



# Project Deliverables and Working with Federated Models

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**Bentley**<sup>®</sup>  
Advancing Infrastructure



# Agenda

- Working with multiple designers in OpenRoads
- Federating models across disciplines
- Using Asset Manager to attach item types
- Project Deliverables
  - PDF
  - DGN
  - iModels
  - LandXML
  - Genio
  - DWG
  - IFC
  - Navigator
  - Synchro
  - Navisworks
  - Microsoft Teams
  - Visualisation - LumenRT

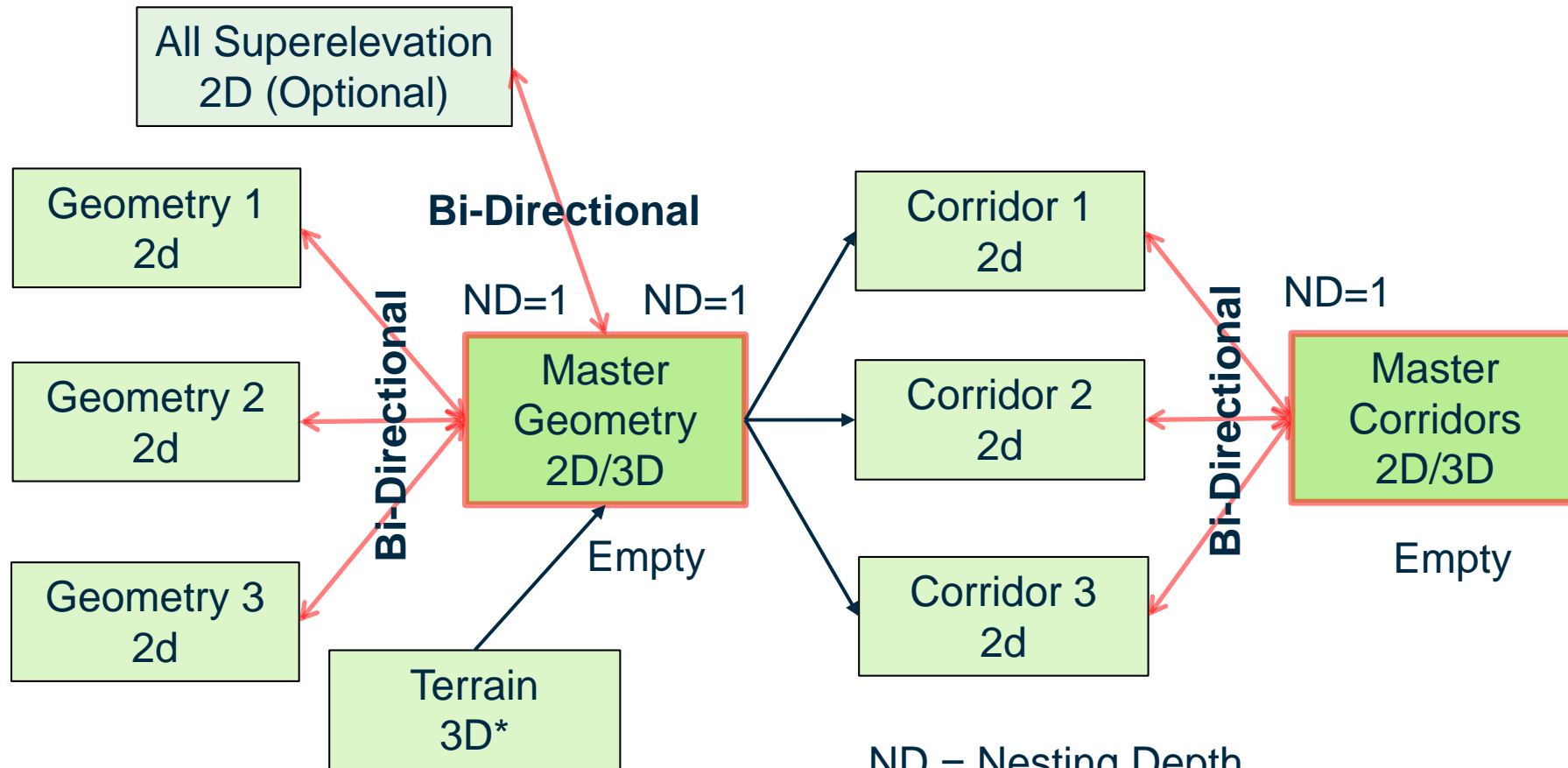
# Industry Drivers

Demand for 3D models & BIM / Digital Engineering project deliverables:



# Working with multiple designers in OpenRoads

- A example of Referencing for a single discipline of a Complex Project



\* Terrain could be it's own  
nested reference structure

ND = Nesting Depth  
Note: All 2D files will have  
auto-managed 3D model

# Working with multiple designers in OpenRoads

- Creating models from multiple references
  - 3D DGN with Terrain
  - For each road consider:
    - 2D DGN with Horizontal and Vertical alignment
    - 2D DGN with Superelevation (optional)
    - 2D DGN with Corridor
    - 2D DGN with Plans
    - 2D DGN with Profiles
    - 2D DGN with Cross Sections
    - 2D DGN for Sight Distance
    - 2D DGN for Aquaplaning etc

# Working with multiple designers in OpenRoads

Corridor01.dgn

Corridor02.dgn

Corridor03.dgn

Corridors Merged for Export.dgn

CorridorsALL.dgn

Geometry01.dgn

Geometry02.dgn

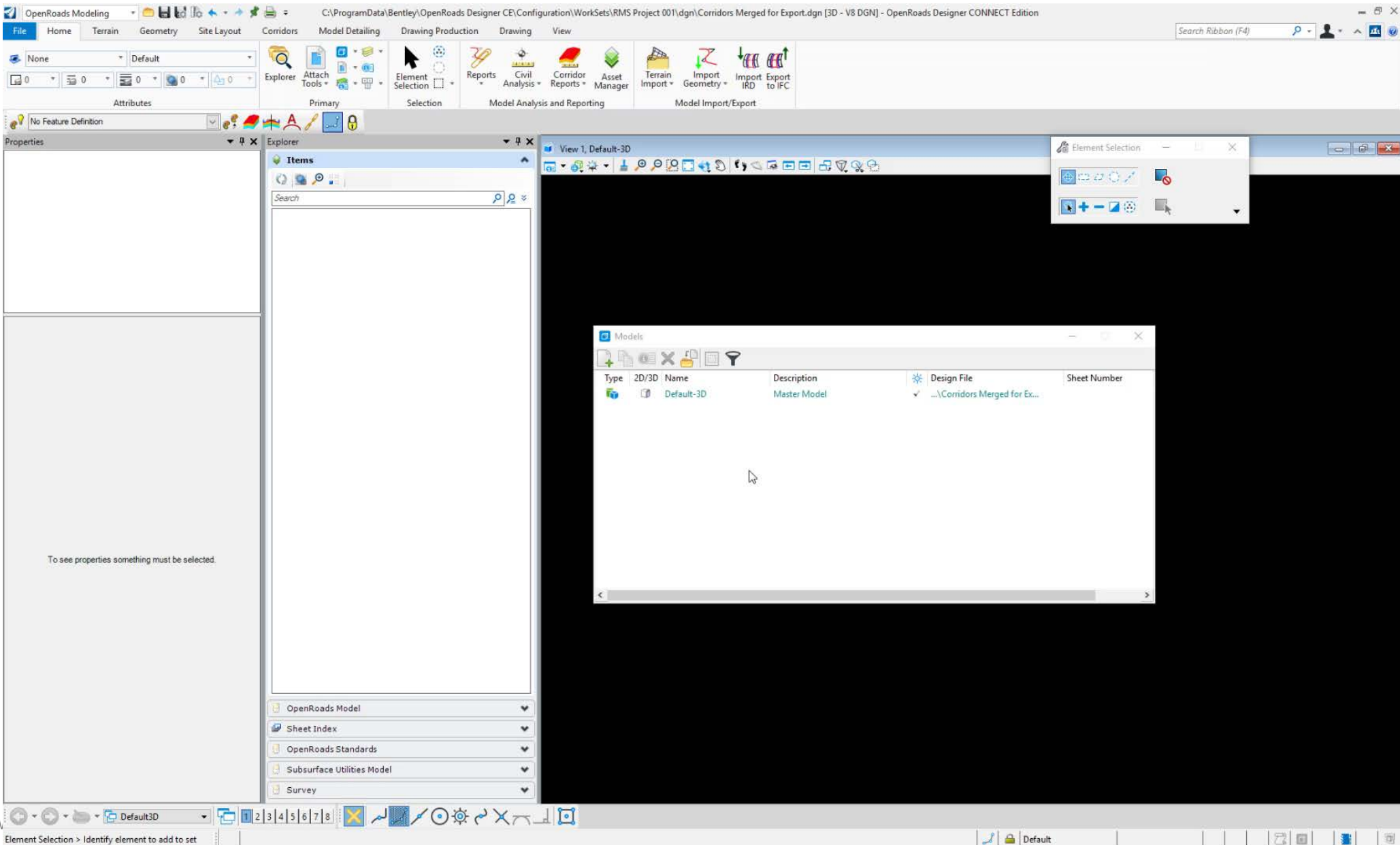
Geometry03.dgn

GeometryALL.dgn

Terrain.dgn



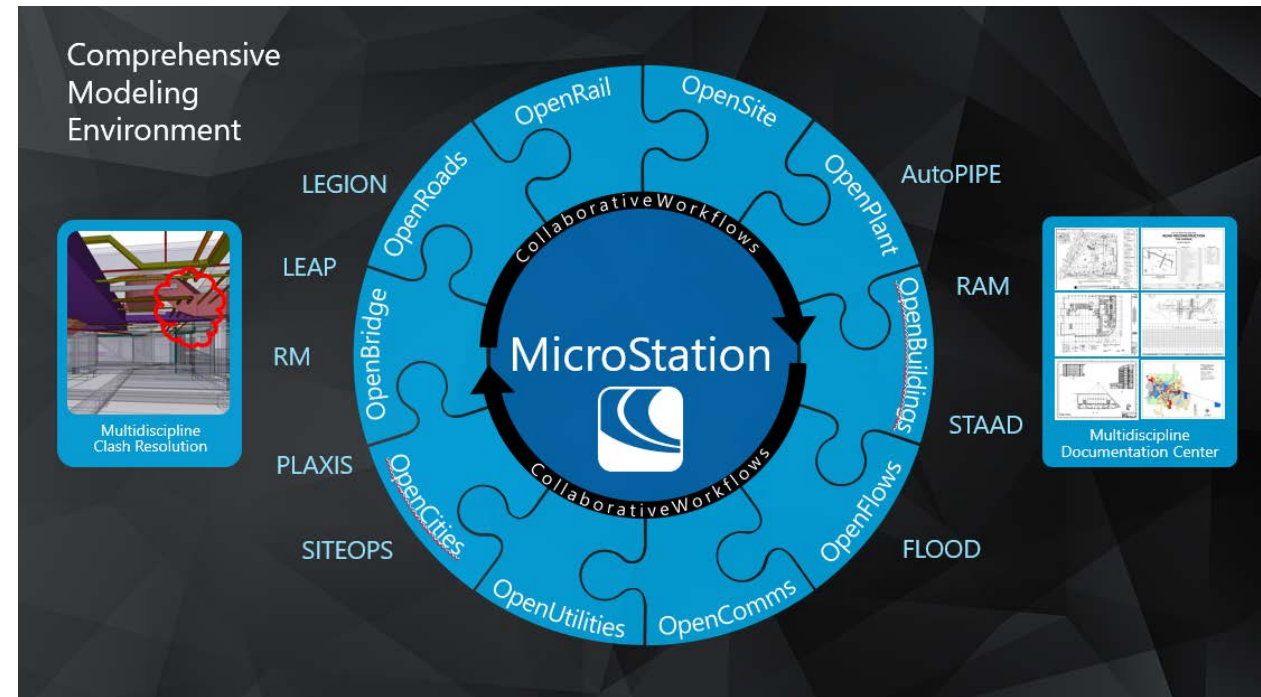
# Merging Corridors





# Federating models across disciplines

- How to view and use other disciplines data?
  - Reference vs Import
  - Native DGN vs other formats
  - View only vs Design integration and rules based association
- How to share your data with other disciplines?
  - Native DGN vs other formats

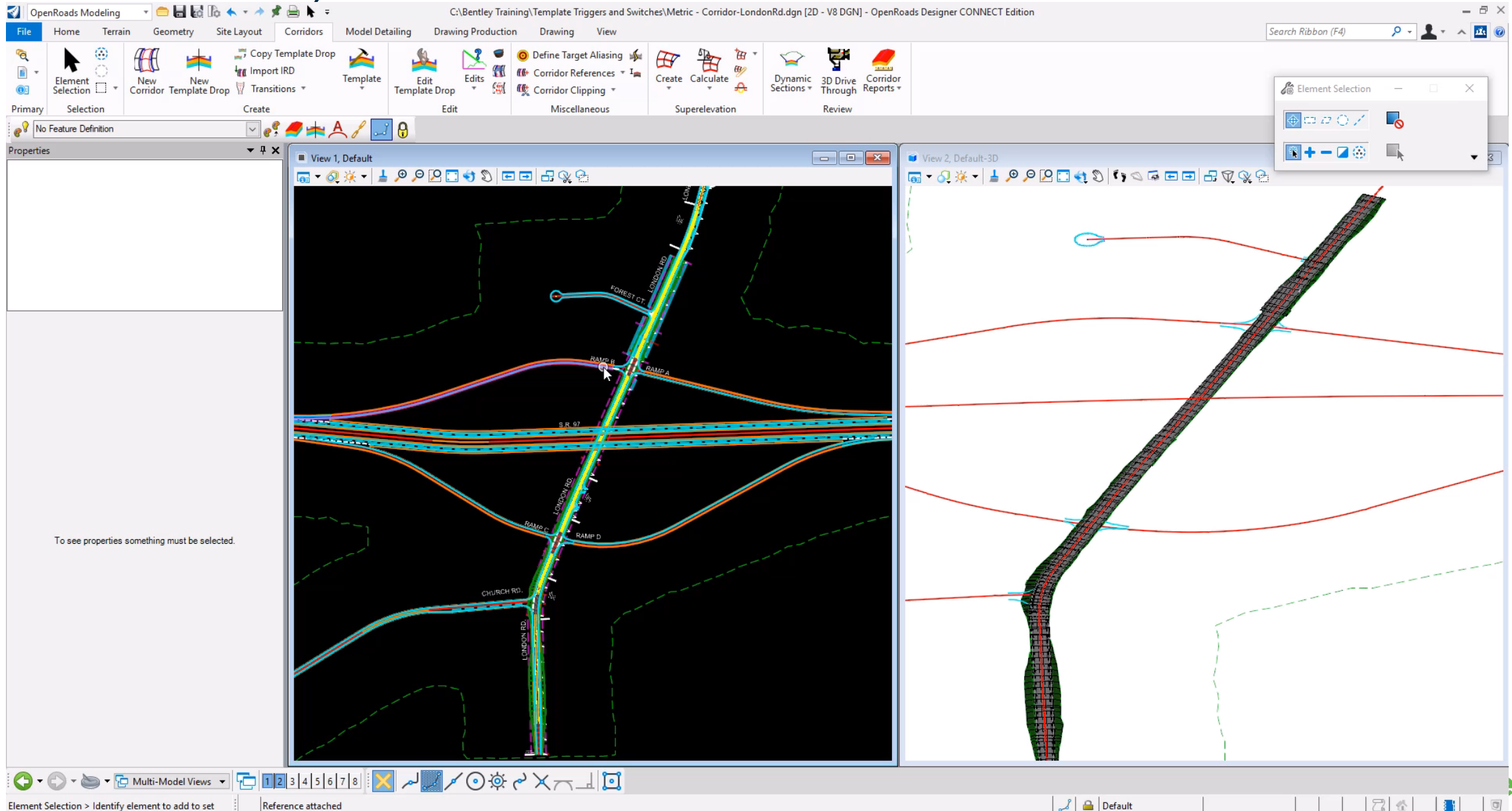




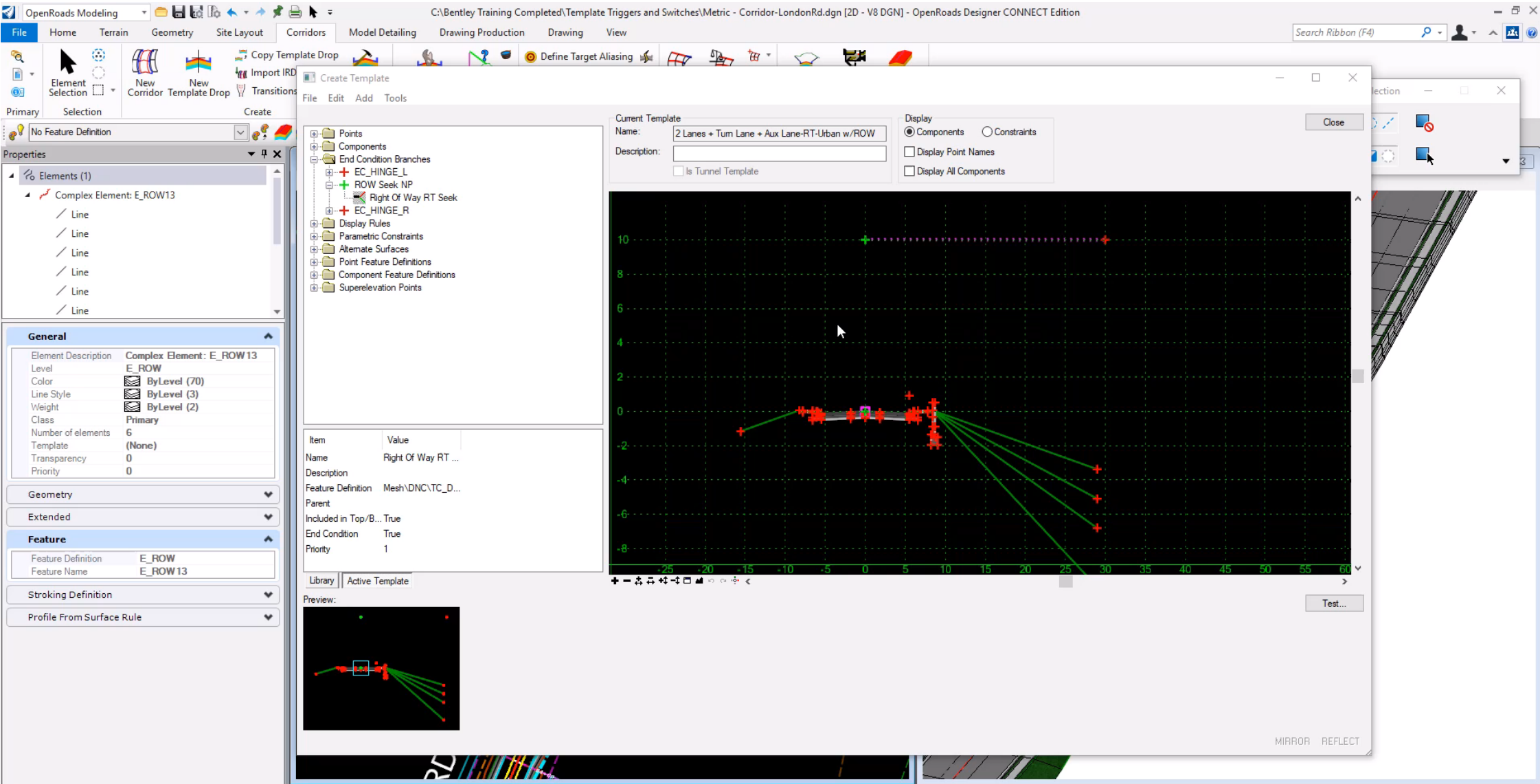
# DWG & IFC – Reference or Import?

- How do you want to use the data?
  - View only
  - Design integration with elements
- Performance consideration
  - Native DWG/IFC or convert to DGN

# Example of DWG Reference for view only (for design integration save to DGN)



# Example of Using DGN Reference for design integration



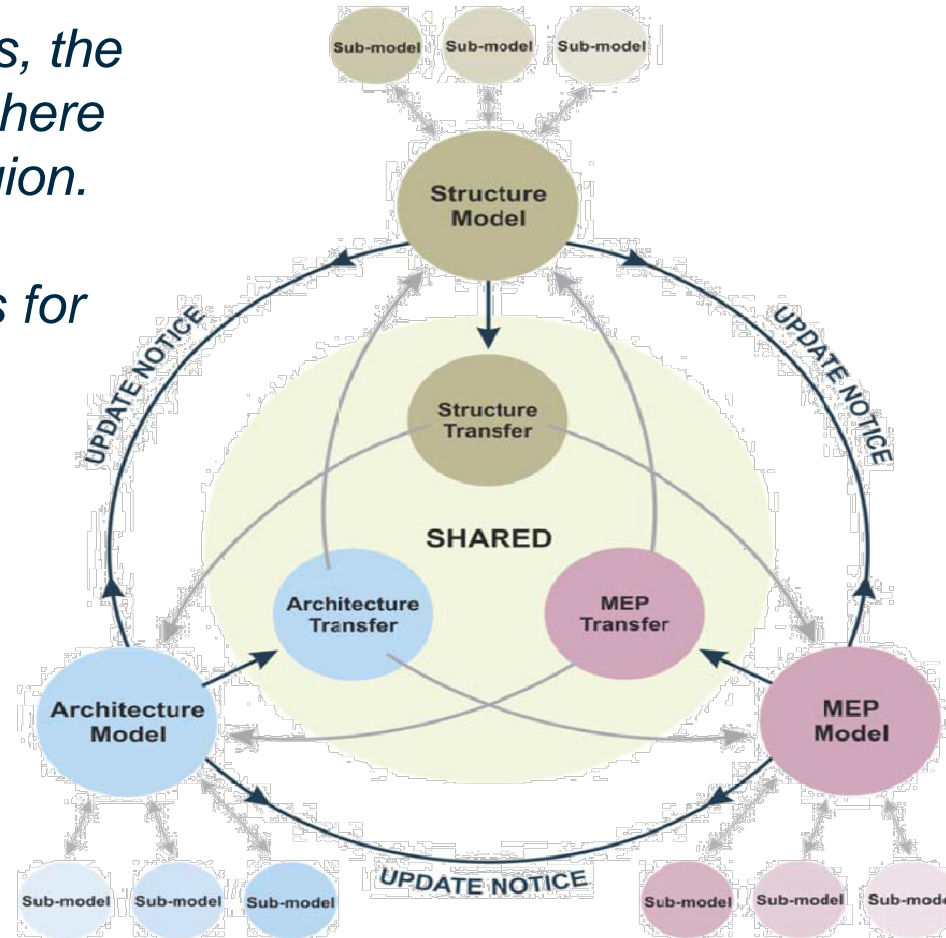


# DGN Advantages

- Geocoordination including GDA 2020
- Speed of native format
- No data conversion
- Live updates via referencing
- Scalability – compression and performance
- Parametric modelling across reference files

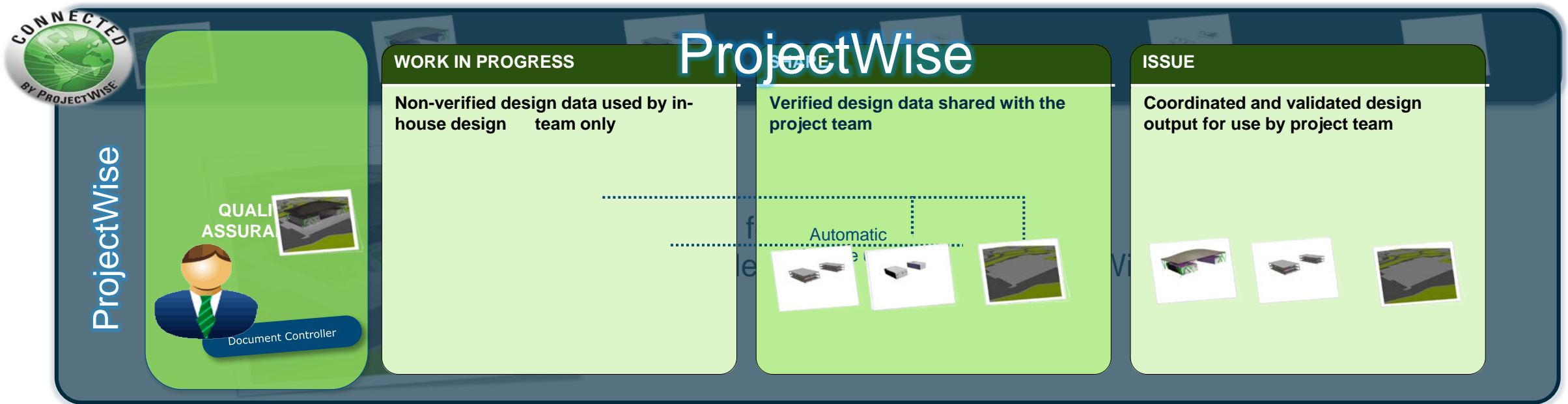
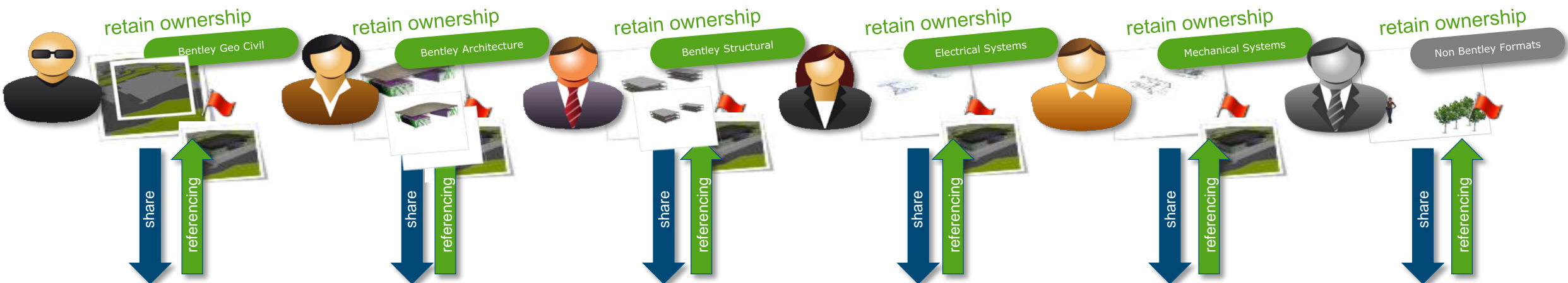
# CDE: Shared and WIP Area

*For indicative purposes, the Shared area is shown here as a single shaded region. This may, in truth be synchronized locations for each stakeholder.*



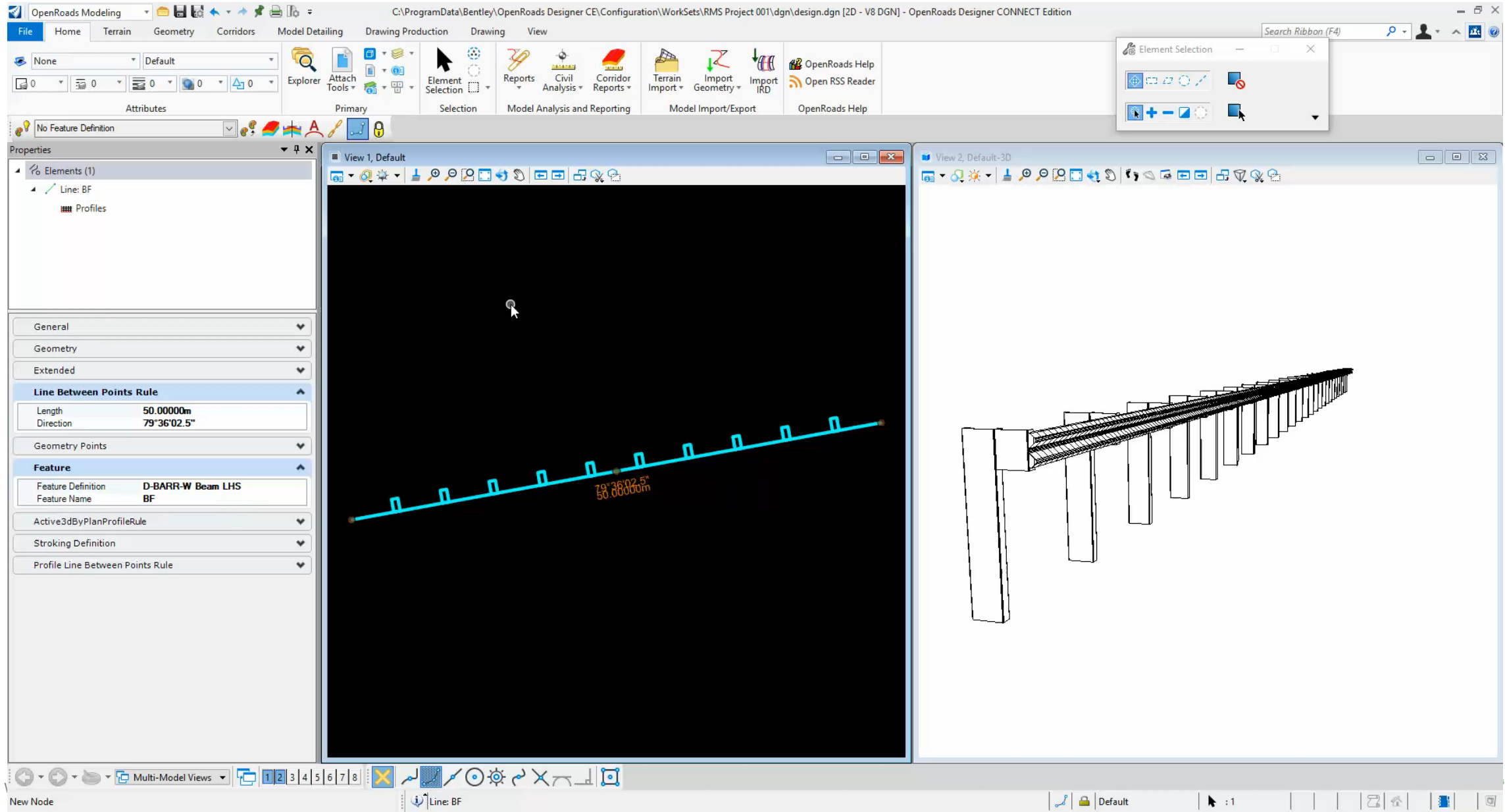
- [Project Folder]
  - BIM [BIM data repository]
    - 01-WIP [WIP data repository]
      - Designs [CAD files (incl. 'Modified')]
      - Drawings [Design models (incl. 'Modified')]
      - Sheets [Sheet/dwg files]
      - Coordination Models [Export data e.g. gbXML or images]
      - Composition Models [Components created during this project]
    - WIP\_TSA [WIP Temporary Shared Area (TSA)]
  - 02-Shared [Verified Shared data]
    - CAD [CAD data/output files]
    - BIM [Design models]
    - CoordModels [Compilation models]
  - 03-Published [Published Data]
    - + YYYYMMDD-Description [Sample submission folder]
    - + YYYYMMDD-Description [Sample submission folder]
  - 04-Archived [Archived Data repository]
    - + YYYYMMDD-Description [Archive folder]
    - + YYYYMMDD-Description [Archive folder]
  - 05-Incoming [Incoming Data repository]
    - Source [Data originator]
    - + YYYYMMDD-Description [Incoming folder]
    - + Source [Data originator]
  - 06-Resource [Project BIM Resources Library]
    - + Titleblocks [Drawing borders/titleblocks]
    - + Logos [Project logos]
    - + Standards [Project standards]

# Federated BIM approach: BS1192

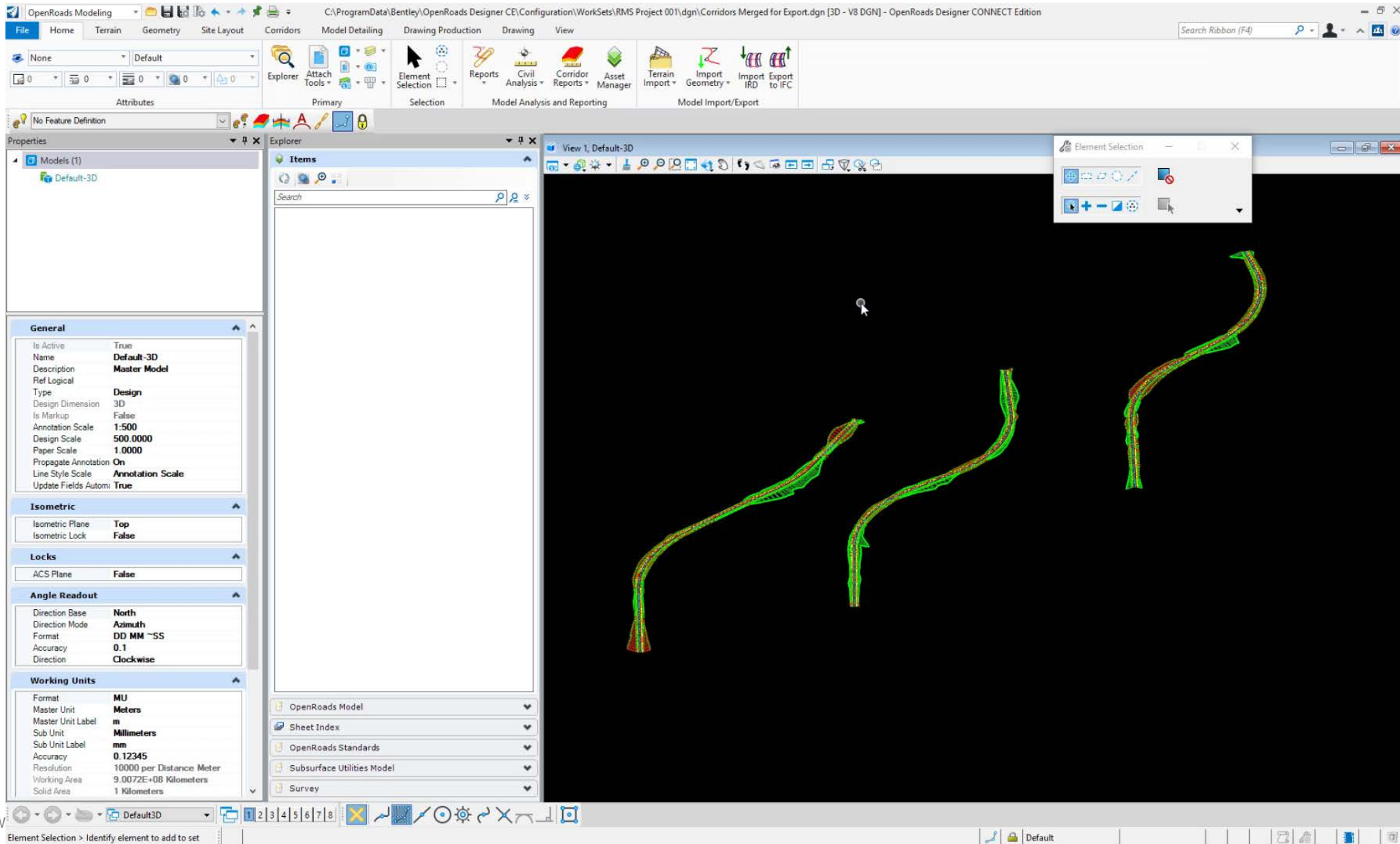




# Using Asset Manager to attach item types



# Asset Manager – Bulk attaching Item Types to 3D model



# Project Deliverables

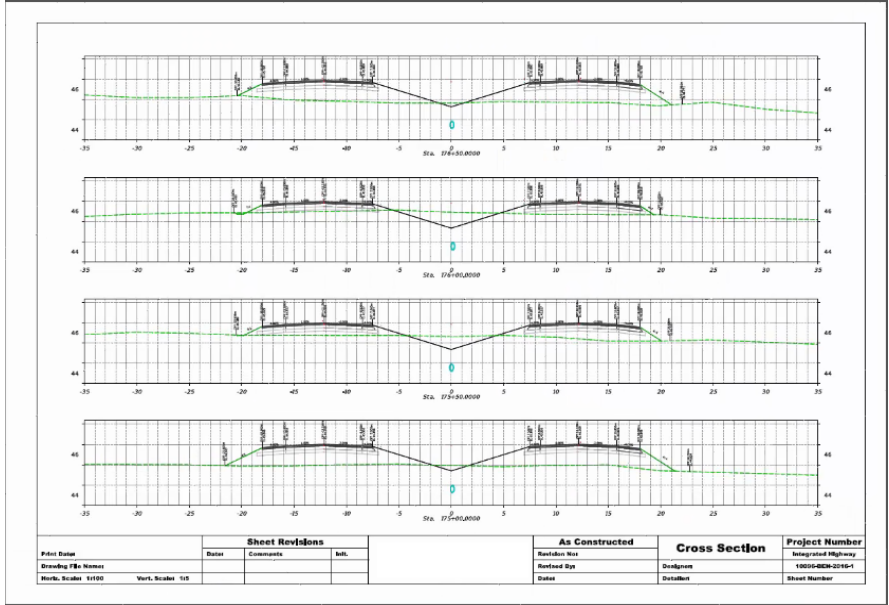
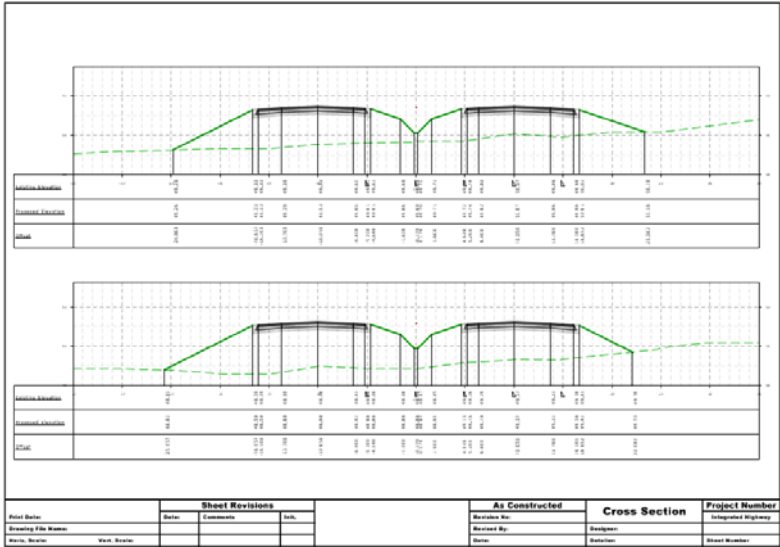
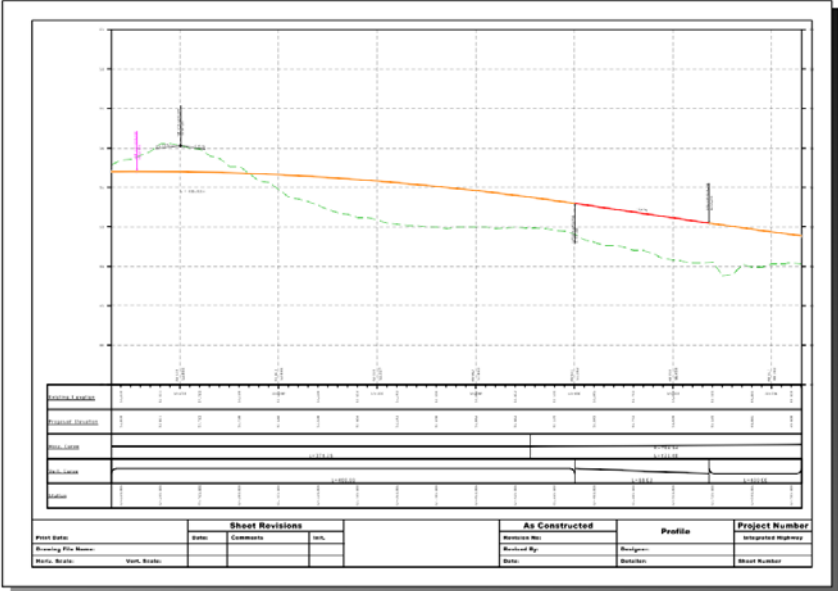
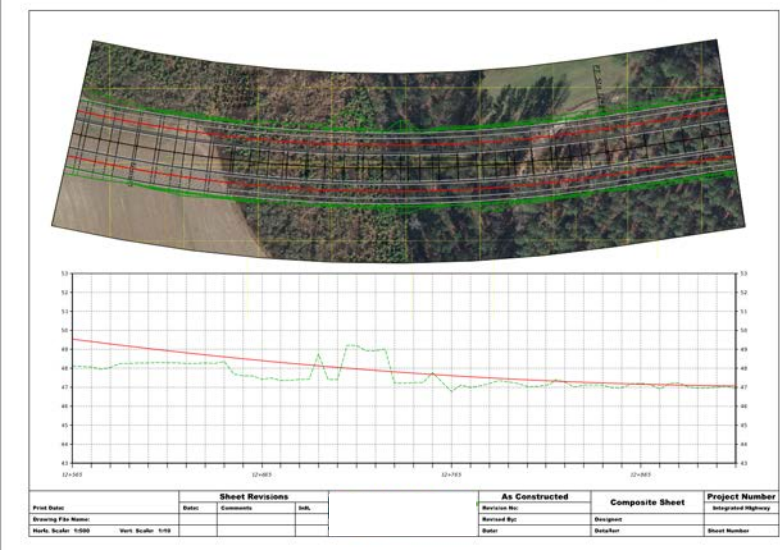
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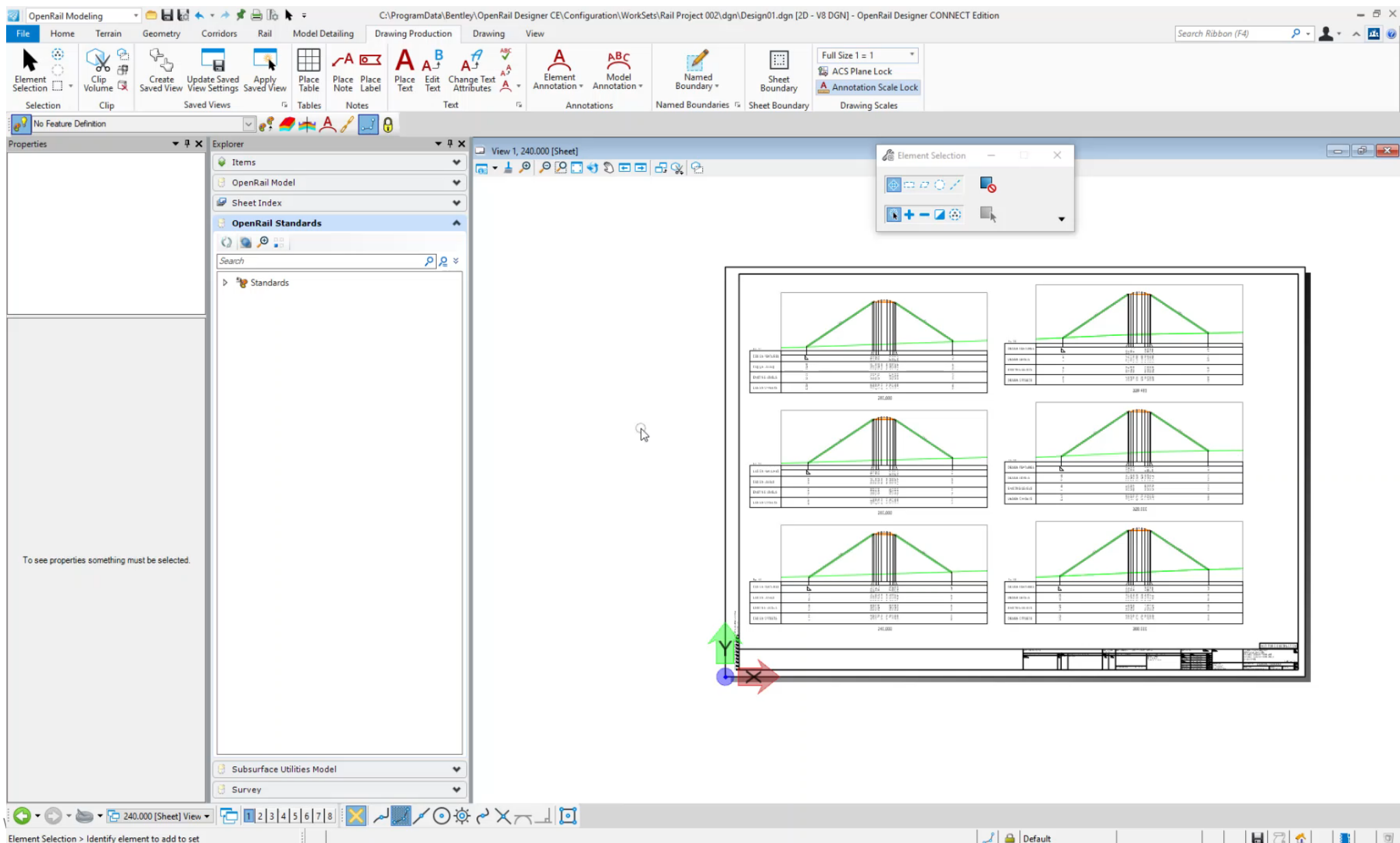


# Drawing Production

- Annotation for:
  - ☐ Plan
  - ☐ Profiles
  - ☐ Cross Sections



# PDF – 2D, 3D, Geospatial, Animated



# DGN

- No data conversion required
- Use referencing to see live updates and leave file ownership with the OpenRoads users
- Apply workflows using ProjectWise



# iModels

- Publish from Desktop
- Automated publishing from ProjectWise
- View using
  - Navigator Desktop
  - Web Browser
  - iPad or Android App



# LandXML & Genio Export

- Horizontal and Vertical Geometry
- Terrains



# DWG Export Options

Save As DWG/DXF Options

General Remap References Filter

Basic

Name	Value
DWG Version:	2018
Source of Level Display:	Global
Viewport Freeze per View Level Display	Viewports & Global Layers
Units:	Master Units
Line Code Scale (Design Units/Cycle):	0.00000
Use Level Symbology Overrides	<input type="checkbox"/>
Preserve OpenRoads Designer Settings	<input type="checkbox"/>
DWG Seed File:	C:\Program Files\...\seed.dwg

Advanced

Drop Unsupported LineStyles	<input type="checkbox"/>
Drop Unsupported Dimensions	<input type="checkbox"/>
Create True Color From DGN Color Indices	<input type="checkbox"/>
Convert Empty Enter-Data Fields to Spaces	<input type="checkbox"/>
Set UCS From Current ACS	<input checked="" type="checkbox"/>
Save Front and Back Clip Planes	<input type="checkbox"/>
Force Positive Extrusion For Clockwise Arcs	<input type="checkbox"/>
DXF Precision (Decimal Places):	0.123456
Non-Default Design Models:	Create Separate Files
Create Separate Files for Sheets	<input type="checkbox"/>
PolyFace Mesh Tolerance Angle	30.00
Force Zero Z-Coordinate	<input type="checkbox"/>

Application Data

Rendering

References

Create Overlays for References (No Live Nesting)	<input type="checkbox"/>
Save Path:	When saving to same directory
Map Logical Names to XRef Block Names	<input checked="" type="checkbox"/>
Set Viewport Layer From Clip Element	<input type="checkbox"/>
Set Viewport Locked From Locate Off	<input type="checkbox"/>
Copy Raster Files to Output Folder	<input type="checkbox"/>

Line Weights

Entity Mapping

Classes

Cells

Fonts

Dimensions

OK Cancel

Save As DWG/DXF Options

General Remap References Filter

CSV File:

☐ Apply Level Mapping

☐ Apply Font Mapping

☐ Apply Line Style Mapping

☐ Apply Color Mapping

☐ Apply Weight Mapping

OK Cancel

Save As DWG/DXF Options

General Remap References Filter

External Attachments: Retain

Self Attachments: Merge

Non-Default Models Attachments: Merge

Masked Attachments: Retain

Copy Levels During Merge: If Overrides Exist

☐ Merge Visible Edges of 3D Attachments

☒ Convert Reference Files

☐ Allow Optimized Clip For Reference Merge

☐ Unnest (Copy) Live Nested Attachments

☐ Merge Displayed Levels Only

☐ Merge Viewport Attachments

OK Cancel

Save As DWG/DXF Options

General Remap References Filter

Geometry: Everything

Fence Mode: Inside

Clip Volume: Ignore

Models...

☒ Auxiliary Coordinate Systems

☒ Saved Views

☒ Shared Cell Instances

☒ Unused Shared Cell Definitions

☒ Named Groups

☒ Frozen Levels

☒ Tags

OK Cancel

# IFC Export

- Export Alignments to IFC 4.1
  - Includes alignment schema
- Export 3D model to IFC
  - no Civil Schema available in IFC definition
  - Uses IFC proxies



# Export Alignments to IFC 4.1

ISO-10303-21;

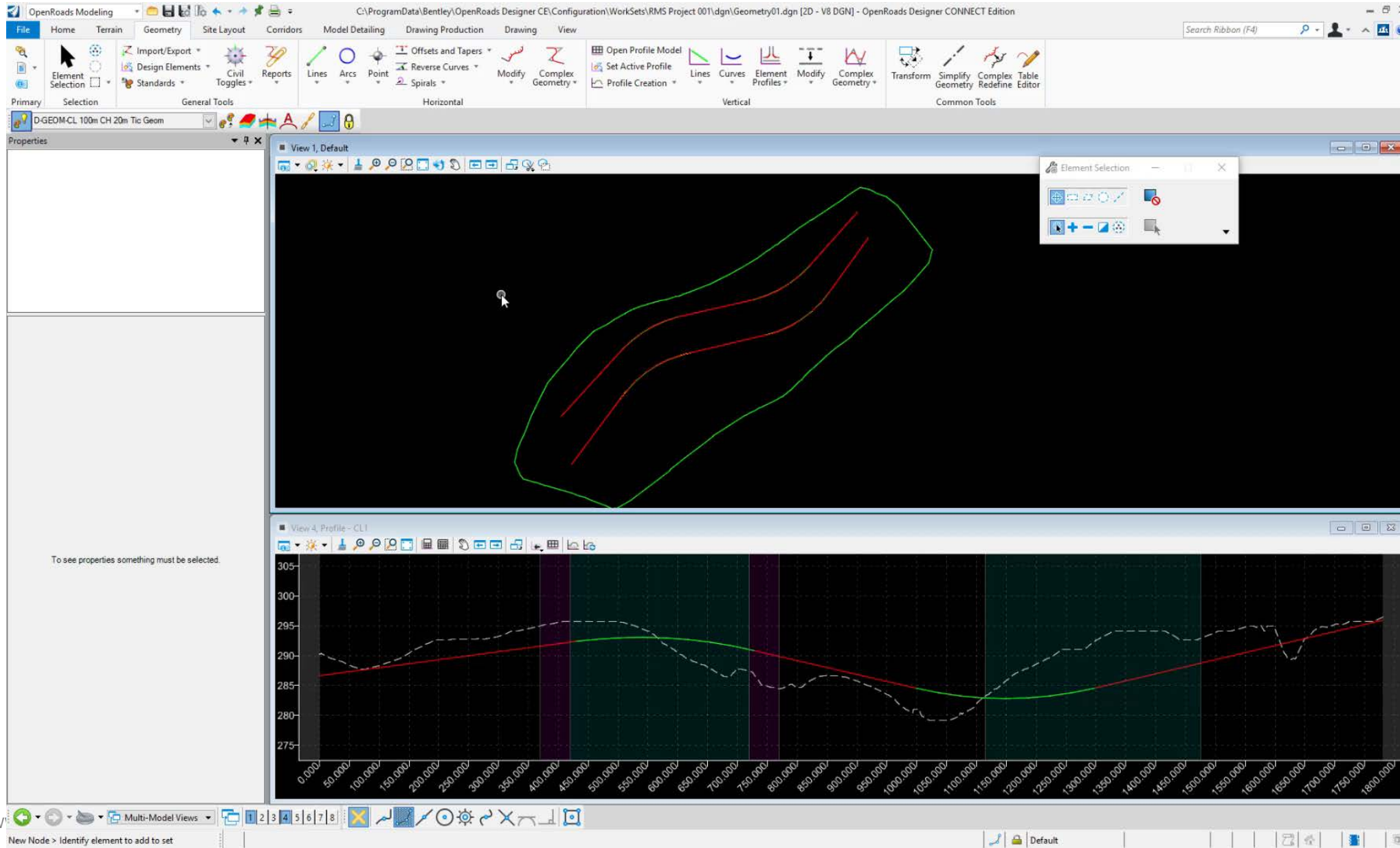
HEADER;

FILE\_DESCRIPTION(('ViewDefinition [CoordinationView]'),'2;1');

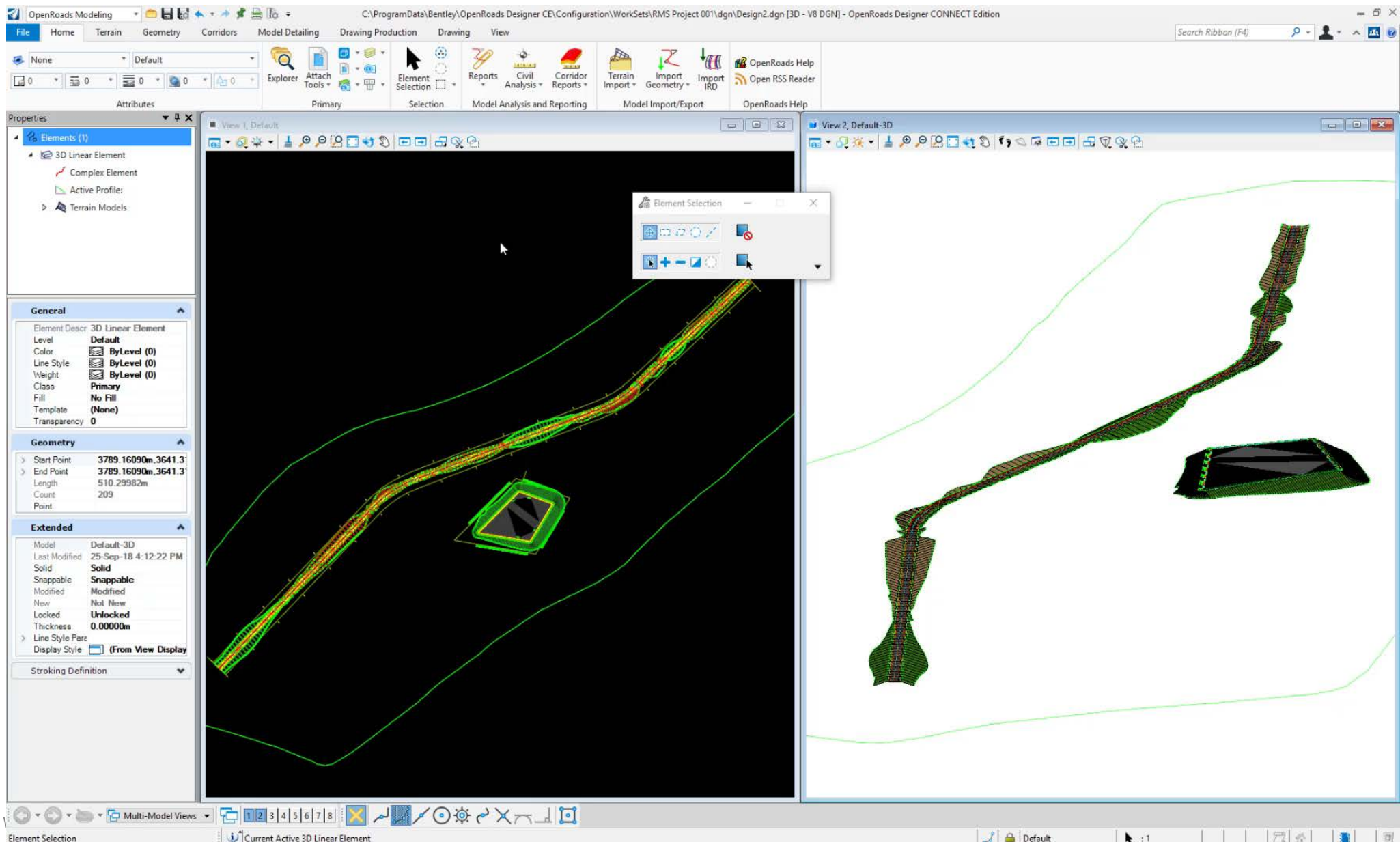
FILE\_NAME('CL1.ifc','2019-05-30T14:26:45',('Paul.Cusack'),('Bentley Systems

FILE\_SCHEMA(('IFC4X1'));

ENDSEC;

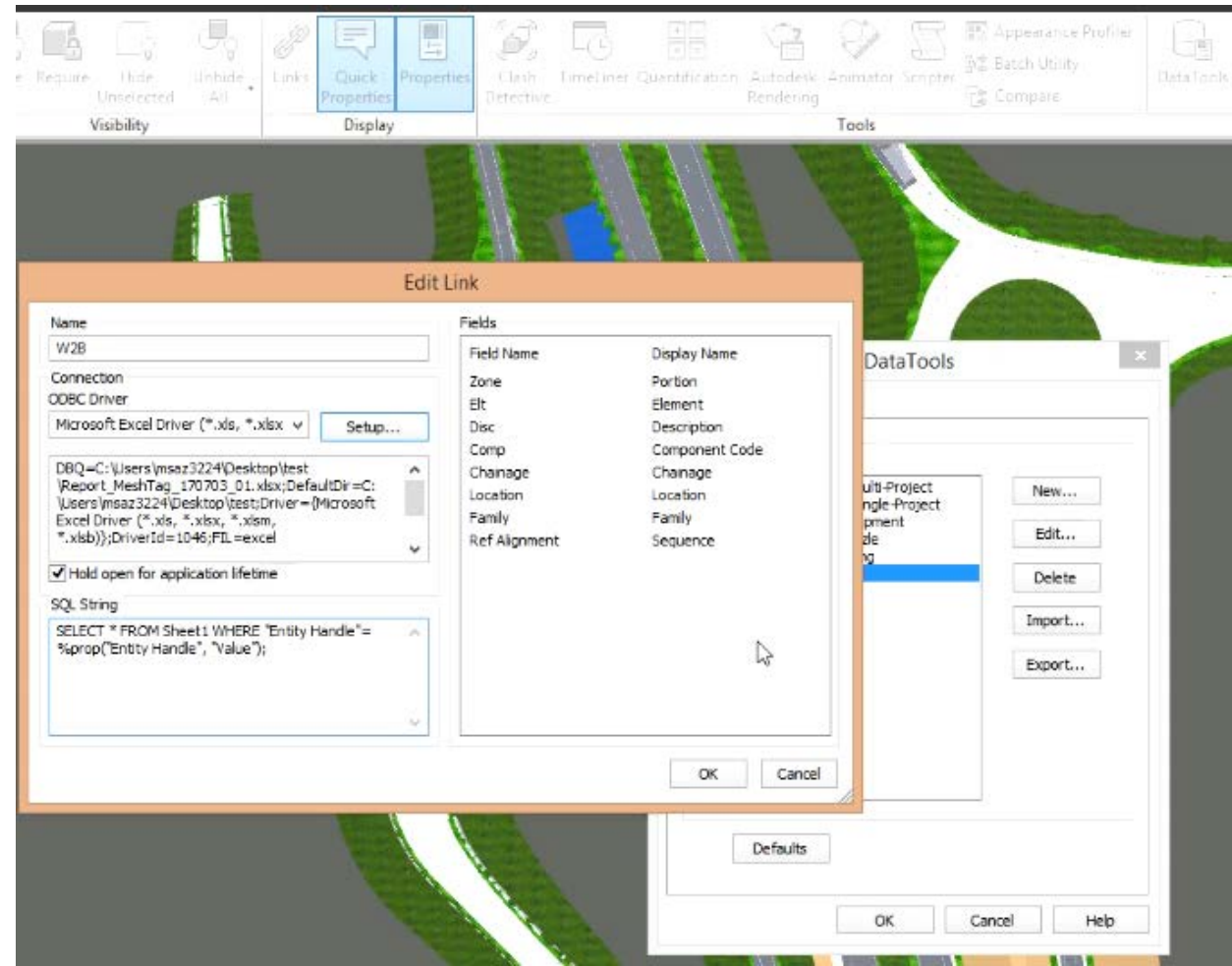
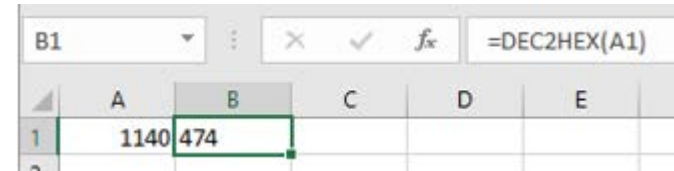


# Export 3D Model to IFC



# Navisworks

- Export to DWG
  - DGN Element IDs are shown as hexadecimal in DWG
- Export Item Types to Excel
  - Convert IDs to Hexadecimal
- Import DWG to Navisworks
- Import Excel Item Types using Data Tools



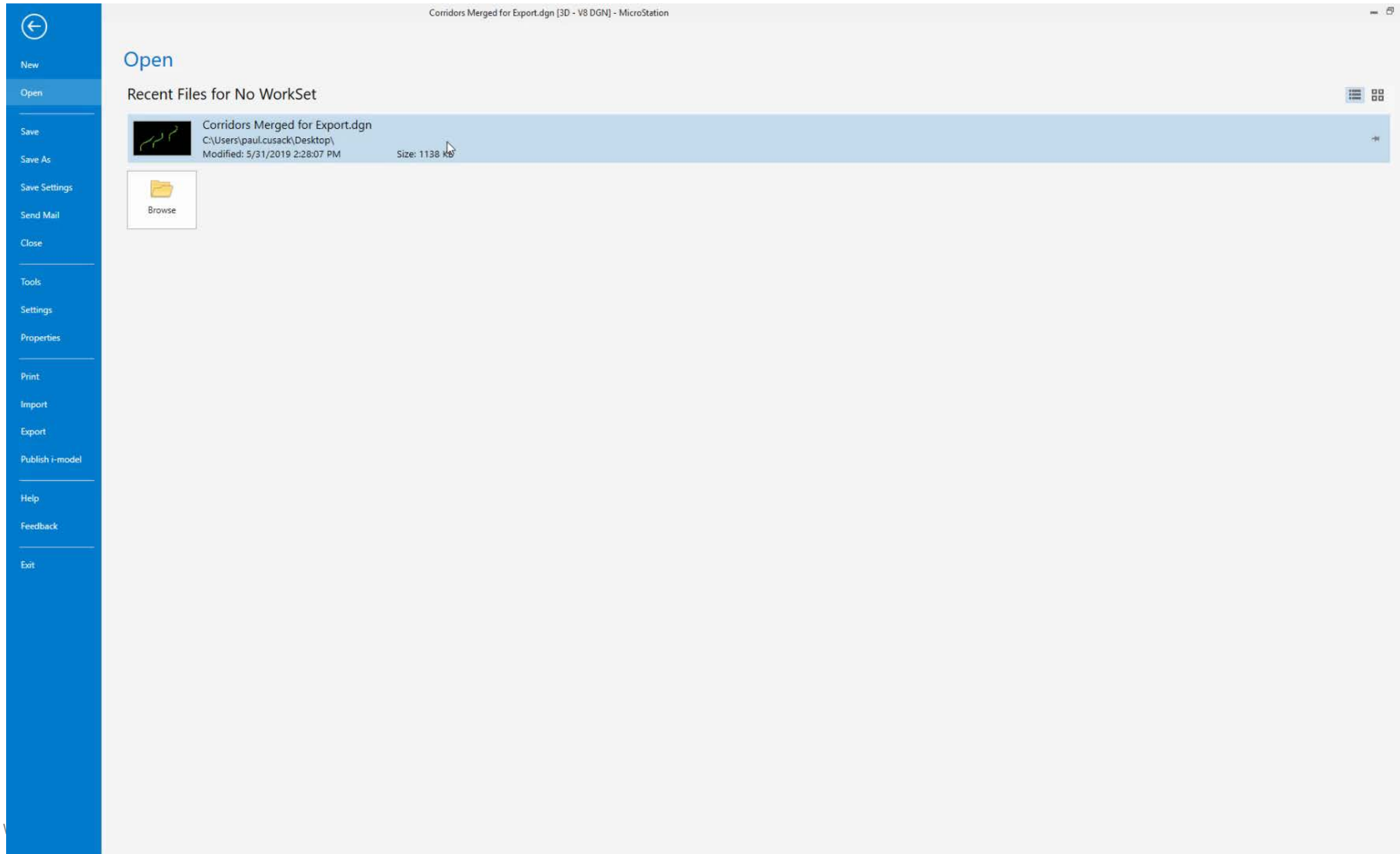
# OpenRoads to Navisworks - Export Item types to Excel

The screenshot displays the OpenRoads Designer CONNECT Edition interface. The main window shows a 3D view of a road corridor with green and yellow lines representing the road geometry. The left sidebar contains the 'Properties' panel, which is currently empty, and the 'Item Types' panel, which lists various item types. The top menu bar includes options like File, Home, View, Annotate, Attach, Analyze, Curves, Constraints, Utilities, Drawing Aids, Content, Mesh, and CONNECT Services. An 'Element Selection' dialog box is open in the bottom right corner, showing a list of elements and their properties. In the top right corner, an Excel spreadsheet is visible, showing a table with columns A, B, C, D, and E. The formula bar at the top right indicates the formula  $=DEC2HEX(A1)$  is being applied to cell B1.

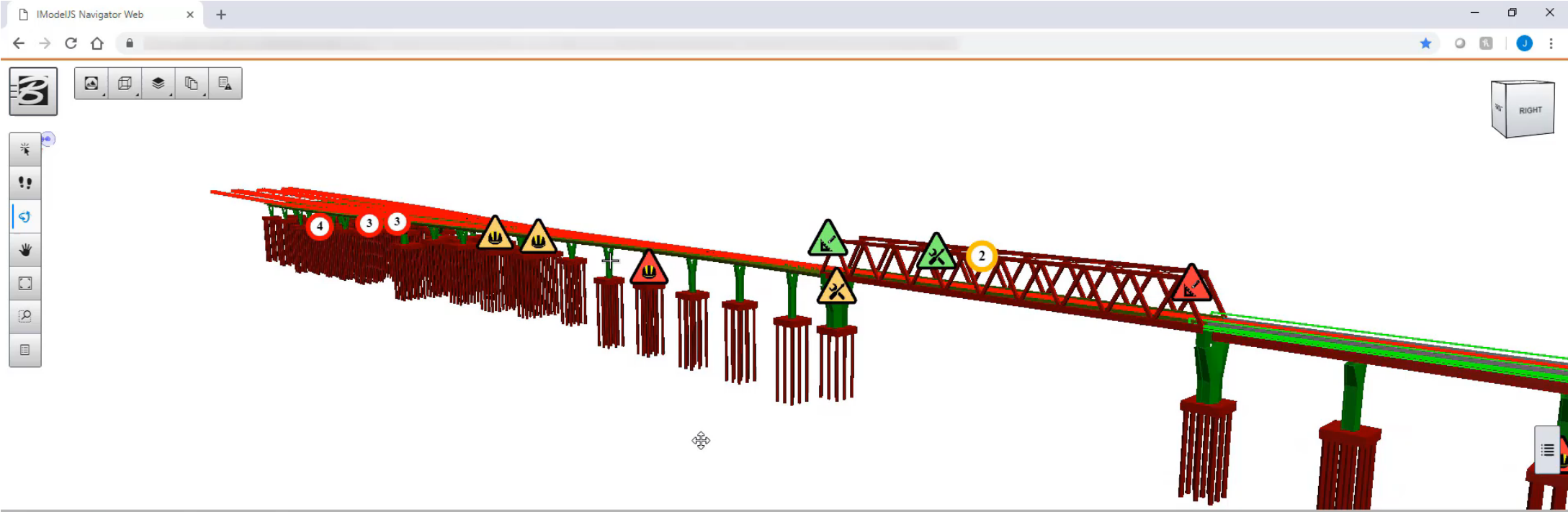
	A	B	C	D	E
1	1140	474			



# Viewing 3D model and Item Types in Bentley View or MicroStation

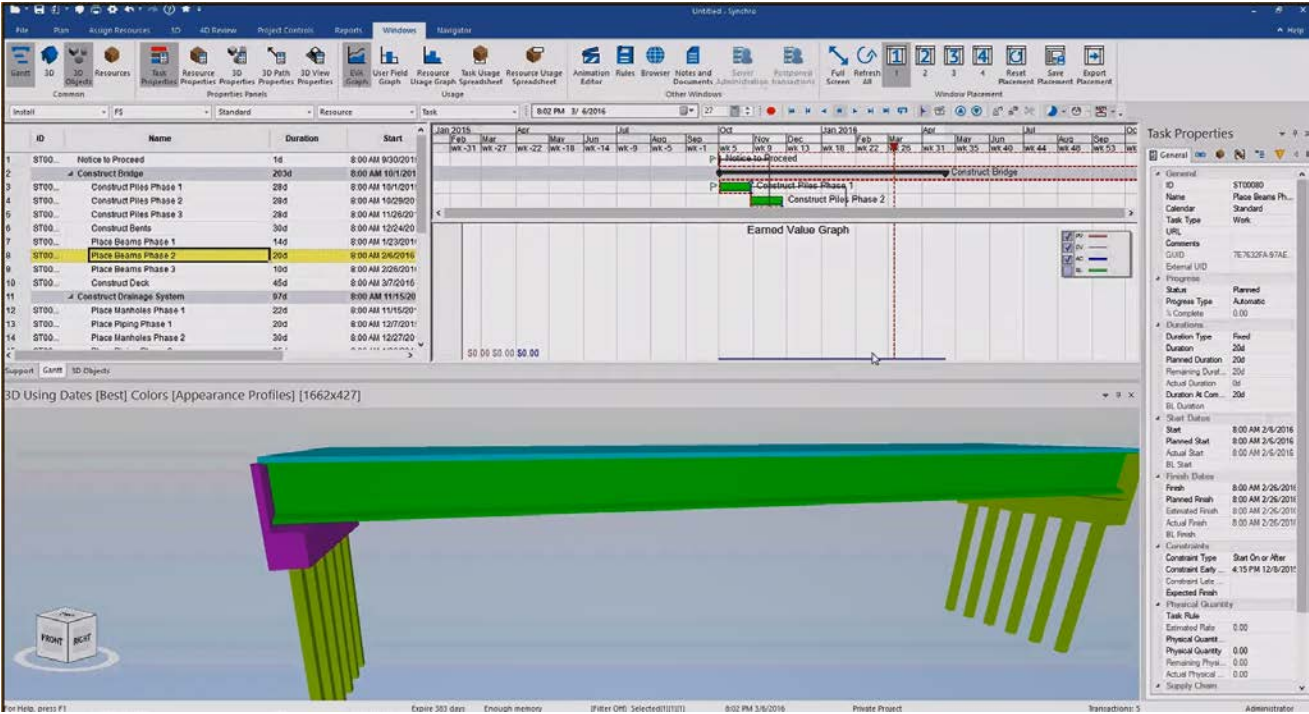


# Navigator



22 Open		0 Closed		22 All			
Hazard #	Activity	Design Type	Initial Risk	Residual Risk	Construction Team	Hazard	
17	Construction	Permanent	20	3	primary civil	Exposed ends of reinforcement after pile trimming.	
22	Construction	Permanent	15			Exposed ends of reinforcement after pile trimming.	
20	Operation & Maintenance		8			potential icing	
19	Construction	Temporary	8			Exposed ends of reinforcement after pile trimming.	
19	Construction	Temporary	8			Exposed ends of reinforcement after pile trimming.	
18	Operation & Maintenance	Permanent	10	5		working at heights	
16	Construction	Permanent	15	5	primary civil	Underground services.	
15	Construction	Permanent	15			Exposed ends of reinforcement after pile trimming.	
14	Design	Permanent	10			potential stress moments	
11	Operation & Maintenance	Permanent	10	6		Working at heights	
12	Operation & Maintenance	Permanent	9	5		working at heights	
13	Design	Permanent	10	5		Potential stress moments	

# Synchro





Activity

Chat

1

Teams

Meetings

Files

Store

Feedback

Favorites

PT

P00001 - Power Plant Pro...

...

General

00 - Contracts

01 - Estimates

02 - Project Management

03 - Design

04 - Delivered Milestones

More

Add team

PT

P00001 - Power Plant Pro...

>

02 - Project Manageme...

★

...

Private

No classification

Conversations

Files

Project Dashboard

Status Report

Published Model

+

Secure

https://dev-connect-imodelweb.bentley.com/?id=8d35db58-4c35-4f4c-95dd-e52b370c9f38&projectId=95b8160c-8df9-437b-a9bf-22ad01fecc6b&dataId=81df8fb5-5fc5-4514-82f0-e5ed98a3efab

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# LumenRT



# LumenRT Web 360 Tours





# LumenRT VR

- Google Cardboard
- Oculus Rift
- HTC Vive and more







# Questions?

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# OpenRoads Designer CONNECT Edition LEARNING

- *Introduction to OpenRoads Designer*
- *QuickStart for Survey*
- *QuickStart for Terrain Display*
- *Creating Terrain from Lidar Data*
- *QuickStart for OpenRoads Designer Geometry*
- *Beyond Centreline Geometry*
- **QuickStart for OpenRoads Designer Corridor Modeling**
- **Creating and Manipulating the Corridor**
- **Template Triggers and Switches**
- **Using Civil Cells in OpenRoads Designer**
- **Site Modeling and Non-Corridor Modeling**
- **Corridor Modelling Quantities**
- **Using and Defining Superelevation**
- *QuickStart for OpenRoads Designer Drawing Production*
- *QuickStart using gINT Civil Tools*
- *QuickStart - Evaluating Subsurface Utilities in OpenRoads Designer*
- *QuickStart - Laying out a Drainage Network in OpenRoads Designer*
- *Hydraulic Analysis and Design in OpenRoads Designer*

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