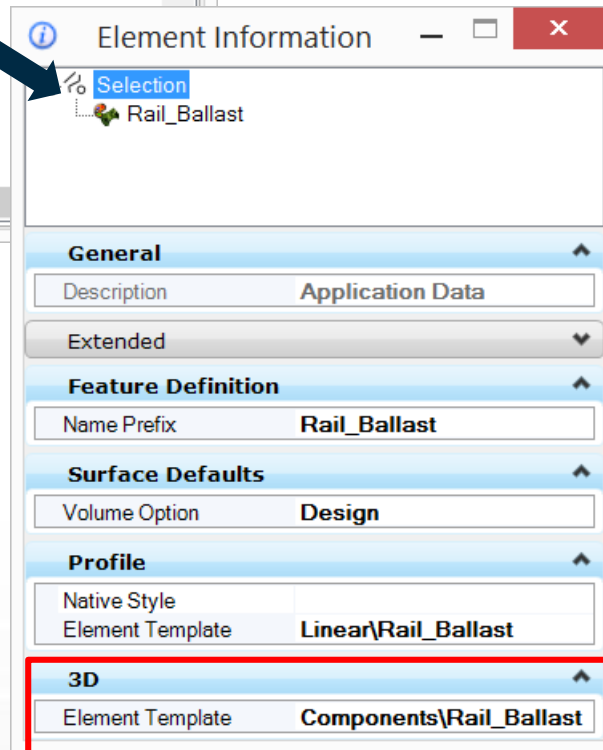
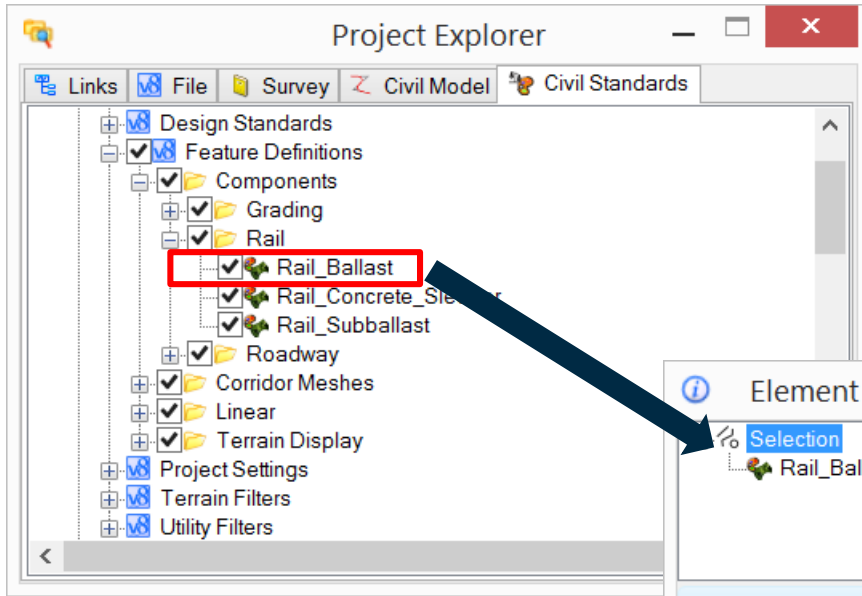
GEOPAK

InRoads Rail Track PowerCivil

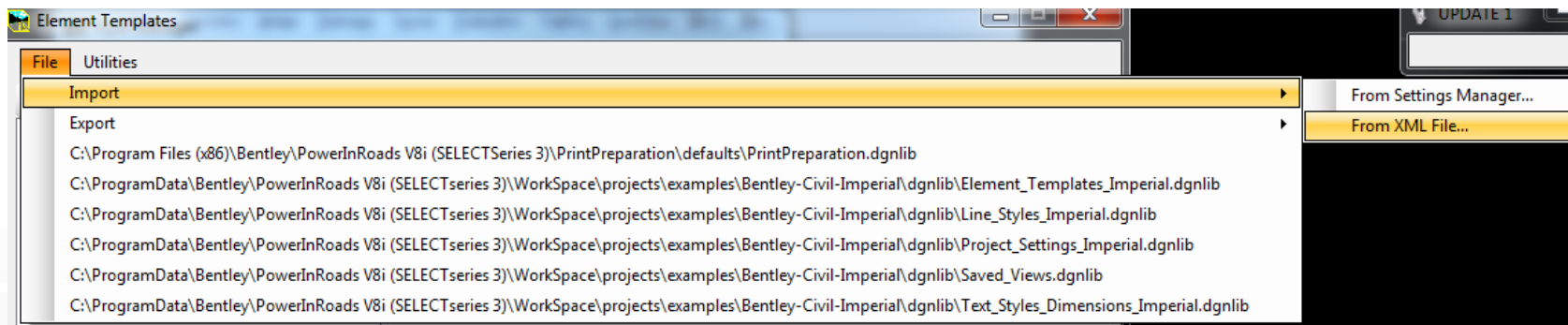
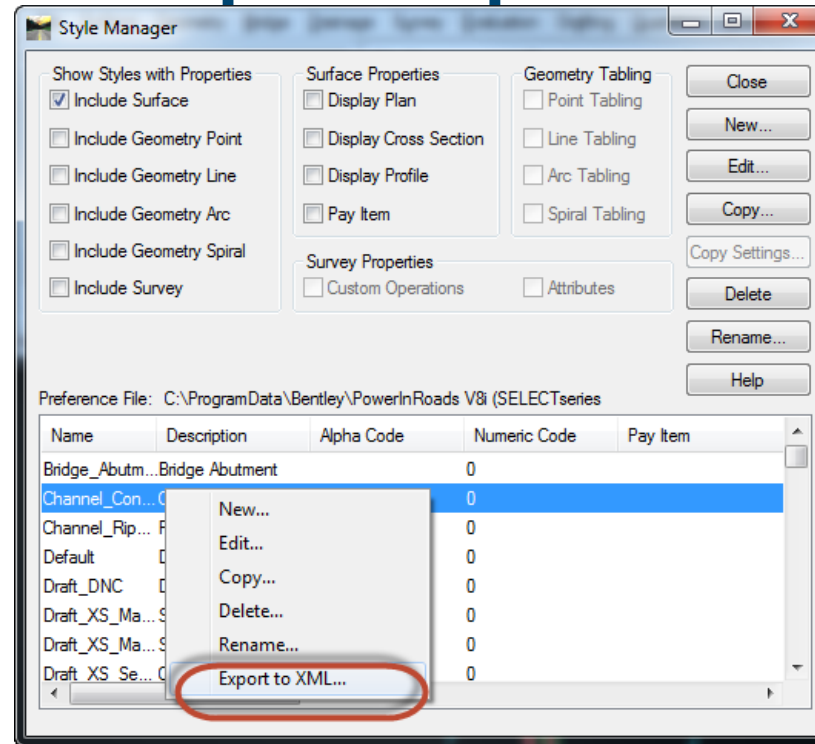
MX



Feature Definitions point to Element Templates

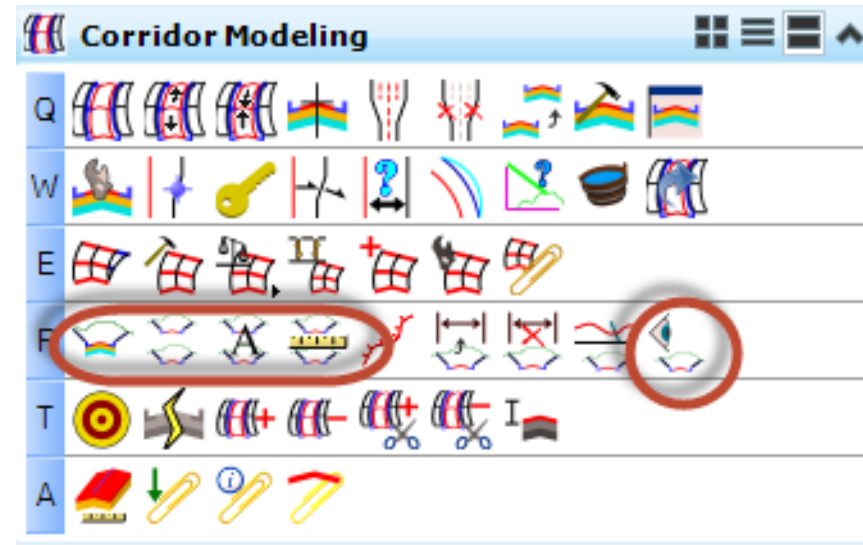


Creating Element Templates via Export/Import



XIN Preference Needed for All Product Lines

- Create Cross Sections
- Annotate Cross Sections
- End Area Volumes & Mass Haul
- Cross Section Viewer



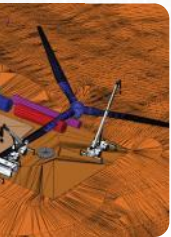
Best Practice



Link to legacy style files only once

*After the initial linking has been done, any structural changes to the feature definition tree (new features, renaming of features, etc.) should be made directly in the **DGN Lib.***

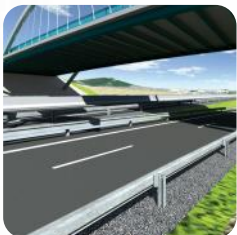
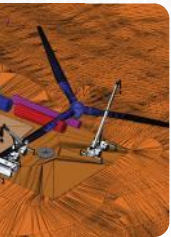
Exception - changes to symbology or annotation, which would be made in the legacy style file.



Project Data

Civil Objects that Make up the Model

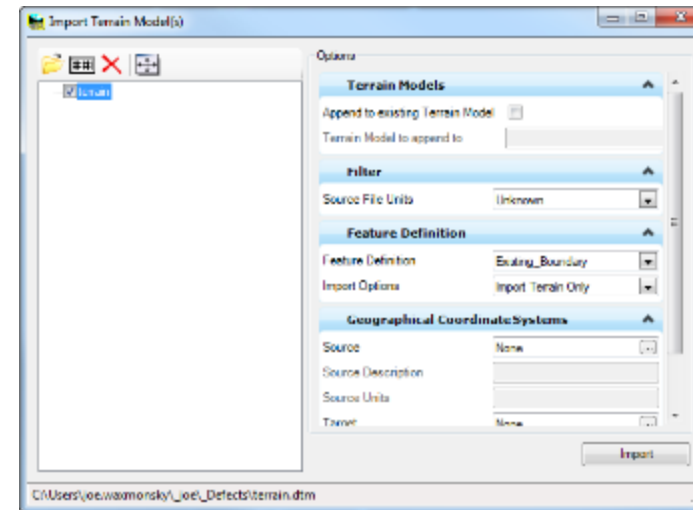
- Terrain Surfaces
- 2D Geometry + Profiles = 3D Geometry
- Corridors
- Linear Templates
- Surface Templates



Project Data - Terrain

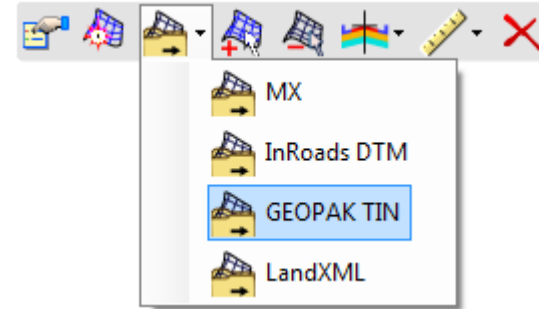
Importing Terrain

- Legacy Formats Unchanged
- Import to a Terrain Model
 - No Components
 - No Features



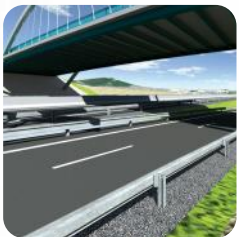
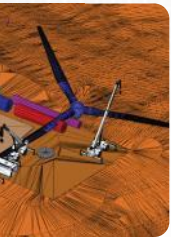
Exporting Terrain

- Select the boundary element, hover and click Export Terrain Model from the context menu.
- Select the desired output from the pull down list



Remember

The Terrain is needed in in OpenRail and DTM. It can be created in either location and imported / exported to the other.

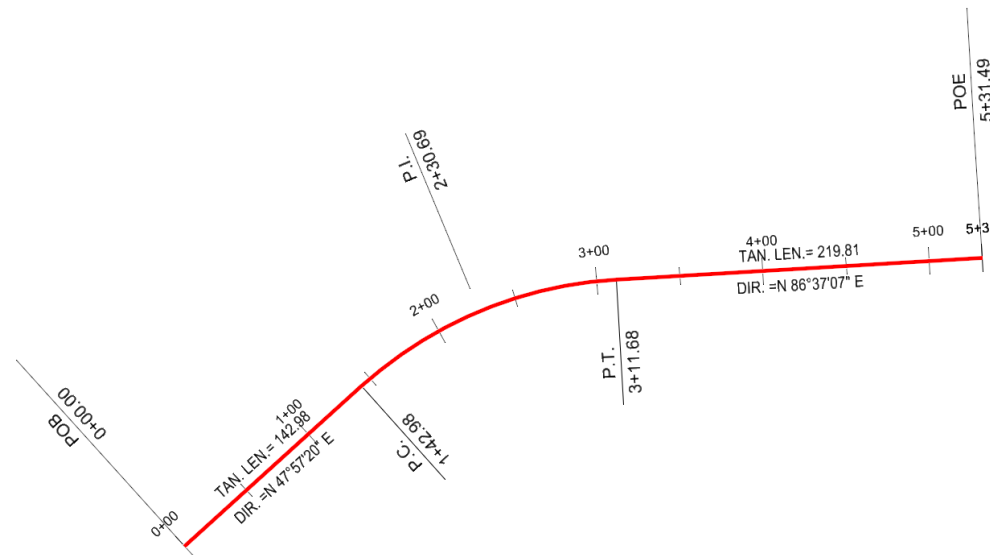


Project Data - Geometry

Geometry Files - ALG

- ALG Required for Rail Workflow
- Import from OpenRoads/OpenRail
 - Required for Corridor Modeling
 - Supports the following spiral types as true, un-ruled geometry
 - Clothoid
 - Biquadratic Parabola
 - Bloss
 - Sinusoidal
 - Cosine
 - Cant geometry is not imported
- Required for Plans Production

Format Unchanged



Rail Geometry

- Create / Edit in ALG (just the same process as in SELECTseries 2)
 - Horizontal, Vertical & Cant Geometry
 - Horizontal & Vertical Regression Analysis
 - Turnouts
 - Light Rail Manufacturing
 - Swept Envelope Analysis
 - Design Checks
- **Import Geometry to DGN for Modeling only**

Rail Geometry

Active Project Properties

Surface: Default Geometry Project: Import Geometry Horizontal Alignment: Dn Main Des Vertical Alignment: Dn Main Des Cant: New Cant Feature Filter: <Unnamed>

View 1, Default

Element Selection > Identify element to add to set

Power Rail Track V8i (SELECTSeries 4)

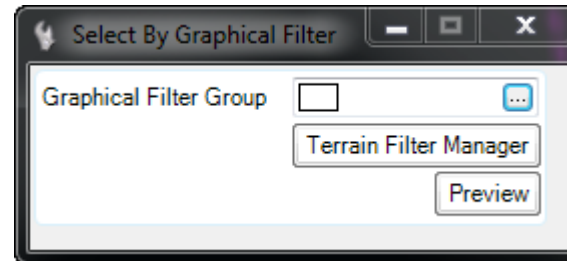
Name	Type
Des Cant	Cant
Dn Main Des	Vertical Align...
Ex Cant	Cant
New Cant	Cant

Geometry Projects

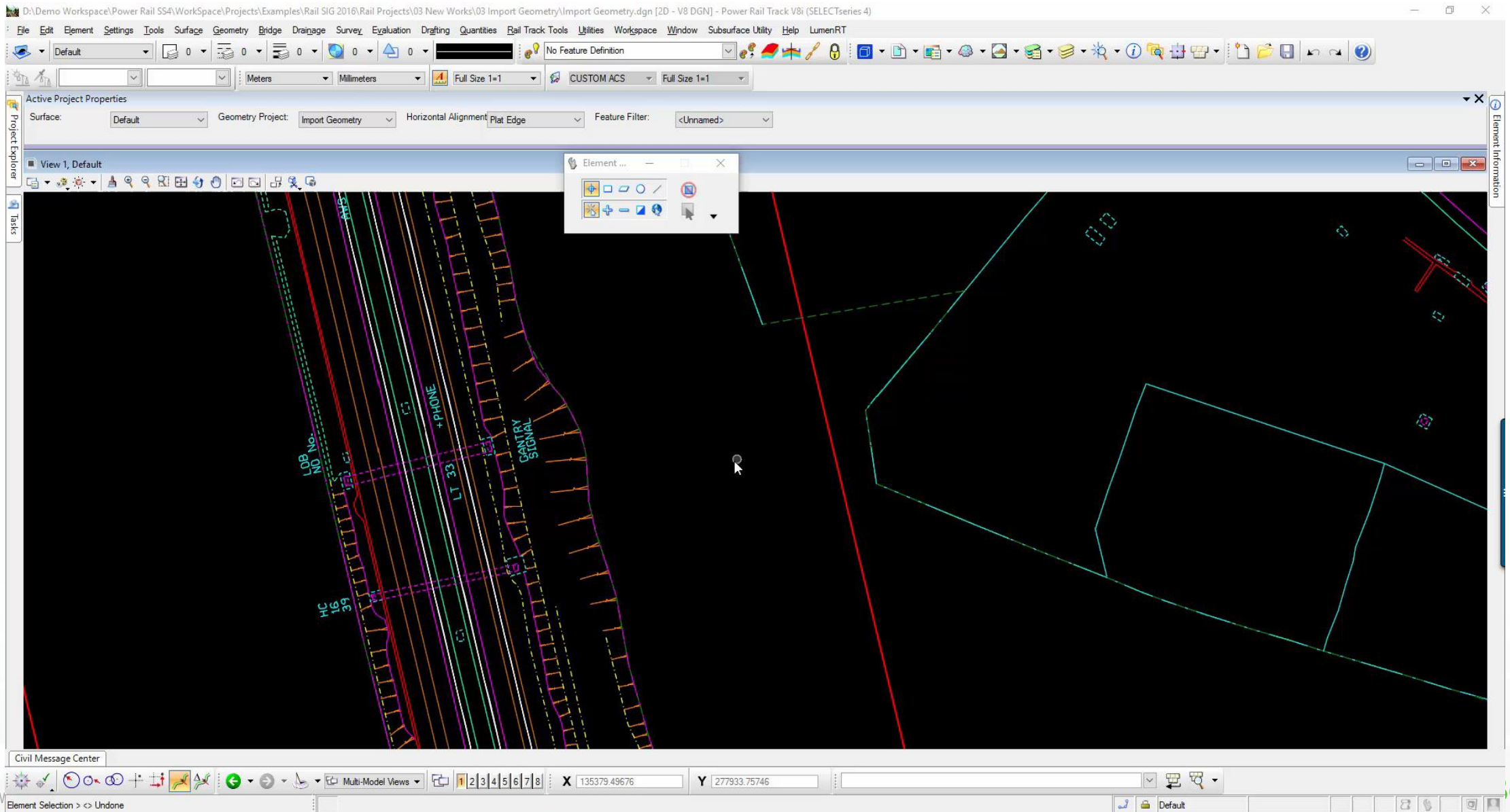
- Import Geometry
 - Cogo Buffer
 - 4 Track Sub Base Cont...
 - Dn Goods Des
 - Dn Main Des
 - T1 Up Goods-T1 Up M...
 - T2 Dn Main-T1 Dn Goc...
 - T2 Up Main -T1 Dn Ma...
 - T3 Up Main-T2 Up Goc...
 - Up Goods Des
 - Up Main Des
 - T1 Dn Goods
 - T1 Dn Main
 - T1 Up Goods
 - T1 Up Main
 - T2 Dn Main
 - T2 Up Goods
 - T2 Up Main
 - T3 Up Main

Export Geometry

- Only needed for DGN created geometry
- Considerations
 - Only Geometry required to Generate Annotations
 - Works over References
 - Honors Selection Sets
 - Select By Graphical Filter



Rail Geometry



Best Practice



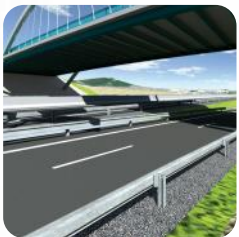
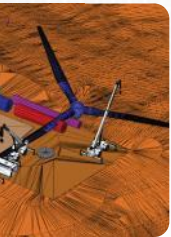
Import Geometry

- Rail Workflow
 - DO NOT Enable Rules
 - Geometry edited in ALG
 - Only import centre line geometry
- Road Workflow
 - Enable Rules
 - Geometry edited in DGN

Export Geometry

- Rail Workflow
 - Nothing to export, geometry in ALG
- Road Workflow
 - Manually Export – Do Not Use Auto Export

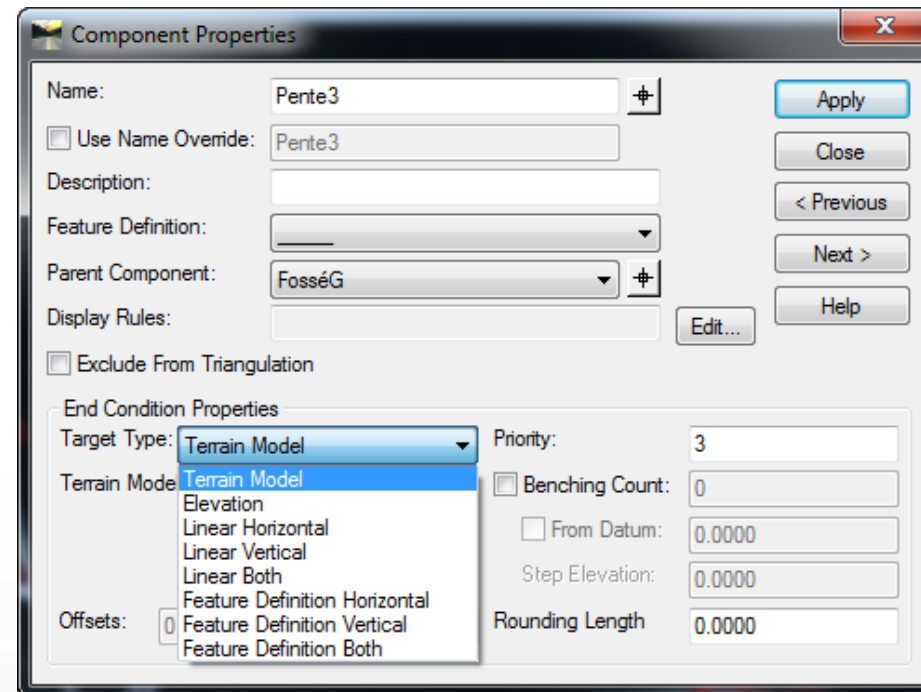
Created in 2D DGN Files!



Project Data - Corridor Modeling

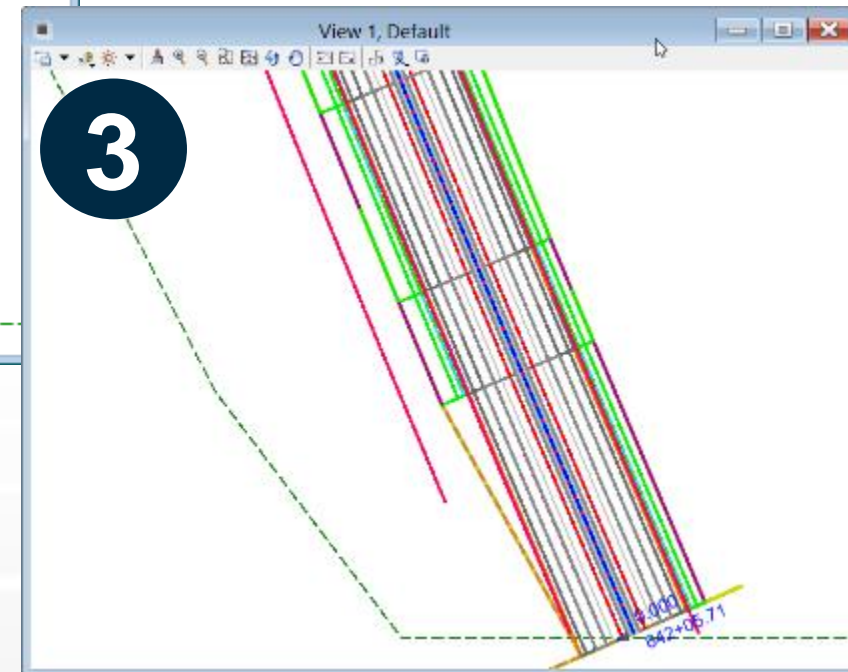
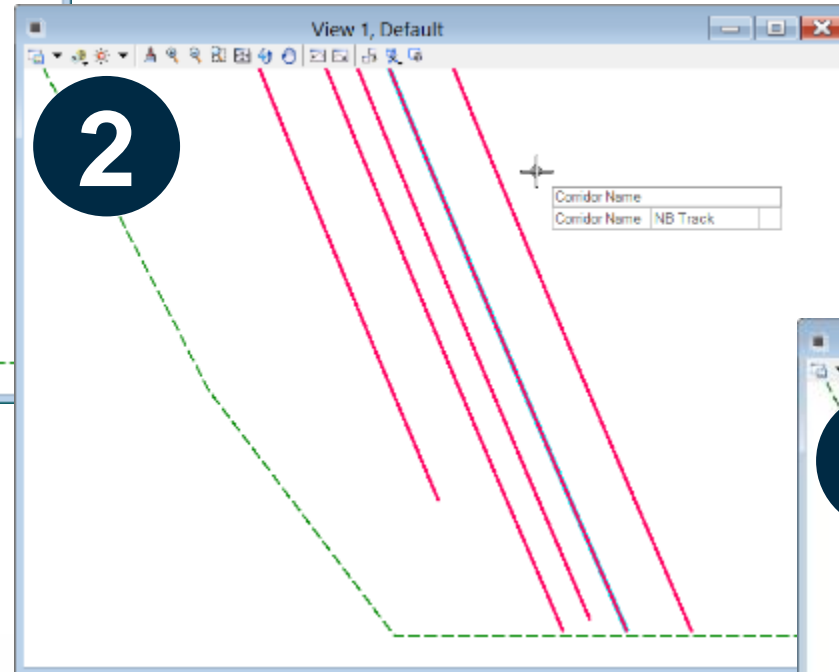
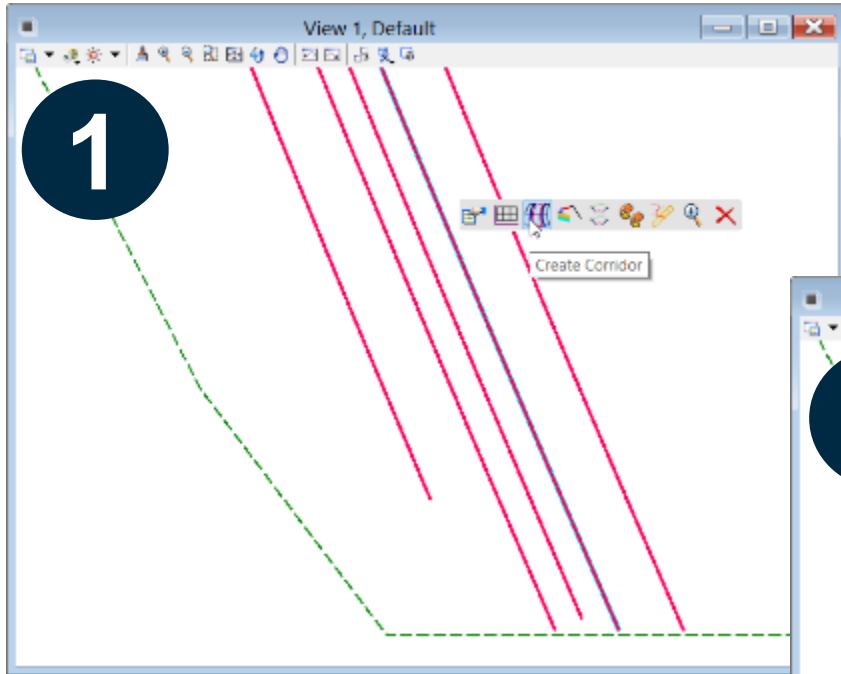
Template Library (.ITL)

- Same Format
- Additions & Changes
 - Removed Vertical Styles Constraints
 - Naming
 - Styles = Feature Definition
 - Targets Renamed

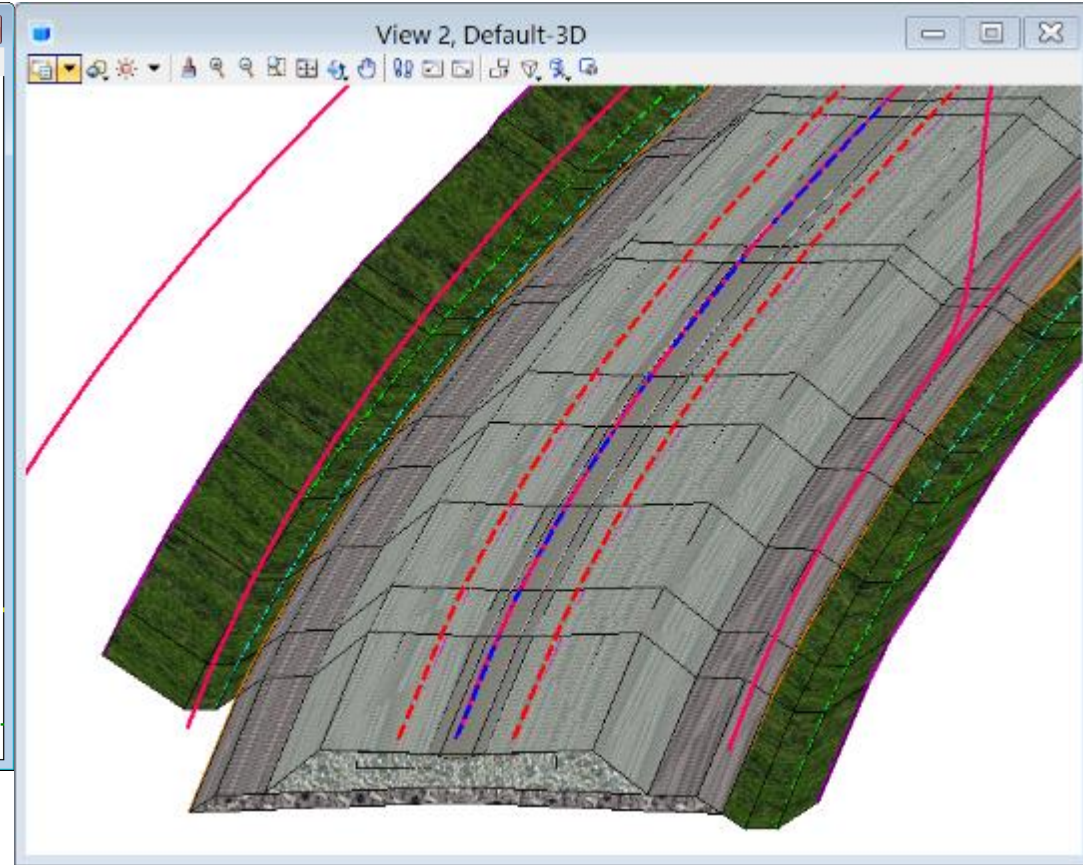
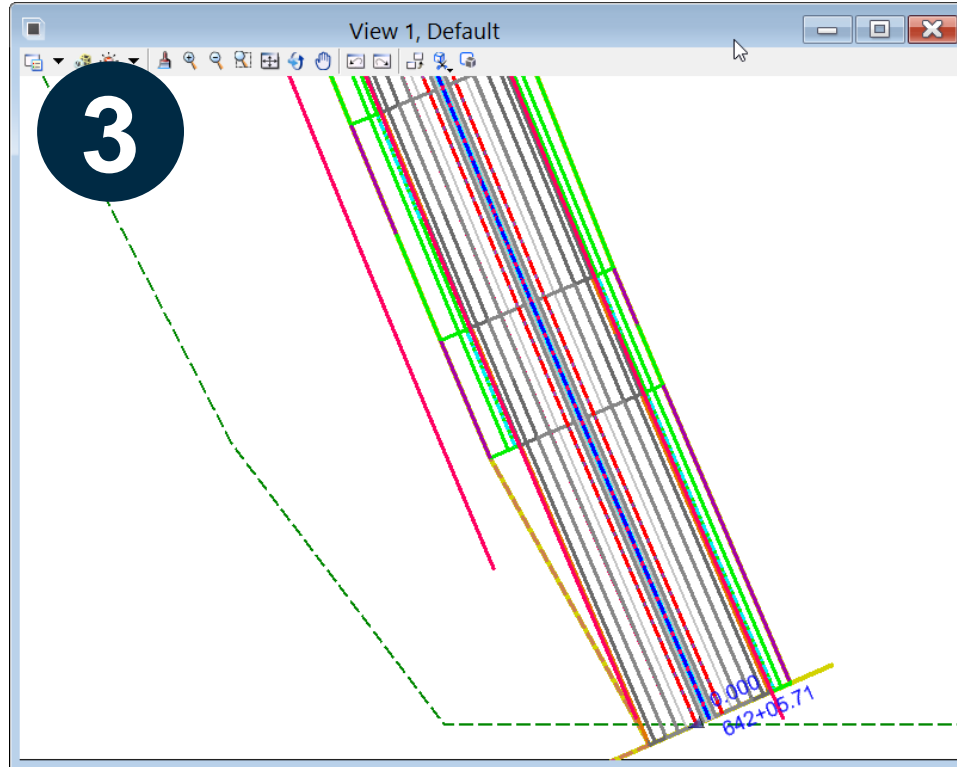


Create Corridor

- 1 – Right click on centerline geometry
- 2 – Follow on screen prompts
- 3 – Corridor is created



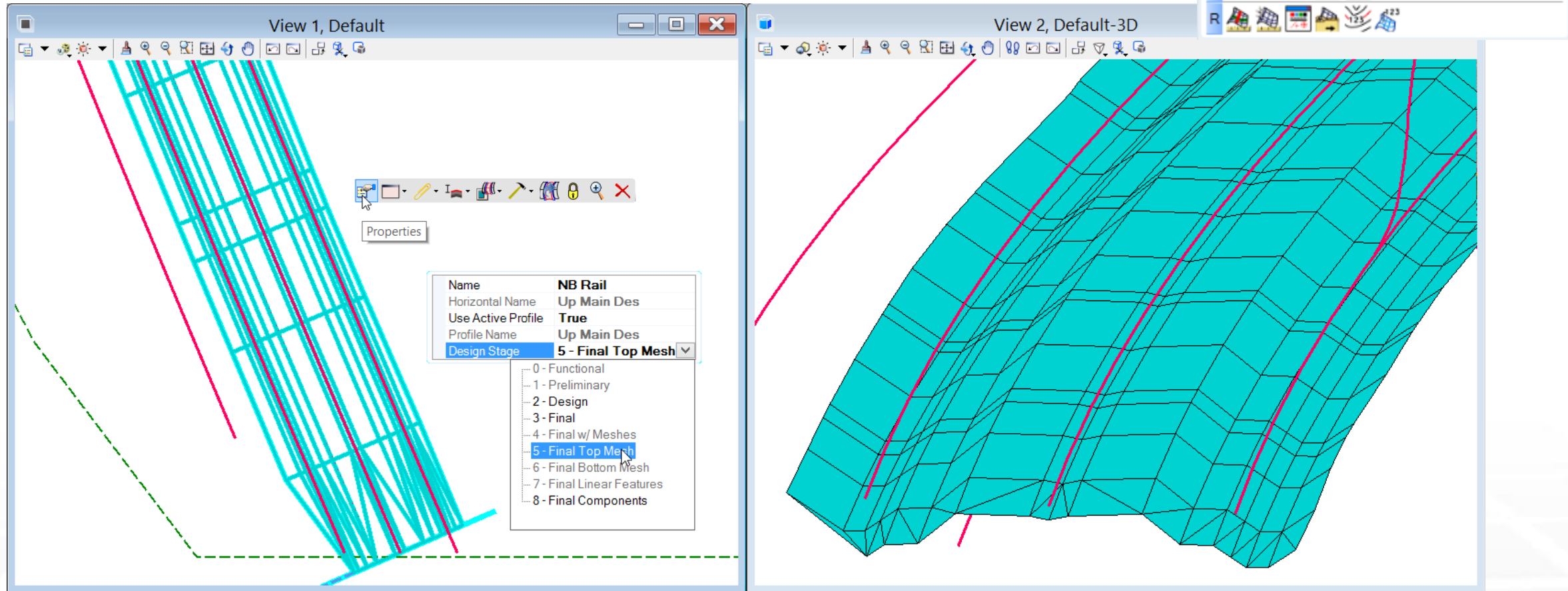
Create Corridor



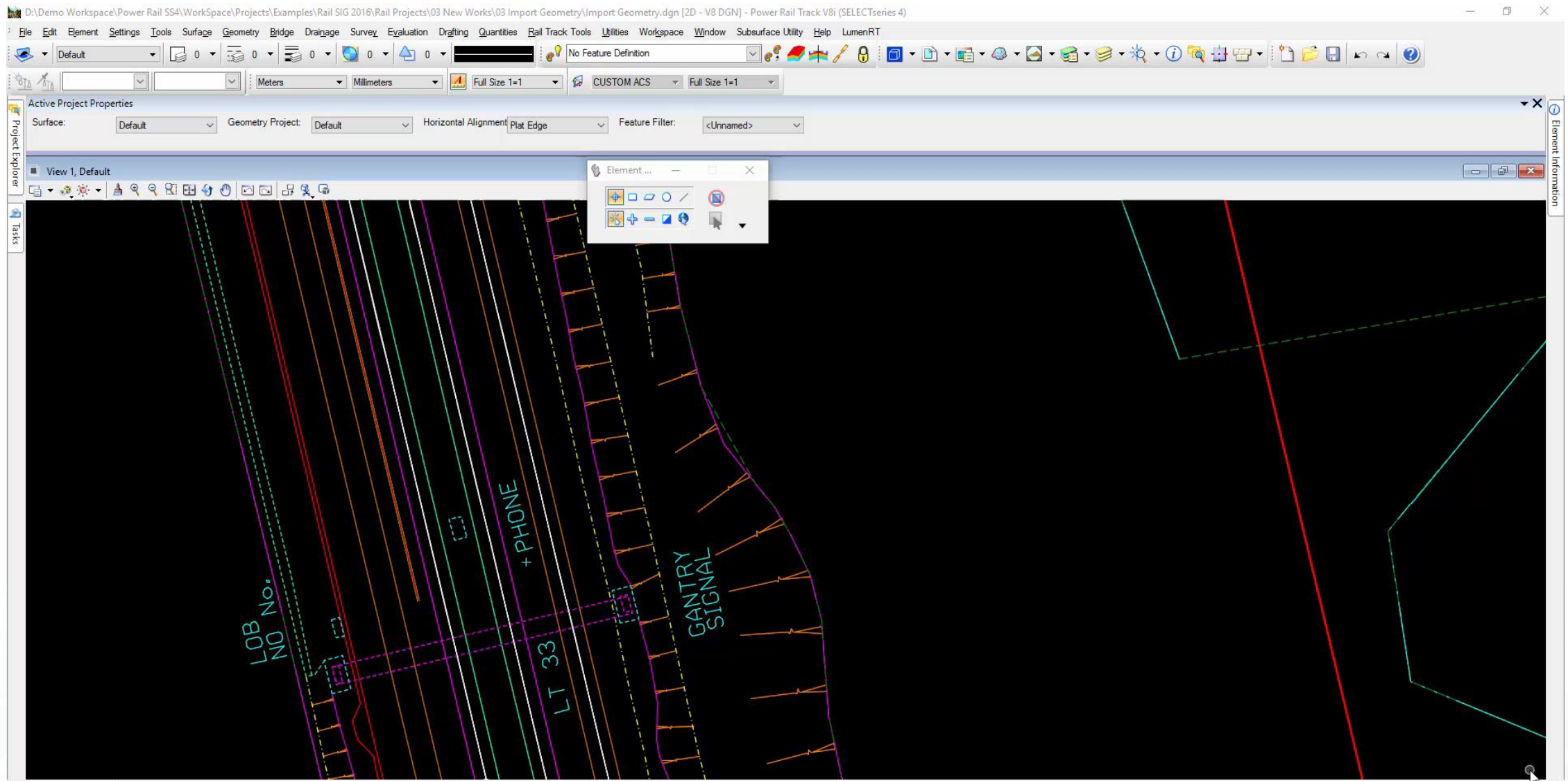
- 1 – Right click on centerline geometry
- 2 – Follow on screen prompts
- 3 – Corridor is created
- 4 – 3D Model automatically generated

Design Stages

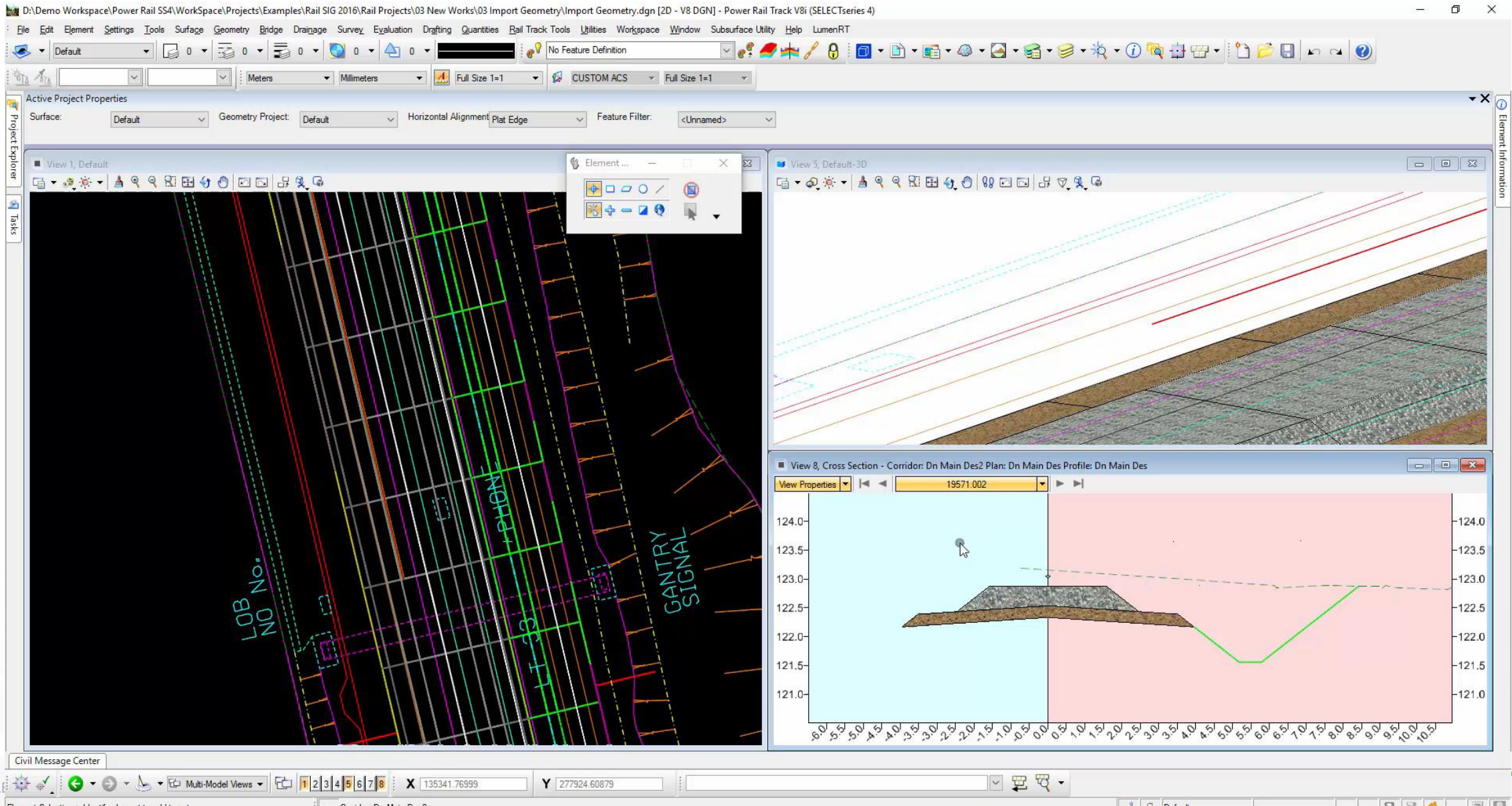
- What is in the Model
 - Components
 - 3d Linear Features
 - Top/Bottom Mesh
- Build Terrain Model from Top Mesh
 - Terrain > Create from Elements tool



Basic Corridor Modeling

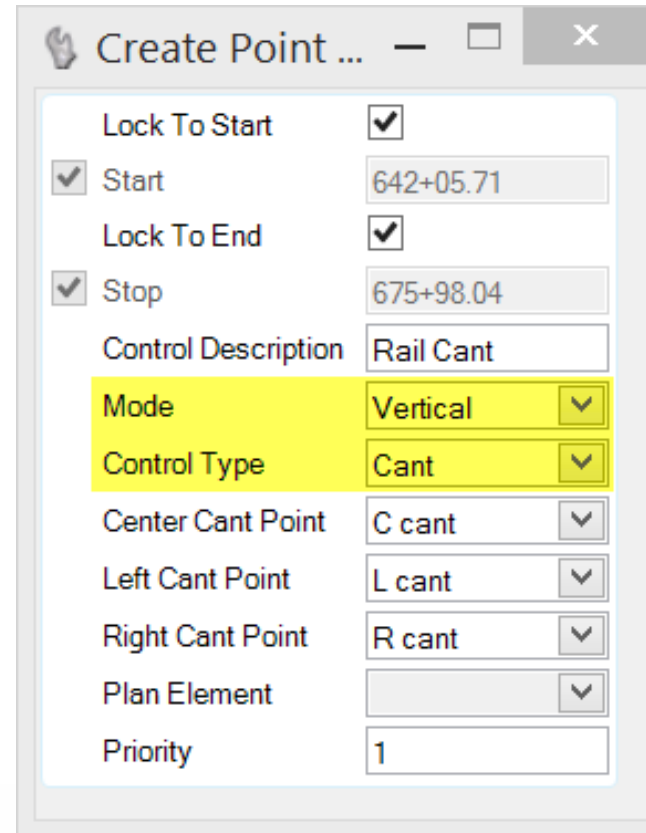


Extended Corridor Modeling



Cant

- Read directly from ALG file
 - ALG must be loaded
 - Active Cant geometry used in Corridor
- Defined as Corridor Point Control
 - Mode – Vertical
 - Control Type - Cant



Property	Value
Lock To Start	<input checked="" type="checkbox"/>
Start	642+05.71
Lock To End	<input checked="" type="checkbox"/>
Stop	675+98.04
Control Description	Rail Cant
Mode	Vertical
Control Type	Cant
Center Cant Point	C cant
Left Cant Point	L cant
Right Cant Point	R cant
Plan Element	
Priority	1

Cant Corridor Modeling

The screenshot displays the Bentley software interface for Cant Corridor Modeling. The top menu bar includes options like File, Edit, Element, Settings, Tools, Surface, Geometry, Bridge, Drainage, Survey, Evaluation, Drafting, Quantities, Rail Track Tools, Utilities, Workspace, Window, Subsurface Utility, and Help. The toolbar contains various icons for drawing and editing. The Active Project Properties panel shows settings for Surface, Geometry Project, Horizontal Alignment, Vertical Alignment, Cant, and Feature Filter. The main view is divided into three panels: View 1 (Default) showing a 2D plan view of the rail corridor with tracks and infrastructure; View 5 (Default-3D) showing a 3D perspective view of the tracks and cant; and View 8 (Cross Section - Corridor) showing a vertical profile of the tracks and cant. The cross-section view includes a vertical axis ranging from 122.5 to 126.0 and a horizontal axis ranging from -10.5 to 6.0. The software title bar indicates the file path: D:\Demo Workspace\Power Rail SS4\Workspace\Projects\Examples\Rail SIG 2016\Rail Projects\03 New Works\03 Import Geometry\Import Geometry.dgn [2D - V8 DGN] - Power Rail Track V8i (SELECTSeries 4).

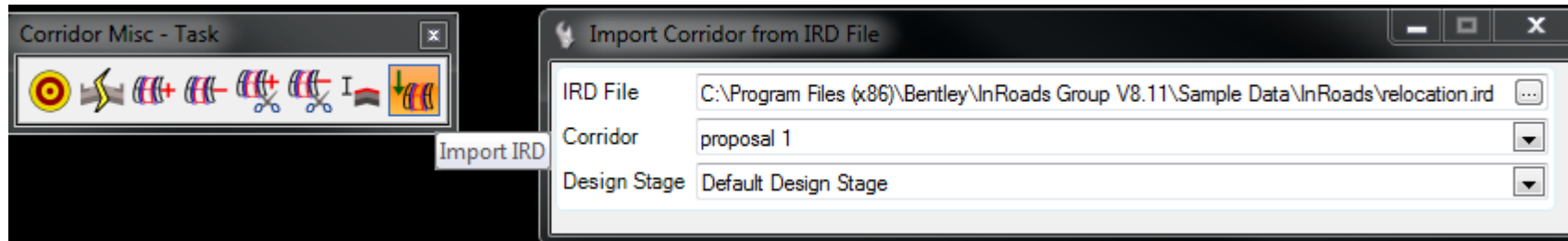
Best Practice



Recommended Rail Modeling Workflow

Geometry and Corridor in the same 2D DGN file

Import Corridor from IRD File



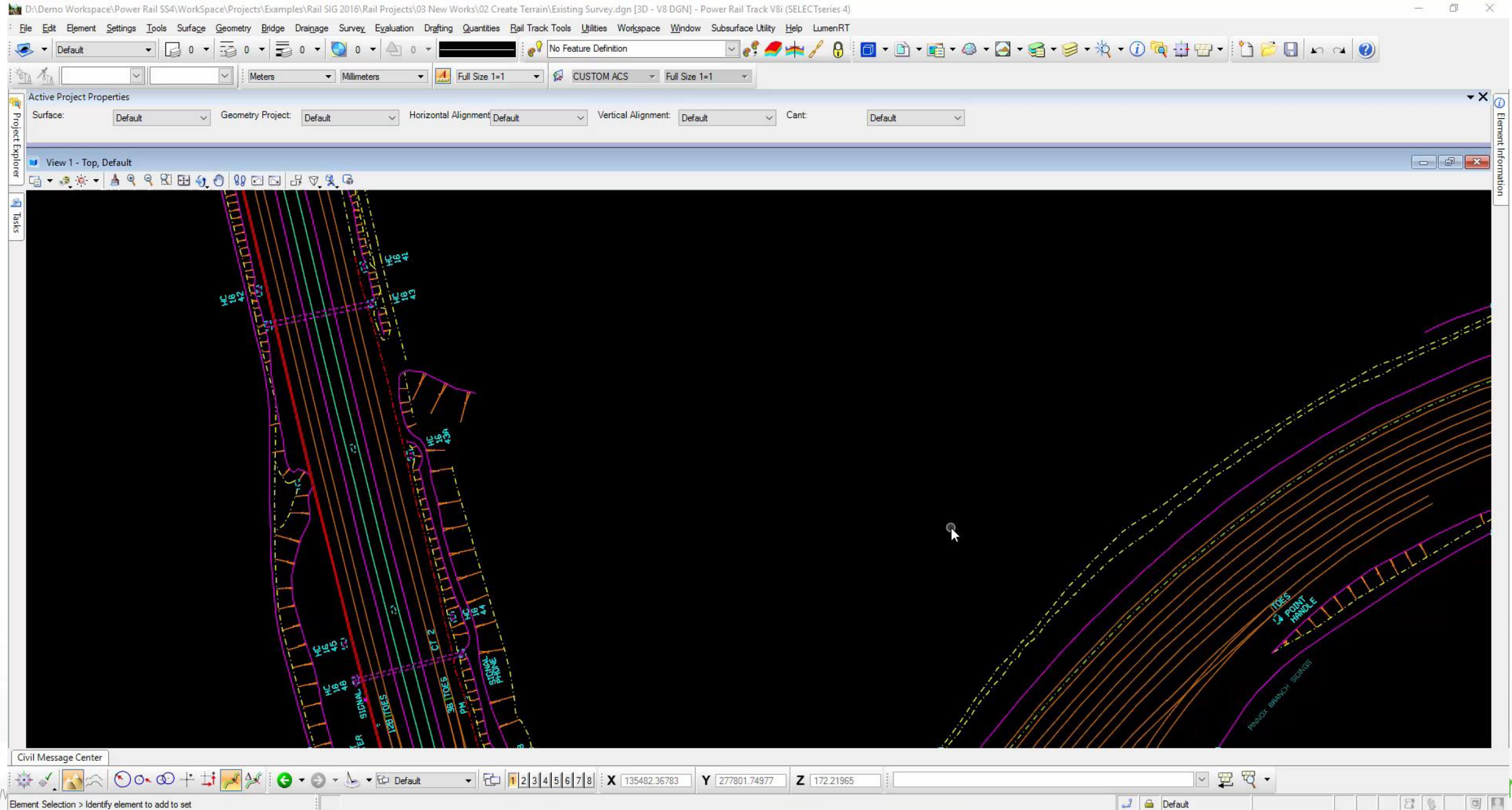
Import Corridor from IRD File

- Only one corridor at a time can be imported.
- **An imported corridor's baseline horizontal and profile geometry must already exist in the design file or an attached reference file.**
- Superelevation point controls will be imported.
- All dependencies will be matched by name with objects in the design model.
- When importing secondary alignments, the .alg that contains the secondary alignment geometry must reside in the same directory as the .ird.

Import Corridor from IRD File

- A corridor's missing dependencies will be reported at the time of import. The import can then be canceled or continued without missing dependencies.
- Corridor objects that are missing a dependency will not be imported.
 - For example, if a point control is a corridor feature point control, the corridor and the corridor feature must already exist. If they do not, the point control will not be imported.
- In order for a Target Alias to be imported at least one of its dependencies must exist in the design model. Missing aliases will not be imported.
- Dependency Reports
 - Open IRD in Civil Report Browser
 - Reports in Corridor Modeling folder

IRD import Terrain



IRD import Corridor

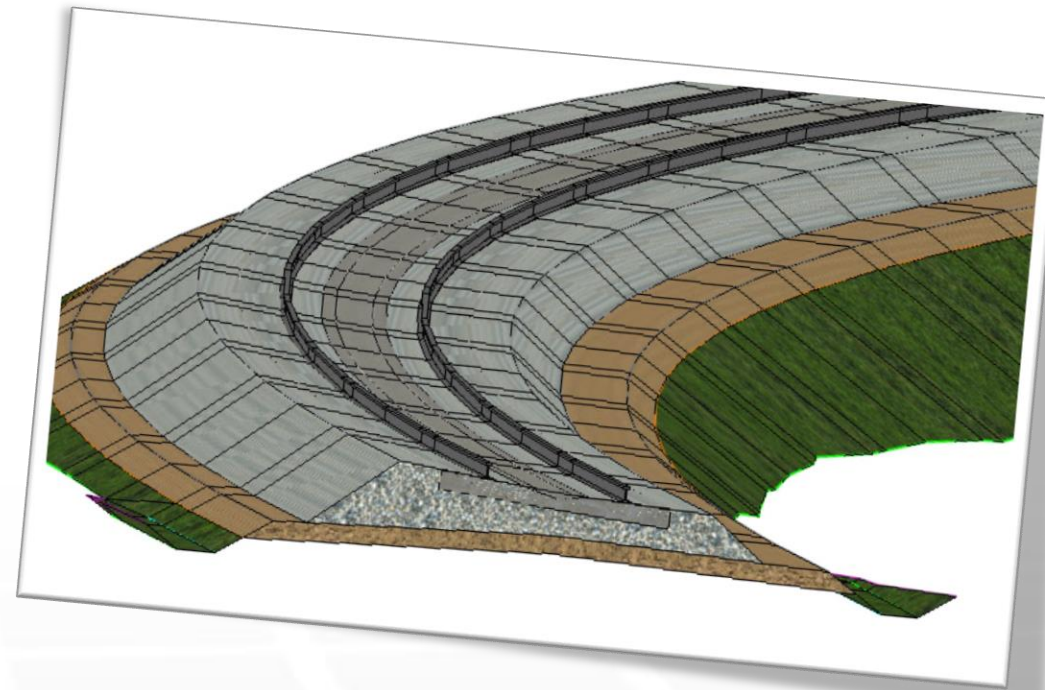
The screenshot displays a CAD application window titled "D:\Demo Workspace\Power Rail SS4\Workspace\Projects\Examples\Rail SIG 2016\Rail Projects\03 New Works\03 Import Geometry\Import Geometry.dgn [2D - V8 DGN] - Power Rail Track V8i (SELECTseries 4)". The interface includes a menu bar, a toolbar, and a "Project Properties" panel. The main workspace is divided into three views:

- View 1, Default:** A 2D plan view of the rail corridor. It shows multiple parallel tracks with various colored lines representing different elements. Labels include "LOB No. NO. 1", "PHONE", and "GANTRY SIGNAL".
- View 5, Default-3D:** A 3D perspective view of the rail corridor, showing the tracks and their vertical alignment.
- View 8, Cross Section - Corridor: Dn Main Des2 Plan: Profile:** A cross-section profile view of the corridor. The vertical axis represents elevation, ranging from 122.8 to 124.2. The horizontal axis represents distance along the corridor, ranging from -4.2 to 2.8. The profile shows the ground surface (dashed line) and the proposed rail bed (solid line) with various layers of construction.

The bottom of the interface features a "Civil Message Center" and a status bar with coordinates (X: 135365.01491, Y: 277955.92534) and a "Multi-Model Views" panel.

Summary

- OpenRail at SELECTseries 4 provides extended modeling capabilities through a hybrid workflow where the 3D model is no longer a byproduct of the Design
 - Corridor Resides in the DGN
 - Work in 2D, 3D Model Automatically
 - Integrate Corridor and Non-Corridor (Site) Modeling
 - Everything works in same model
 - Use the tools that best fit the situation
 - Target MicroStation Elements
 - WYSIWYG
 - Use Reference Files to Control Display of Model
 - Drainage, Bridges, Signage, etc..





OpenRail SELECTseries 4 - Managing Geometry and Corridor Modeling

Robert Nice – Senior Application Engineer