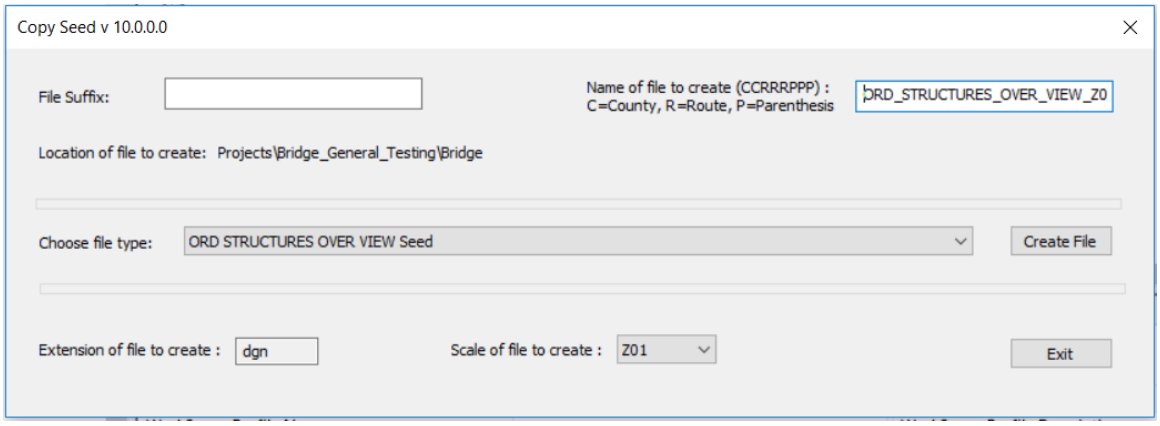
CONNECT Seed Files and Naming Convention

For CONNECT projects there are several seed files for use with OpenBridge Modeler, OpenRoad Designer, and ProStructures.

The OpenBridge Modeler and OpenRoad Designer seed files for structure projects are located in the CONNECT managed workspace at: pw:\\ntPwInt1.dot.int.lan:PWMain\Documents\IowaDOTStandardsConnect\Configuration \Organization-Civil\IowaDOT_Standards\Seed\

The Copy Seed utility can be used to create the files for OpenBridge Modeler and OpenRoad Designer. The CONNECT CopySeed program is located at: pw:\\ntPwInt1.dot.int.lan:PWMain\Documents\Consultant Data\ProjectWise Custom Tools\CopySeed\ Design consultants will need to install with the provided CopySeedSetup.msi file.

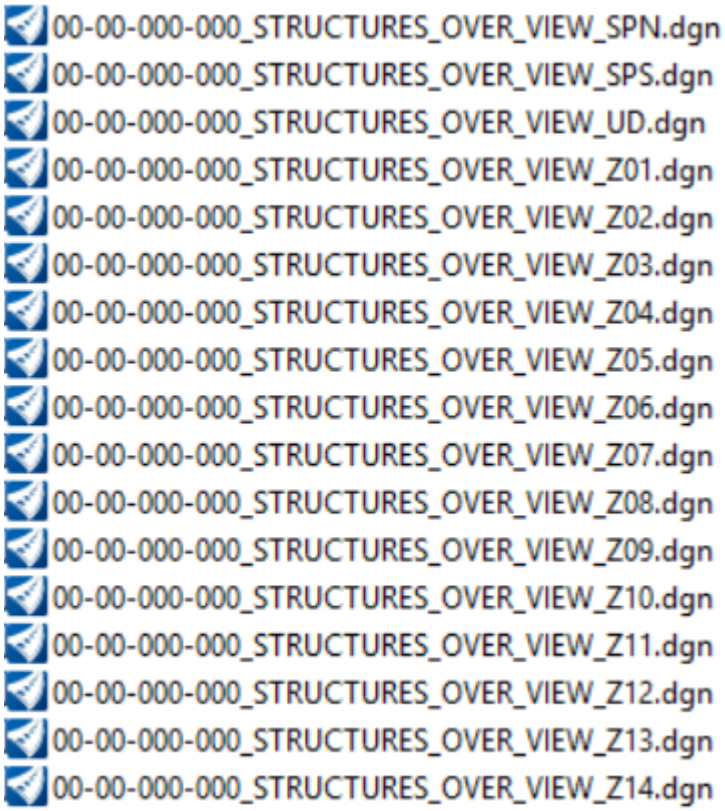
Choose type of file, select the correct zone in Scale of file to create field and complete the name of the file based on information included in this document.



The seed files are listed below organized by application and type of project.

OpenRoad Designer structures overview seed files are used to provide the overview of all structures in the project. No live elements should be contained in these files. All relevant files for the structure models will be referenced to this file.

The options provided are for each possible IaRCS survey zone. The correct seed file must be used to appropriately view all structures in the correct locations.



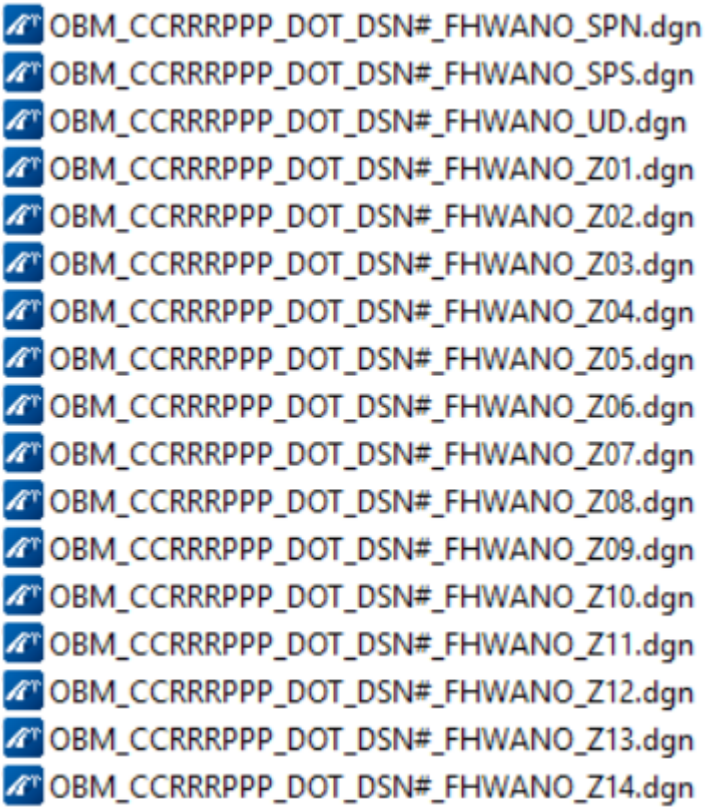
The naming convention is described below.

- 00-00-000-000 used to identify the PIN number for the project

i.e. 92-06-030-030_STRUCTURES_OVER_VIEW_SPN.dgn

OpenBridge Modeler 3D seed files are used to develop the individual bridge model.

The options provided are for each possible IaRCS survey zone. The correct seed file must be used to appropriately place the bridge on the alignment in the model.



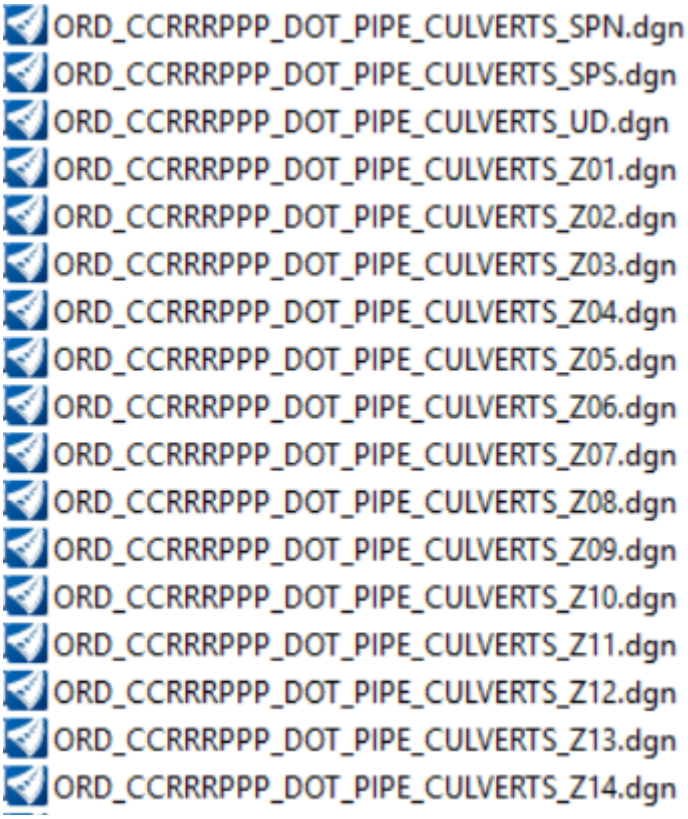
The naming convention is described below.

- OBM signifies an OpenBridge Modeler file
- CCRRRPPP used to identify county, route and paren number of the specific project
- DOT or consultant firm designation
- DSN# used to list the specific design number of the model
- FHWANO used to list the specific FHWA number of the bridge modeled

i.e. OBM_06030209_DOT_216_700495_SPN.dgn

OpenRoad Designer pipe culverts seed files are used to develop the layout and modeling of pipe culvert structures.

The options provided are for each possible IaRCS survey zone. The correct seed file must be used to appropriately place the pipe culverts along the alignment.



The naming convention is described below.

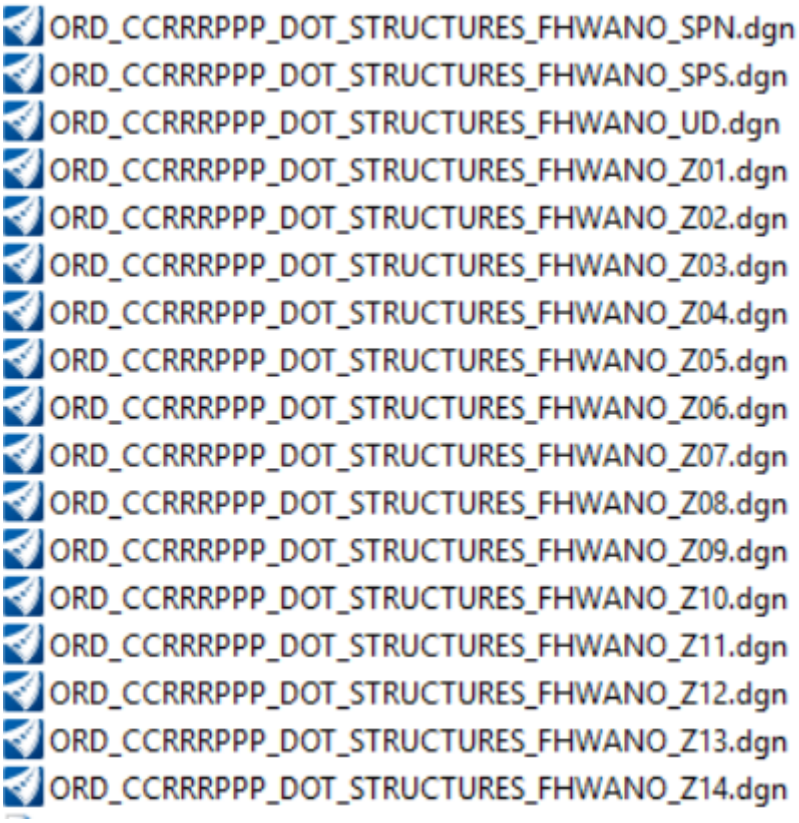
- ORD signifies an OpenRoad Designer file
- CCRRRPPP used to identify county, route and paren number of the specific project
- DOT or consultant firm designation

i.e. ORD_06030181_DOT_PIPE_CULVERTS_SPN.dgn

These files contain the models needed to develop the layout and modeling of pipe culvert structures. Refer to CONNECT Models and Naming Convention for additional information.

OpenRoad Designer structures seed files are used to develop the layout and modeling of box culverts and other structures.

The options provided are for each possible IaRCS survey zone. The correct seed file must be used to appropriately place the culverts along the alignment.



The naming convention is described below.

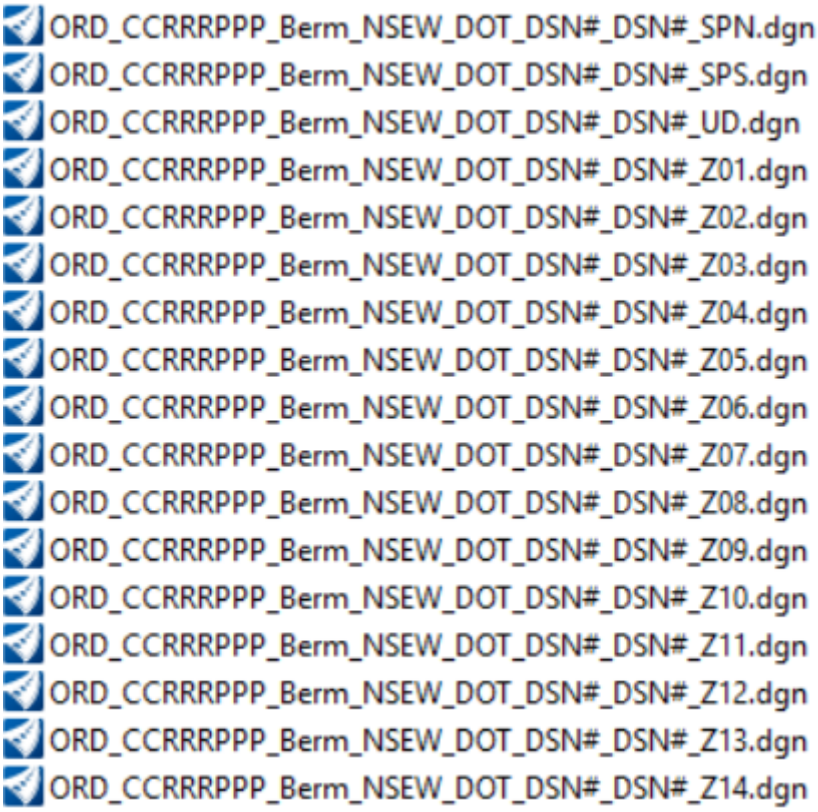
- ORD signifies an OpenRoad Designer file
- CCRRRPPP used to identify county, route and paren number of the specific project
- DOT or consultant firm designation
- FHWANO used to list the specific FHWA number of a bridge size box culvert
  If the structure is not a bridge size culvert, do not include this portion of the naming convention

i.e. ORD_06030205_DOT_STRUCTURES_SPN.dgn

These files contain the models needed to develop the layout and modeling of box culverts and other related structures. Refer to CONNECT Models and Naming Convention for additional information.

OpenRoad Designer berm and revetment seed files are used to develop the layout of the berm and revetment for structures.

The options provided are for each possible IaRCS survey zone. The correct seed file must be used to appropriately place the berm and revetment at the location of the structure.



The naming convention is described below.

- ORD signifies an OpenRoad Designer file
- CCRRRPPP used to identify county, route and paren number of the specific project
- NSEW used to indicate directional location of berms
- DOT or consultant firm designation
- DSN# used to list the specific design number(s) of the related bridge design(s)

i.e. ORD_06030208_Berm_EW_DOT_216_218_SPN.dgn

The ProStructures seed file, Imperial3d.dgn, is used to develop rebar layout and complete structural details. The seed file is located in the CONNECT managed workspace at:
pw:\\ntPwInt1.dot.int.lan:PWMain\Documents\IowaDOTStandardsConnect\Configuration\Organization-Civil\IowaDOT_Standards\ProStructures\Seed\Imperial3d.dgn

The Copy Seed utility can be used to create the files for ProStructures. Choose type of file of Bridge Plan Production Seed.

The naming convention is described below.

- PS signifies a ProStructures file
- CCRRRPPP used to identify county, route and paren number of the specific project
- DSN# used to list the specific design number of the structure details
- FHWANO used to list the specific FHWA number of the bridge details
- IaRCS survey zone

i.e. PS_06030209_216_700495_SPN.dgn

CONNECT Models and Naming Convention

An OpenBridge Modeler seed file will be used to develop the bridge replacement and new bridge projects using OpenBridge Designer. Files containing models of culvert designs will be developed with OpenRoad Designer using the Drainage and Utilities workflow tools with ORD seed files. Refer to CONNECT Seed Files and Naming Convention for additional information.

The explanation of the specific name and use of models are provided below.

For the STRUCTURES_OVER_VIEW file, two models are provided. No live elements should be created in either model.

STRUCTURES_OVER_VIEW_2D

- Reference 2D models from the pipe culverts, structures and berm files for projects related to the specific PIN.

STRUCTURES_OVER_VIEW_3D

- Reference 3D models from the OpenBridge Model, pipe culverts, structures and berm files for projects related to the specific PIN.

For the OBM file created for each new bridge or bridge replacement project, the bridge modeling is in the default model. Other models for sheeting are contained in this file.

Each saved view for the drawing model will be named to designate the view or bridge section created.

Sheet models for the Type size and location (TSL) of the bridge will be created from the section drawing models. The model will be named TSL_CC_DDDD to designate the county and design number of the bridge design.

For ORD PIPE_CULVERTS file for road pipe culvert layout and modeling, two models are provided.

PIPES

- 2D model for layout of the road pipe locations.

STR info

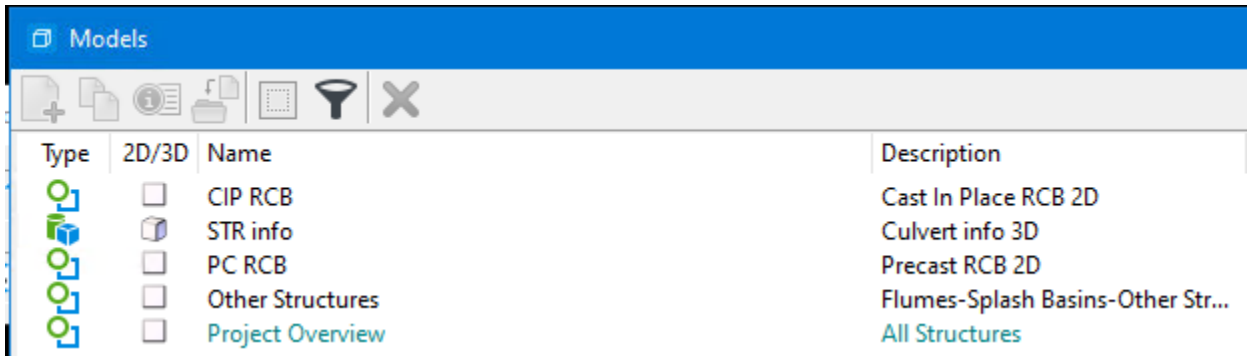
- For entry of the 3D graphics of each pipe culvert. Refer to the Culvert Workflow section of the CONNECT Applications webpage for documentation of the complete process.

A PIPES-3D model will be created when the STR info model is referenced into the 2D model. OpenRoad Designer will automatically create a managed 3D model. This model cannot and should not be deleted.

Longitudinal section drawing models will be added for each road pipe location through use of the section call out tool. Each longitudinal model will be named with STA prefix to designate location, the specific station and longitudinal section.

i.e. STA 1317+50.00 Longitudinal Section

For ORD STRUCTURES file for box culvert and other related structure designs, five models are provided.



CIP RCB

- 2D model for layout of the cast in place box culvert.

A CIP RCB-3D model will be created when the STR info model is referenced into the 2D model. OpenRoad Designer will automatically create a managed 3D model. This model cannot and should not be deleted.

STR info

- For entry of the 3D graphics of each box culvert. Refer to the Culvert Workflow section of the CONNECT Applications webpage for documentation of the complete process.

PC RCB

- 2D model for layout of the precast box culvert.

A PC RCB-3D model will be created when the STR info model is referenced into the 2D model. OpenRoad Designer will automatically create a managed 3D model. This model cannot and should not be deleted.

Other Structures

- 2D model for layout of flumes and splash basin type of structures related to the box culverts.

Project Overview

- Reference 2D models for the CIP and PC culverts and related structures into one model for overview of the project. No live elements should be created in this model.

The file will contain the models necessary to provide the 3D modeling of the culverts and structures as well as the drawing and sheet files to provide the plan and profile details for the project.

Longitudinal section drawing models will be added for each culvert through use of the section call out tool. Each longitudinal model will be named with CIP or PC prefix to designate which type of culvert and the specific station and longitudinal section.

i.e. CIP 1205+91.00 Longitudinal Section

Sheet models for each Type size and location (TSL) within the project area will be named TSL_CC_DDDD to designate the county and design number of the culvert.

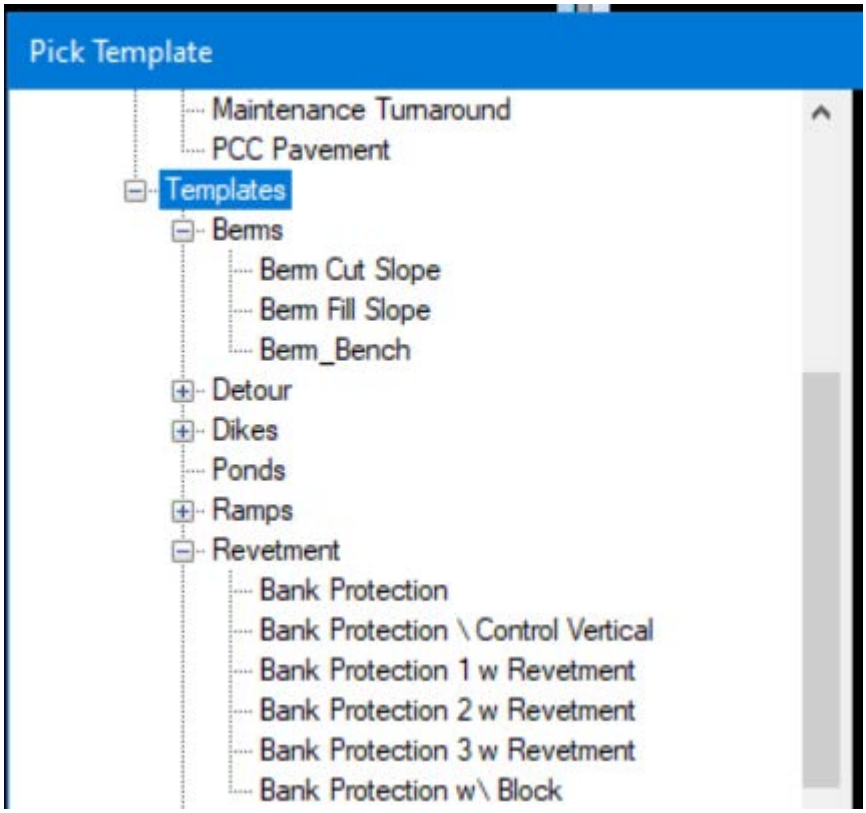
For ORD_Berm files, one 2D model, Berm and Revetment modeling, is provided.

The model can be copied and renamed as needed to indicate which berm is being designed. A model for each end or quadrant of the bridge is recommended with the direction indicated in the model name.

i.e. East Berm

Berm and Revetment modeling-3D or renamed 3D model is created when the template tools are used to generate the berm or revetment.

Current possible templates are listed below.



The ProStructures seed file contains one 3D model, Model. This model is copied and renamed as needed to develop rebar layout and complete structural details.

The file will contain the models necessary to provide the complete details of the structure as well as the drawing and sheet models for the project.

More guidance on use of ProStructures will be provided in the future.

CONNECT Project Font

The TrueType Font EngineeringVert is intended to be used for CONNECT projects.

The Engineering Vert font files are located in the managed workspace at: pw:\\ntPwInt1.dot.int.lan:PWMain\Documents\IowaDOTStandardsConnect\Configuration\Organization-Civil\IowaDOT_Standards\Fonts\

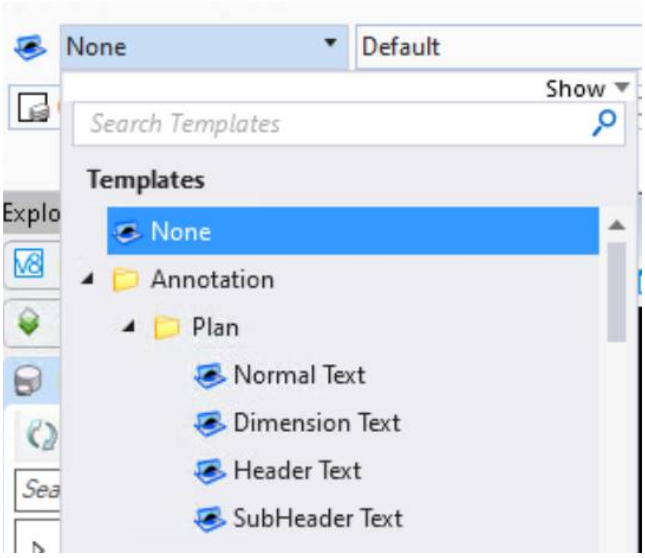
The text and dimension style library IowaDOT_Text Favorites_Text Styles_Dimension Styles.dgnlib in the managed workspace uses the EngineeringVert and EngineeringVertBold font.

True type fonts are unable to apply a weight. If a bolder text is desired use the EngineeringVertBold font.

The dgnlib is located in the managed workspace at: pw:\\ntPwInt1.dot.int.lan:PWMain\Documents\IowaDOTStandardsConnect\Configuration\Organization-Civil\IowaDOT_Standards\Dgnlib\Feature Definitions\

The managed workspace provides access to these fonts in the Bentley applications. The user would need to export the font files from the workspace and copy to C:\Windows\Fonts in order to use these fonts in Microsoft applications.

Four Annotation Plan element templates are included in the workspace to easily provide the EngineeringVert text outside of the use of dimensions. These have been configured in IowaDOT_Bridge_Features_Levels_Elem Temp Imperial.dgnlib



The use of the Dimension Text element template is intended for text elements in tables so that the text fits appropriately. All dimensions and table text elements should use the Dimension Text element template resulting in the same text style and level being used.

The other templates are for use as the name of the element template suggests, placement of normal text, subheader text and header text. All text in notes should use the Normal Text element template with sentence case style.

Notes:

- The use of the new TrueType Font EngineeringVert is applied to new releases of design standards. Additional standards series will be updated as other modifications are required for those standards. A mix of fonts on the plan sheets with the standards having the MicroStation font is acceptable.

- There is a known issue with the use of the EngineeringVert fonts in the ProStructures application that we are trying to resolve. When the combination of letters is lower case ff, fi, fl the two letters disappear after typed in the editor dialog box. Capital letters display correctly.

CONNECT Levels

The levels used for CONNECT workspace projects are provided in various level libraries. The main library for Bridge projects is IowaDOT_Bridge_Features_Levels_Elem Temp Imperial.dgnlib.

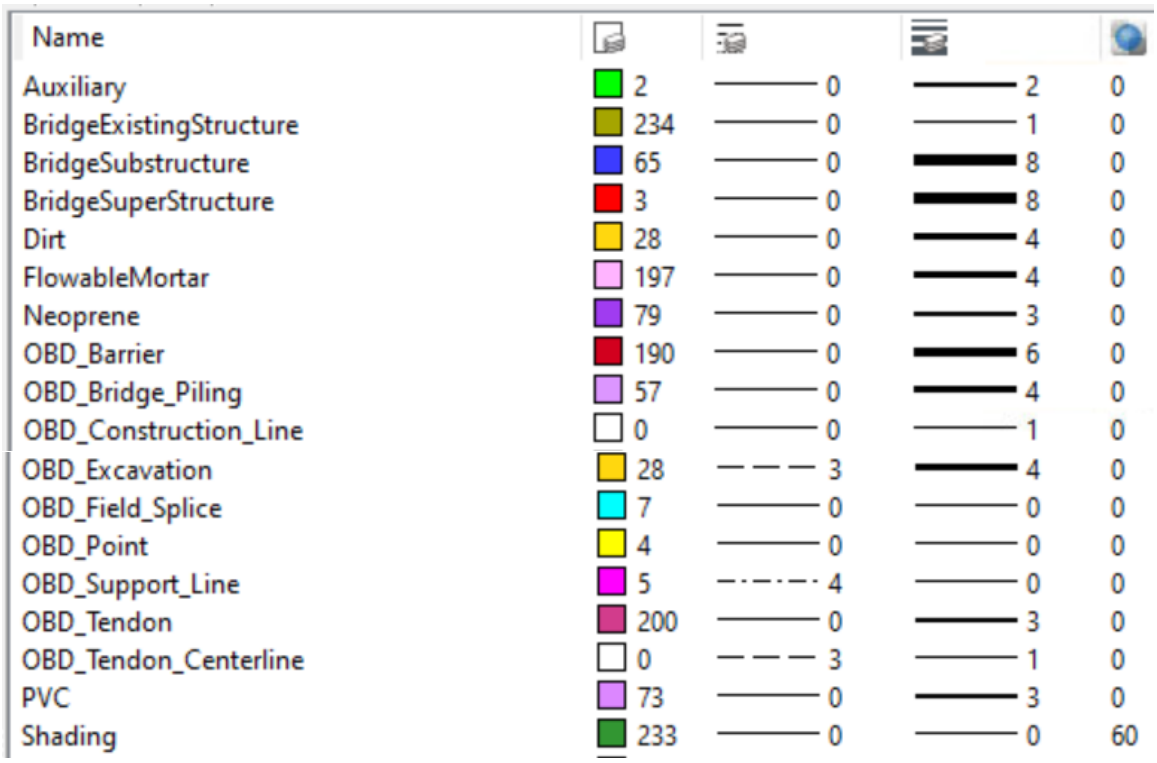
Placement of elements on levels is controlled by selection of features in several instances. For additional information refer to CONNECT Feature Definitions.

The levels are shown below through views of Level Manager organized by application and use. The name, color, style, weight, and transparency of the levels are provided.

OpenBridge Modeler levels for decorations for placement or information for the bridge features. These levels have the plot attribute turned off.

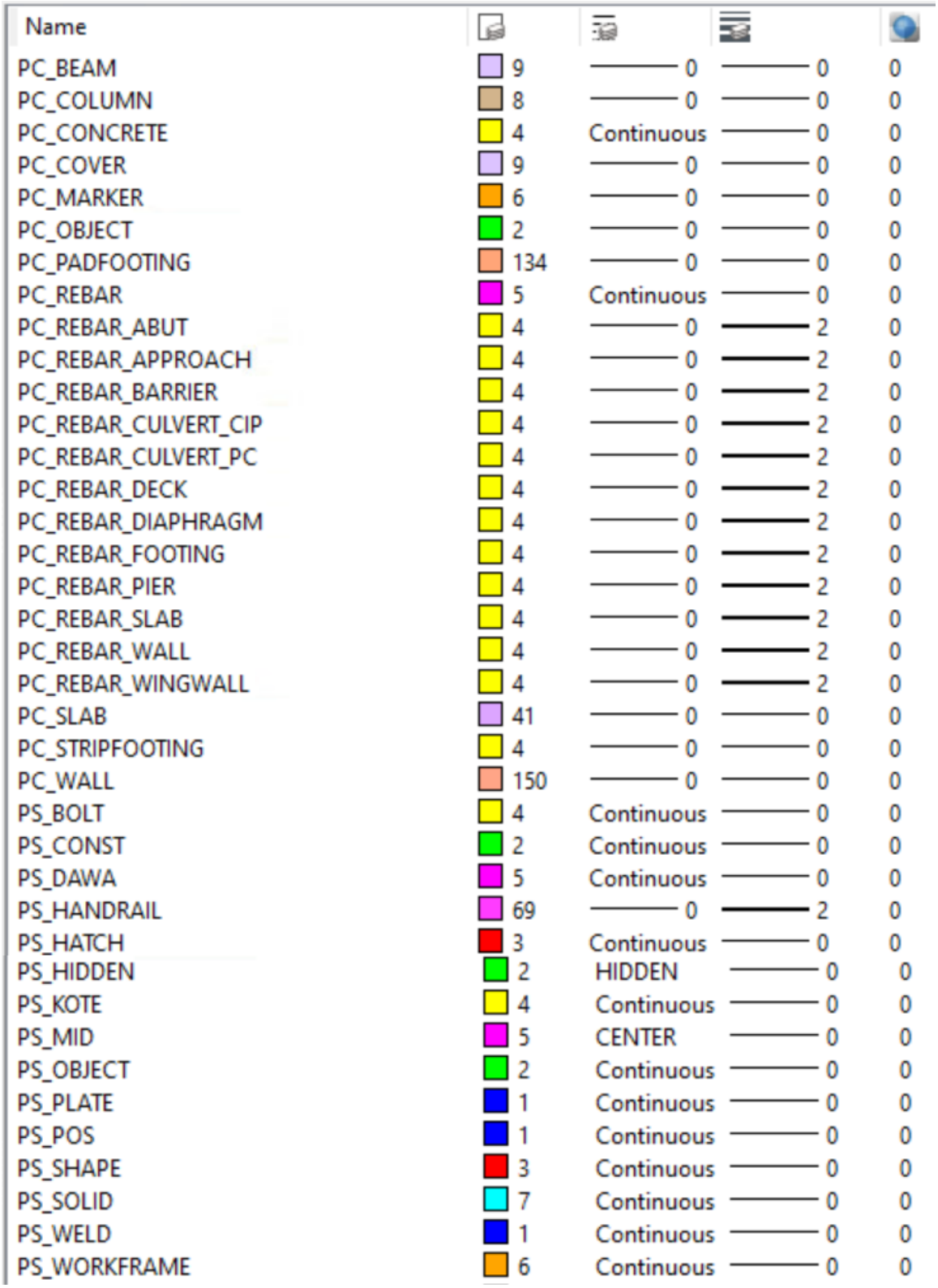
Name				
OBD_D_Barrier_Outline	144	0	0	0
OBD_D_Beam_End	195	0	2	0
OBD_D_Beam_Layout	39	0	1	0
OBD_D_Beam_Layout_Text	135	0	0	0
OBD_D_Beam_PL_Offset	64	2	0	0
OBD_D_Bridge_Decorations	0	0	0	0
OBD_D_CrossFrames	156	0	0	0
OBD_D_Diaphragm_Concrete	0	0	0	0
OBD_D_Field_splice	0	0	0	0
OBD_D_Reports_Lines	36	0	0	0
OBD_D_Segmental_Deck_Outline	0	0	0	0
OBD_D_Segmental_Lines_Text	0	0	0	0
OBD_D_Shear_studs	0	0	0	0
OBD_D_Stiffeners	41	0	2	0
OBD_D_Sub	145	0	0	0
OBD_D_Sub_Text	135	0	0	0
OBD_D_Super	195	0	0	0
OBD_D_Super_Text	135	0	0	0
OBD_D_Unit_Label	34	0	0	0

OpenBridge Modeler levels for modeling bridge features. These levels have the plot attribute turned on except level OBD_Construction_Line.



Name				
Auxiliary	2	0	2	0
BridgeExistingStructure	234	0	1	0
BridgeSubstructure	65	0	8	0
BridgeSuperStructure	3	0	8	0
Dirt	28	0	4	0
FlowableMortar	197	0	4	0
Neoprene	79	0	3	0
OBD_Barrier	190	0	6	0
OBD_Bridge_Piling	57	0	4	0
OBD_Construction_Line	0	0	1	0
OBD_Excavation	28	3	4	0
OBD_Field_Splice	7	0	0	0
OBD_Point	4	0	0	0
OBD_Support_Line	5	4	0	0
OBD_Tendon	200	0	3	0
OBD_Tendon_Centerline	0	3	1	0
PVC	73	0	3	0
Shading	233	0	0	60

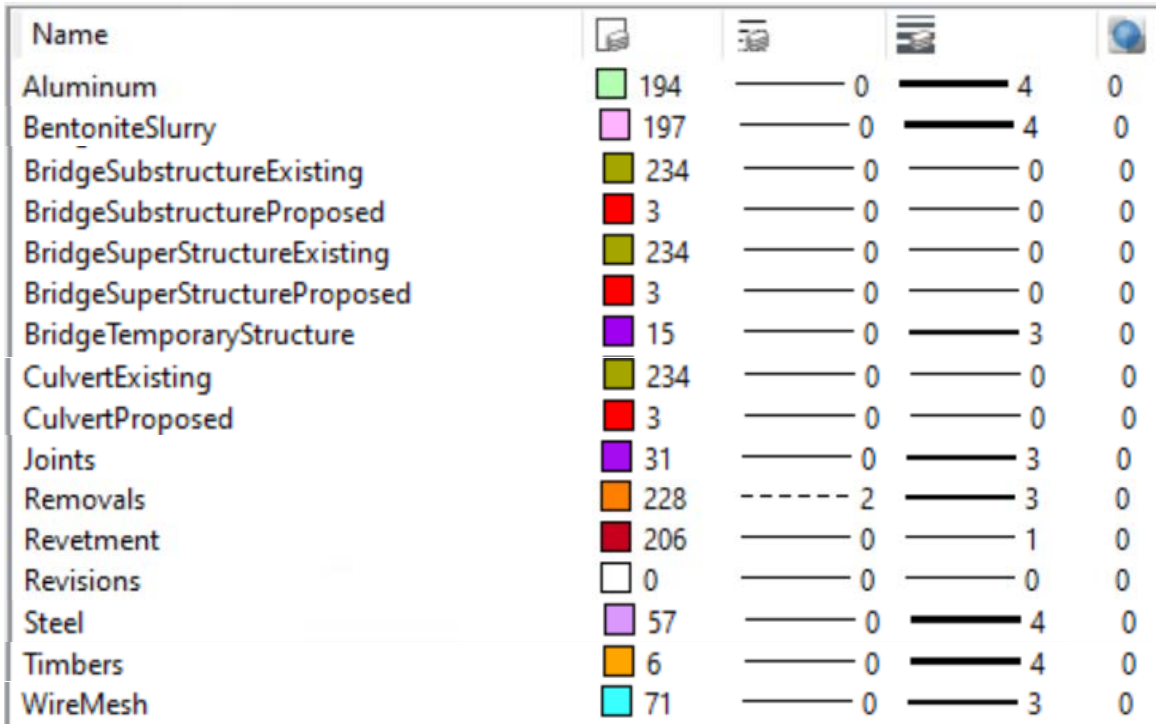
ProStructures levels for elements modeled in ProStructures and rebar placement.



Name				
PC_BEAM	9	0	0	0
PC_COLUMN	8	0	0	0
PC_CONCRETE	4	Continuous	0	0
PC_COVER	9	0	0	0
PC_MARKER	6	0	0	0
PC_OBJECT	2	0	0	0
PC_PADFOOTING	134	0	0	0
PC_REBAR	5	Continuous	0	0
PC_REBAR_ABUT	4	0	2	0
PC_REBAR_APPROACH	4	0	2	0
PC_REBAR_BARRIER	4	0	2	0
PC_REBAR_CULVERT_CIP	4	0	2	0
PC_REBAR_CULVERT_PC	4	0	2	0
PC_REBAR_DECK	4	0	2	0
PC_REBAR_DIAPHRAGM	4	0	2	0
PC_REBAR_FOOTING	4	0	2	0
PC_REBAR_PIER	4	0	2	0
PC_REBAR_SLAB	4	0	2	0
PC_REBAR_WALL	4	0	2	0
PC_REBAR_WINGWALL	4	0	2	0
PC_SLAB	41	0	0	0
PC_STRIPFOOTING	4	0	0	0
PC_WALL	150	0	0	0
PS_BOLT	4	Continuous	0	0
PS_CONST	2	Continuous	0	0
PS_DAWA	5	Continuous	0	0
PS_HANDRAIL	69	0	2	0
PS_HATCH	3	Continuous	0	0
PS_HIDDEN	2	HIDDEN	0	0
PS_KOTE	4	Continuous	0	0
PS_MID	5	CENTER	0	0
PS_OBJECT	2	Continuous	0	0
PS_PLATE	1	Continuous	0	0
PS_POS	1	Continuous	0	0
PS_SHAPE	3	Continuous	0	0
PS_SOLID	7	Continuous	0	0
PS_WELD	1	Continuous	0	0
PS_WORKFRAME	6	Continuous	0	0

Additional levels used for CONNECT workspace projects are provided in IowaDOT_FeatureDefinitions_ElementTemplates_Annotation_Levels.dgnlib These are primarily for use with OpenRoad Designer processes.

These levels may be used for modeling or detailing structures also. Those listed below are levels more typically used for structure projects. This is not intended to be an all-inclusive list. Levels available that are logical for placement of various elements can be used. These levels have the plot attribute turned on.



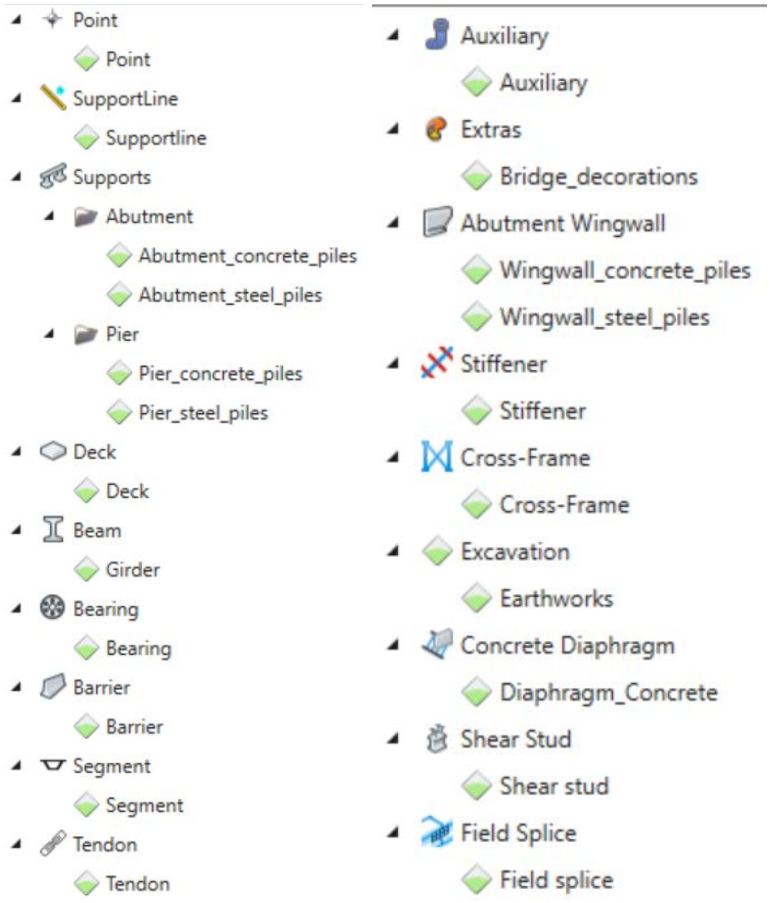
Name				
Aluminum	194	0	4	0
BentoniteSlurry	197	0	4	0
BridgeSubstructureExisting	234	0	0	0
BridgeSubstructureProposed	3	0	0	0
BridgeSuperStructureExisting	234	0	0	0
BridgeSuperStructureProposed	3	0	0	0
BridgeTemporaryStructure	15	0	3	0
CulvertExisting	234	0	0	0
CulvertProposed	3	0	0	0
Joints	31	0	3	0
Removals	228	2	3	0
Revetment	206	0	1	0
Revisions	0	0	0	0
Steel	57	0	4	0
Timbers	6	0	4	0
WireMesh	71	0	3	0

CONNECT Feature Definitions

The feature definitions used for CONNECT workspace projects are provided in various features and element templates libraries. The main library used for Bridge projects is IowaDOT_Bridge_Features_Levels_Elem Temp Imperial.dgnlib.
The main library used for pipe and culvert projects is IowaDOT_SU_Utility_FeatureDefinitions_ElementTemplates.dgnlib

The feature definitions are shown below through expanded views of the Feature Definitions in Explorer organized by library.

OpenBridge Modeler features for placement of the bridge components are listed below.



The feature symbology provided through the element templates and levels used are provided in the same dgnlib file.

Feature Symbology Default Element Template, Plan Element Template, and 3D Element Template are currently all the same element template for each feature.

Refer to CONNECT Levels for additional information on the levels used for the features in OpenBridge Modeler.

The feature symbology name, default element template, and associated level are provided in the tables below.

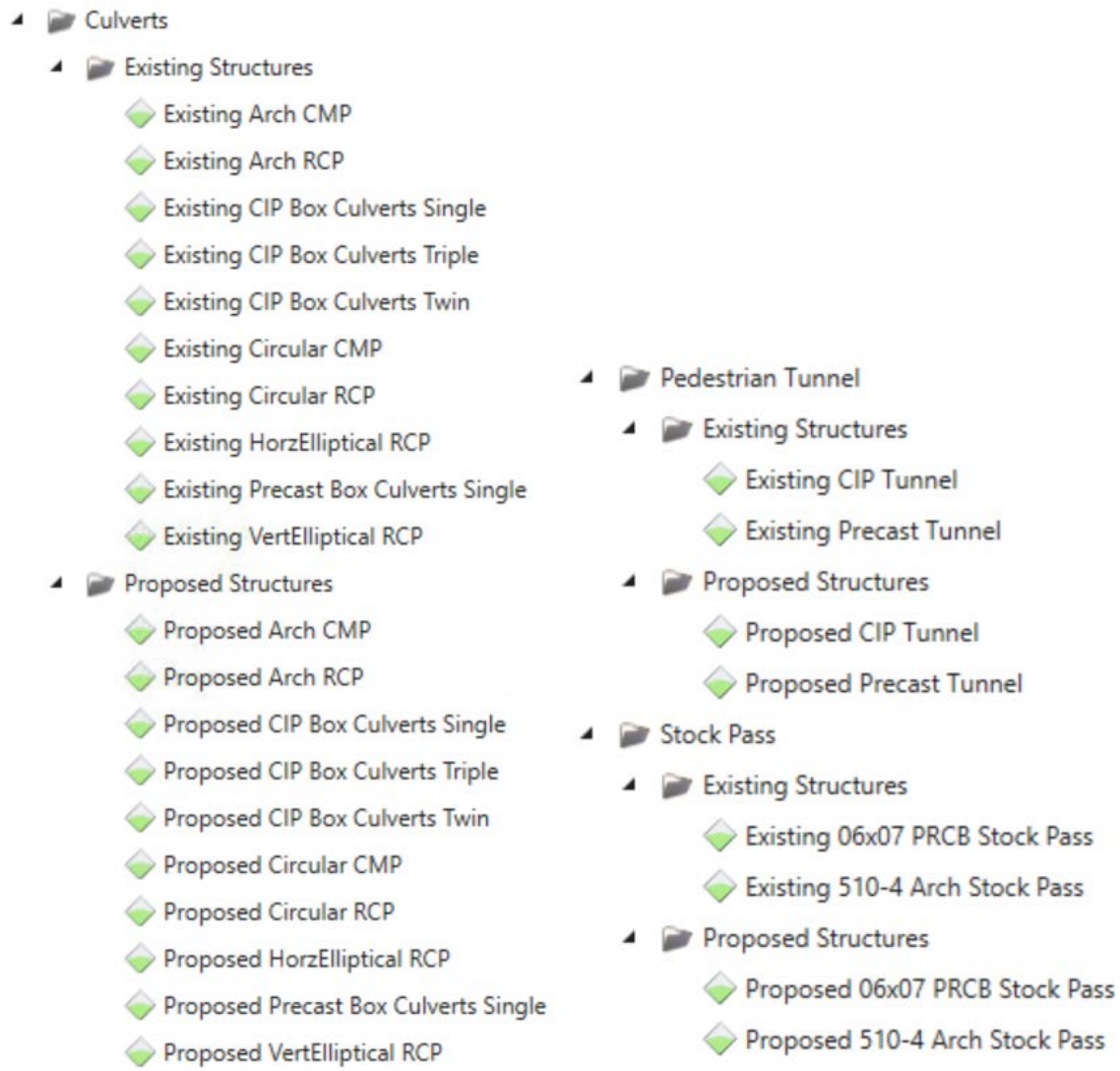
Solid		
Feature Symbology Name	**Feature Symbology Default Element Template**	**Base Element Symbology - Level**
Abutments	Abutments\Abutments	BridgeSubstructure
Caps	Abutments\Caps	BridgeSubstructure
Columns	Abutments\Columns	BridgeSubstructure
Footings	Abutments\Footings	BridgeSubstructure
Piles_concrete	Abutments\Piles_concrete	OBD_Bridge_Piling
Piles_steel	Abutments\Piles_steel	OBD_Bridge_Piling
Barrier	Auxiliary\Barriers\Barrier	OBD_Barrier
Bearings	Bearings\Bearings	BridgeSubstructure
GroutPad	Bearings\GroutPad	BridgeSubstructure
Seat	Bearings\Seat	BridgeSubstructure
CrossFrames	CrossFrames\CrossFrames	BridgeSuperStructure
Deck	Deck\Deck	BridgeSuperStructure
Diaphragm_Concrete	Diaphragms\Diaphragm_Concrete	BridgeSuperStructure
Bolt	Field splice\Bolt	OBD_Field_Splice
Field splice	Field splice\Field splice	OBD_Field_Splice
Filler plate	Field splice\Filler plate	OBD_Field_Splice
Plate	Field splice\Plate	OBD_Field_Splice
Concrete	Girder\Concrete	BridgeSuperStructure
Girder	Girder\Girder	BridgeSuperStructure
Haunch	Girder\Haunch	BridgeSuperStructure
Steel	Girder\Steel	BridgeSuperStructure
Wet Joint	Girder\Wet Joint	BridgeSuperStructure
Caps	Piers\Caps	BridgeSubstructure
Columns	Piers\Columns	BridgeSubstructure
Footings	Piers\Footings	BridgeSubstructure
Piers	Piers\Piers	BridgeSubstructure
Piles_concrete	Piers\Piles_concrete	OBD_Bridge_Piling
Piles_steel	Piers\Piles_steel	OBD_Bridge_Piling
Closure	Segments\Closure	BridgeSuperStructure
Expansion	Segments\Expansion	BridgeSuperStructure
PierSegment	Segments\PierSegment	BridgeSuperStructure
Segment	Segments\Segment	BridgeSuperStructure
Typical	Segments\Typical	BridgeSuperStructure
Shear stud	Shear stud\Shear stud	BridgeSuperStructure
Stiffeners	Stiffeners\Stiffeners	BridgeSuperStructure
Tendon	Tendons\Tendon	OBD_Tendon
Tendon_centerline	Tendons\Tendon_centerline	OBD_Tendon_Centerline
AbutmentWingwall	Wingwalls\AbutmentWingwall	BridgeSubstructure

Footing	Wingwalls\Footing	BridgeSubstructure
Piles_concrete	Wingwalls\Piles_concrete	OBD_Bridge_Piling
Piles_steel	Wingwalls\Piles_steel	OBD_Bridge_Piling
Wingwall	Wingwalls\Wingwall	BridgeSubstructure

	Linear	
Feature Symbology Name	**Feature Symbology Default Element Template**	**Base Element Symbology - Level**
Barrier_outline	Decorations\Barrier_outline	OBD_D_Barrier_Outline
Beam_end	Decorations\Beam_end	OBD_D_Beam_End
Beam_layout	Decorations\Beam_layout	OBD_D_Beam_Layout
Beam_layout_text	Decorations\Beam_layout_text	OBD_D_Beam_Layout_Text
Beam_PL_offset	Decorations\Beam_PL_offset	OBD_D_Beam_PL_Offset
Bearing_Group	Decorations\Bearing_group	OBD_D_Sub
Bridge_decorations	Decorations\Bridge_decorations	OBD_D_Bridge_Decorations
CrossFrames	Decorations\CrossFrames	OBD_D_CrossFrames
Deck_outline	Decorations\Deck_outline	OBD_D_Super
Diaphragm_Concrete	Decorations\Diaphragm_Concrete	OBD_D_Super
Field splice	Decorations\Field splice	OBD_D_Field_splice
Reports_lines	Decorations\Reports_lines	OBD_D_Reports_Lines
Segmental_deck_outline	Decorations\Segmental_deck_outline	OBD_D_Segmental_Deck_Outline
Segmental_lines_text	Decorations\Segmental_lines_text	OBD_D_Segmental_Lines_Text
Shear studs	Decorations\Shear studs	OBD_D_Shear_studs
Stiffeners	Decorations\Stiffeners	OBD_D_Stiffeners
SupportLine_text	Decorations\SupportLine_text	OBD_D_Sub_Text
Unit_label	Decorations\Unit_label	OBD_D_Unit_Label
SupportLine	SupportLines\SupportLines	OBD_Support_Line
	Surface	
Feature Symbology Name	**Feature Symbology Default Element Template**	**Base Element Symbology - Level**
Earthworks_Cut	Earthworks \Excavation	OBD_Excavation
	Point	
Feature Symbology Name	**Feature Symbology Default Element Template**	**Base Element Symbology - Level**
Auxiliary	Auxiliary	Auxiliary
Point	Point	OBD_Point

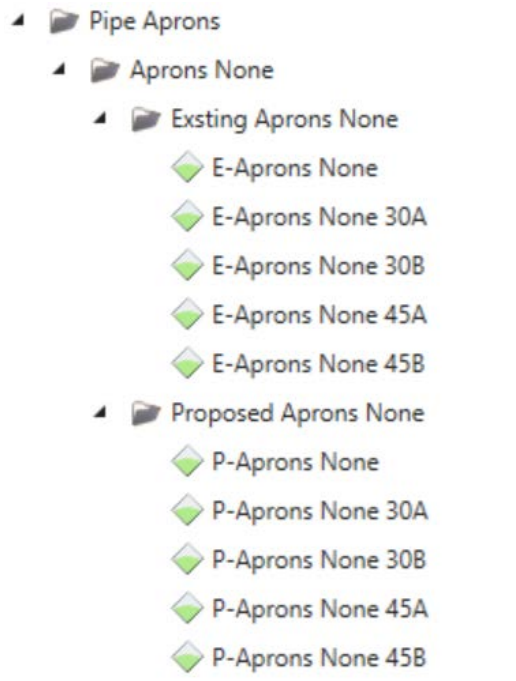
OpenRoad Designer features used for pipe and culvert placement are provided under Conduit, StormWater feature definitions in IowaDOT_SU_Utility_FeatureDefinitions_ElementTemplates.dgnlib.
Various types of culverts are provided as existing and proposed structures features.

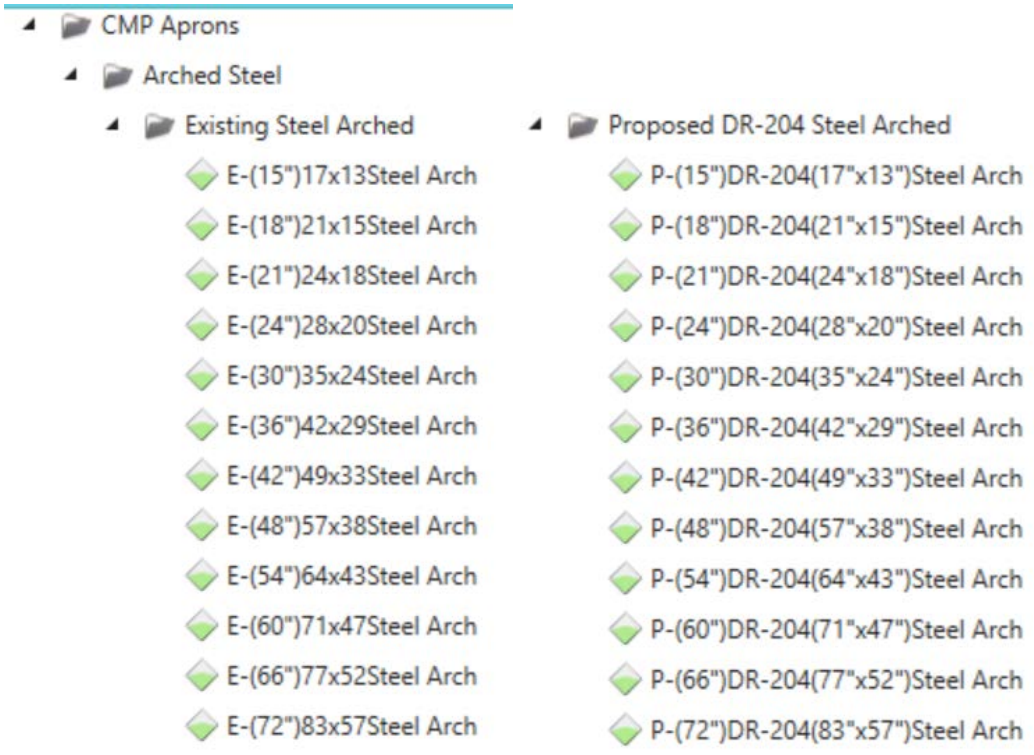
Refer to the Culvert Workflow documentation or additional information on the use of the features in OpenRoad Designer.



Additional OpenRoad Designer features used for pipe and culvert placement are provided under Node, StormWater Node feature definitions. Various types of pipe aprons and culvert headwalls are provided as existing and proposed features.

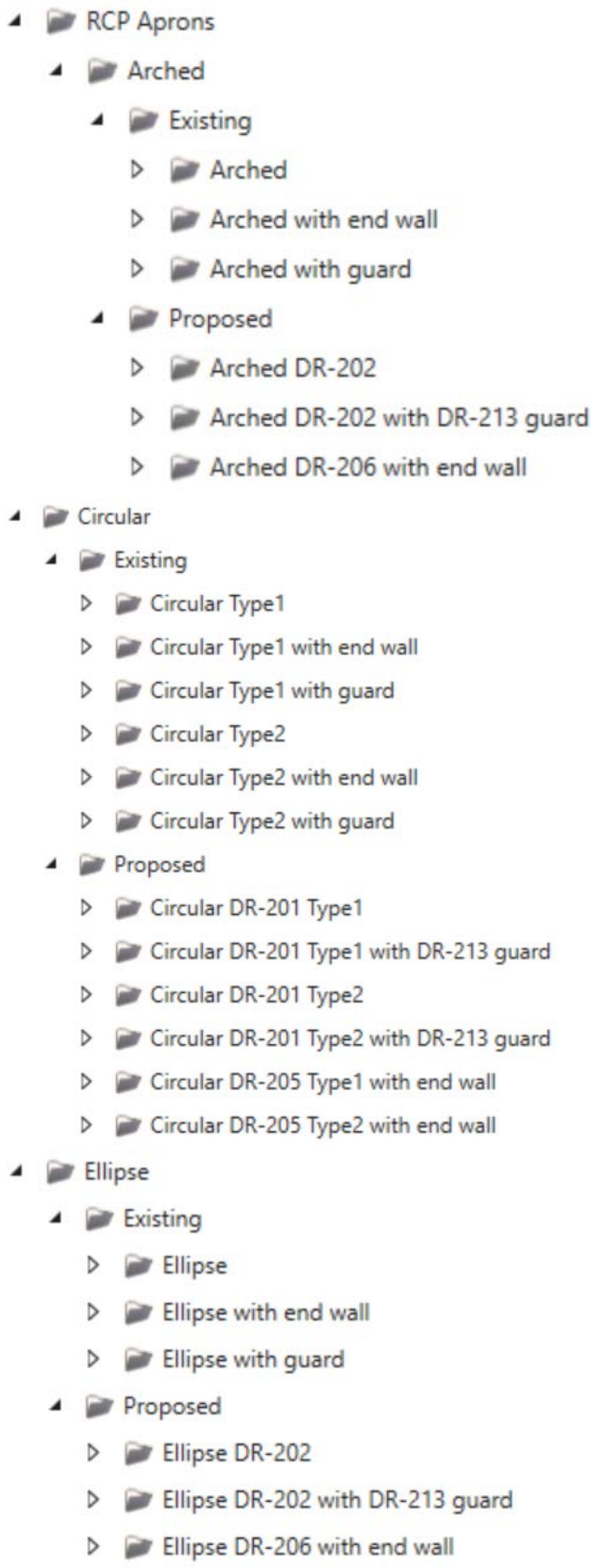
Apron options include no apron. The pipe aprons are organized and named by type, shape, size, and standard.





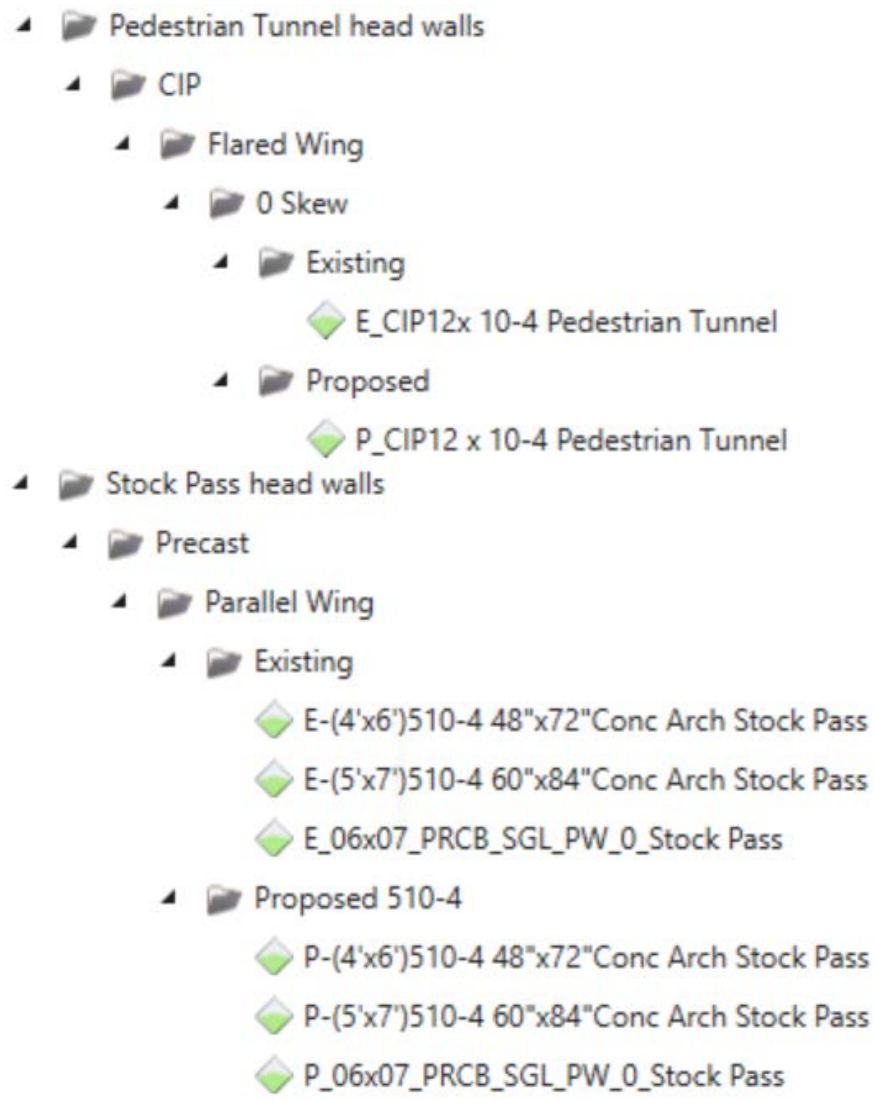
- Beveled Pipe Guard
  - Existing Pipe Guard
    - E-(12")DR-212 Pipe Guard
    - E-(15")DR-212 Pipe Guard
    - E-(18")DR-212 Pipe Guard
    - E-(21")DR-212 Pipe Guard
    - E-(24")DR-212 Pipe Guard
  - Proposed DR-212 Pipe Guard
    - P-(12")DR-212 Pipe Guard
    - P-(15")DR-212 Pipe Guard
    - P-(18")DR-212 Pipe Guard
    - P-(21")DR-212 Pipe Guard
    - P-(24")DR-212 Pipe Guard
- Circular Steel
  - Existing Steel Circular
    - E-(06")Steel Circular
    - E-(08")Steel Circular
    - E-(10")Steel Circular
    - E-(12")Steel Circular
    - E-(15")Steel Circular
    - E-(18")Steel Circular
    - E-(21")Steel Circular
    - E-(24")Steel Circular
    - E-(30")Steel Circular
    - E-(36")Steel Circular
    - E-(42")Steel Circular
    - E-(48")Steel Circular
    - E-(54")Steel Circular
    - E-(60")Steel Circular
    - E-(66")Steel Circular
    - E-(72")Steel Circular
    - E-(78")Steel Circular
    - E-(84")Steel Circular
    - E-(90")Steel Circular
    - E-(96")Steel Circular
  - Proposed DR-203 Steel Circular
    - P-(06")DR-203 Steel Circular
    - P-(08")DR-203 Steel Circular
    - P-(10")DR-203 Steel Circular
    - P-(12")DR-203 Steel Circular
    - P-(15")DR-203 Steel Circular
    - P-(18")DR-203 Steel Circular
    - P-(21")DR-203 Steel Circular
    - P-(24")DR-203 Steel Circular
    - P-(30")DR-203 Steel Circular
    - P-(36")DR-203 Steel Circular
    - P-(42")DR-203 Steel Circular
    - P-(48")DR-203 Steel Circular
    - P-(54")DR-203 Steel Circular
    - P-(60")DR-203 Steel Circular
    - P-(66")DR-203 Steel Circular
    - P-(72")DR-203 Steel Circular
    - P-(78")DR-203 Steel Circular
    - P-(84")DR-203 Steel Circular
    - P-(90")DR-203 Steel Circular
    - P-(96")DR-203 Steel Circular

The additional apron node features listed are not expanded for specific named features.



The reinforced concrete box headwalls are organized and named by number of barrels, type of wings, skew, and size. These features are not expanded for specific named features.

These features are expanded for specific named features.

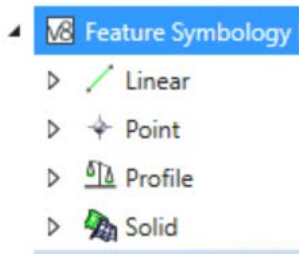


These are not intended to be an all-inclusive lists of possible existing or proposed nodes. Several categories have been populated only as needed for active projects. Work continues to create features for what exists in our structure inventory and what we have for culvert standards.

The feature symbology provided through the element templates and levels used are provided in the same dgnlib file.

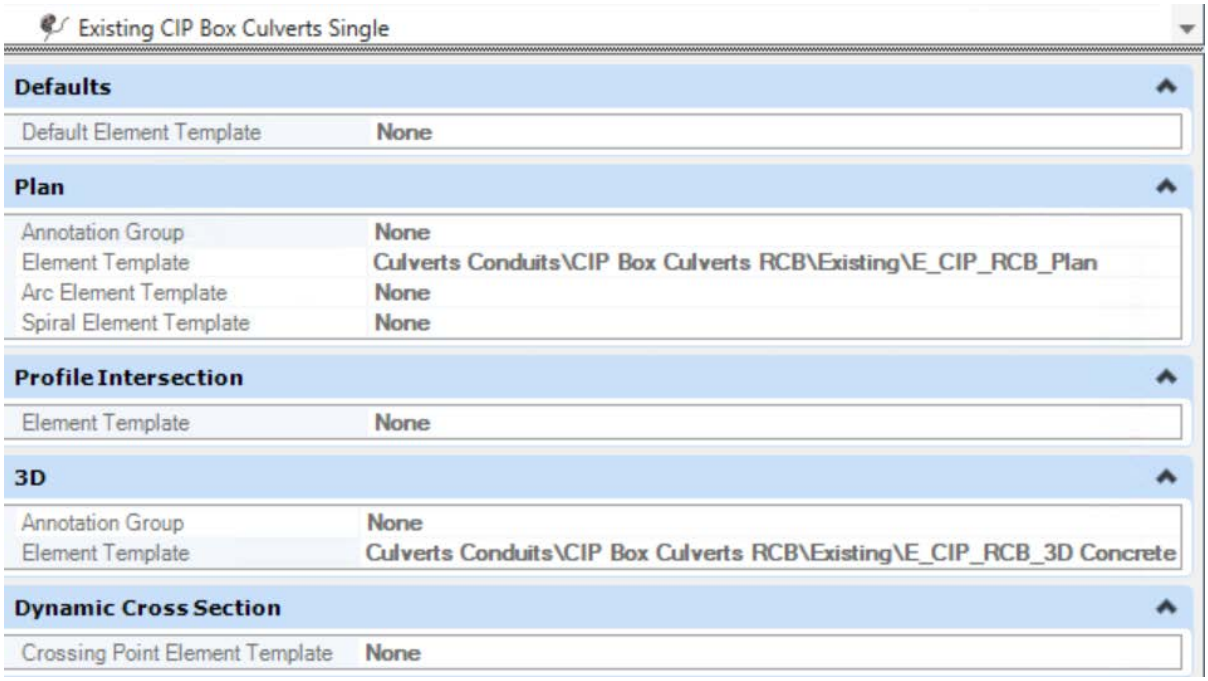
Refer to CONNECT Levels for additional information on the levels used for the features in OpenRoad Designer.

The feature symbology is organized by four main categories.



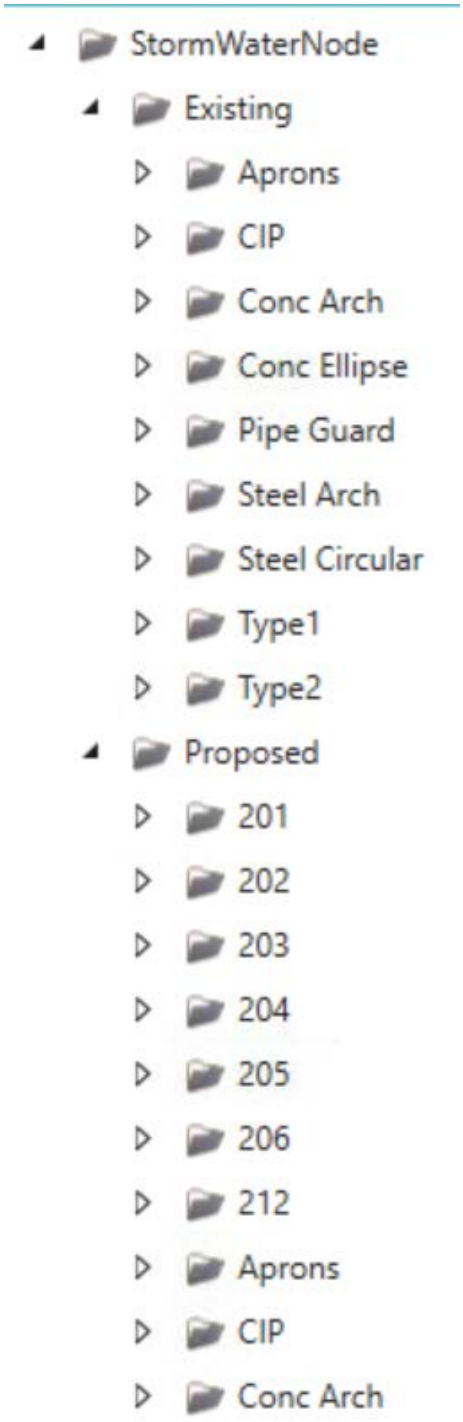
The pipe and culvert feature symbology for the main structure are provided under Linear, Conduit, StormWater and are named the same as the features. Each symbology specifies an element template for the Plan and the 3D model.

An example of properties settings is shown below.



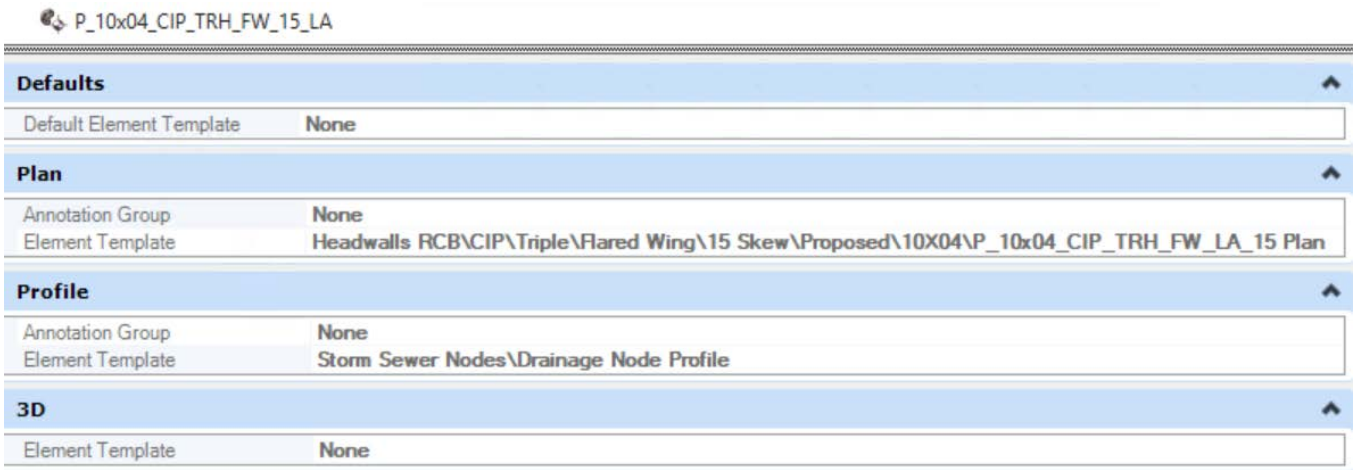
The pipe and culvert feature symbology for types of pipe aprons and culvert headwalls are provided under Point, Node, StormWaterNode and are named the same as the features.

These are organized by existing and proposed and then categorized by type of node.



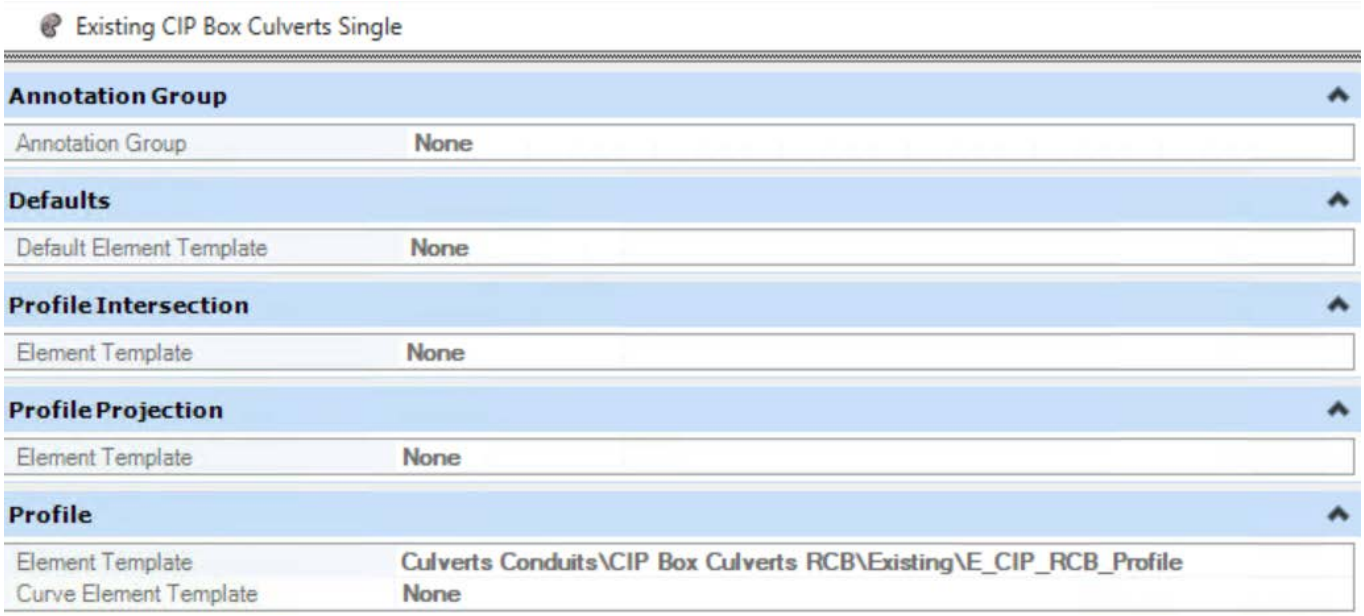
Each symbology specifies an element template for the Plan and Profile.

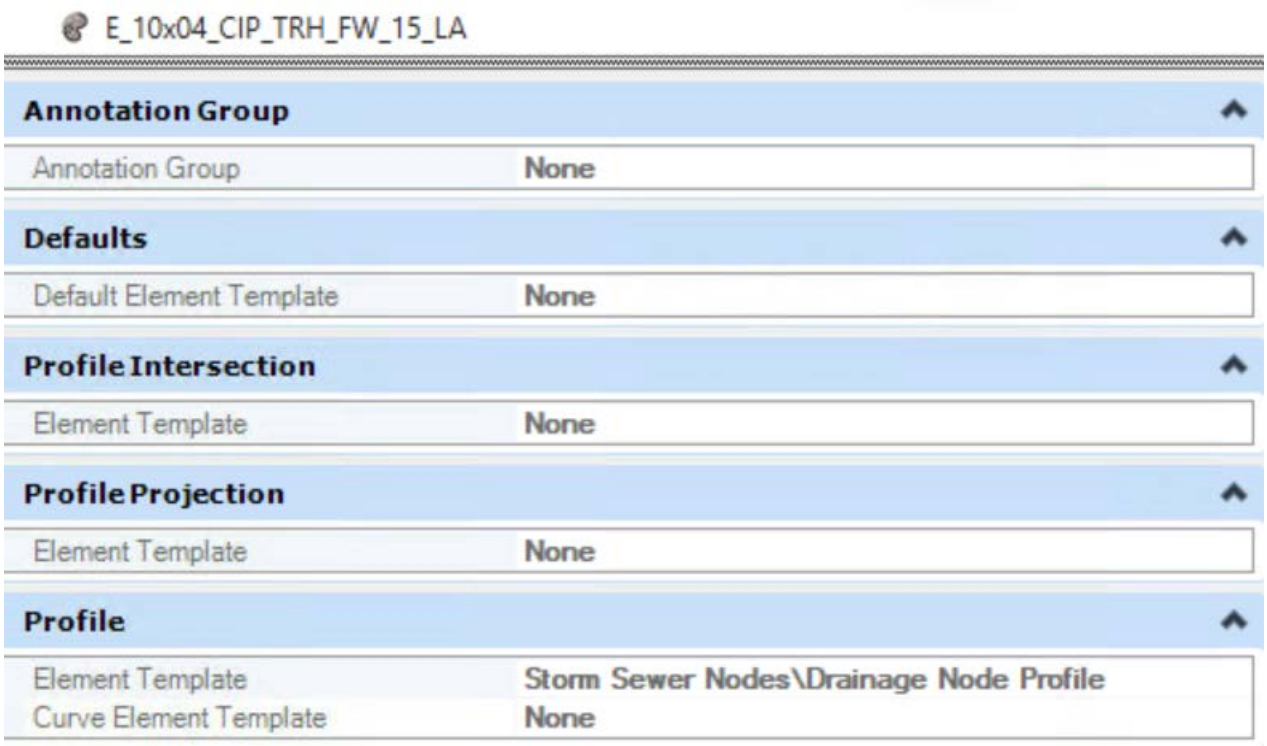
An example of properties settings is shown below.



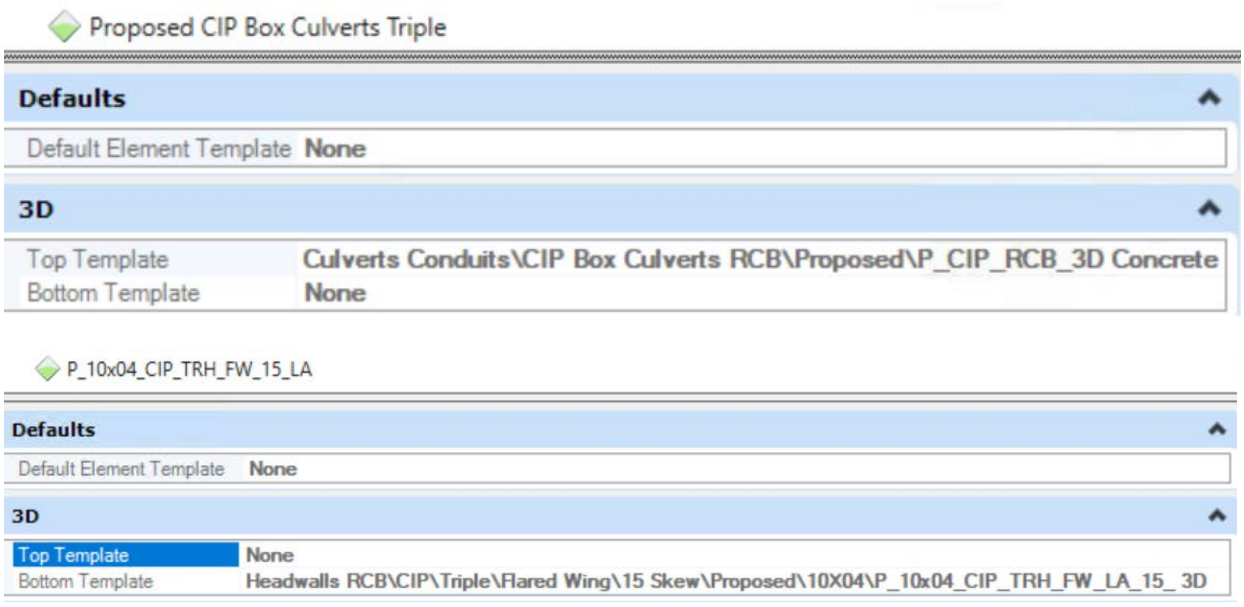
The pipe and culvert feature symbology for the structure profiles are provided under Profile, Conduit, StormWater and Profile, Node, StormWaterNode. These are named the same as the features. Each symbology specifies an element template for the Profile.

Examples of properties settings are shown below.





The pipe and culvert feature symbology for the solid category are provided under Solid, Conduit, StormWater and Solid, Node, StormWaterNode. These are named similar to the features. Each symbology specifies an element template for 3D modeling.

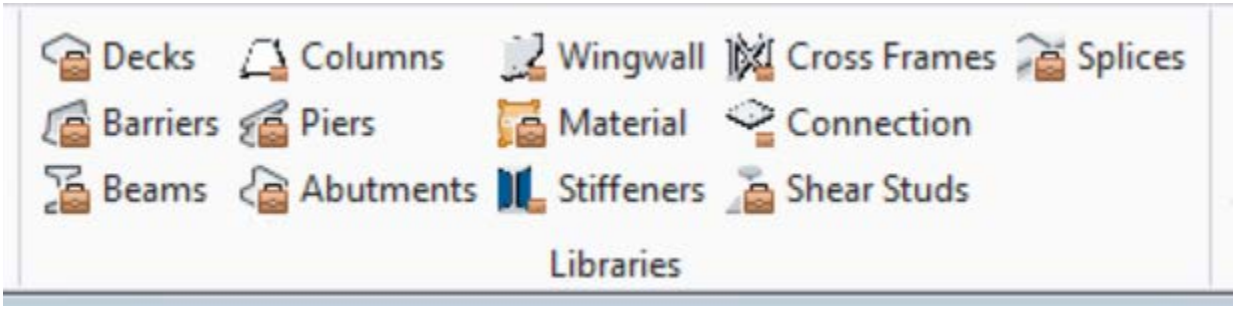


The existing and proposed culvert features use the CulvertExisting and CulvertProposed levels for al features.

ProStructures is not a feature-based application.

CONNECT Standard Libraries

For CONNECT projects OpenBridge Modeler contains standard libraries for decks, barriers, beams, columns, piers, abutments, wingwall, material, stiffeners, cross frames, connection, shear studs, and splices.



For information on the libraries for decks, barriers, beams, and piers refer to Iowa DOT CONNECT Edition Standard Templates. These libraries contain Iowa specific options stored as templates.

There are no Iowa specific customizations for the columns, abutments, wingwall, stiffeners, cross frames, connection, shear studs, and splices libraries at this time.

For the materials library Iowa specific options are provided. The items are shown below organized by category tab.

Concrete

Name	Description	Unit Wt (PCF)	Unit Price	Poisson	f'c (ksi)	f'ci (ksi)	MR (ksi)	E (ksi)	CTE (1/F)
Click here to add new item									
14 IN. P10L Prestressed Concrete Piles	Piles – Concrete (P10L TYPE 2)	150	1	0.2	5	5	0.59	4592.232476	6E-06
16 IN. P10A Prestressed Concrete Piles	Piles – Concrete (P10A TYPE 2)	150	1	0.2	5	5	0.59	4592.232476	6E-06
16 IN. P10L Prestressed Concrete Piles	Piles – Concrete (P10L TYPE 2)	150	1	0.2	5	5	0.59	4592.232476	6E-06
A30-A42, B34-B50, C30-C67 BEAMS	PPCB	150	1	0.2	5	5	0.54	4592	6E-06
A46-A55, B55-B67, BTC80-BTC90, BTD100-BTD105, BTB80 Beams	PPCB	150	1	0.2	7	6	0.63	5131.521081	6E-06
BTB70 Beams	PPCB	150	1	0.2	5.5	5	0.56	4738.96446	6E-06
BTC100, BTD115-BTD120, BTE135 Beams	PPCB	150	1	0.2	8	7	0.68	5362.699475	6E-06
BTC105, BTD125, BTB90, BTE140-BTE145 Beams	PPCB	150	1	0.2	8.5	7.5	0.7	5471.066702	6E-06
BTC110-BTC115, BTC120, BTD130-BTD135, BTB95-BTB105, BTE150-BTE155 Beams	PPCB	150	1	0.2	9	8	0.72	5575.242887	6E-06
BTC30-BTC60, BTD50-BTD70, BTB30-BTB65, BTE60-BTE75 Beams	PPCB	150	1	0.2	5	4.5	0.54	4592	6E-06
BTD90-BTD95, BTB75 Beams	PPCB	150	1	0.2	6.5	5.5	0.61	5007.548587	6E-06
BTE115-BTE120 Beams	PPCB	150	1	0.2	6	5.5	0.59	4877.010345	6E-06
C71-C80, BTC65-BTC75, BTD75-BTD85, BTE80-BTE110 Beams	PPCB	150	1	0.2	6	5	0.59	4877.010345	6E-06
D100-D105 Beams	PPCB	150	1	0.2	7.5	6	0.66	5249.693898	6E-06
D110, BTC95, BTD110, BTB85, BTE125-BTE130 Beams	PPCB	150	1	0.2	7.5	6.5	0.66	5249.693898	6E-06
D35-D95 Beams	PPCB	150	1	0.2	5	5	0.54	4592	6E-06
Deck Concrete - CCS & PPCB Bridges	CIP Superstructure	150	1	0.2	3.5	3.5	0.45	4082.312237	6E-06
Deck Concrete - RS Bridges	CIP Superstructure	150	1	0.2	4	4	0.48	4266	6E-06

High Performance Structural Concrete	High Performance	150	1	0.2	5	0	0.54	4592	6E-06
Precast Abutment Backwall	Precast Backwall	150	1	0.2	5	0	0.54	4592	6E-06
Precast Footing Abutment	Precast Footing	150	1	0.2	5	0	0.54	4592	6E-06
Prestressed Concrete Deck Units	Precast Decks	150	1	0.2	6	0	0.59	4877	6E-06
Pretensioned Prestressed Concrete, Box Beams	BOX BEAMS	150	1	0.2	5	4.5	0.54	4592.232476	6E-06
Reinforced Concrete, Box Beams	CIP BOX BEAMS	150	1	0.2	4	4	0.48	4266.223084	6E-06
Self-consolidating concrete	Self-concolidating	150	1	0.2	5	0	0.54	4592	6E-06
Structural Concrete	Structural Concrete	150	1	0.2	4	0	0.48	4266	6E-06
Structural Concrete (Bridge) - CCS & PPCB Bridges	Typical Bridge Concrete	150	1	0.2	3.5	0	0.45	4082.312237	6E-06
Structural Concrete (Bridge) - RS Bridges	Typical Bridge Concrete	150	1	0.2	4	0	0.48	4266	6E-06
Structural Concrete (Miscellaneous) - CCS & PPCB Bridges	Repairs	150	1	0.2	3.5	0	0.45	4082.312237	6E-06
Structural Concrete (Miscellaneous) - RS Bridges	Repairs	150	1	0.2	4	0	0.48	4266	6E-06
Structural Concrete, Class X	Seal Courses	150	1	0.2	3.5	0	0.45	4082.312237	6E-06
Substructure Concrete - Drilled shafts	Generic Substructure	150	1	0.2	4	0	0	0	0
Substructure Concrete - PPCB Bridges	Generic Substructure	150	1	0.2	3.5	3.5	0.45	4082.312237	6E-06
Substructure concrete (other)	Substructure concrete	150	1	0.2	4	0	0.48	4266	6E-06
UHPC - Heat Treated	UHPC Joint for County Box Be:	150	1	0.2	25	0	0	0	0
UHPC - Not Heat Treated at 28 days	UHPC Joint for County Box Be:	150	1	0.2	21	0	0	0	0
UHPC - Not Heat Treated at 4 Days	UHPC Joint for County Box Be:	150	1	0.2	12	0	0	0	0
Ultra High Performance Concrete Joint	UHPC Joint	150	1	0.2	10	0	0.76	5772	6E-06

Steel

Name	Description	Unit Wt (PCF)	Unit Price	Poisson	Fy (ksi)	Fu (ksi)	G (ksi)	E (ksi)	CTE (1/F)
Click here to add new item									
CrossFrames Gr. 36	Grade 36	490	1	0.295	36	58	11500	29000	6.5E-06
Curved box girders	Grade 50W	490	1	0.295	50	65	11500	29000	6.5E-06
Curved plate girders	Grade 50W	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel Pipe, 14 IN. (P10A TYPE 1)	Steel Piles	490	1	0.295	42	58	11500	29000	6.5E-06
Piles, Steel Pipe, 14 IN. (P10L TYPE 1)	Steel Piles	490	1	0.295	42	58	11500	29000	6.5E-06
Piles, Steel Pipe, 16 IN. (P10A TYPE 1)	Steel Piles	490	1	0.295	42	58	11500	29000	6.5E-06
Piles, Steel Pipe, 16 IN. (P10L TYPE 1)	Steel Piles	490	1	0.295	42	58	11500	29000	6.5E-06
Piles, Steel, HP 10 X 42	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 10 X 42 (CONCRETE ENCASEMENT P10A TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 10 X 42 (CONCRETE ENCASEMENT P10L TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 10 X 57	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 10 X 57 (CONCRETE ENCASEMENT P10A TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 10 X 57 (CONCRETE ENCASEMENT P10L TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 12 X 53	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 12 X 53 (CONCRETE ENCASEMENT P10A TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 12 X 53 (CONCRETE ENCASEMENT P10L TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 12 X 63	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 12 X 74	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 12 X 84	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 14 X 102	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 14 X 117	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 14 X 73	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 14 X 73 (CONCRETE ENCASEMENT P10L TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 14 X 89	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 14 X 89 (CONCRETE ENCASEMENT P10L TYPE 3)	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Piles, Steel, HP 8 X 36	Steel Piles	490	1	0.295	50	65	11500	29000	6.5E-06
Rolled wide flange sections	Grade 50W	490	1	0.295	50	65	11500	29000	6.5E-06
Straight box girders	Grade 50W	490	1	0.295	50	65	11500	29000	6.5E-06
Straight plate girders	Grade 50W	490	1	0.295	50	65	11500	29000	6.5E-06
Structural Steel Gr. 36	Grade 36	490	1	0.295	36	65	11500	29000	6.5E-06
Structural Steel Gr. 50	Grade 50	490	1	0.295	50	65	11500	29000	6.5E-06
Structural Steel Gr. 50W	Grade 50W	490	1	0.295	50	65	11500	29000	6.5E-06

Miscellaneous

Name	Description	Unit Price
Click here to add new item		
Concrete Barrier Railing	Traffic Barrier	1
Concrete Barrier Railing, Aesthetic	Traffic Barrier	1
Concrete Barrier, Reinforced, Separation	Traffic Barrier	1
Concrete Open Railing	Traffic Barrier	1
Concrete Open Railing, TL-4	Traffic Barrier	1
Disc Bearing	Disc Bearing	1
Excavation	Earthwork	1
Neoprene Bearing Pads	Neoprene Pad	1
Rocker bearing	Rocker Bearing	1

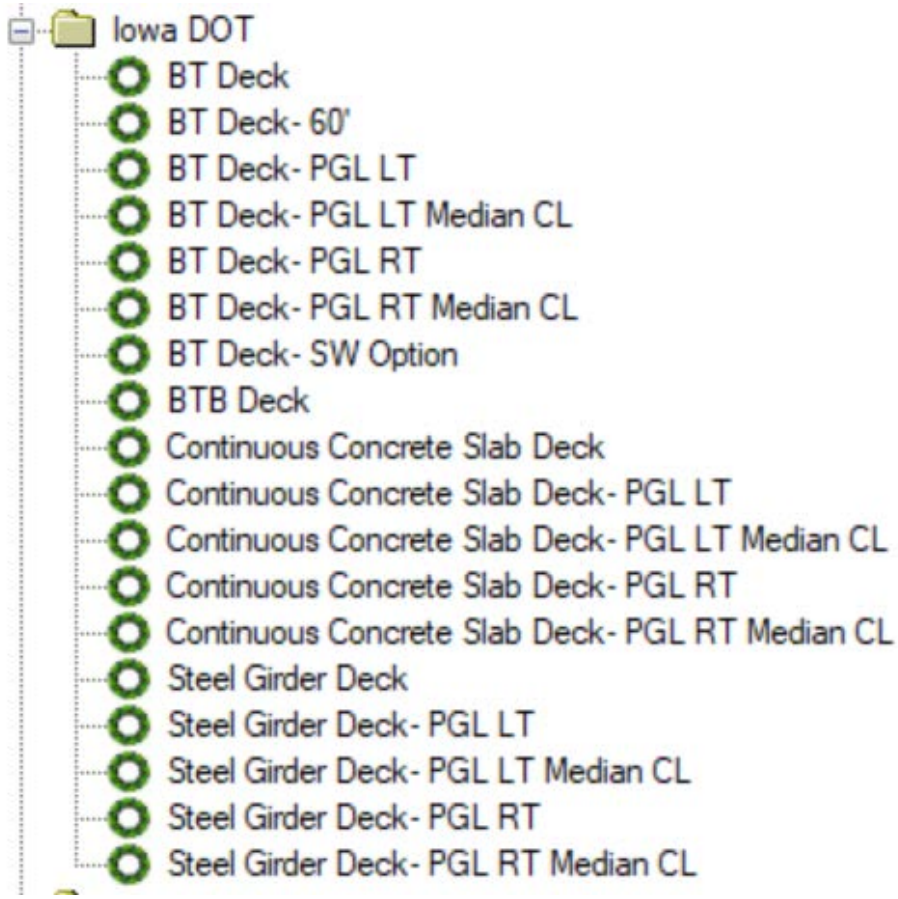
Iowa chose not to include unit price values for materials.

CONNECT Standard Templates

For CONNECT projects OpenBridge Modeler Iowa specific templates are available for the placement and modification of decks, barriers, beams, and pier components of a bridge.

The templates are shown below organized by component.

Deck templates are available for various types of superstructure and configurations of the deck and is indicated in the name.

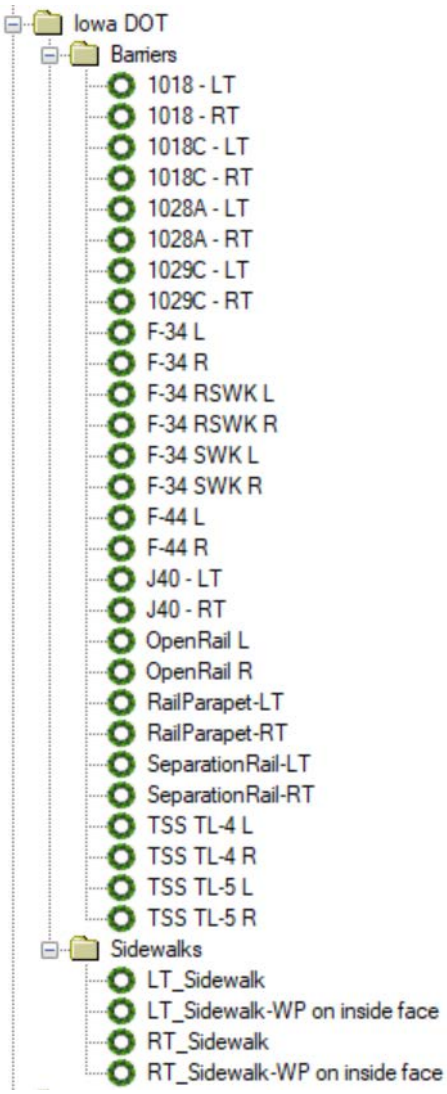


Abbreviations included in names are:

BT - bulb tee
PGL – profile grade line
LT – left
RT – right
SW – sidewalk
CL – centerline

Barrier templates are available for each type of barrier Iowa DOT allows with left and right variations and is indicated in the name. The directional options allow for correct orientation of the placed barrier.

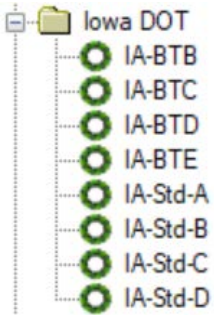
Sidewalk options are provided to be placed separately and are included with the F-34 barrier rails.



Additional abbreviations included in names are:

L – left
R – right
RSWK – raised sidewalk
SWK – sidewalk
TSS – Texas single slope
WP – working point

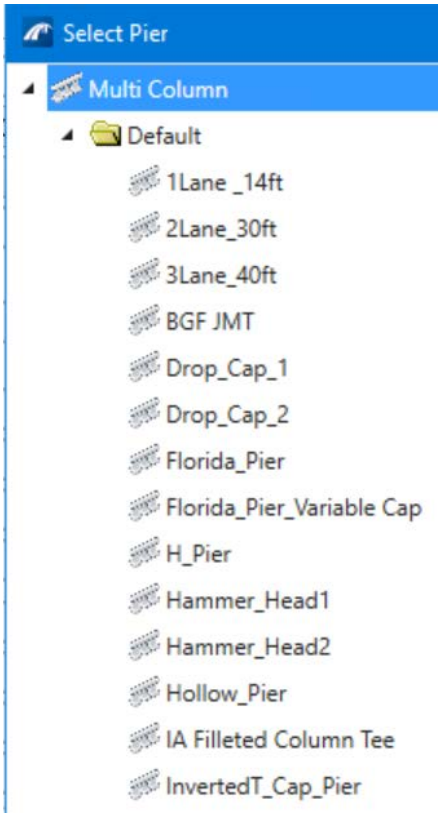
Beam templates available for each type of prestressed precast beam Iowa DOT allows.

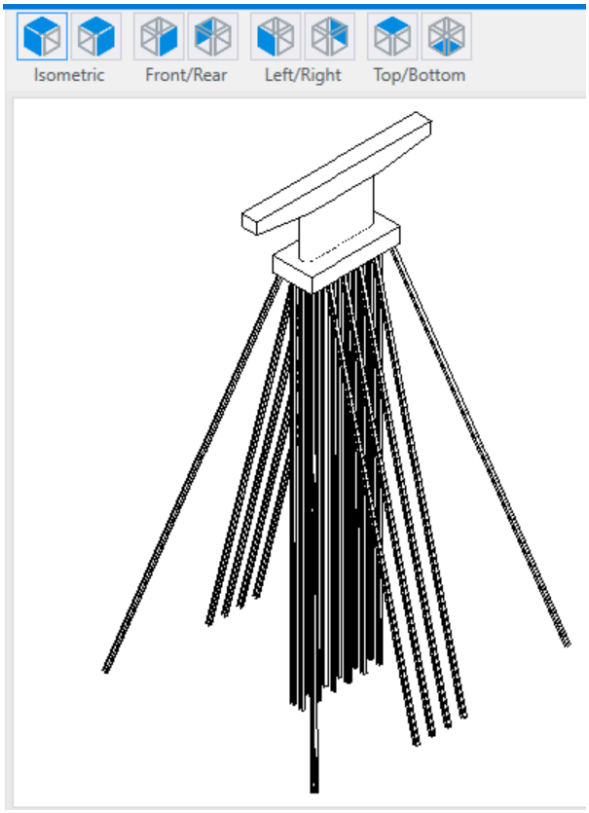


Additional abbreviations included in names are:

Std – Standard

Pier templates include one custom Multi Column Iowa DOT option, IA Filleted Column Tee.



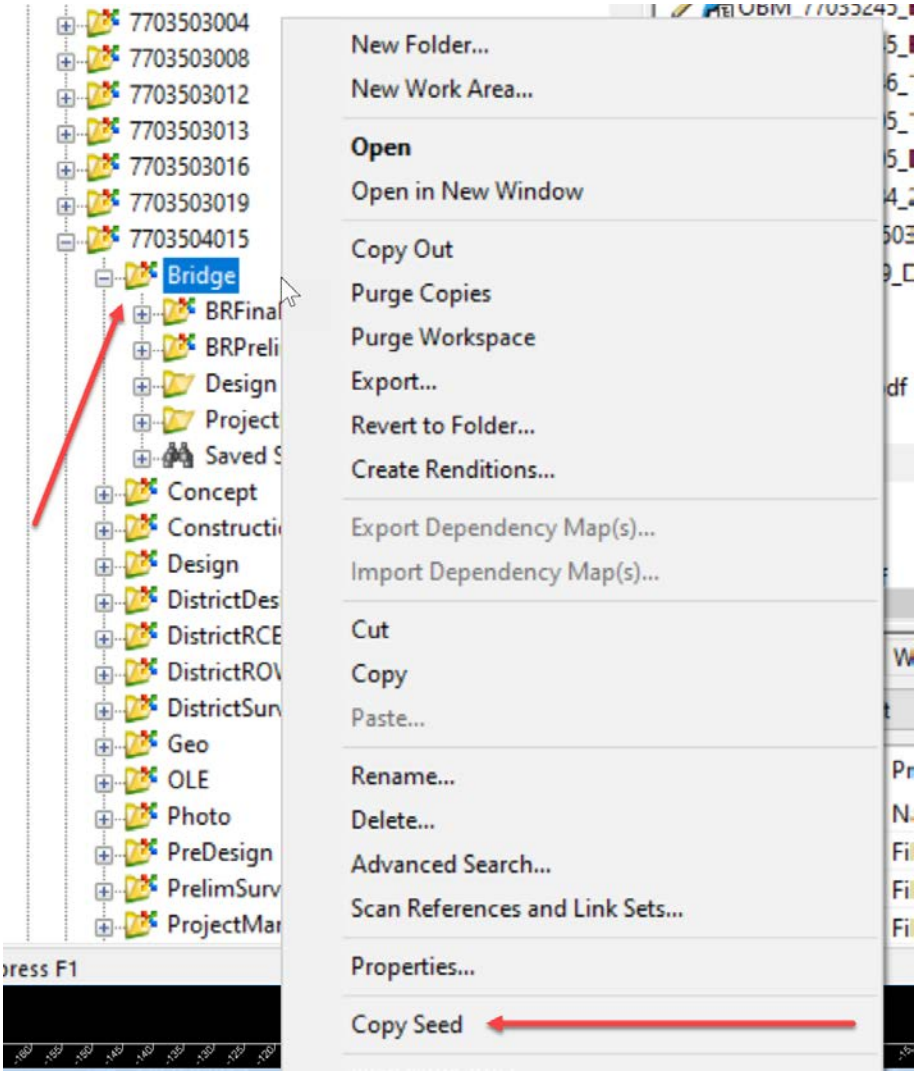


Templates may be modified or new ones added as additional bridge projects are completed in OpenBridge Modeler or new standards are issued. The documentation will be updated as needed.

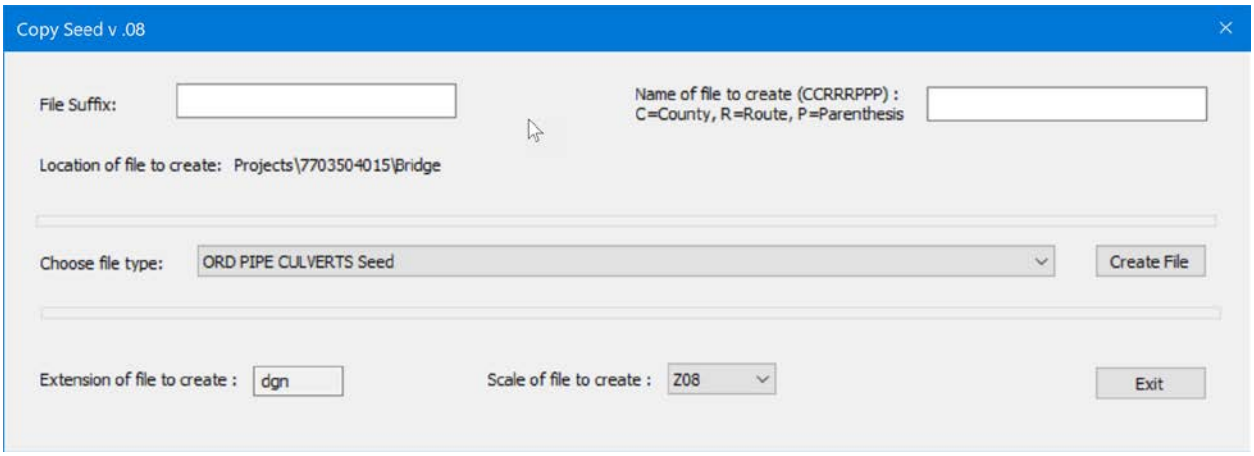
Setting up the MicroStation File to do Drainage Design.

These instructions were created on 4/28/2021. These instructions were created with:

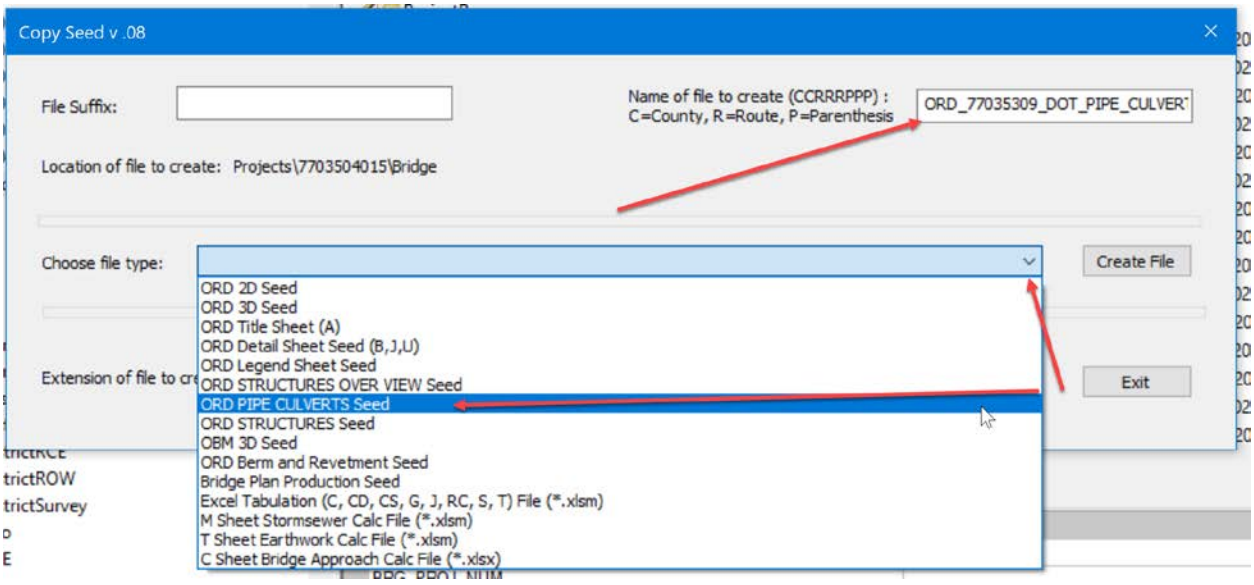
The first step to doing a drainage design in CONNECT is to create the files needed to do our work in. In ProjectWise, use the Copy Seed tool. Navigate to the correct project directory for the project, right click on the project folder and select the Copy Seed command.



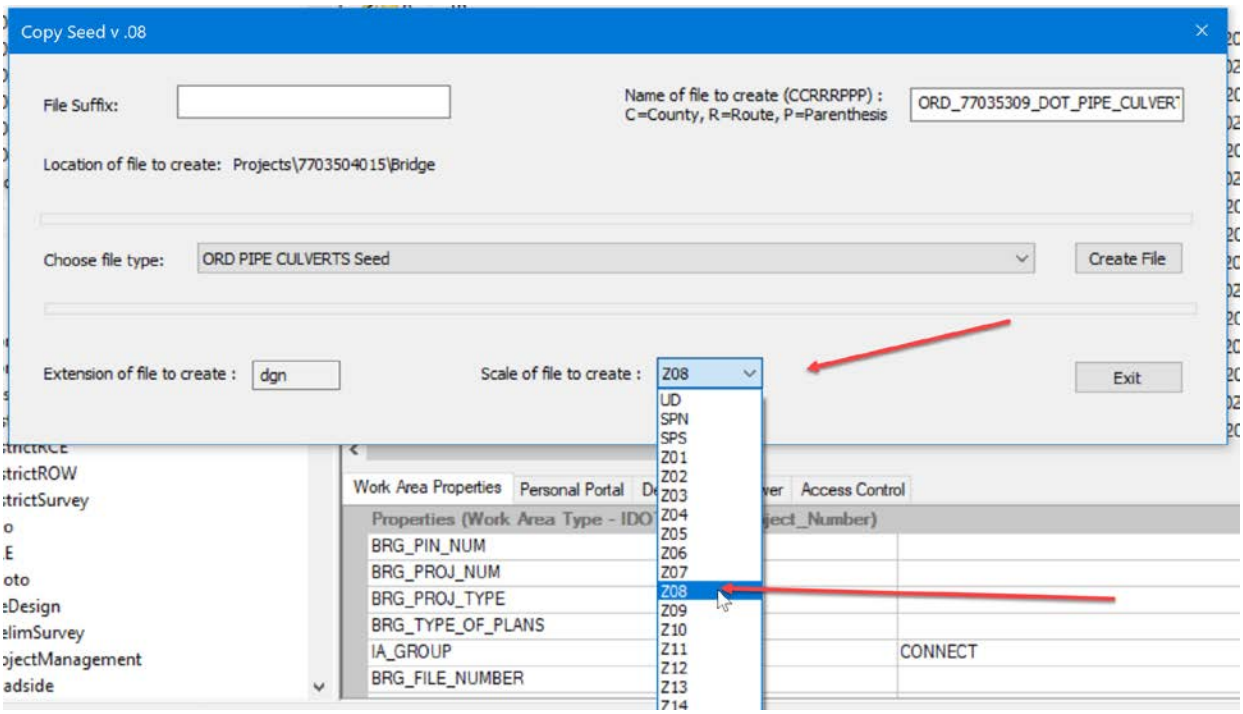
This will open this tool:



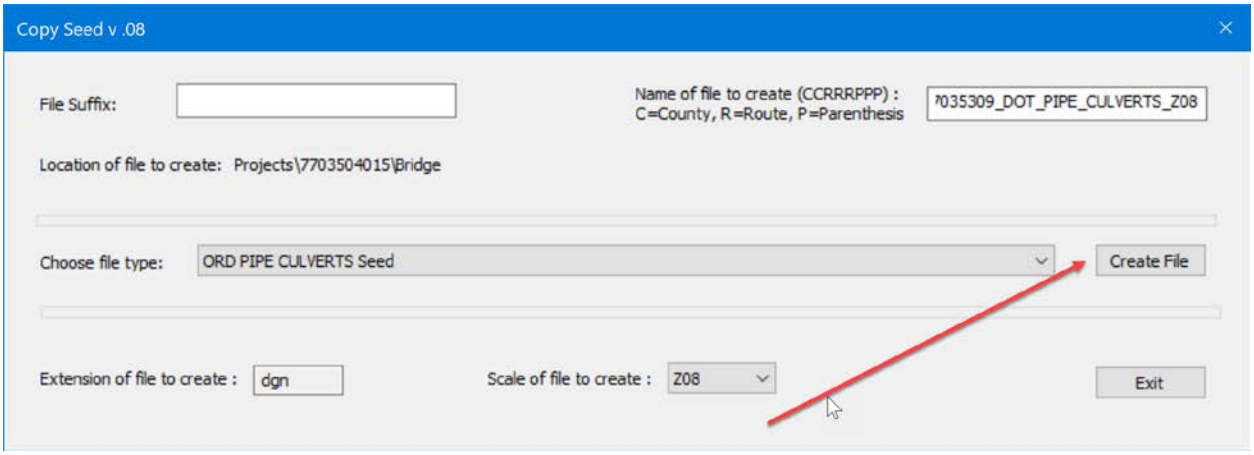
Next, name the file. For pipes, the naming convention for this file is ORD_CCRRRPPP_DOT_PIPE_CULVERTS_SPN. ***ORD***=the version of MicroStation that the work is done in ***CC***=County ***RRR***=Route ***PPP***=Parenthesis ***DOT***=company and or source of the file ***PIPE_CULVERTS***=type of work_\ ***SPN***=coordinate projection of this project. For this example, the file will be ORD_77035309_DOT_PIPE_CULVERTS_Z08.dgn.



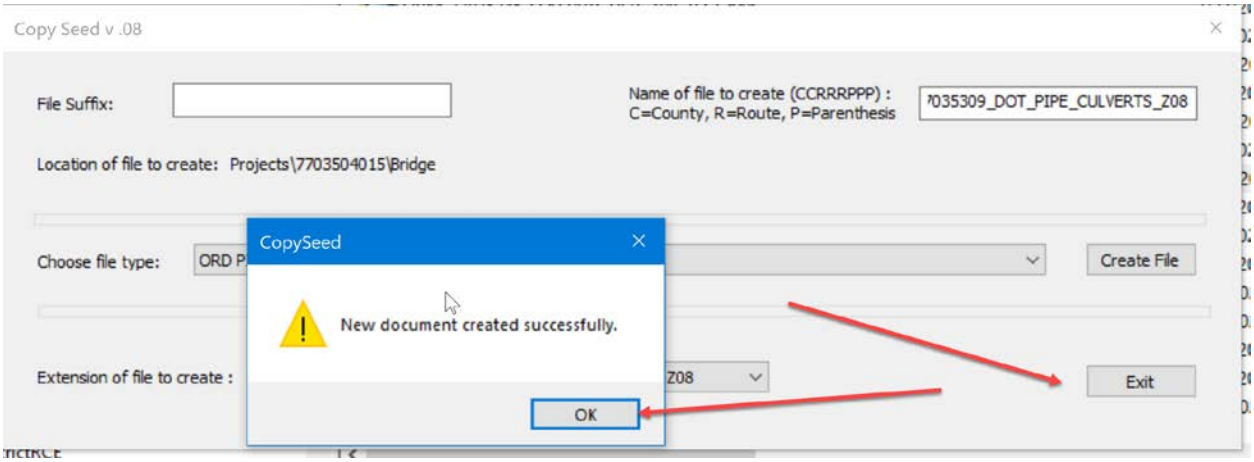
Next, select the correct file type. For this work, choose the ORD PIPE CULVERTS Seed.



Next, select the correct coordinate projection for this file. For this example, select Z08 for IaRCS Zone 08. Then click on the Create File button.



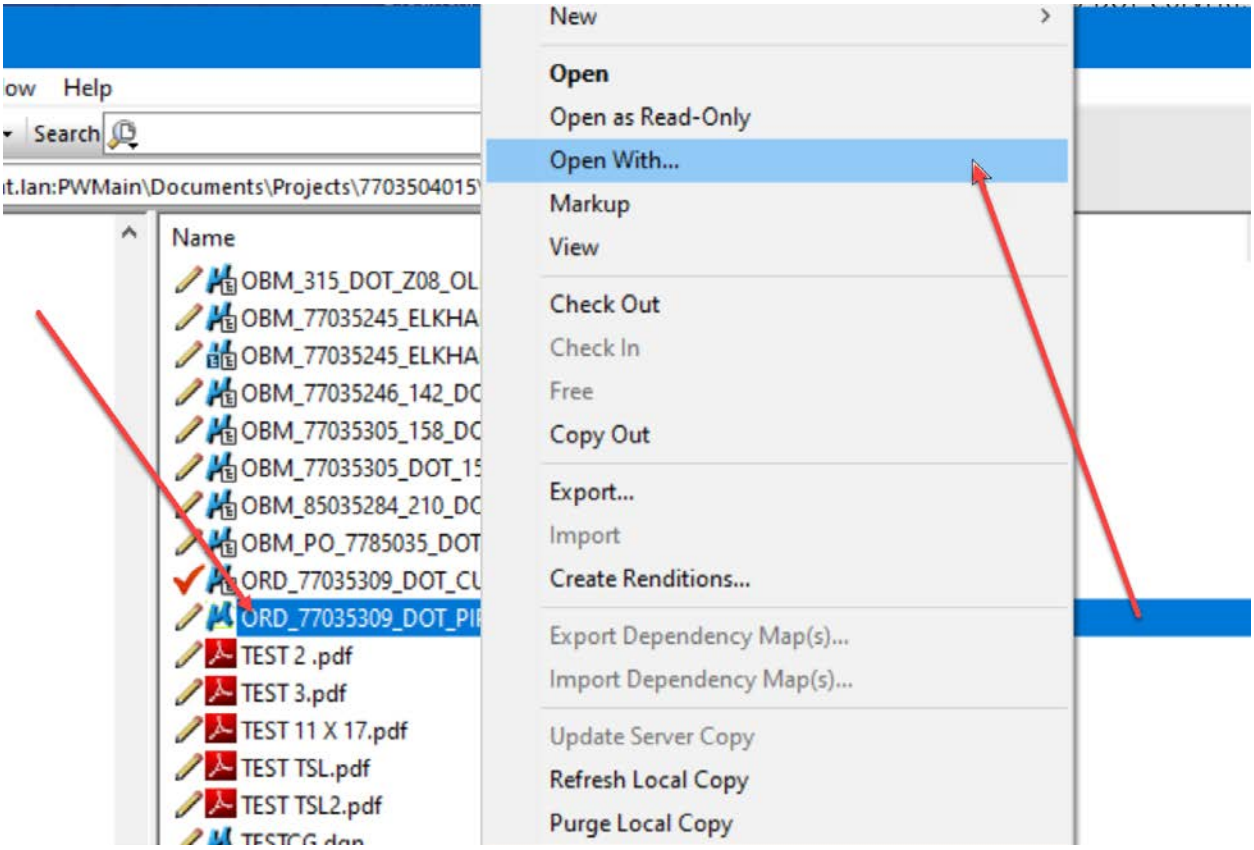
This will create the correct MicroStation file in the project directory. A message displays saying New document created successfully. Click ok on the message.



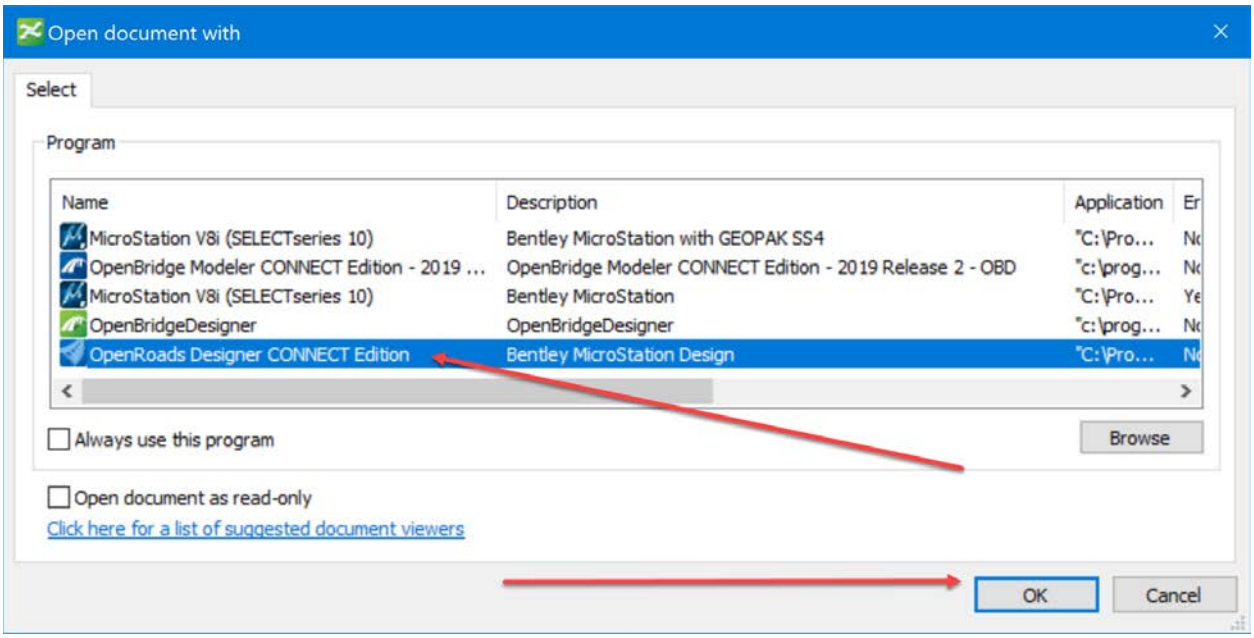
Then click on the Exit button to close the Copy Seed tool.

If your design includes RCB, Flume or drop basins, then repeat this process in order to create an ORD_CCRRRPPP_DOT_STRUCTURES_Z##.dgn file for these types of designs.

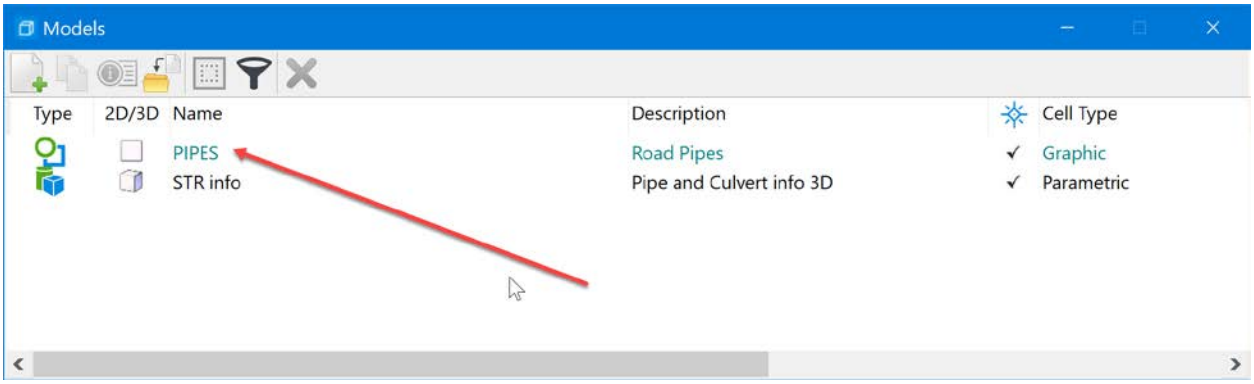
Once the MicroStation file is created, open it in the project directory. Select the file then right click and select the Open With option.



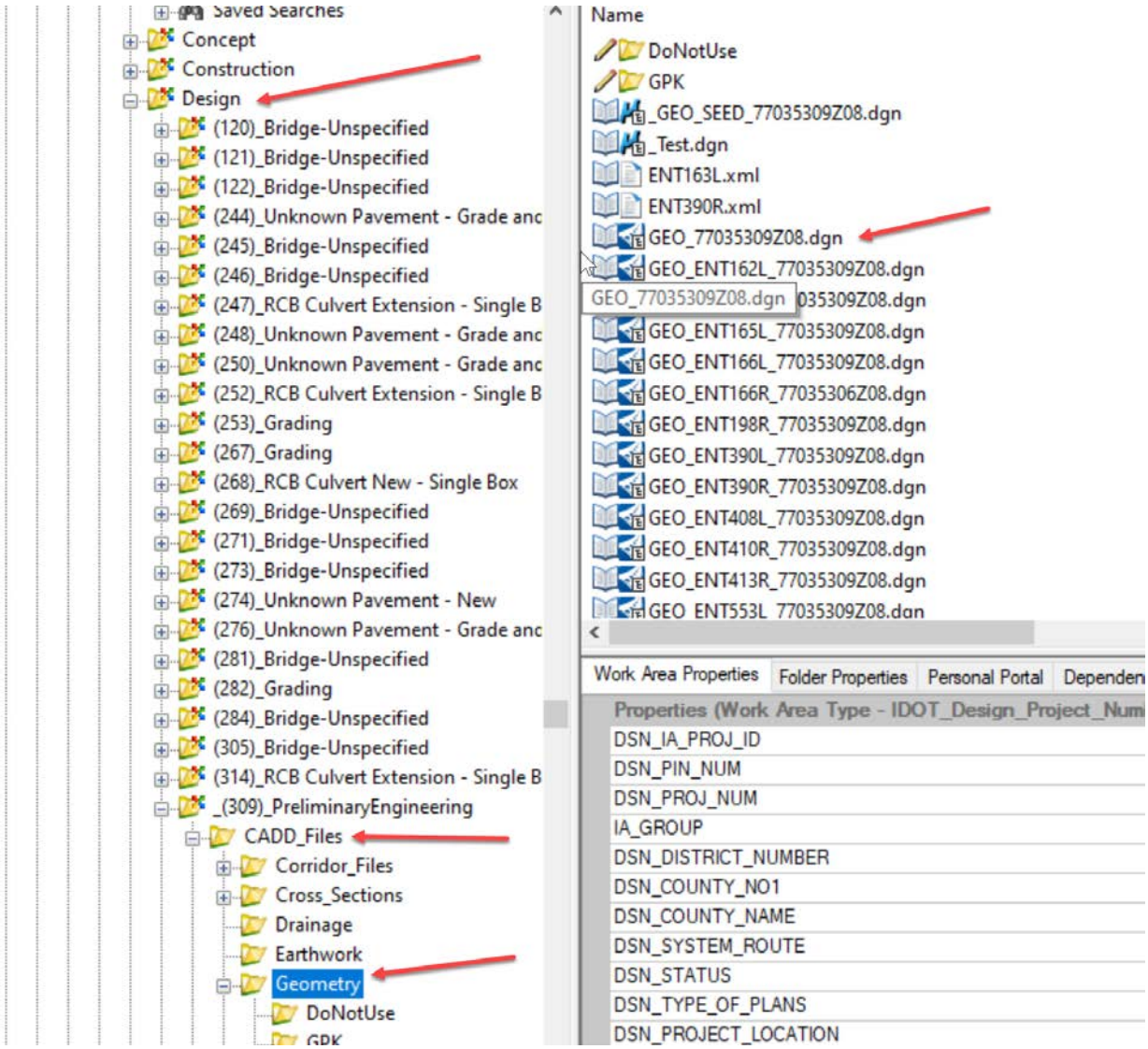
Next, select the OpenRoads Designer CONNECT Edition program. Then click on OK.



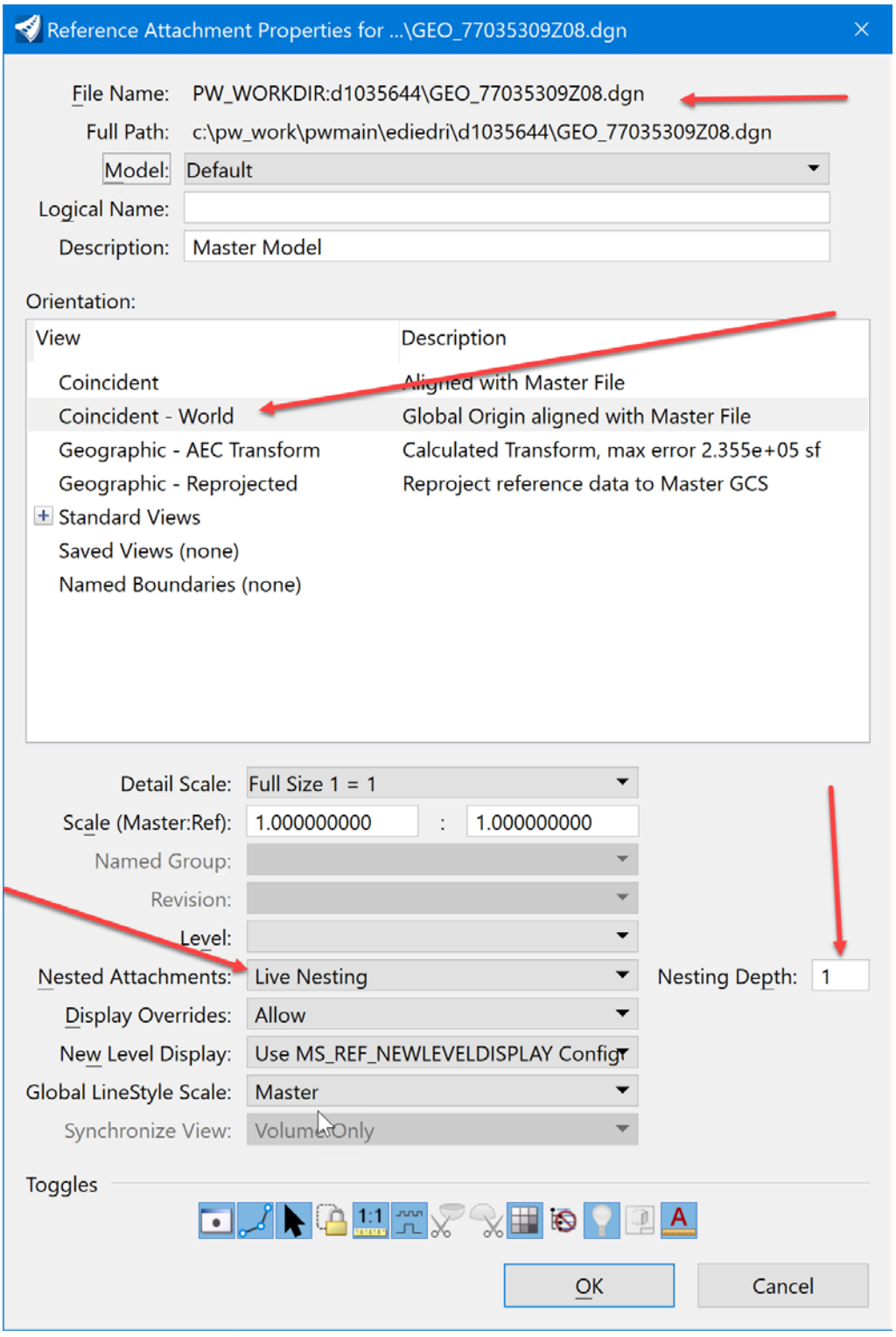
Now that the file is open, first set the file up to make a 3D cut of the proposed corridor and/or a dynamic section of the proposed corridor.



To perform either function: In the PIPES model, reference in the Road Design alignment that has an active profile, this file should be located in the Design folder under the CADD_Files\Geometry\ folder. Select the GEO Alignment file that is named GEO_CCRRRPPPZZZ.dgn. For this example, it will be GEO_77035309Z08.dgn

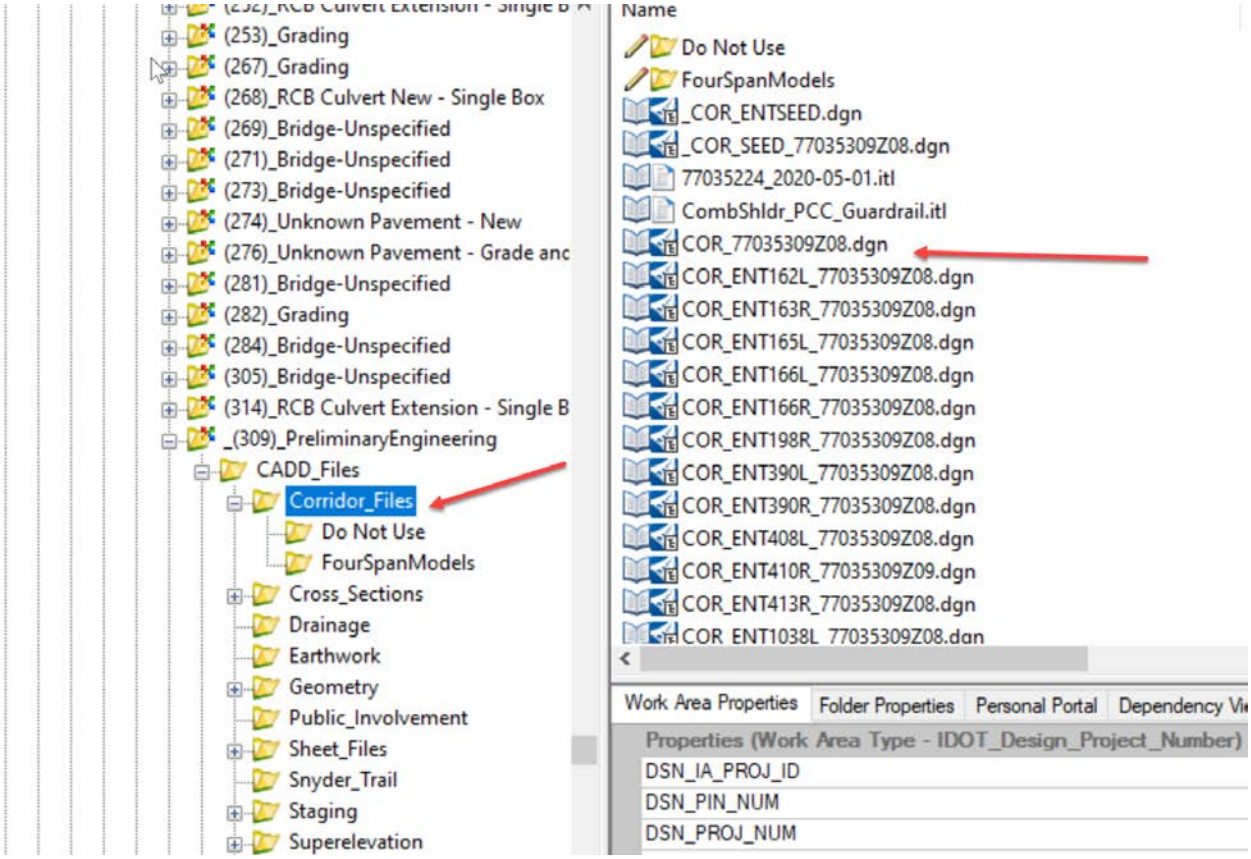


This is the container GEO file that will contain all the Alignments for this project.

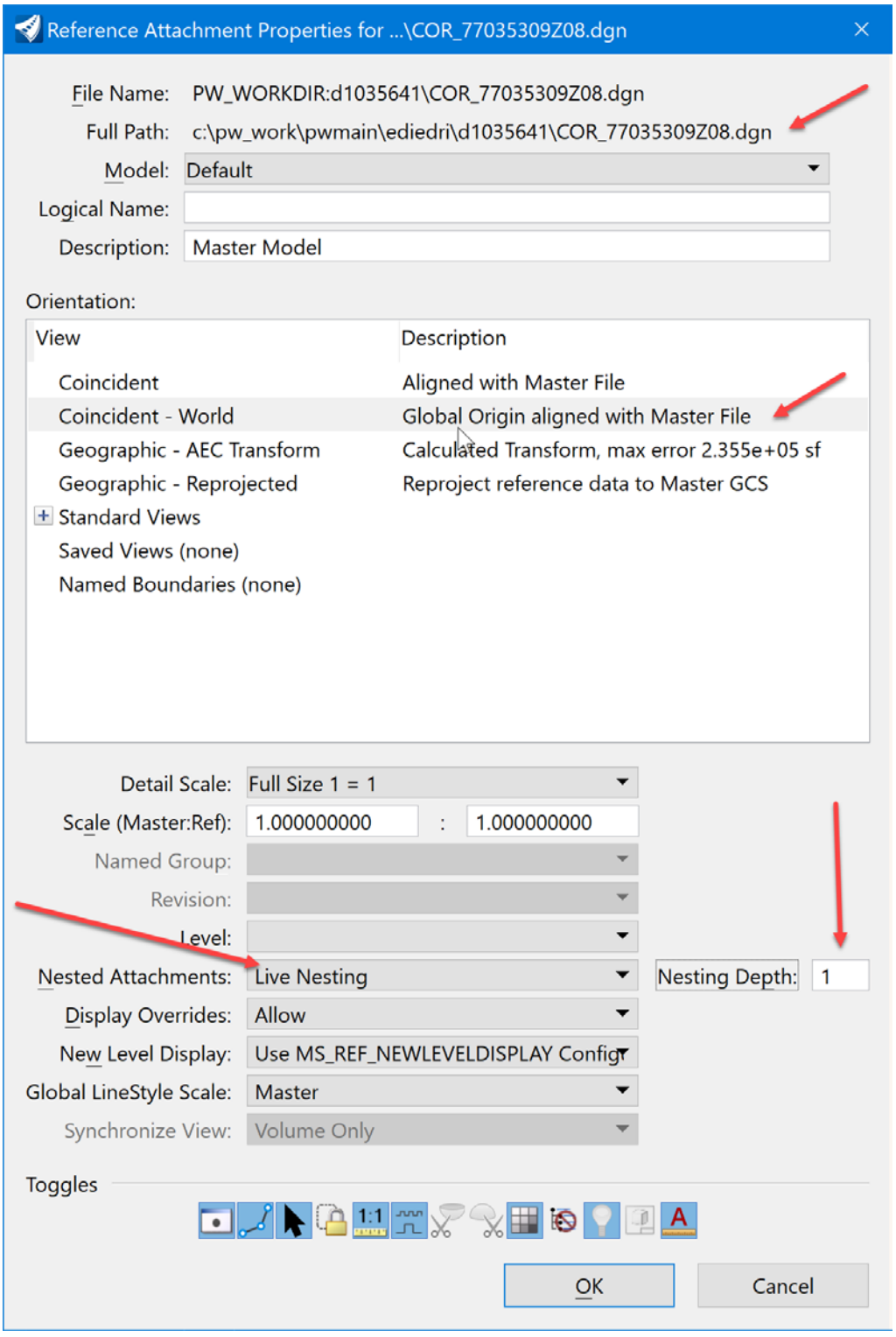


Attach the GEO file using the orientation of Coincident World. Then turn on the live nesting and set its depth to 1.

Next, reference the proposed corridor container file. This file should be located in the Design folder under CADD_Files\Corridor_Files\folder. Select the COR Corridor file that is named COR_CCRRRPPPZZZ.dgn. For this example, it will be COR_77035309Z08.dgn

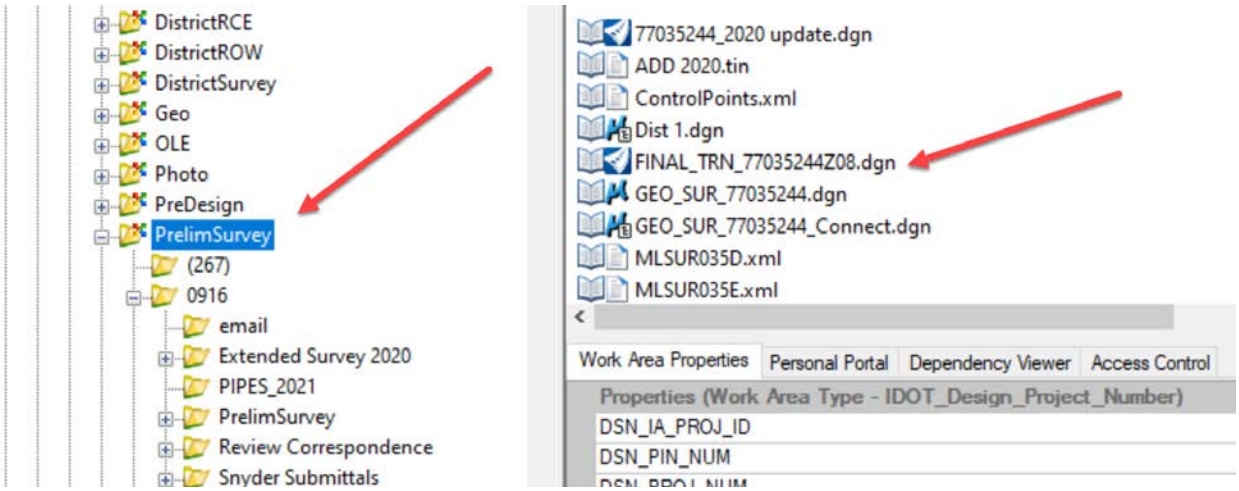


This is the container COR file that will contain all the Corridor for this project.

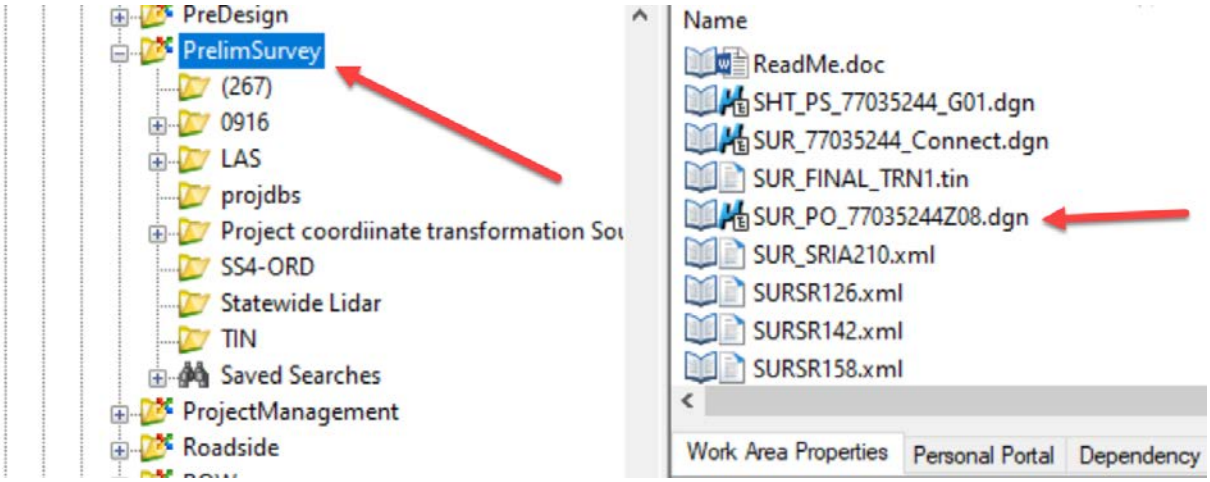


Attach the COR file using the orientation of Coincident World. Then turn on the live nesting and set its depth to 1.

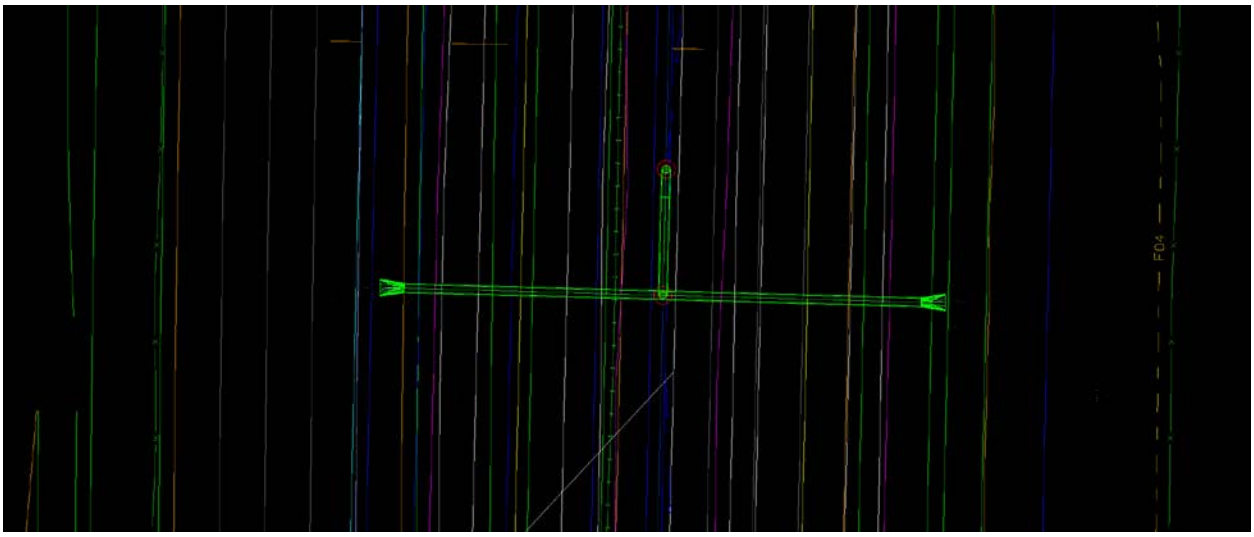
Next, reference in the existing ground. To do this, reference in the TRN file from the survey or Photo location. For this example, it is in the Prelim Survey folder and is called FINAL_TRN_77035244Z08.dgn



Next, attach the survey file that contains the existing 3D pipes and surrounding topo features that will be needed to do an effective design.

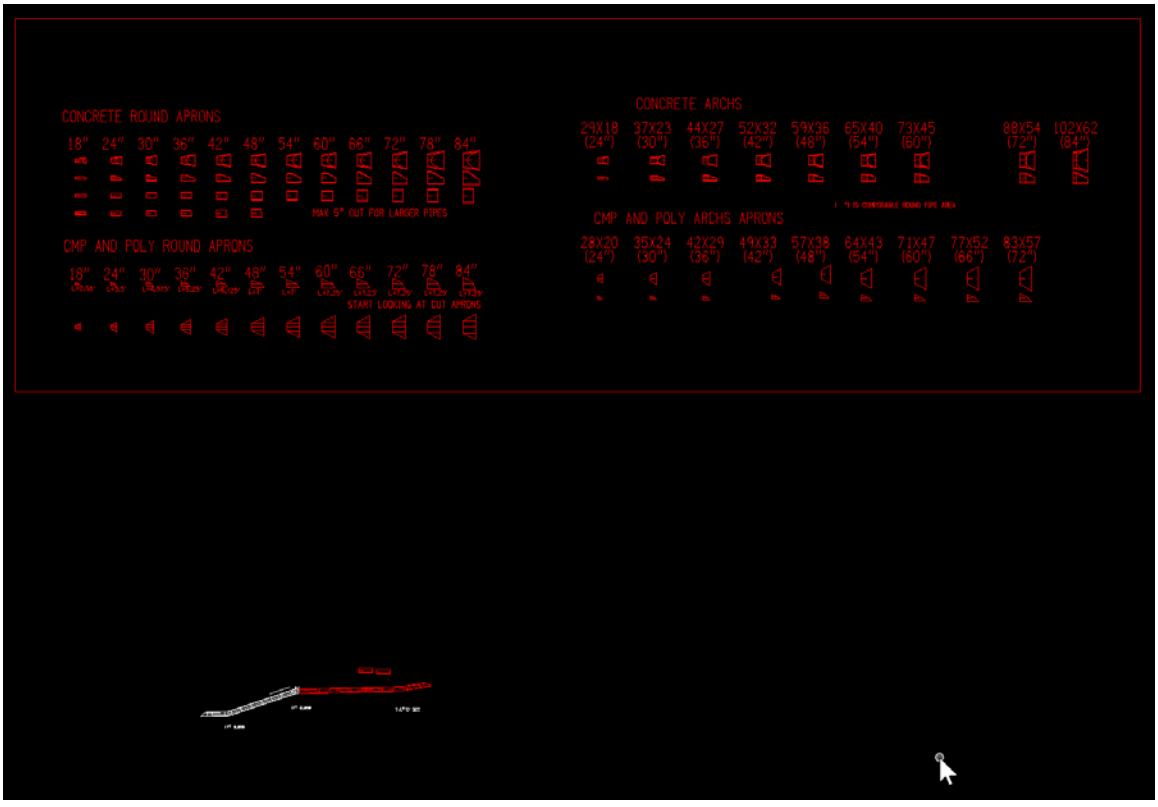


This should appear similar to below.

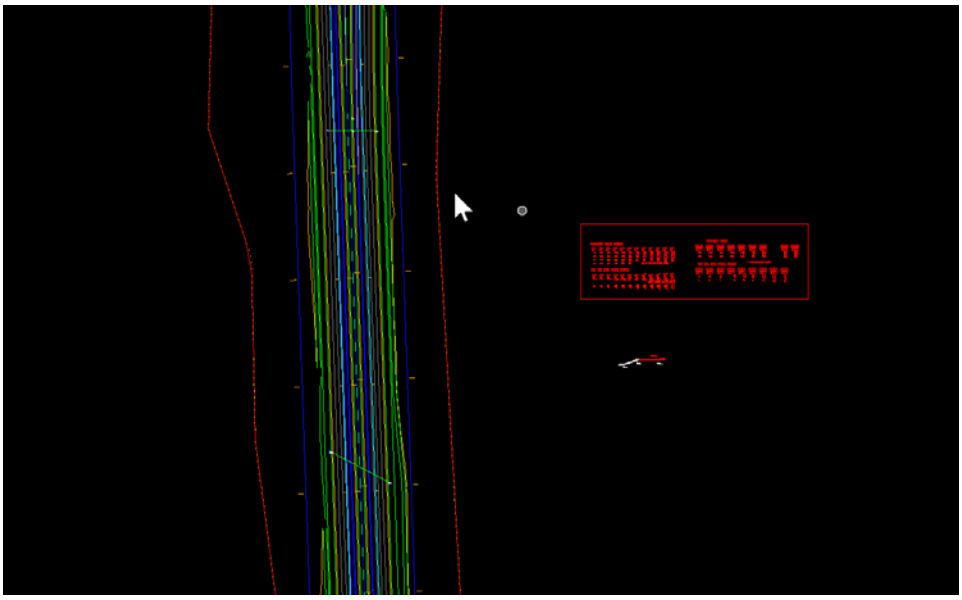


Make sure the files are referenced to the 2D model (that is the PIPES model in this MicroStation file). ORD will make a managed model automatically once any 3D information is referenced to this 2D model. ORD names the managed model PIPES-3D. This is a crucial step in setting up this workflow.

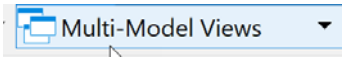
Next, reference in a file that contains a selection of our pipe aprons. This file is located in pw:\\ntPwInt1.dot.int.lan:PWMain\Documents\IowaDOTStandardsConnect\Configuration\Organization-Civil\IowaDOT_Standards\Cell\BridgeDesignDetails\ApronsConnect.dgn. Then, find this refenced content in the file. It should look like this:



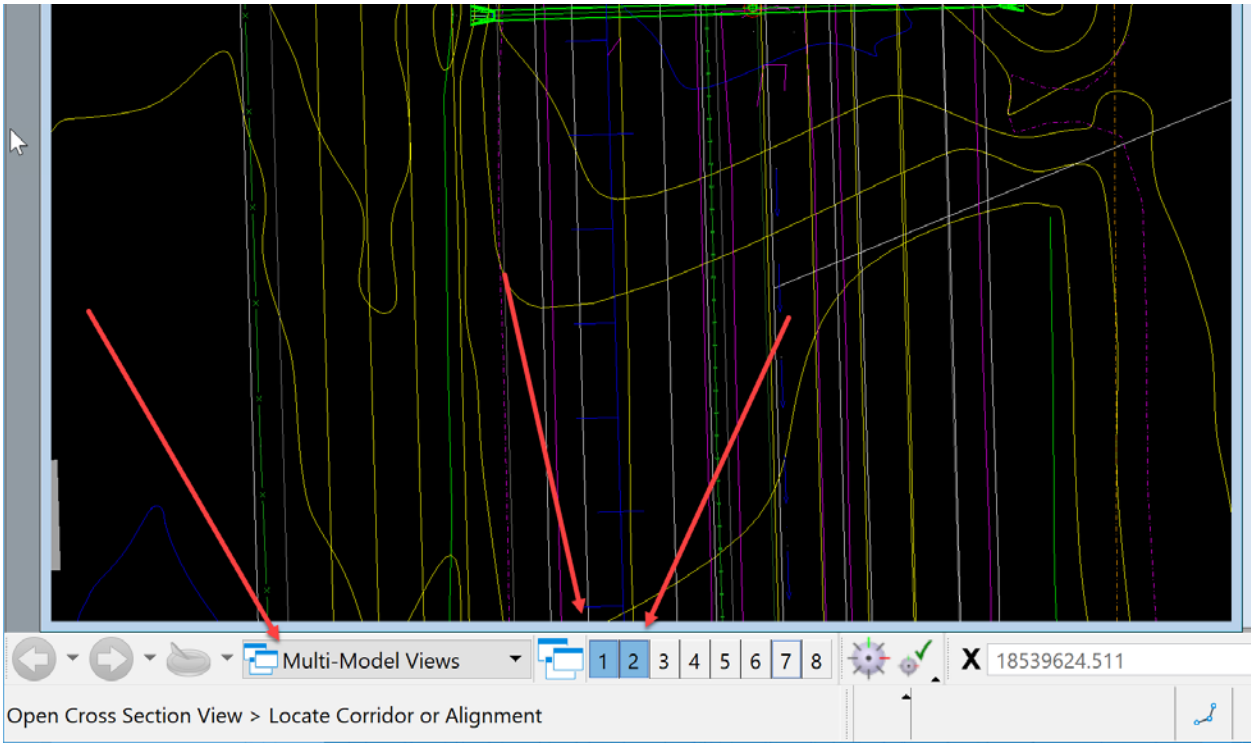
Next, select it with the Element Selection tool and with the copy tool make a copy of it and place it close to our design corridor.



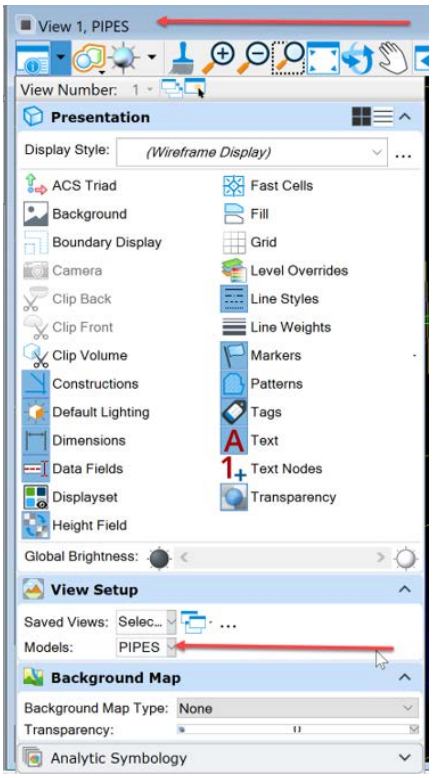
Then, detach the reference file.

Next, set a few things in the file to make it a little easier to use. The first step is to set up the Multi-Model Views in this file. 

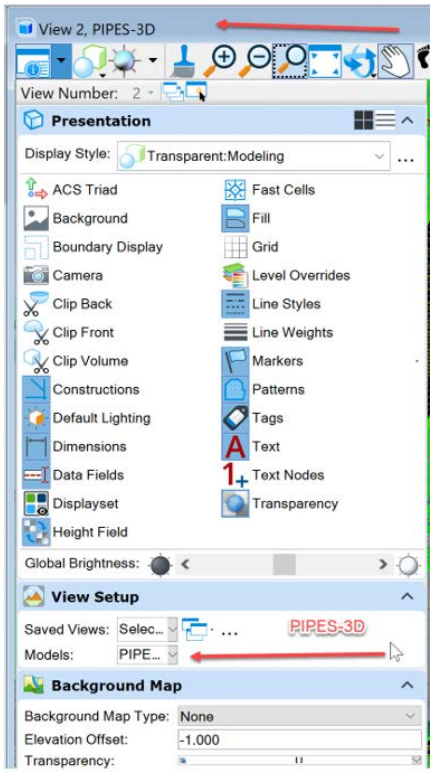
This will allow viewing the 2D and 3D model at the same time. To set this up, open two views and then select the Multi-Model Views option.



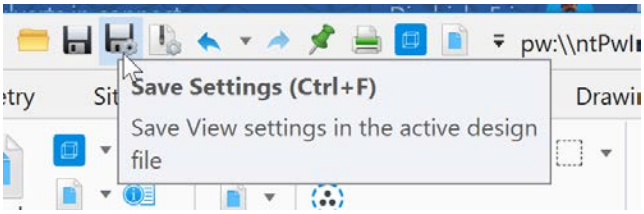
To verify that it is set correctly, open the View Attributes in each window and see what model it is set to. For our needs, set View 1 to the PIPES model which is the pipes 2D model.



For our needs, set View 2 to the PIPES-3D model which is the pipes 3D model.



This allows viewing and manipulating the information in the two models without having to change the model thru the model pallet. Once you have this set, save the settings so that the next time you get into the file there will be no need to set it up again.



Now that the file is set up, start designing and calculating our pipe inverts from the project information.

Laying out Culverts and Drainage Design in CONNECT

These instructions were created on 5/04/2021. These instructions were created with:

The first step is to review the profile information and determine where a pipe is needed. Once a location is determined for a pipe, then calculate the correct size. Following calculating the correct type, size and location, design the new pipe and/or structure. There are two methods available to analyze the corridor to design the new pipe and/or structure.

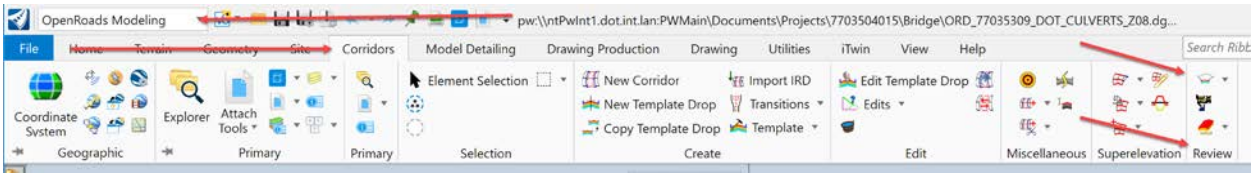
If the design is for a structure and/or pipe that is perpendicular to the alignment, use the first method of cutting a Dynamic Section.

First Method

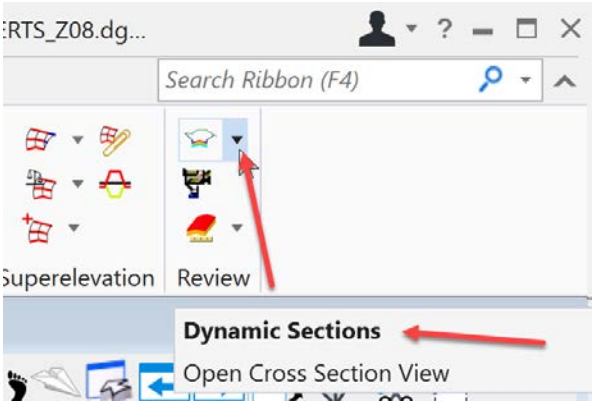
Cutting a Dynamic Section - The tool is in the OpenRoads Modeling workflow on the Corridors tab in the Review group. When using this tool, the recommendation is to turn the corridor reference display off in the 2D model View 1 (This was done previously when setting up the cadd file). The reason is this tool will ask to select a corridor or alignment. With the corridor turned off, selection of the alignment is easier. To do this, make sure the View 1 is set to be the active view and open the refence pallet and turn off the corridor.

Next, open a view to display the section in. For this example, use View 7.

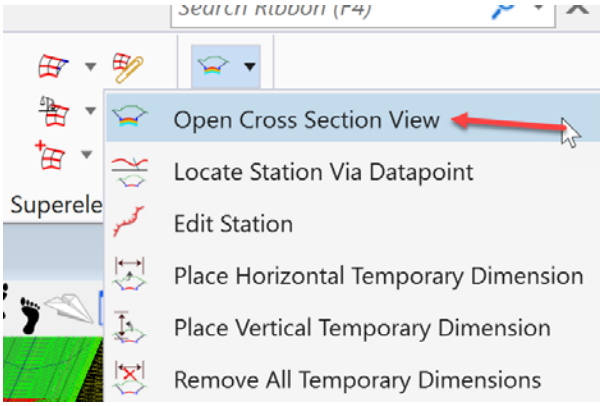
In the OpenRoads Modeling workflow; on the Corridors tab in the Review group,



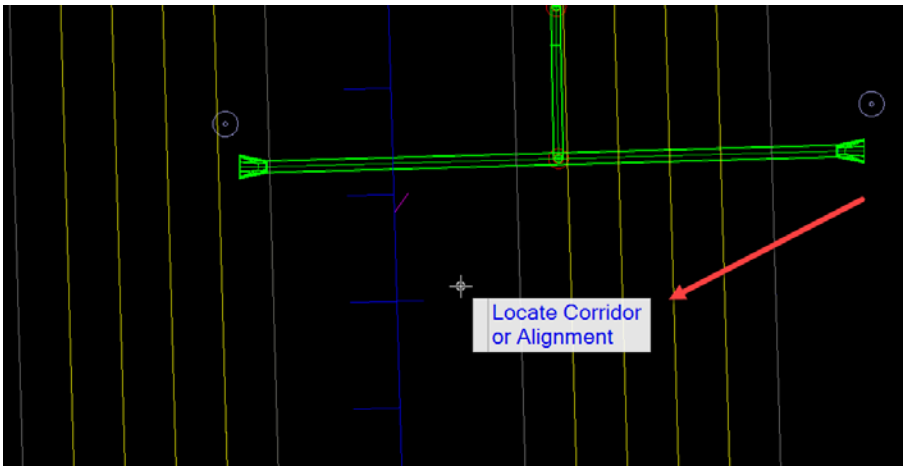
select the Dynamic Sections tools.



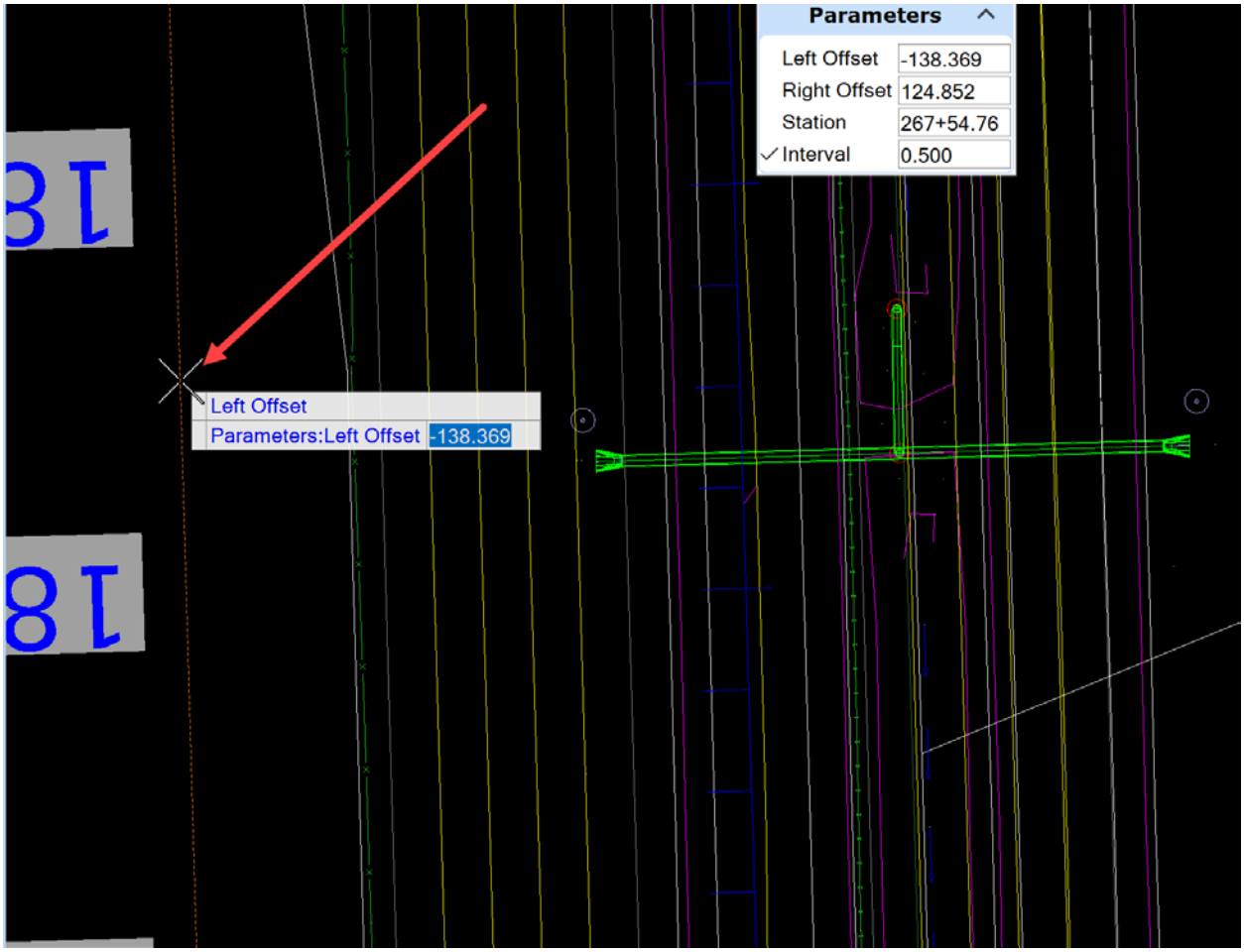
Then select the Open Cross Section View tool.



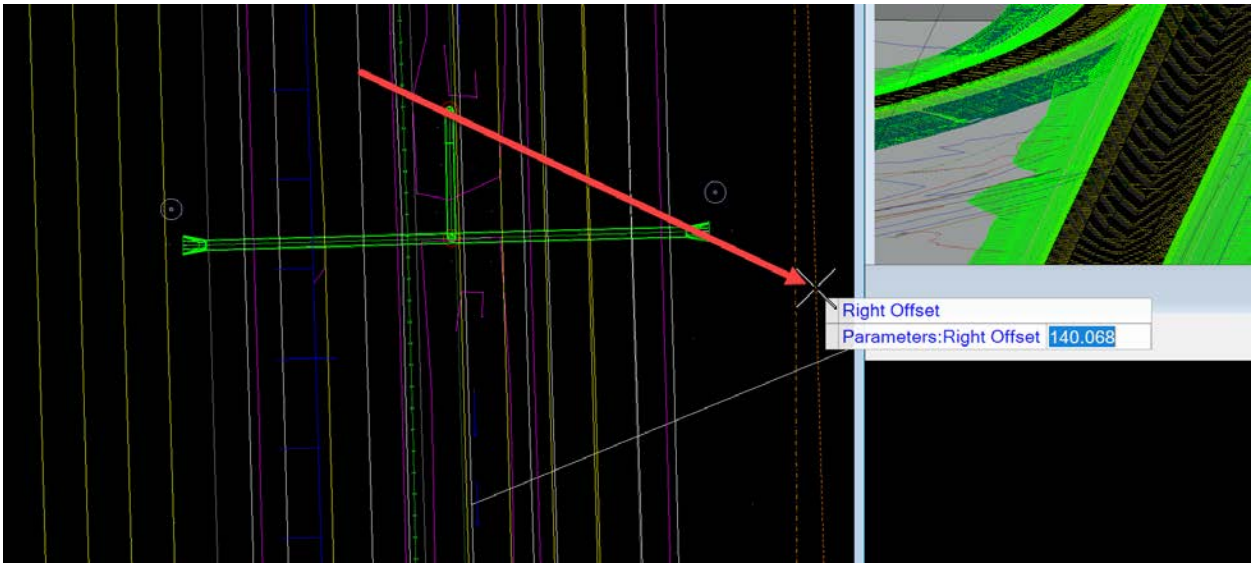
It prompts to locate the alignment.



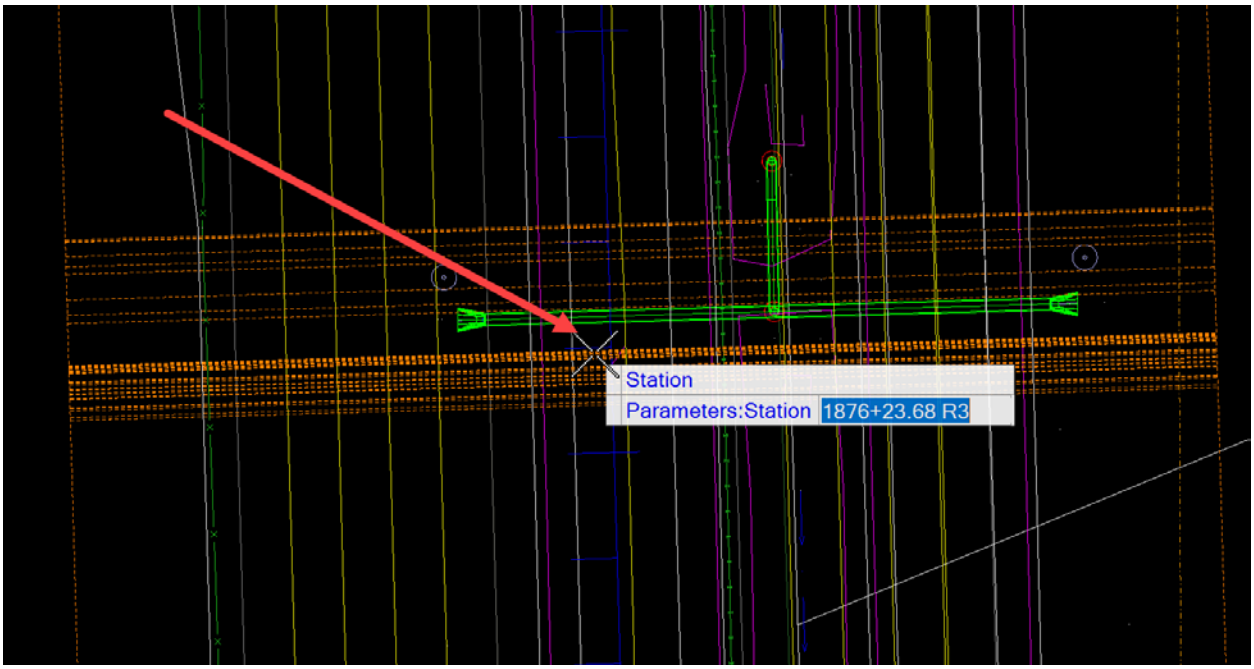
Data point on the alignment in the 2D view, in this example View 1.



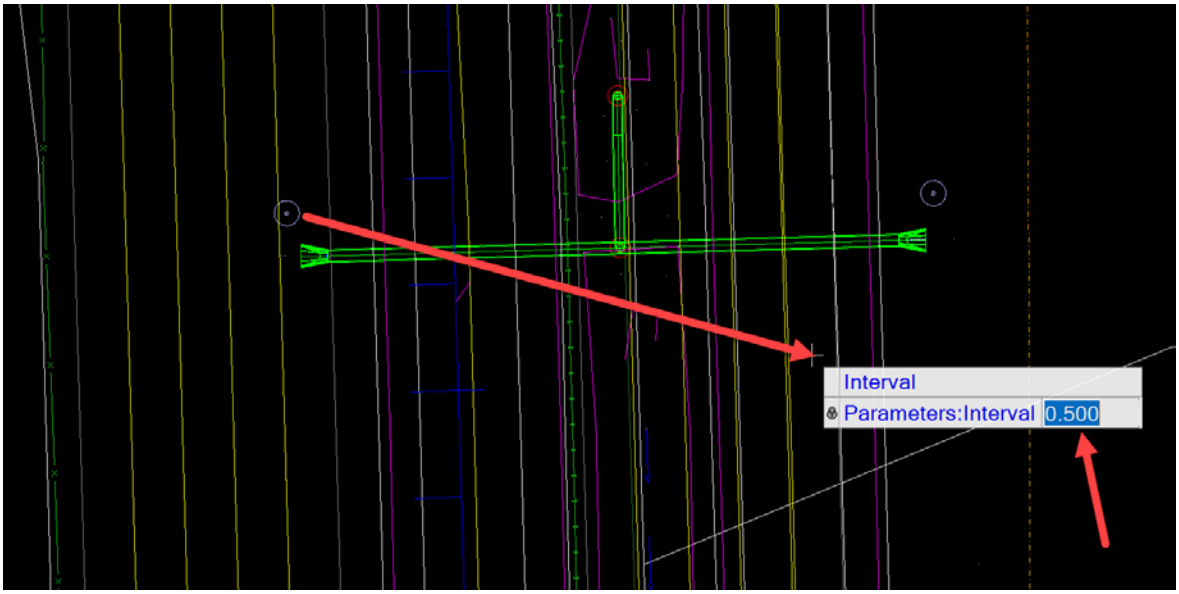
Then select the Offset Left. This will determine how far left the section will cover.



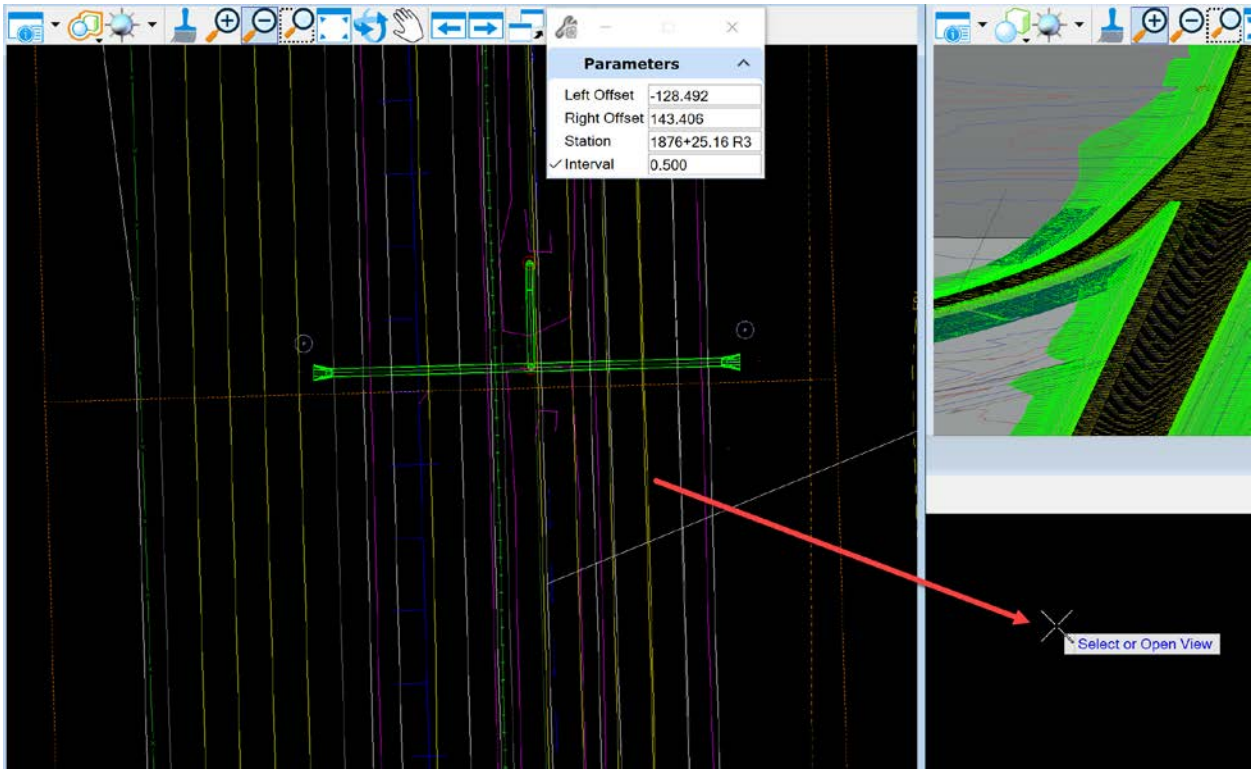
Then select the Offset Right. This will determine how far right the section will cover.



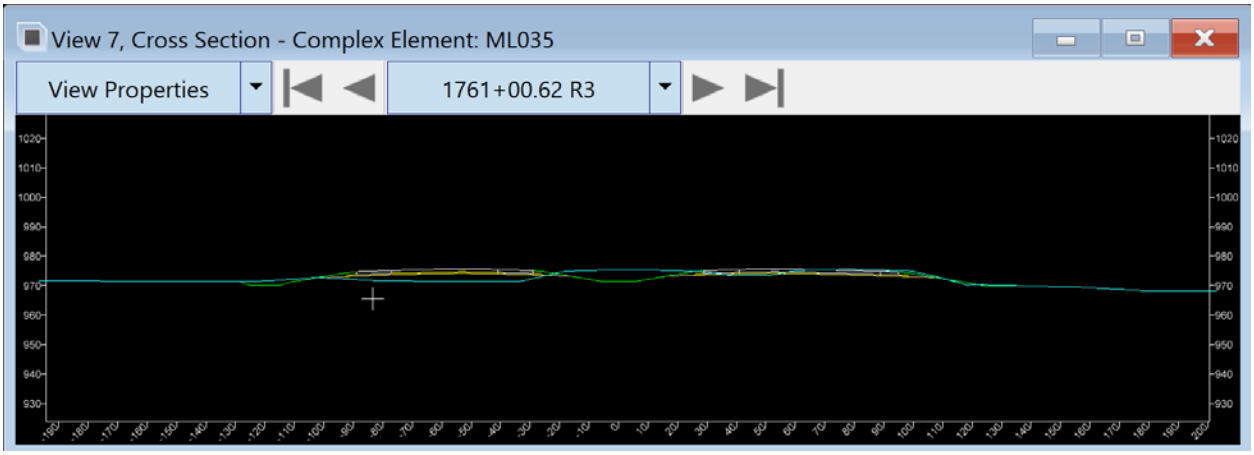
Then select the Station. Note: This does not need to be perfect when selecting it here, it can be adjusted later to a specific station.



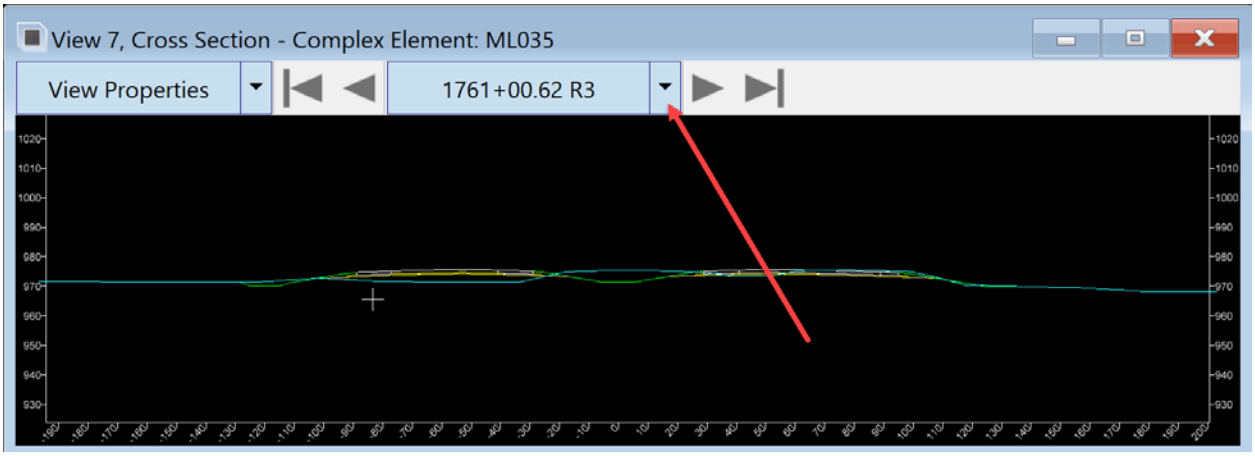
Then Select the Interval. Note: Recommend an interval of 0.5 = 6” for culvert design.



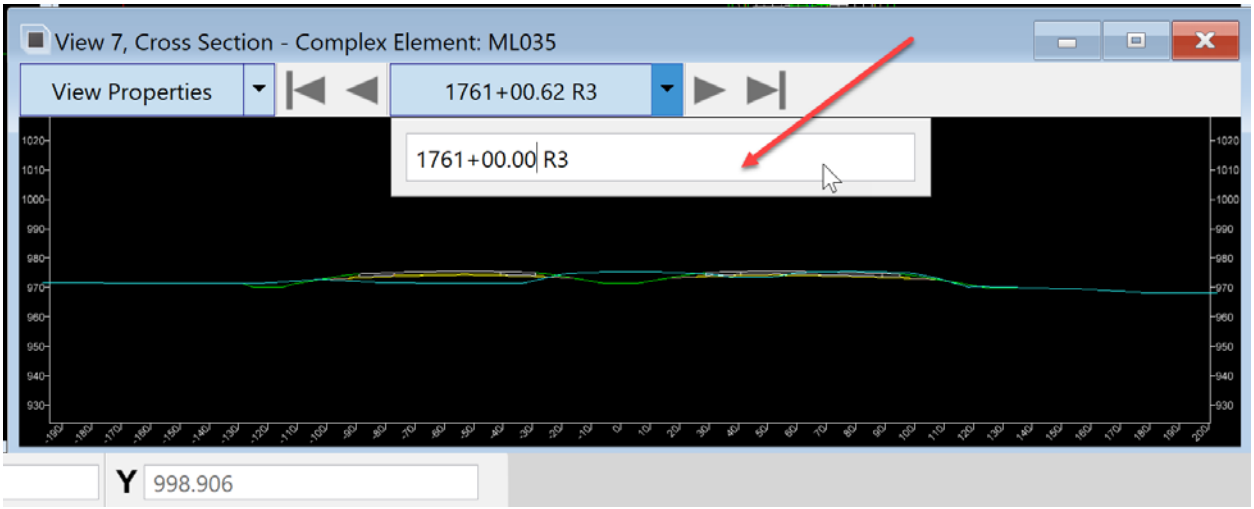
Then Select the View. Data point in View 7 and the section will appear.



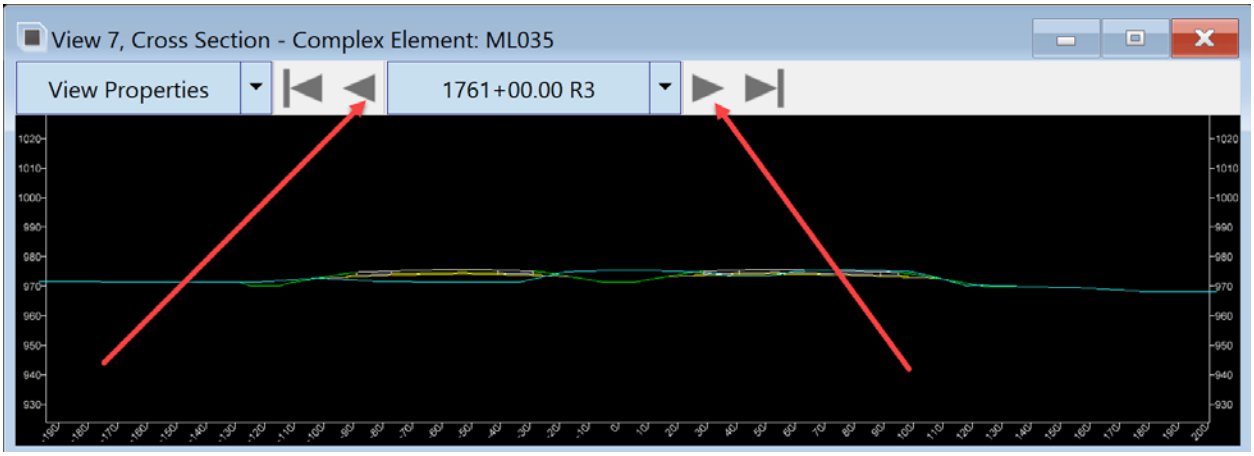
Adjust the Station with the pull down by clicking here:



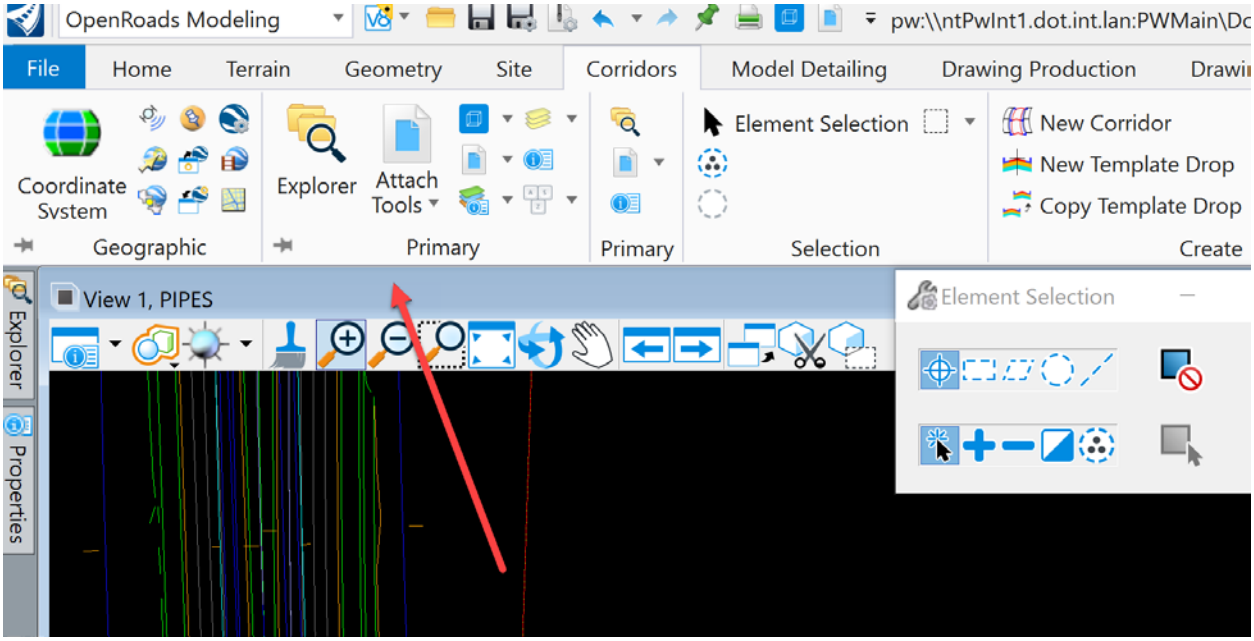
Then type the Station value needed and hit enter.



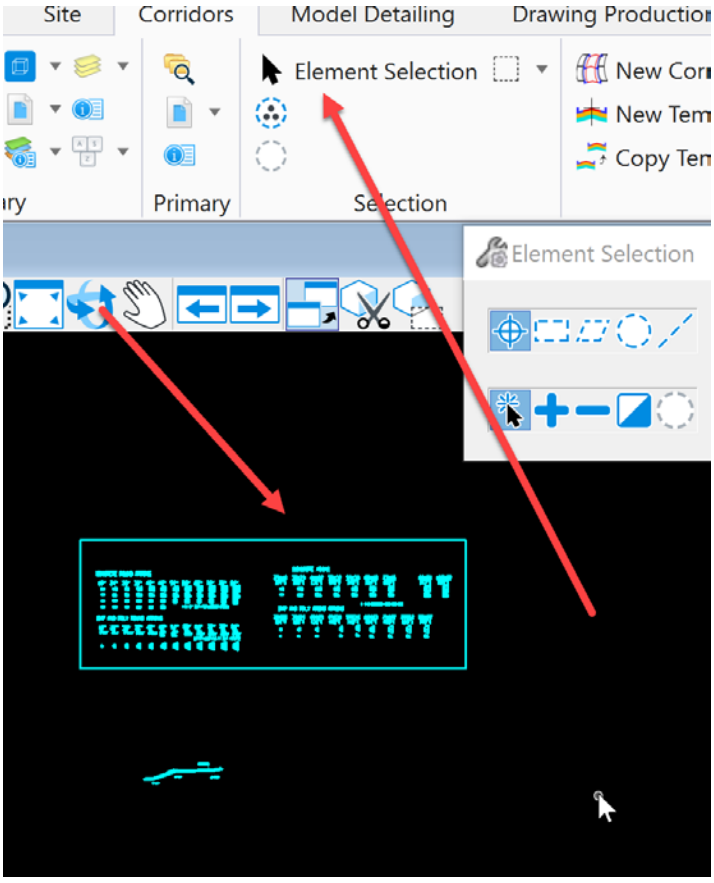
Or use the radio buttons on each side of the Station value, to change the station at the Interval that was selected when the section was created. The value 0.5 = 6” was used so it will advance or move back every 6” by clicking on the buttons.



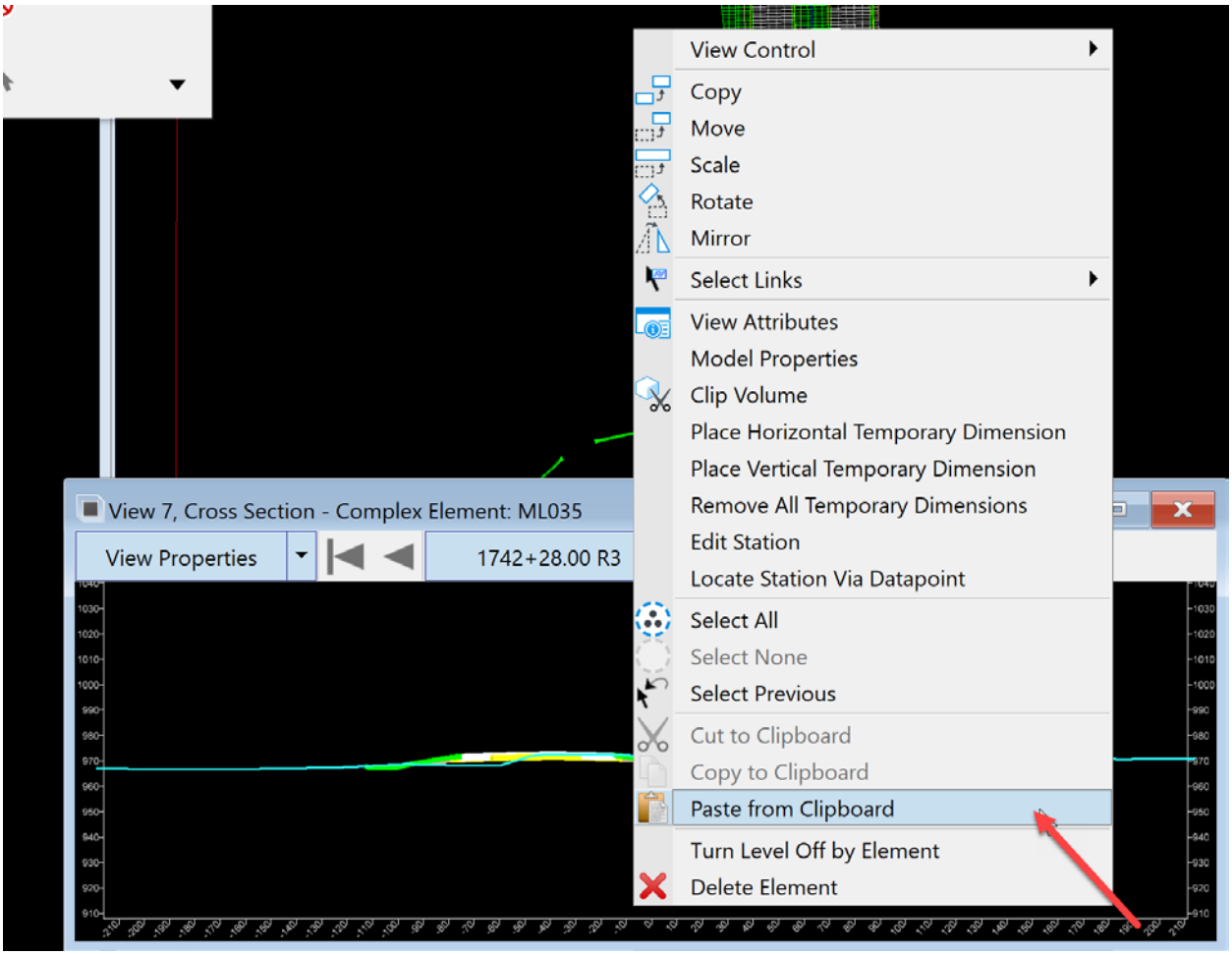
Now that there is a section cut in the area for placing a pipe, one more thing needs added to do the design. Copy the pipe aprons into the cross-section model in View 7. To do this, make the View 1 active by clicking on top of the view.



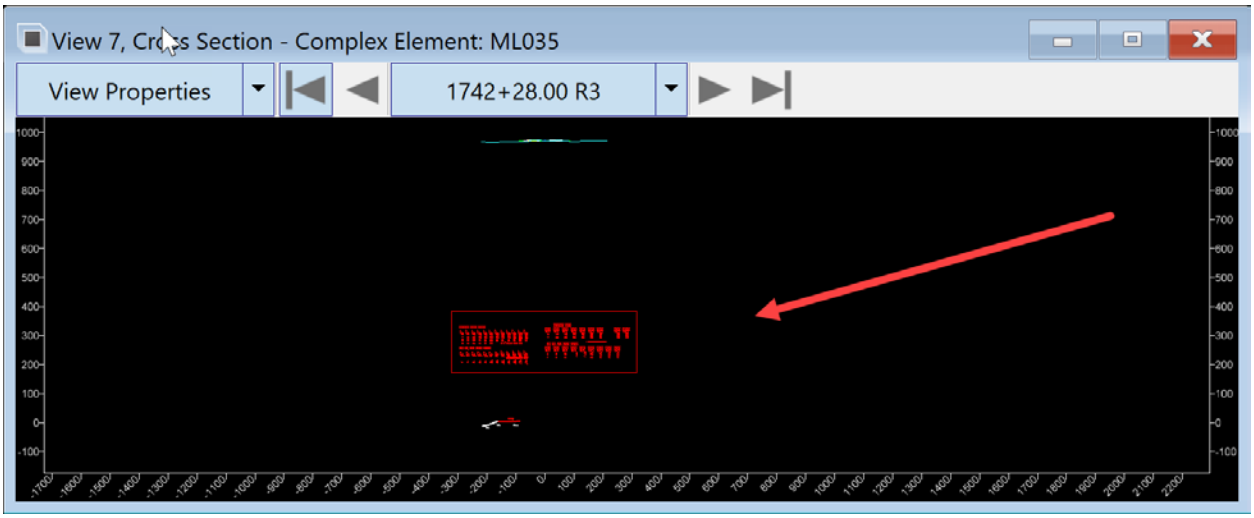
Then with the element selection tool, select the pipe aprons that were placed near the design corridor.



Then press the ctrl + C key on the keyboard to do a copy. Then make the View 7 active by clicking on top of the view. Then in the View 7, right click and hold for a second to access the right click menu.



Select Paste from Clipboard. The aprons should appear on the end of the cursor in that window. Datapoint to place them in this window.

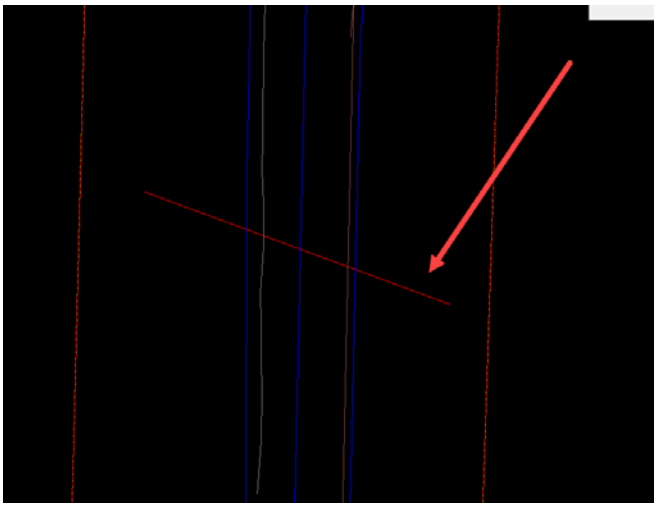


What was done provided a copy of the apron cells into the cross section model that will be used to determine the invert locations of the pipes in the cross section. Keep in mind, that these will be in this model no matter what section is cut until deleted.

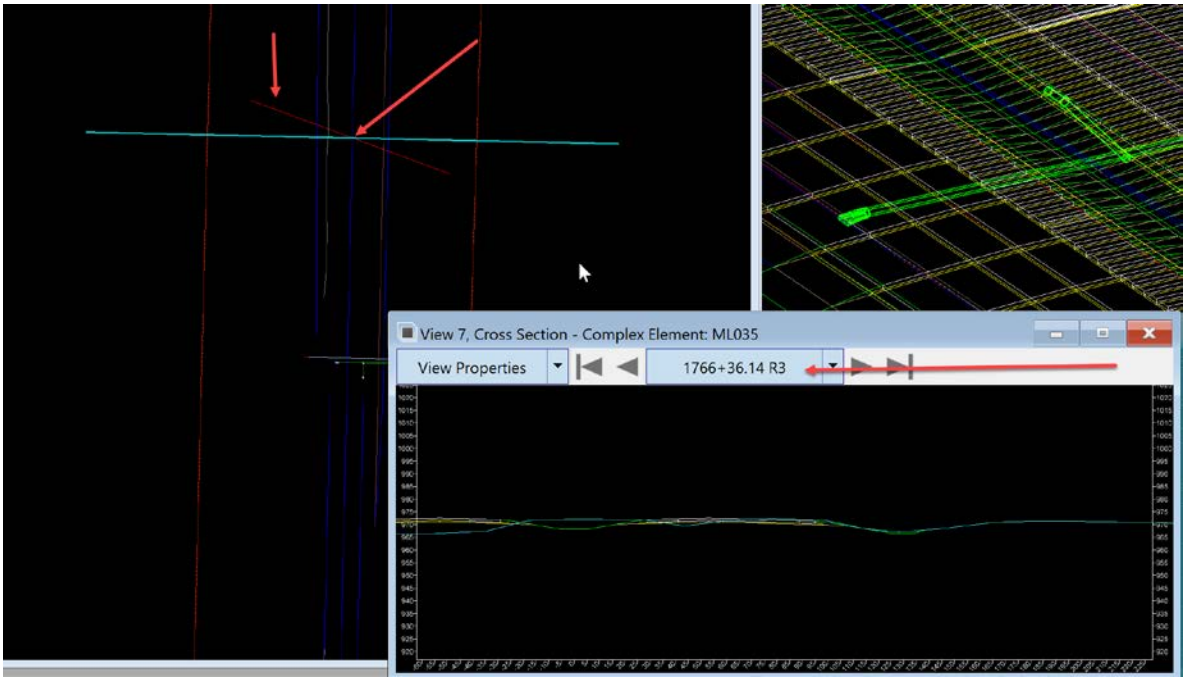
If the designis for a structure and/or pipe that is not perpendicular to the alignment, use the second method that will be designing in the profile window.

Second Method

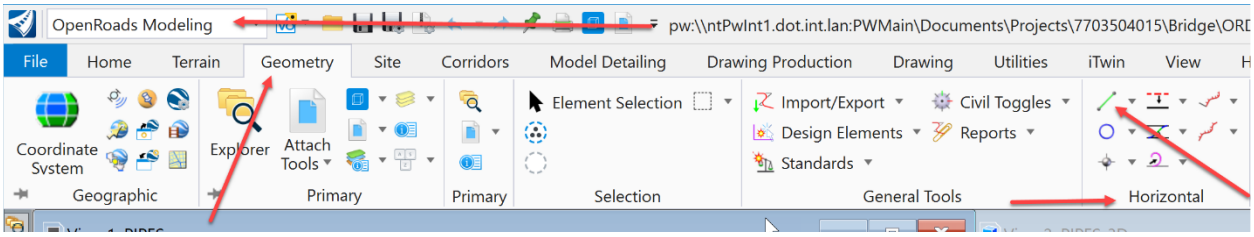
Designing in the profile window - To do this, place a line where the structure should be placed.



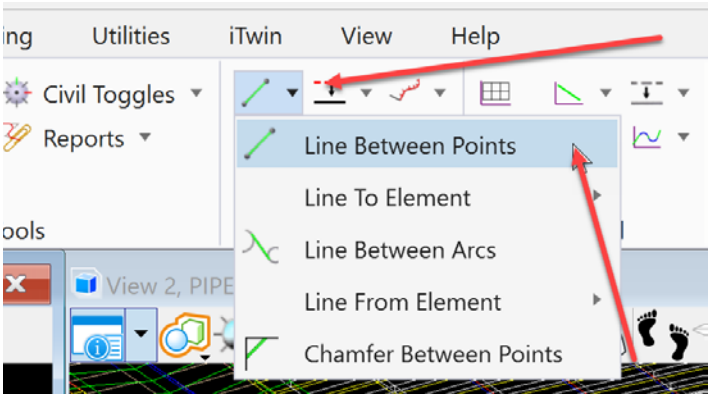
Then, cut a section on that line where it intersects the alignment. This will give us a station value for the new structure. For this example, it will be STA 1766+36.14



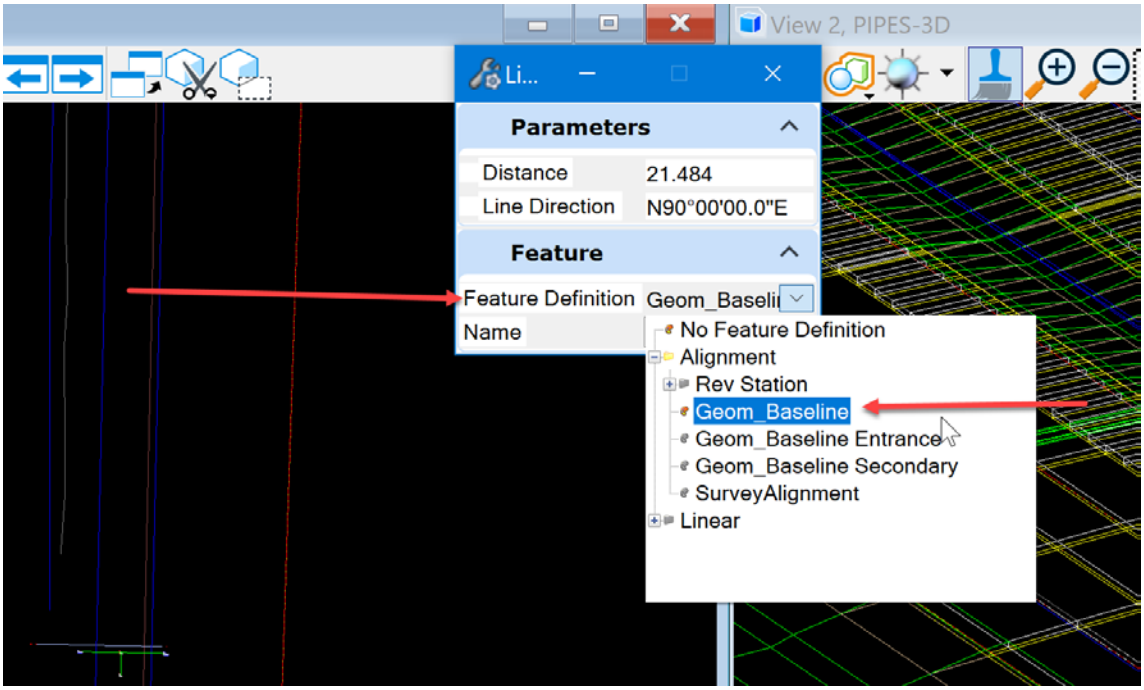
Next, place a geometry base line on the line placed as the structure alignment (the red line in the image above). To do this, change the workflow to OpenRoads Modeling workflow. On the Geometry tab select the Line tools in the Horizontal group.



Select the Line Between Points tool.

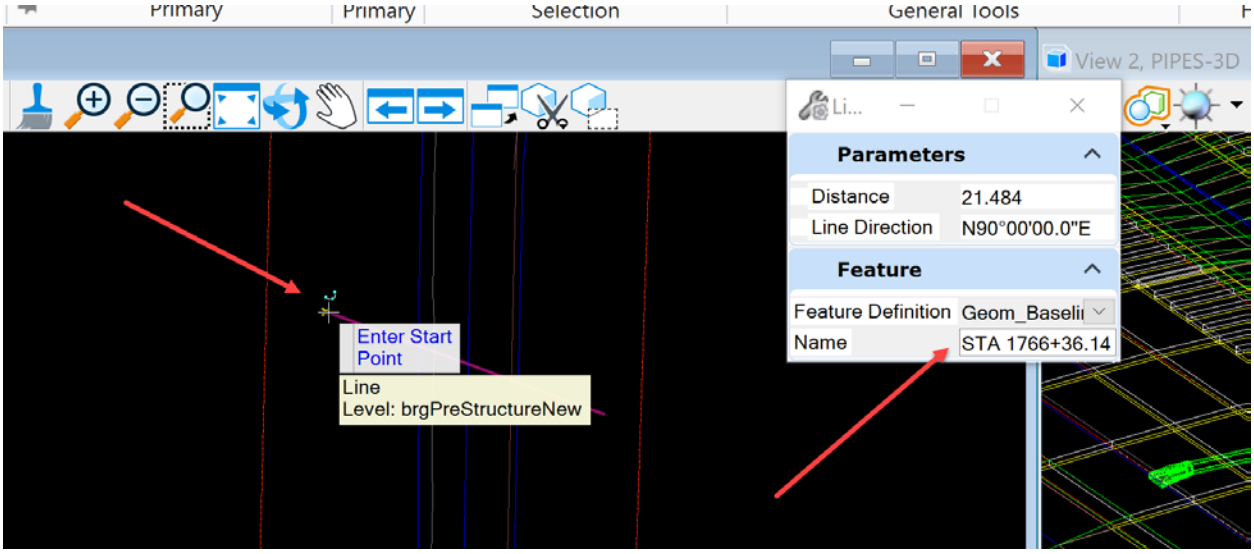


Then set the Feature to Geom_Baseline

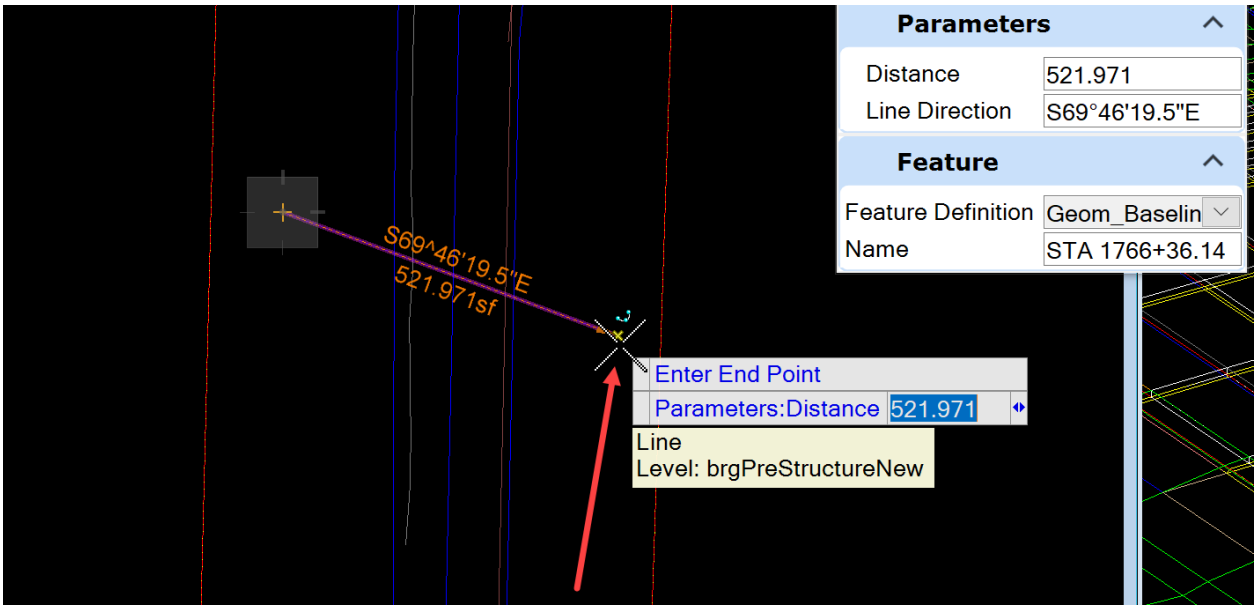


Next, name the feature the station location of the proposed structure.

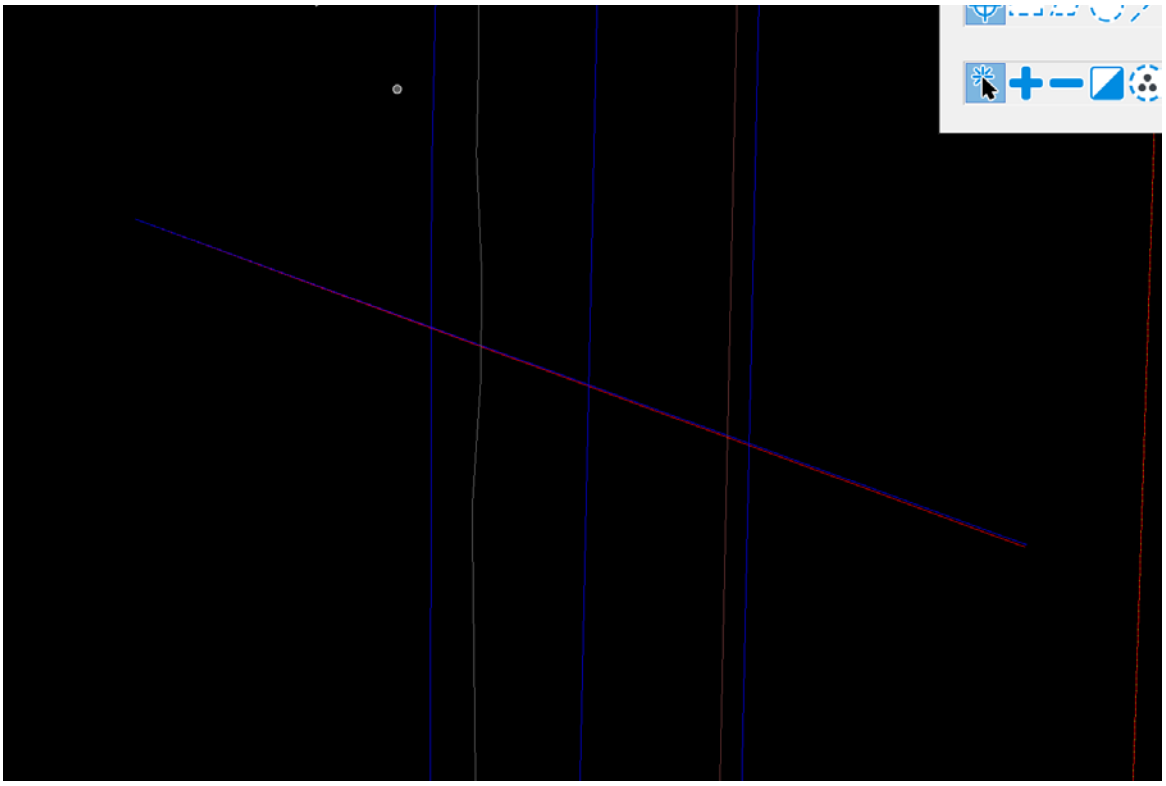
For this example it will be STA 1766+36.14.



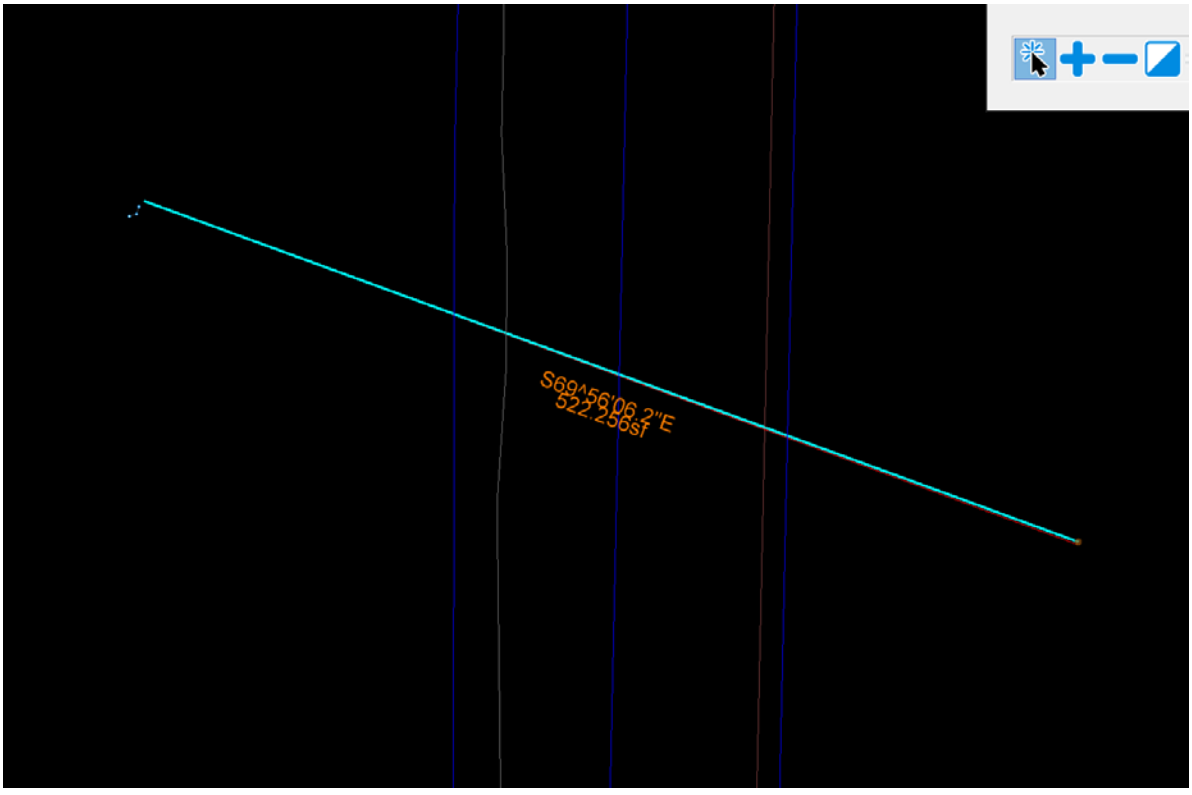
Then select a start point by snapping on the end of the line placed as the structure alignment (the red line in the image above).



Then enter the end point. It should appear similar to below.

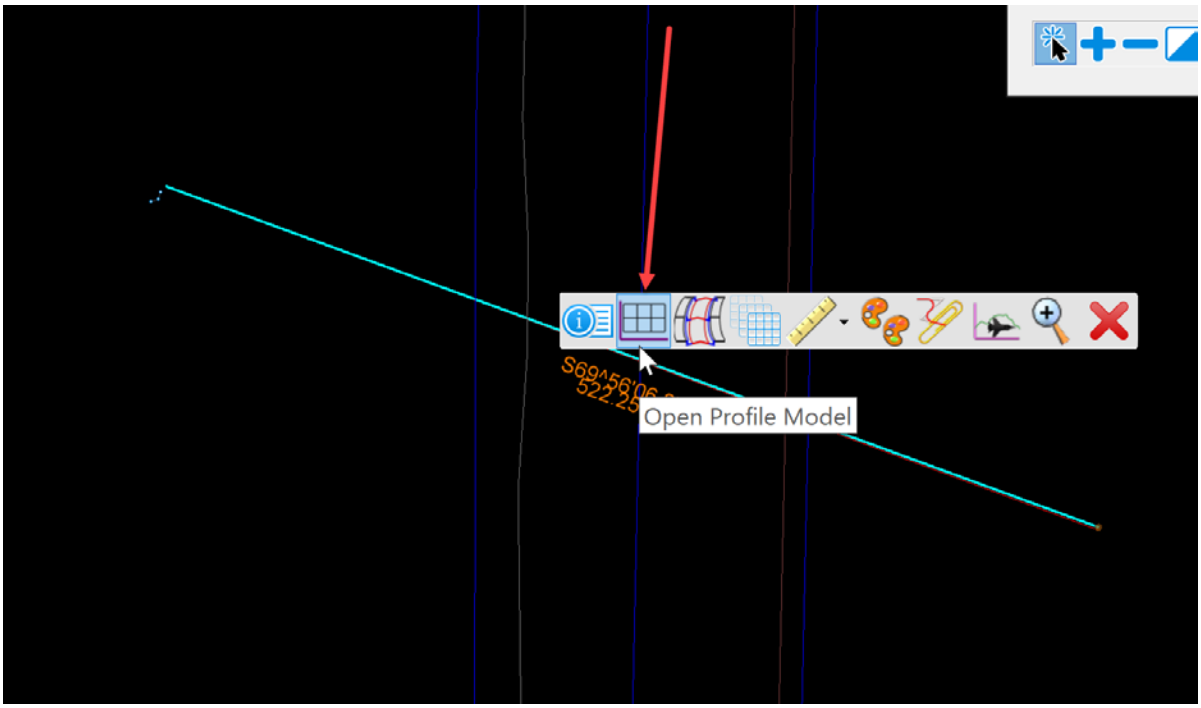


Next with the element selection tool, select the geometry just created.

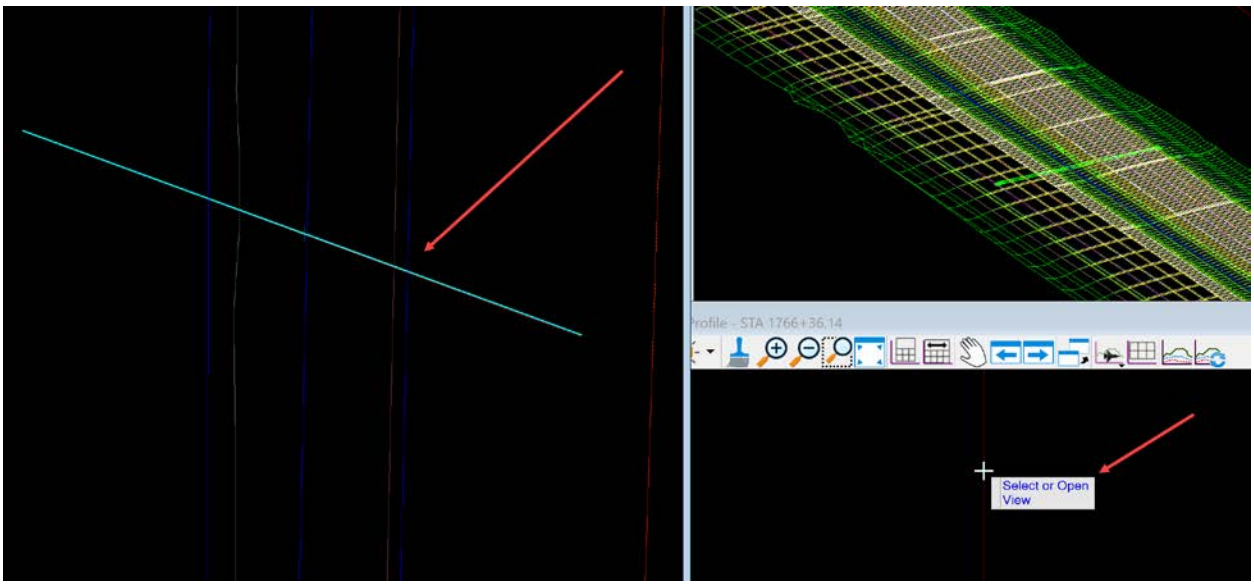


Next, open a window to view the profile in. Recommendation is to use View 8 for the profile window and View 7 for the cross-section window. Do not try to use the same window for both.

For this example, use View 8. Once the view is open, return to View 1 that has the geometry just created already selected. Hover over it to open the heads-up tools.

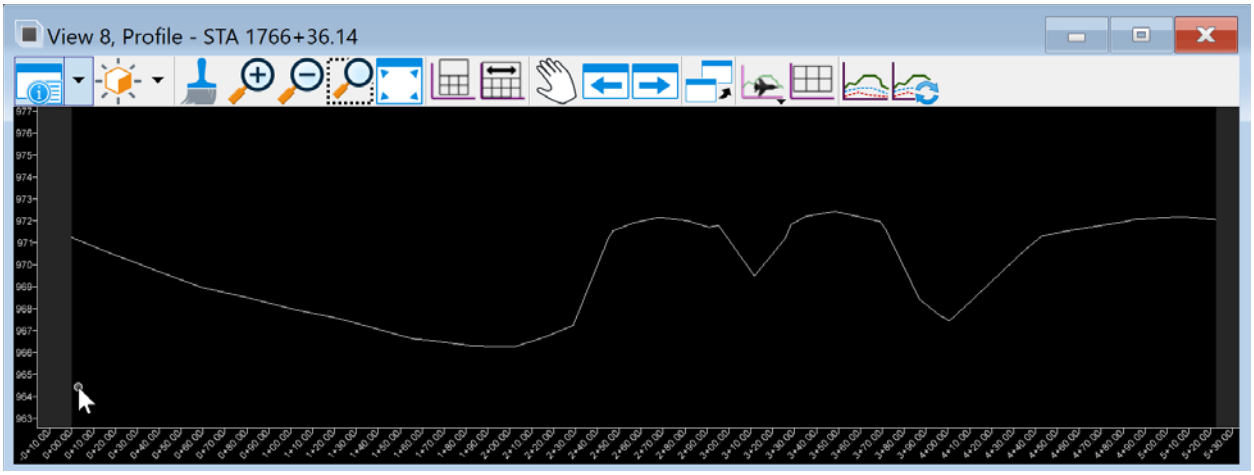


Then select the Open Profile Model tool.

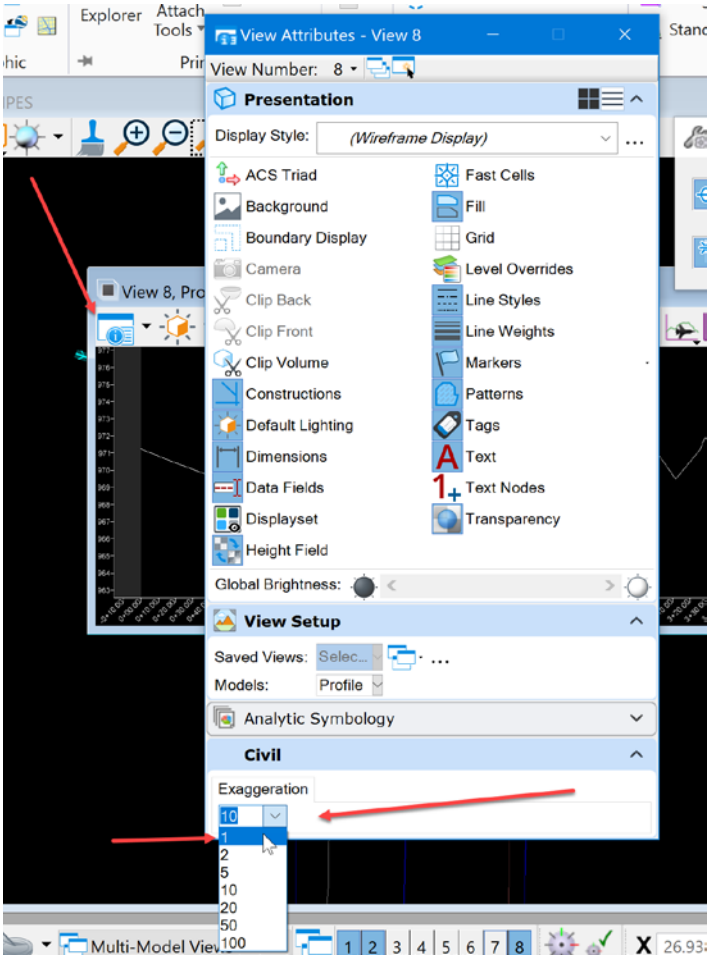


It will prompt to select or open view. Data point in the open profile window that is View 8 for this example.

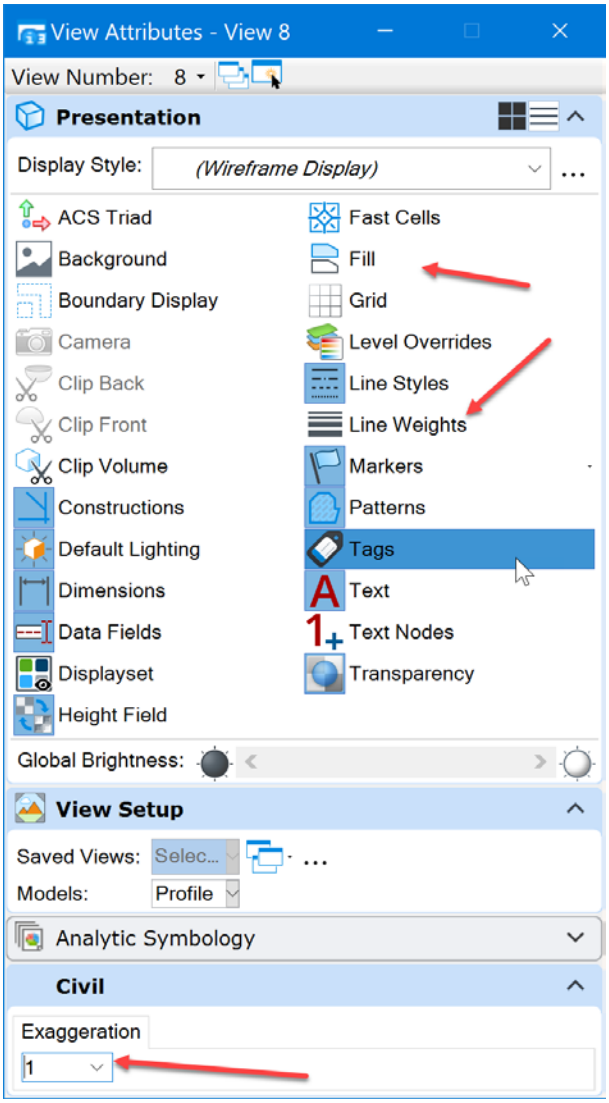
It should appear similar to below.



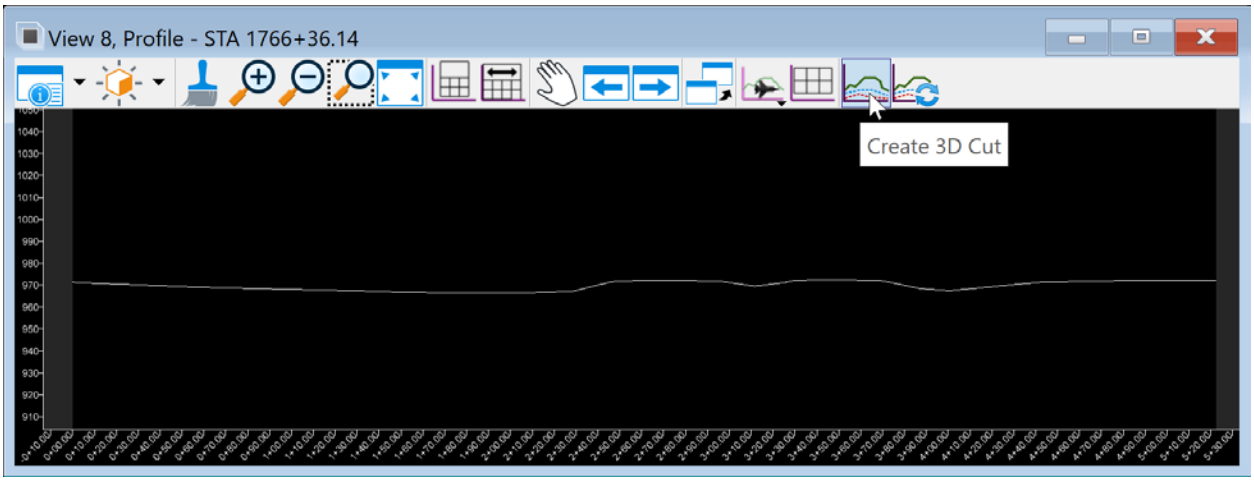
Next, set the exaggeration to 1 in the View Attributes dialog box.



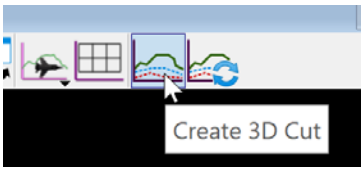
Also recommend having the fill and line weights turned off.



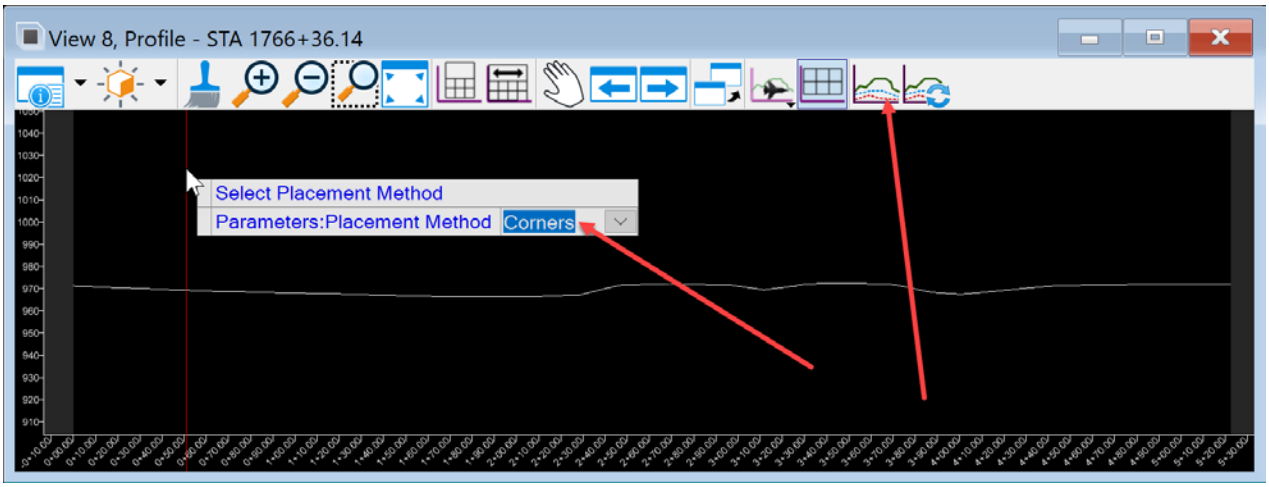
Next, create a 3D cut along this geometry



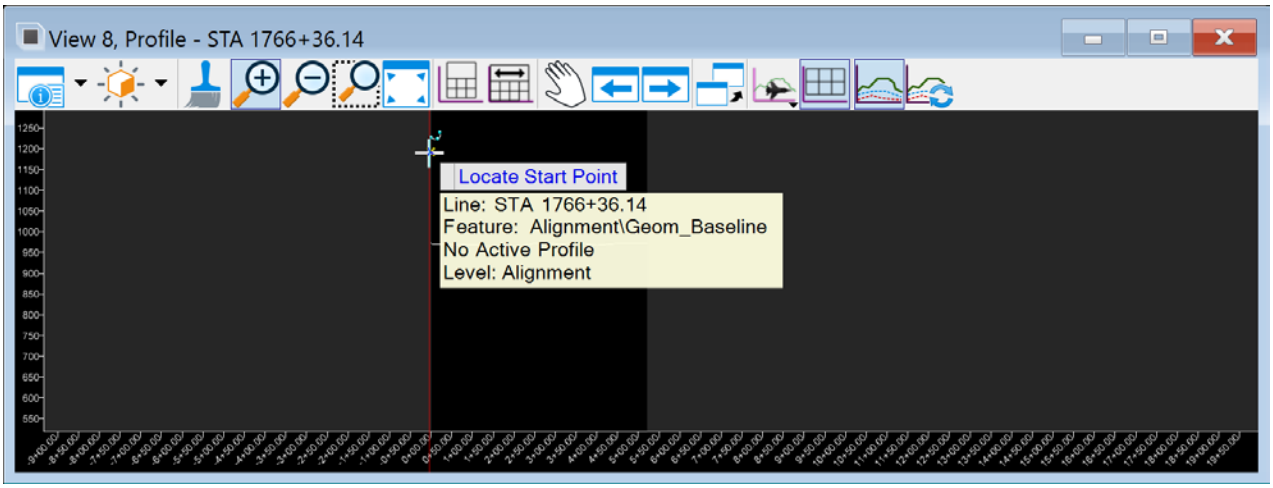
To do this, select the Create 3D Cut tool



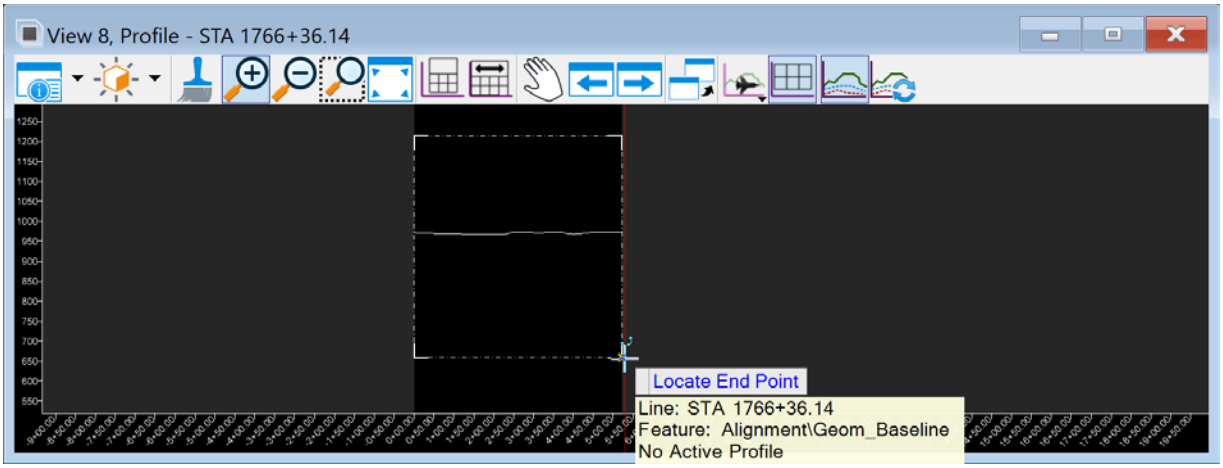
Use the Corners method. Data point to accept the method.



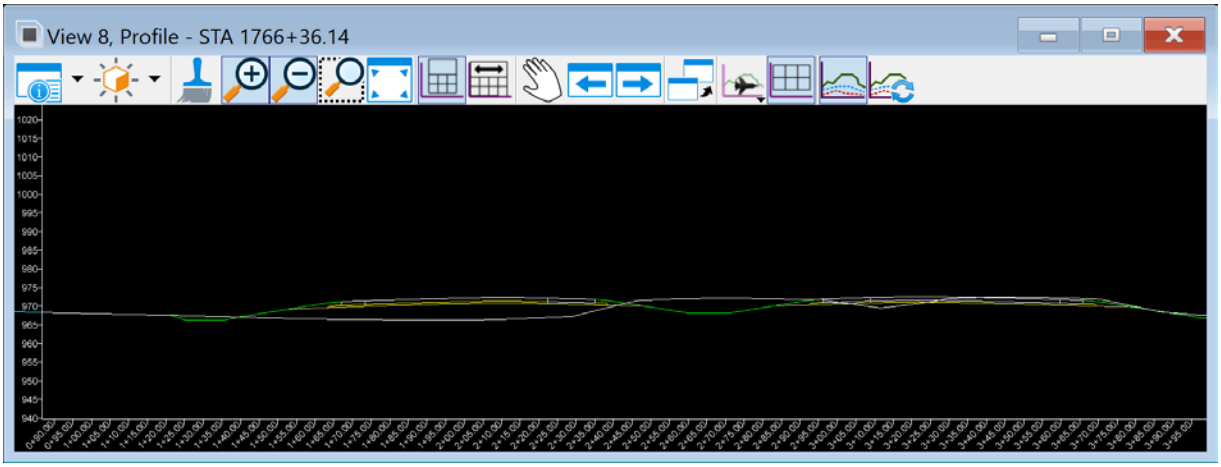
It will prompt to locate the start point. Make sure the start is all the way to one side or the other. Recommend to start at the top right and end at the lower left.



After the data point, it will start drawing a box in the view that the 3D cut is in.

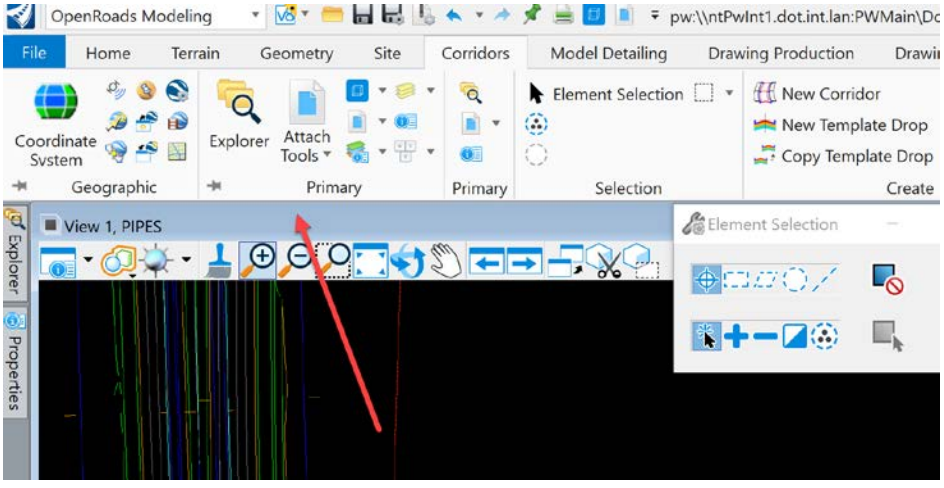


Data point the end point to complete the 3D cut. It should appear similar to below.

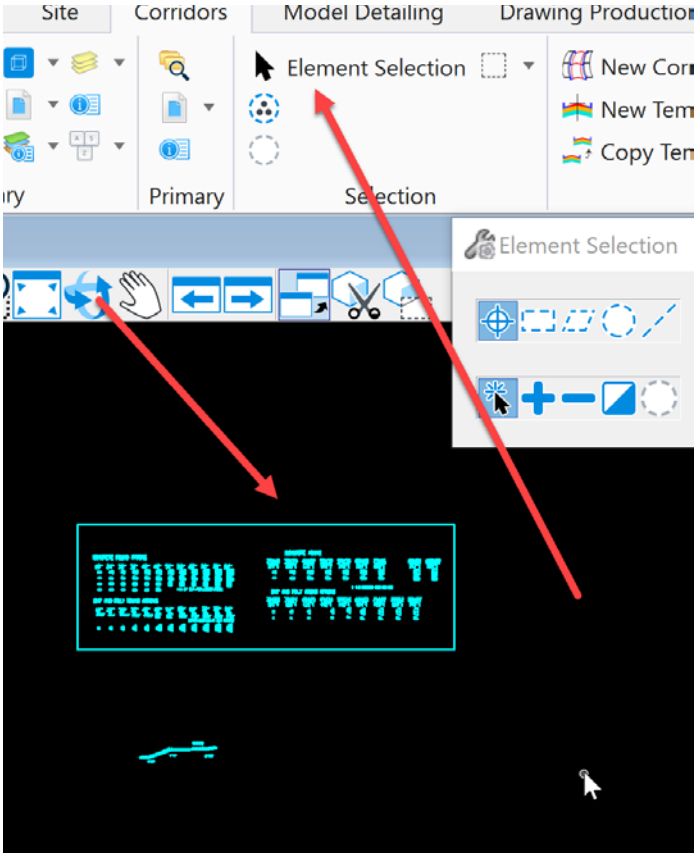


Now that there is a 3D cut created in the area for placing a pipe, one more thing needs added to the view to do the design, copying the pipe aprons into the profile model in View 8.

To do this, make View 1 active by clicking on top of the view.

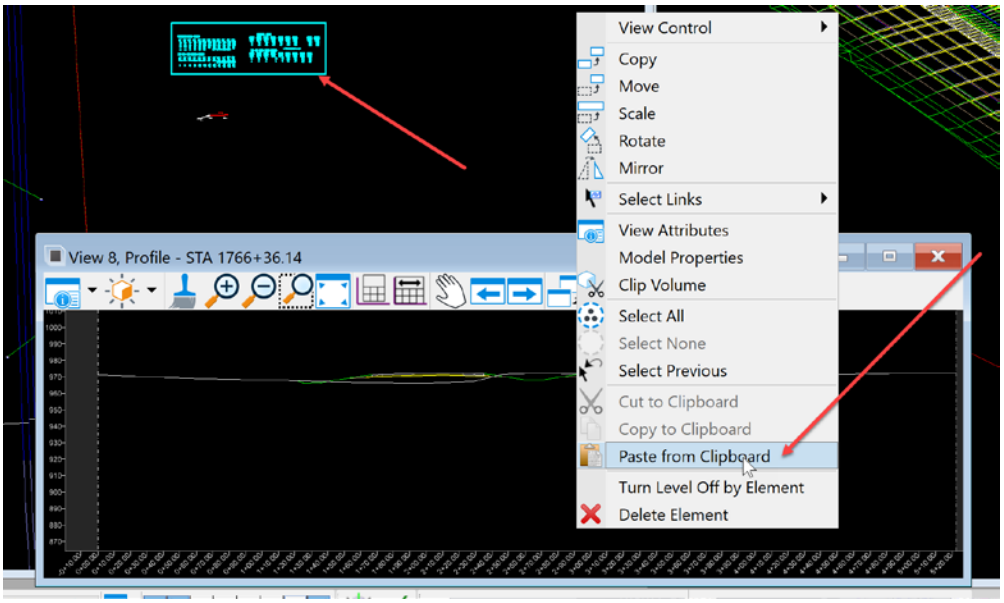


Then with the Element Selection tool, select the pipe aprons that were placed near the design corridor.



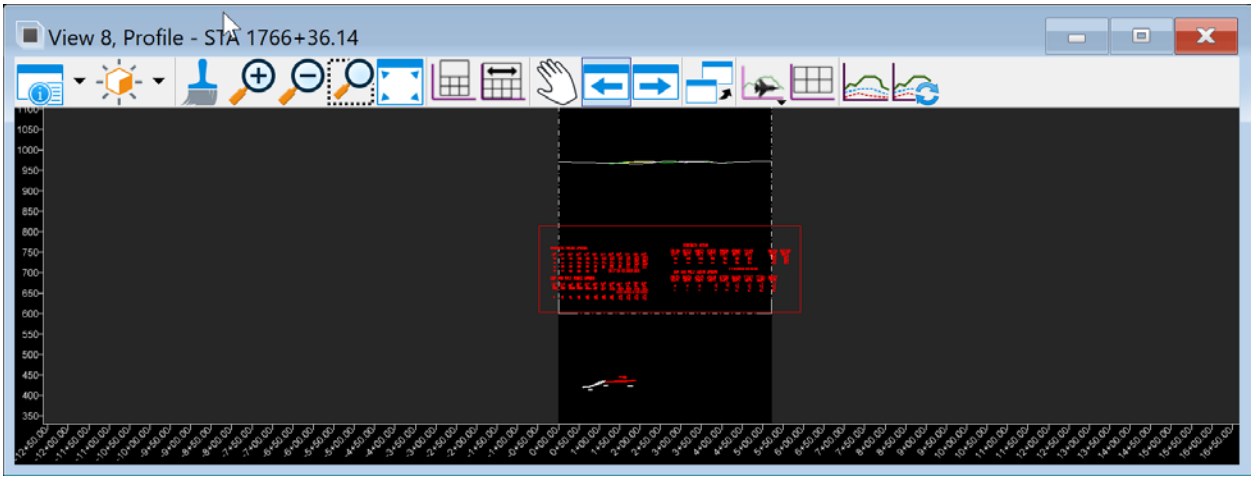
Press the ctrl + C keys on the keyboard to do a copy.

Then, make View 8 active by clicking on top of the view. Right click and hold for a second to access the right click menu.



Select Paste from Clipboard.

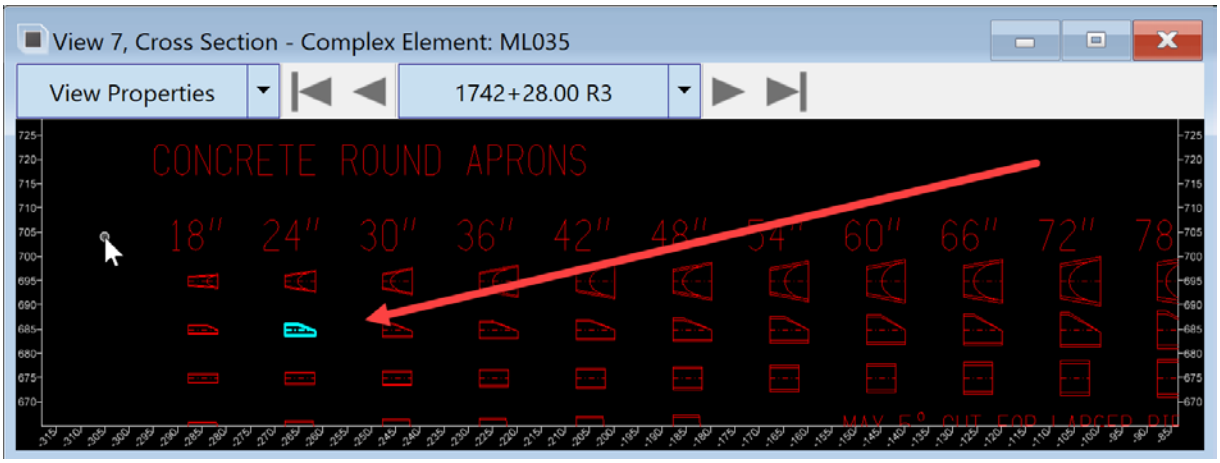
The aprons should appear on the end of the cursor in that window. Datapoint to place them in this window.



Keep in mind, that these will be in this model no matter what section is cut until deleted.

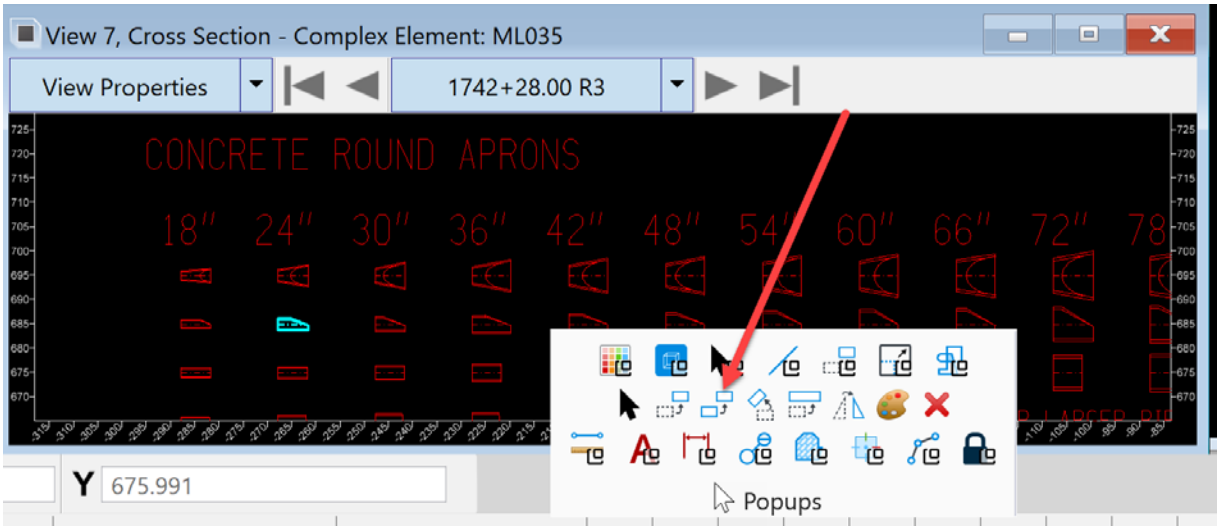
What was done provided a copy of the apron cells into the profile model that will be used to determine the invert locations of the pipes in the profile 3D cut. These will be in this model no matter what profile and profile 3D is cut until deleted.

Now the file is ready for design. For this example, the design is a 24" RCP crossroad pipe. In the section view, View 7 in this example, zoom in on the 24" RCP pipe apron and select it with the element selection tool.

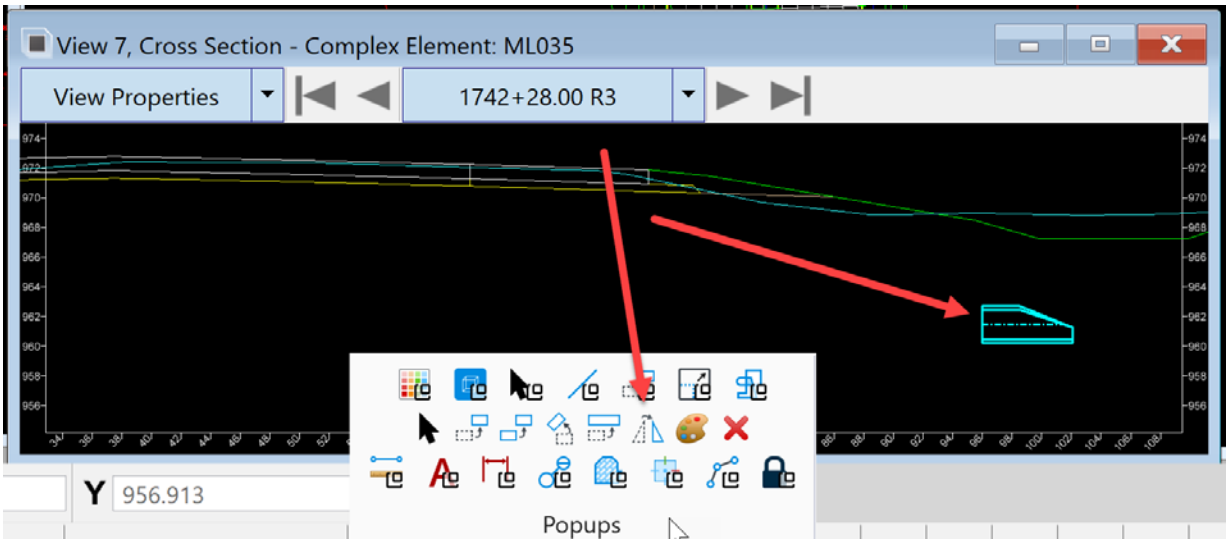


Then with the copy command, copy the apron and place it close to the cross section. Note: to quickly access the copy command press the spacebar on the keyboard.

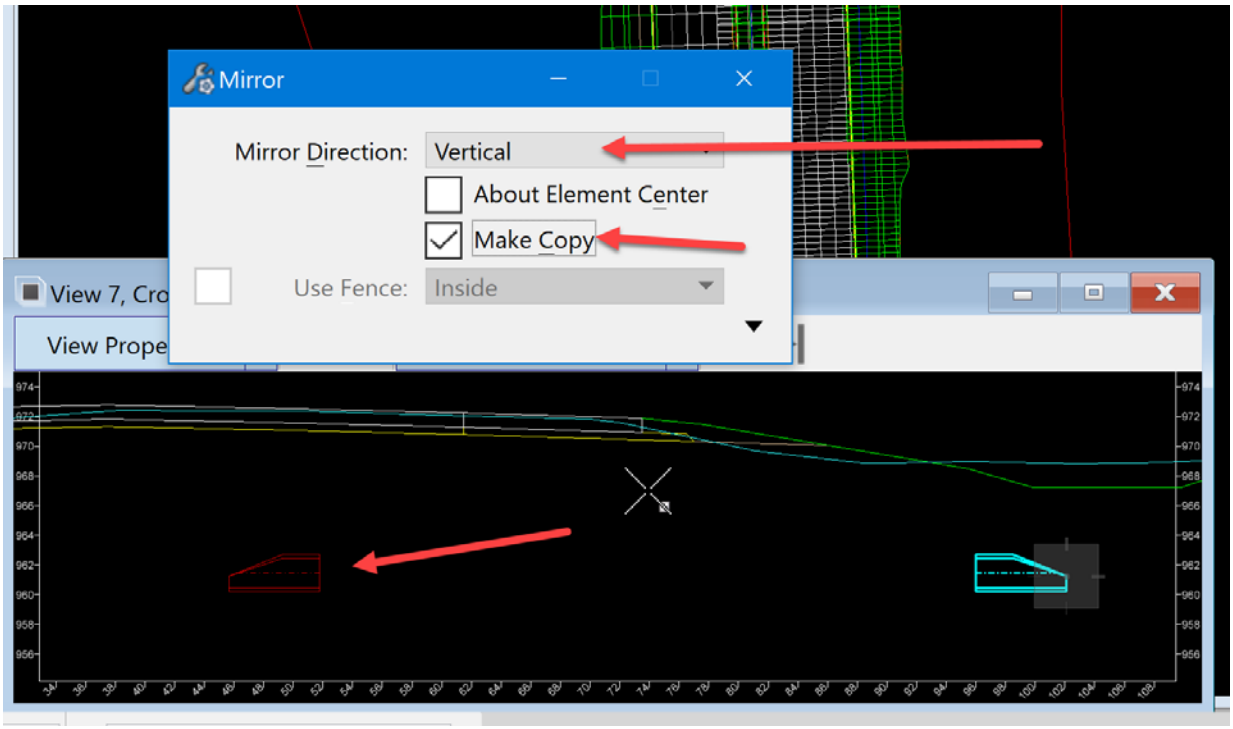
The Popups will appear. Select the copy command.



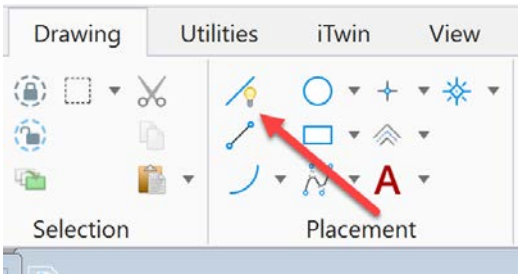
While the copied apron is still selected, press the spacebar on the keyboard and select the Mirror command.



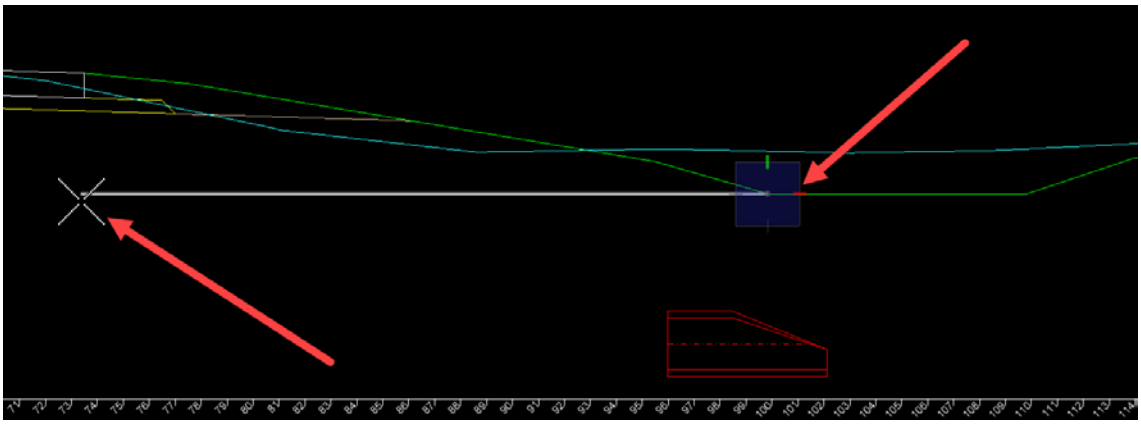
Set the Mirror Direction to Vertical and turn on the Make Copy option. Then place the mirrored copy on the other side of the section.



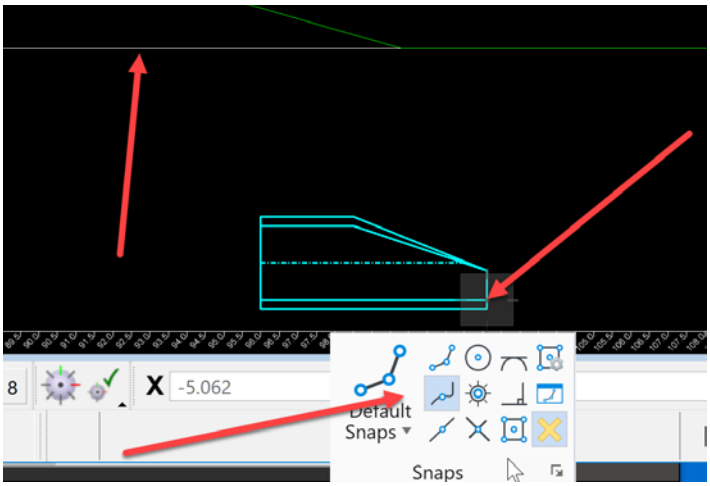
Next, select the smart line command.



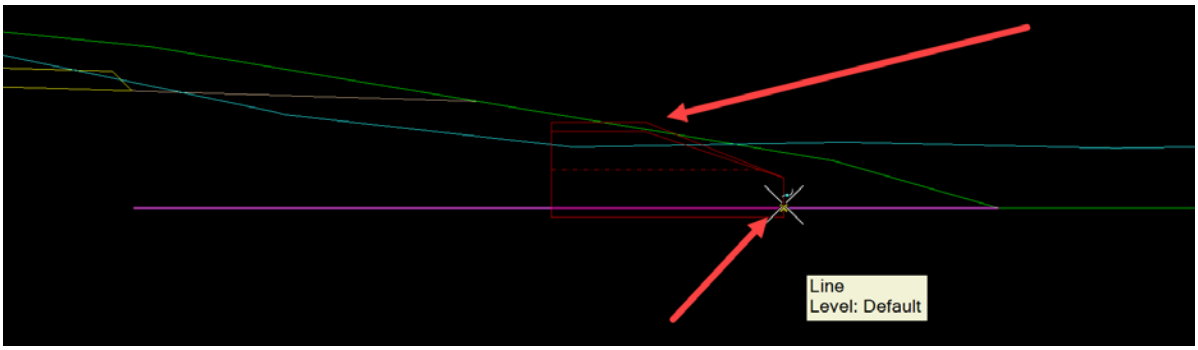
With AccuDraw turned on, snap to the lowest point in the ditch and draw a line using the compass locked on that axis from that point.



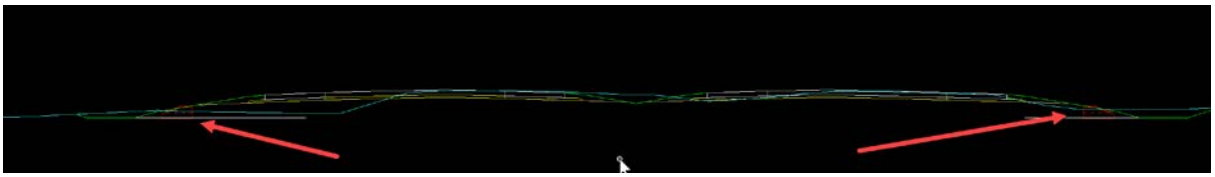
Then use the Element Selection tool to select the apron copied to that side of the section



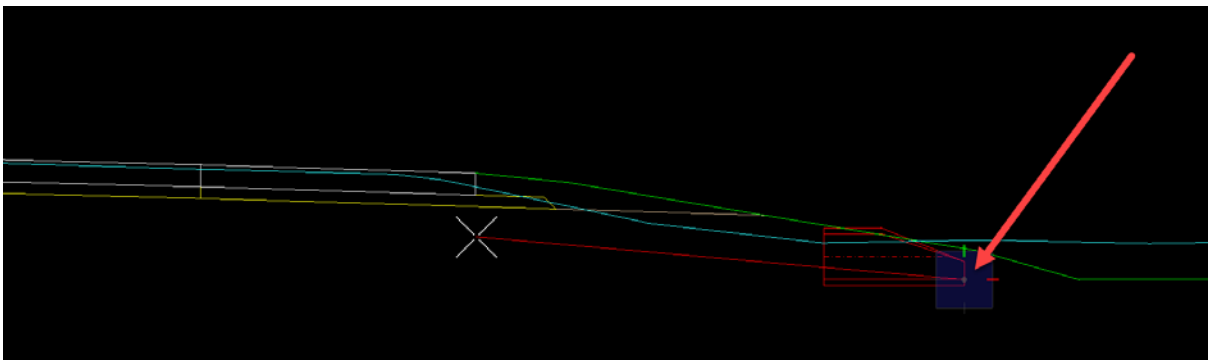
Once it is selected, use the move command to place it at the end of the apron on the flowline. Then set the AccuSnap mode to nearest snap.



Place the apron along the line that represents low point elevation of the ditch until the apron is just peeking out of the foreslope in the section.

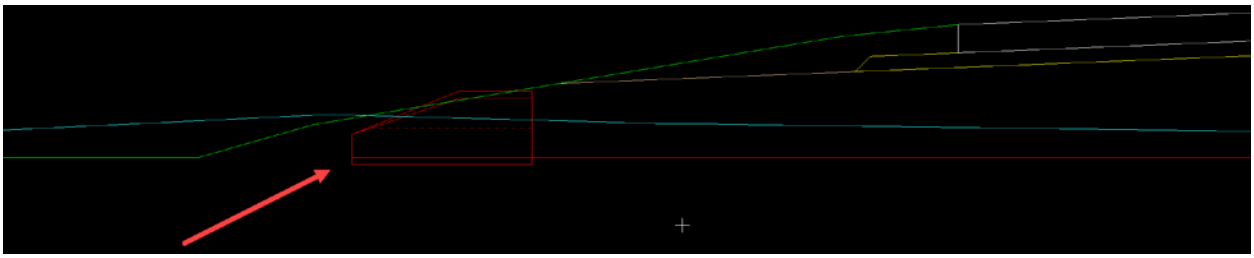


Next, repeat this on the other side of the section.

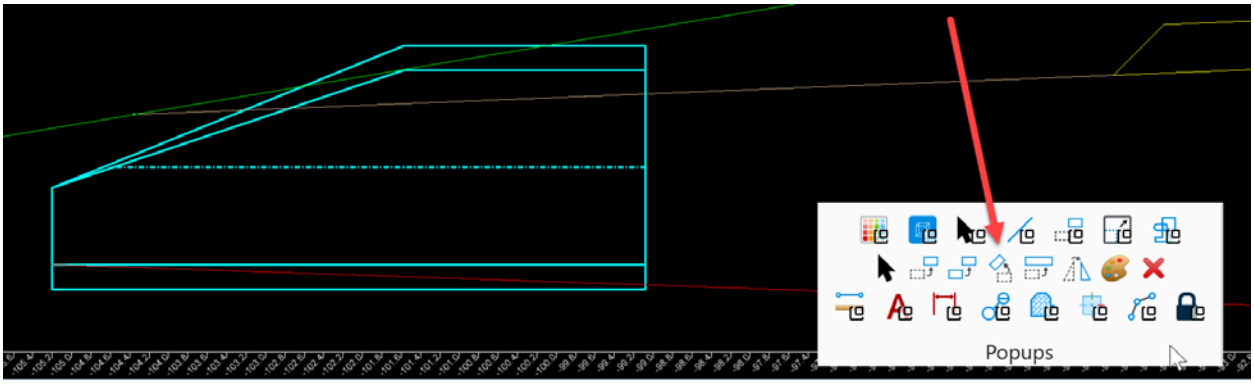


Once the aprons are placed on each end, the lines that were used to establish the ditch elevations can be deleted.

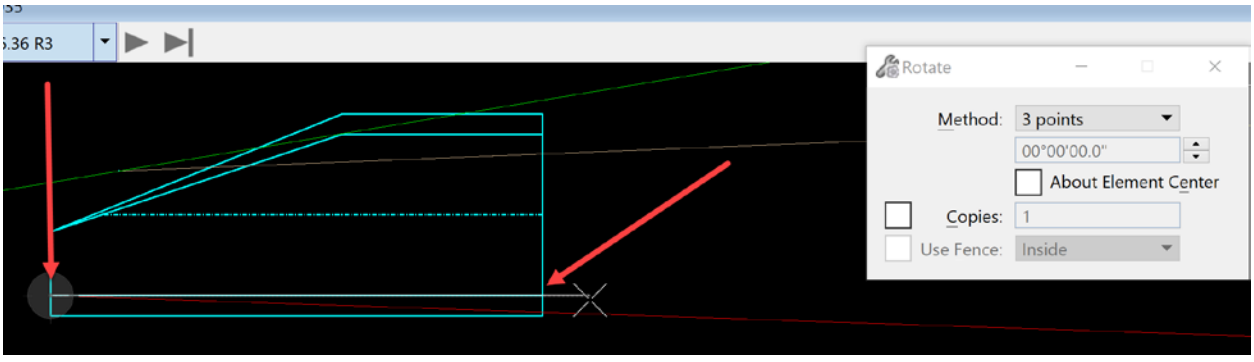
Next, place a smart line from the flowline end of the apron at one end to the flowline end of the apron at the other end. This is also a great place to check the % of fall the structure has.



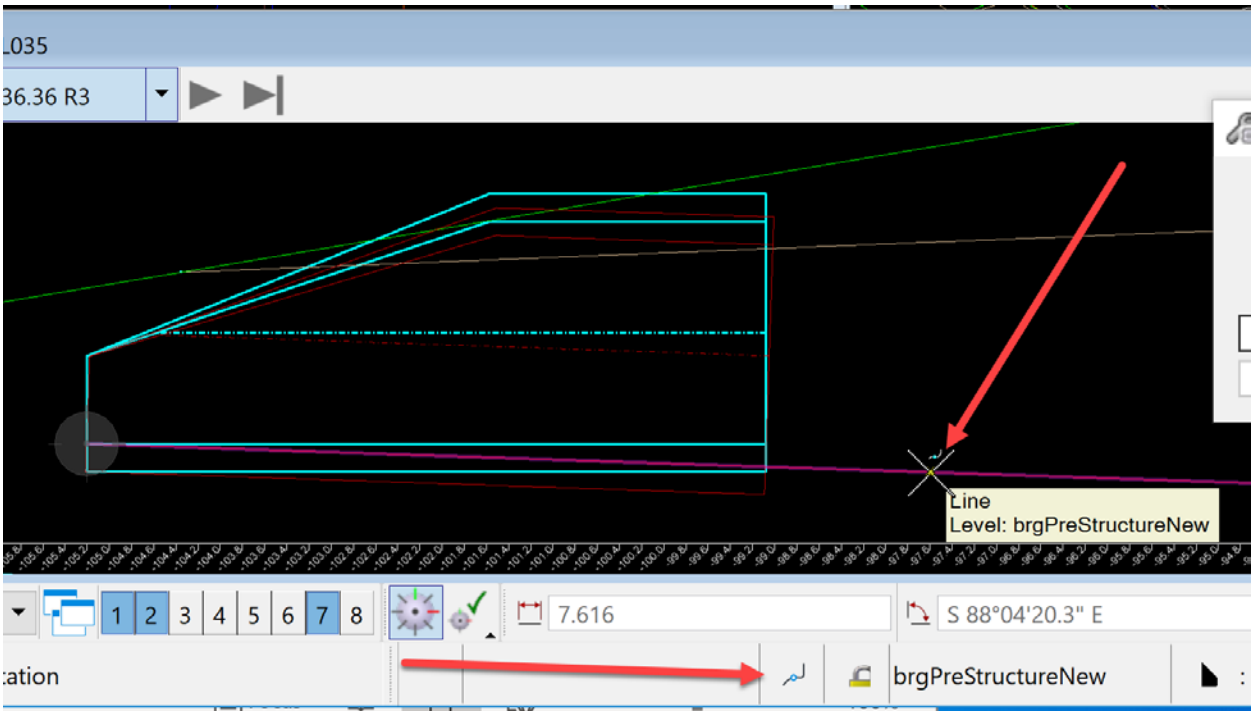
Next, rotate the aprons at each end of the structure to match the % of fall the structure has. To do this use the element selection tool and select the apron.



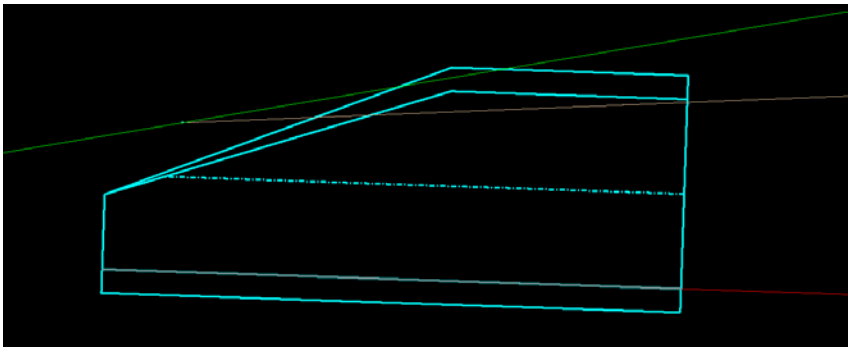
Press the spacebar on the keyboard and select the rotate command. Set the Method to 3 points and select the point at the flowline at the end of the apron for the first point. For the second point select the flowline at the pipe joint.



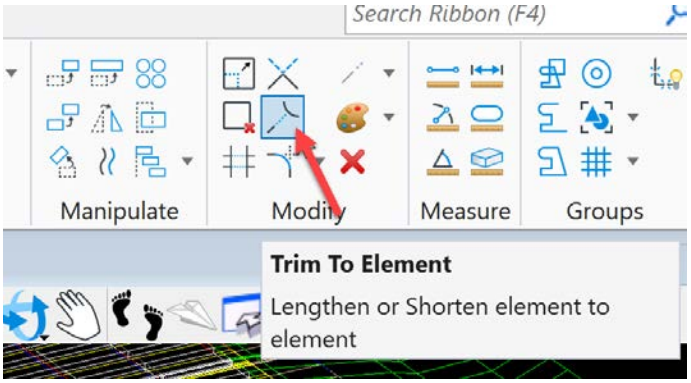
Then for third and last point, change the AccuSnap to a nearest snap and snap the line that was placed from end of apron to end of apron.



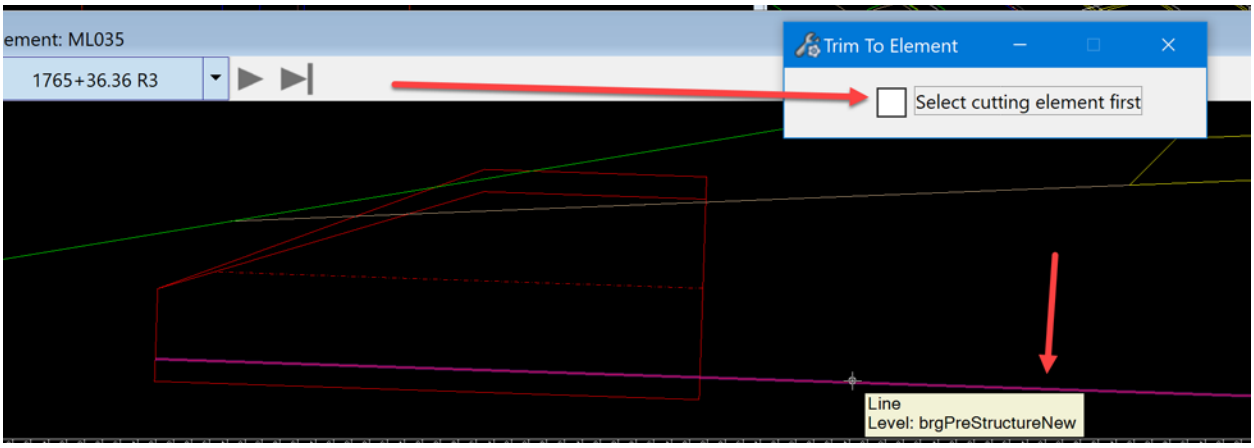
It should appear similar to below.



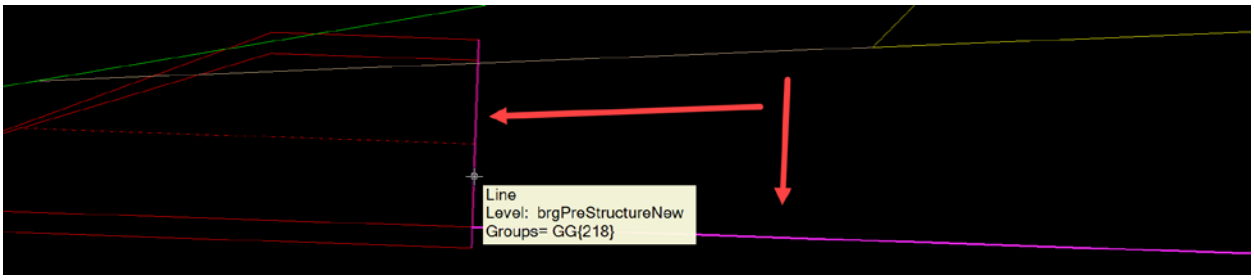
Then use the Element Selection tool to unselect the apron. Then repeat the same process on the other apron. Once the aprons are rotated select the Trim to Element tool.



Select the line that was placed from flowline to flowline as the first element to cut.



Then select the edge of the apron to trim the line to.

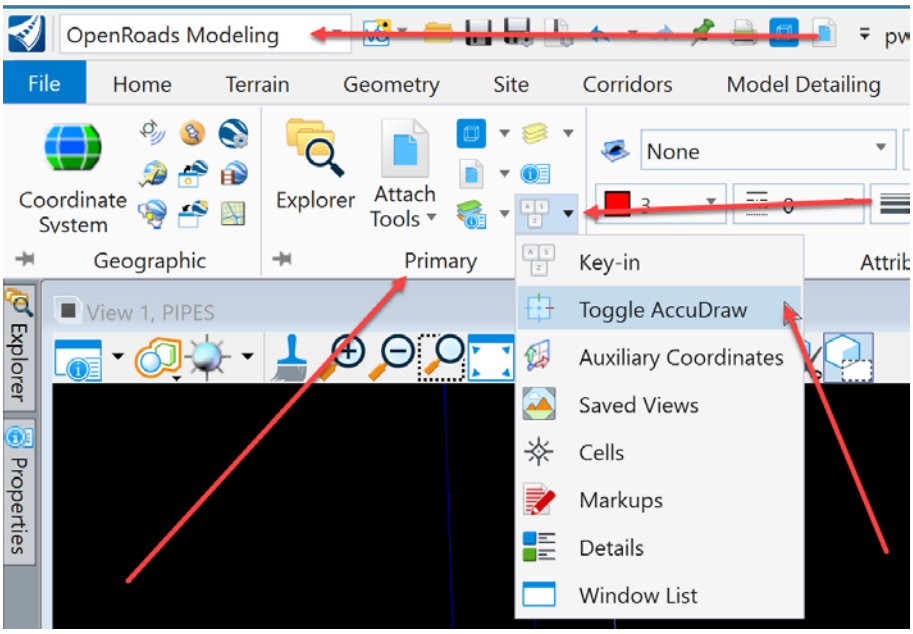


Then repeat this on the other apron. This will make the line between the aprons the exact distance the aprons are apart.

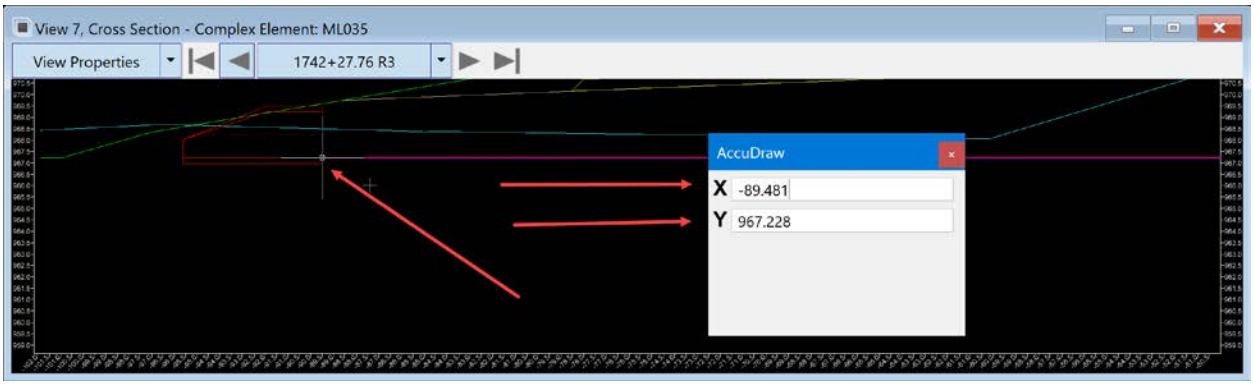
Next, measure that distance and adjust this line to make it match the intervals needed. For example, if it is RCP it needs to be an even 2' interval. If it is an RCB or CMP it needs to be even 1' intervals. Note: if the line is lengthened or shortened too much, check the apron rotation again using the process above. Keep in mind that the point that the apron is rotated from is the end of the apron that is set to the ditch low point elevation.

Once the structure design is as desired, then record the invert elevations and offsets of each key point. If using the ASCI graphics input file method demonstrated in these instructions, that is the location to record that information. For more information about the ASCI graphics input file, please refer to CW03_ASCI Graphics Import Input File.

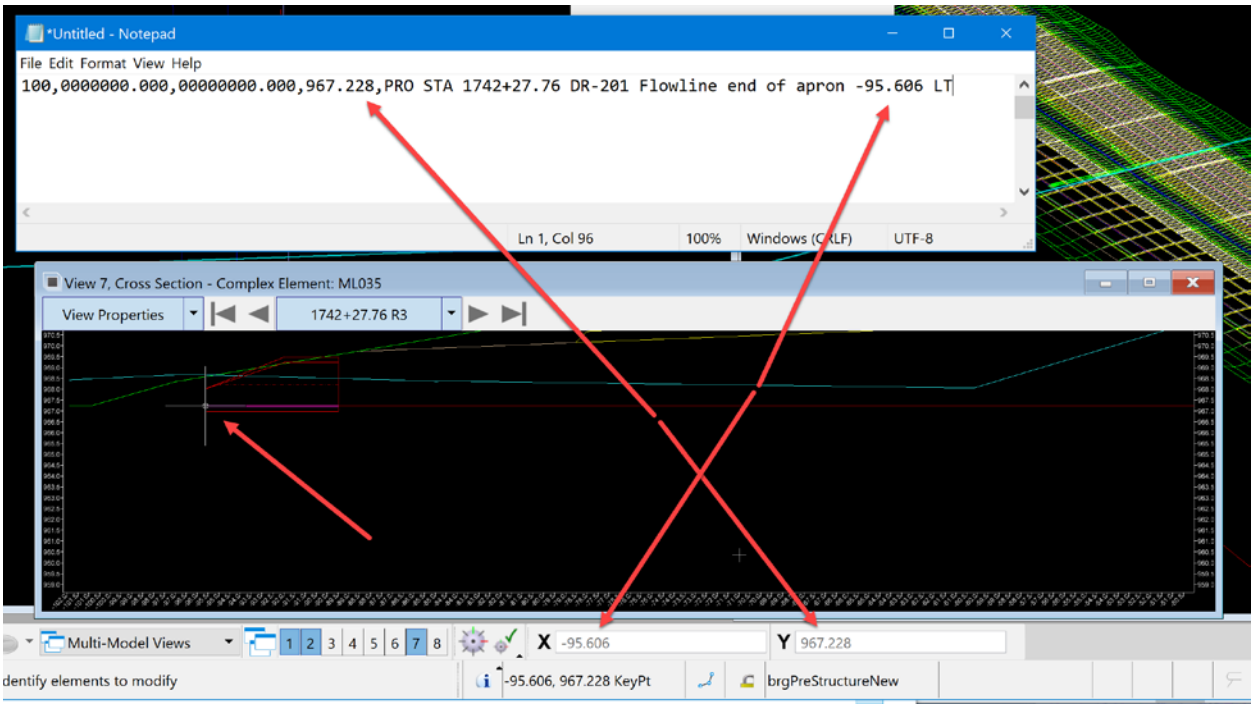
To record the invert elevations and offsets of each key point, make sure the AccuDraw is toggled on. Note: AccuDraw toggle is located in the Primary group on the More tool pulldown.



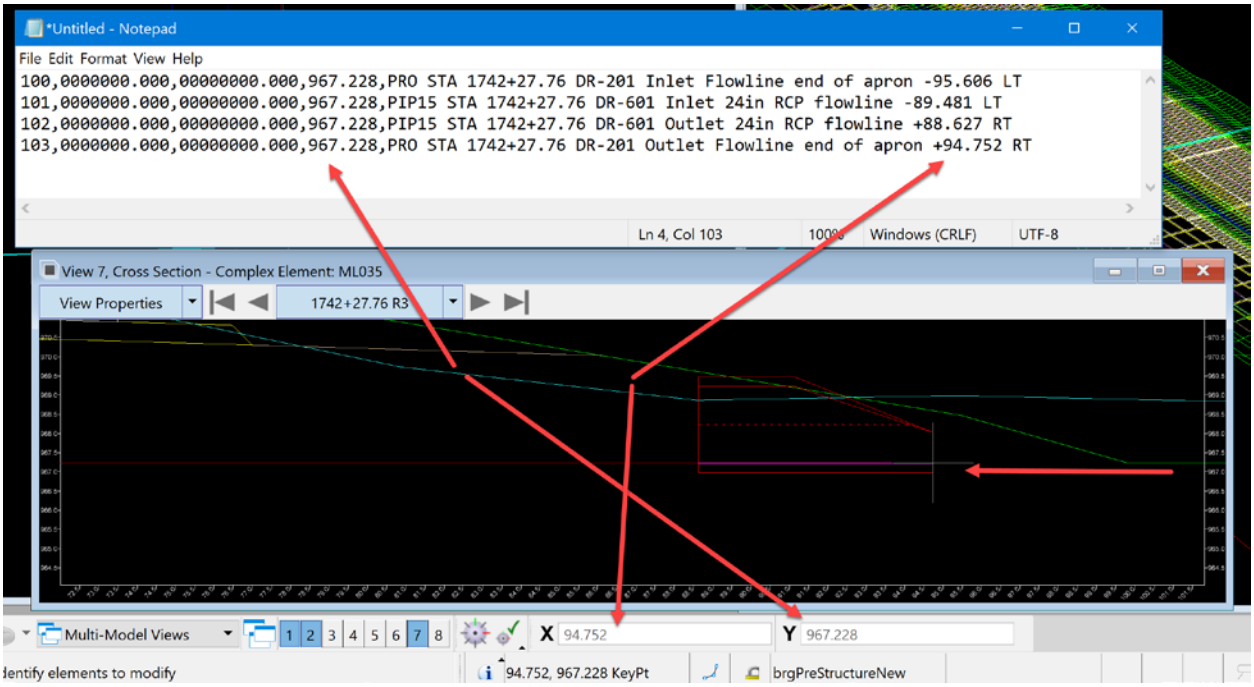
Then snap to each key point. The AccuDraw coordinate readout box will display that points coordinates. The X = offset and the Y = elevation.



Record each of these values for each point in the ASCI graphics input file.

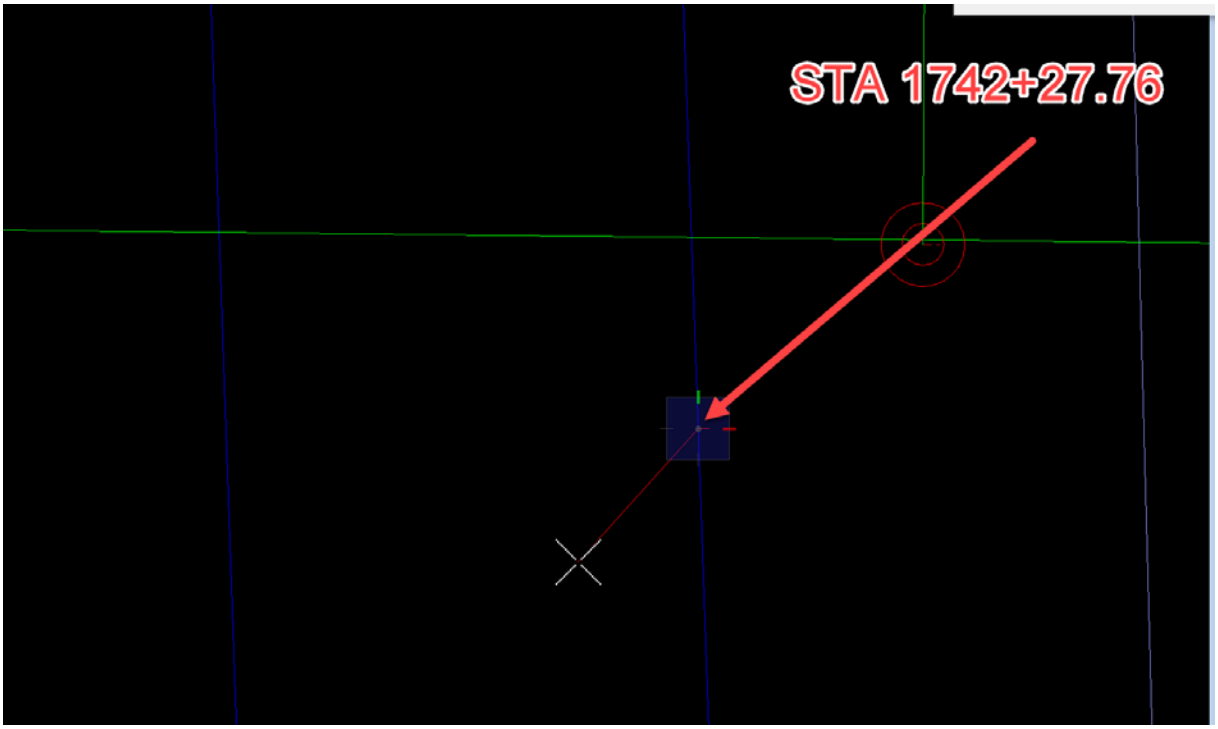


Next, repeat this for each key point that is needed to model the pipe or culvert.

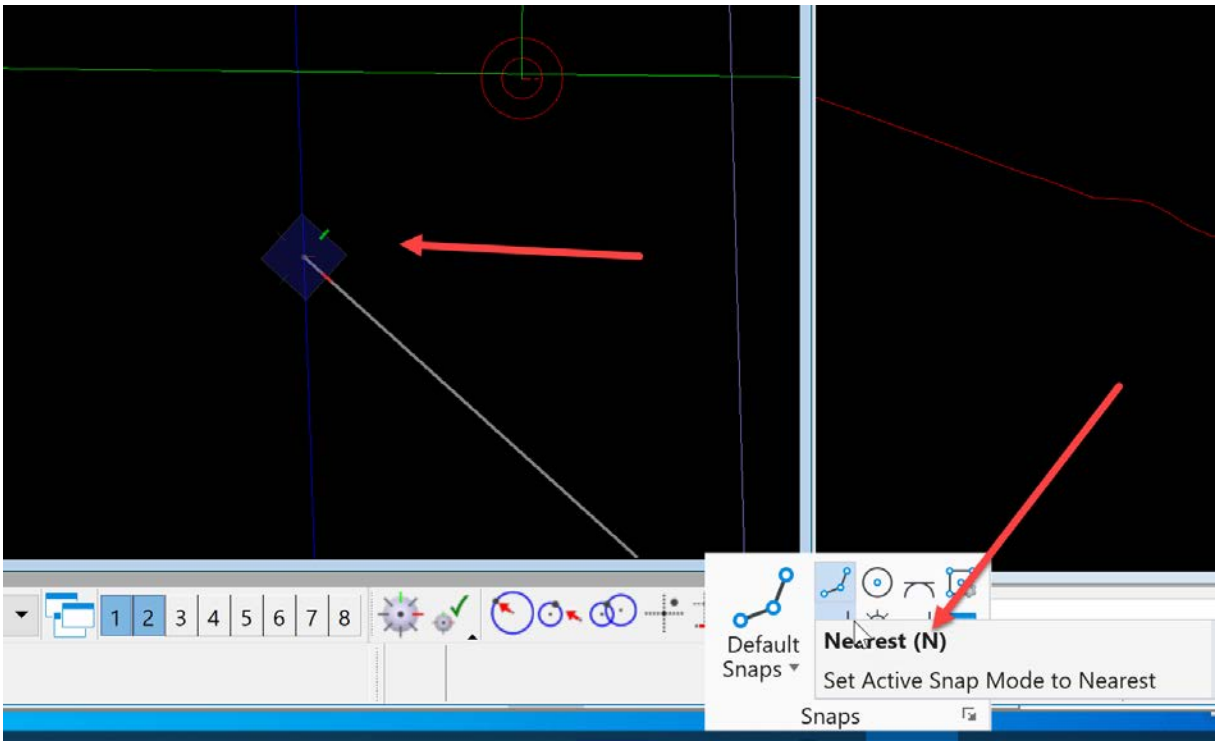


Once all the values are recorded, calculate the X and Y coordinates. To do this, use Civil AccuDraw or standard AccuDraw. Note: When using Civil AccuDraw make sure standard AccuDraw is turned off before toggling on Civil AccuDraw. (MicroStation does not like having both toggled on at the same time.)

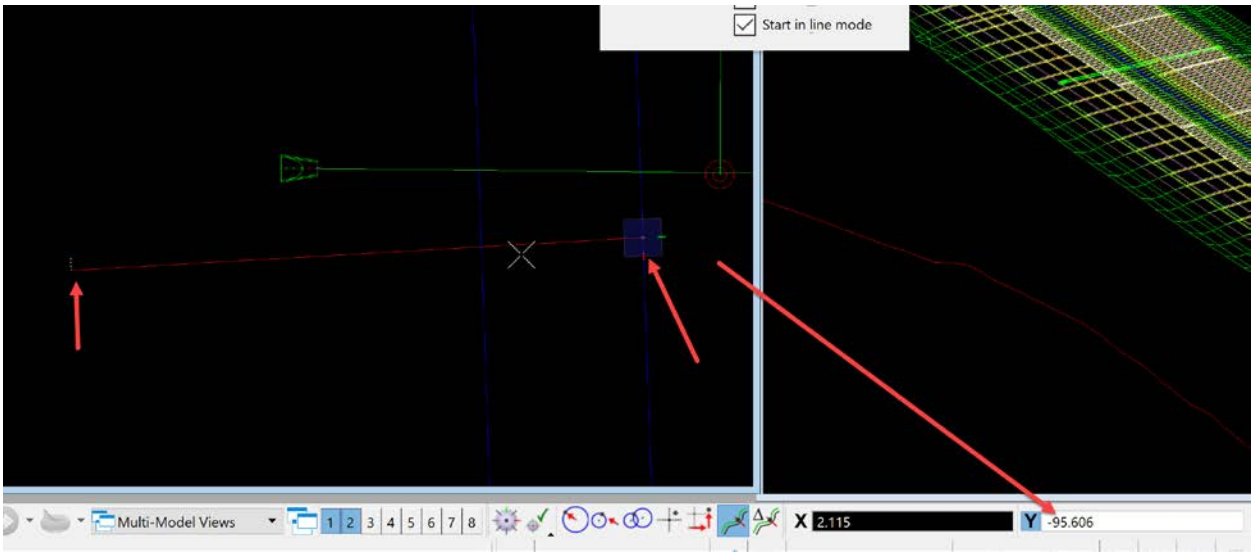
Using standard AccuDraw is covered in this set of instructions. To do this, locate the correct station for the structure along the alignment. For this example, it will be 1742+27.76. Once this location is known select the smart line tool and snap to that point or station along the alignment to start the line at.



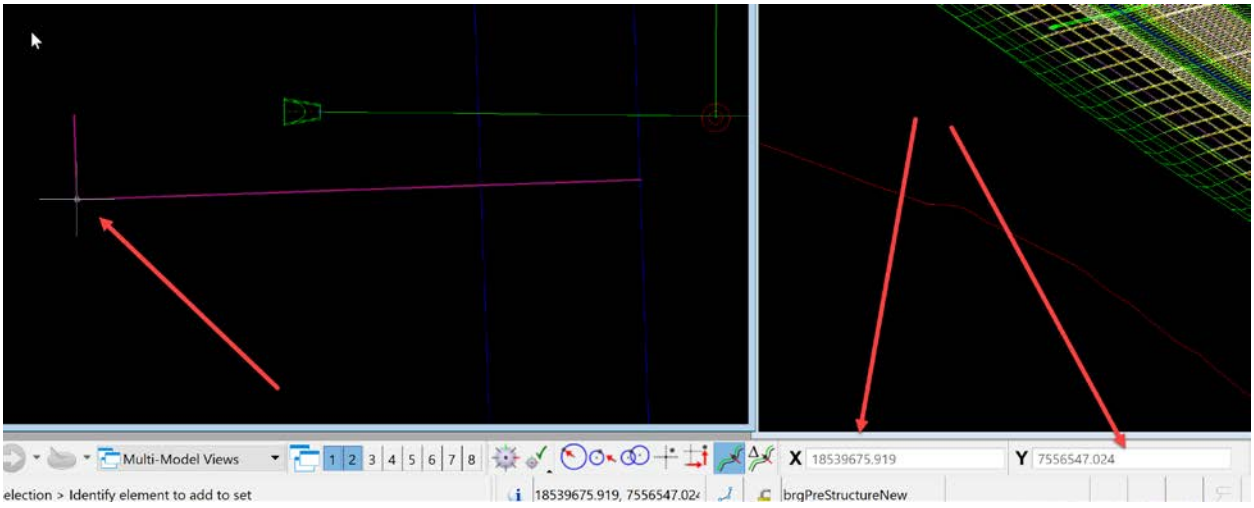
With the line started type R Q on the keyboard to rotate quick the AccuDraw compass. Then with a nearest snap, snap to the alignment.



This will rotate the AccuDraw compass so that it is set to the alignment's axis. Then pull the line in the direction needed to calculate the coordinate and type in the distance of the offset of that point. For this example, it will be -95.606. Pull the line to the left of the alignment and type in 95.606. Note: negative numbered offsets are to the left and positive numbered offsets are to the right.



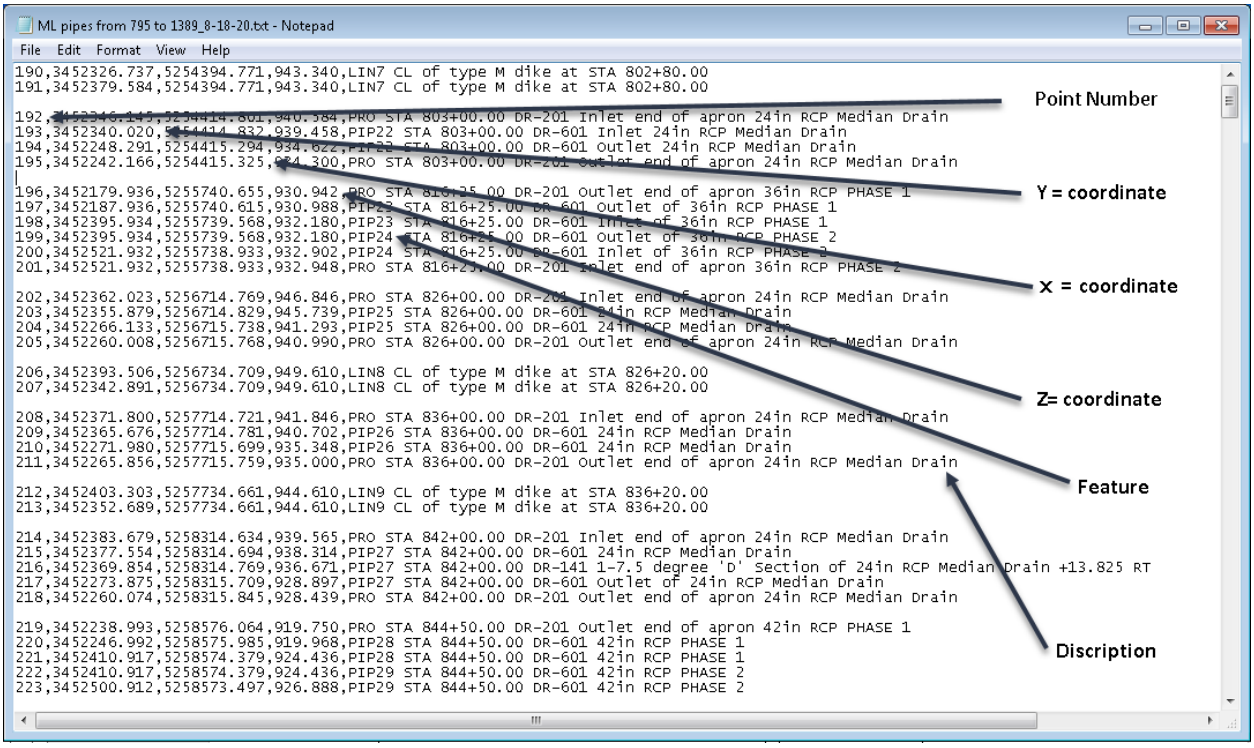
Then data point to accept it. This way, a perfect 90-degree line from the CL is drawn that is the correct distance for the offset. Then snap to the end of this line.



AccuDraw will display the X and Y Coordinates of that point. Then place these coordinates in the ASCI graphics input file. Repeat this process for each input point.

ASCI Graphics Import Input File

Once the invert coordinates of the pipe and/or culverts to be modeled are determined, there are two options to place it. 1st is with Civil AccuDraw; 2nd is with the ASCI graphics. The format of the ASCI graphics input file will be covered first. In a note pad file, make a comma delimited format file. This consists of the point number, Y coordinate, X coordinate, Z coordinate, feature and description. It should look something like this:



The first number is the point number. This number can start as any number but cannot be repeated in the ASCI file and it is a good idea not to repeat it per project. This number needs to increase as the file grows.

The Second number is the Y coordinate of the invert.

The third number is the X coordinate of the invert.

The fourth number is the Z coordinate of the invert.

The fifth value is the feature. The feature can map or draw many different lines and/or cells. For this process, the feature will be PIP (which is the feature for pipes). To make each feature unique, add a number to the feature so that MicroStation knows what features points to connect with the correct line style. So, the first feature will be PIP1, the next one will be PIP2 and so on.

The sixth value is the point description of each point. This value is a little different than the previous values because it is not separated from the other values by a comma but separated with a space between it and the feature. Up to 256 characters can be used to describe the point that will be mapped.

For this process describe the point by design station, design standard, indicate inlet or outlet, include size and last the type of structure.

This is an example for a 24 inch RCP median drain at station 803+00.00

193,3452340.020,5254414.832,939.458,PIP22 STA 803+00.00 DR-601 Inlet 24in RCP Median Drain

Once all the invert coordinates are recorded in the ASCI graphics import input file it should look something like this:

```
190,3452326.737,5254394.771,943.340,LIN7 CL of type M dike at STA 802+80.00
191,3452379.584,5254394.771,943.340,LIN7 CL of type M dike at STA 802+80.00
192,3452346.145,5254414.801,940.584,PRO STA 803+00.00 DR-201 Inlet end of apron 24in RCP Median Drain
193,3452340.020,5254414.832,939.458,PIP22 STA 803+00.00 DR-601 Inlet 24in RCP Median Drain
194,3452248.291,5254415.294,934.622,PIP22 STA 803+00.00 DR-601 Outlet 24in RCP Median Drain
195,3452242.166,5254415.325,934.300,PRO STA 803+00.00 DR-201 Outlet end of apron 24in RCP Median Drain
196,3452179.936,5255740.655,930.942,PRO STA 816+25.00 DR-201 Outlet end of apron 36in RCP PHASE 1
197,3452187.936,5255740.615,930.988,PIP23 STA 816+25.00 DR-601 Outlet of 36in RCP PHASE 1
198,3452395.934,5255739.568,932.180,PIP23 STA 816+25.00 DR-601 Inlet of 36in RCP PHASE 1
199,3452395.934,5255739.568,932.180,PIP24 STA 816+25.00 DR-601 Outlet of 36in RCP PHASE 2
200,3452521.932,5255738.933,932.902,PIP24 STA 816+25.00 DR-601 Inlet of 36in RCP PHASE 2
201,3452521.932,5255738.933,932.948,PRO STA 816+25.00 DR-201 Inlet end of apron 36in RCP PHASE 2
202,3452362.023,5256714.769,946.846,PRO STA 826+00.00 DR-201 Inlet end of apron 24in RCP Median Drain
203,3452355.879,5256714.829,945.739,PIP25 STA 826+00.00 DR-601 24in RCP Median Drain
204,3452266.133,5256715.738,941.293,PIP25 STA 826+00.00 DR-601 24in RCP Median Drain
205,3452260.008,5256715.768,940.990,PRO STA 826+00.00 DR-201 Outlet end of apron 24in RCP Median Drain
206,3452393.506,5256734.709,949.610,LIN8 CL of type M dike at STA 826+20.00
207,3452342.891,5256734.709,949.610,LIN8 CL of type M dike at STA 826+20.00
208,3452371.800,5257714.721,941.846,PRO STA 836+00.00 DR-201 Inlet end of apron 24in RCP Median Drain
209,3452365.676,5257714.781,940.702,PIP26 STA 836+00.00 DR-601 24in RCP Median Drain
210,3452271.980,5257715.699,935.348,PIP26 STA 836+00.00 DR-601 24in RCP Median Drain
211,3452265.856,5257715.759,935.000,PRO STA 836+00.00 DR-201 Outlet end of apron 24in RCP Median Drain
212,3452403.303,5257734.661,944.610,LIN9 CL of type M dike at STA 836+20.00
213,3452352.689,5257734.661,944.610,LIN9 CL of type M dike at STA 836+20.00
214,3452383.679,5258314.634,939.565,PRO STA 842+00.00 DR-201 Inlet end of apron 24in RCP Median Drain
215,3452377.554,5258314.694,938.314,PIP27 STA 842+00.00 DR-601 24in RCP Median Drain
216,3452369.854,5258314.769,936.671,PIP27 STA 842+00.00 DR-141 1-7.5 degree 'D' Section of 24in RCP Median Drain +13.825 RT
217,3452273.875,5258315.709,928.897,PIP27 STA 842+00.00 DR-601 Outlet of 24in RCP Median Drain
218,3452260.074,5258315.845,928.439,PRO STA 842+00.00 DR-201 Outlet end of apron 24in RCP Median Drain
219,3452238.993,5258576.064,919.750,PRO STA 844+50.00 DR-201 Outlet end of apron 42in RCP PHASE 1
220,3452246.992,5258575.985,919.968,PIP28 STA 844+50.00 DR-601 42in RCP PHASE 1
221,3452410.917,5258574.379,924.436,PIP28 STA 844+50.00 DR-601 42in RCP PHASE 1
222,3452410.917,5258574.379,924.436,PIP29 STA 844+50.00 DR-601 42in RCP PHASE 2
223,3452500.912,5258573.497,926.888,PIP29 STA 844+50.00 DR-601 42in RCP PHASE 2
224,3452508.912,5258573.419,927.106,PRO STA 844+50.00 DR-201 Inlet end of apron 42in RCP PHASE 2
225,3452391.414,5259714.625,923.846,PRO STA 856+00.00 DR-201 Inlet end of apron 24in RCP Median Drain
226,3452385.270,5259714.685,922.924,PIP30 STA 856+00.00 DR-601 Inlet of 24in RCP Median Drain
227,3452307.394,5259715.448,921.465,PIP30 STA 856+00.00 DR-601 Outlet of 24in RCP Median Drain
228,3452301.269,5259715.508,921.350,PRO STA 856+00.00 DR-201 Outlet end of apron 24in RCP Median Drain
229,3452372.283,5259734.565,926.610,LIN10 CL of type M dike at STA 856+20.00
230,3452422.898,5259734.565,926.610,LIN10 CL of type M dike at STA 856+20.00
1000,3452403.131,5261014.573,906.596,PRO STA 869+00.00 DR-201 Inlet of DR-641 end of apron 24in RCP
```

Once the input file is complete then it can be loaded in the MicroStation file.

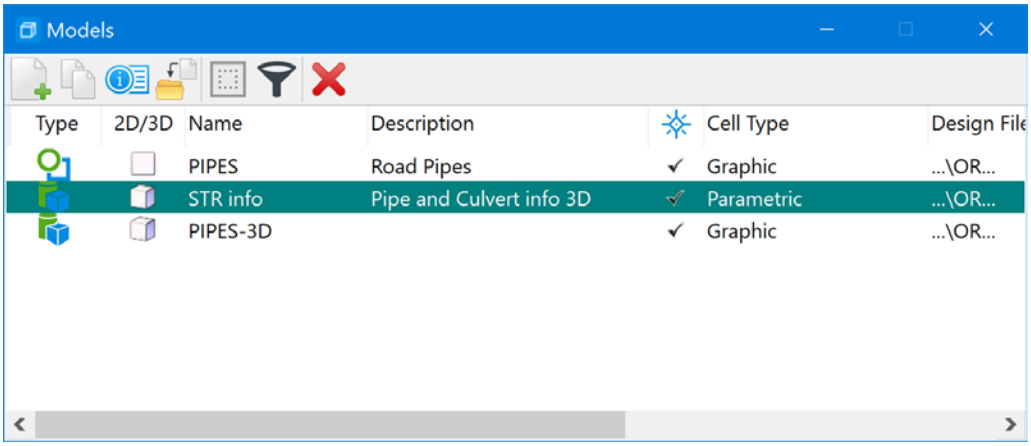
To proceed: refer to CW04_Loading the ASCI graphics input file into MicroStation file.

Loading the ASCI Graphics Input File into MicroStation File

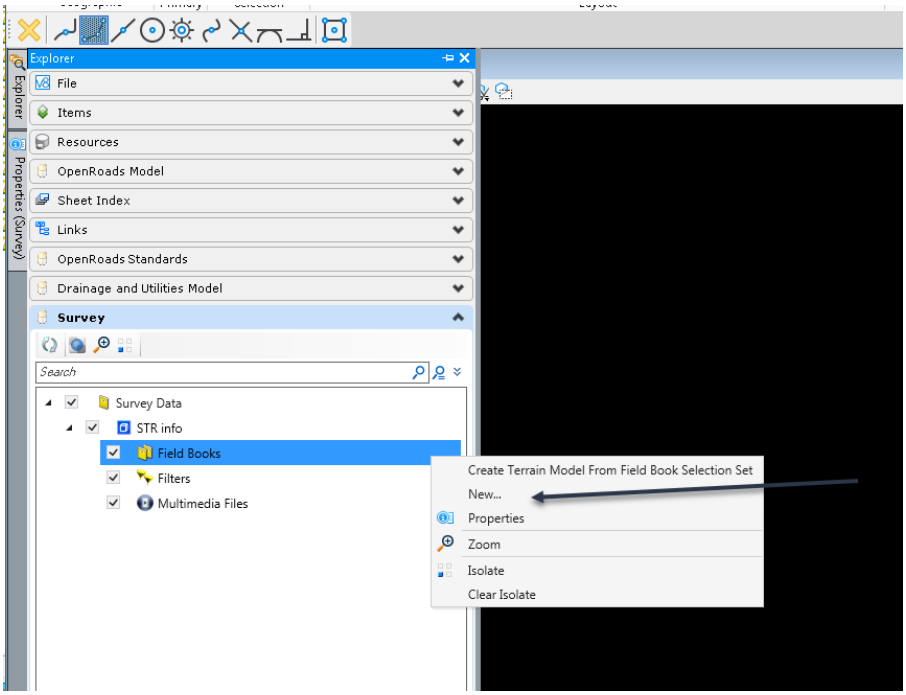
These instructions were created on 3/23/2021. These instructions were created with:

Once the ASCI graphics input file is done then the file is ready to load in our MicroStation file.

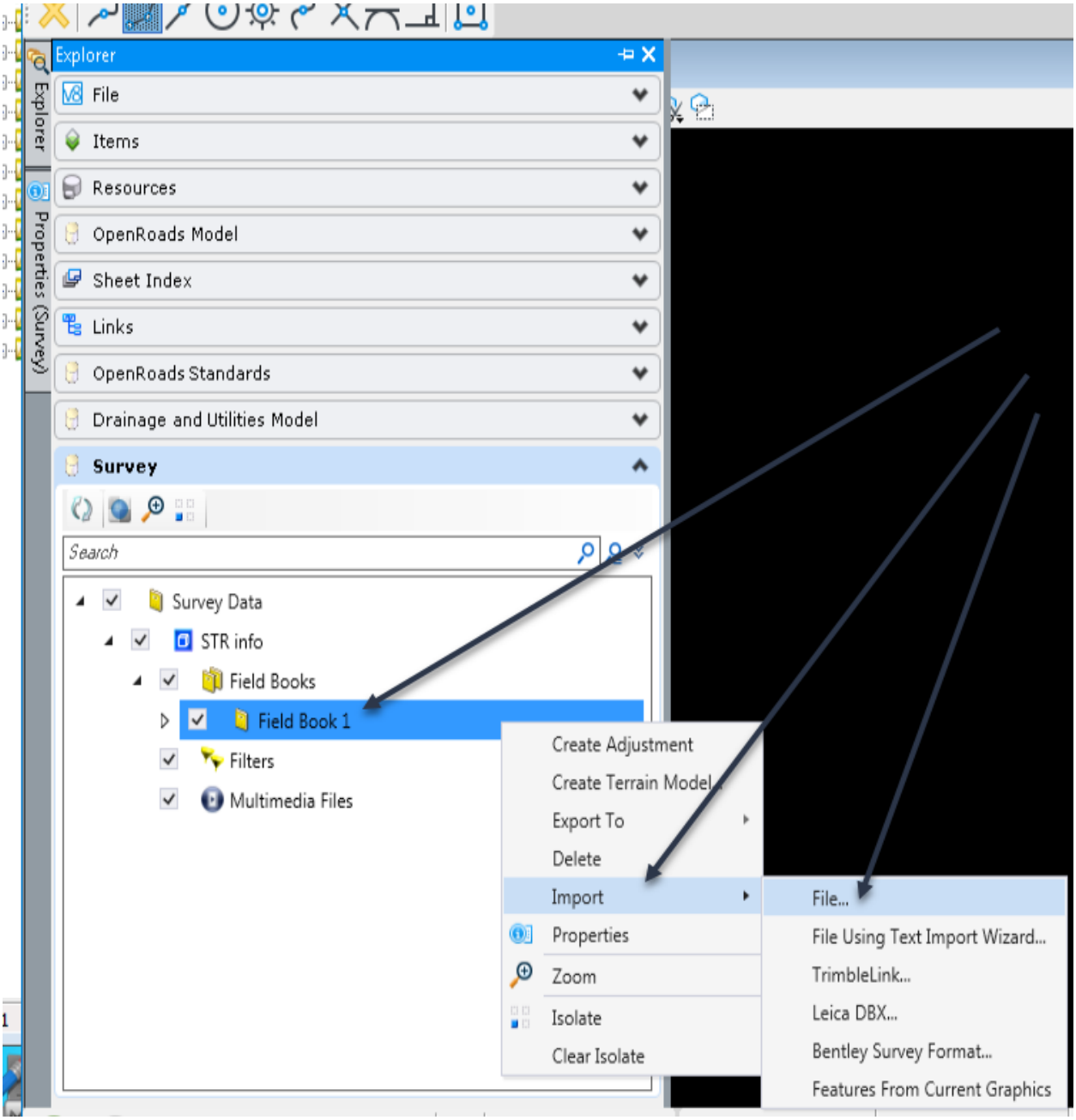
With the MicroStation file open, go to the Models dialog box and select the STR info to make it the active model.



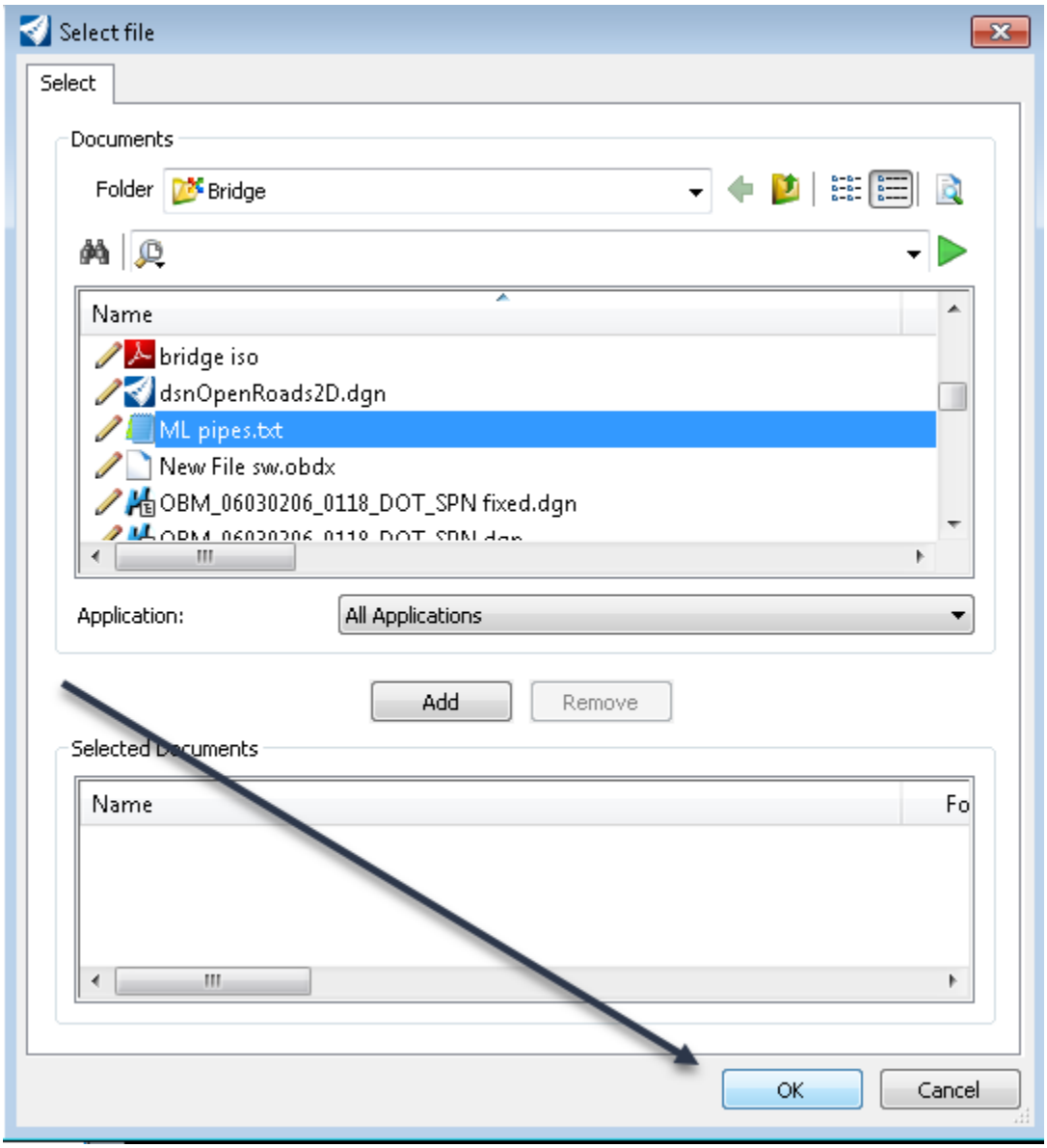
In project Explorer under the Survey tab select Field Books under STR info, then right click and select New. The name of the Field Book is automatic using a sequential number starting with 1. This will make a new field book that will be used to load the ASCI graphics input file that contains the invert coordinates.



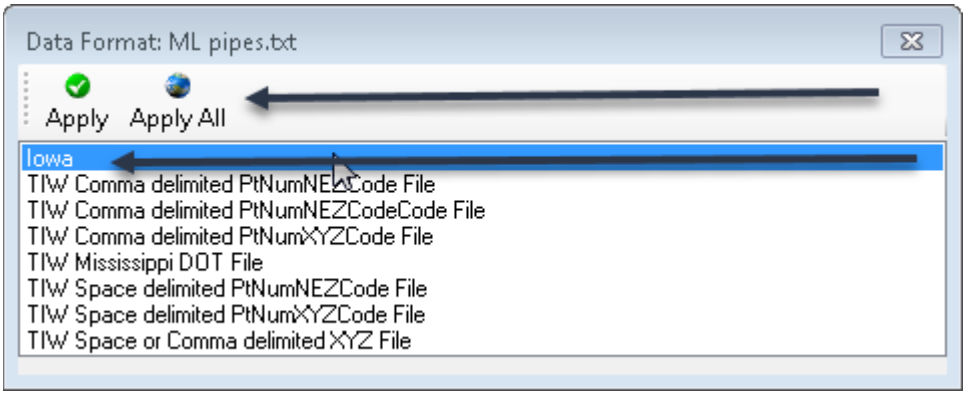
Next select the new field book, then right click and select import. Select the ASCI graphics input file that was created.



Then browse to where the Survey input file that contains the invert coordinates is stored. Then click OK.



It will prompt for the data format. Select the Iowa format and then click Apply All.

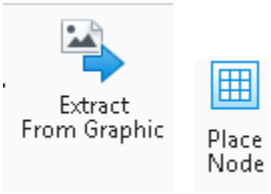


This will map all the points and lines in the survey input file.

Once the points and lines from the ASCI graphics input file are loaded and the correct location is verified, then start creating the structures.

How to Place Pipes with the Drainage and Utilities Tools

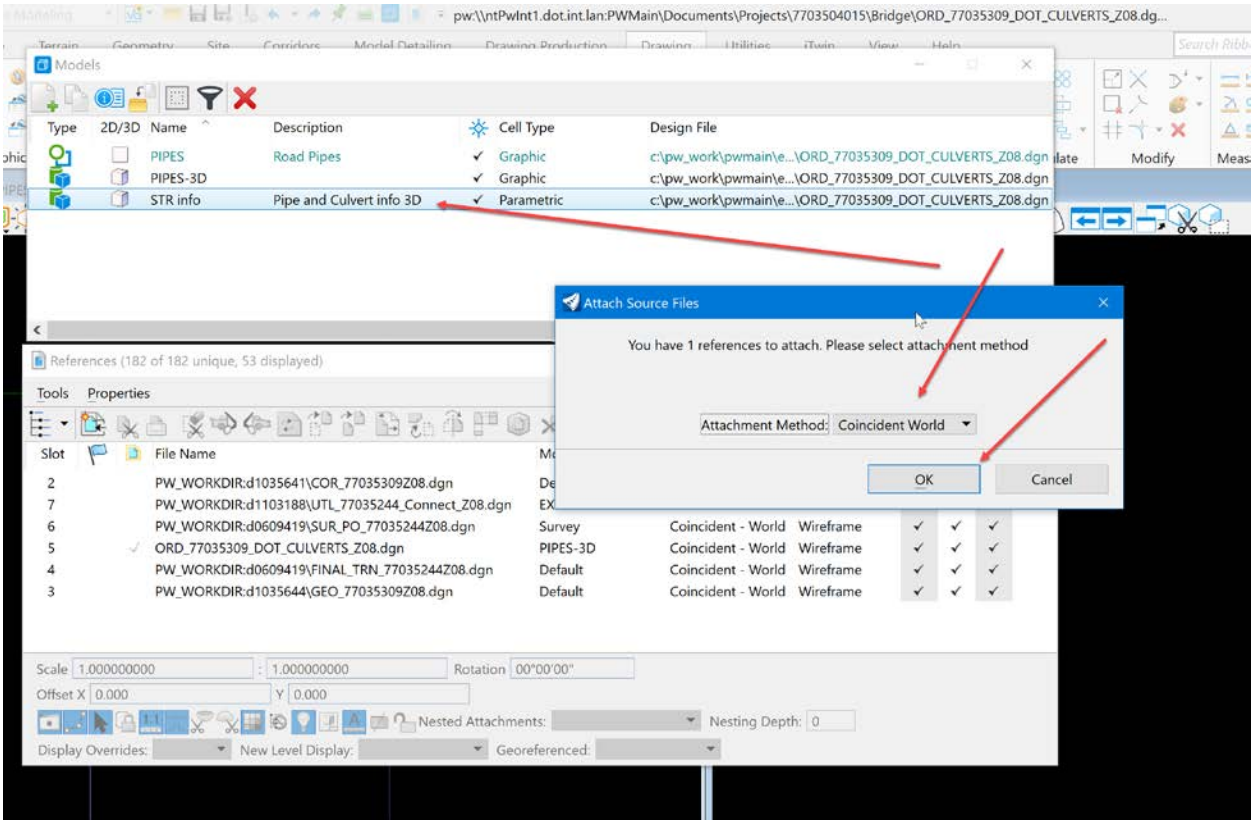
These instructions were created on 1/03/2021 and revised on 5/5/2021 These instructions were created with:



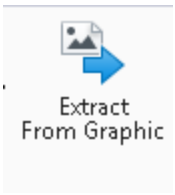
Once the invert coordinates of the pipe and/or culverts to be modeled are determined, then there are two options to place the structure. Place Nodes with Civil AccuDraw or ASCI graphics.

The following instructions cover the Extract by graphics workflow first. To use this tool, generate a 3D line beginning and ending at the determined invert coordinates. Complete this with AccuDraw or with the ASCI file. Note: This method is not the preferred method. It is an old workflow that has some limitations but is quicker and easier to use.

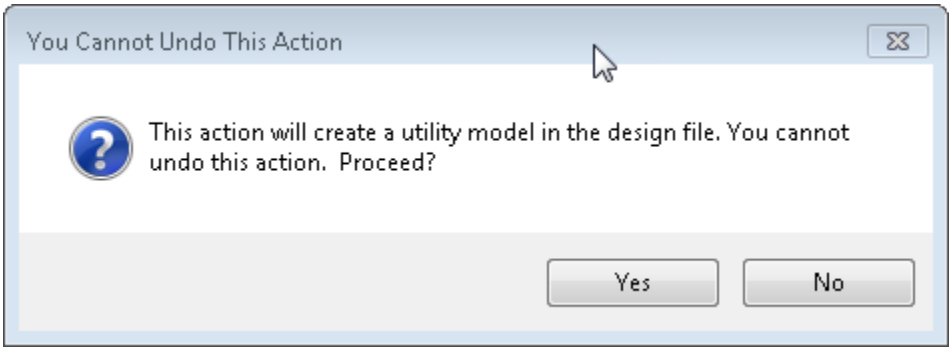
Once the points and lines from the ASCI graphics input file are loaded and the correct location is verified, then start creating the structures. To do this, open the PIPES model and reference in the STR info model. Keep in mind, that the PIPES model is a 2D model and once the STR info model (which is a 3D model) is reference in, MicroStation will automatically create a PIPES-3D model. This is a managed model that cannot and should not be deleted.



The PIPES (2D) model is ready to create the structures. Note: Aalways make the structures in the 2D model not the 3D model. Next, select the referenced line from the STR info model and activate the utility model by clicking on the Extract From Graphic tool under the Drainage and Utilities workflow on the Lay out tab.

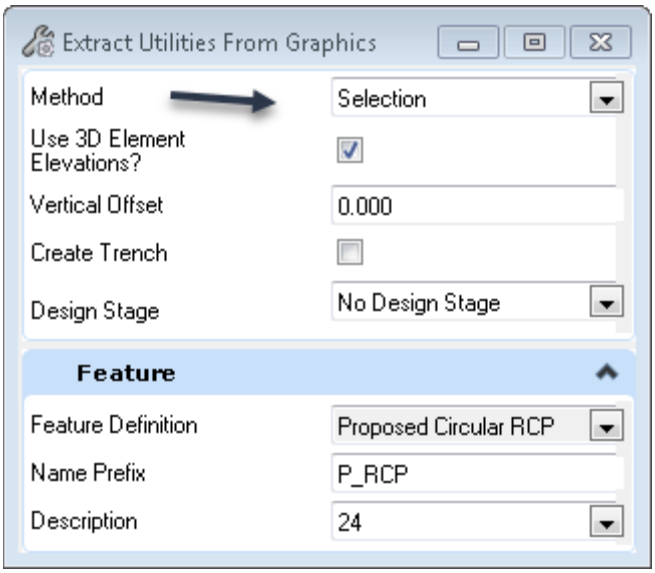


It will display this warning.

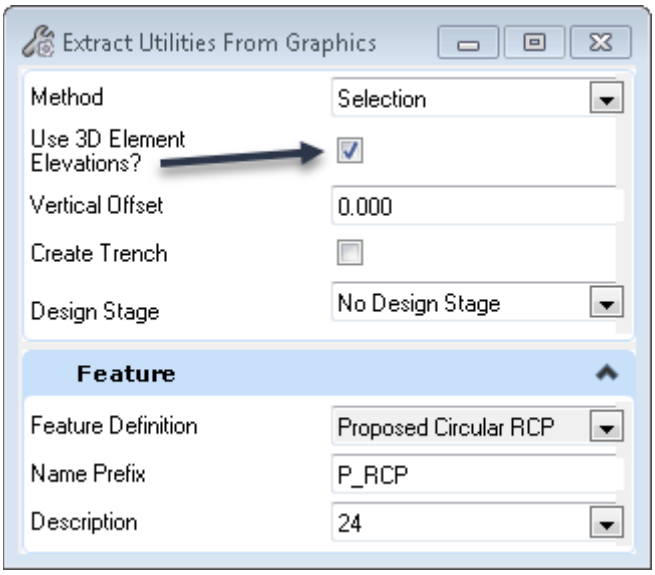


Click Yes. Then select the line again and click on the Extract From Graphic tool again.

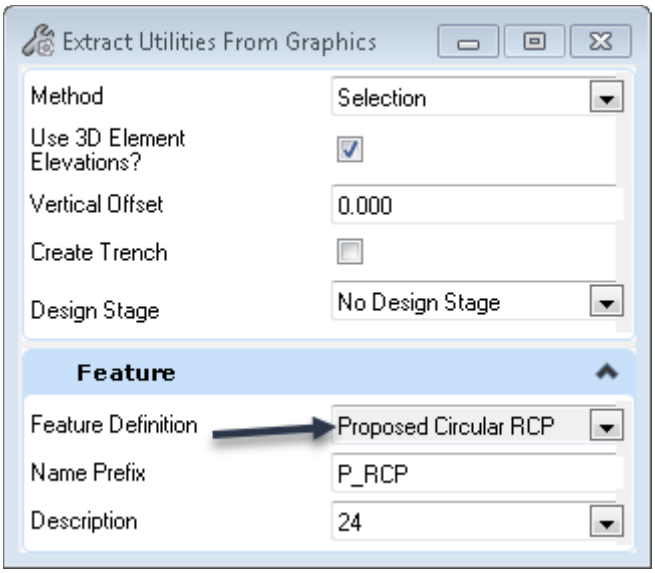
This will open this Extract Utilities From Graphics dialog box. Select the Selection option from the Method drop down list.



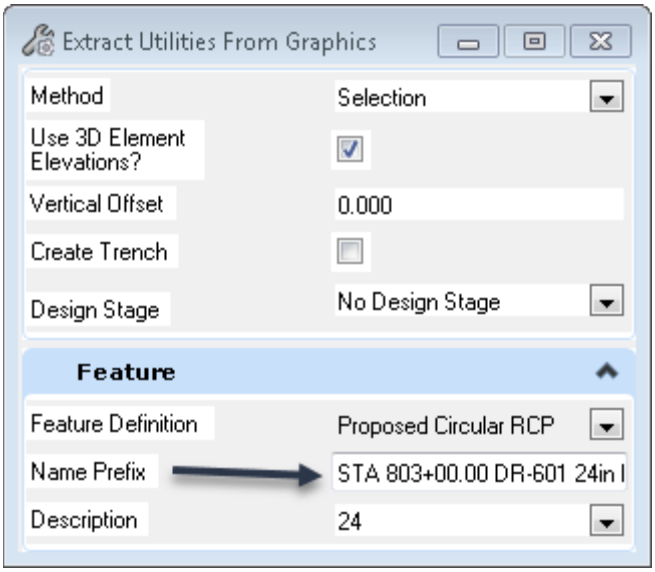
Make sure that the Use 3D Element Elevations is toggled on.



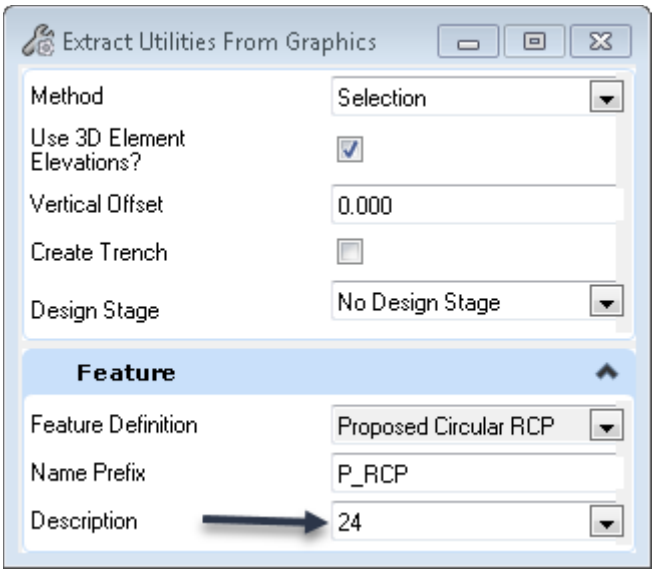
Then, select the feature definition for the structure being designed. In this example, create a Proposed Circular RCP.



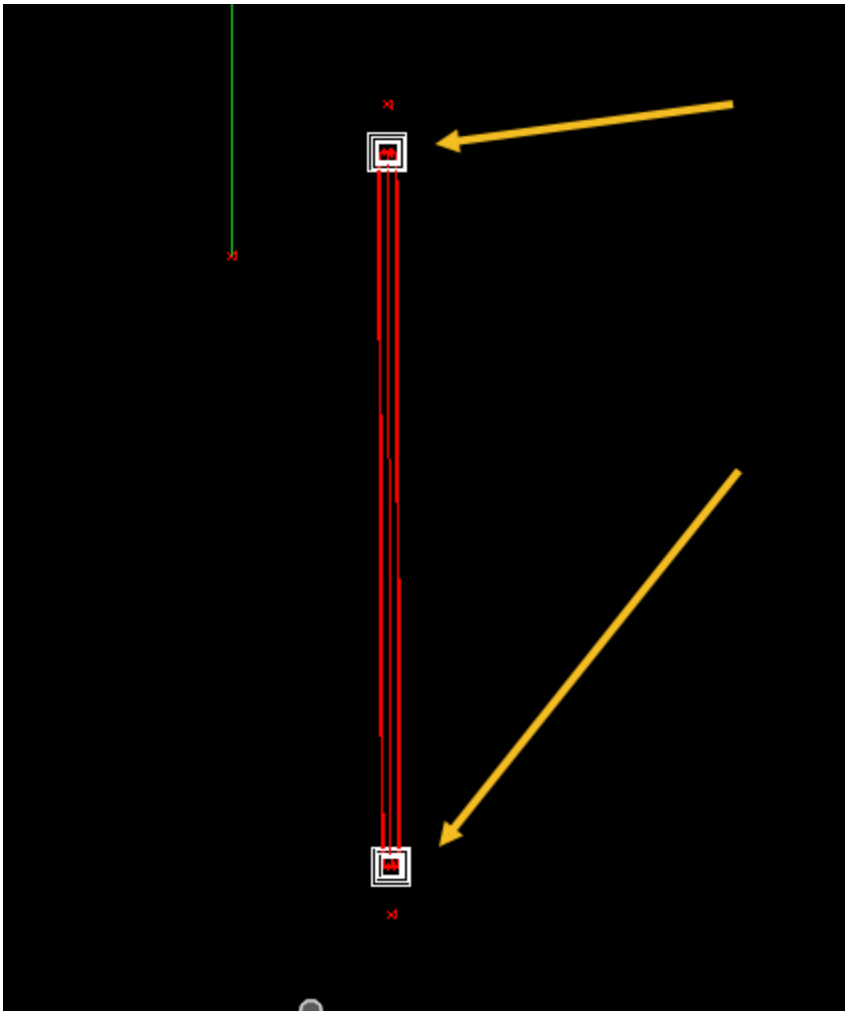
The Name Prefix is the point description from the survey ASCI import input file.



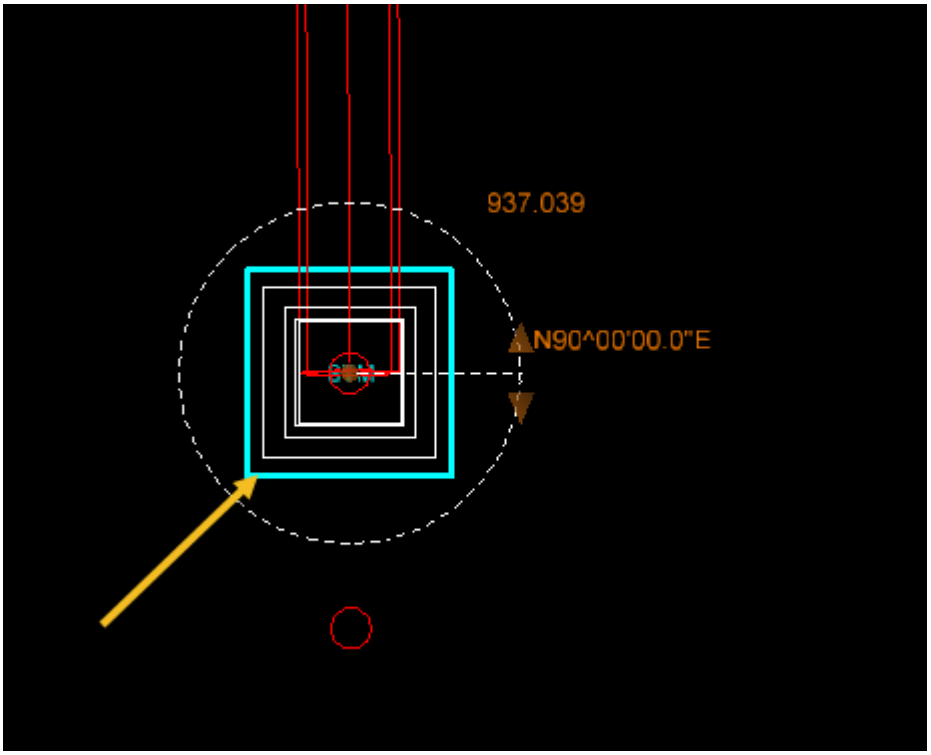
Then, select the description that is the size of the pipe.



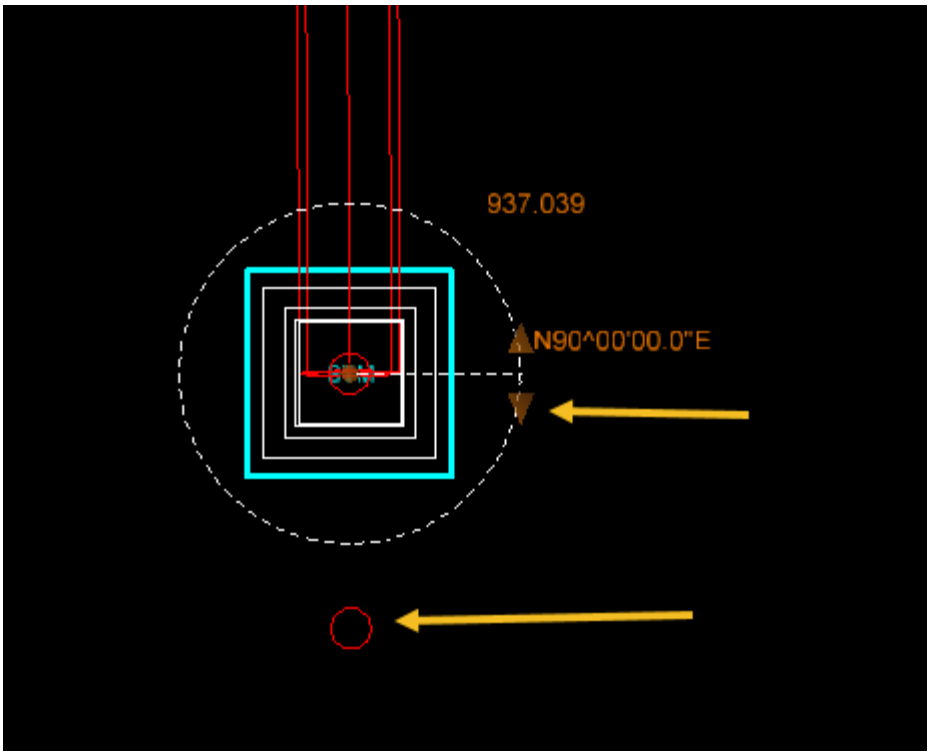
In this feature, it will place the conduit with two of the default nodes attached at each end. It should look something like this.



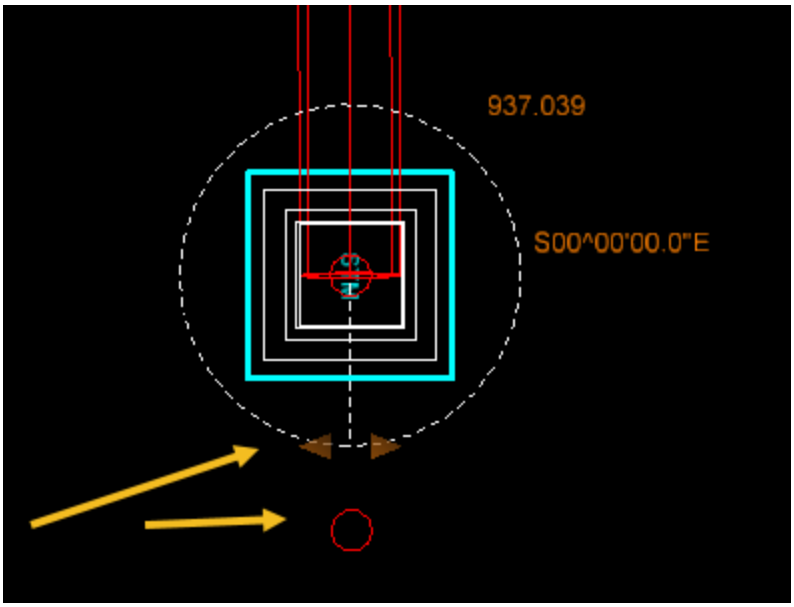
In this example, it is a 24-inch RCP so aprons will be placed on this conduit. To replace these default nodes with aprons, first rotate them then change the feature. To rotate the node, select the outside square and the compass will appear like this.



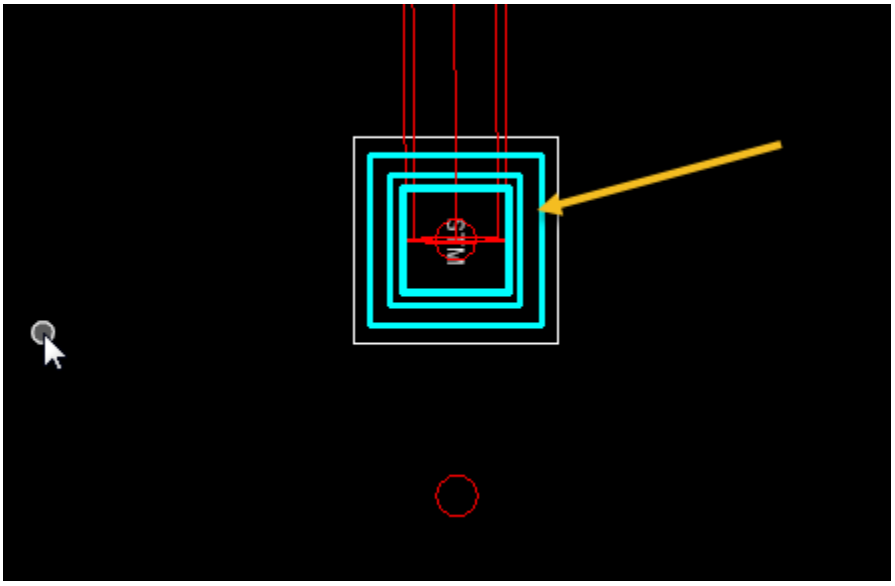
Once the compass shows up, select one of the compass arrows and snap to the PRO point from the input file.



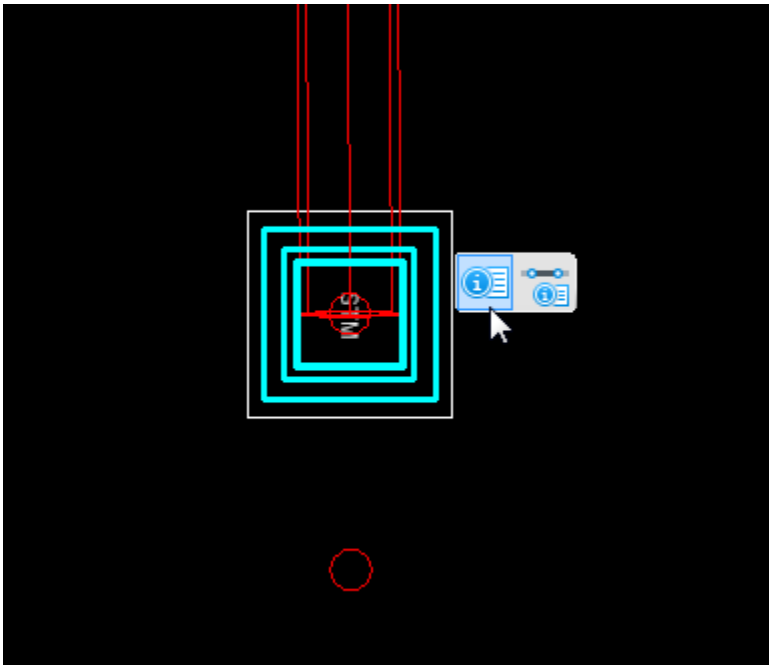
It should look something like this.



Next, change the feature to model the apron required. To do this, select the inner square.

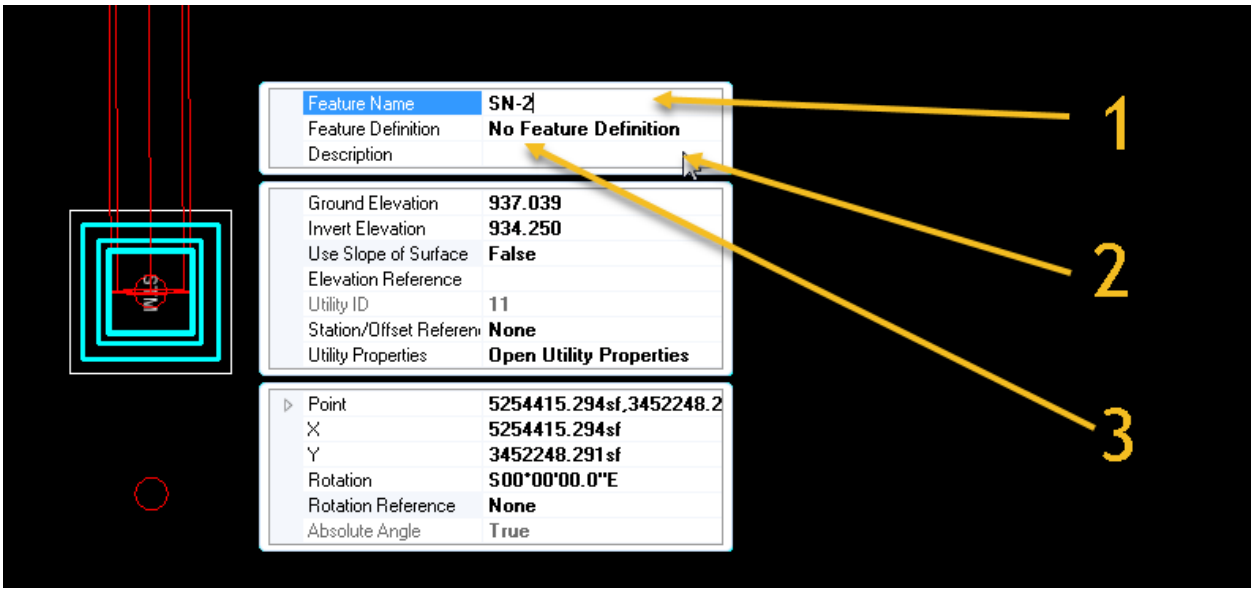


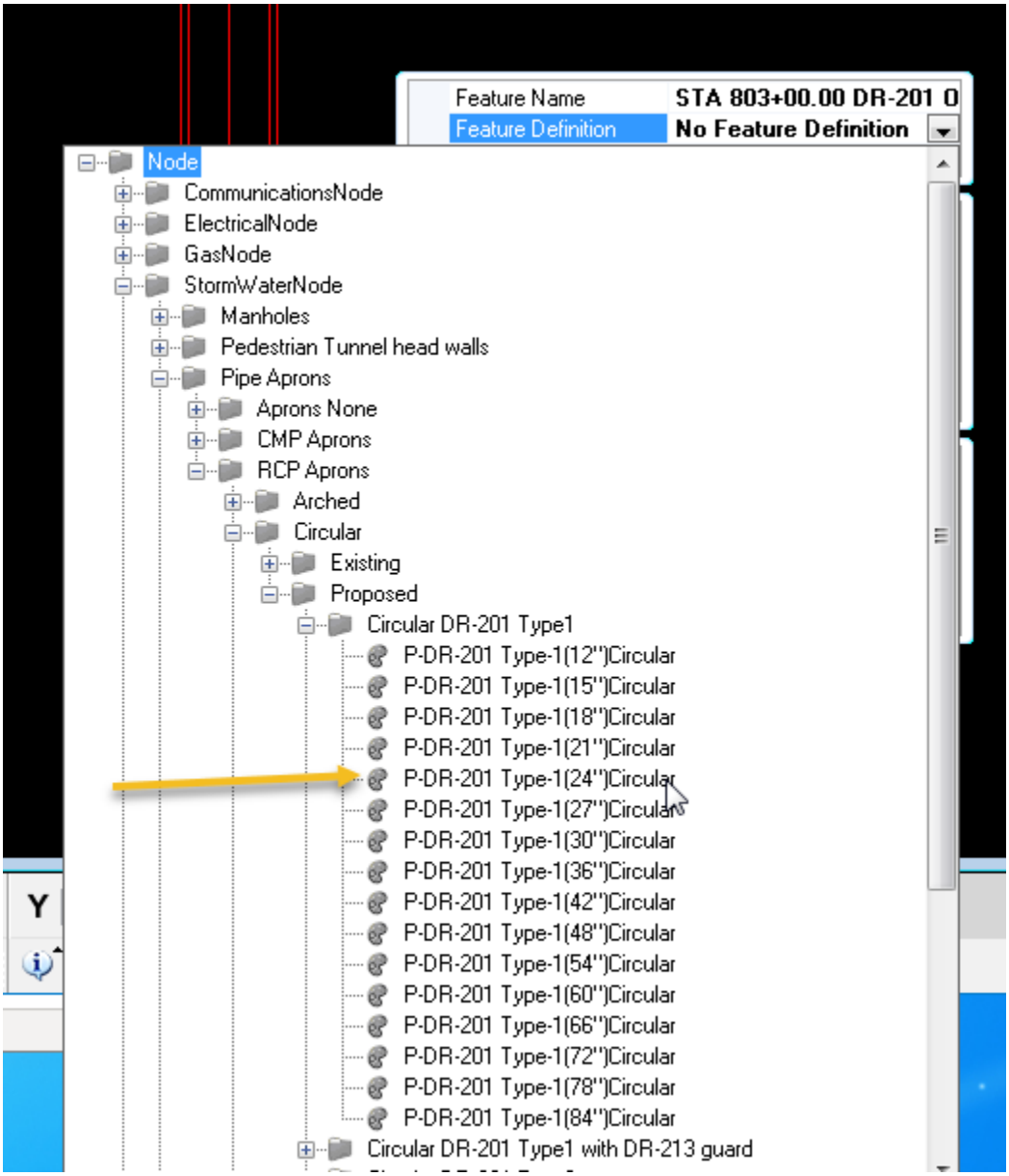
Then hover over it to bring up the heads-up tools. Then select the Properties window.



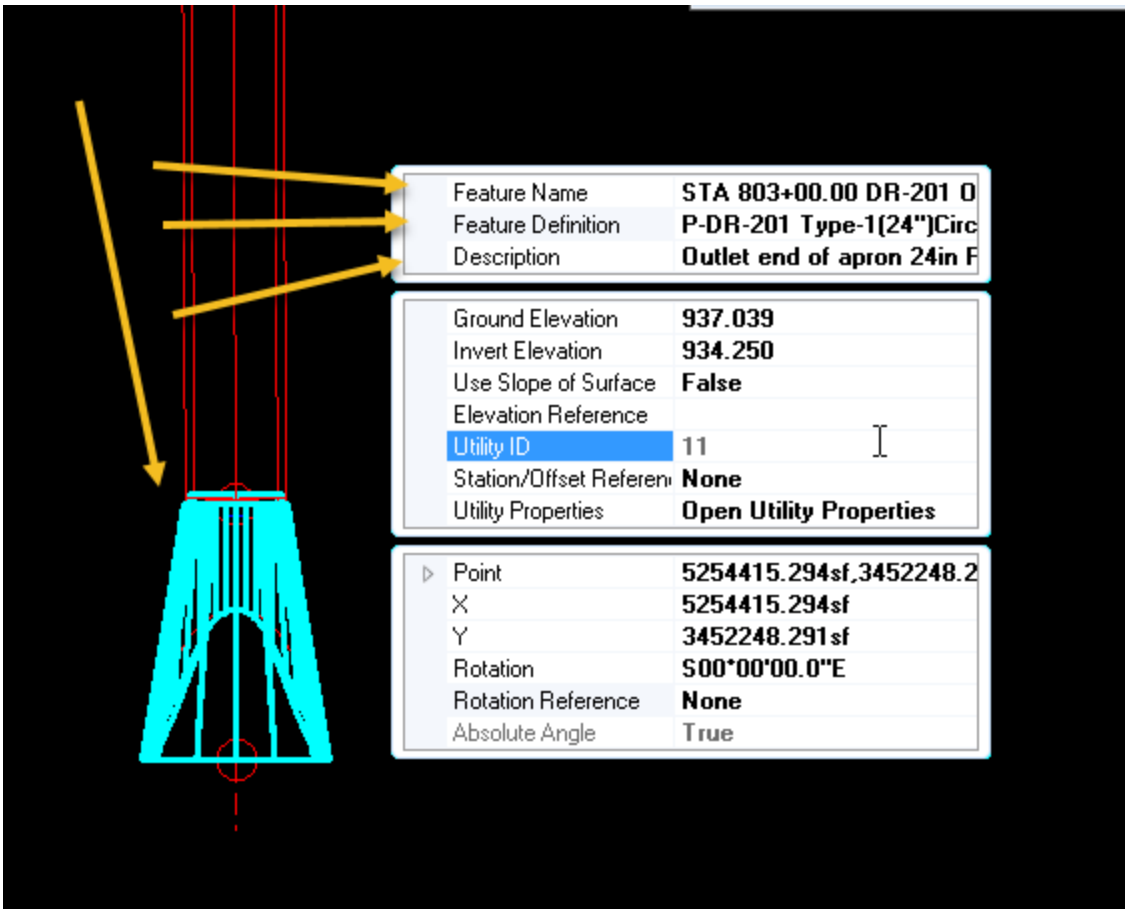
In the properties window define:

1. The Feature Name that will be the station, standard and either inlet or outlet. For this example, it will be “STA 803+00.00 DR-201 Outlet”. This can be copied from the point description of the PRO shot from the input file.
2. The description will be the second half of the point description of the PRO shot. For this example, “Outlet end of apron 24in RCP Median Drain”
3. Then select the Feature Definition.

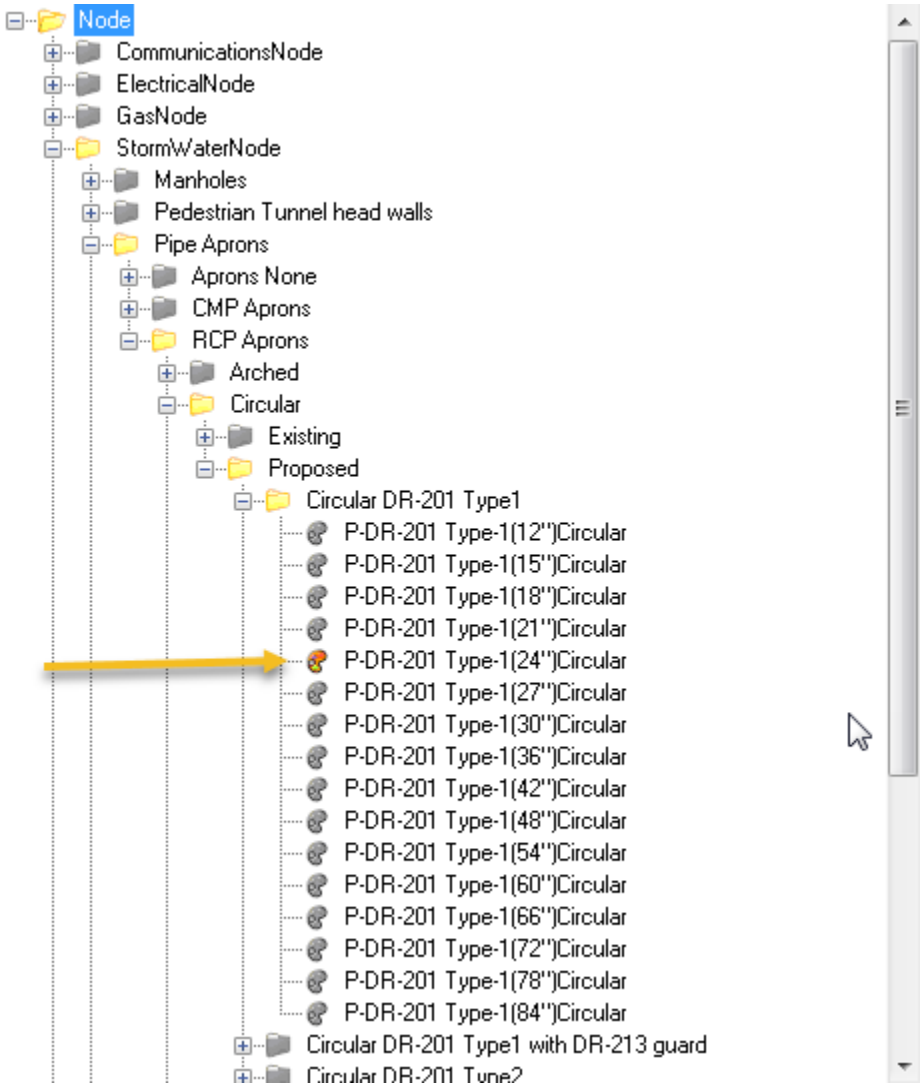

Feature Name
SN-2
Feature Definition
No Feature Definition
Description
Ground Elevation
937.039
Invert Elevation
934.250
Use Slope of Surface
False
Elevation Reference
Utility ID
11
Station/Offset Referen
None
Utility Properties
Open Utility Properties
Point
5254415.294sf,3452248.2
X
5254415.294sf
Y
3452248.291sf
Rotation
S00°00'00.0"E
Rotation Reference
None
Absolute Angle
True
1
2
3



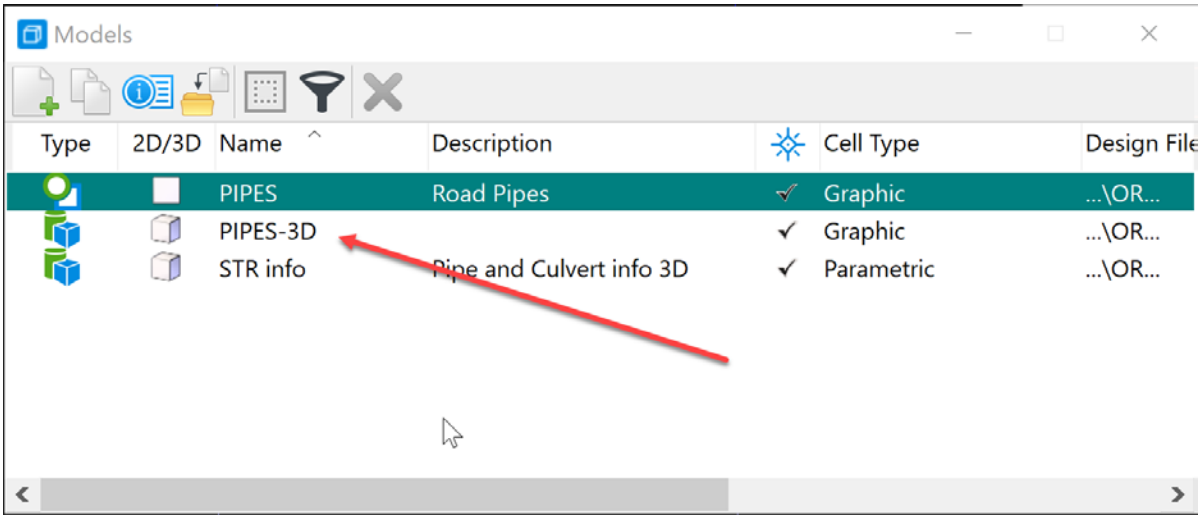
It should look something like this.



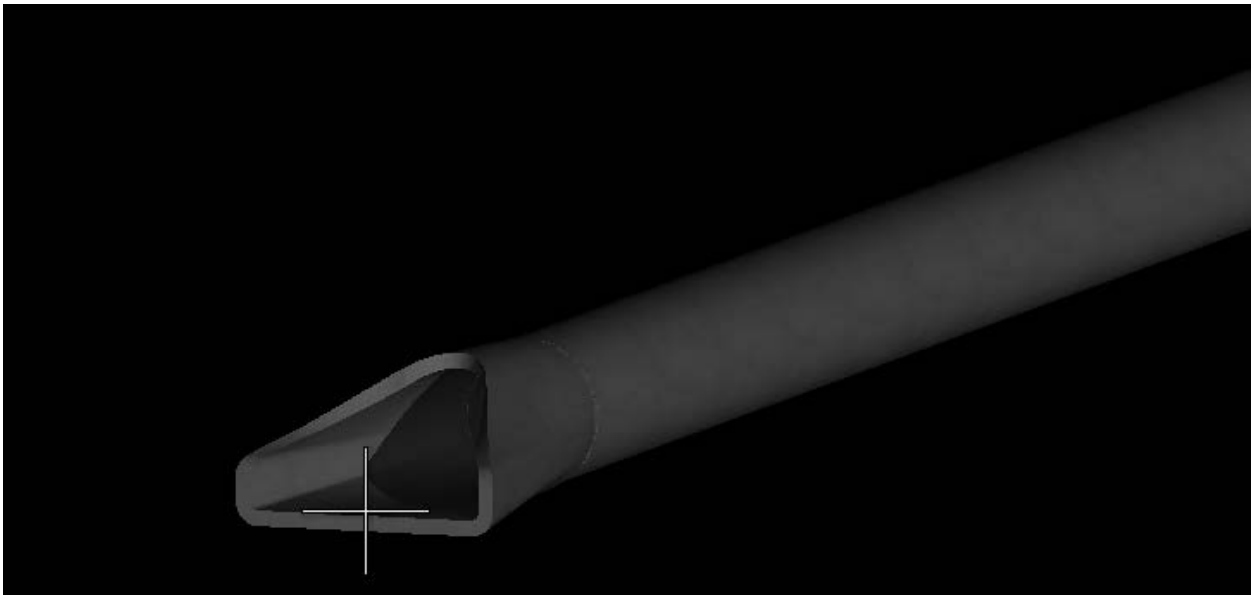
Repeat this process at each end of the structure. Once a feature is used, it will become highlighted and embedded into the file.



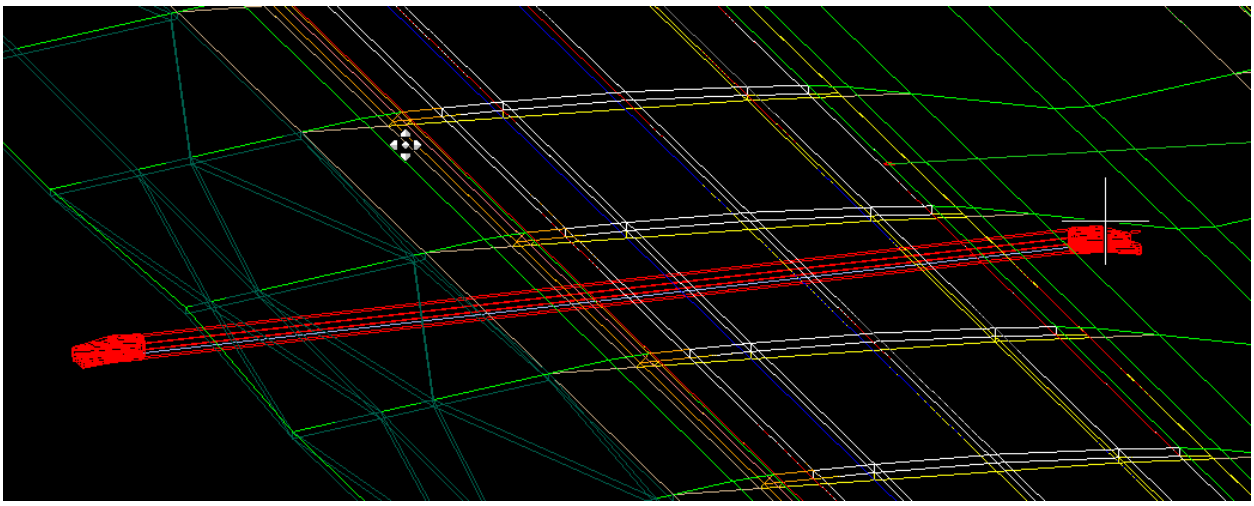
Once that is completed the structure will be modeled in the PIPES-3D model.



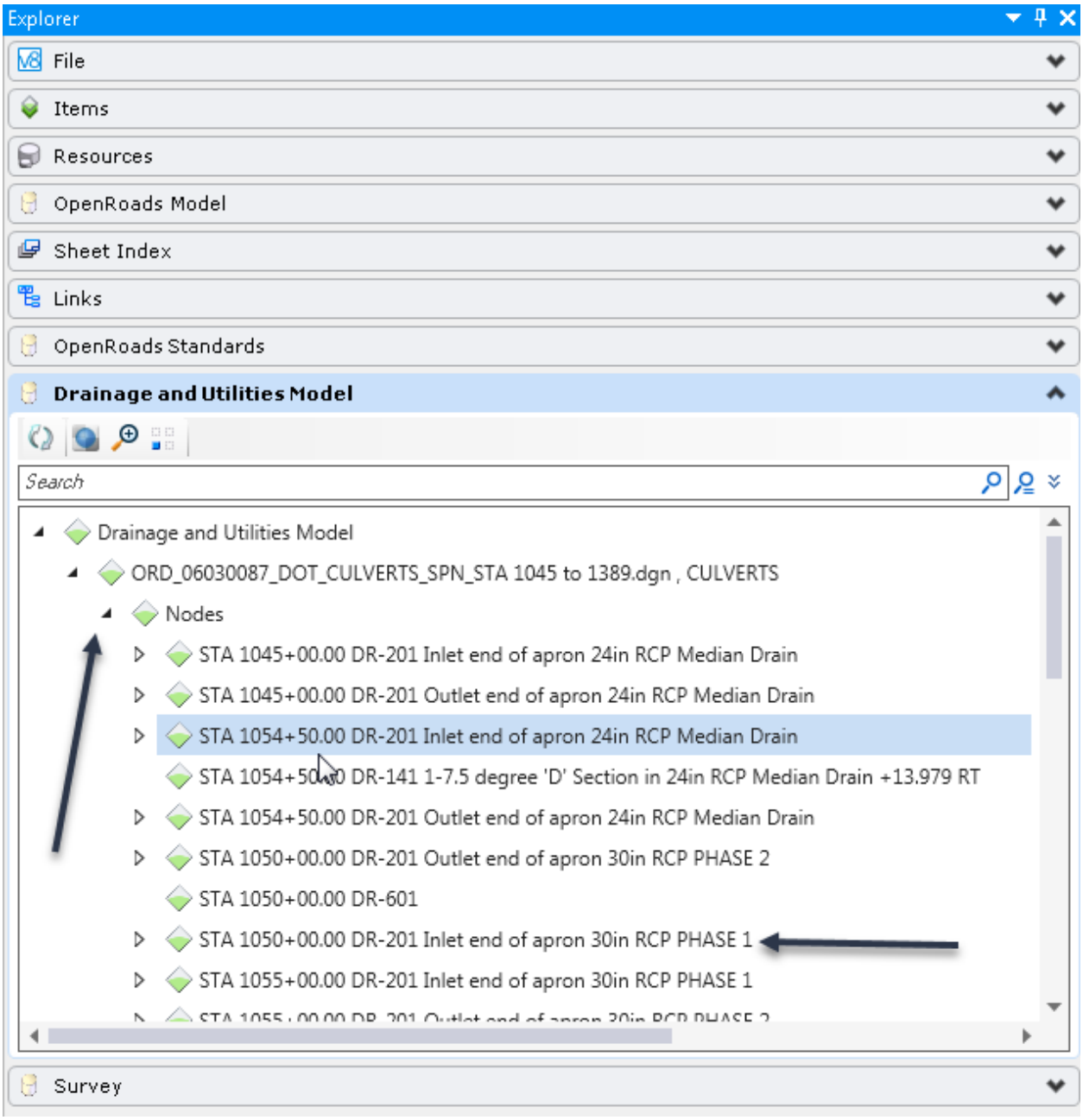
View the structure by opening the PIPES-3D model. It should look something like this.



Then reference in the COR files and see how the drainage design correlates to the Road Design earth work and grading design.

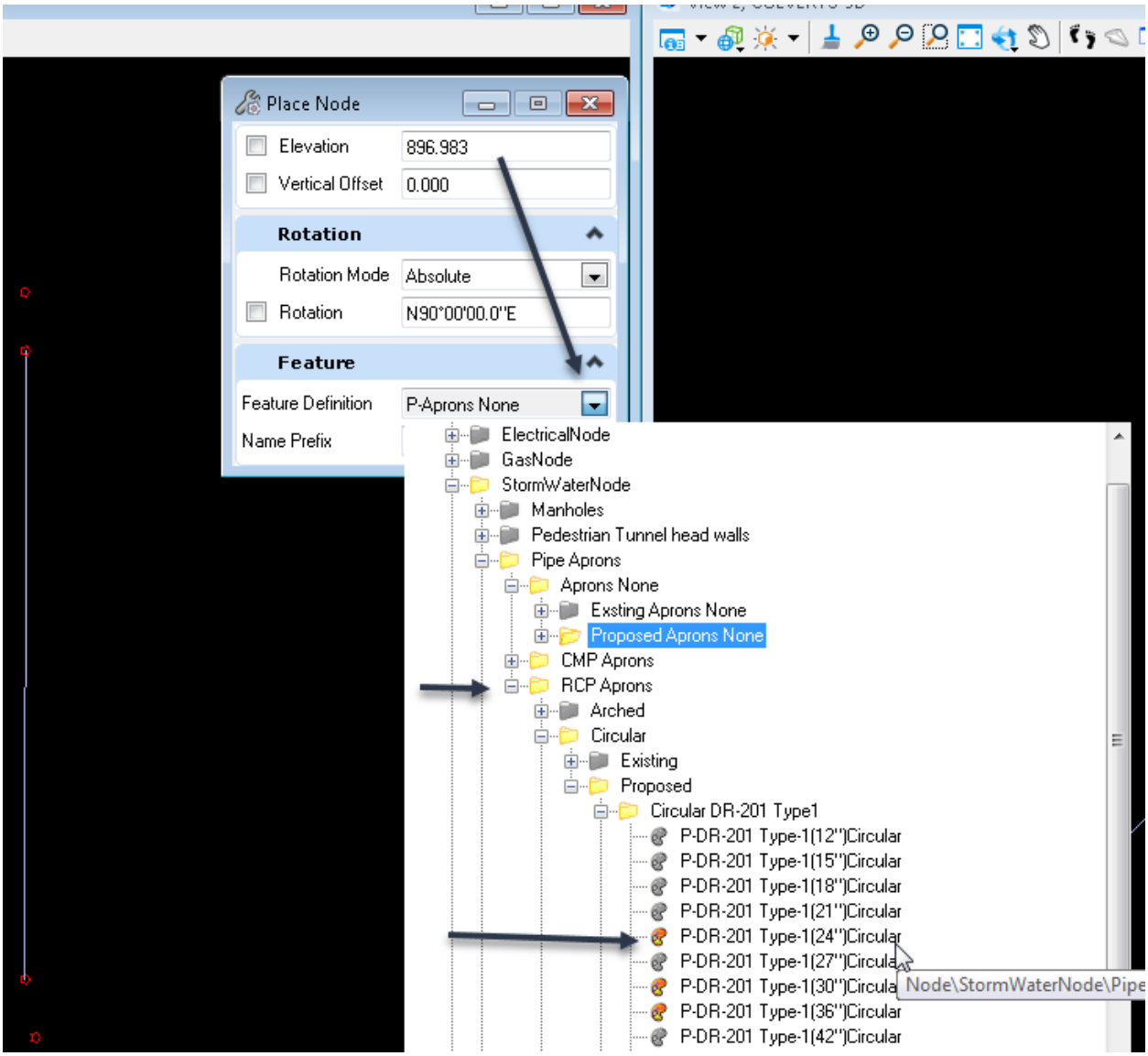


The reason the nodes and conduits are named this way, is that when viewing the information in project Explorer in the Drainage and Utilities Model, it makes it easier to find the correct entry for each structure modeled in the project.



The 2nd method of modeling the pipes or culverts is Place nodes. 

The Place Node workflow can be done with AccuDraw or with the ASCI graphics as shown before. The following instructions cover using ASCI 3D graphics as shown before. To do this, click on the Place Node tool. Then select the feature of the node to be placed. For this example, place a 24-inch RCP apron.



Use the description field from the ASCI file for the Name Prefix.

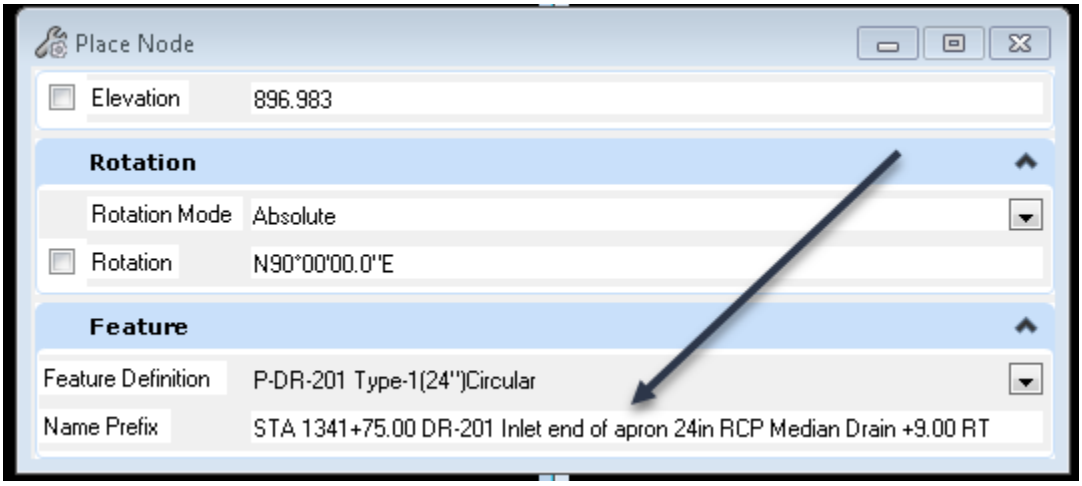
699,3452954.566,5308286.119,896.149,PRO STA 1341+75.00 DR-201 Inlet end of apron 24in RCP Median Drain +9.00 RT

700,3452948.442,5308286.216,896.068,PIP159 STA 1341+75.00 DR-601 Inlet of 24in RCP Median Drain +15.12 RT

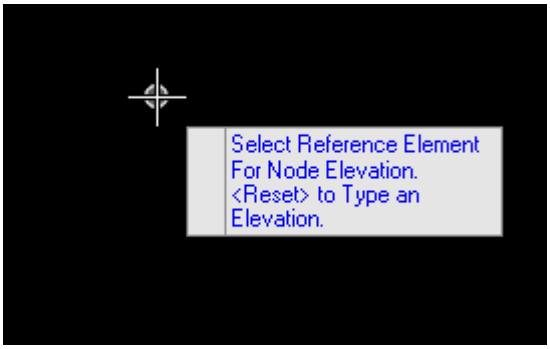
701,3452882.444,5308286.185,895.190,PIP159 STA 1341+75.00 DR-601 Outlet of 24in RCP Median Drain +81.11 RT

702,3452876.334,5308287.275,895.109,PRO STA 1341+75.00 DR-201 Outlet end of apron 24in RCP Median Drain +87.24 RT

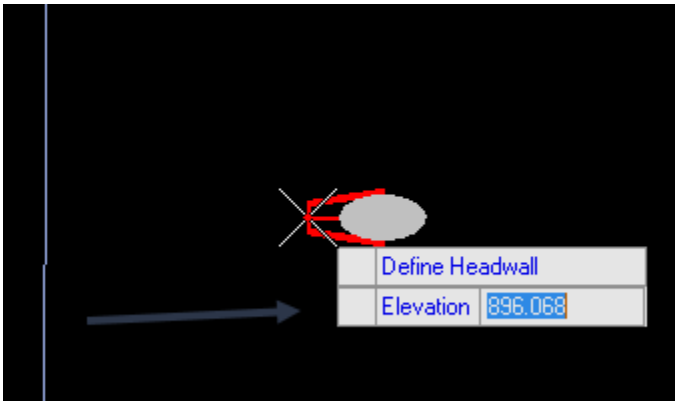
It should look something like this.



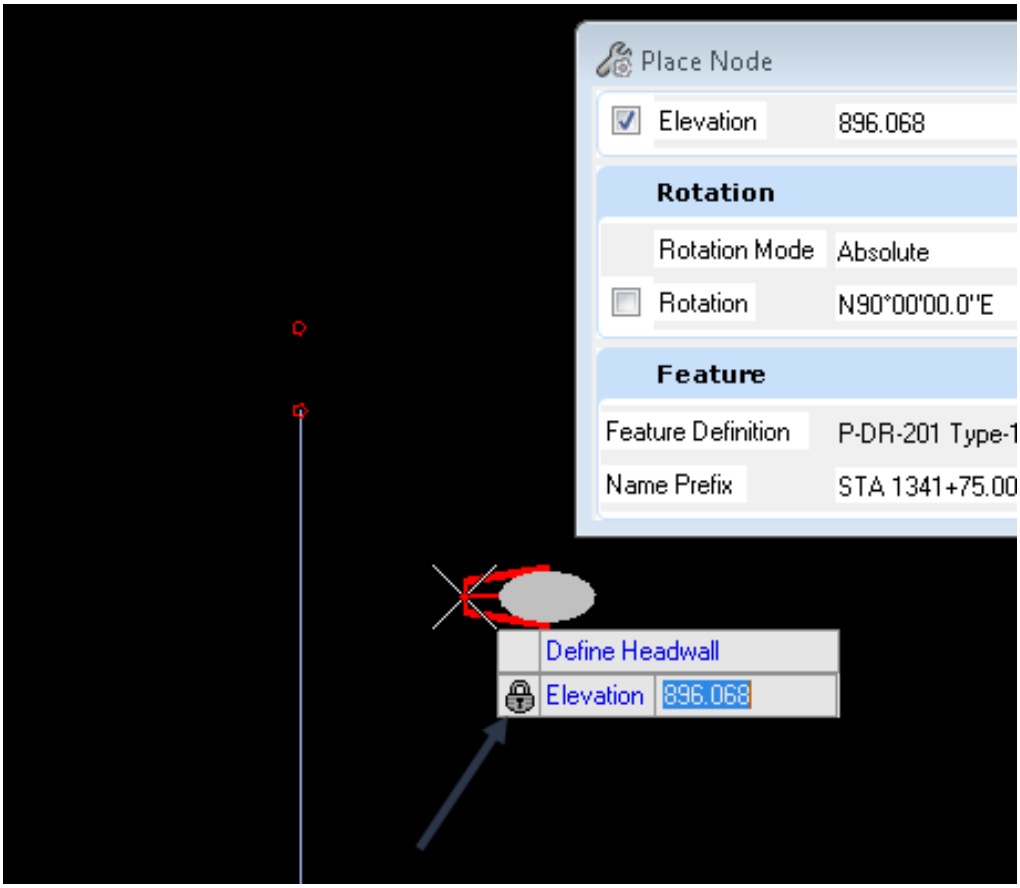
Next, move the cursor to the 2D view and it will prompt to Select Reference Element or to Reset to Type an elevation. Reset and type the elevation.



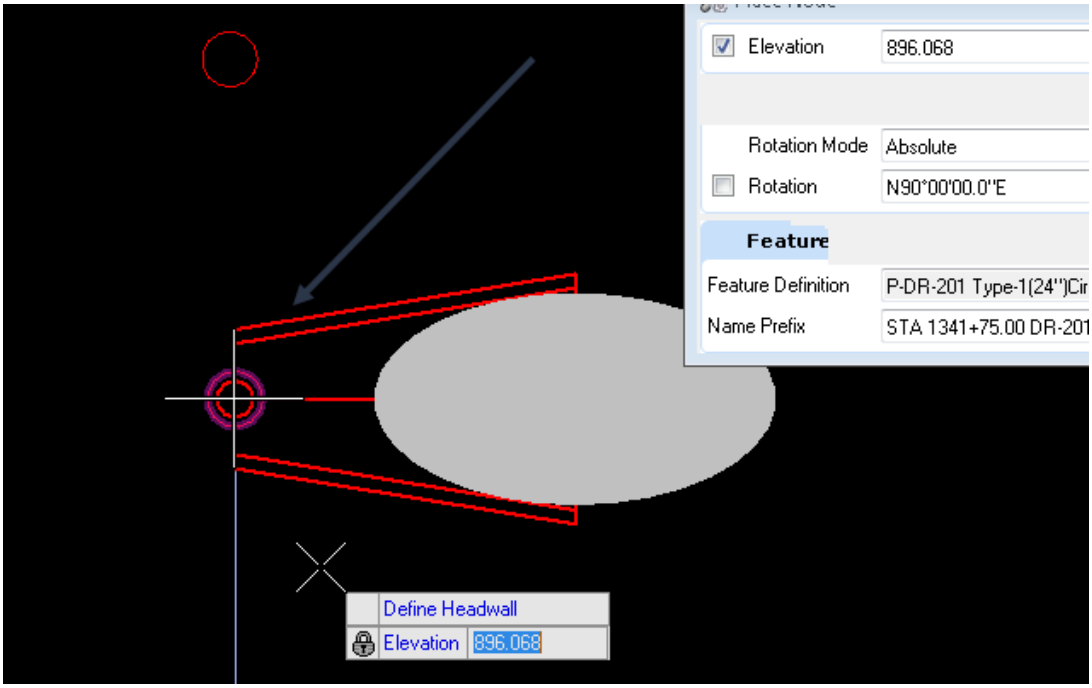
For this example, use 896.068 that is the flowline elevation of the design.



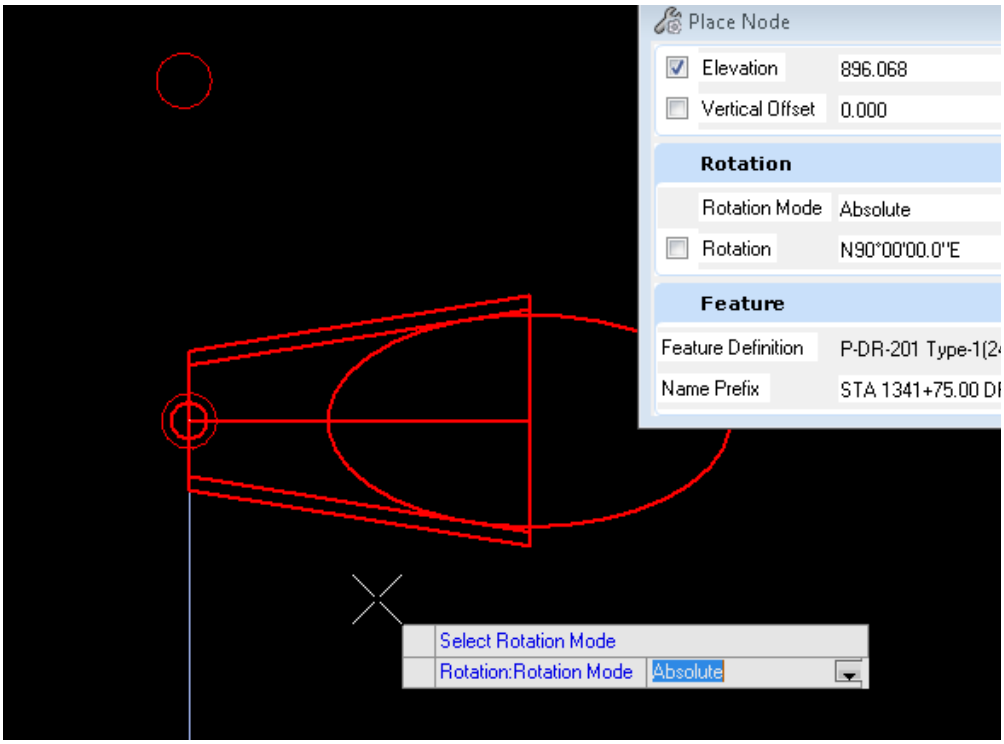
Next hit the enter key and it will lock this elevation and look like this.



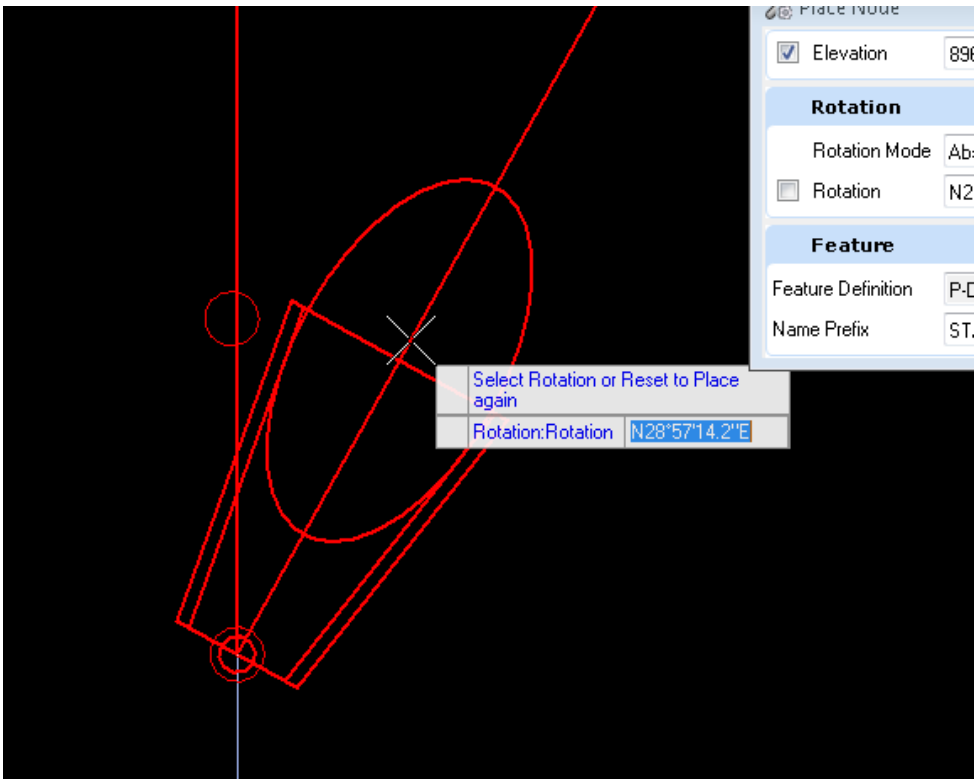
Then, snap to the ASCI graphics to place the apron or node like this.



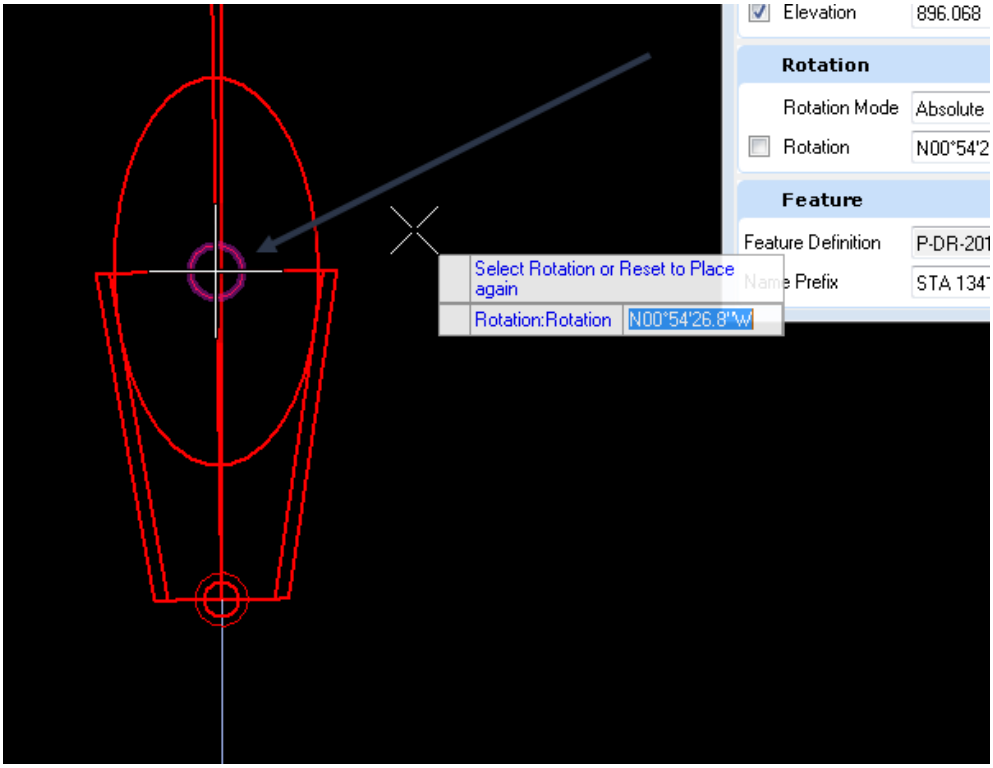
Then, data point to accept it and it will prompt to select rotation mode. For this example, use the absolute mode.



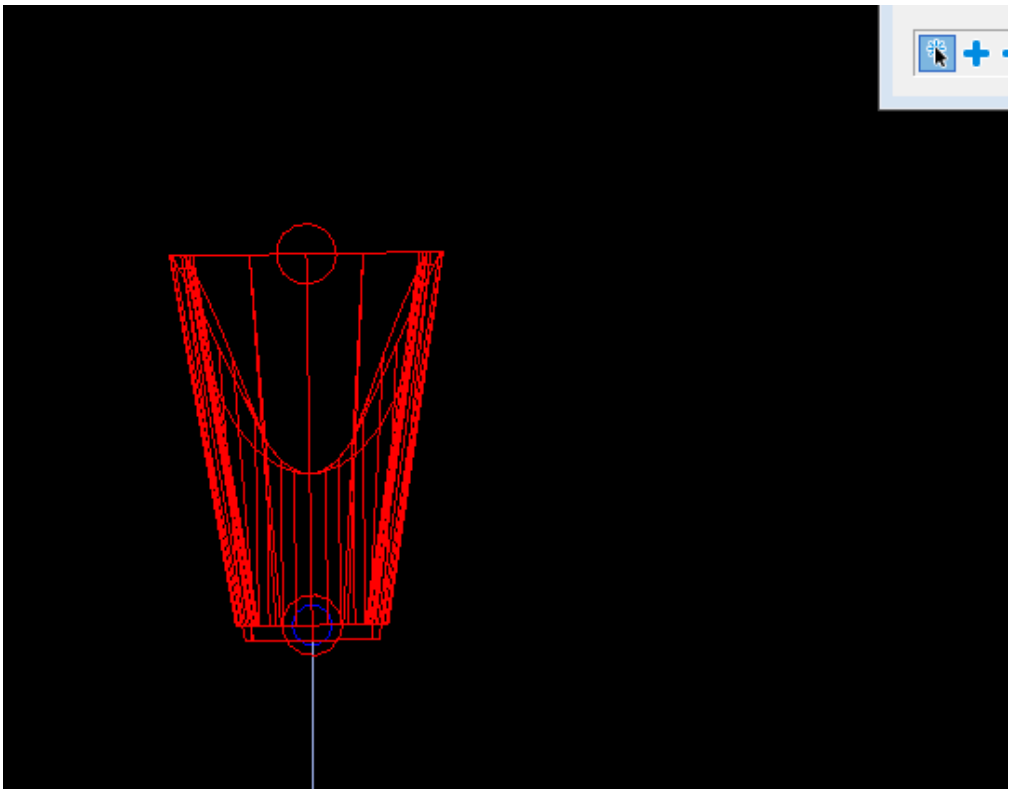
Data point again and the apron will rotate until another data point to accept the rotation.



Snap to the ASCI graphics to set the rotation to the PRO graphic from the ASCI input.

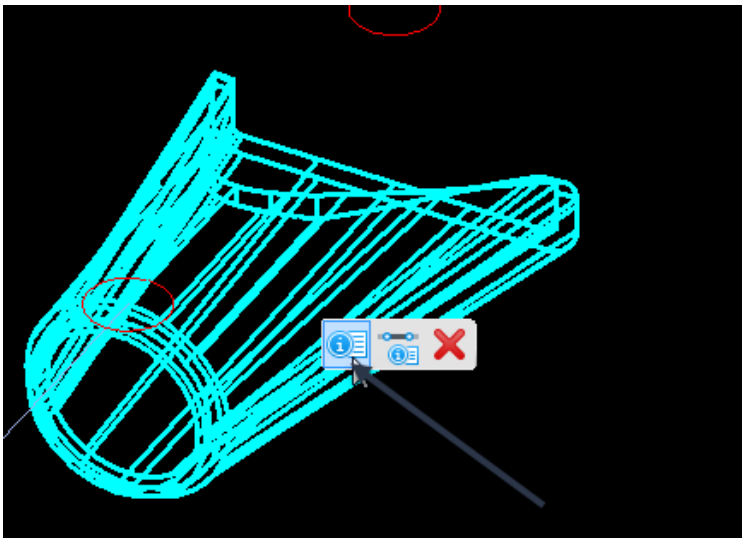


Then, data point to accept. Once it is dome placing the node, hit the escape key to exit the tool. It should look like this:

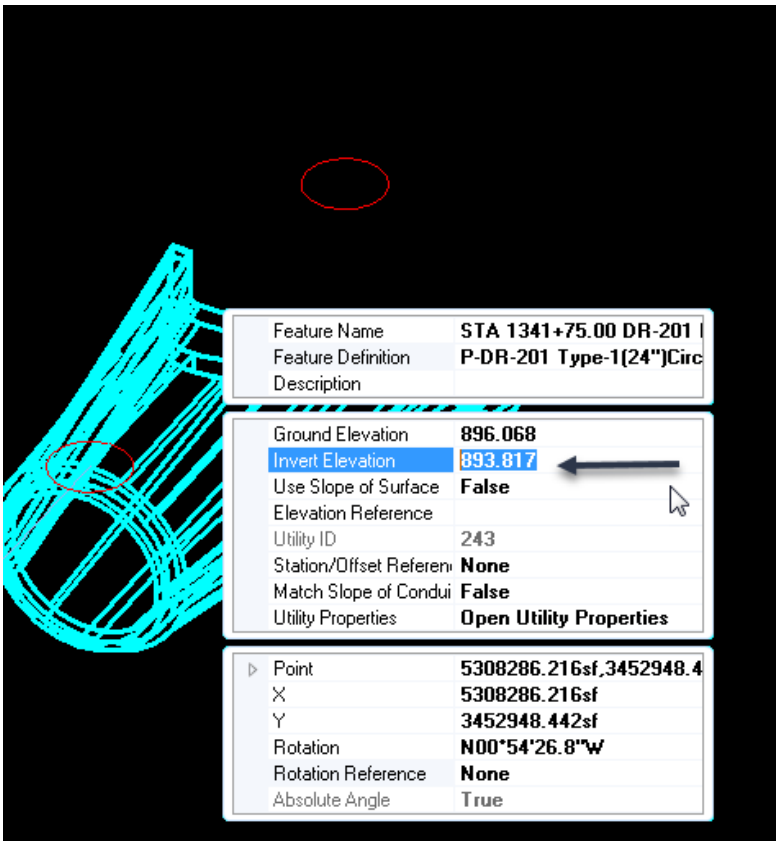


Repeat this on the other end and/or at any vertices along the conduit using the appropriate node in each location.

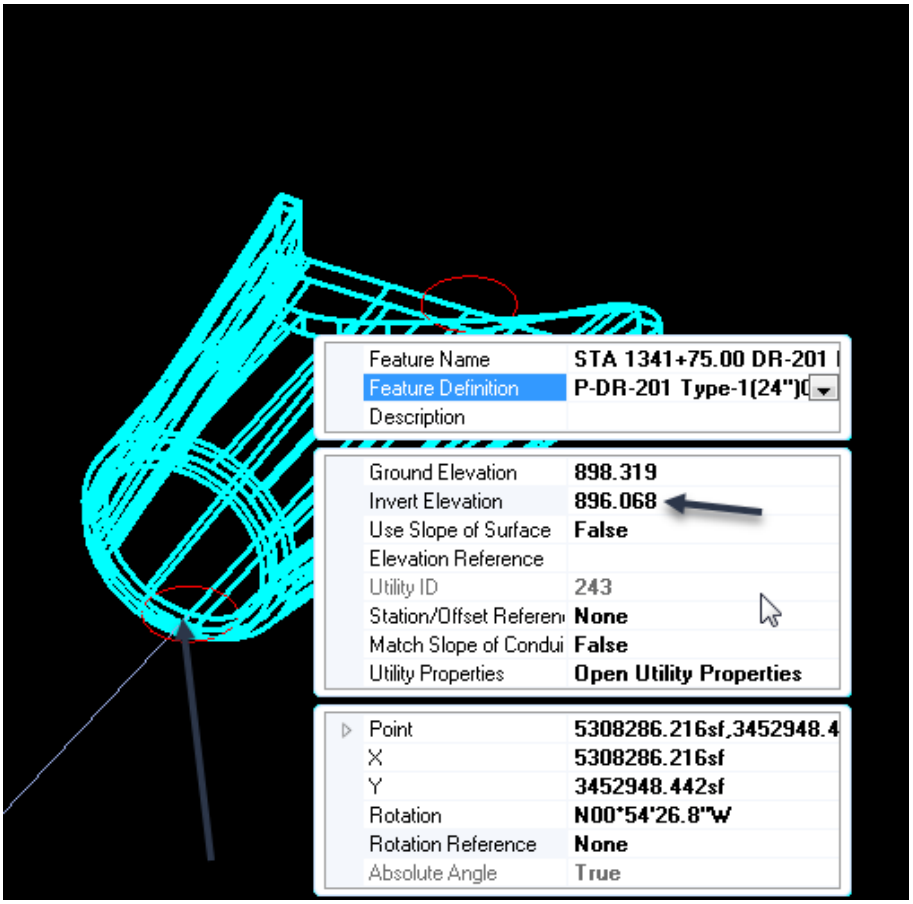
Keep in mind, that the elevation typed in is the invert elevation not the ground elevation that the software is asking for. To fix this look at the node in the 3D view and select it with the element selection tool.



Then bring up the properties of the element and edit the invert elevation to match the design invert elevation.

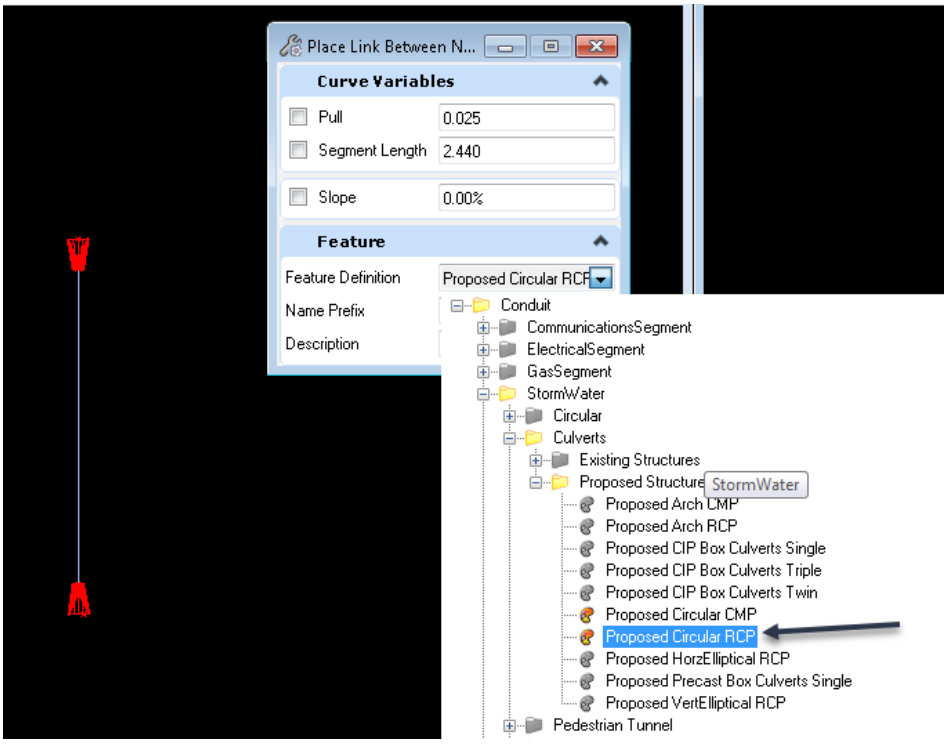


This will correct the elevation placement. .

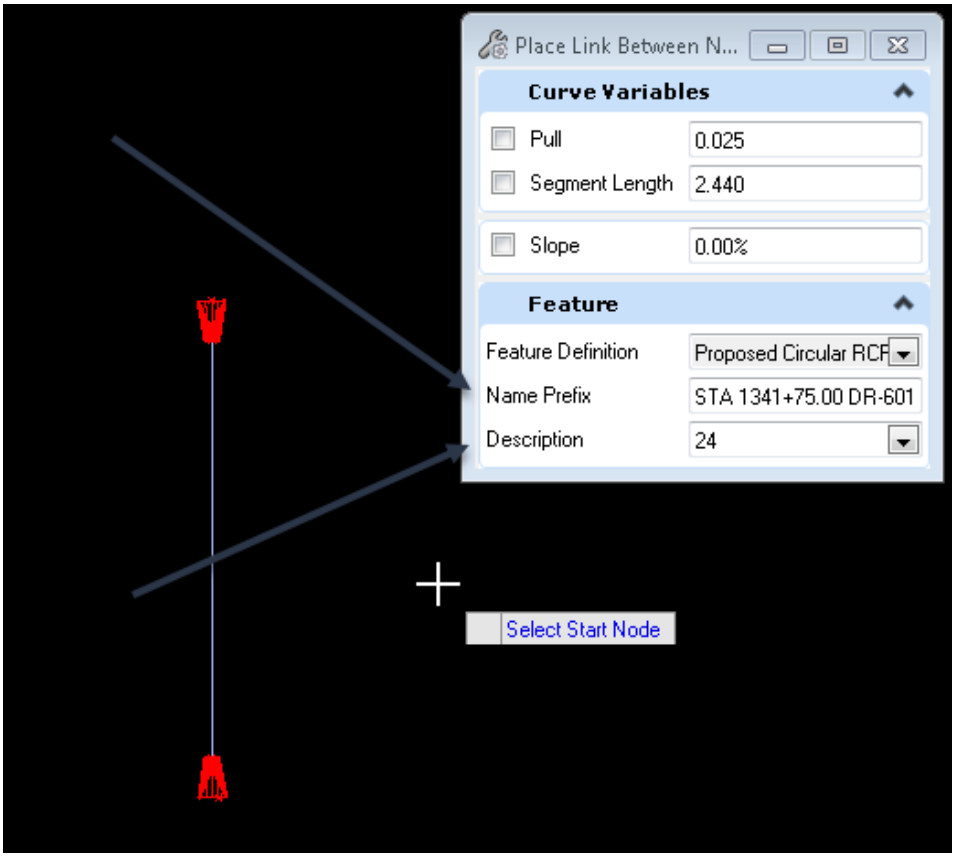


After the nodes are placed that are needed to model the structure, then connect the nodes with the appropriate conduit. To do this, select the Place Conduit tool.

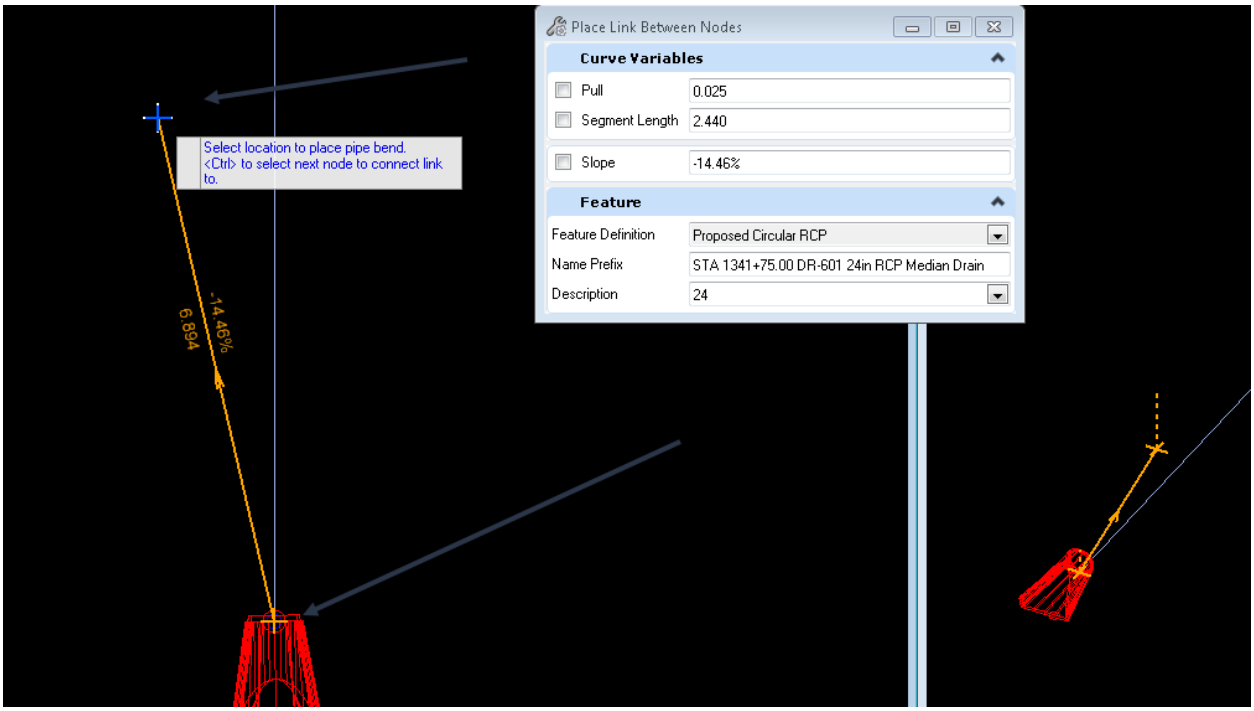
Then, select the feature that is needed to model the structure.



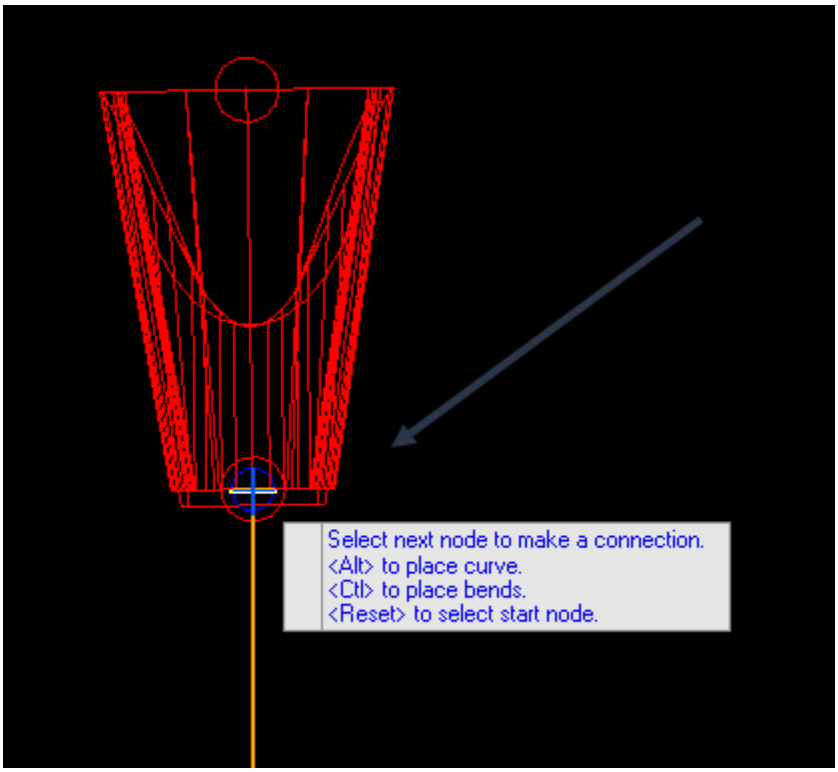
For this example, use the Proposed Circular RCP.



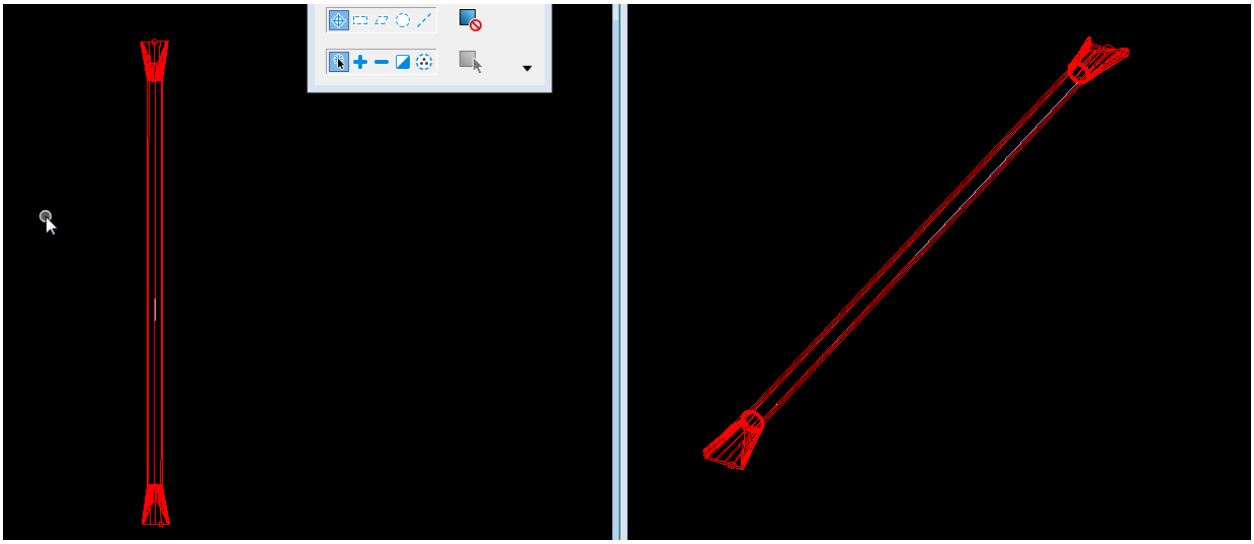
Use the description field from the ASCI file and place it in the Name Prefix field. Then select the size of the structure in the description field. Next, select the node to start from.



Then select the next node along the structure.



It should look something like this.



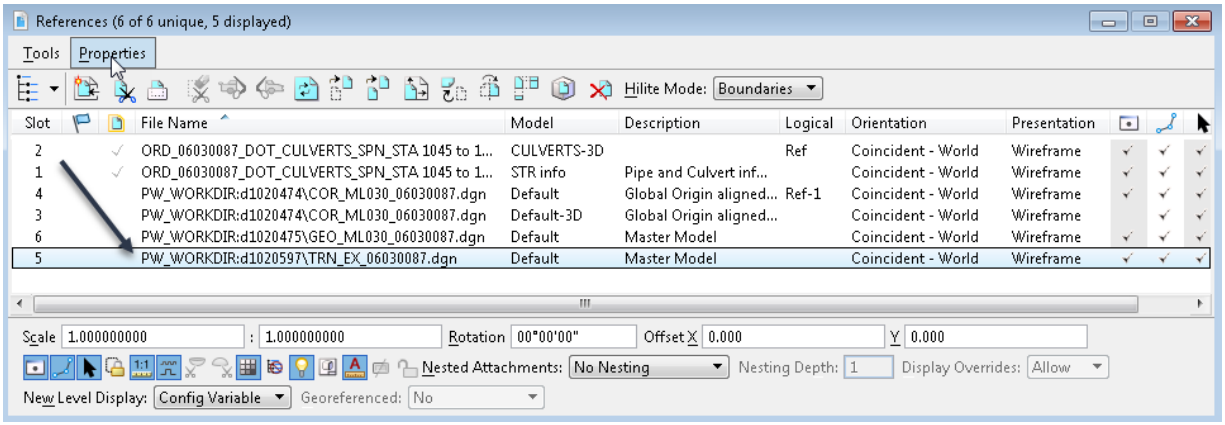
Now turn on the reference COR files and see how the drainage design correlates to the Road Designs earth work and grading design.

Calculating Excavations

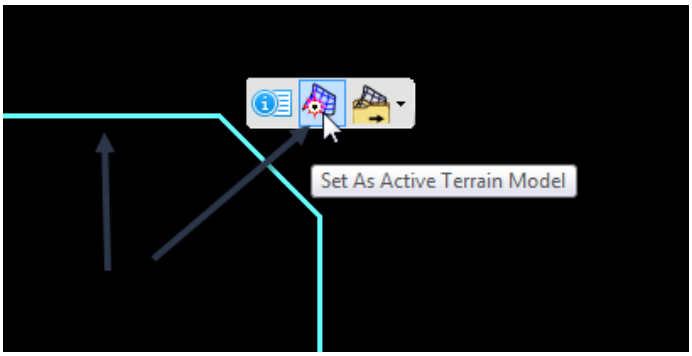
These instructions were created on 4/13/2021. These instructions were created with:

OpenRoads Designer CONNECT Edition - 2020 Release 3 Update 9 - Version 10.09.00.91

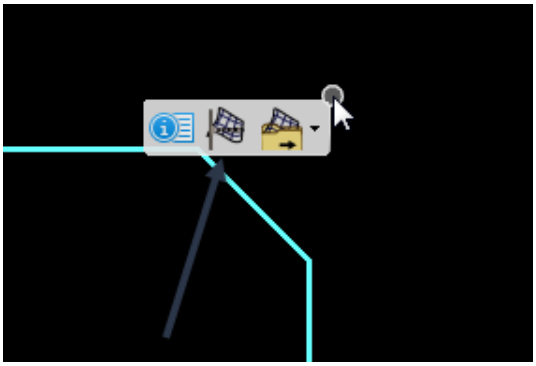
Once the structures are modeled, calculate the excavations. To do this, reference in the TRN to calculate the excavations from. In most situations, it will be from the existing ground TRN.



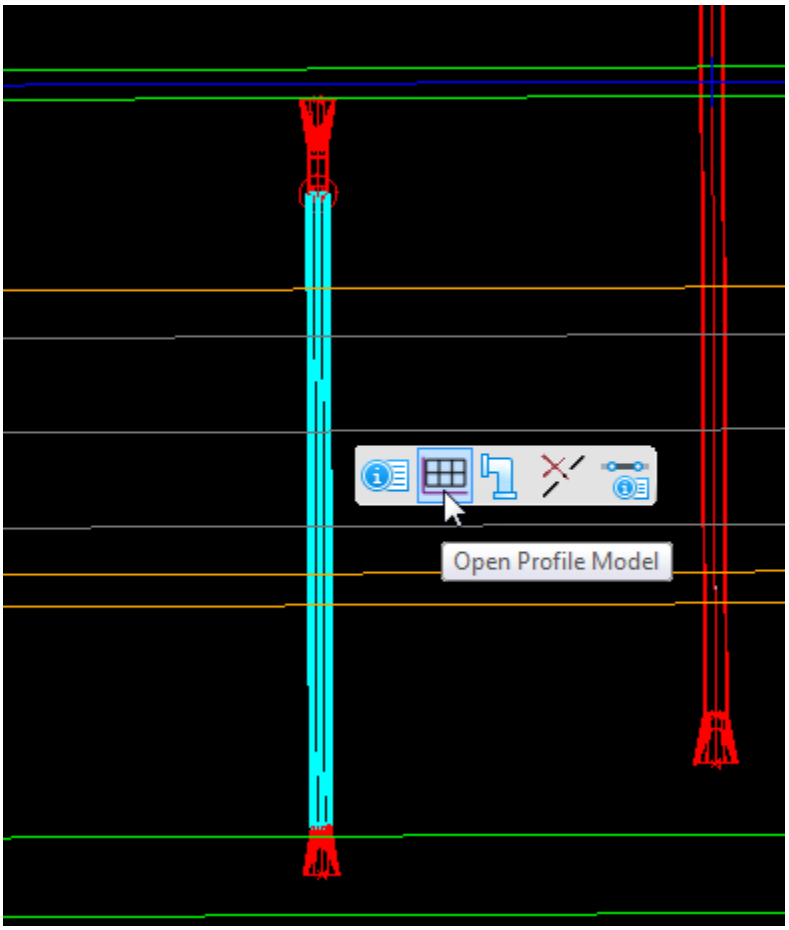
Then, make the TRN active. To do this, select the boundary of the TRN and use the heads-up tools to select the Set As Active Terrain Model tool.



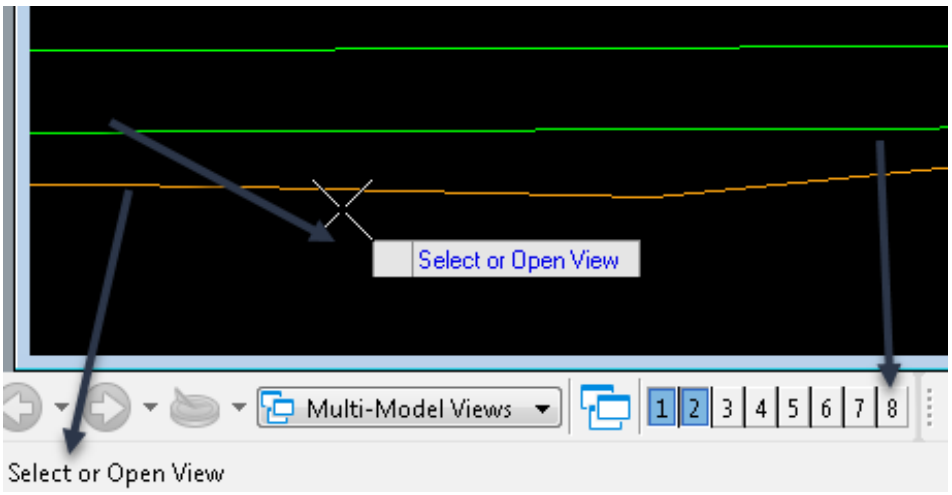
To verify that the TRN is set to active, hover over the boundary and the tools should appear as shown below.



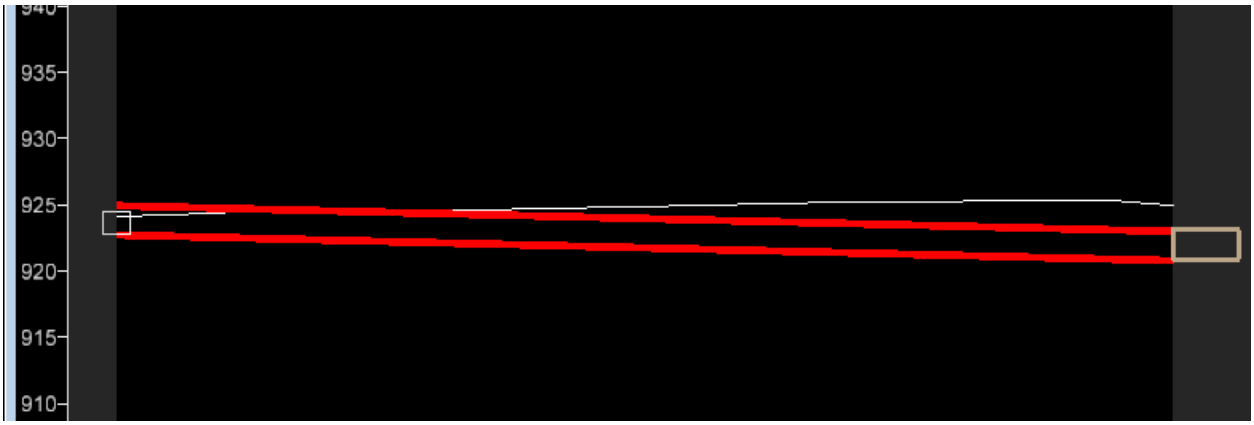
Once the TRN is set to active, then a profile needs to be applied to the conduit before the excavation template can be pushed. To do this, select the structure and select the Open Profile Model tool.



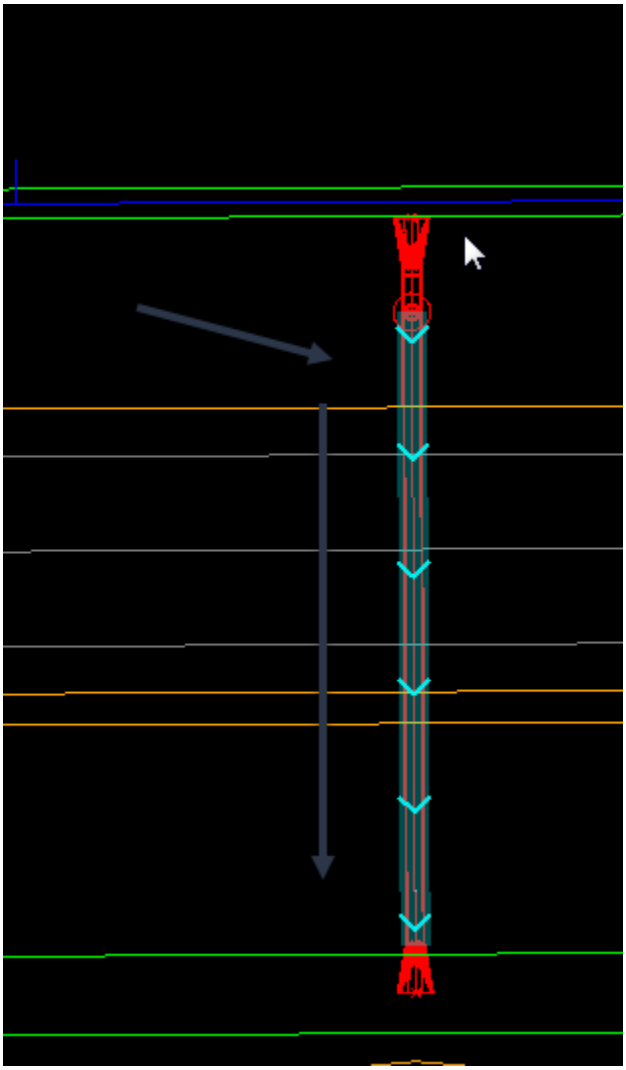
It will prompt to Select or Open View. For this example, use View 8.



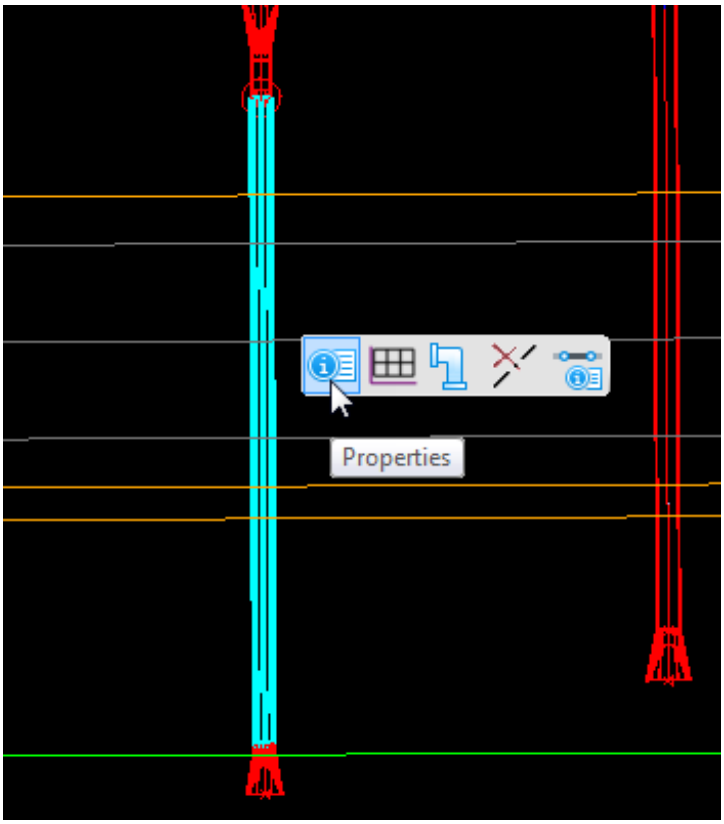
The profile view will display and should appear similar to below.



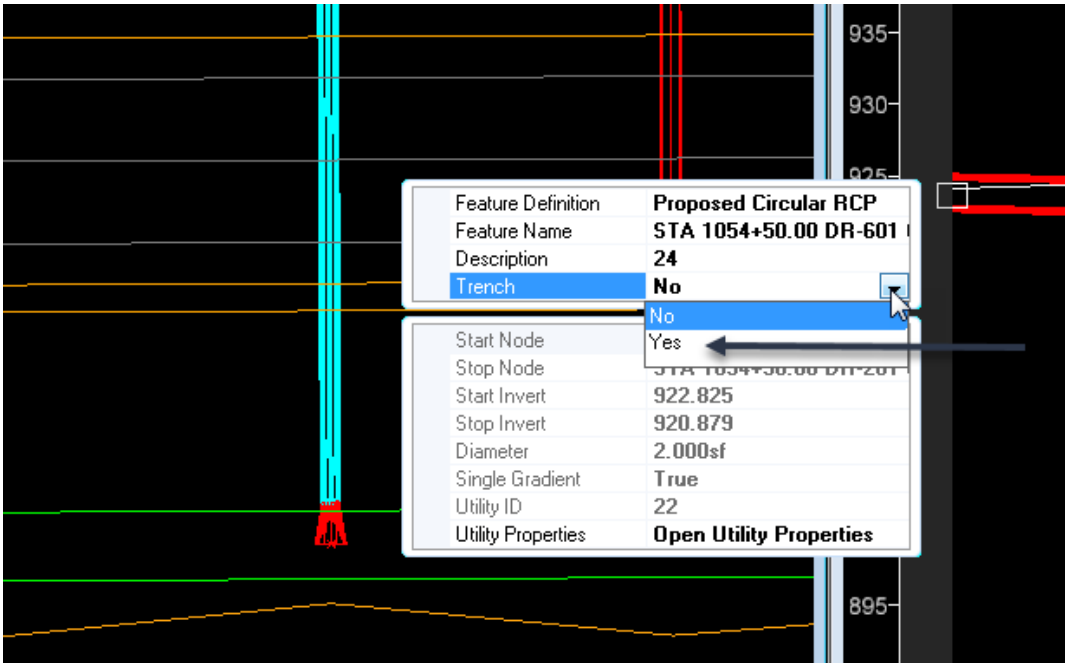
In the plan view or 2D model, it will appear similar to below. Notice that the view shows the direction of the water flow.



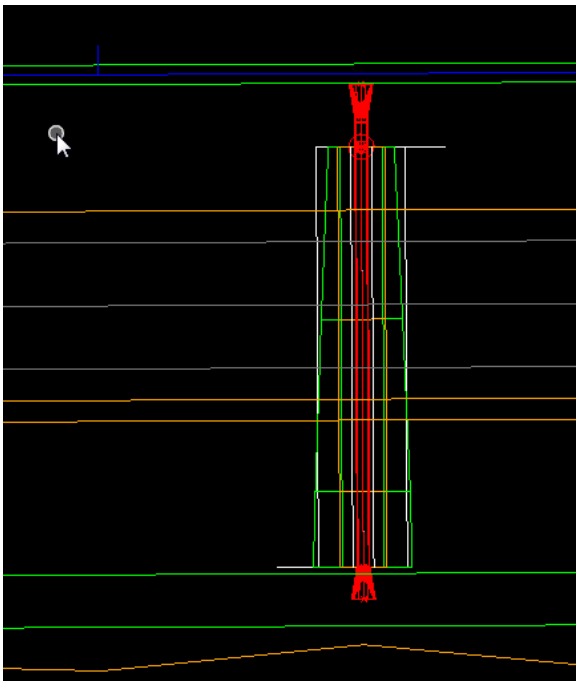
Once the profile has been applied to the conduit, the excavation can be calculated. To do this, unselect the conduit, then select it again to bring up the heads-up tools. But this time, select the Properties tool.



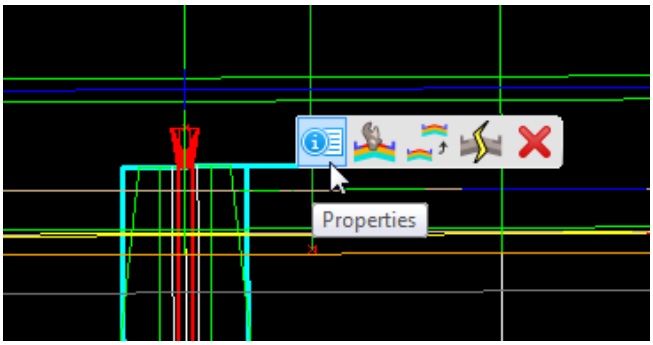
In the Properties, under the Trench field select Yes.



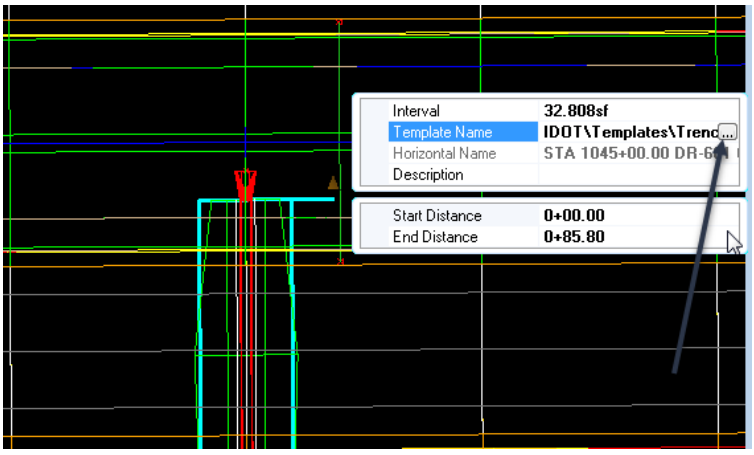
This will create the excavation corridor and should appear as shown below.



The default Trenching template is the Excav. 1 Mat. Bed. If this is not the template required for this project, change it to the template needed. To do this, select the corridor and open the Properties.

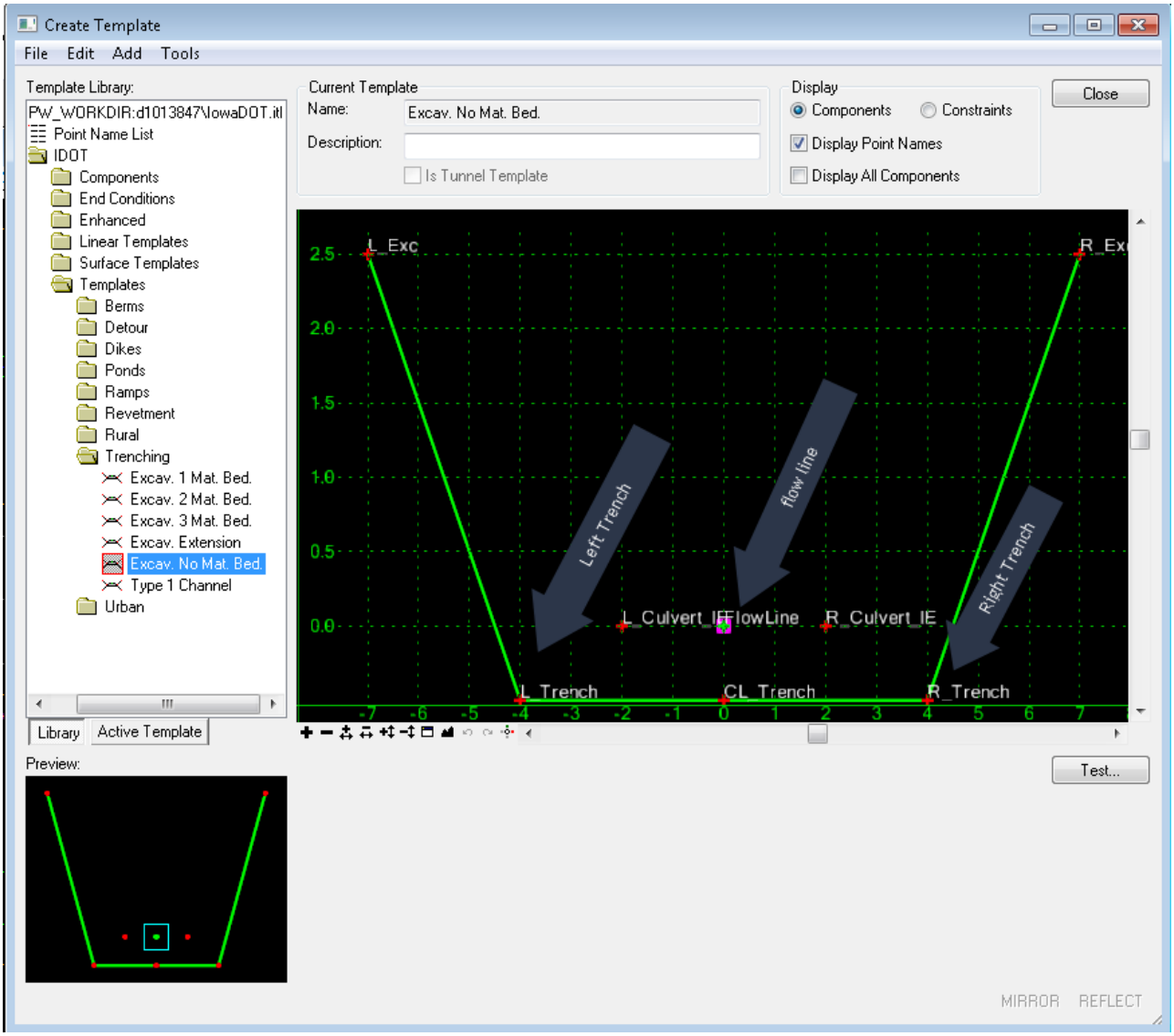


Then select the Template Name needed.



The excavation template is set up as a default for a 48-inch pipe. If the pipe is another size, change the parametric constraints of the template.

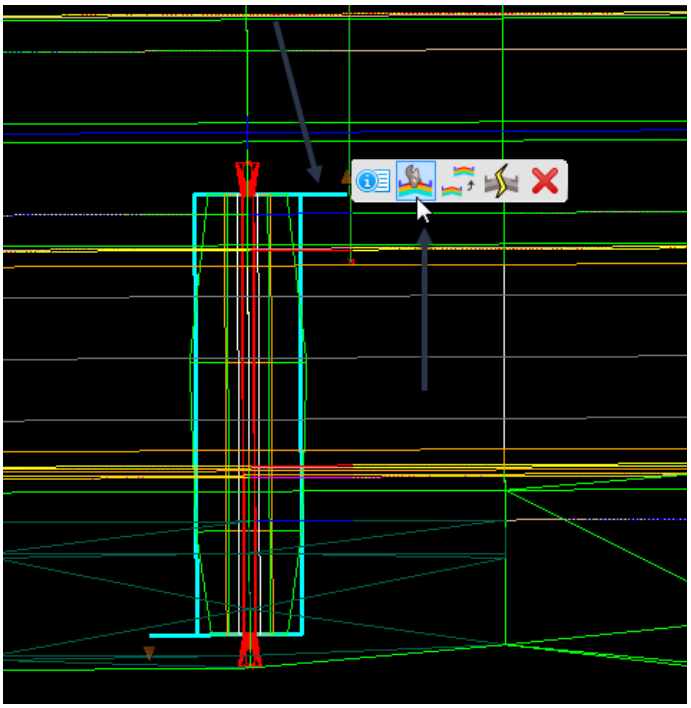
The default Trenching template Excav. 1 Mat. Bed. is pushed along the flowline of the conduit and the left and right edge of the trench are parametrically constrained by the left and right edge of the inside opening of the culvert that is ruled to the flowline.



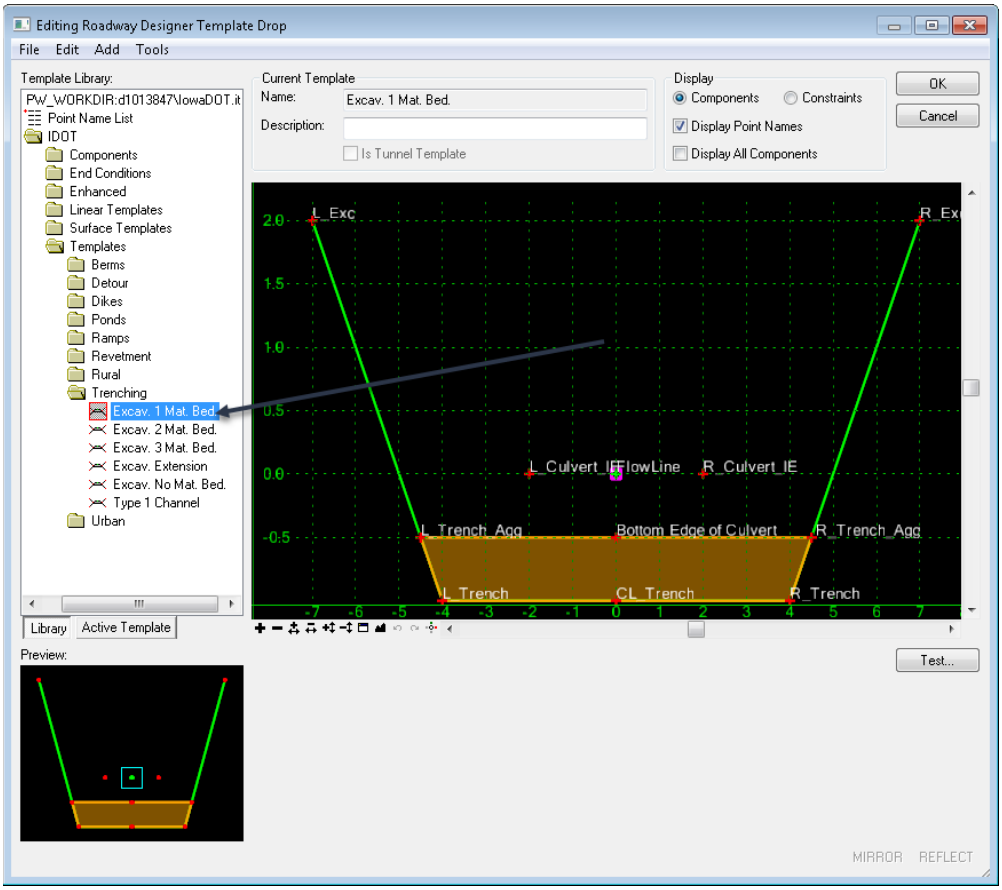
To change the size of the trench, calculate the distance from the flowline to the edge of the inside opening of the pipe being modelled. For example, for a 24-inch pipe, this distance would be 1.00 ft from the flowline left and 1.00 ft from the flowline right which equals ½ distance of the size of the pipe.

Once the correct distance is determined, change the parametric constraints of the template to match the structure. To do this, select the corridor and bring up the heads-up tools.

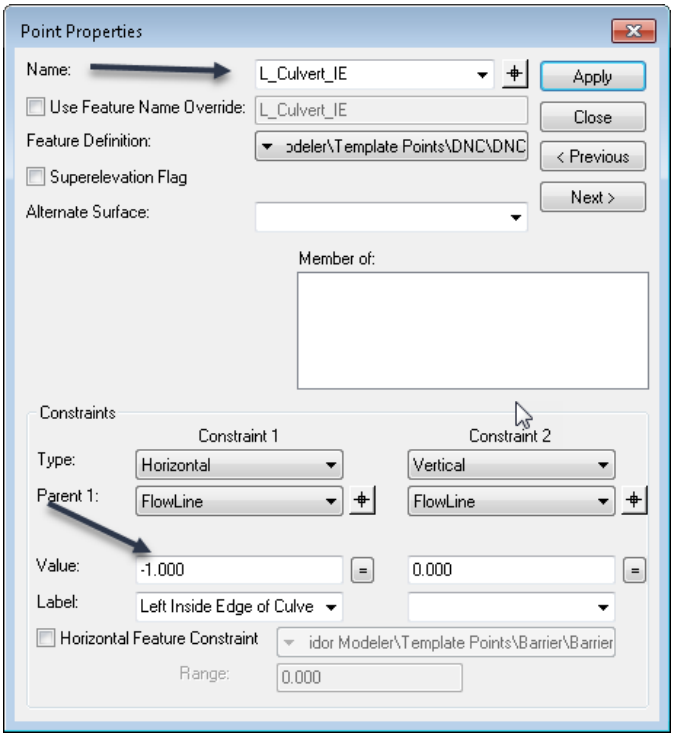
Then select the Edit Template Drop tool.



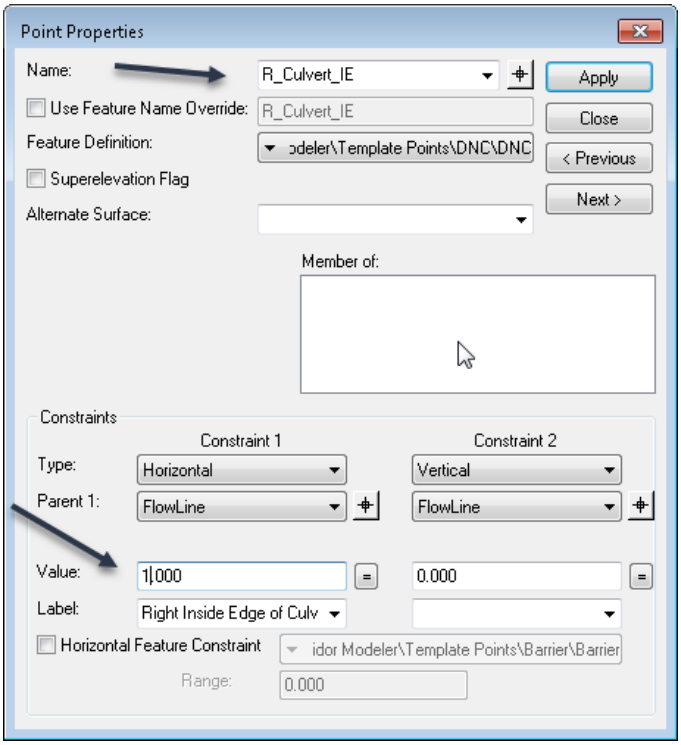
This will open the template that was used to model this trench.



To change the parametric constraints on the L_Culvert_IE or R_Culvert_IE points on the template, double click on the point in the template. It will open the constraints on that point. For this example, it will be a 24 inch pipe, so it should appear as shown below.

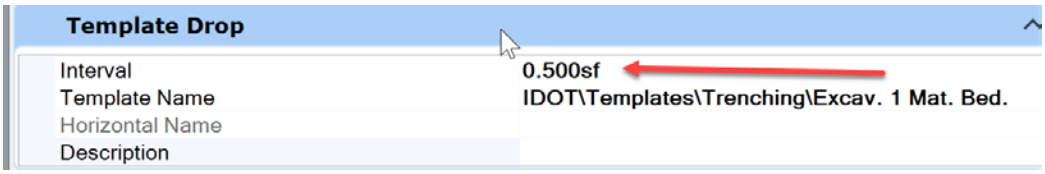


Once the constraint value is changed to -1.00 for the left-side, click on Apply then Close buttons. Then repeat the same operation on the other side. Note that the right-side constraint value will +1.00.



This will resize the trench to fit the structure modeled.

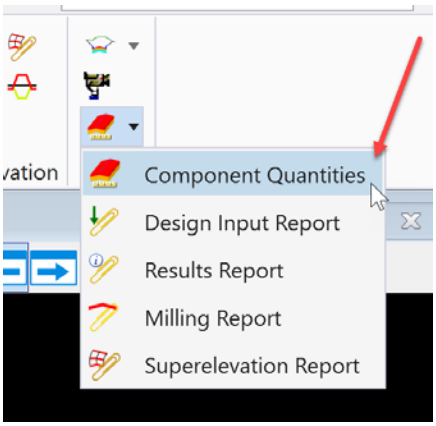
Also change the Template Drop Interval to .5 sf to provide a more accurate excavation quantity.



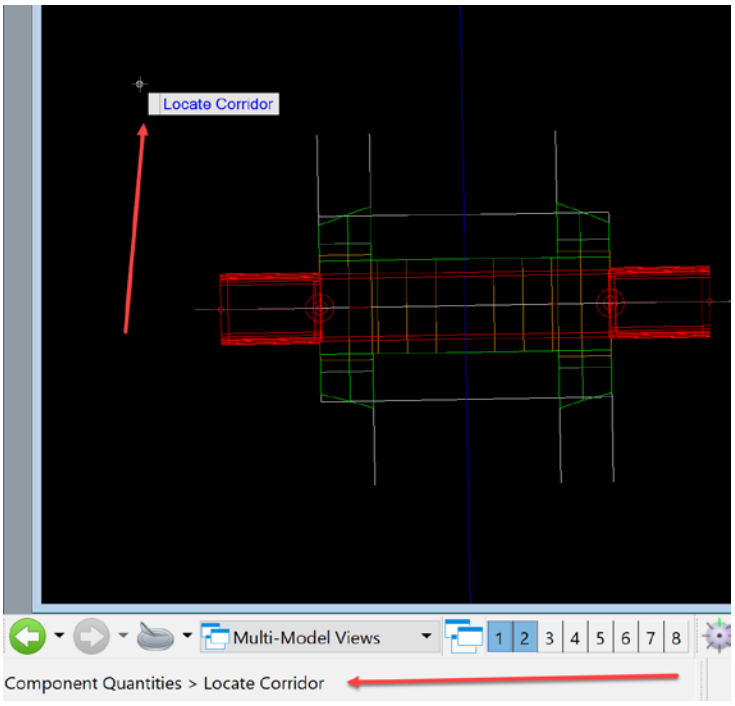
A template will be dropped every 6”. Any closer than 6” will not increase the accuracy.

Next compute the excavation quantities from the excavation corridor that was made with the template.

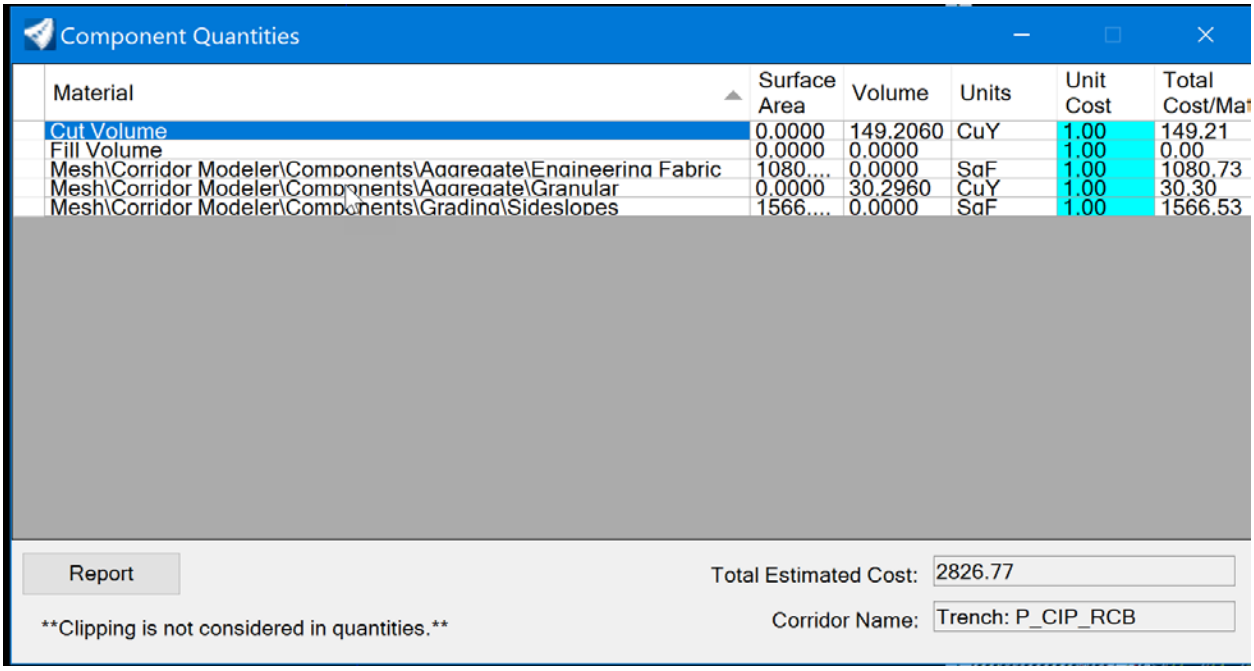
To do this, select Component Quantities in the Corridor Reports tool on the Corridors tab in the Review group.



It will prompt to locate the corridor. Select the excavation corridor.



It will open the window that provides the quantities from the template or templates used to create the excavation corridor.

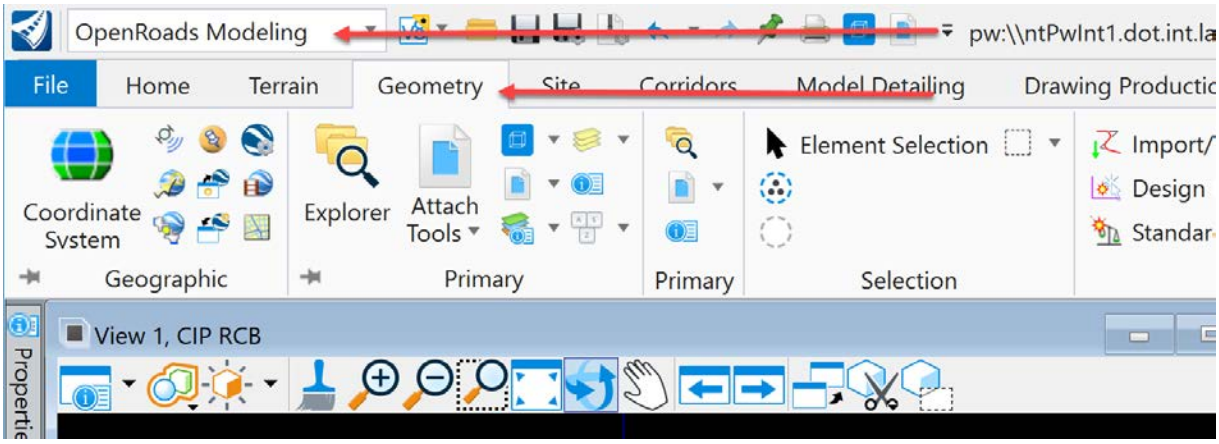


The unit cost of each item can be added. Click on the Report button to save the quantities into a report as a deliverable for the project.

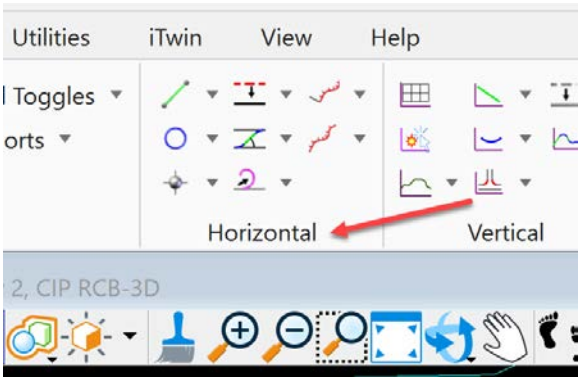
For an RCB to calculate the headwall excavation, there are two options. The first is to follow the instructions above and add geometry to each headwall or the second option is to make geometry for the complete structure and calculate the trench from that.

For this example, add geometry to each headwall. Keep in mind that the process to make the geometry on each headwall is the same as the second option except add more points in the profile process to account for every change of elevation in that structure.

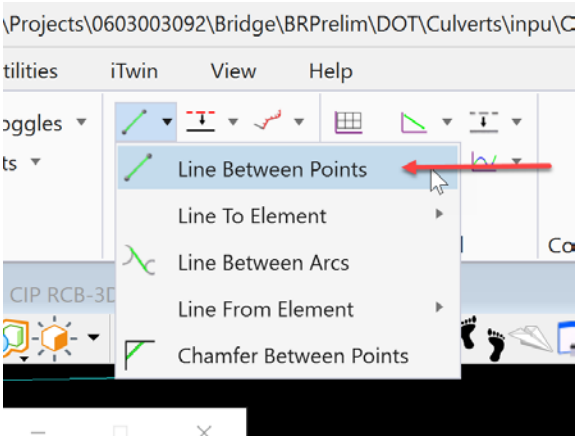
The first step in this process is to work in the 2D model and select the OpenRoads Modeling workflow.



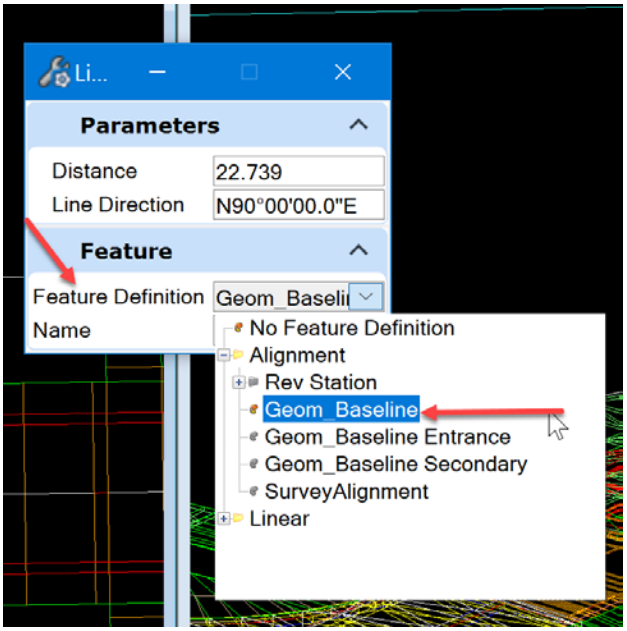
In the Geometry tab in the Horizontal group.



Select the Line Between Points tool.

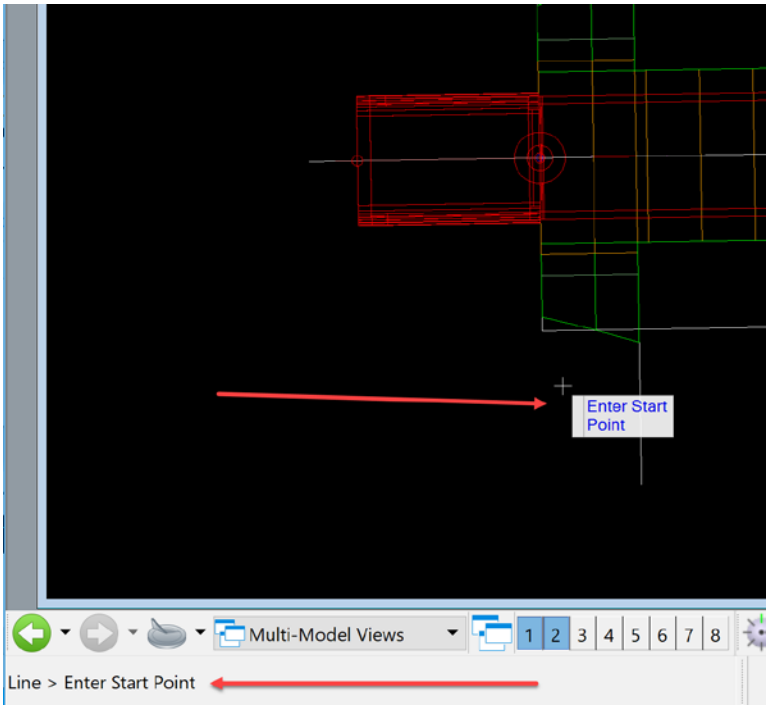


It will open the following dialog box. Select the needed Feature Definition, Geom_Baseline feature.

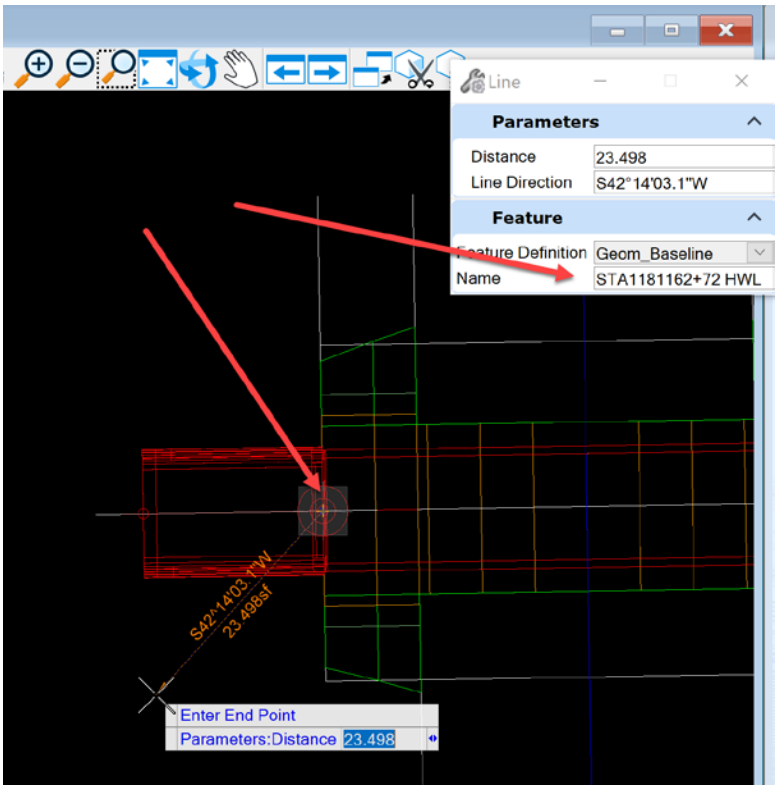


Next, name the Geo baseline being created for this process. The naming convention is STA1181162+72 HWL to indicate the station of the structure, STA1181162+72, and headwall with direction of left.

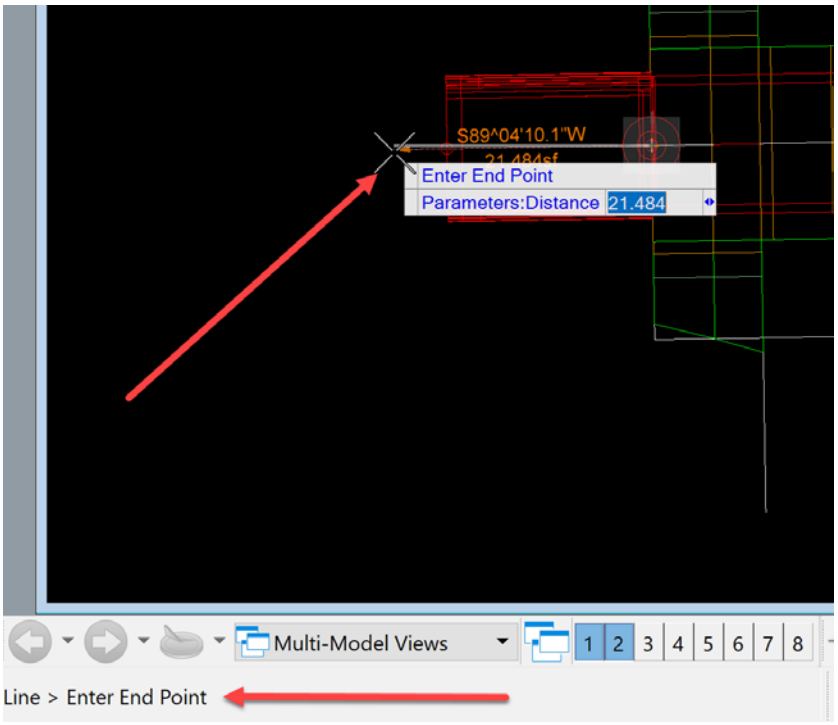
It will prompt to define the start point of the line.



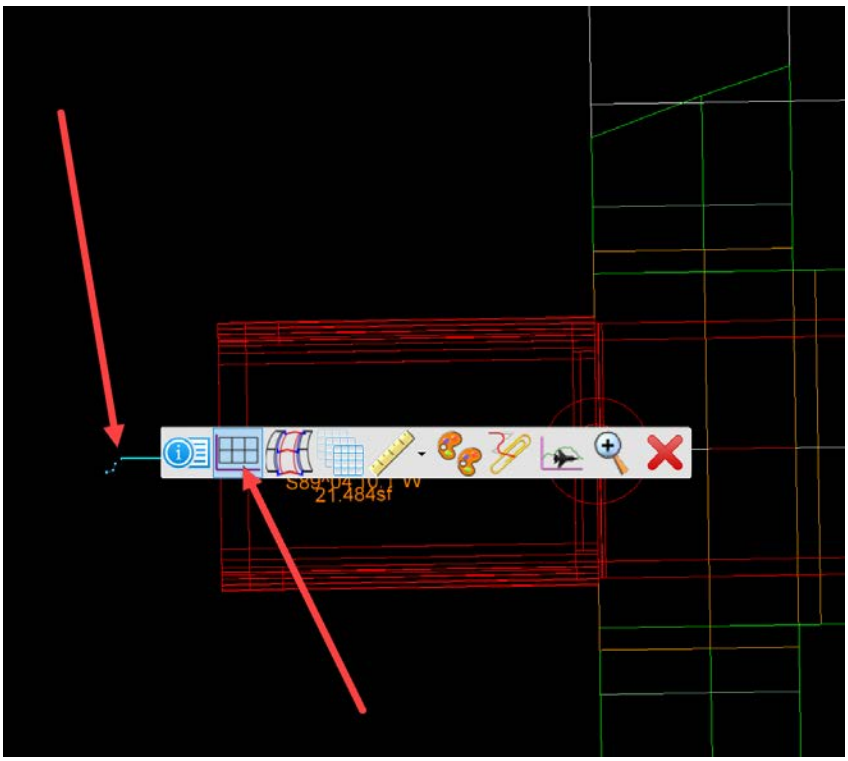
Snap to the end of the original excavation corridor to start this line.



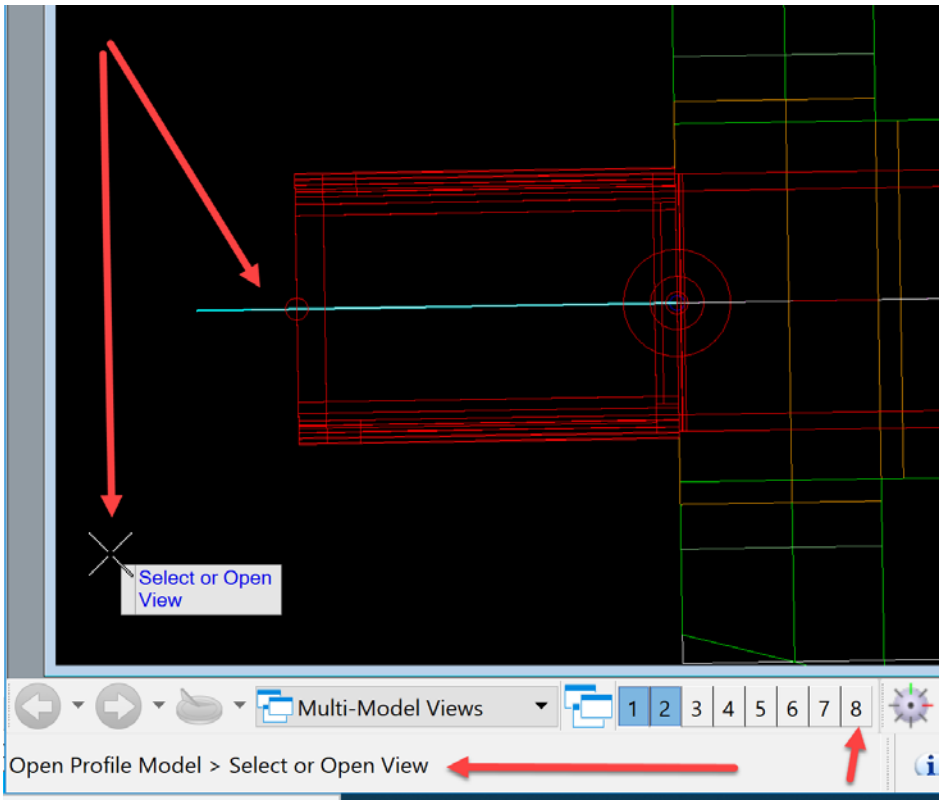
Then select the end point. End the line past the end of the curtain wall.



Next, select the STA1181162+72 HWL baseline just created with the element selection tool. Then hover over it for the heads-up tools access.

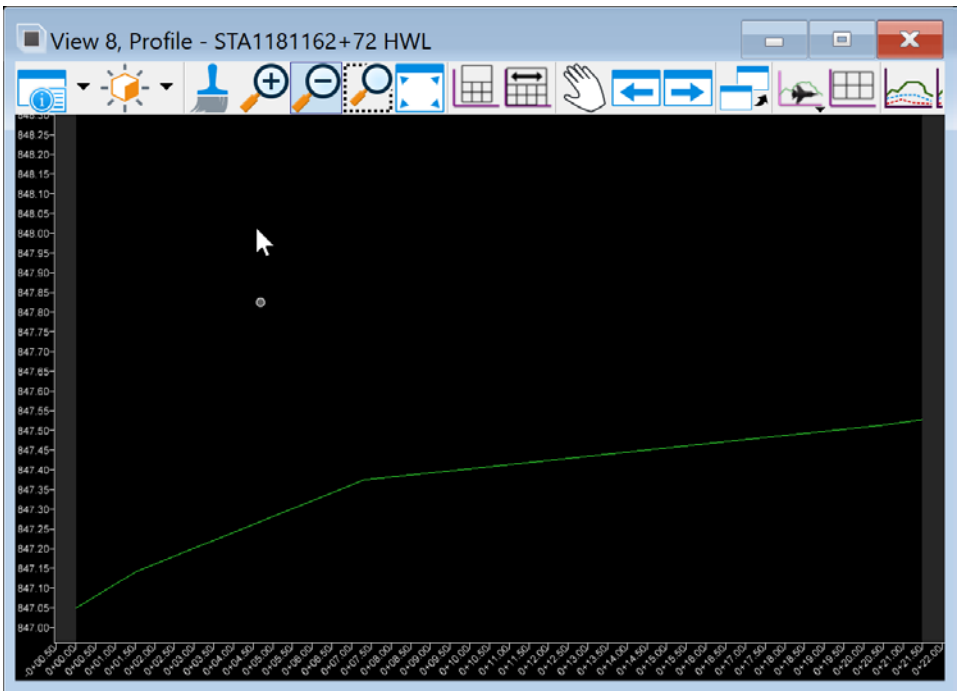


Next, select the Open Profile Model tool and then select a view to open it in.

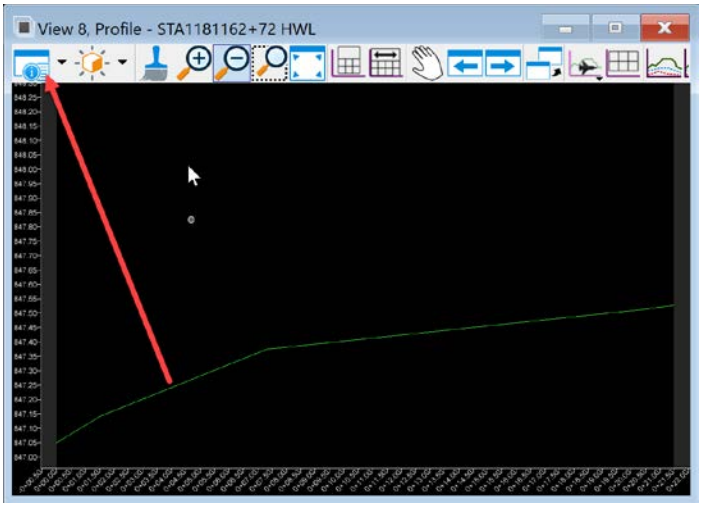


For this example, select View 8.

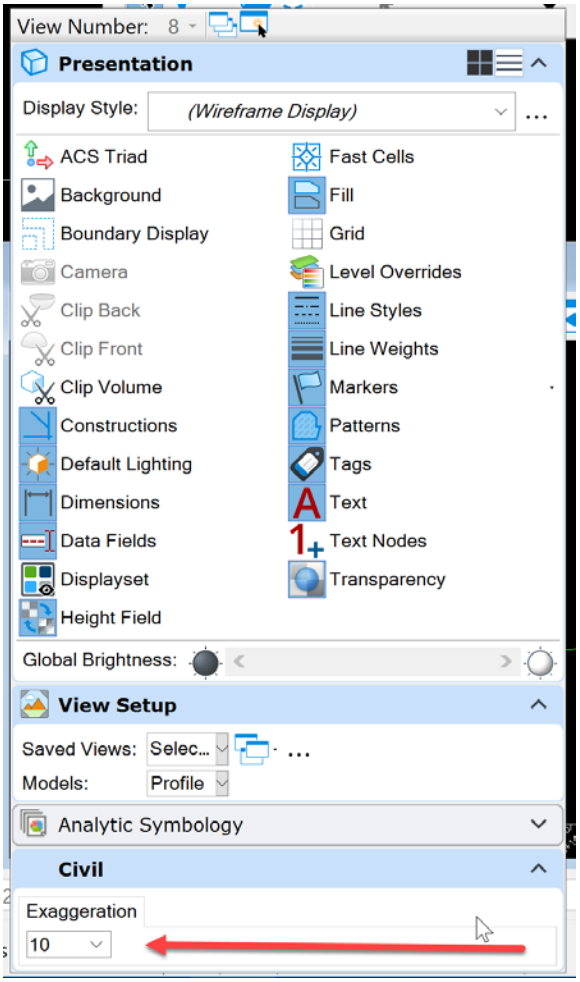
Once the view is opened, data point in the view. The additional profile will display and appear similar to below.



Next, set the exaggeration in the profile view.

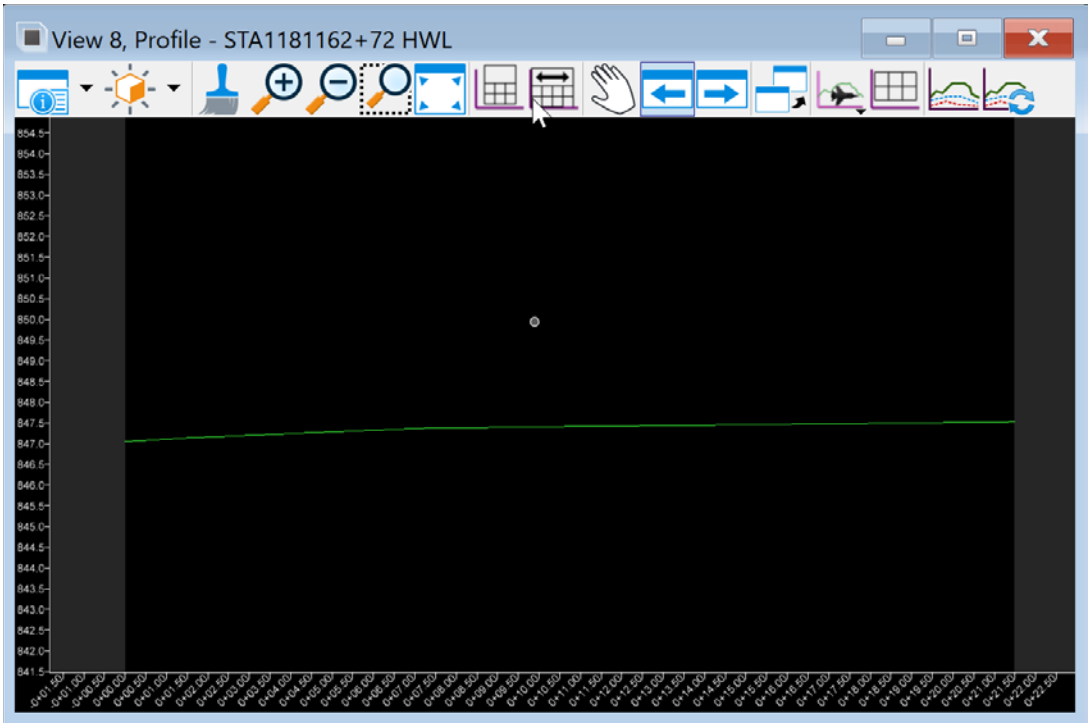


Click the View Attributes button at the top of the view.

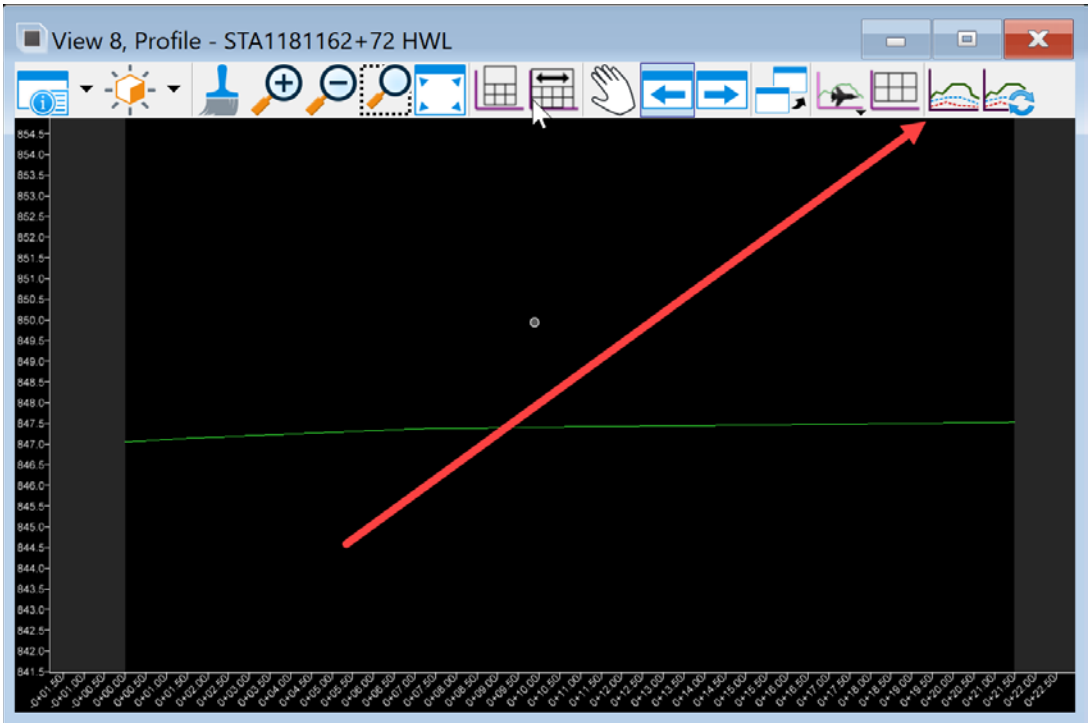


Set the exaggeration to 1.

The view of the profile will now appear as shown below.

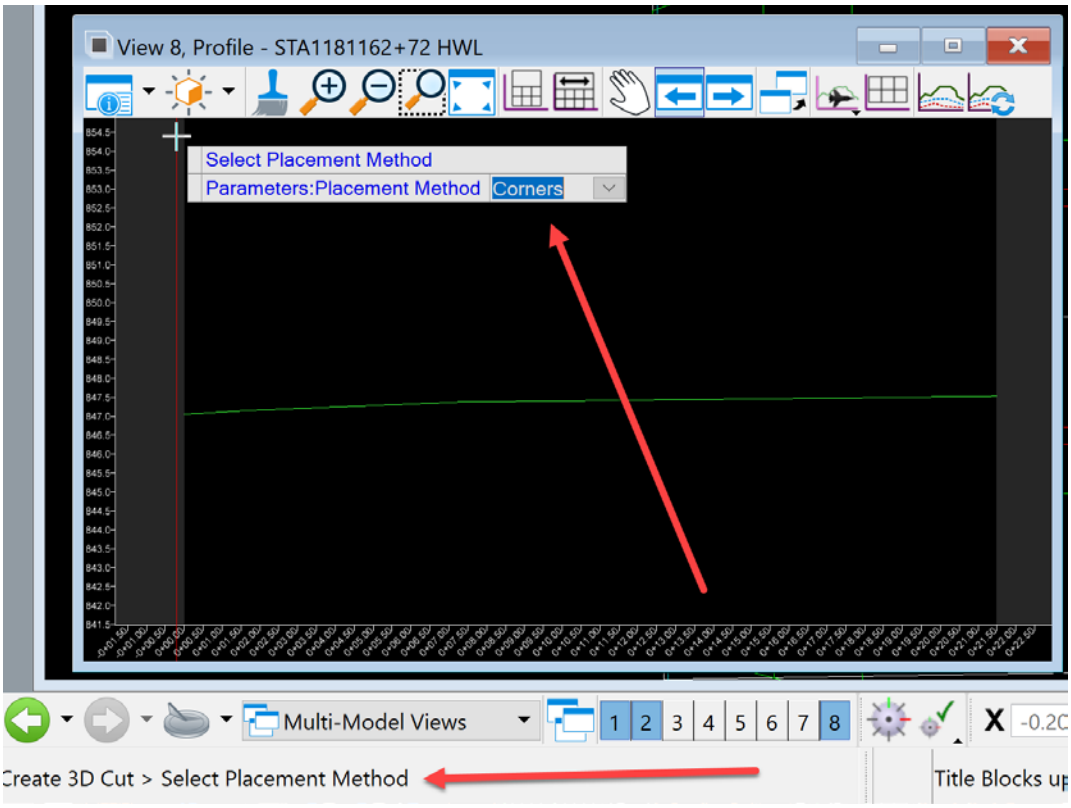


Next, set the 3D cut in the profile window.



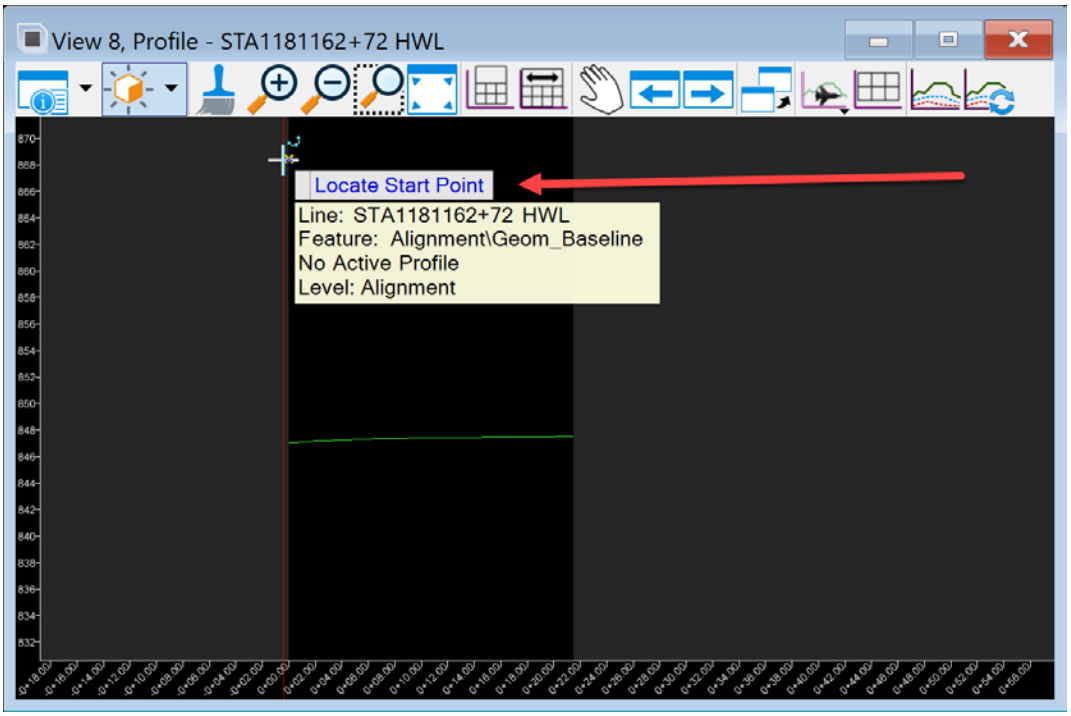
Select the Create 3D Cut tool at the top of the view.

It will prompt to Select Placement Method. Use the Corners method.

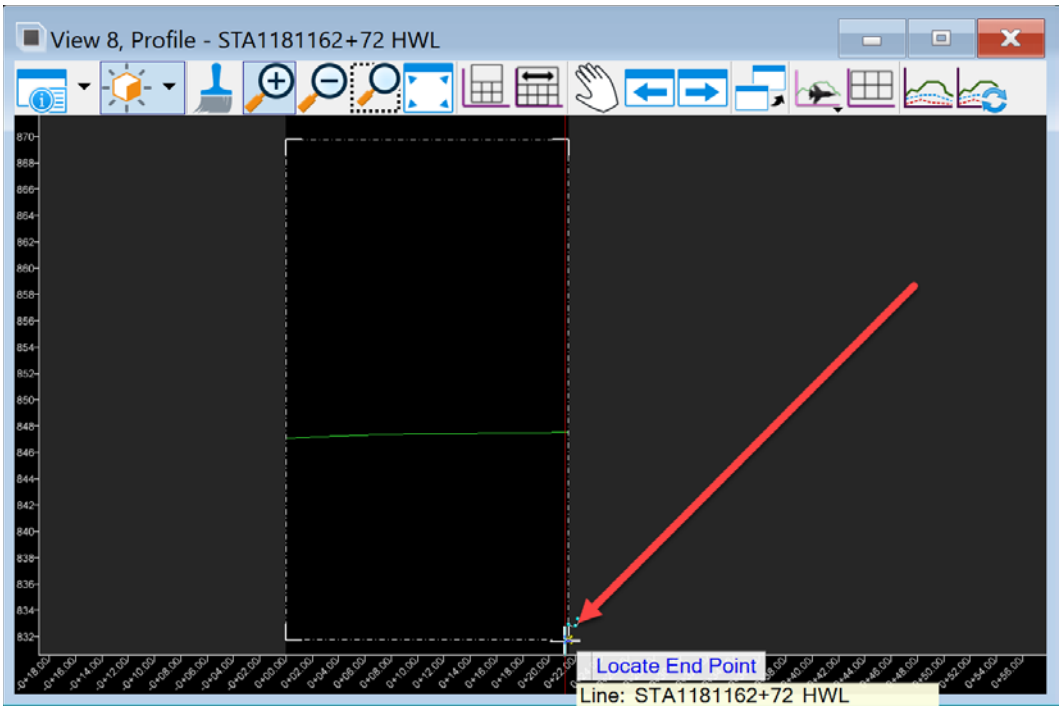


Data point to accept the method and it will prompt to locate the start point.

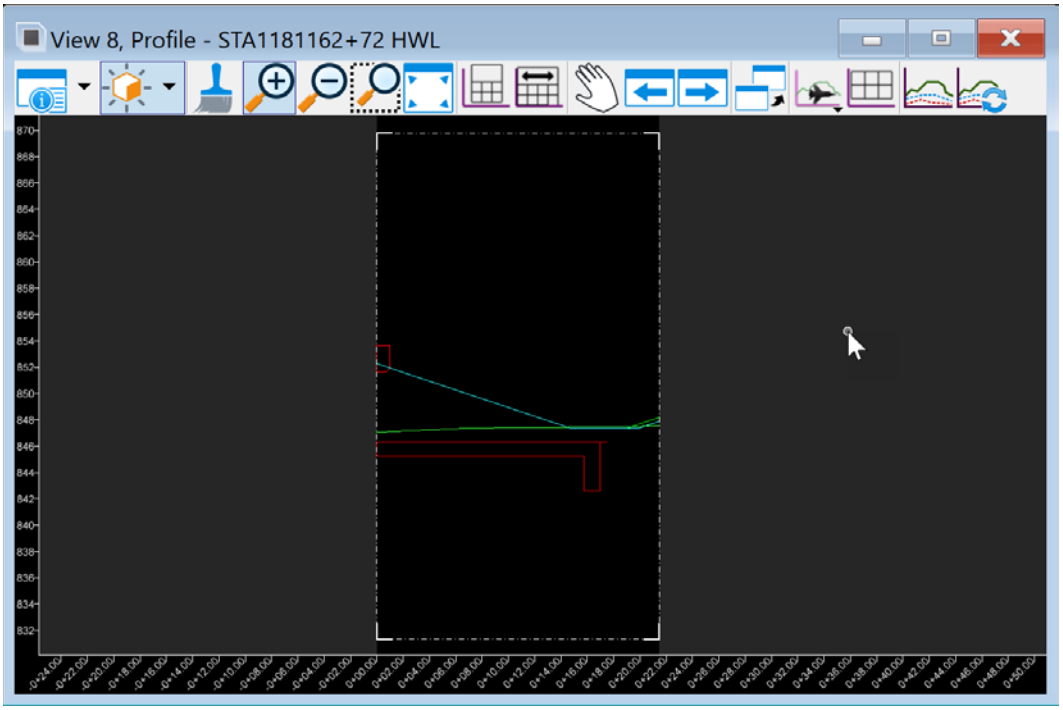
Start it all the way to one side or the other. Recommend to start at top right and end at the lower left.



After the data point, a box will start drawing in the view to make the 3D cut.

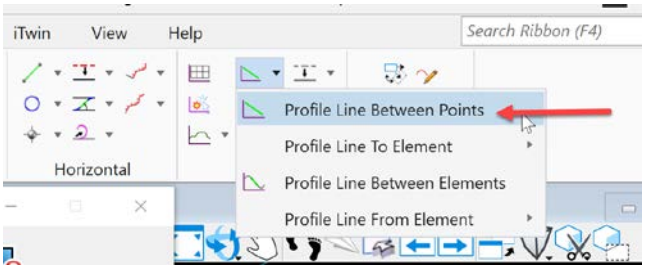


Data point the end point to complete the 3D cut. It will appear as shown below.

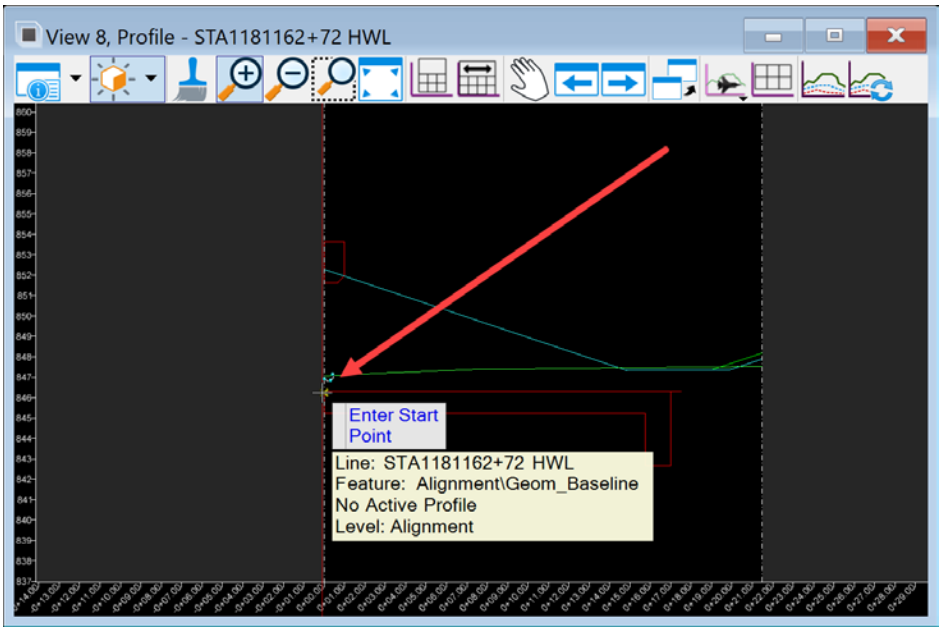


Next, set the profile on the STA1181162+72 HWL baseline that was created.

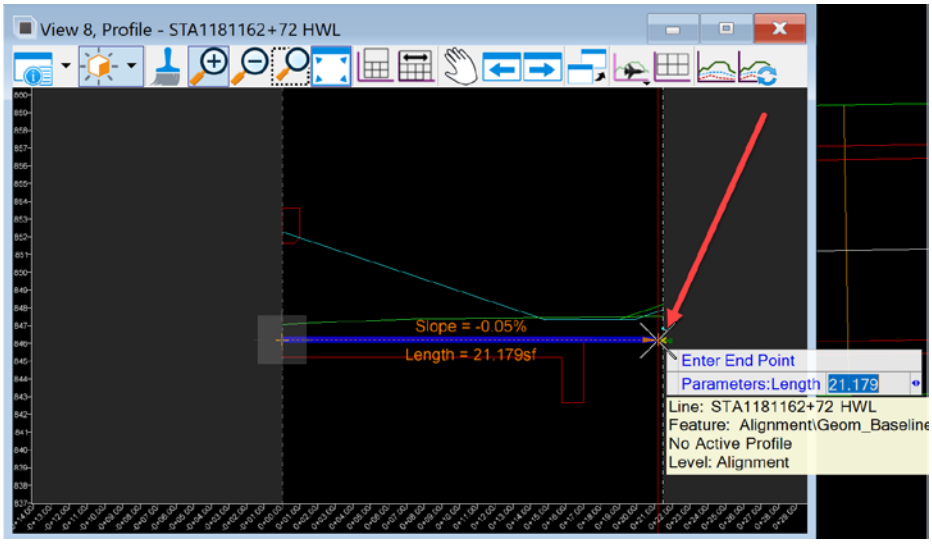
To do this, select Profile Line Between Points in the Lines tools on the Geometry tab in the Vertical group.



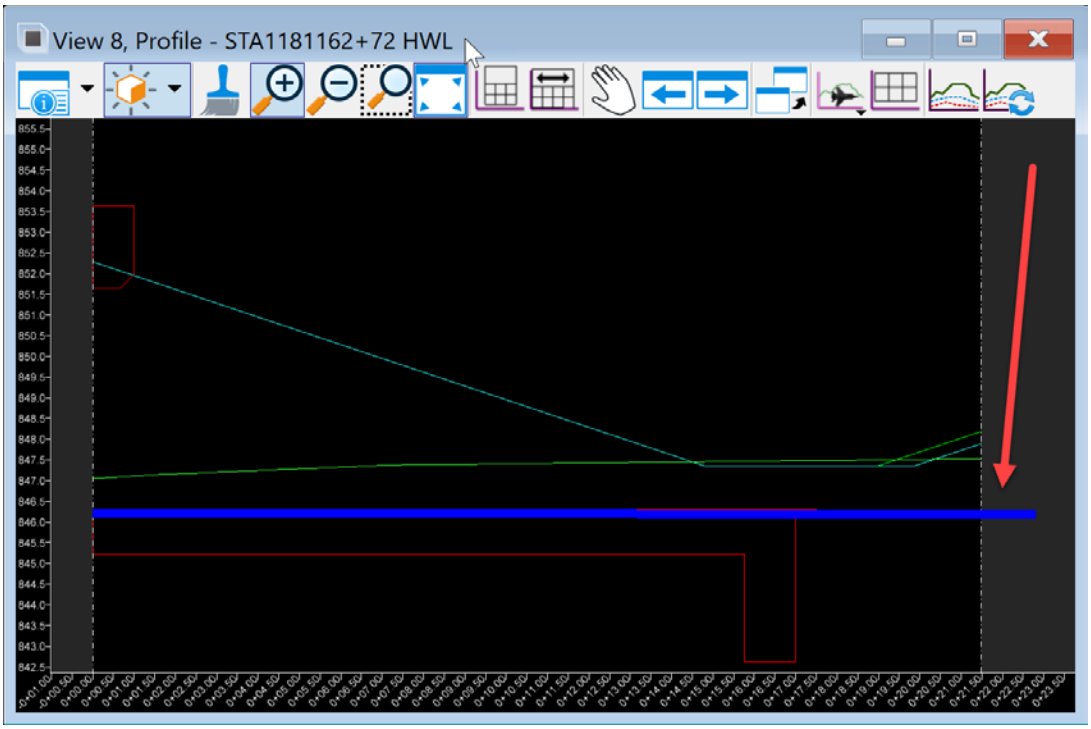
In the profile window, snap to the flowline of the headwall to start the new profile.



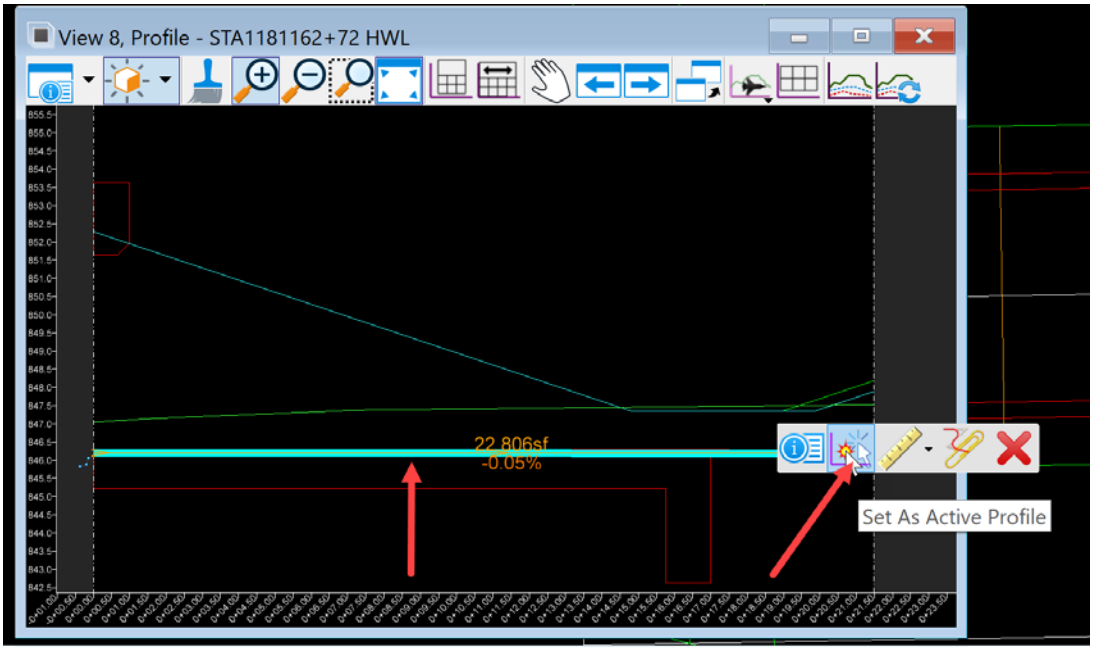
Using the AccuDraw compass, pull the line beyond the headwall in the open profile window and data point to finish the profile.



This will create the profile down the headwall at the same elevation as the flowline of the headwall.



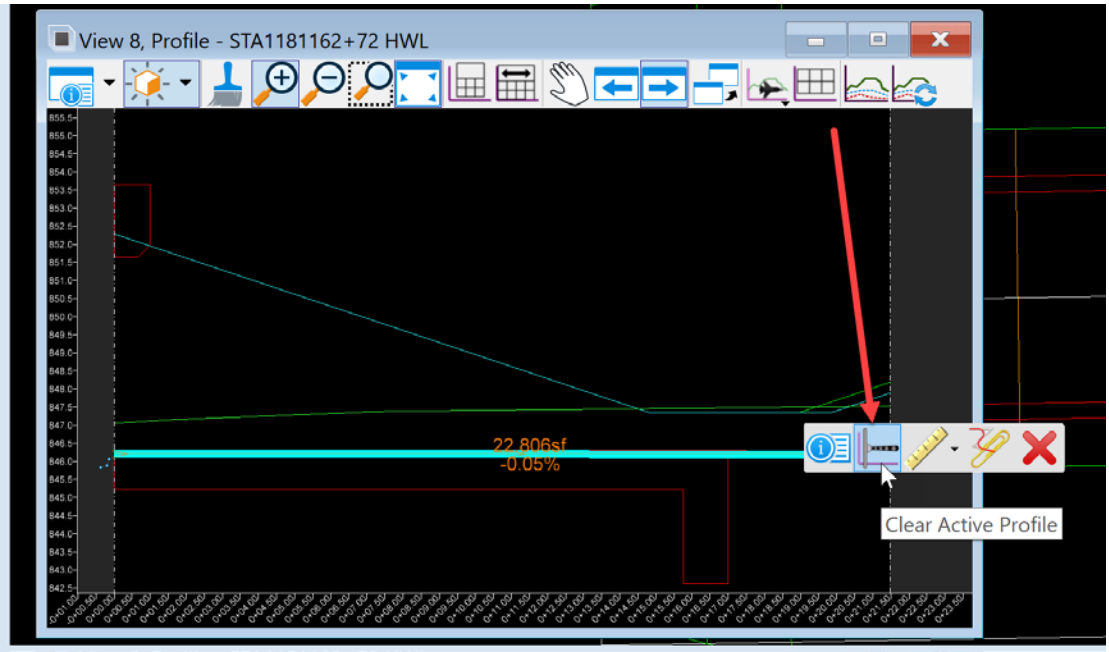
Next, make this profile the active profile. Select the profile just created in profile window with the element section tool, then hover over it until the heads-up tools appear.



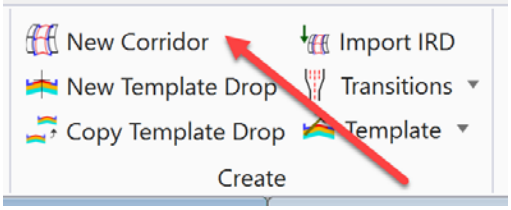
Select the Set As Active Profile tool.

To verify that the new profile is active, hover over profile again and the clear active profile tool will appear.

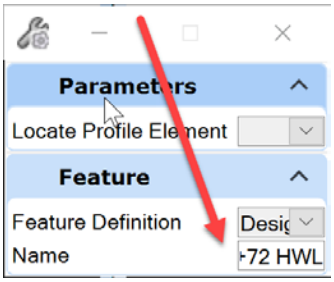
Once this is completed, close the profile view.



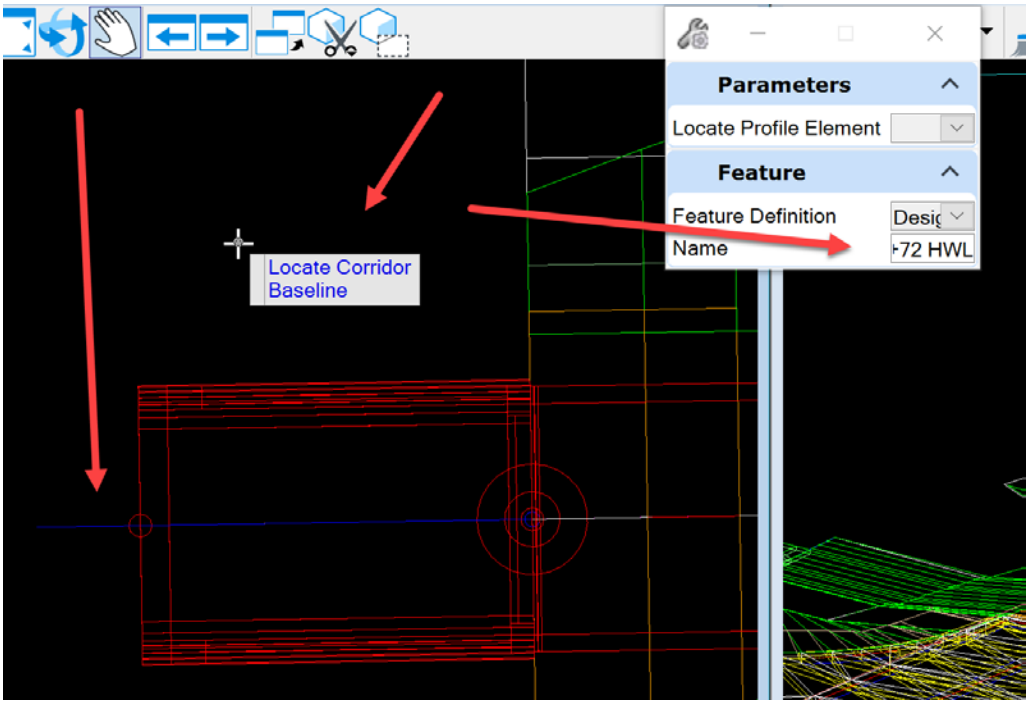
Next, select the New Corridor tool on the Corridors tab in the Create group.



Name it STA1181162+72_HWL to match the baseline.



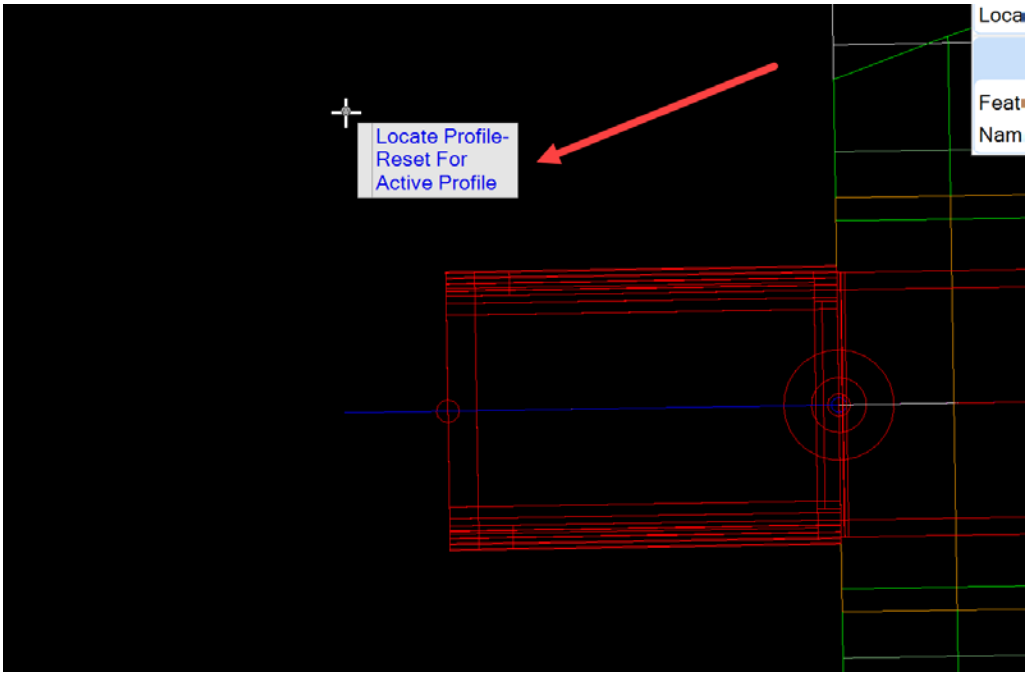
Next, it will prompt to Locate Corridor Baseline.



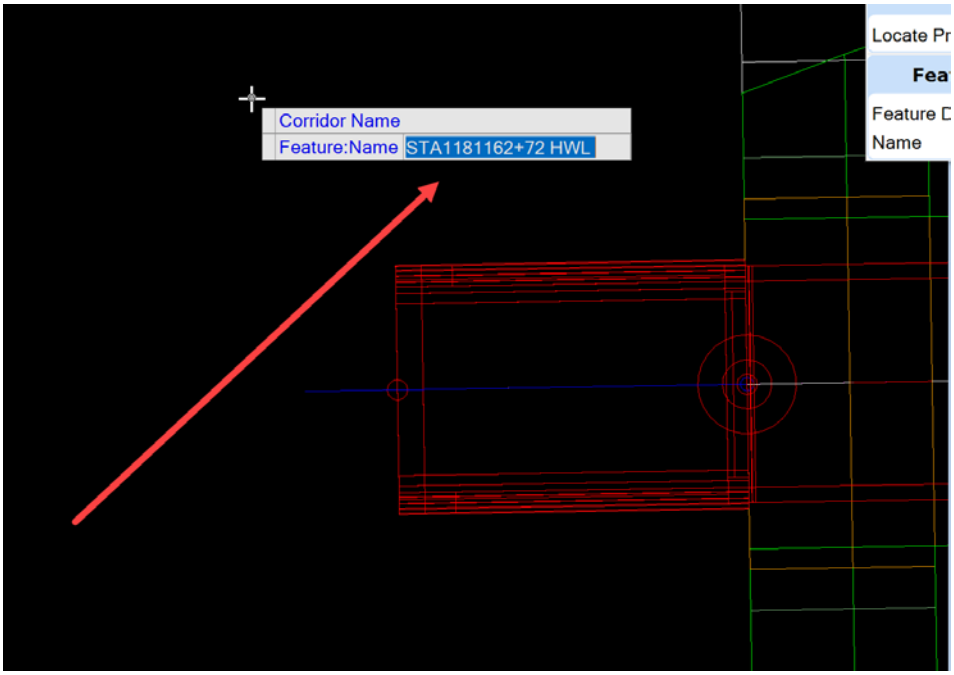
Data point on the STA1181162+72 HWL baseline that was created.

Next, it will prompt to Locate Profile or Reset For Active Profile.

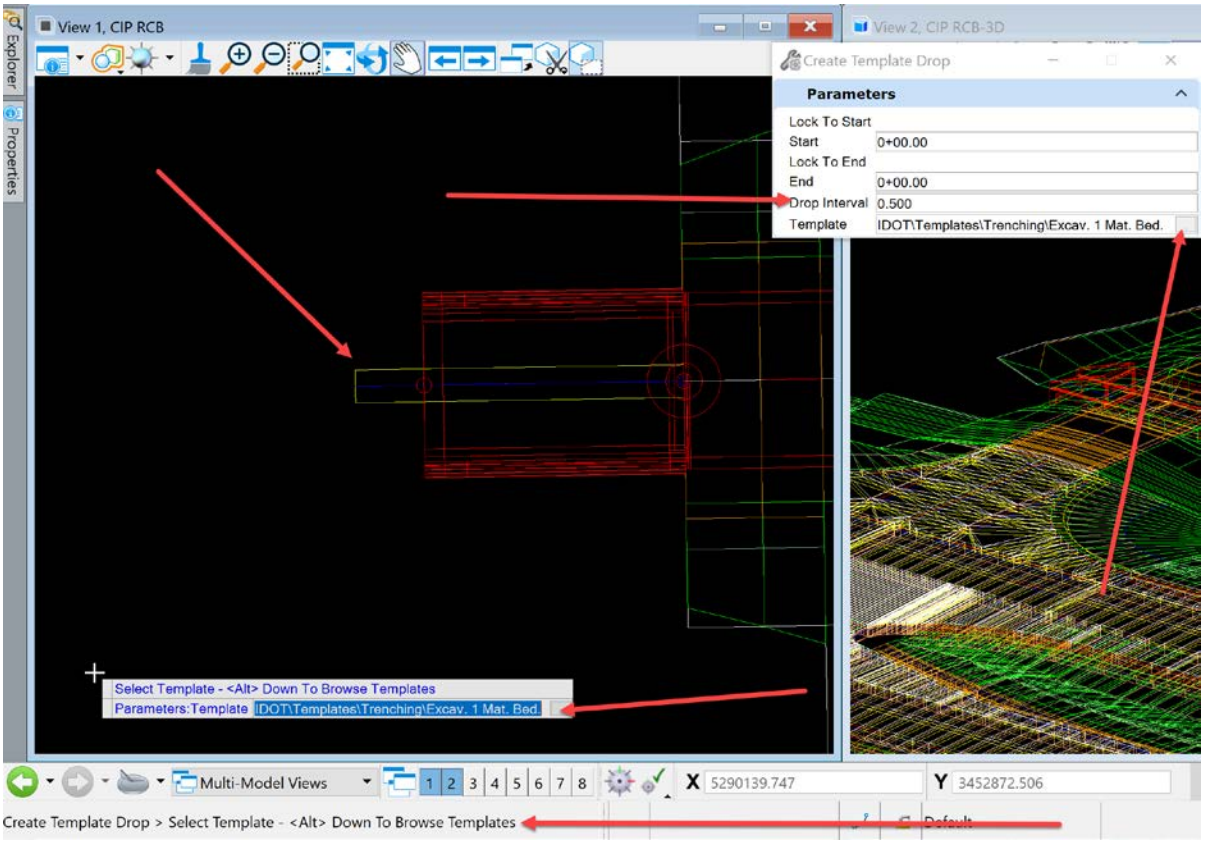
Reset since the STA1181162+72 HWL profile is set as the active profile.



Next, it will prompt to verify the Corridor Name. If it is correct, data point to accept.

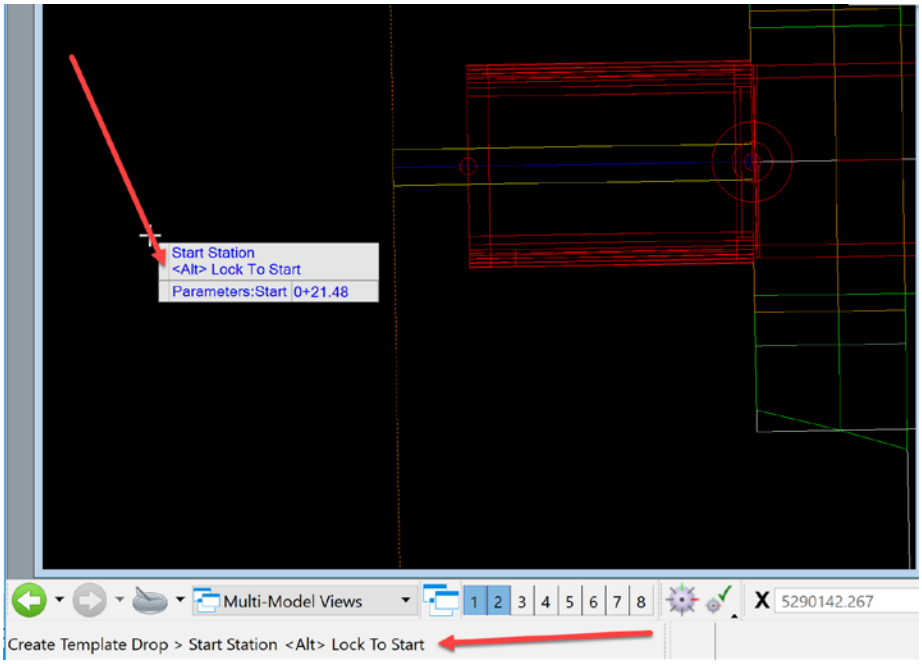


Next, it will prompt to pick the Parameters Template that is needed. This is the excavation template that best fits the trench needs. If the template that is selected is not the template needed, press the alt key and down arrow on the keyboard to open the template library to select a different template.

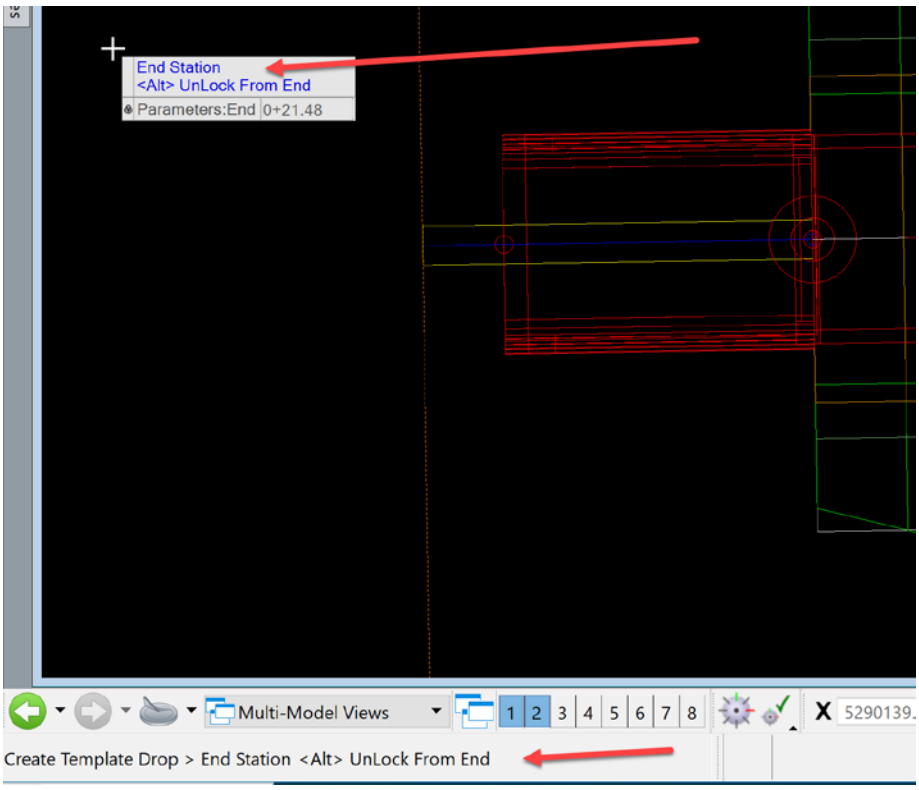


Once the template is selected, then data point to accept.

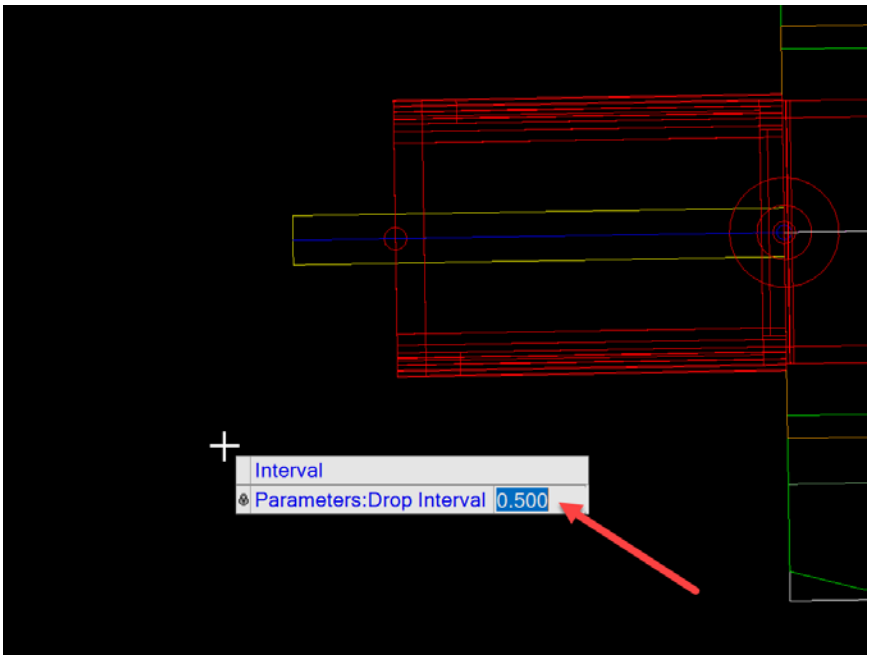
Next, it will prompt for a start station. Push the alt key on the keyboard to lock it to the beginning. Data point to accept.



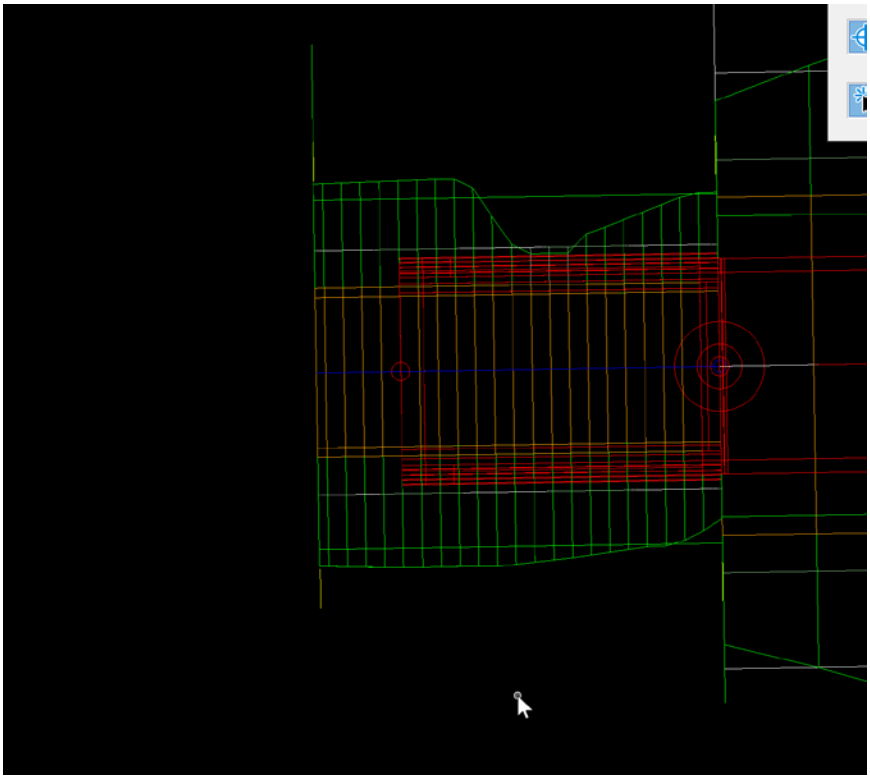
Next, it will prompt for an end station. Push the alt key on the keyboard to lock it to the end station. Data point to accept.



Next, it will prompt for the Parameters Drop Interval. This is the distance between the templates it will drop. Set the interval to .5, which will place a template every 6" or ½ foot. Data point to accept.



Next, it will create the excavation corridor. It will appear as shown below.

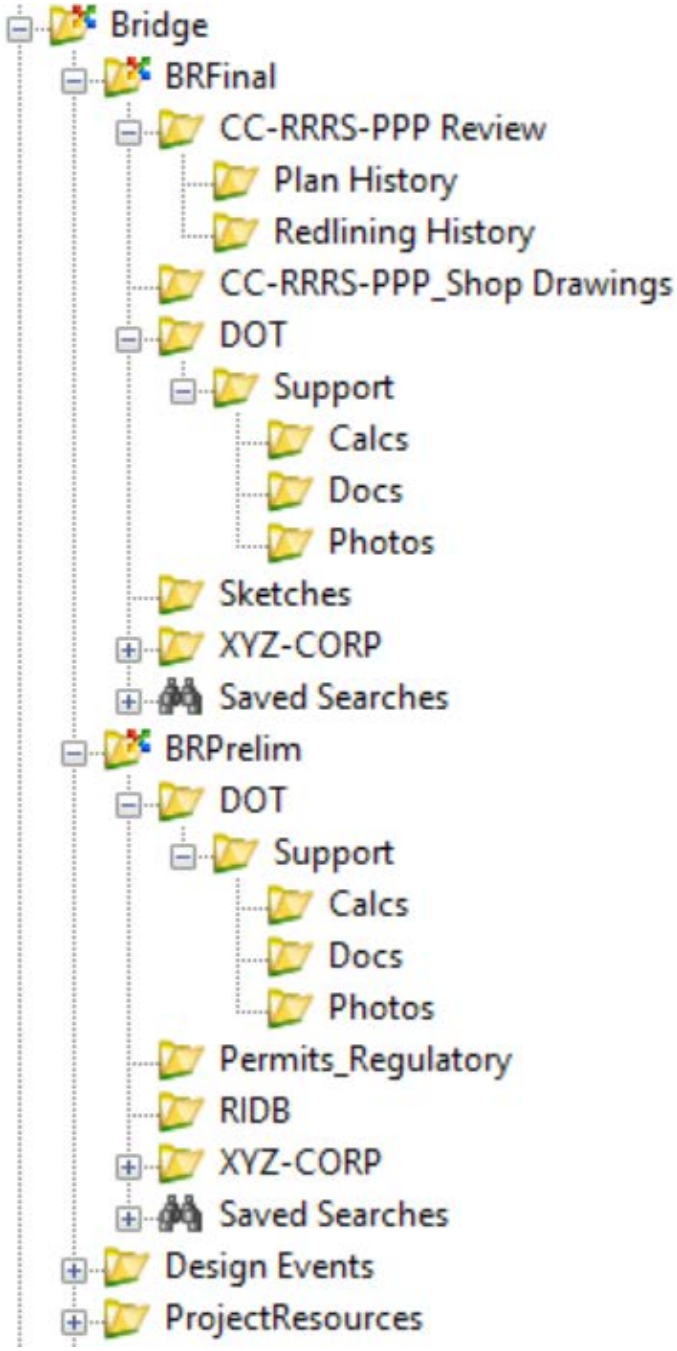


Keep in mind that it is placing the default template that is not adjusted to the structure.

Change the parametric constraints of the template to match the structure as described above.

CONNECT Bridge Project Folder Structure in ProjectWise

For CONNECT projects the default folder structure for projects includes one root folder for bridge related projects. Subfolders for files specific to BRFinal for final design of a project and BRPrelim for the preliminary design, hydraulics and permit related documentation are provided.



Limit the root folder Bridge to the development of models and the files to be used by other designers to reference with other files stored under the appropriate subfolders.

Both BRFinal and BRPrelim contain subfolders for use by internal staff (DOT) or consultants (XYZ-CORP). Both areas have the preferred Support folder structure to be used for storing

calculations, documentation, and photos. Refer to Consultant ProjectWise CONNECT Bridge Project Folder Structure for additional information.

CC-RRRS-PPP is the contract ID format used for some subfolder names. The contract ID contains a 2-digit county, 3-digit route, single digit federal control section number, and 3-digit paren number of the specific project.

The explanations of the specific use of the subfolders are provided below.

Bridge

- Store the project overview and 3D model files for bridges, pipes, culverts and berms related to the project in this main root folder. Other designers should reference from the overview file of all the structures in the project.

BRFinal

- Contains the detail files developed in MicroStation or ProStructures.

CC-RRRS-PPP Review

- The review folder is used to turn in files for review before turn in for letting.
- Rename the folder to reflect the contract ID.
- Store the latest reviewed version of the plans with the date included in the file name.
  i.e. 99-0034-038_01-23-2021.pdf

Plan History

- The plan history folder is for the PDF files of modified plan sets.
- Store all revised versions of the plans. These plan sets are intended to be obsolete.
- Include the date in the file name.
  i.e. 99-0034-038_01-23-2021.pdf

Redlining History

- The redlining history folder is for the PDF files reviewed by the designer (engineer or technician).
- Store all reviewed versions of the plans with the comments and markups.
- Include the initials of the reviewer and date in the file name.
  i.e. 99-0034-038_AMJ_01-23-2021.pdf

CC-RRRS-PPP_Shop Drawings

- The shop drawing folder is used to store the final shop drawings.
- Rename the folder to reflect the contract ID.

DOT

Support

- Store files that support the design process that do not fall into the specific categories of the subfolders or create additional subfolders as appropriate.

Calcs

- Store related calculation files.

Docs

- Store project related documentation, communication, e-mails, and information not considered to be calculations.

Photos

- Store photos obtained related to the development of the design.

Sketches

- Store CADD file and PDF files developed for inspection sketches. The sketches are used by bridge maintenance personnel for inspections.

XYZ-CORP

- Refer to Consultant ProjectWise CONNECT Bridge Project Folder Structure for additional information.

BRPrelim

- Contains the files developed at the preliminary design stage. A copy of the models completed at this stage will be stored in this location as backup with work continuing in the files under Bridge.

DOT

Support

- Store files that support the preliminary design process that do not fall into the specific categories of the subfolders or create additional subfolders as appropriate.

Calcs

- Store related hydraulic calculation files.

Docs

- Store project related documentation, communication, e-mails, and information not considered to be calculations.

Photos

- Store photos obtained related to the preliminary development of the design.

Permits_Regulatory

- Store documentation for permits related to the design.

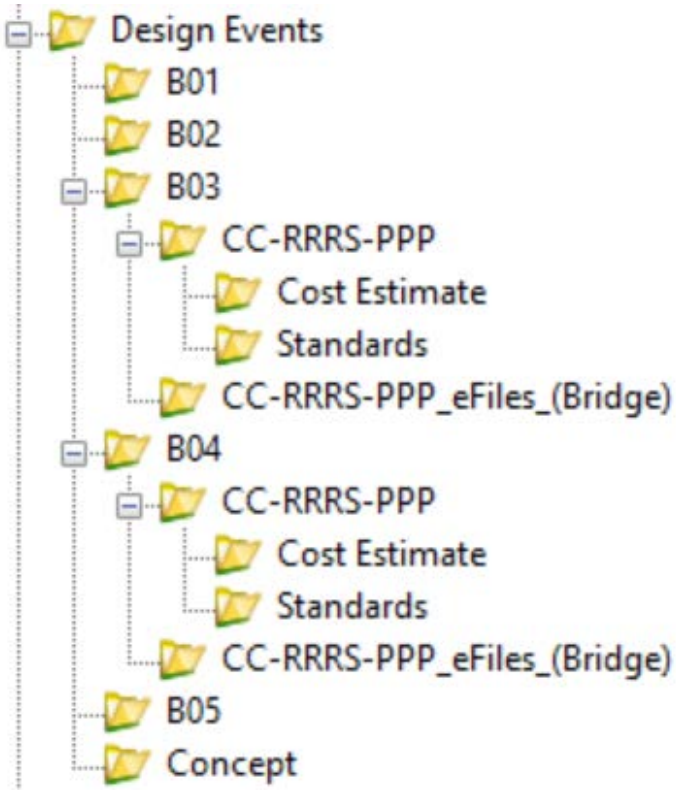
RIDB

- Store the files for the data required at each site for the Riverine Infrastructure Database (RIDB). Refer to the Riverine Infrastructure Database portion of the Bridges and Structures Bureau website (https://iowadot.gov/bridge/).

XYZ-CORP

- Refer to Consultant ProjectWise CONNECT Bridge Project Folder Structure for additional information.

The Design Events portion of the folder structure is intended for final deliverable submittals only. This is used by designers to finalize submittals and organize files for turn in.



Design Events

B01 - Used for Preliminary Design submittal to Final Design.

B02 - Used for Preliminary Design submittal to the Design Bureau.

B03 - Used for Final Bridge Plans submittal to the Contracts Bureau.

CC- RRRS-PPP

- Contract ID folder renamed to finalize turn in of project.
- Store project plan for letting including addendums and all subsequent plan revisions, if applicable.

Cost Estimate

- Store cost estimate file.

Standards

- Store standards used for the project.

CC- RRRS-PPP_eFiles_(Bridge)

- Contract ID folder renamed to finalize turn in of project.

- Store data files for construction including information for staking layout, beams and deck.
- Add the design number with four digits to the end of each file name if multiple designs are part of the same project.
  i.e. 99-0034-038_PPC Beam Data Spreadsheet_1217.xlsx

B04 - Used for Final Bridge Plans submittal to the Design Bureau.

CC- RRRS-PPP

- Contract ID folder renamed to finalize turn in of project.
- Store project plan for letting including addendums and all subsequent plan revisions, if applicable.

Cost Estimate

- Store cost estimate file.

Standards

- Store standards used for the project.

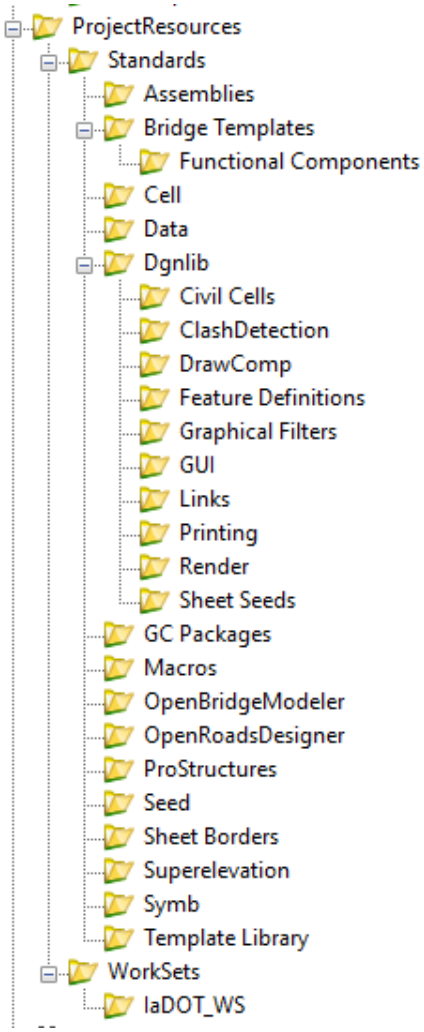
CC- RRRS-PPP_eFiles_(Bridge)

- Contract ID folder renamed to finalize turn in of project.
- Store data files for construction including existing plans and information for staking layout, beams and deck.
- Add the design number with four digits to the end of each file name if multiple designs are part of the same project.
  i.e. 99-0034-038_PPC Beam Data Spreadsheet_1217.xlsx

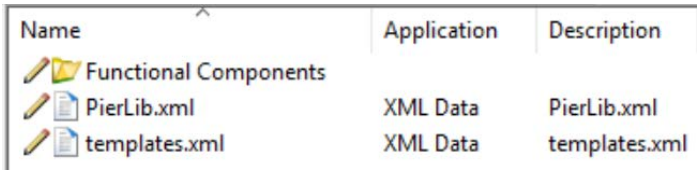
B05 - Used for storing approved Section 408 document.

Concept - Used for storing the final concept for project.

The ProjectResources portion of the folder structure is intended for storage of project specific WorkSets files used with the CONNECT applications.



The Bridge Template subfolder will contain two template files that can be used to store project specific versions of the templates used.



Refer to CONNECT Standard Templates for additional information on templates available and possible project specific usage.

Additional information will be provided as we expand use of the project WorkSets.

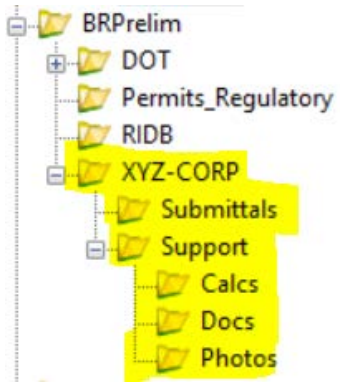
Consultant ProjectWise CONNECT Bridge Project Folder Structure

The XYZ-CORP subfolder under the BRPrelim or BRFinal subfolders of Bridge are provided as a working and submittal area for the consultant assigned to the project. The consultant folder is renamed to indicate the consultant. The appropriate permission is assigned to the folders in ProjectWise prior to the beginning of the design. There will be a folder structure provided for each consultant involved in the project.

The Bridge folder stores the project overview and 3D model files for bridges, pipes, culverts and berms related to the project. This folder will also be used by consultants so all other designers can reference from the same location regardless of the designer and stage of design. Refer to CONNECT Bridge Project Folder Structure for additional information.

CC-RRRS-PPP is the contract ID format used for some subfolder and file names. The contract ID contains a 2-digit county, 3-digit route, single digit federal control section number, and 3-digit paren number of the specific project.

The explanations of the specific use of the subfolders are provided below.



Submittals

- Store intermittent deliverables for B01 and B02 submittals in this folder. The consultant will deliver the final TSL pdf file directly in the B01 or B02 Design Events folder. Refer to CONNECT Bridge Project Folder Structure for additional information.

Support

- Store files that support the preliminary design process that do not fall into the specific categories of the subfolders or create additional subfolders as appropriate.

  Calcs

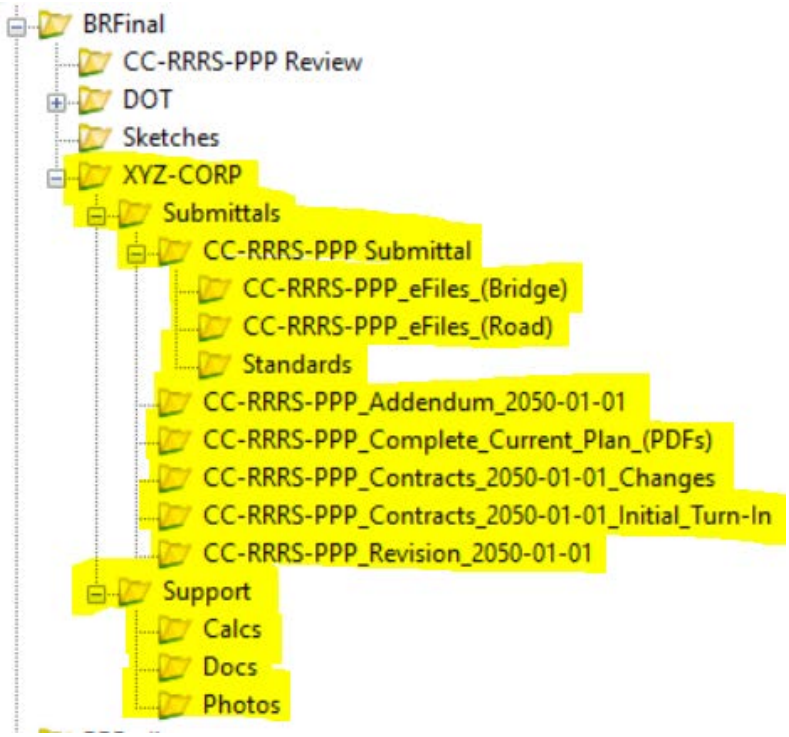
  - Store related hydraulic calculation files.

  Docs

  - Store project related documentation, communication, e-mails, and information not considered to be calculations.

  Photos

- Store photos obtained related to the preliminary development of the design.



The explanations of the specific use of the subfolders are provided below.

BRFinal

- Contains the detail files developed in MicroStation or ProStructures.

Submittals

- Store deliverables for B3 and B4 submittals in these subfolders.

CC-RRRS-PPP Submittal

- This submittal subfolder is used to submit plans for review before final turn in for letting.
- Rename the folder to reflect the contract ID.
- The files should include the plan and related comments.
- Store all review versions of the plans with the date included in the file name.
  i.e. 99-0034-038_01-23-2021.pdf

CC-RRRS-PPP_eFiles_(Bridge)

- Store data files for construction including existing plans and information for staking layout, beams and deck.
- See Bridge Design Manual Section 1.14.1 E-file submittals for list of files needed for projects.
- Rename the folder to reflect the contract ID.

- Add the design number with four digits to the end of each file name if multiple designs are part of the same project.

i.e. 99-0034-038_PPC Beam Data Spreadsheet_1217.xlsx

CC-RRRS-PPP_eFiles_(Road)

- Store data files for construction for road specific items.
- See Design Bureau Manual for list of eFiles needed for projects.
- Rename the folder to reflect the contract ID.

Standards

- Store standards used for the project.

CC-RRRS-PPP_Addendum_2050-01-01

- This submittal subfolder is reserved for possible addendum.
- Rename the folder to reflect the contract ID.

CC-RRRS-PPP_Complete_Current_Plan_(PDFs)

- This submittal subfolder is reserved for submittals after the official contracts turn-in.
- Rename the folder to reflect the contract ID.

CC-RRRS-PPP_Contracts_2050-01-01_Changes

- This submittal subfolder is reserved for submittals after the official contracts turn-in.
- Rename the folder to reflect the contract ID.

CC-RRRS-PPP_Contracts_2050-01-01_Initial_Turn-In

- This submittal subfolder is reserved for submittals after the official contracts turn-in.
- Rename the folder to reflect the contract ID.

CC-RRRS-PPP_Revision_2050-01-01

- This submittal subfolder is reserved for possible revisions.
- Rename the folder to reflect the contract ID.

Support

- Store files that support the design process that do not fall into the specific categories of the subfolders or create additional subfolders as appropriate.

Calcs

- Store related calculation files.

Docs

- Store project related documentation, communication, e-mails, and information not considered to be calculations and final QC/QA documents.

Photos

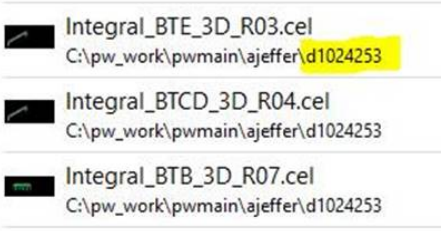
- Store photos obtained related to the development of the design.

OpenBridge Designer Version Upgrade Maintenance

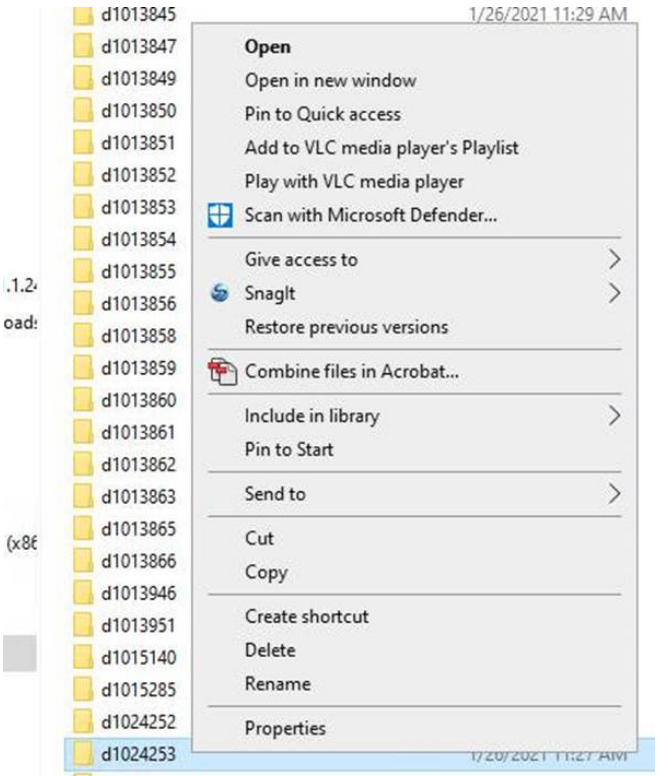
There are two maintenance items recommended after installing a new version of OpenBridge Designer.

To refresh the list of available functional components for modeling the bridge abutments, follow the steps to remove the old versions of the parametric cells that were deleted from the managed workspace. ProjectWise copies to the local computer under your working area all available functional components with the first access to the managed workspace. This process makes only the current abutments available in the list for placing the custom abutments.

1. In Windows Explorer, navigate to C:\pw_work\pwmain\username with username being your personal working directory.
2. Search for *.cel in folders under that location
3. Determine the directory the cel files for integral abutments are stored in, if present.



4. Navigate to and select that specific folder.
5. Right click and select Delete.

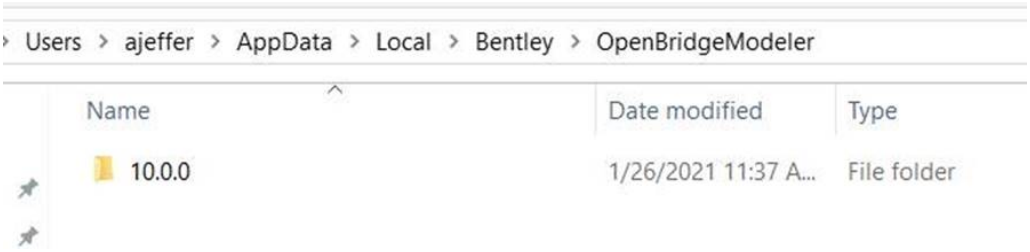


6. Next time an OpenBridge Modeler file is opened in ProjectWise the current functional components will be copied locally.

To clean up system files between versions, follow the steps to remove copies of XML files that may cause functional issues. Following a previous version upgrade it was discovered that the Place Custom Abutment tool did not work correctly in the new version until these files were deleted.

1. In Windows Explorer, navigate to C:\Users\username\AppData\Local\Bentley\OpenBridgeModeler\

   AppData is a hidden system area. This location can be copied and pasted to the explorer address bar. Modify for your Windows profile.



2. Navigate to the specific subfolders you have available. There may be one or more of these folders.
   - 10.0.0\prefs\civil_commands
   - 10.0.0_1\prefs\civil_commands

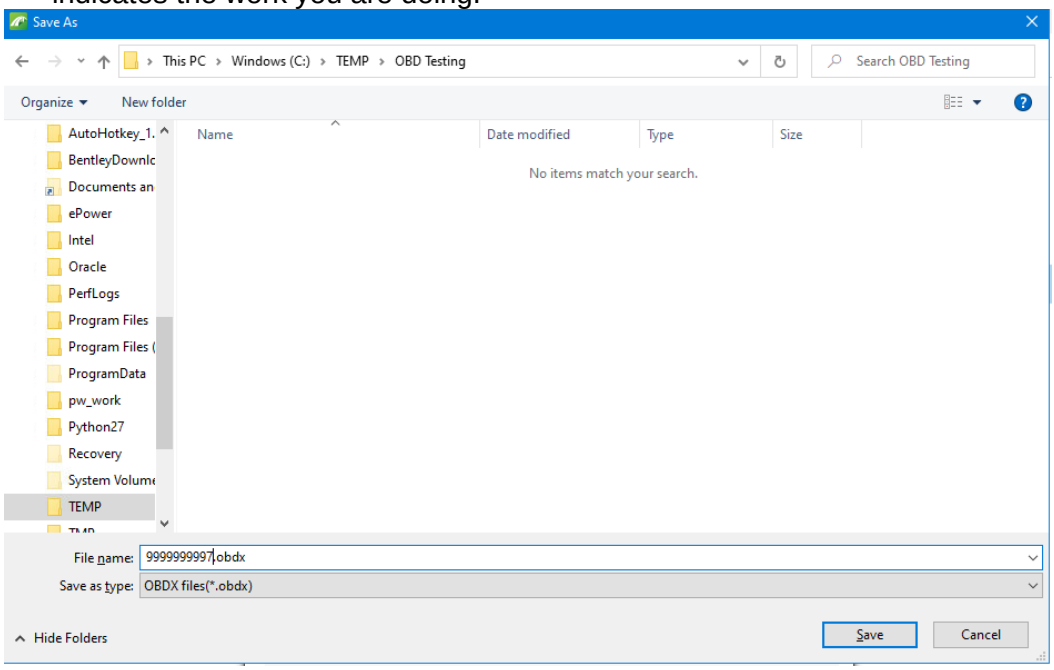
3. Delete all XML extension named files in the folder(s).

Use of LEAP Analysis with OpenBridge Designer

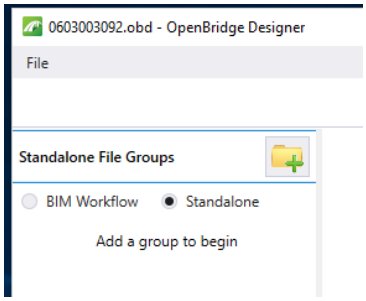
OpenBridge Designer can be used for analysis without a model created through OpenBridge Modeler. The Standalone File Groups option must be used. If the BIM Workflow option is used, then the model of the bridge is needed and sent to the analysis programs.

The following steps should be followed:

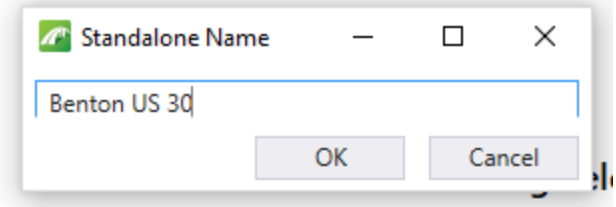
1. Launch OpenBridge Designer.
2. Create an obdx file.
    - Select New File.
    - Navigate to location to create new file.
    - Enter a name that matches the project directory number or a name that logically indicates the work you are doing.



    - Click Save button.
3. Create Standalone Group.
    - Select Standalone workflow option.
    - Click the Add Group button (folder with green plus).

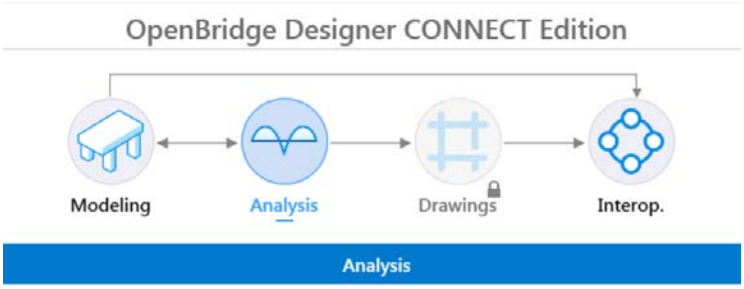


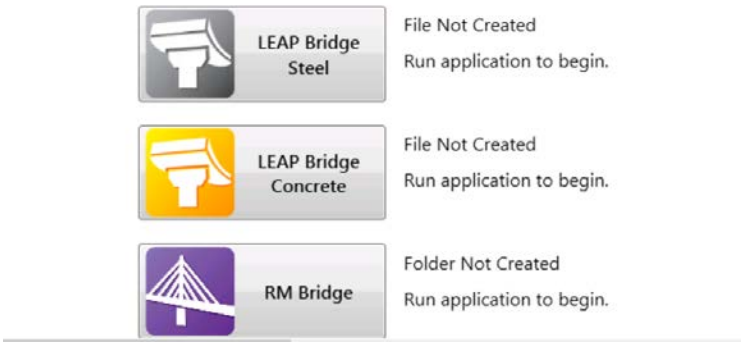
    - Enter the project name for name of the group.



- Click OK button.

4. Click on the Analysis icon.

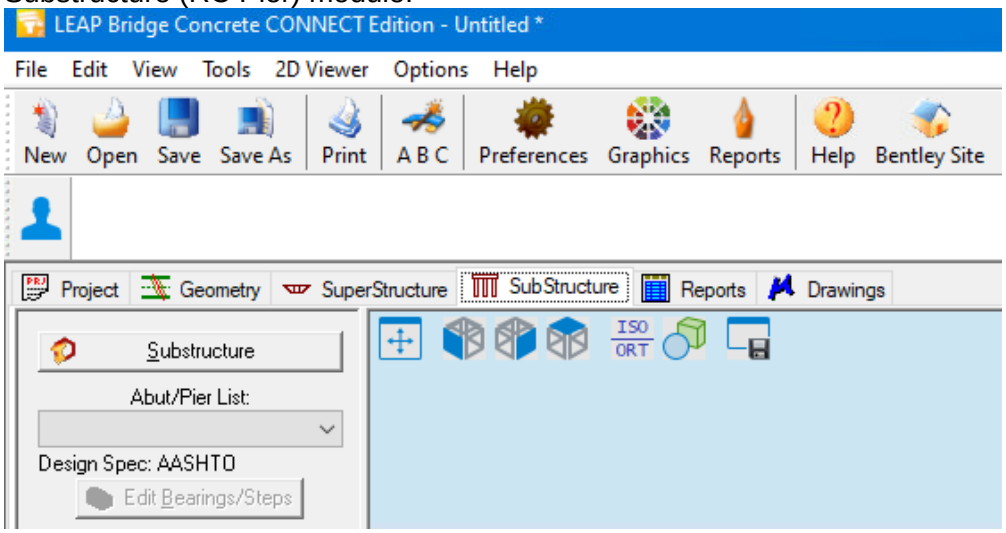




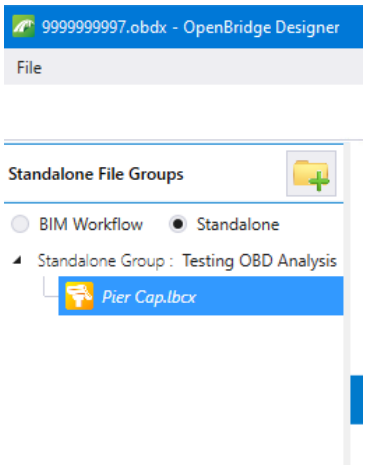
5. Launch LEAP Bridge Concrete (or other application) from the shortcut for applications listed in the lower portion.
6. Proceed with entry of model and typical analysis steps.
7. Click on File > Save or File > Save As to save the model.
8. Enter the file name.
9. Click OK button.
10. The analysis file will be added to the list in the obdx file.
11. Reopen the existing analysis files by selecting in the group list in the obdx file and launching the appropriate analysis application.

As a workflow example, to create a Substructure only file:

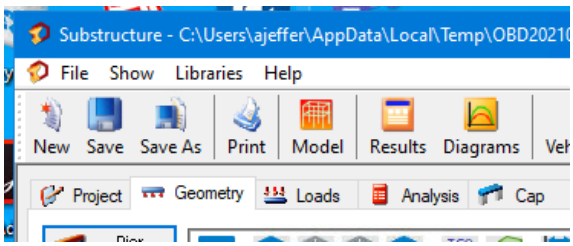
- Complete steps 1-5.
- Access the Substructure tab and click on Substructure button to launch Substructure (RC Pier) module.



- Build the model.
- Click on File > Save or File > Save As and save the model.
- Enter the file name.
- Click OK button.
- When you exit the substructure module, the analysis file will be added to the list in the obdx file.

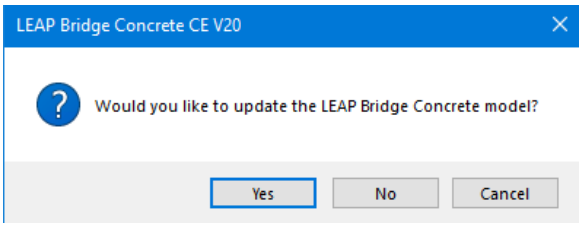


- Reopen the saved analysis file by selecting it in the list and Launch LEAP Bridge Concrete. It will open the Substructure module.

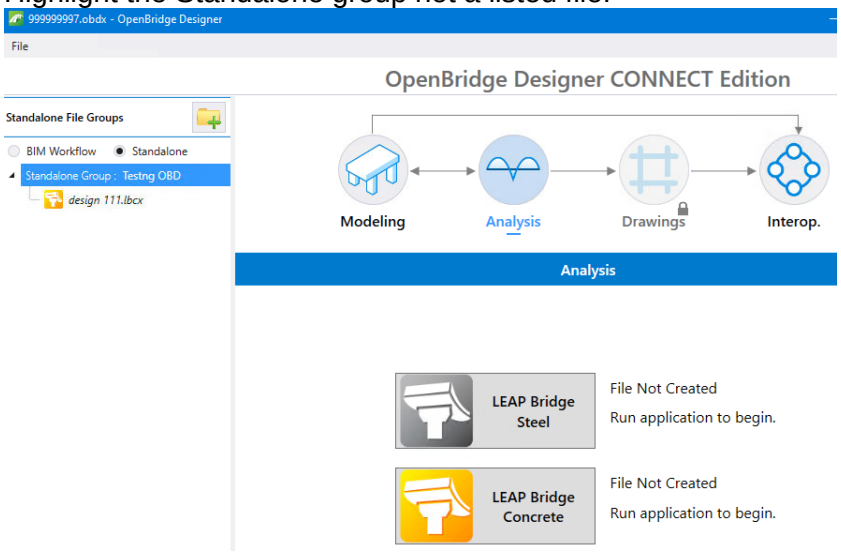


Notes:

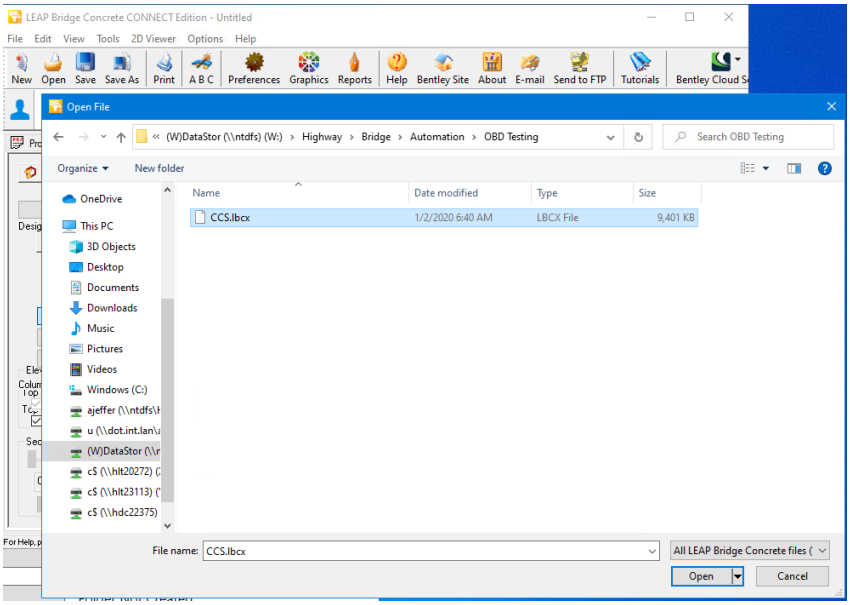
- The obdx file is required for managing the analytical files.
  The location of the file can be on local or network drive or on ProjectWise server.
- The files are saved within the obdx database only and are not available outside the OpenBridge Designer interface.
- If only doing analysis, when you close an analysis module you may see a dialog box indicating to update the model. Make sure to click the No button and exit.



- Existing LEAP Bridge Concrete files created with a previous version can be opened to start a new file.
  - Highlight the Standalone group not a listed file.

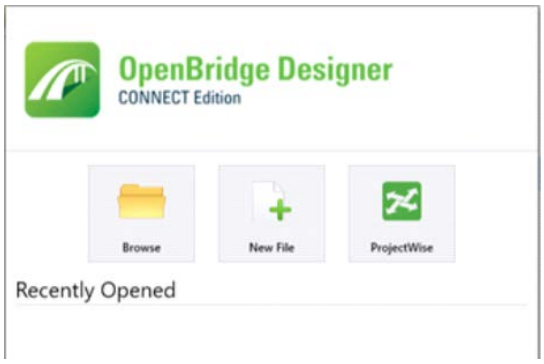


  - Click on the Analysis icon.
  - Launch LEAP Bridge Concrete.
  - Click Open and navigate to the existing lbcx file.

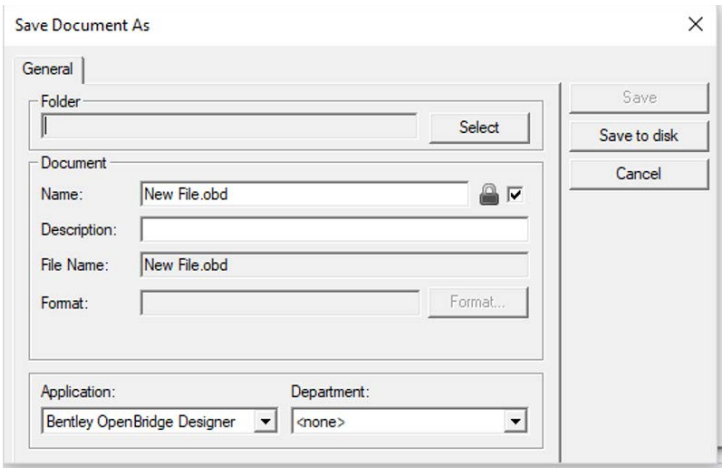


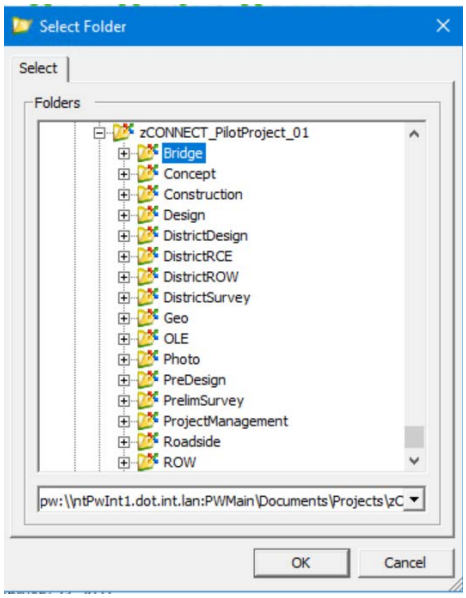
  - Click Open button.
  - The file will be added to the Standalone group once loaded.

- The workflow when working in ProjectWise has slightly different steps to create the obdx file.
  - Select ProjectWise option after launching OpenBridge Designer

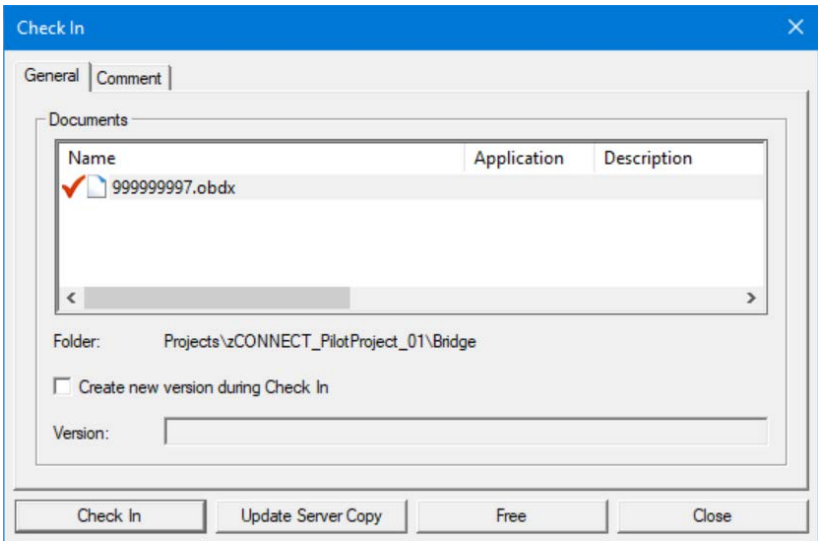


  - Log in to ProjectWise
  - Select New File.
  - Navigate through the Select button to the project directory Bridge subfolder in ProjectWise to create the new file.





- Click OK button
- Enter a name that matches the project directory number.
- Click Save button.
- Steps 3 – 11 are the same with the files saved to the ProjectWise location.
- When exiting OpenBridge Designer a Check In dialog box for ProjectWise will display.



- Click Check In button.