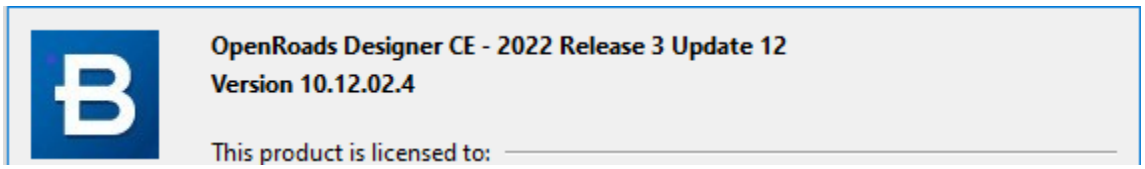
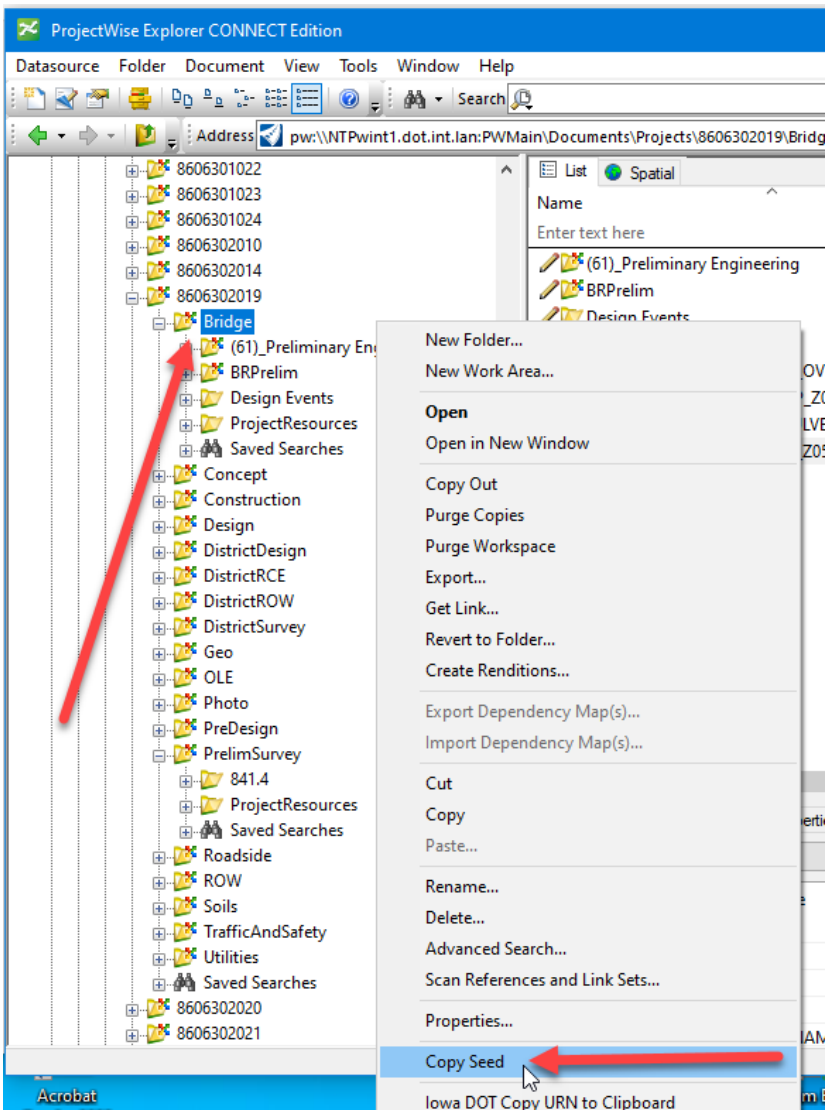
Setting up the OpenRoads Designer File for Drainage Design.

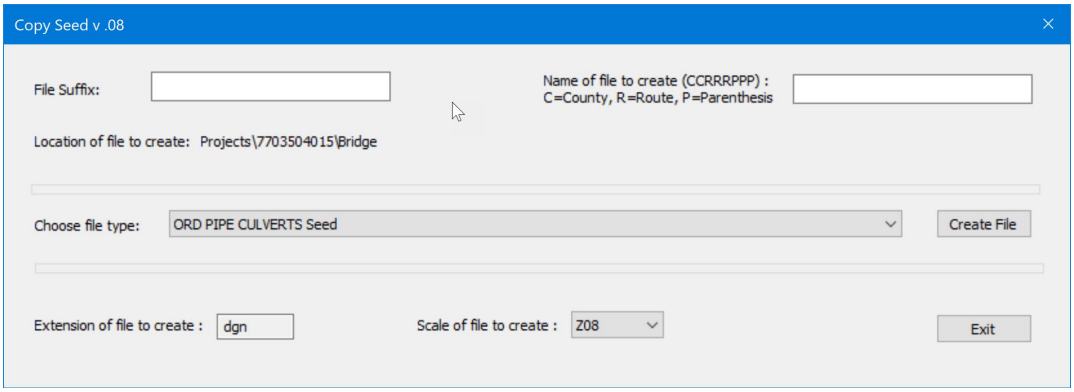
These instructions were created April 2024. These instructions were created with:



The first step to a culvert design, is to create the OpenRoads Designer files that will be needed. In ProjectWise, use the Copy Seed tool. Navigate to the correct project directory for the project. In the Bridge folder right click and select Copy Seed command.



The Copy Seed utility will open.



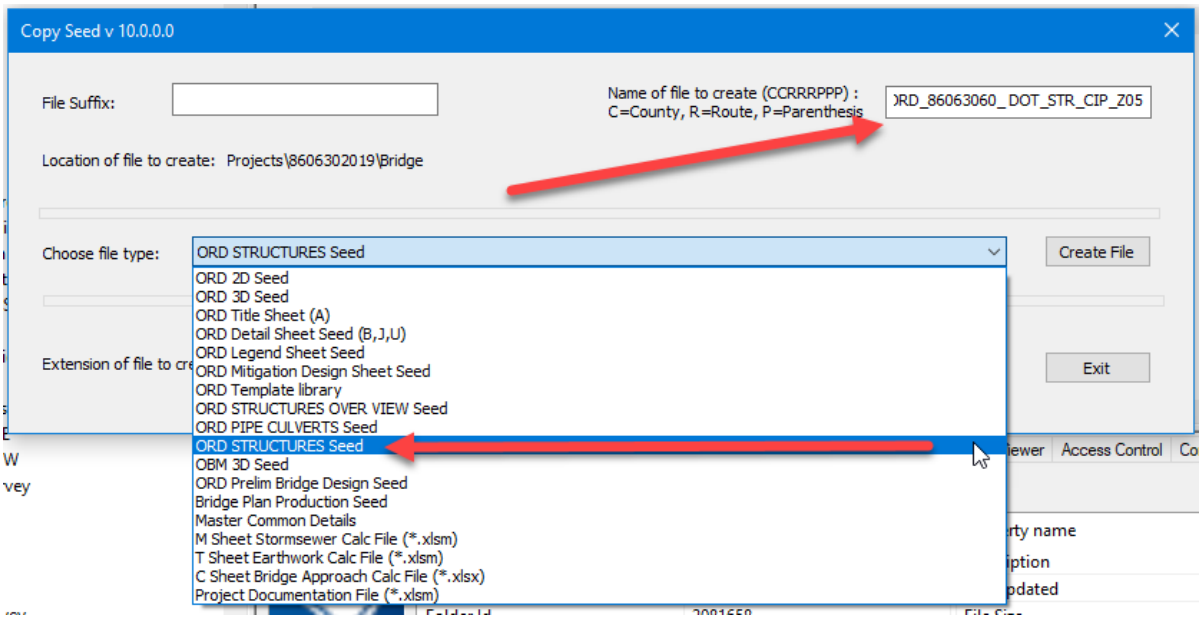
Next, name the file. For culverts, the naming convention for this file is ORD_CCRRRPPP_DOT_STR_CIP_SPN.

where

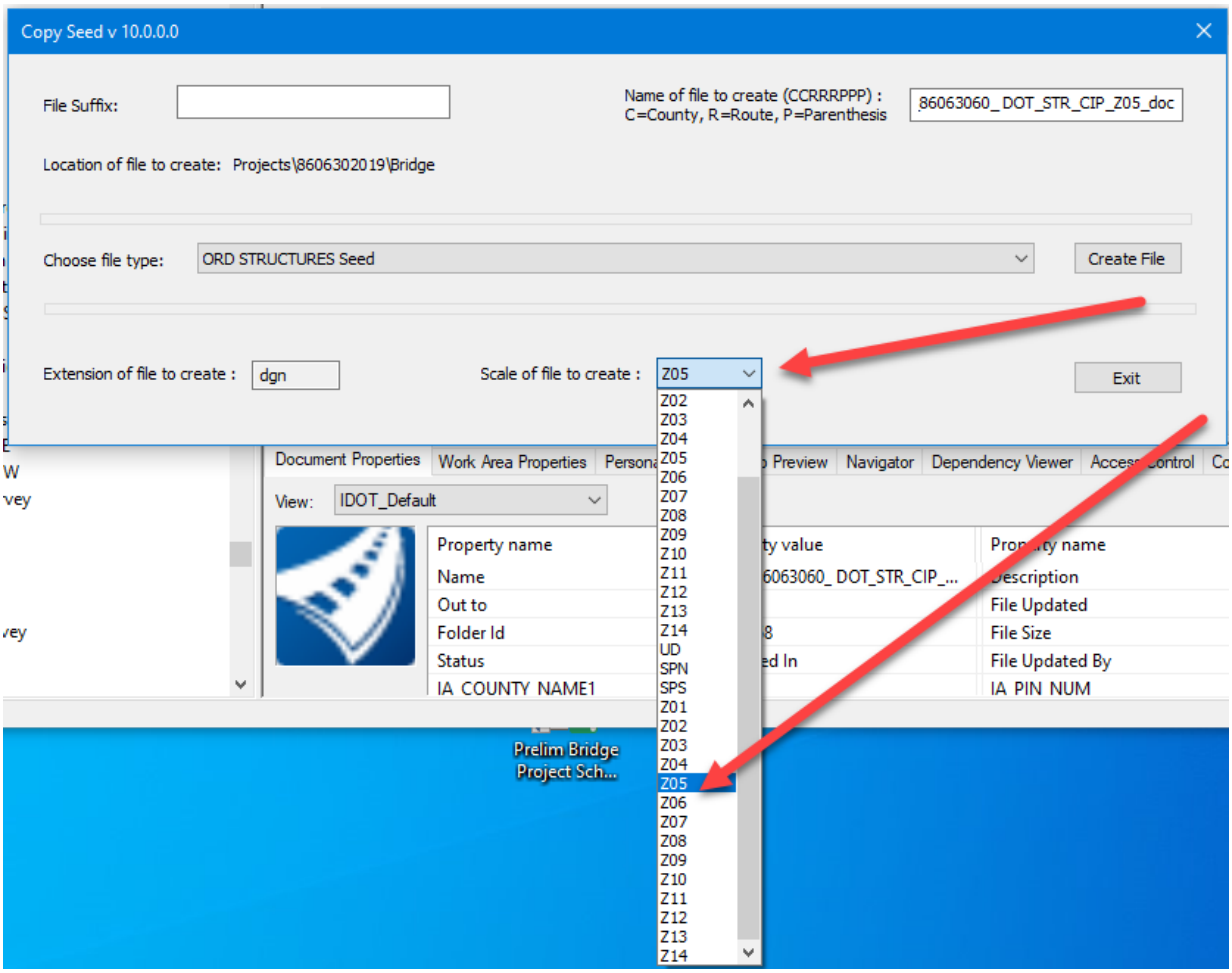
ORD=the application the work is done in
CC=County
RRR=Route
PPP=Parenthesis
DOT=company and/or source of the file
STR_CIP =type of work
SPN=coordinate projection of this project

For this example, the file will be ORD_86063060_ DOT_STR_CIP_Z05.dgn. Please refer to the Seed File document on Iowa Department of Transportation Bridge Connect Documentation page for further instructions on naming the files.

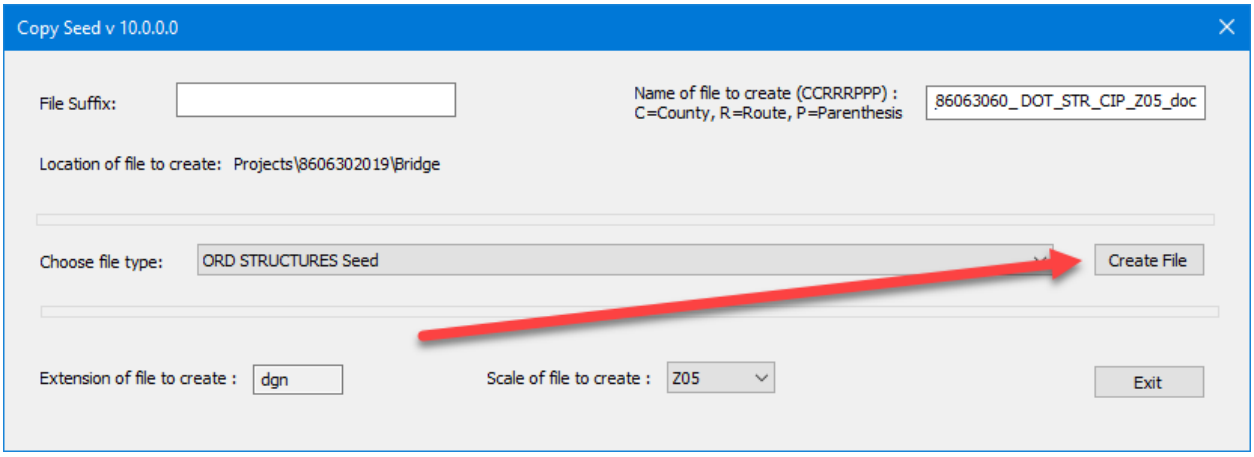
Next select the correct file type. For this work, choose the ORD STRUCTURES Seed.



Then select the correct coordinate projection for this file. For this example, select Z05 for IaRCS Zone 05.

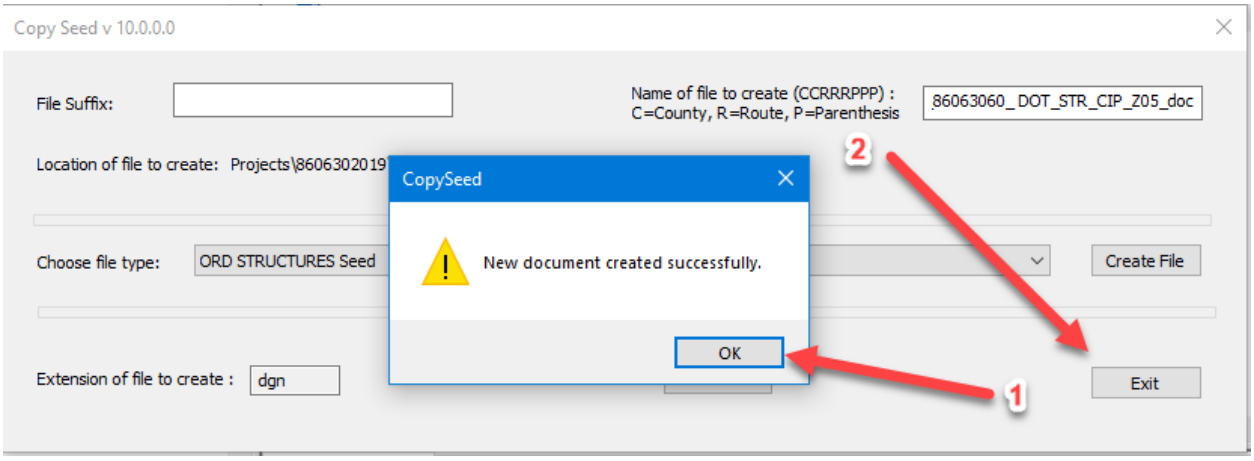


Once everything is set, click on the Create File button.



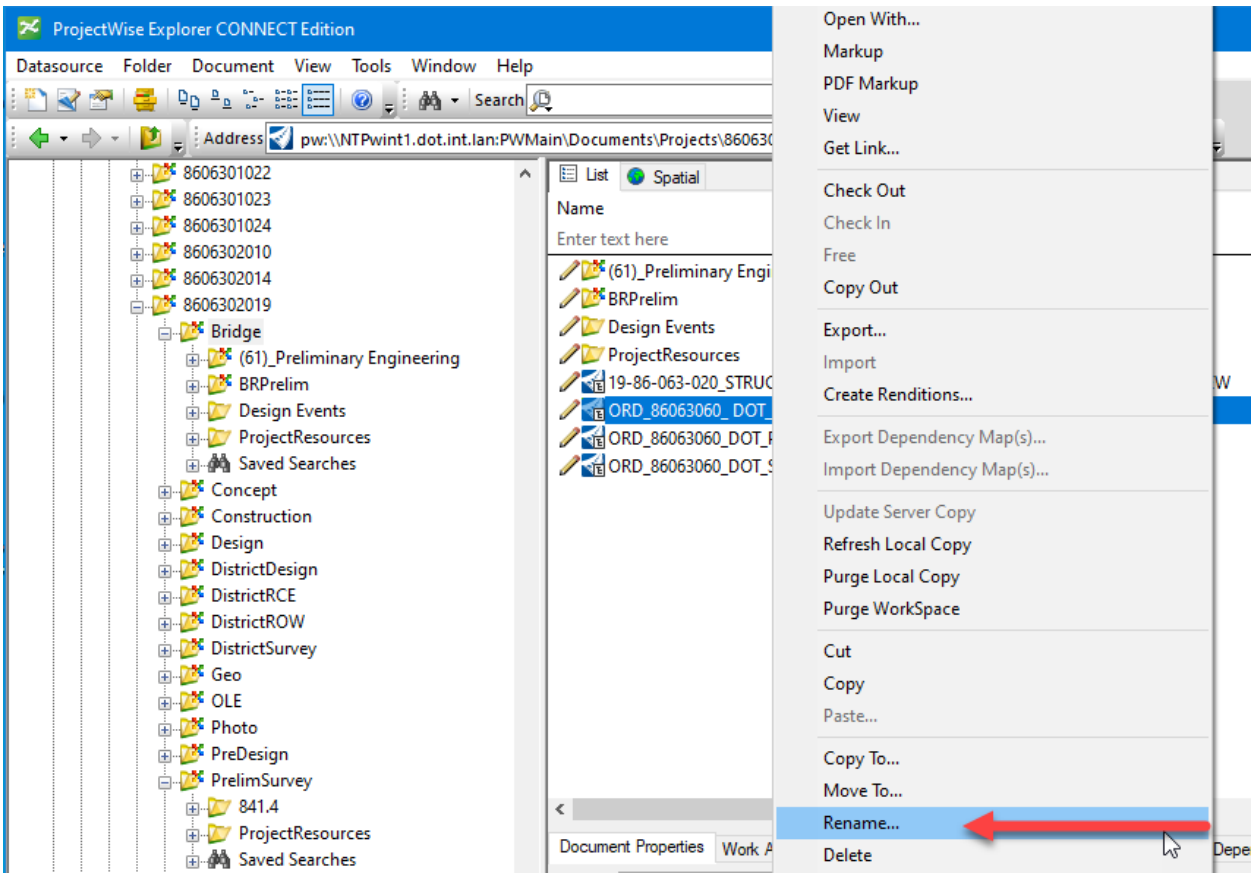
This creates the correct dgn file in the project directory.

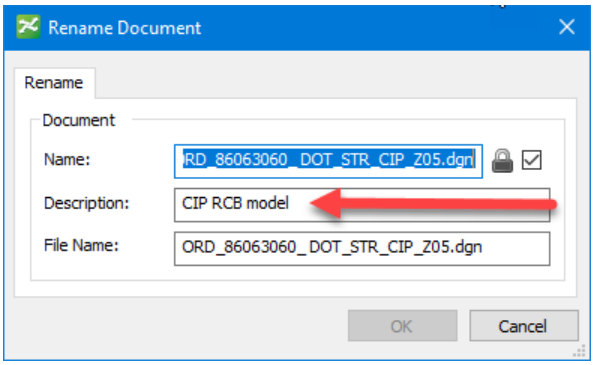
A message saying New document created successfully displays.



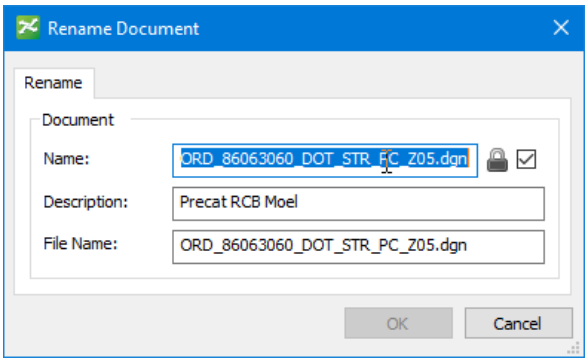
Then, click on the Exit button to close the Copy Seed tool.

Once the file is created, select the file and right click to rename and add the Description. For this file it will be CIP RCB model.

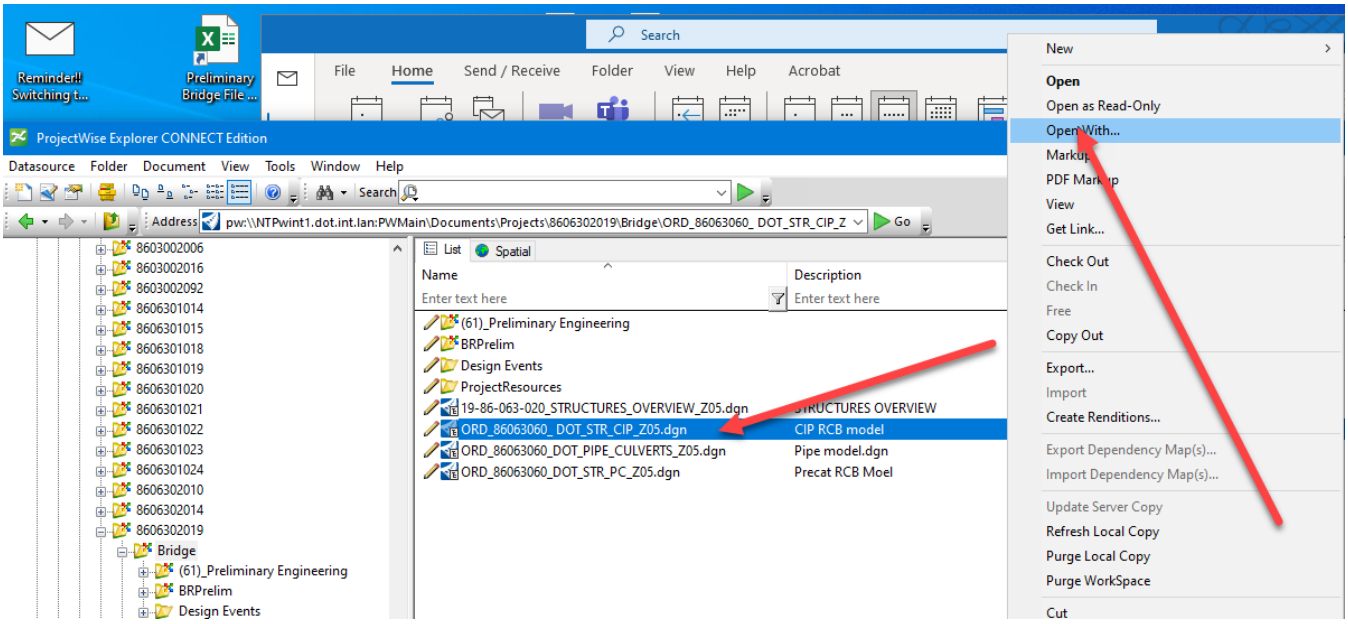




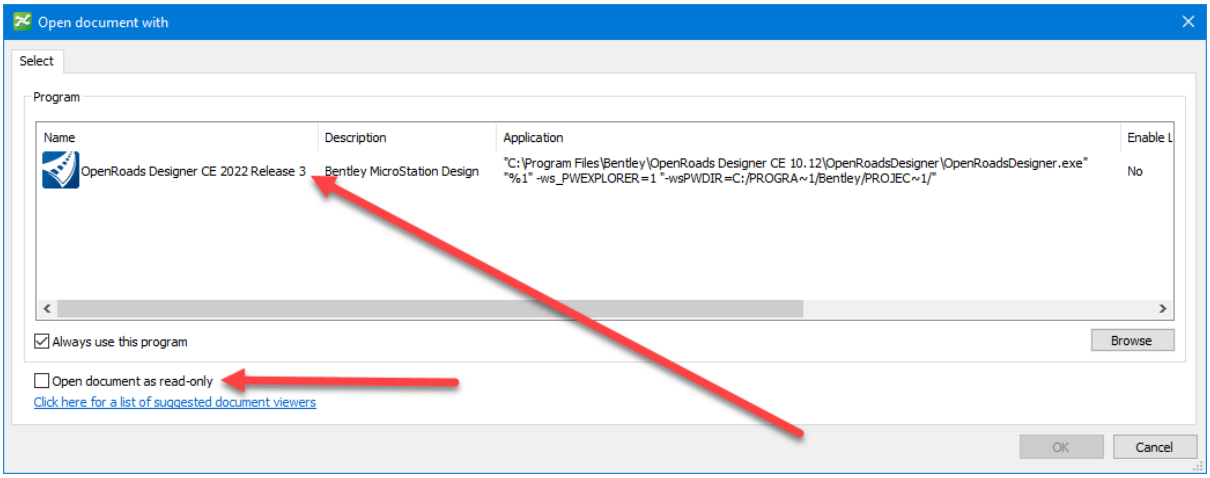
Next, make a copy of the file just created and rename it to make it the precast file.



Once the file is created, open it in the project directory. To do this, select the file, then right click and select Open with ...

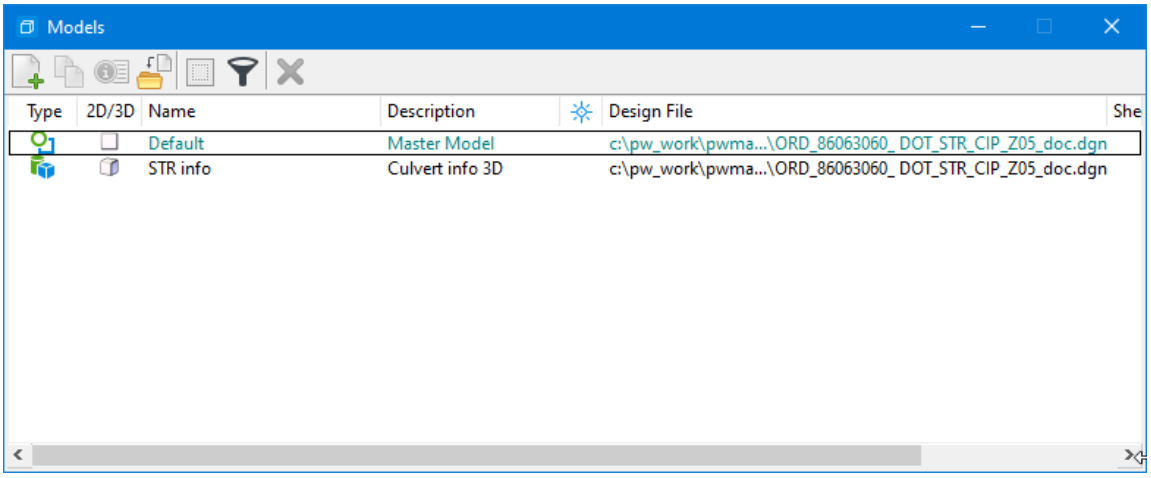


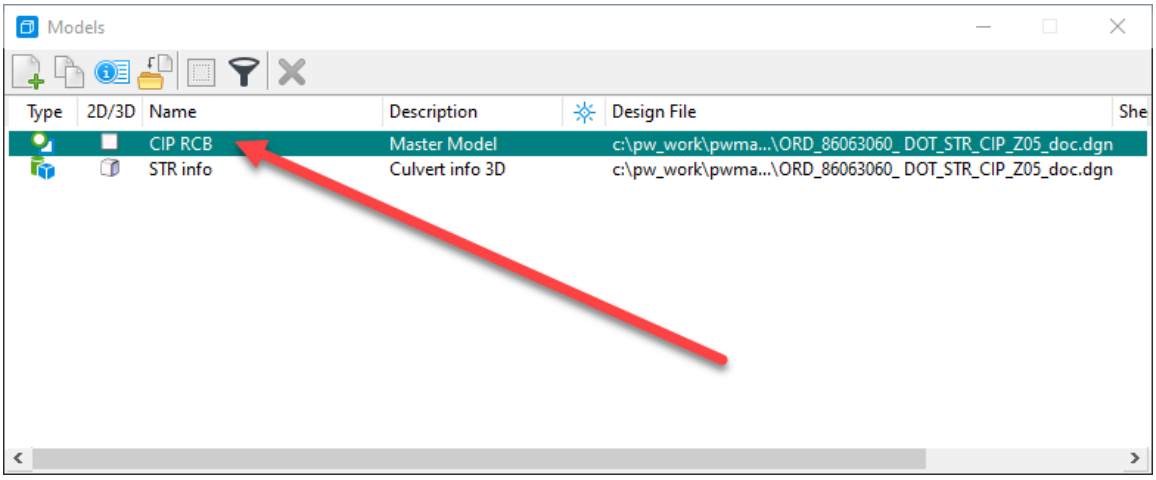
Select the OpenRoads Designer CONNECT Edition program. Then click on OK.



With the file open, rename the Default model to CIP RCB for the ORD_CCRRRPPP_DOT_STR_CIP_SPN file and rename the Default model to PC RCB for the ORD_CCRRRPPP_DOT_STR_PC_SPN file.

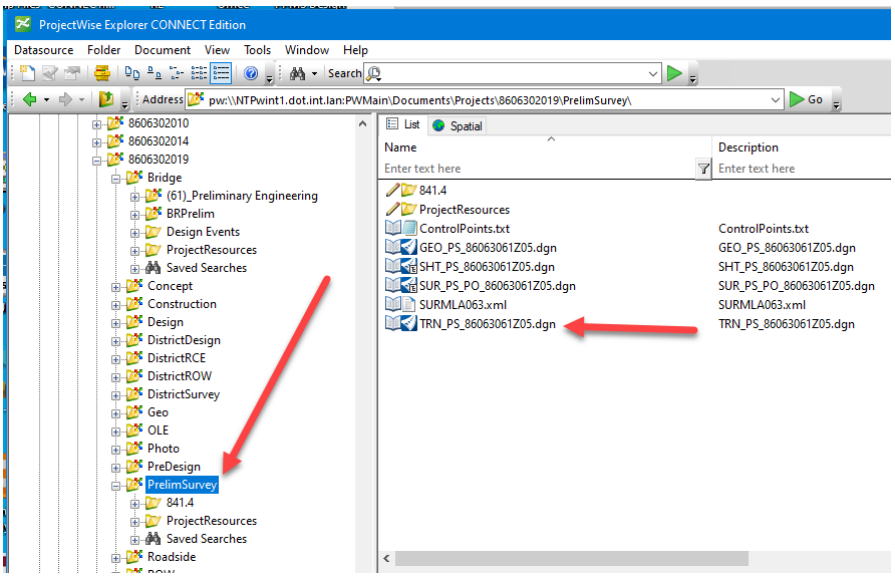
For more information on the model naming refer to
https://iowadot.gov/bridge/tools/CONNECT%20Models.pdf





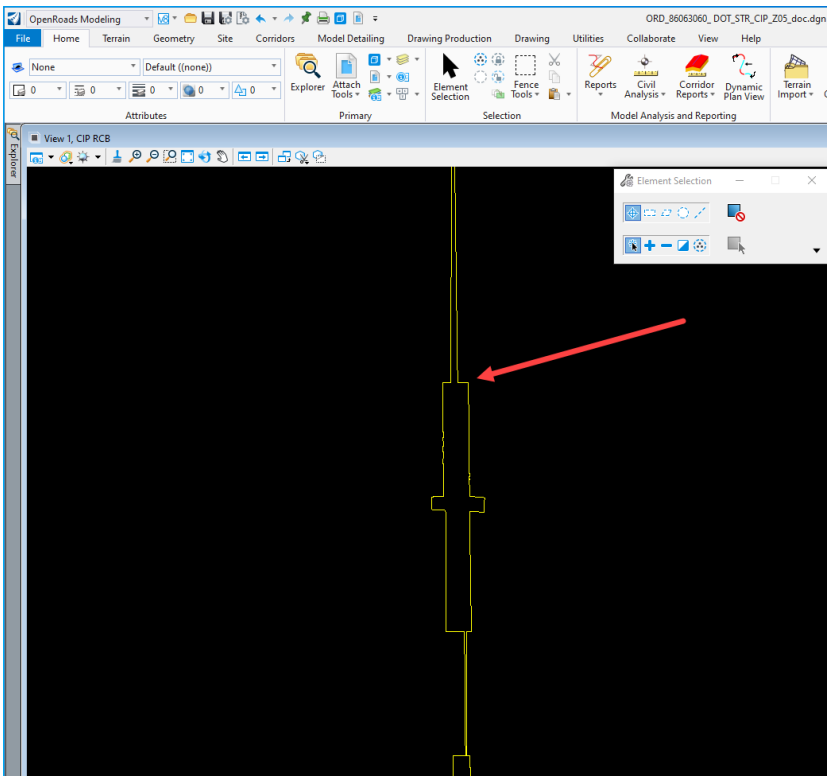
Next, set the file up to use the muti-model workflow. Use the existing ground TRN file to create the 3D managed model. Reference in the existing ground TRN file to the now renamed CIP RCB model in the file that was just created.

In ORD when 3D information is leveraged in a 2D file it will automatically create the 3D managed model.



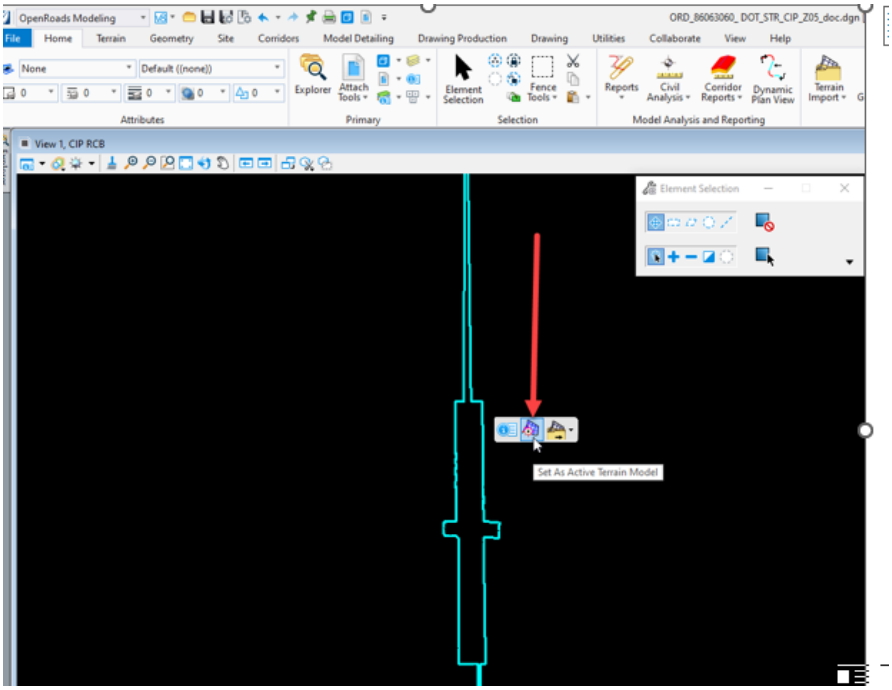
Reference in the TRN file from the survey or Photo location. For this example, it is in the Photo folder and is called TRN_EX_86063061Z05.dgn.

The content of the file should look like this:

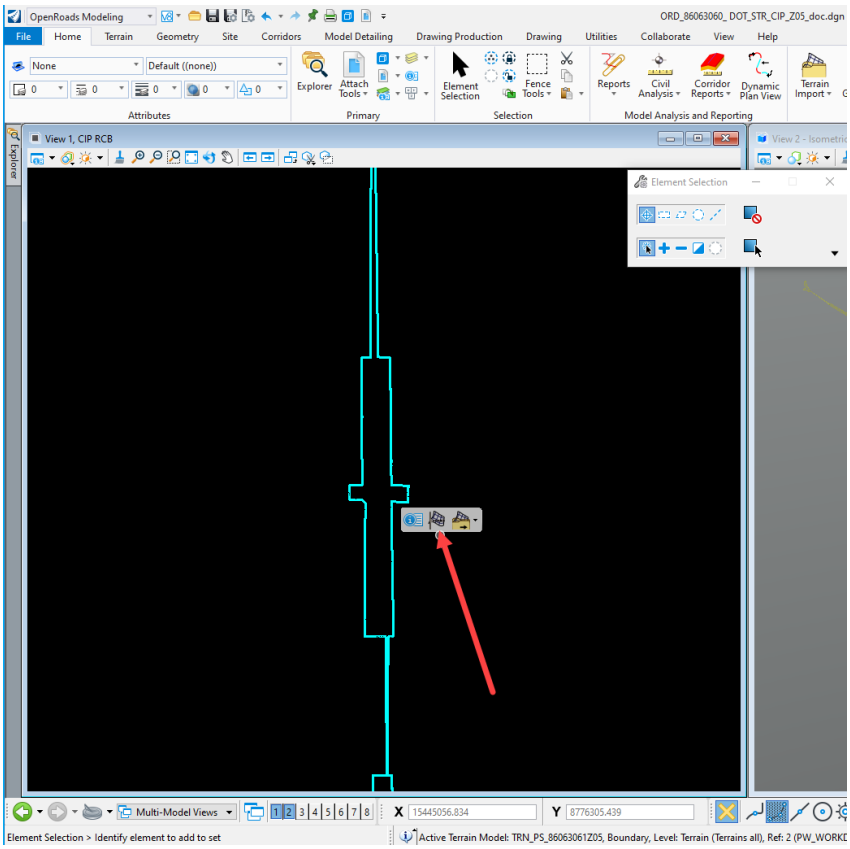


Next, using the Element Selection tool select the boundary of the TRN file.

It should turn blue. Then hover over it to activate the heads-up toolbox.

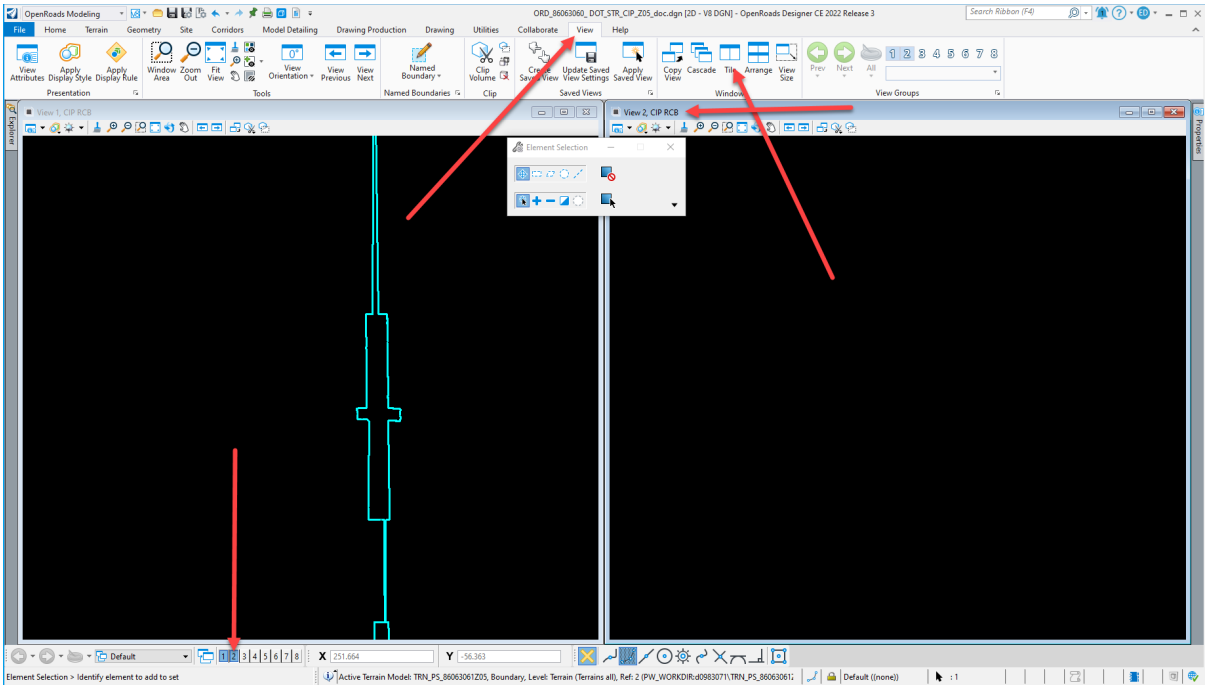


Select the middle tool, Set As Active Terrain Model. Once selected it will change the icon.

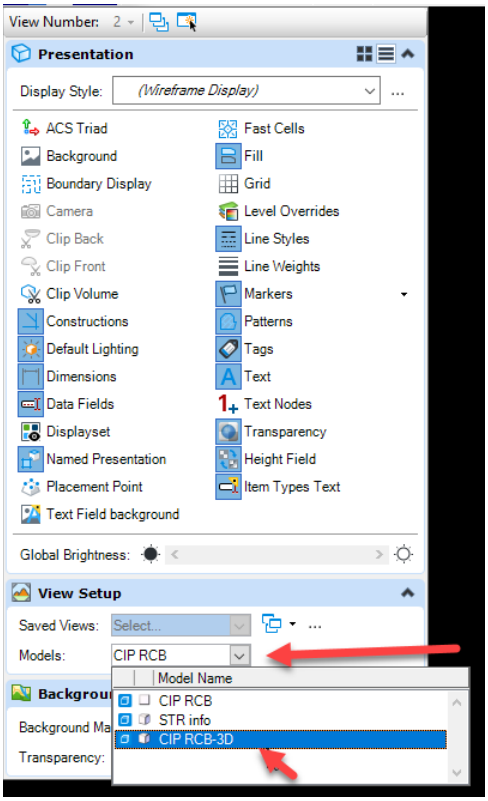


Next, set up multi-model view to be able to use the muti-model workflow.

Next, open a second view window. Then select the Tile windows tool in the Window ribbon.

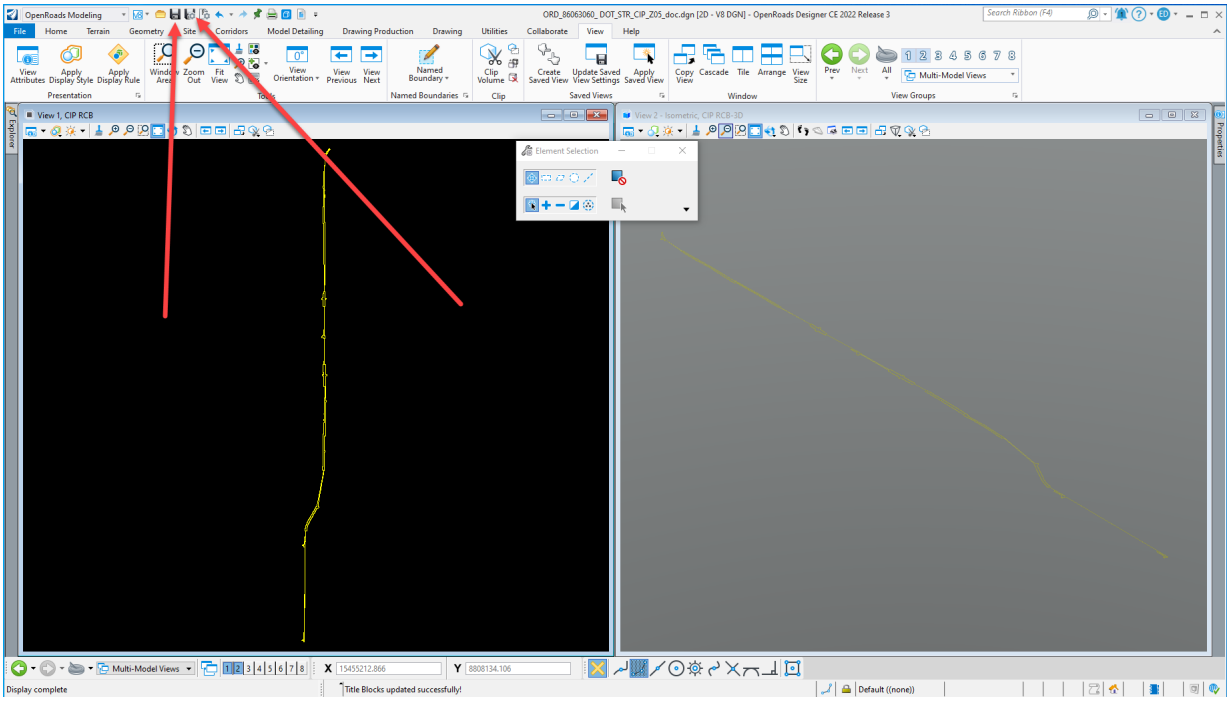


Open the View Attributes tool in view 2. Select the CIP RCB-3D model in the View Setup section of the View Attributes tool.



Note: It is preferred to change the Display Style in this view to Transparent Modeling to make it obvious when working in 2D or 3D.

The content of the file should look like this.



Save the file and save the settings so that the next time the file is opened it will be set to these view settings.

Next, close the file just created and check it into ProjectWise.

Open the precast file ORD_CCRRRPPP_DOT_STR_PC_SPN and repeat the same steps to this file.

Once the precast model file is set up, copy the ORD_CCRRRPPP_DOT_STR_CIP_SPN file and the ORD_CCRRRPPP_DOT_STR_PC_SPN file to the (Paren)_Work Description folder then rename the files for the designs that are needed.

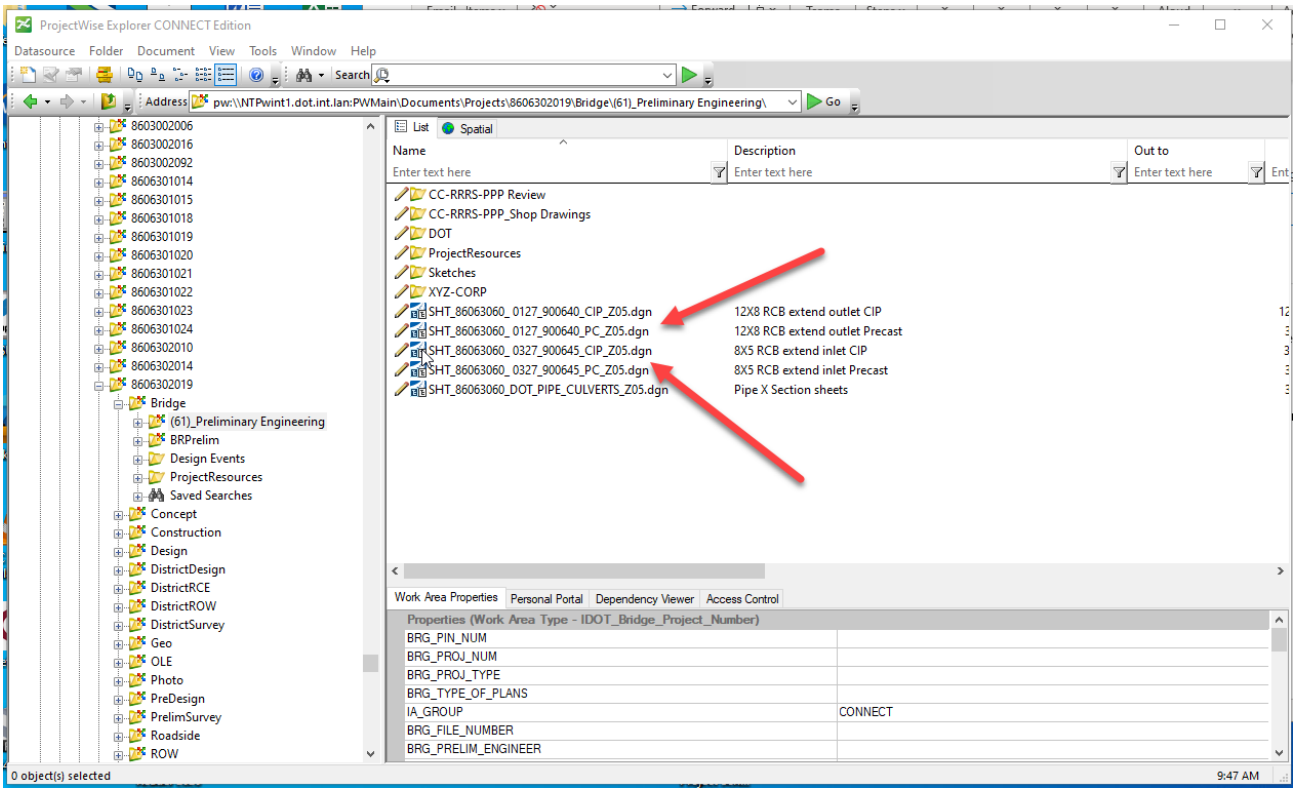
Files should be like this:

SHT_CCRRRPPP_DS#_001425_CIP_SPN.dgn with a description = Twin 10x10 RCB Culvert Design #

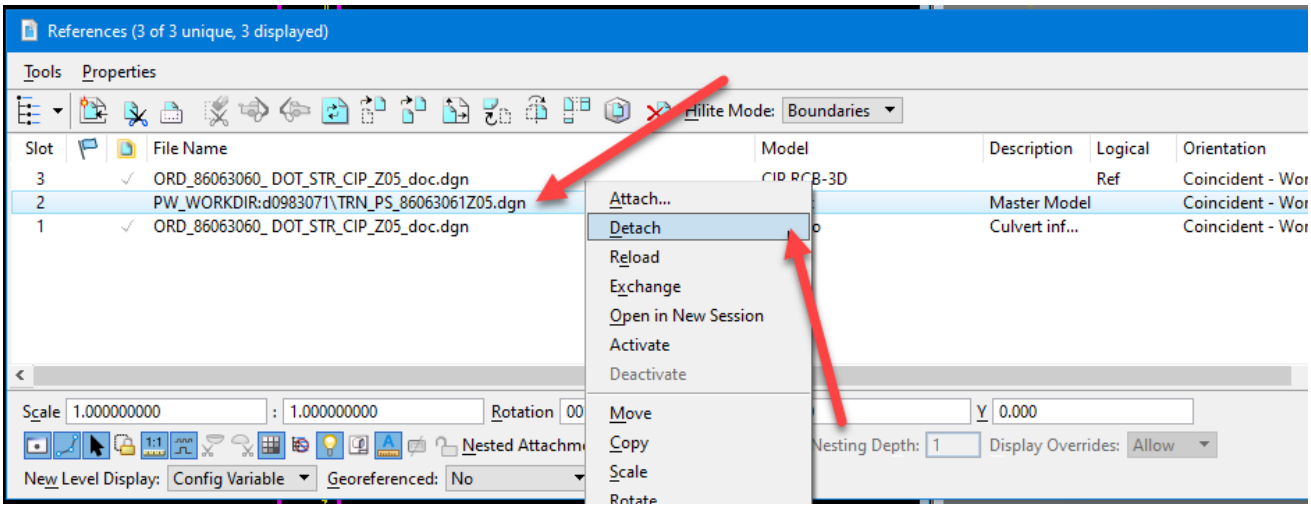
SHT_CCRRRPPP_ DS#_001425_PC_SPN.dgn with a description = Twin 10x10 RCB Culvert Design #

Keep in mind, if the precast is an option; then two SHT files are needed for each location, one for CIP and one for precast. Each location will have a design number along with a FHWA number or Asset ID number. Please refer to the Seed File document on Iowa Department of Transportation Bridge Connect Documentation page for further instructions on naming the files.

For this example, there are two locations that will need to have new designs created for new RCB culverts:



Next, open each of the SHT files. Then, detach the TRN file reference.

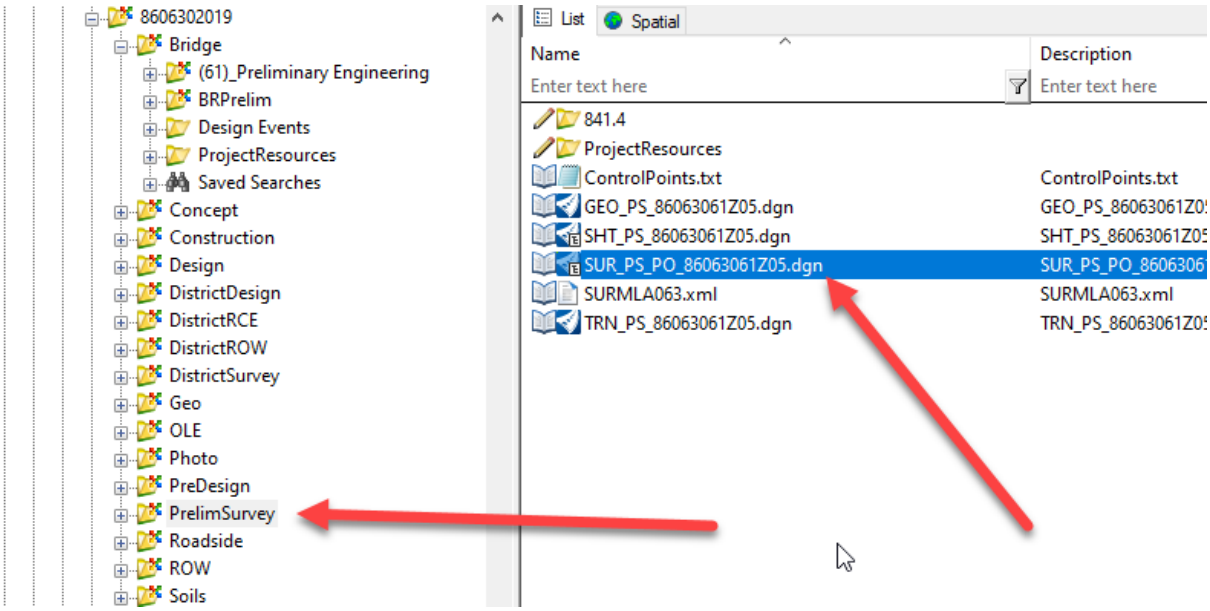


Then attach the correct model file from under the bridge folder using live Nesting Depth of 2. Do this for each sheet file.

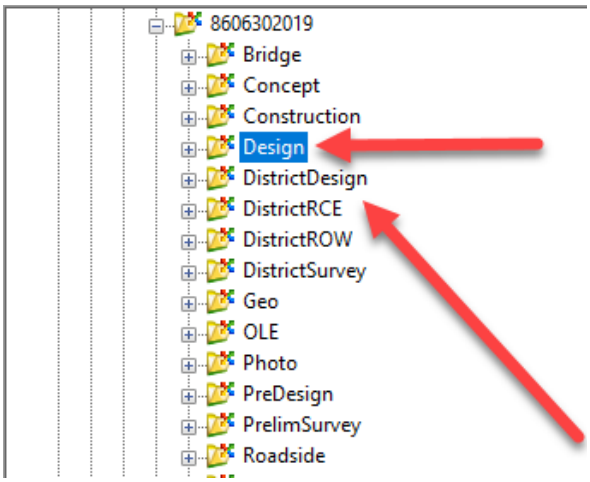
For the CIP sheets, attach ORD_CCRRRPPP_DOT_STR_CIP_Z01.dgn
For the precast sheets, attach ORD_CCRRRPPP_DOT_STR_PC_Z01.dgn

Save settings and exit the file.

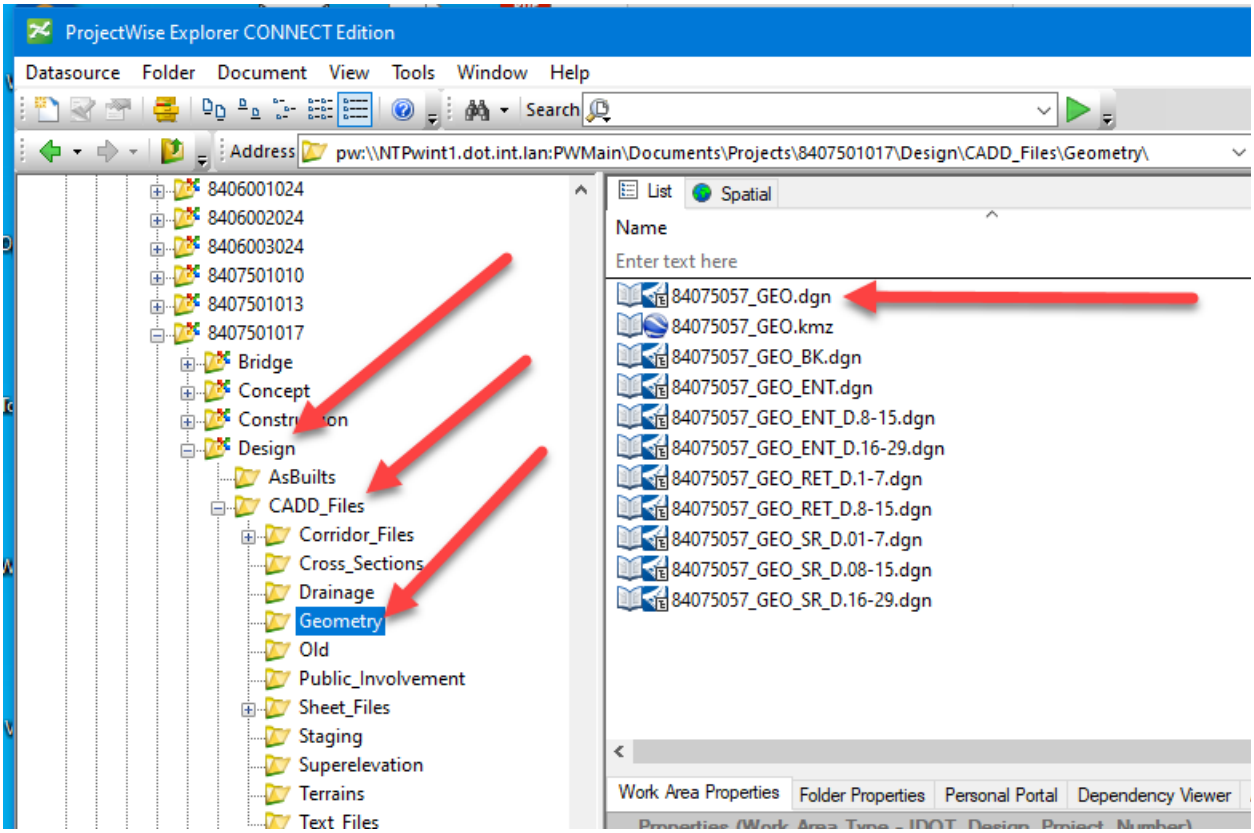
In the Bridge folder and open the ORD_CCRRRPPP_DOT_STR_CIP_Z01.dgn. Attach the survey file that contains the existing 3D culvert and surrounding topo features that will be needed to do an effective design.



Next reference in the Design alignment that has an active profile. This file should be located in the Design or the District Design folder (depending what group is doing the road design portion of this project).

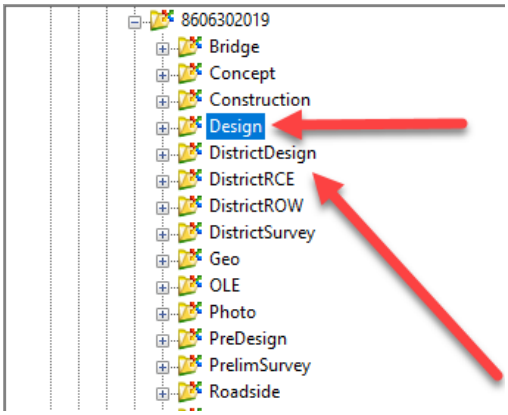


For this example, it is being done by the Design group. So, the alignment is under the CADD_Files\Geometry\ folder. Select the GEO Alignment file that is named GEO_CCRRRPPPZZZ.dgn.

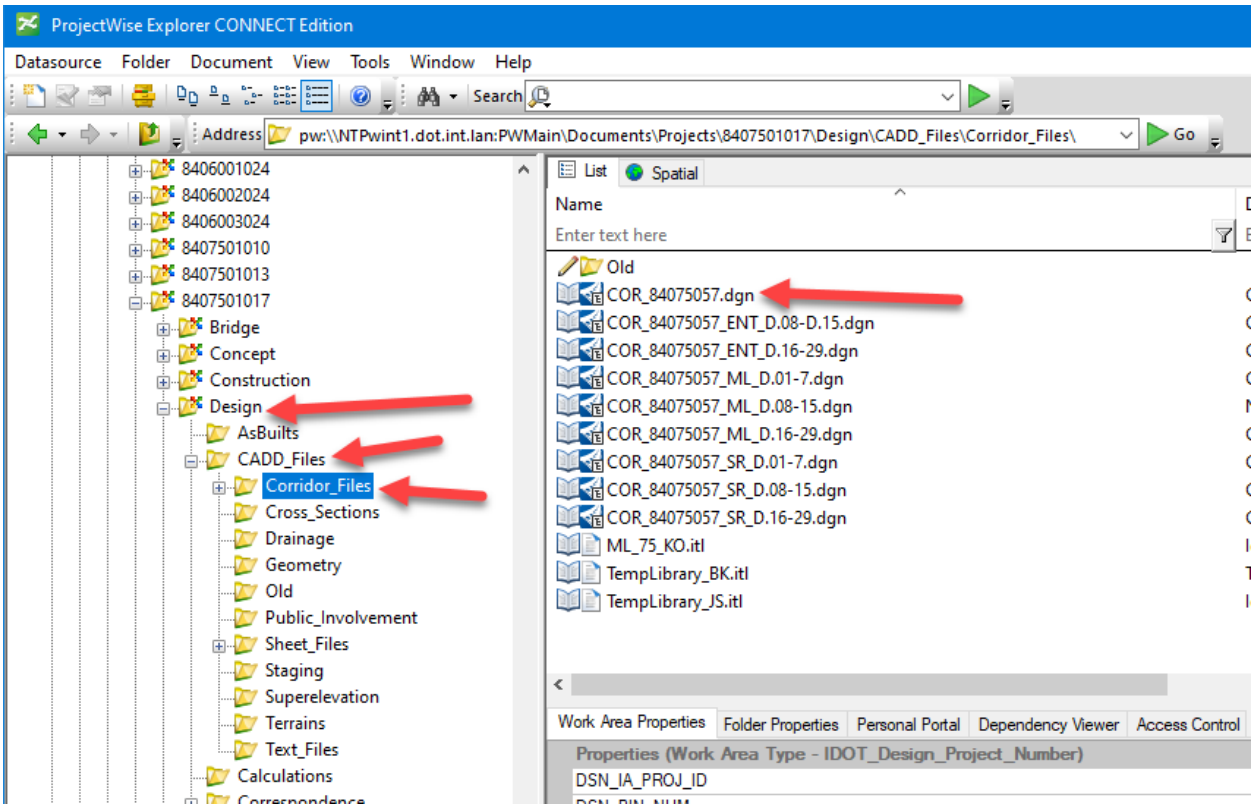


This is the container GEO file that will contain all the Alignments for this project. Attach it using the orientation of Coincident World. Turn on the live nesting and set its depth to 1.

Next, reference the proposed corridor container file. This file should be in the Design or the District Design folder depending on what group is doing the road design portion of this project.

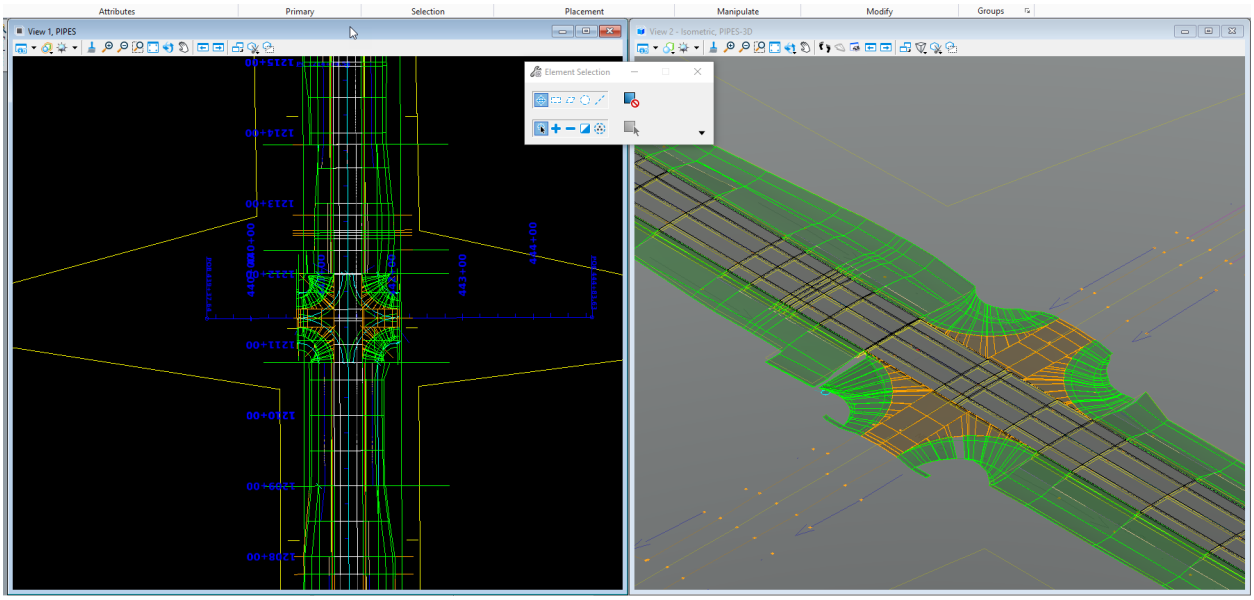


For this example, it is being done by the Design group. So the corridor file is under the CADD_Files\ Corridor_Files\folder. Select the COR Corridor file that is named COR_CCRRRPPPZZZ.dgn.

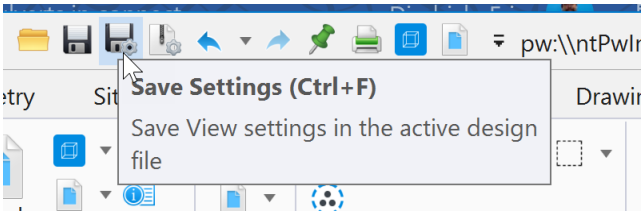


This is the container COR file that will contain all the Corridor for this project. Attach it using the orientation of Coincident World. Turn on the live nesting and set its depth to 1.

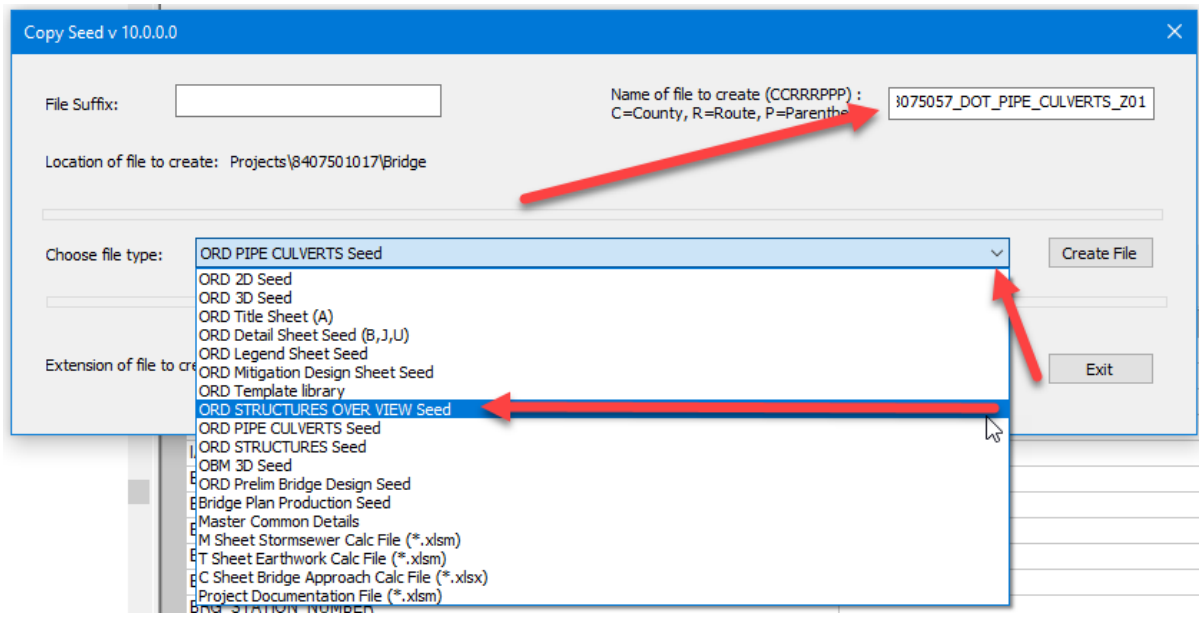
The file contents should look something like this:



Next, click Save Settings.



The last step to setting up the CADD files for culvert design is to make sure the CIP RCB-3D and the PC RCB-3D models are referenced into the Structures Overview file. If there is not a Structures Overview file in the project directory, create it with the Copy Seed tool.



The Structures Overview file will only contain the 3D information from the model files under the Bridge folder. Make sure only the 3D model is referenced from the ORD_CCRRRPPP_DOT_STR_CIP_Z01.dgn and the ORD_CCRRRPPP_DOT_STR_PC_Z01.dgn into the overview file.

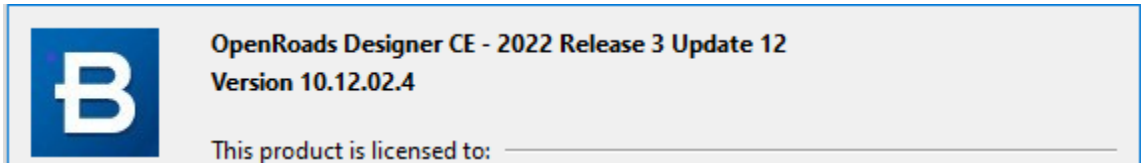
Other designers will be referencing this file nested and don't need to be pulling in any information, but the models that were just created. Make sure all references to the overview file are not nested.

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

CW02_Laying out Culverts in Connect

Laying out Culverts and Drainage Design in Connect

These instructions were created April 2024. These instructions were created with:



First, review the project information and determine where the best locations for the structures that are needed. Once a location is determined, calculate the correct size. Refer to the BDM Chapter 4 https://iowadot.gov/bridge/policy/04-01-00Prelim.pdf. When the correct type, size and location are determined, design the new structure.

Two methods can be used to analyze the corridor to design the new structures. If designing a structure that is perpendicular to the alignment, use the first method of Cutting a Dynamic Section.

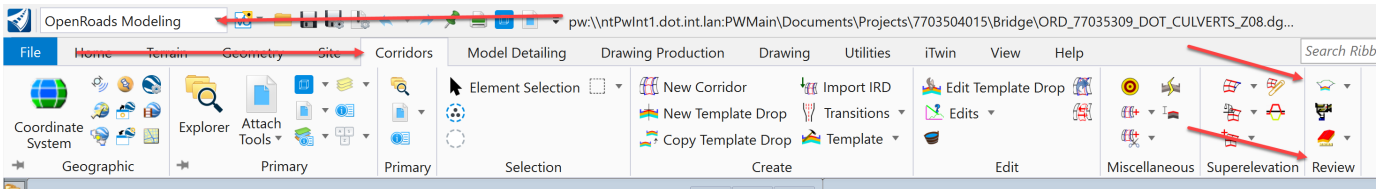
First Method

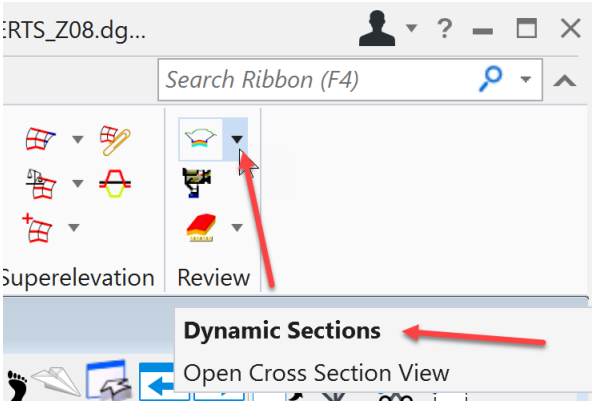
Cutting a Dynamic Section - The tool needed to do this is in the OpenRoads Modeling workflow on the Corridors tab in the Review group or on the Drainage Utilities workflow on the Utilities View tab in the Drawing Views group. Keep in mind that these tools work well if the structure is placed 90 degrees from the alignment. If the desired design is not, then use the second method.

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 for this, 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 Reference dialog box and turn off the corridor.

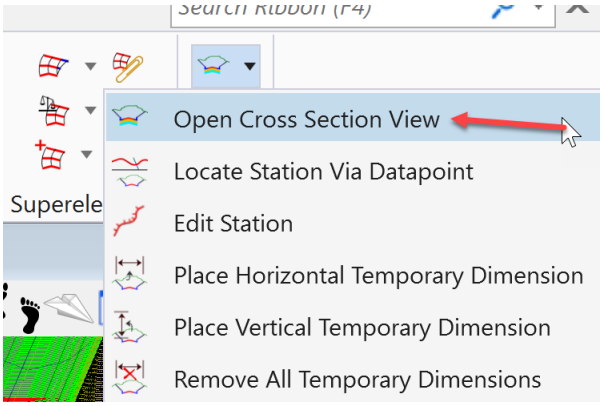
Next, open a view to display the section in. For this example, use View 7.

In the OpenRoads Modeling workflow; on the Corridors tab in the Review group, select the Dynamic Sections tools.



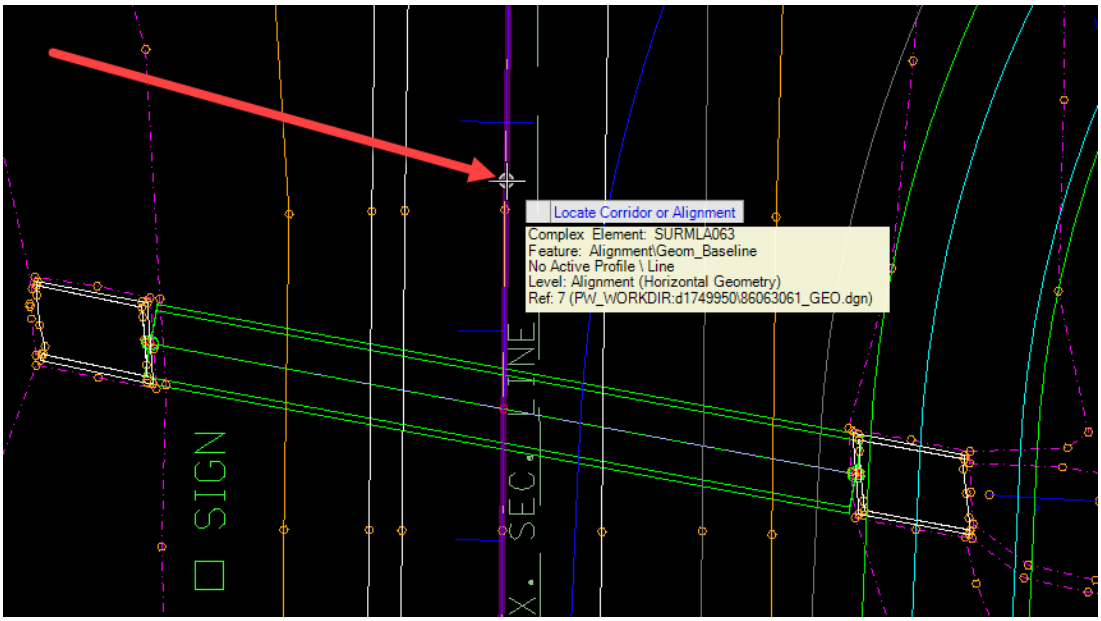


Then select the Open Cross Section View tool.

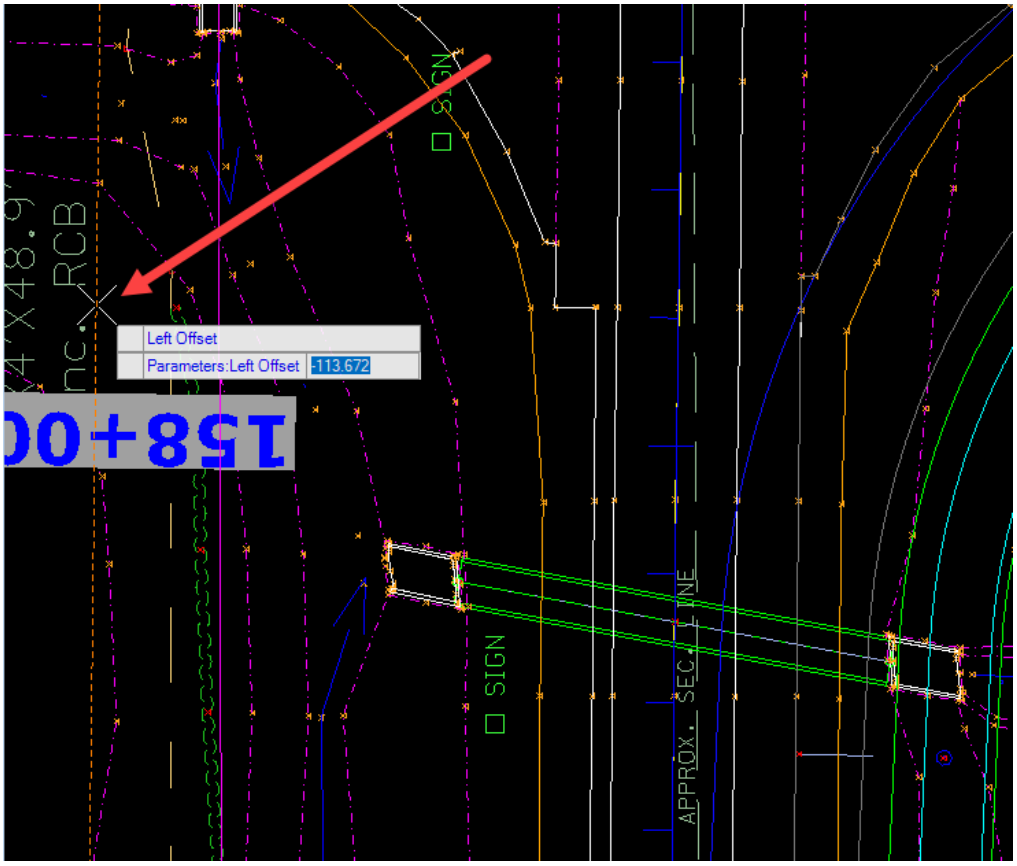


It prompts to locate the alignment.

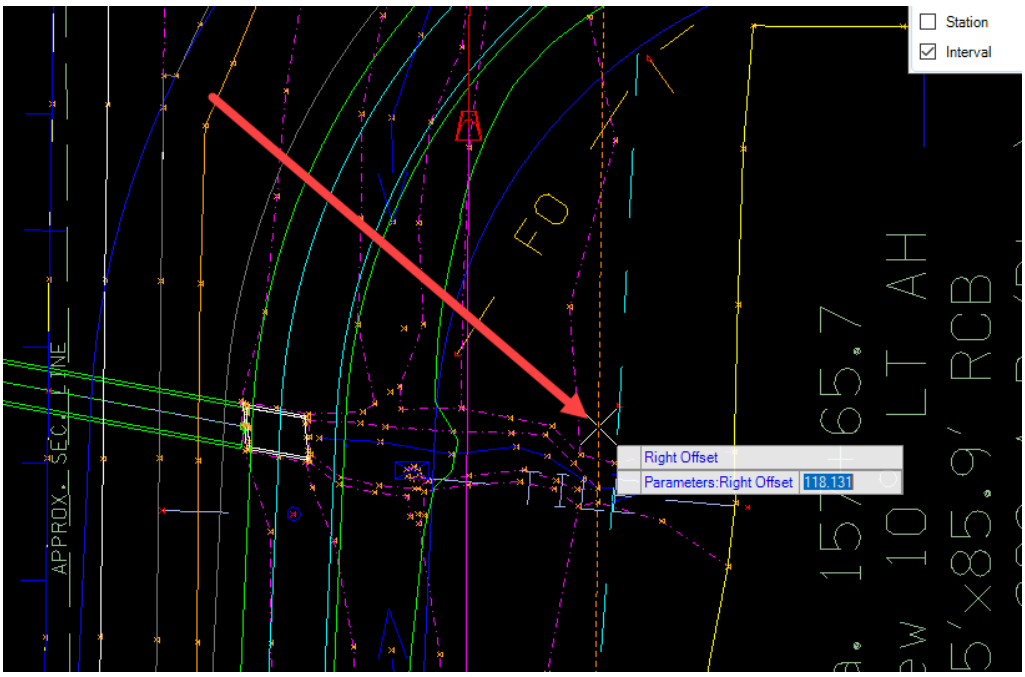
Data point on the alignment in the 2D view. In this example View 1.



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

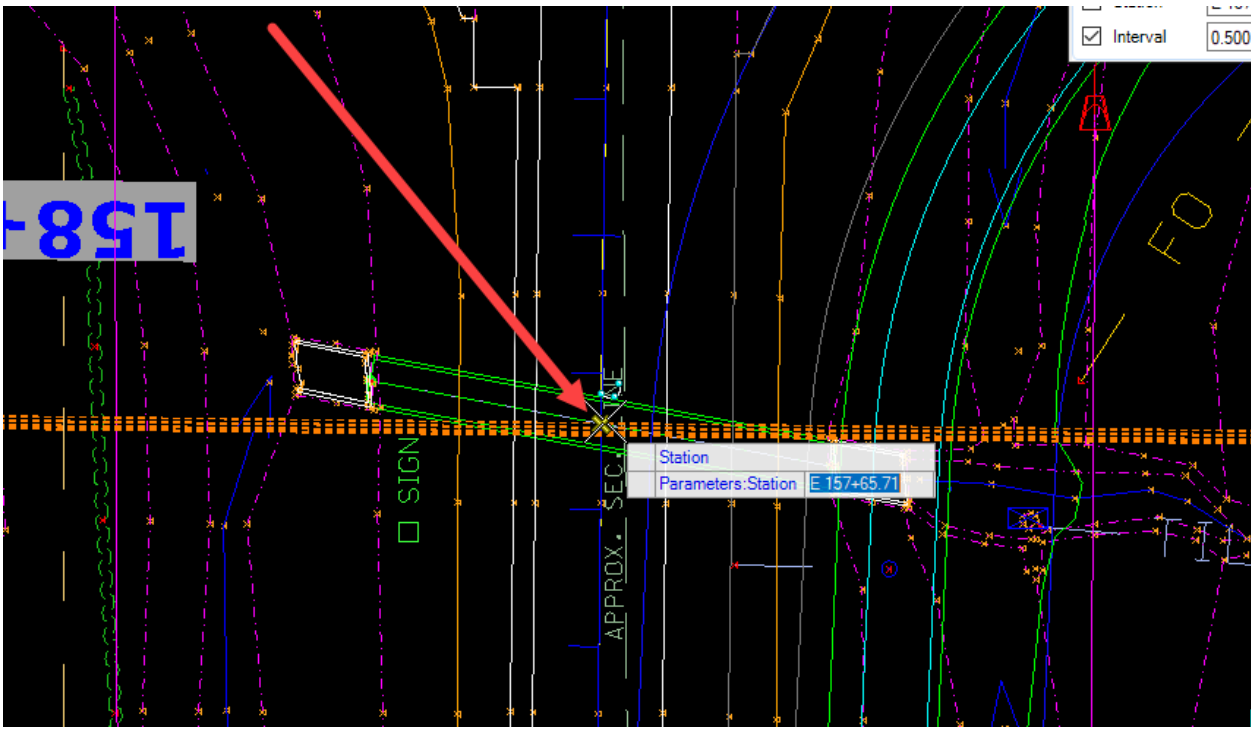


Then select the Offset Right. This will determine how far right the section will cover.



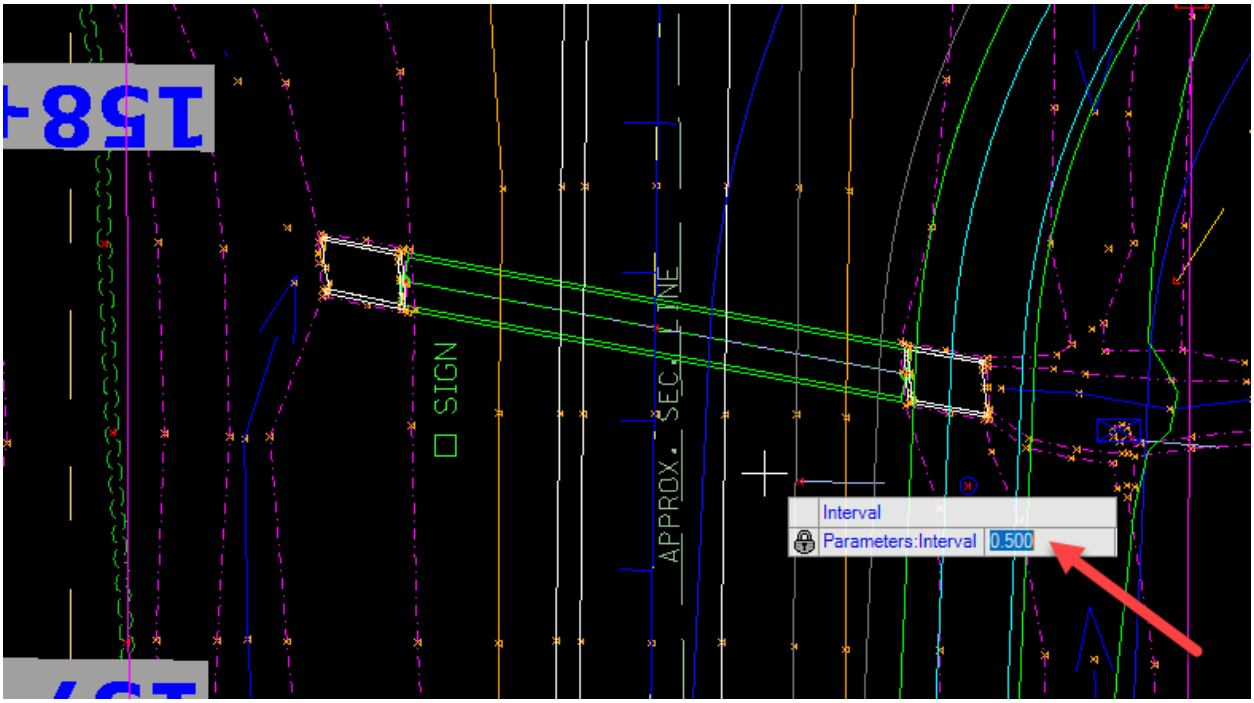
Then select the Station.

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

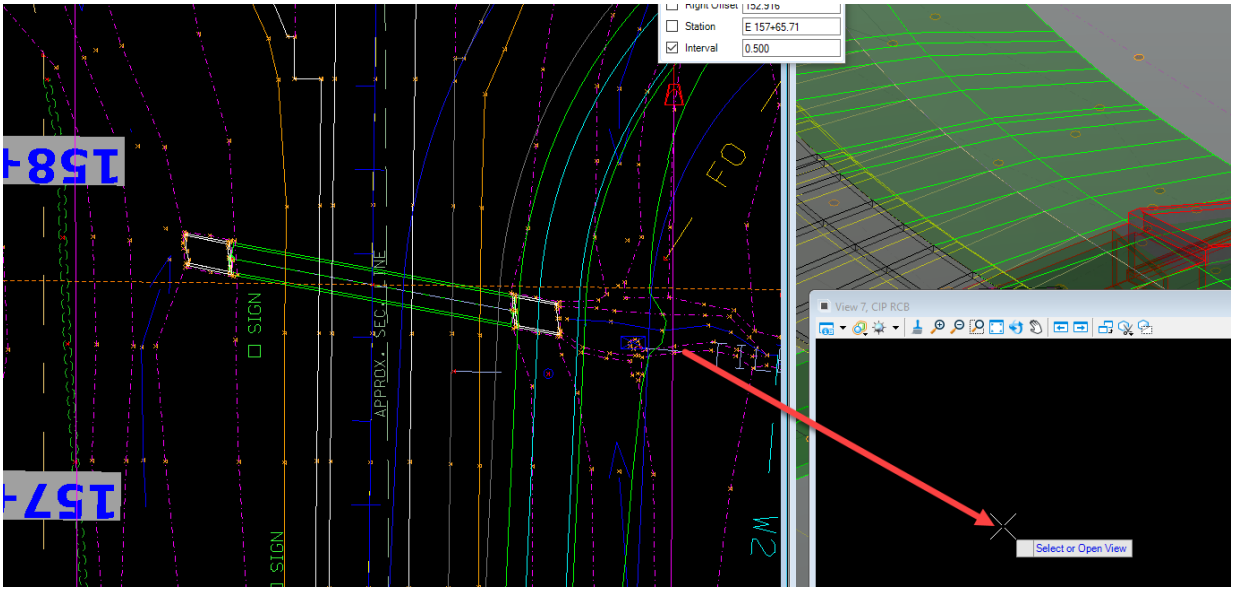


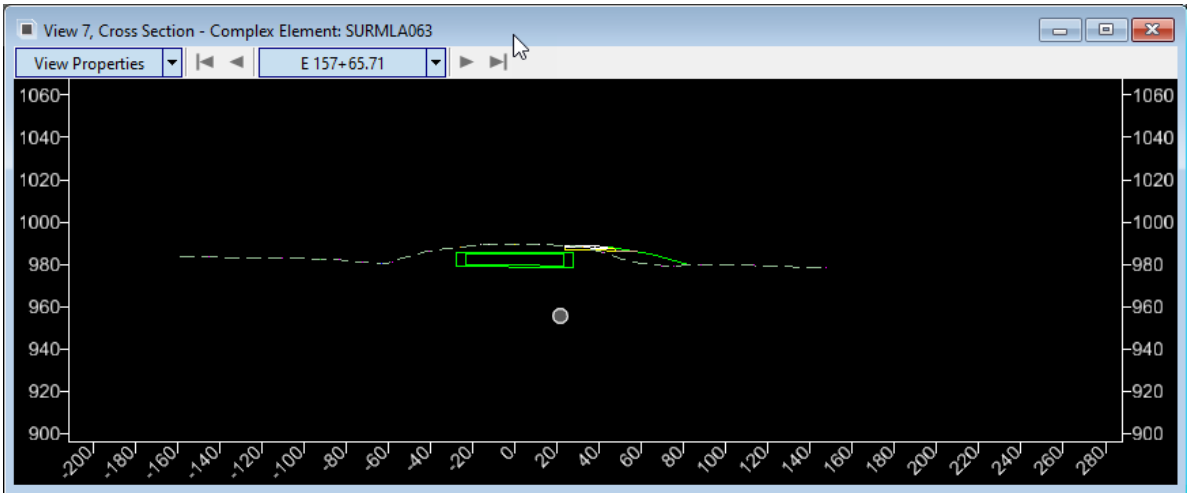
Select the Interval.

Note: Recommend an interval of 0.5 = 6” for culvert design.

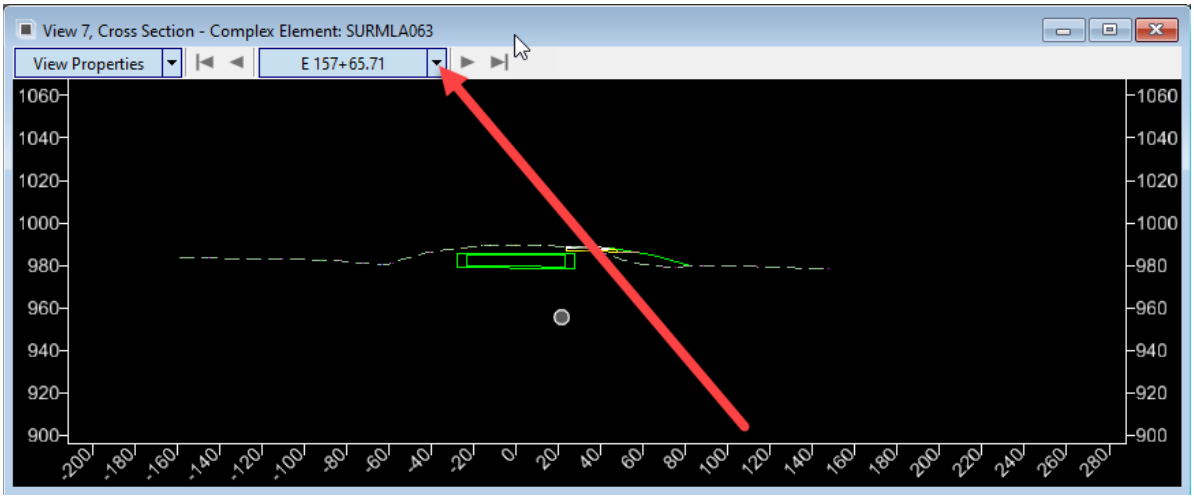


Select the View. Data point in View 7 and the section will appear.

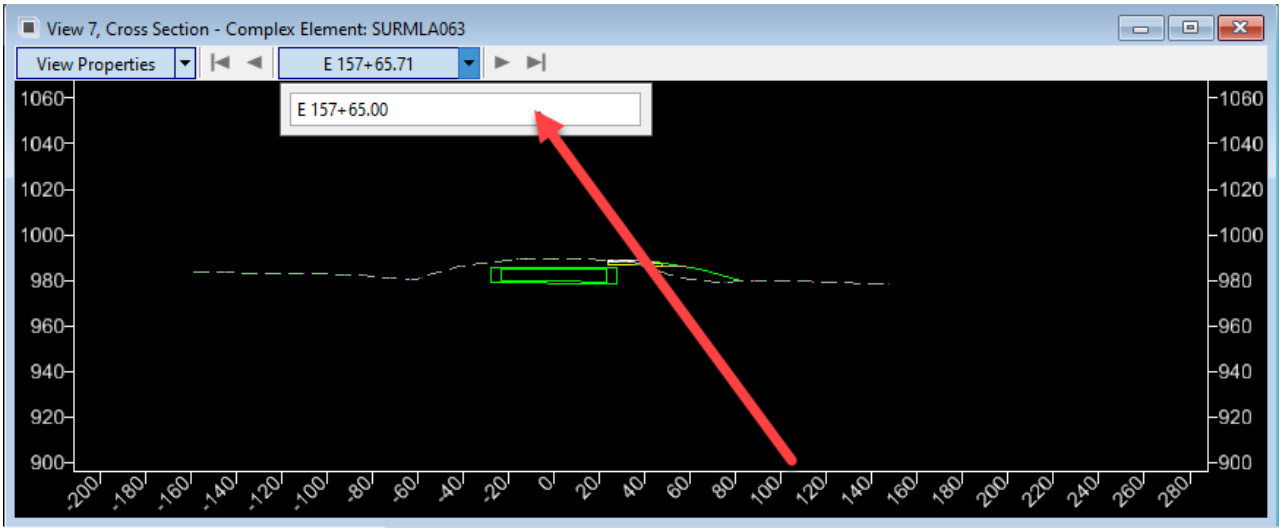




Adjust the Station with the pull down at the top of view window.



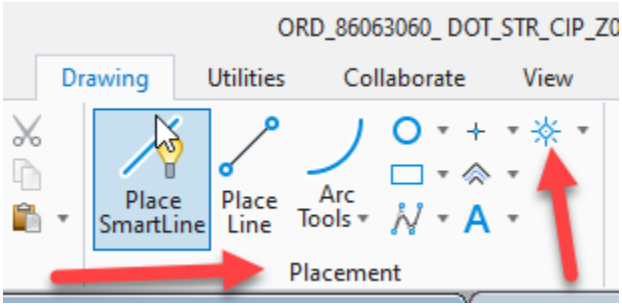
Then type the Station value needed and hit enter.



Or use the arrow buttons on each side of the Station value field 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 the new structure, place the headwall cell that corresponds with the structure design.

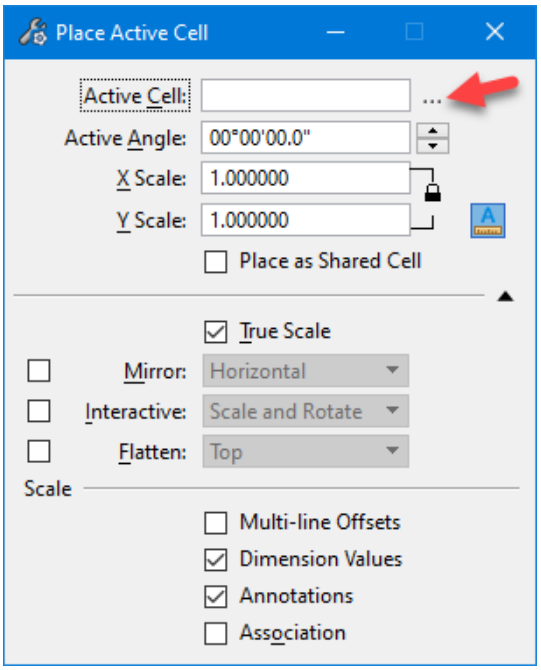
To do this, make the View 1 = 2D model active and use the place cell tool.



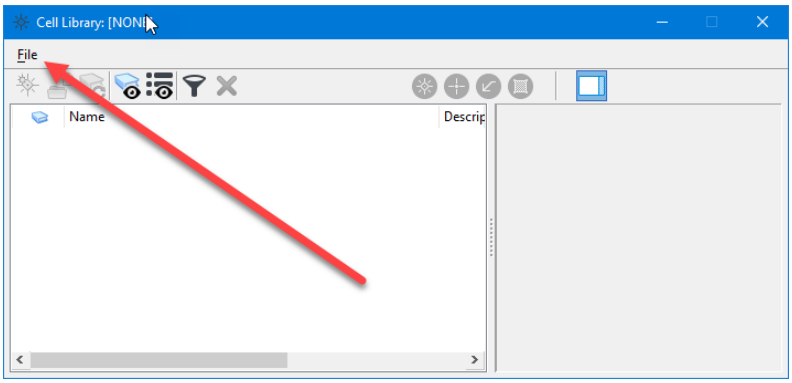
Select the correct cell library

pw:\\NTPwint1.dot.int.lan:PWMain\Documents\Resources\ClientWorkspaces\IowaDOT\IowaDOTProduction\Organization-Civil\IowaDOT_Standards\Cell\Headwalls_CIP.cel and Headwalls_Precast.cel

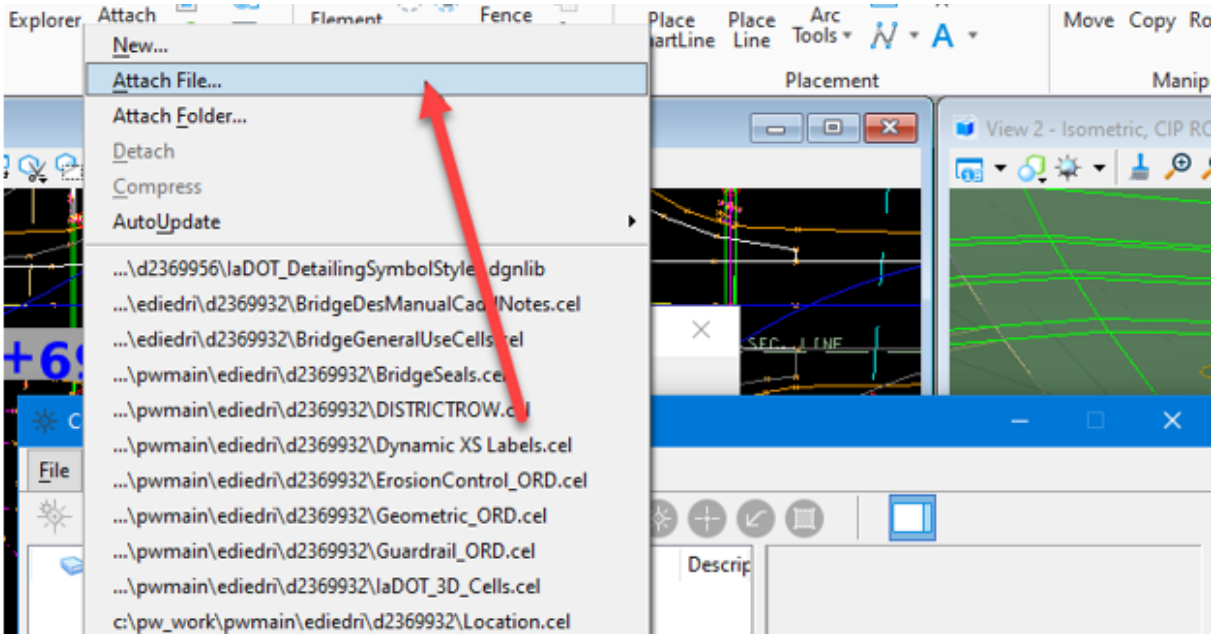
Click on the dots next to the Active Cell field.



This will open the following dialog box. Then click on the File menu.



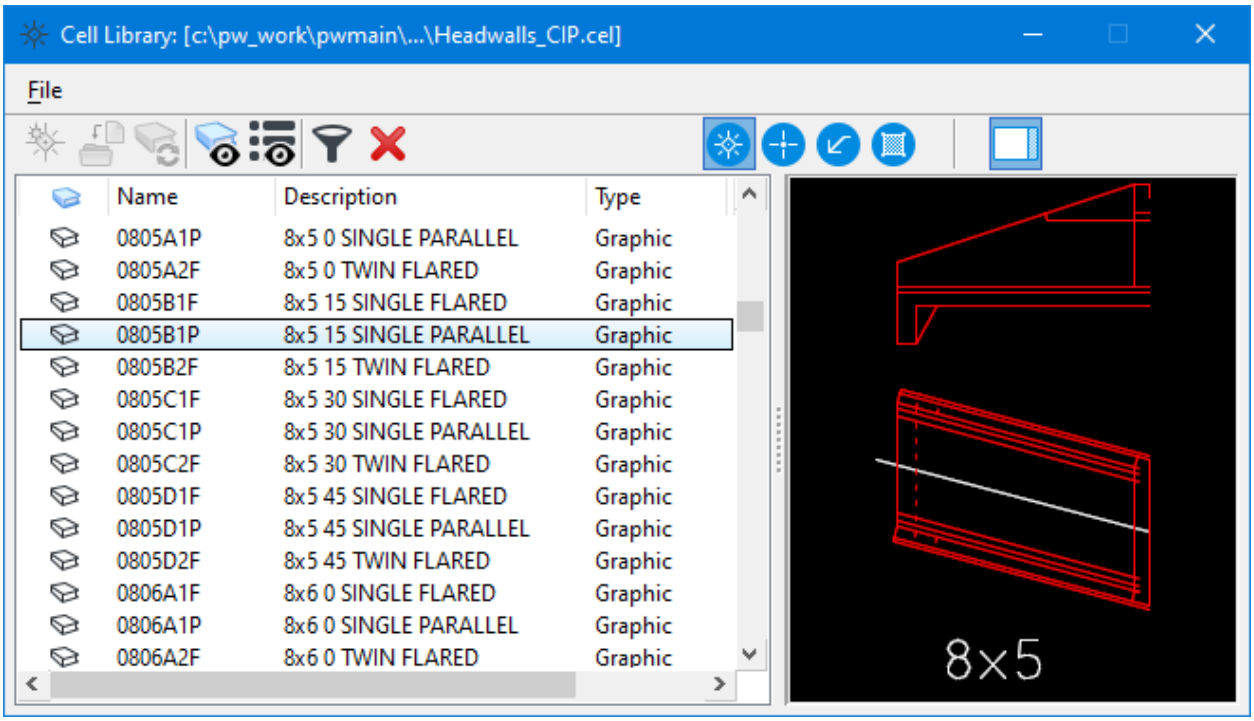
Then click on Attach File….



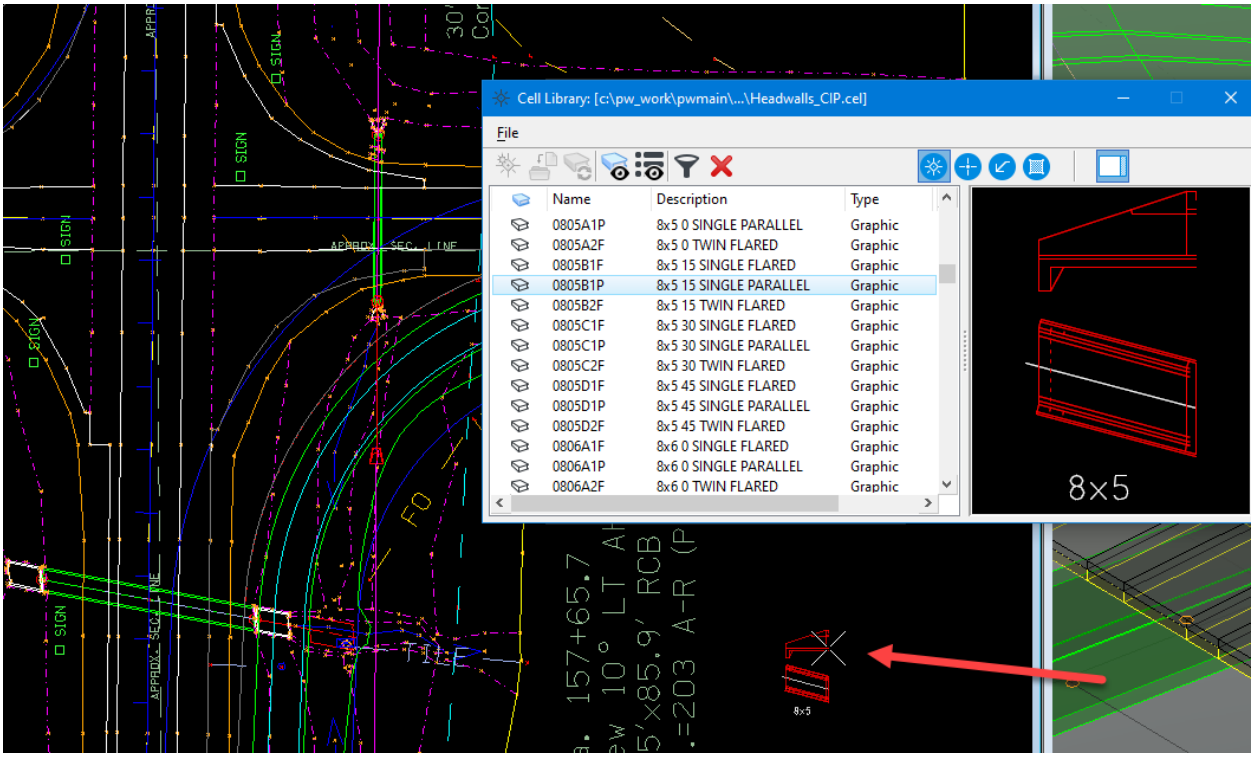
Browse to pw:\\NTPwint1.dot.int.lan:PWMain\Documents\Resources\ClientWorkspaces\IowaDOT\IowaDOTProduction\Organization-Civil\IowaDOT_Standards\Cell\

Once the correct cell library is attached, select the correct cell that corresponds with the structure that is being designed.

For this example, use the single 8’ x 5’ 15-degree CIP RCB. The cell needed is 0805B1P

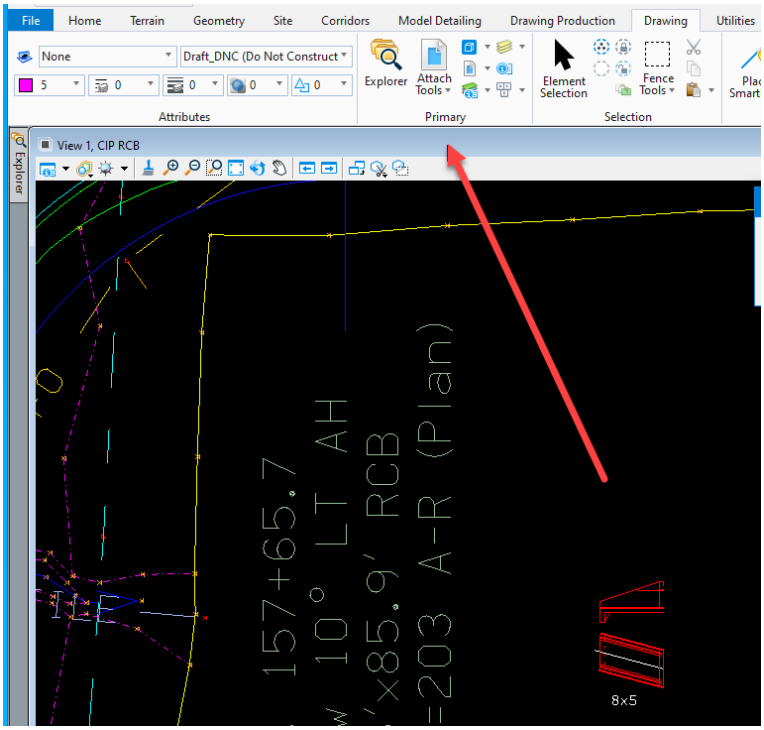


Then place this cell in the 2D View 1 next to the location of the structure being designed.

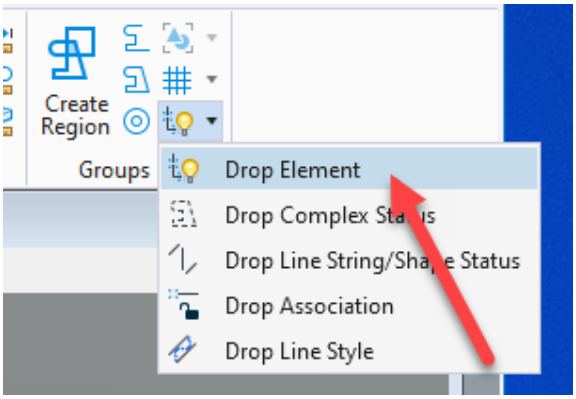


Copy the profile part of the headwall into the cross-section model in View 7.

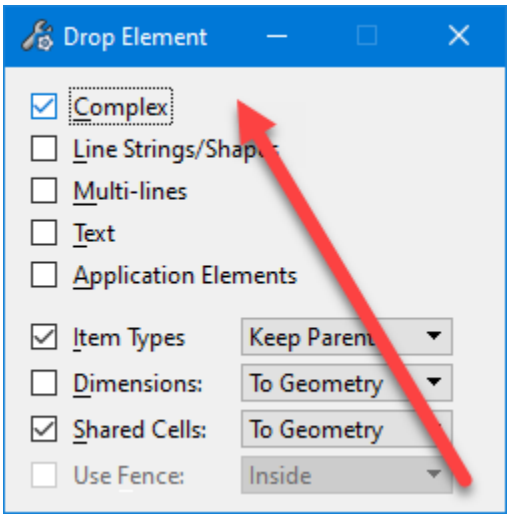
To do this, make the View 1 active by clicking on top of the view.



Then select the drop element tool.

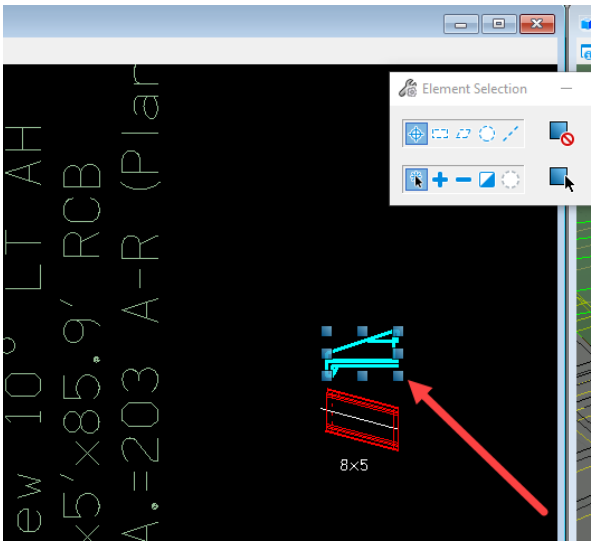


Select complex.

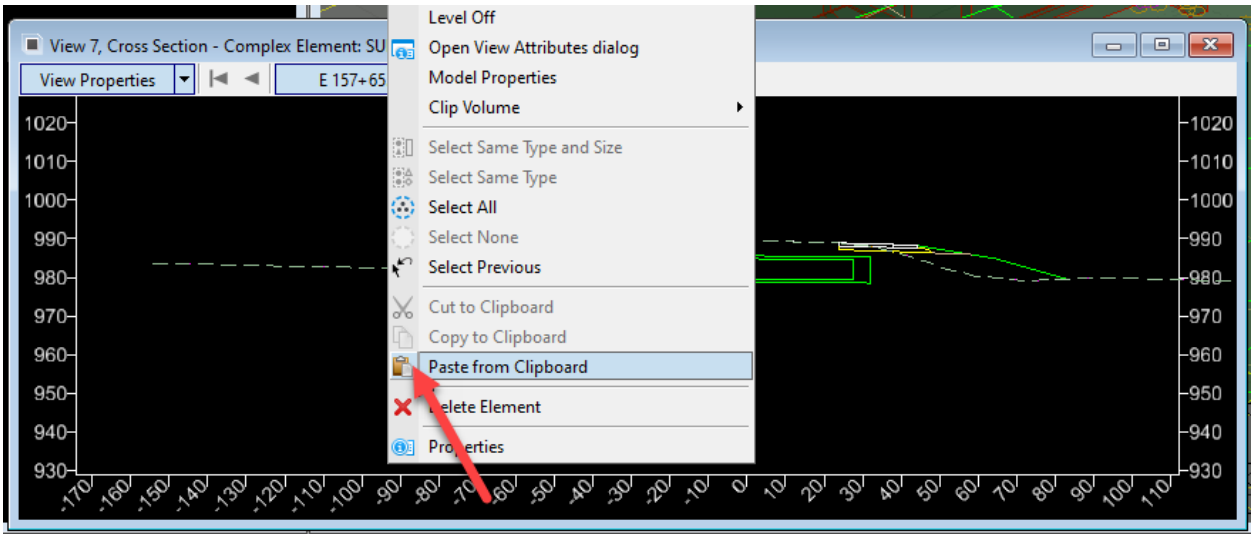


Then click on the cell, which allows selection of just the profile part of the headwall cell.

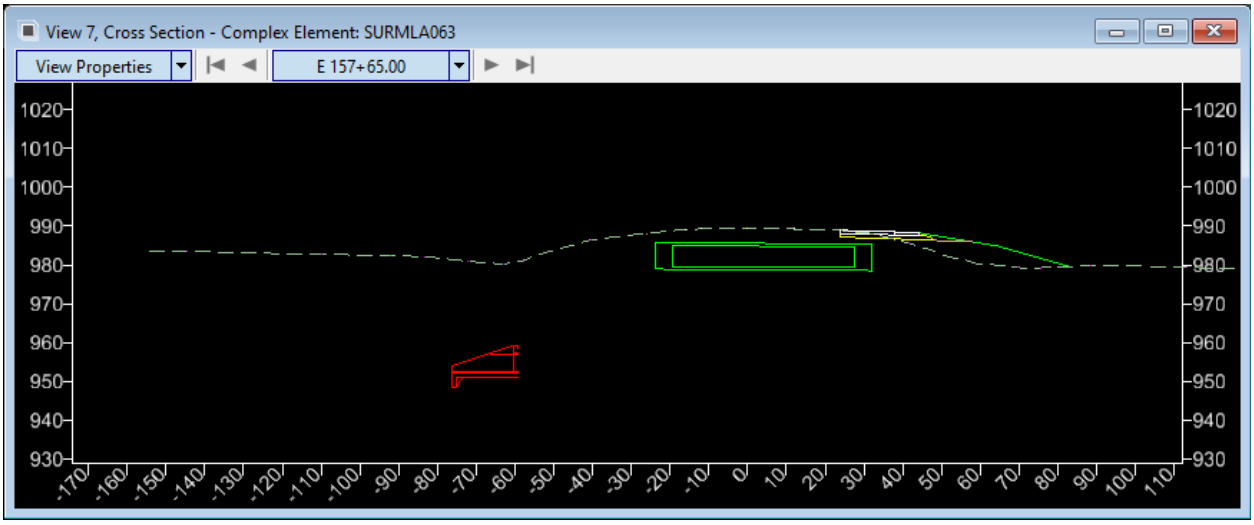
Then use the element selection tool and select the profile part of the headwall cell that was just placed.



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. In View 7, right click and hold for a second to access the right click menu.

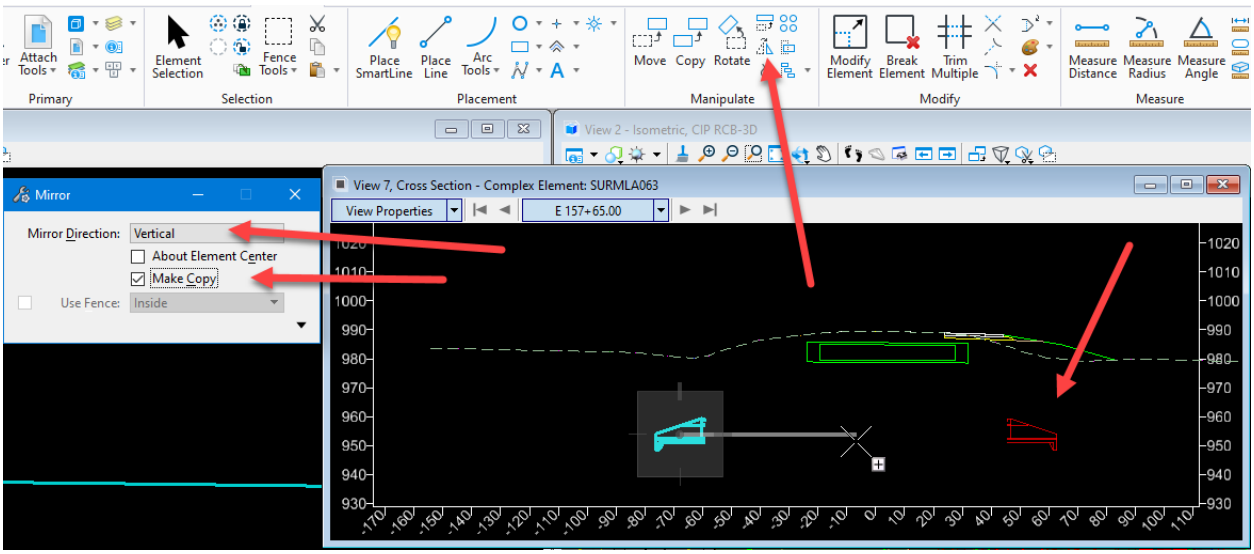


Select Paste from Clipboard. The profile part of the headwall cell should appear on the end of the cursor in that view. Datapoint to place the cell.

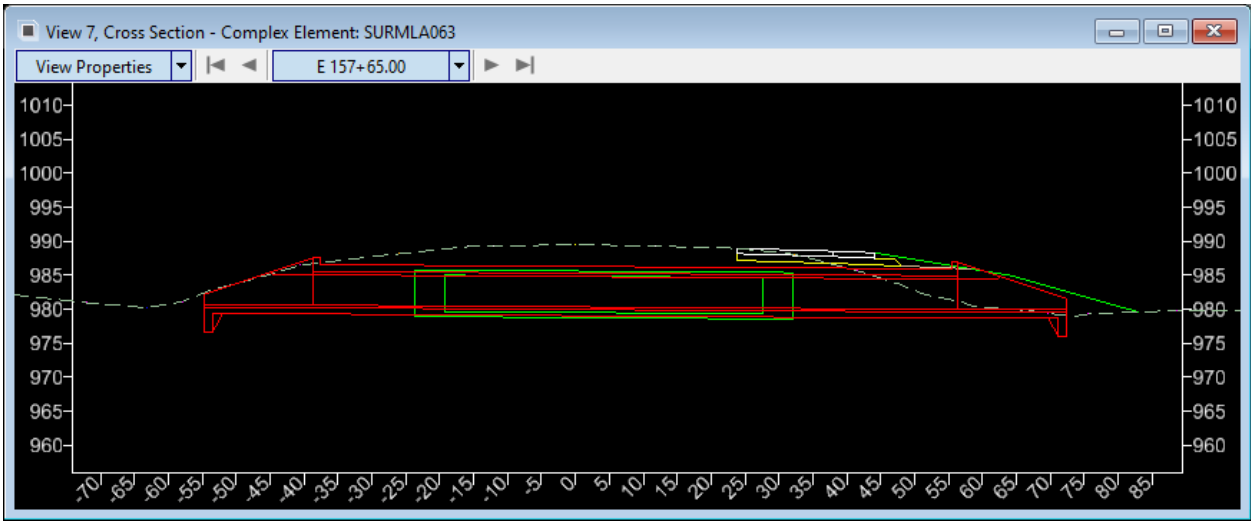


This was done to provide a copy of the profile part of the headwall cell in the Cross Section Dynamic view window that will be used to determine the invert locations of the structure. These are intended to be used as temporary graphics and will remain in this view no matter what section is cut until deleted. Once done using them it is good practice to delete them.

Next, select the profile part of the headwall cell that was just placed in the Dynamic Cross Section view with the element selection tool. Use the Mirror tool, set it to Vertical direction and toggle on Make Copy to make the cell for the other side of the structure. This is used to determine the invert locations at the other end of the structure.



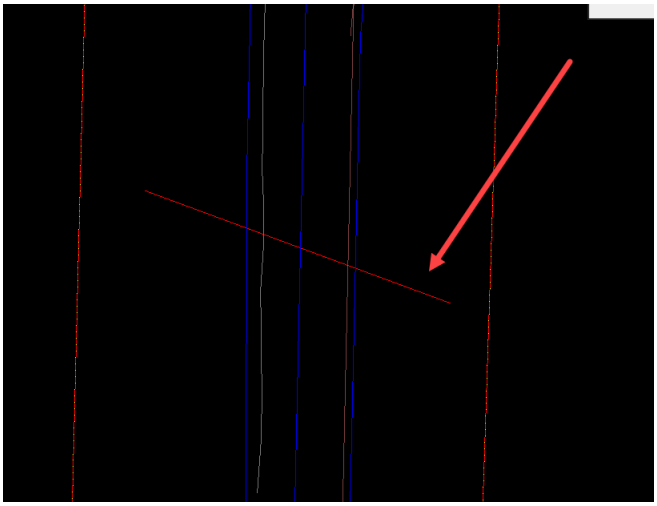
These graphics can be moved and placed anywhere they are needed to design the new structure.



If designing a structure that is not perpendicular to the alignment, use the second method of Designing in the Profile Window.

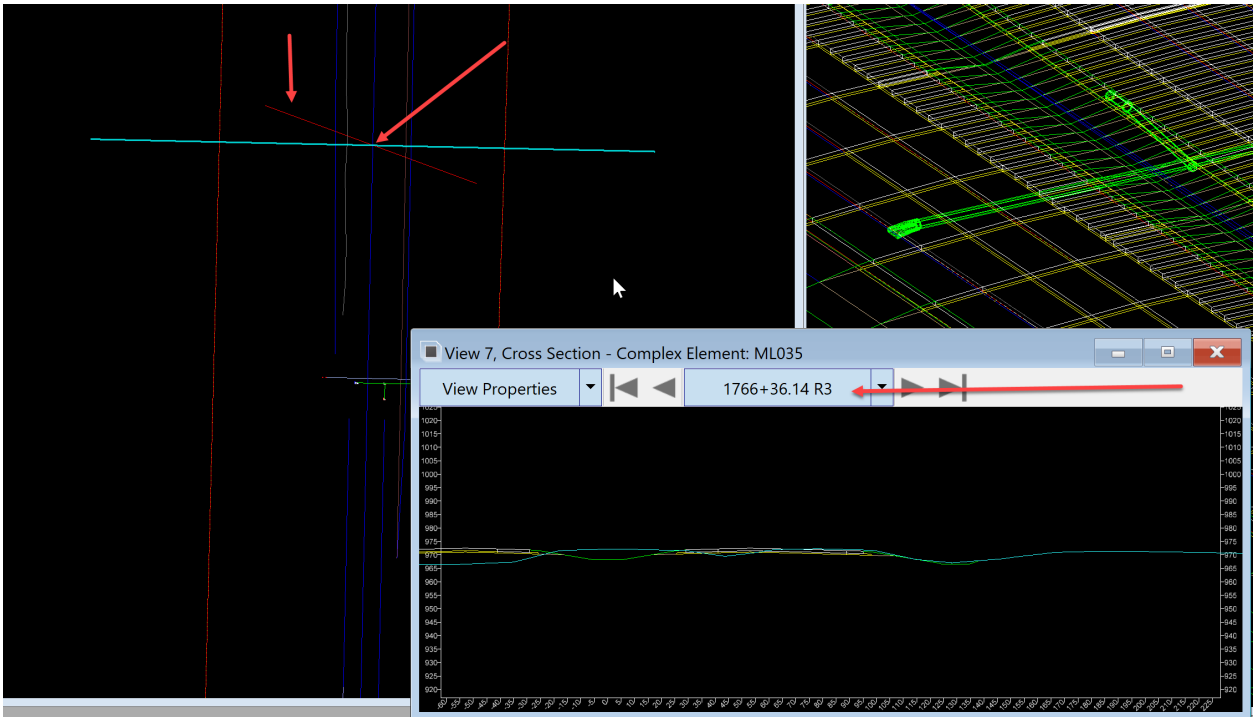
Second Method

Designing in the Profile Window - To start, place a line where the structure should be placed.

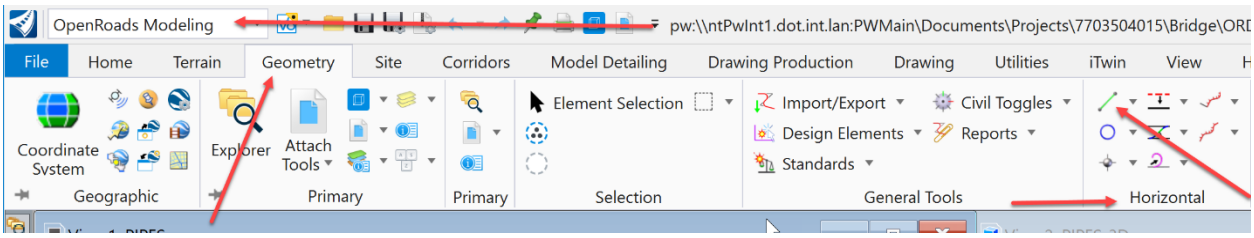


Then, cut a section on that line where it intersects the alignment. This will give us a station value for the new structure.

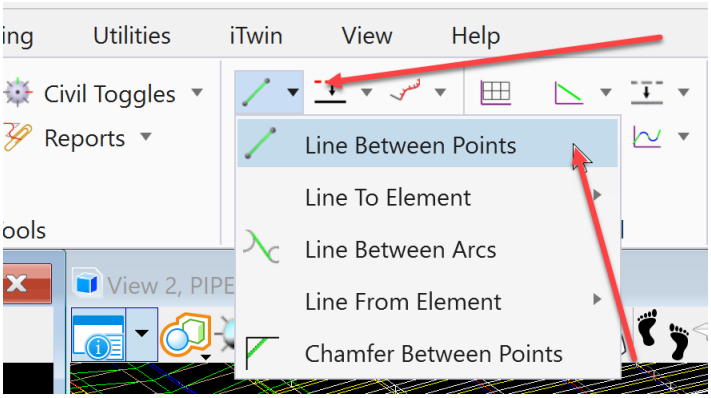
For this example, it will be STA 1766+36.14



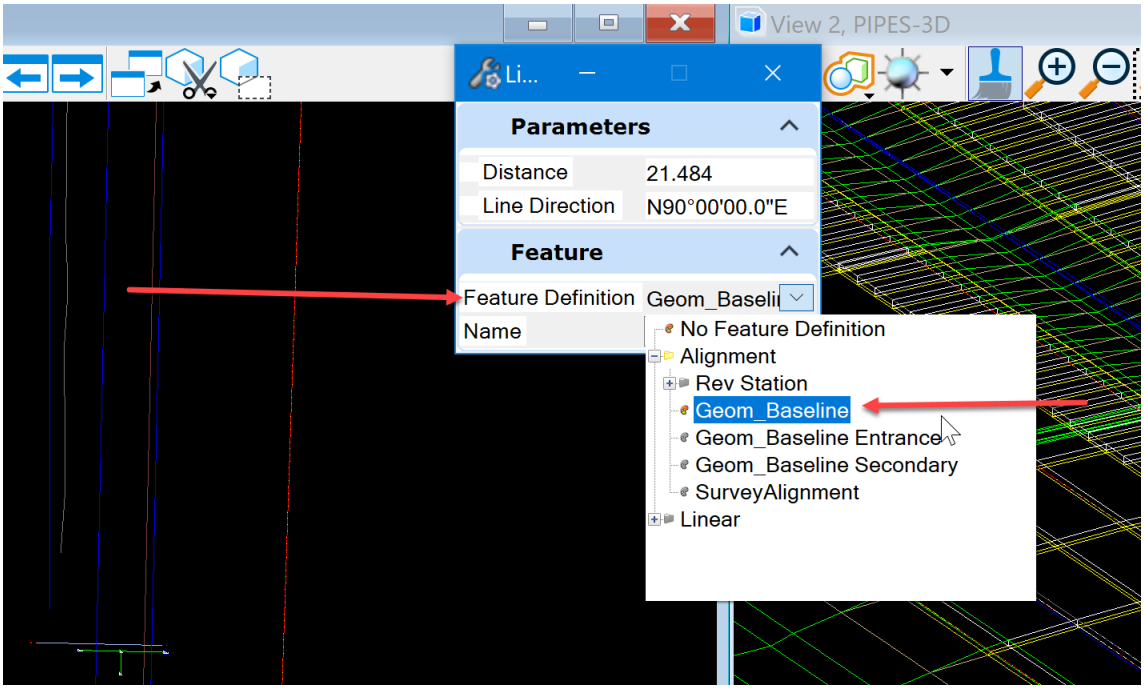
Next, place a geometry base line on the line placed as the structure alignment, the red line in the image above. Change the workflow to OpenRoads Modeling workflow. On the Geometry tab select the Line tools in the Horizontal group.



Select the Line Between Points tool.

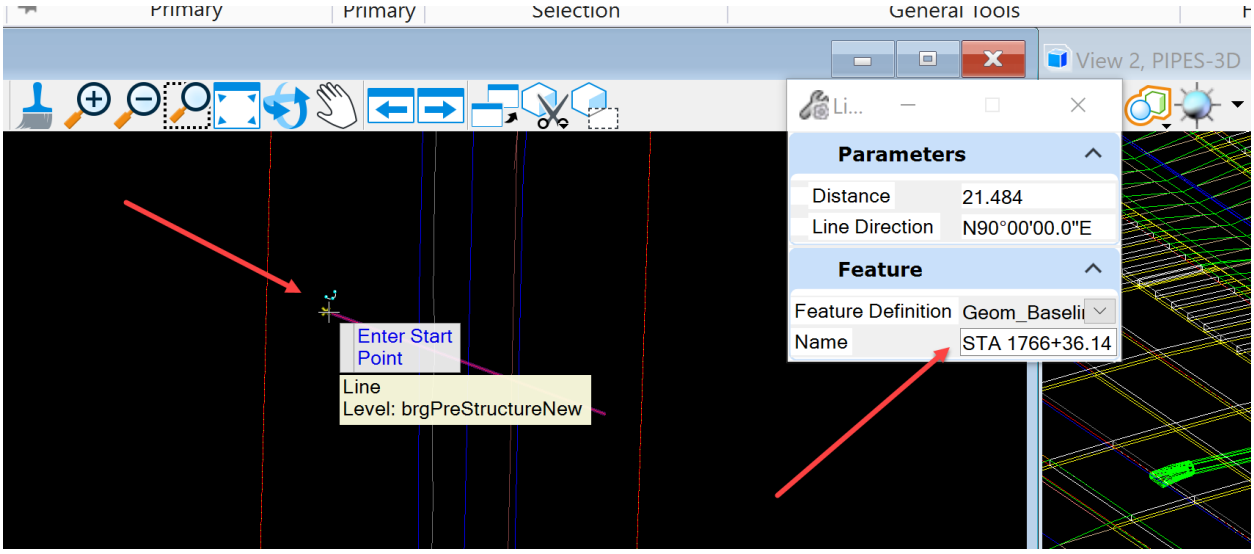


Then set the Feature to Geom_Baseline

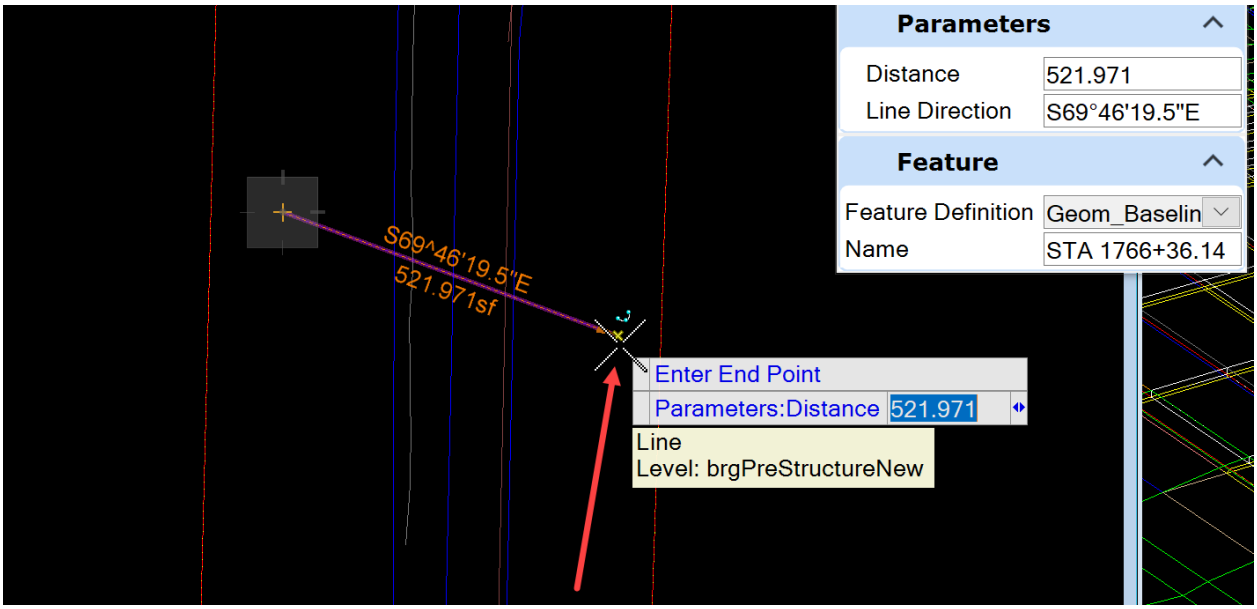


Name the feature as the station location of the proposed structure in the Feature Name field.

For this example, it will be STA 1766+36.14.

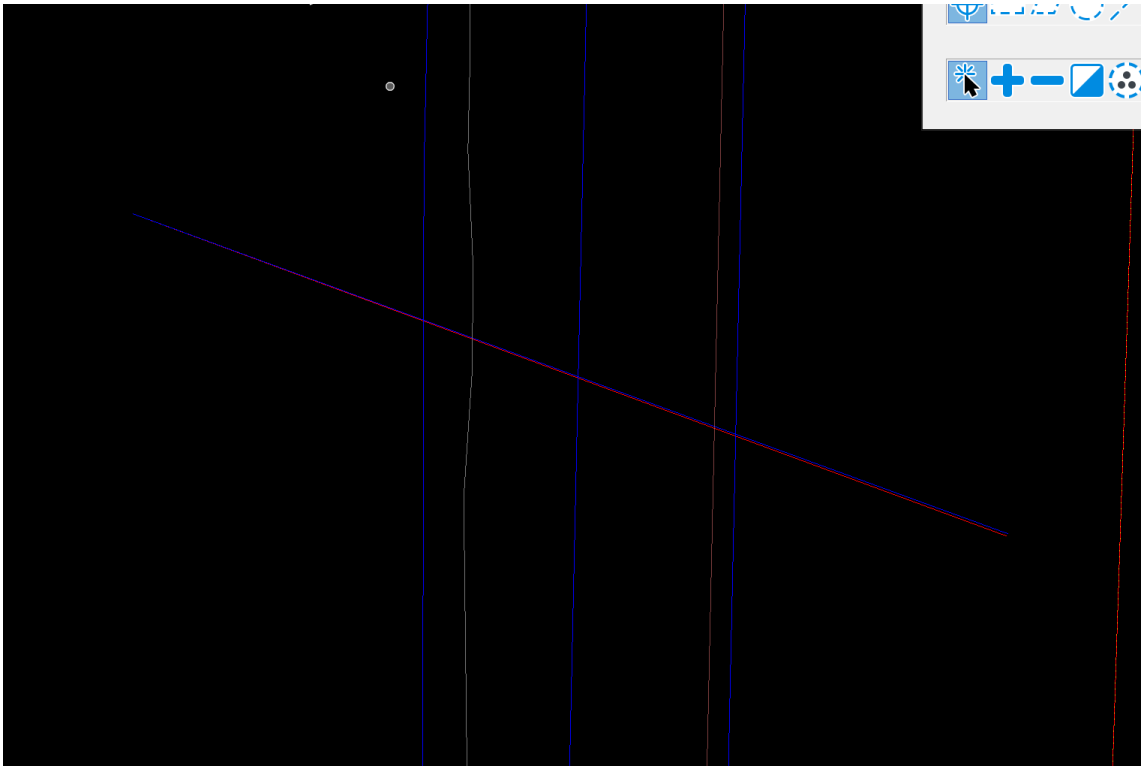


Select a start point by snapping on the end of the line placed as the structure alignment, the red line in the image above.

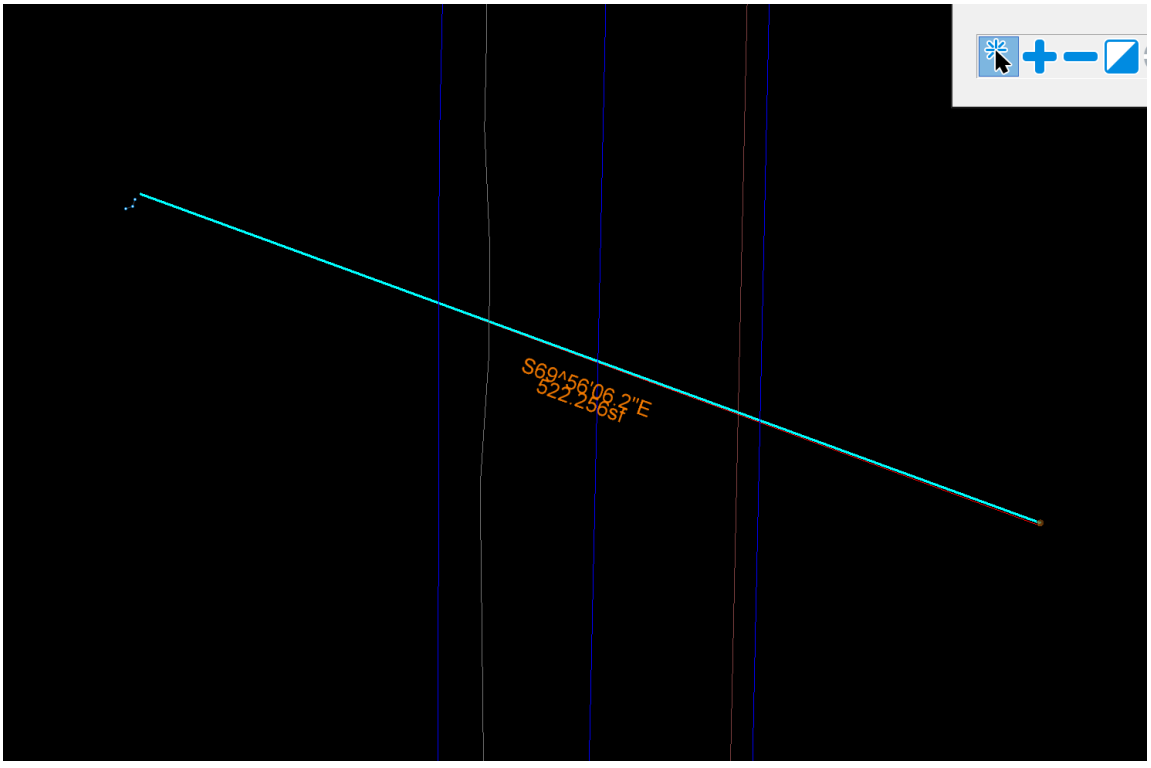


Then enter the end point.

It should look something like this:



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

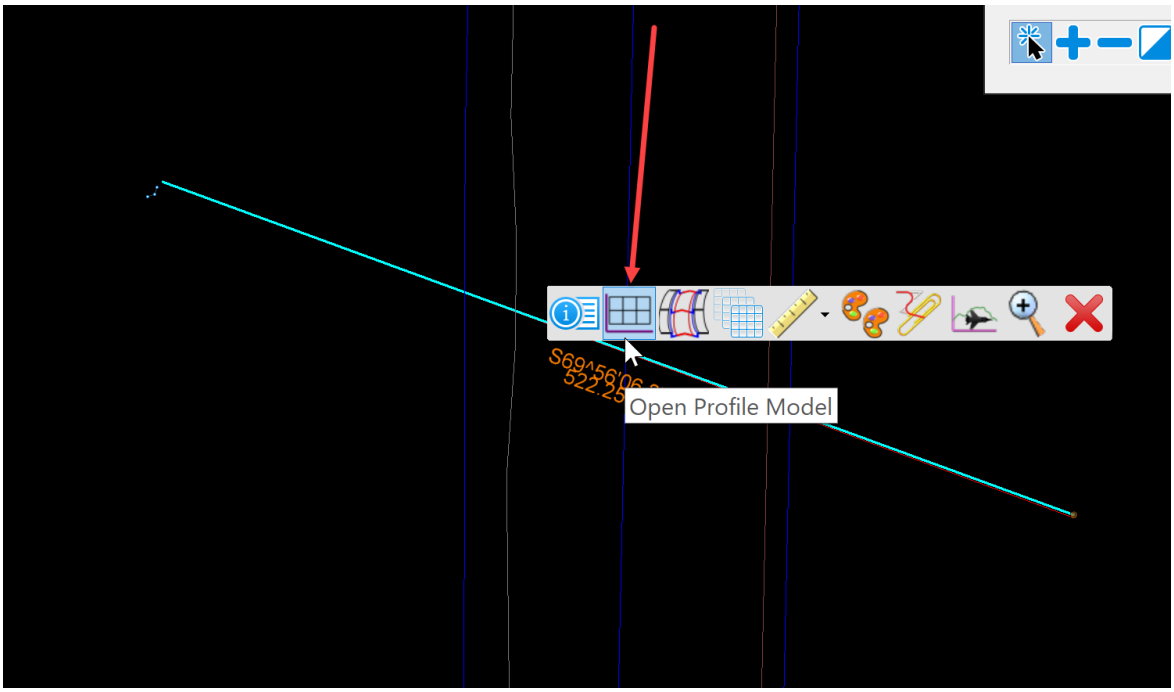


Open a window to view the profile in. The recommendation is to use View 8 for the profile window and View 7 for the cross section window.

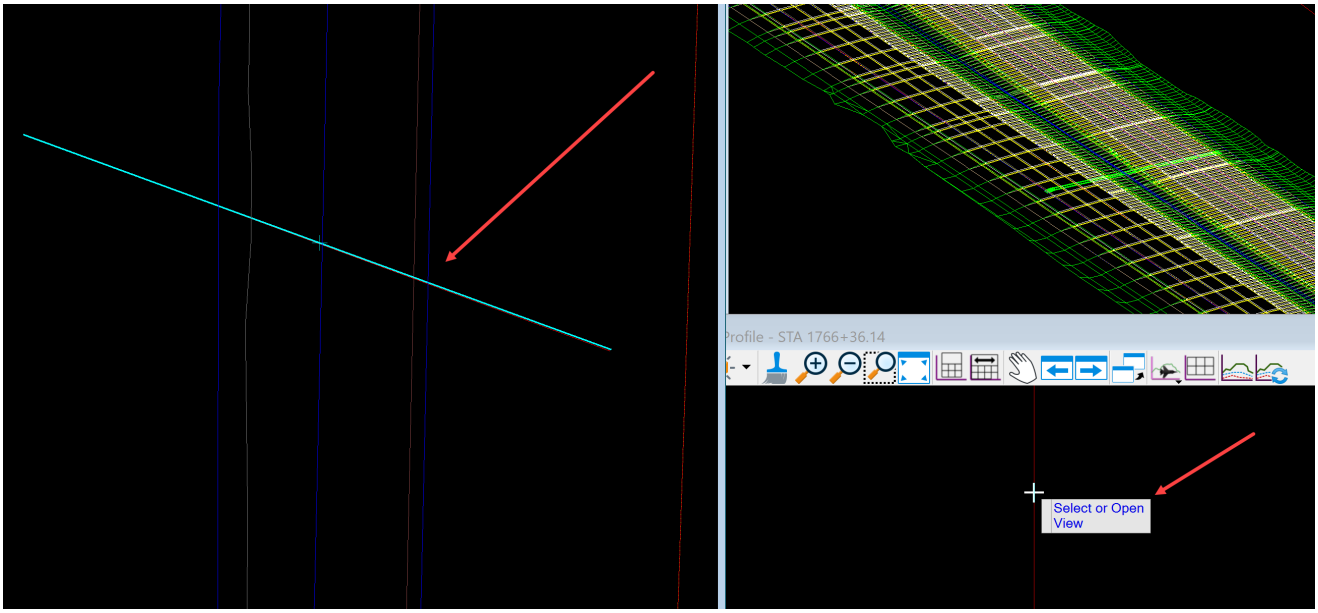
Note: Do not try to use the same window for both.

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.

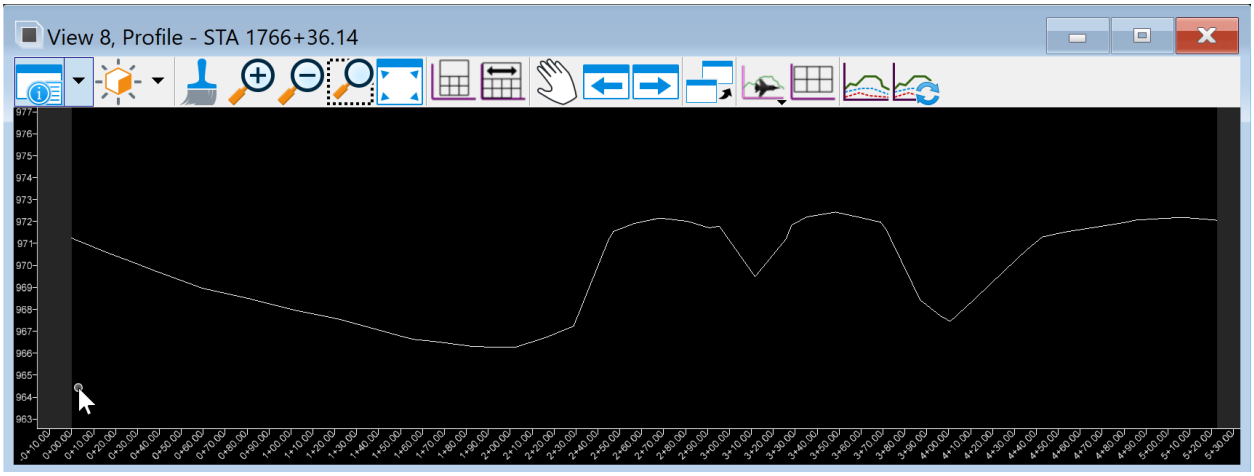
Select the Open Profile Model tool.



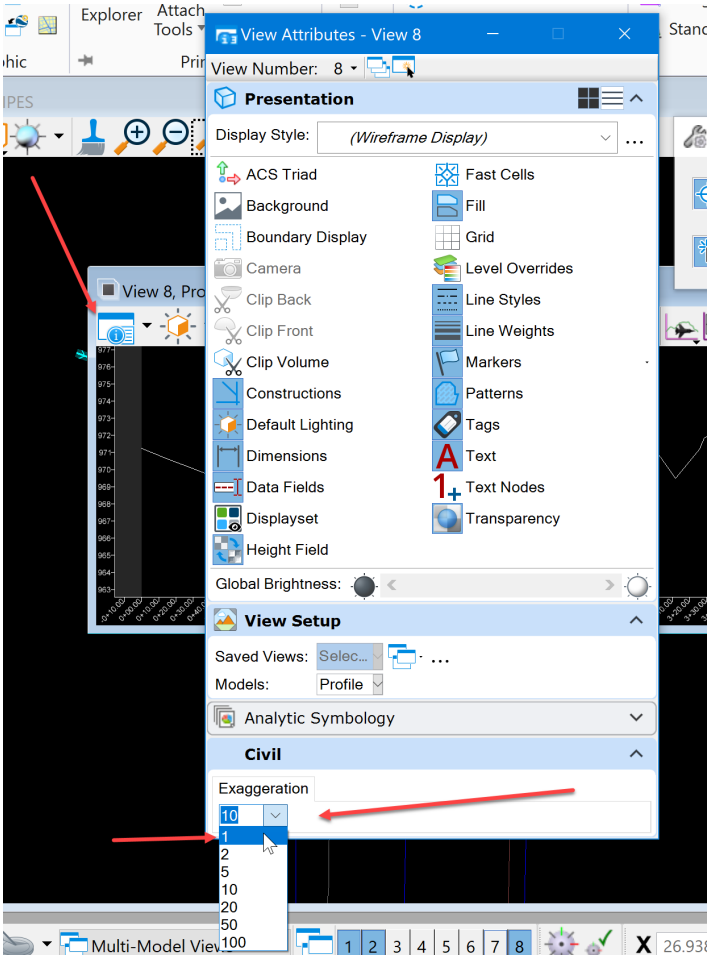
It will prompt to Select or Open View. Data point in the open profile window View 8.



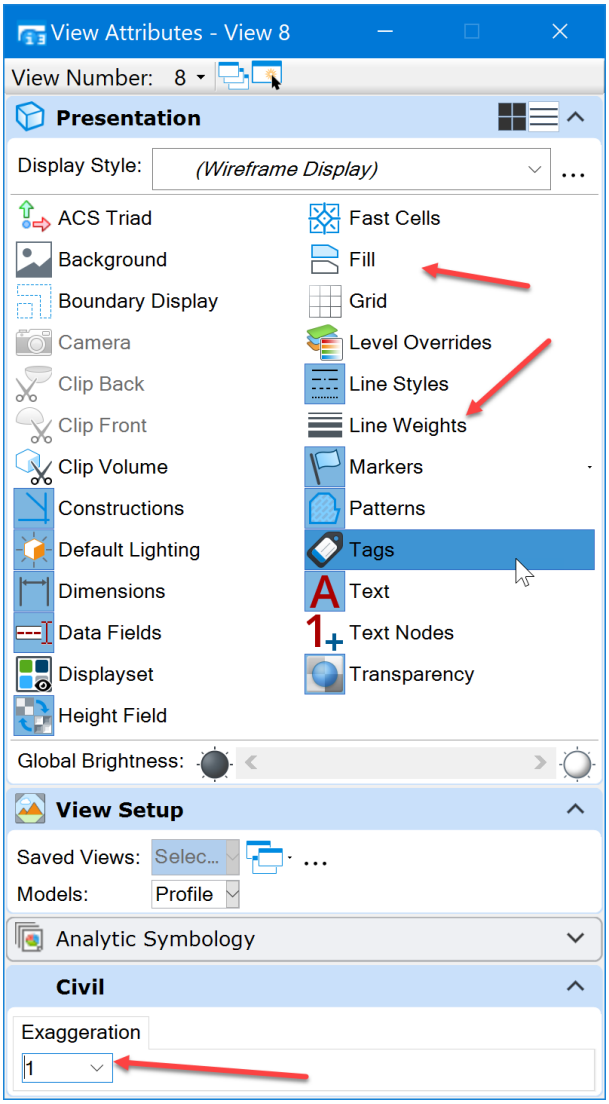
It should look something like this:



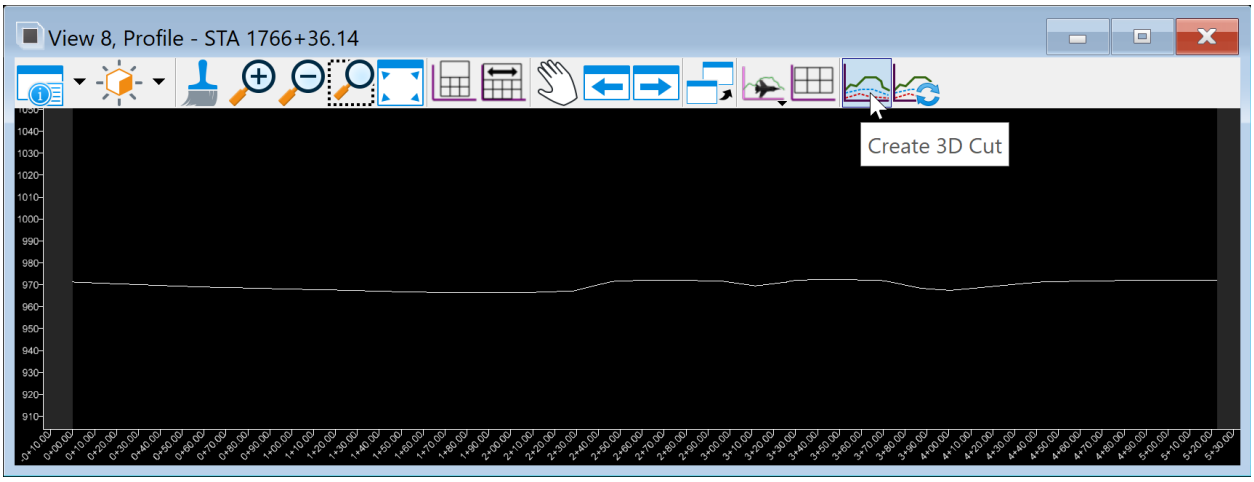
Next, set the exaggeration to 1 in the View Attributes dialog box.



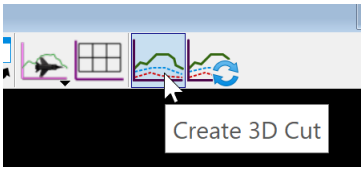
It is recommended to have the fill and line weights turned off.



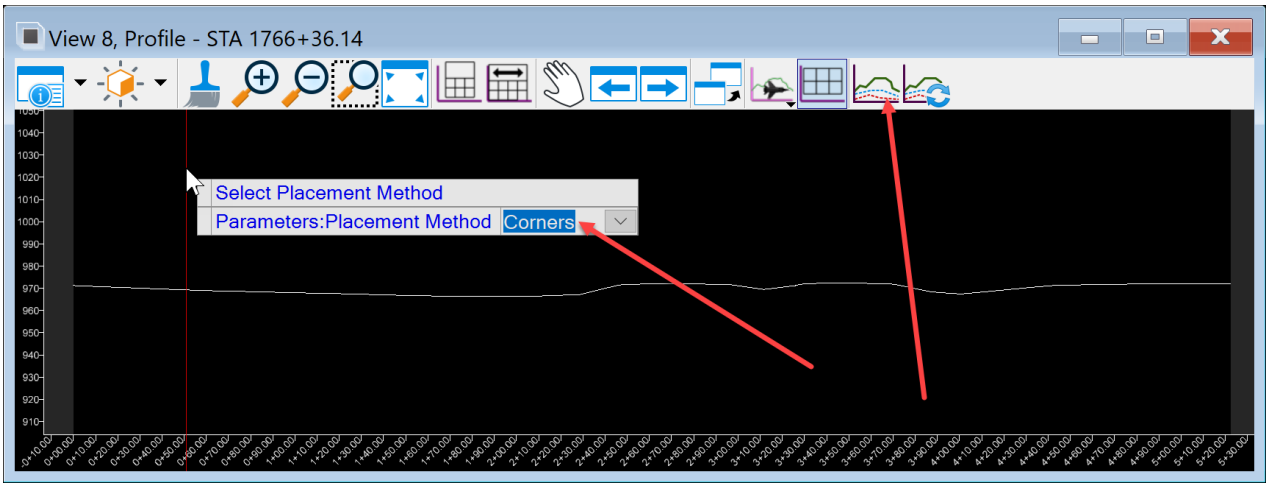
Next, create a 3D cut along this geometry.



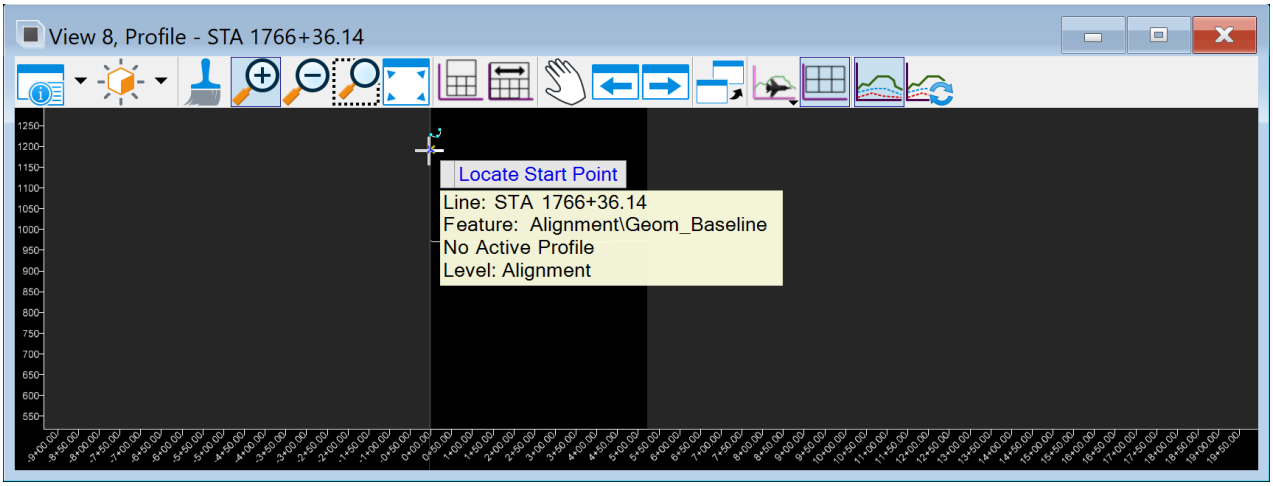
To do this, select the Create 3D Cut tool.



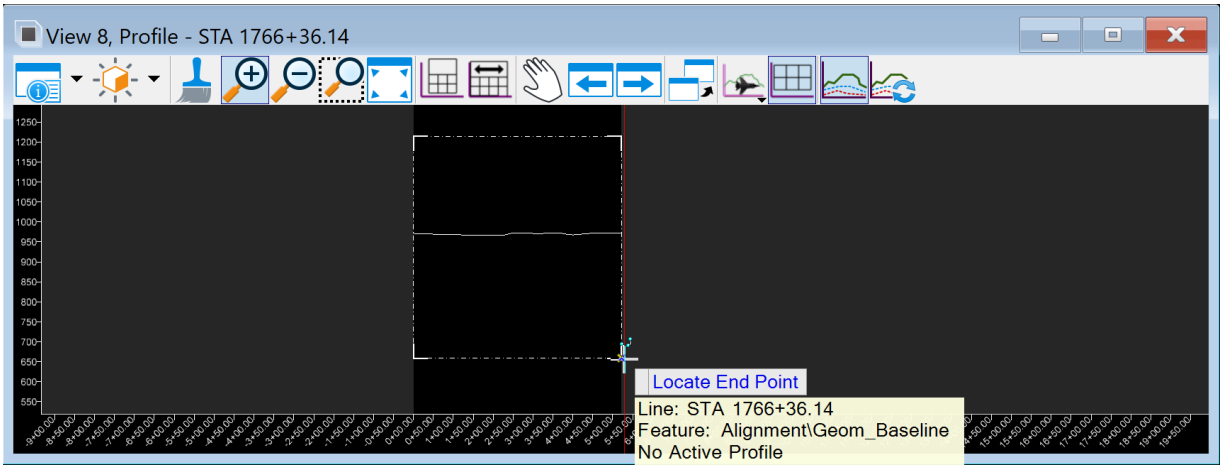
Use the Corners method. Data point to accept the method.



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

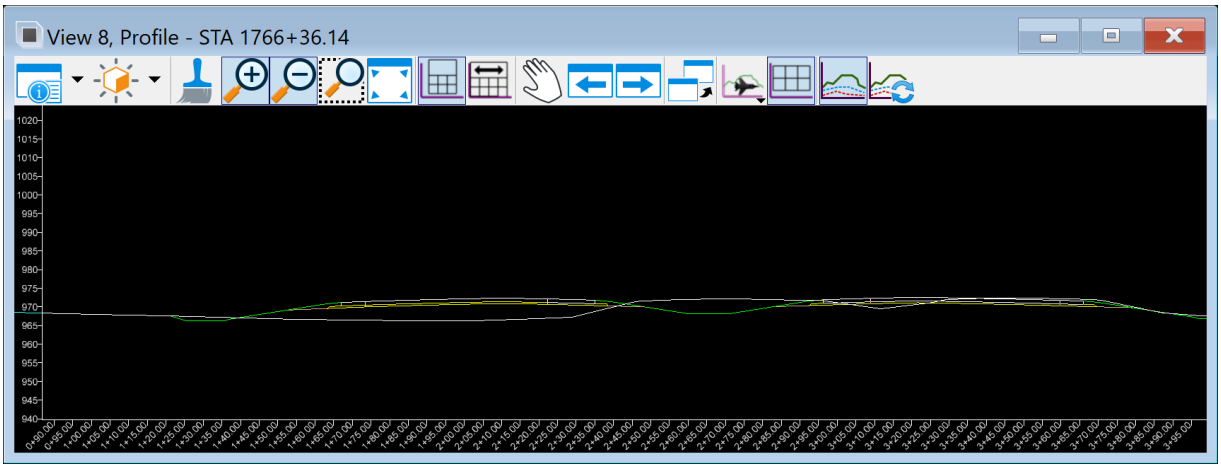


After the data point, it will start drawing a box in the view that the 3D cut is in.



Data point the end point to complete the 3D cut.

It should look something like this:



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

To do this, follow the same steps used in the first method to get the headwall cell into the Dynamic Cross Section view. Move headwall cells to correct design standards locations.

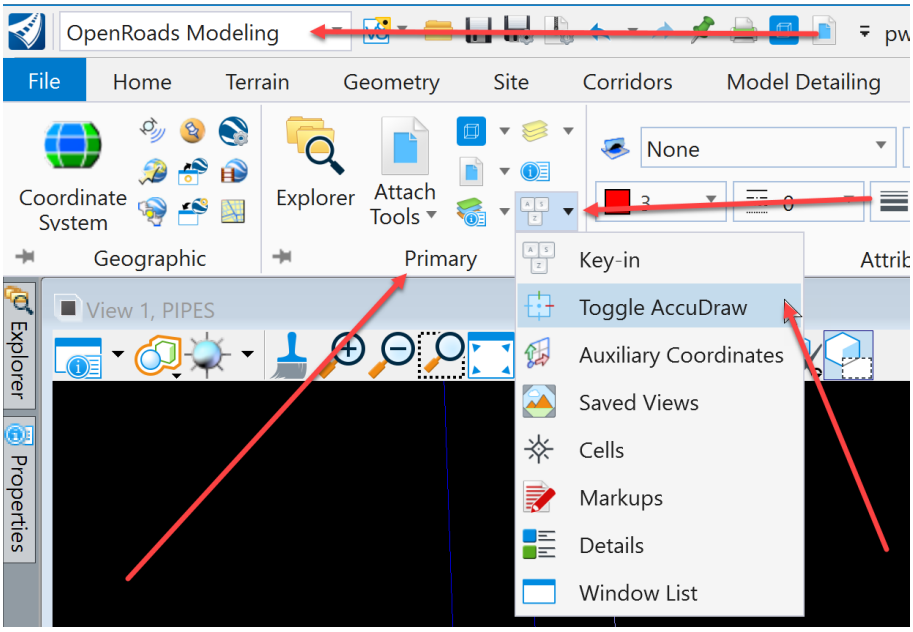
Next, measure the distance and adjust this line between the headwall cells to make it be an even 1' interval.

Once the structure design is as desired, then record the invert elevations and offsets of each key point.

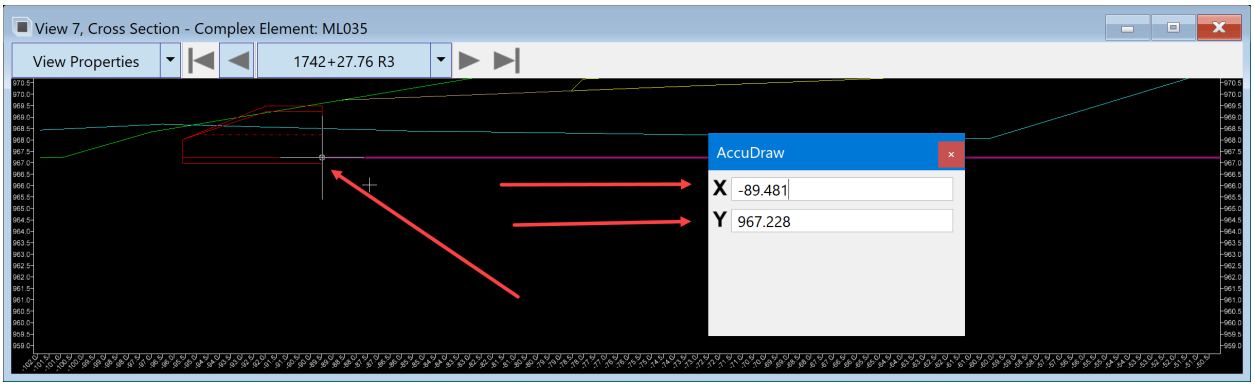
If using the ASCII graphics input file method demonstrated in these instructions, that is the location to record that information. For more information about the ASCII graphics input file, please refer to CW03_ASCII Graphics Import Input File chapter.

To record the invert elevations and offsets of each key point, make sure the AccuDraw is toggled on.

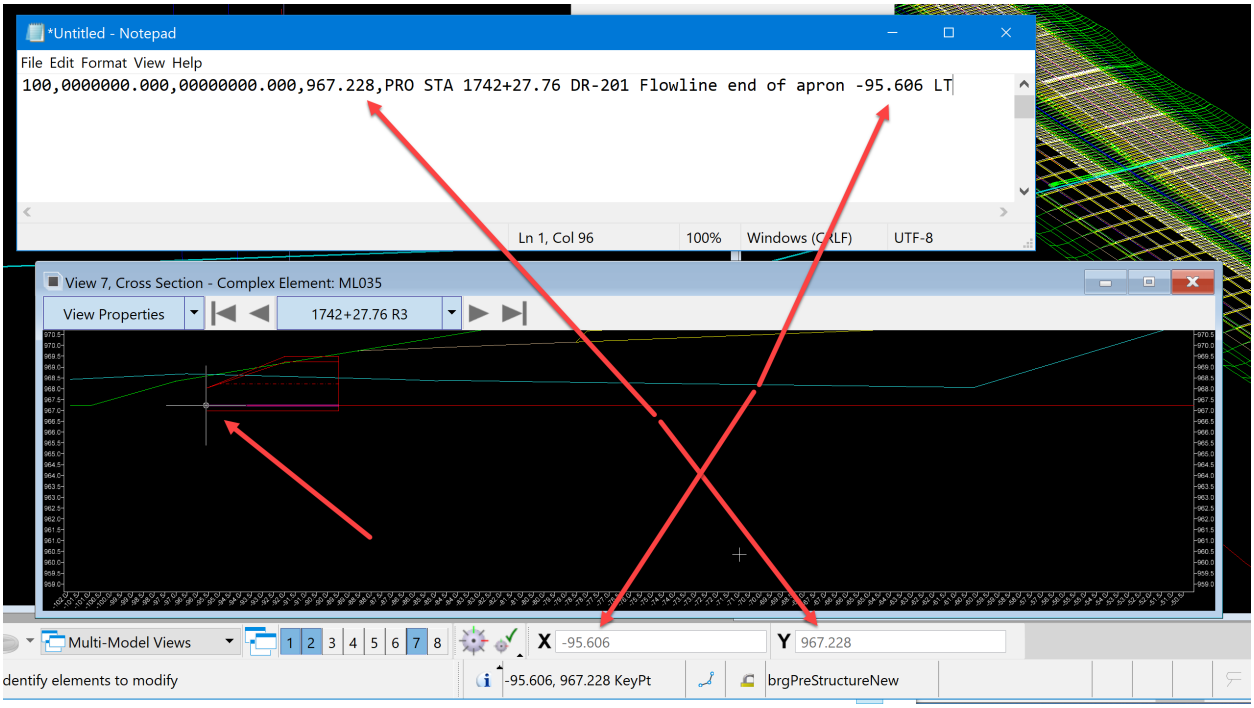
Note: AccuDraw toggle is located in the Primary group on the More tool pulldown.



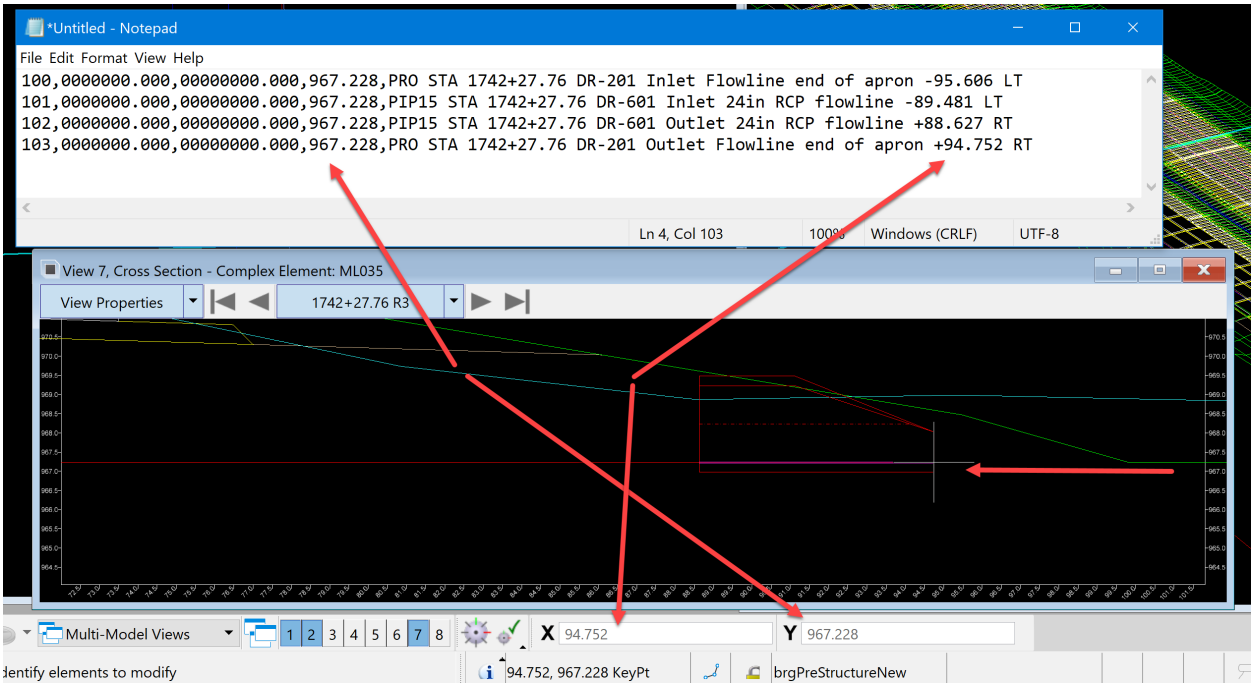
Then snap to each key point. The AccuDraw coordinate readout box will display each point coordinates. The X = offset and the Y = elevation.



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



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

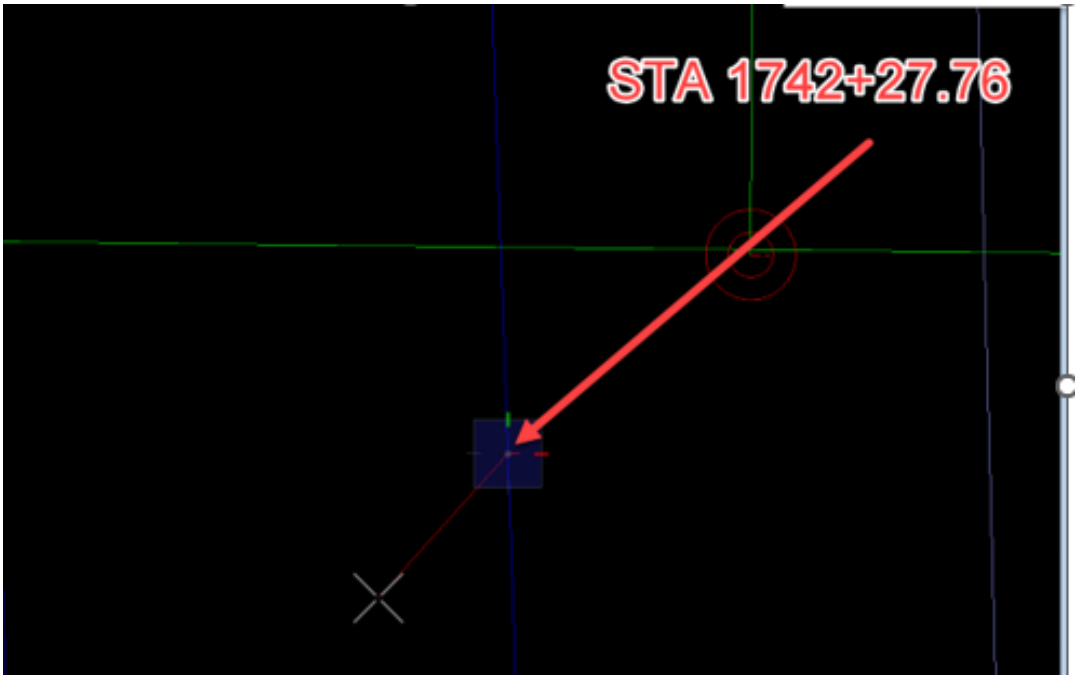


Once all the values are recorded, calculate the X and Y coordinates. Use Civil AccuDraw or standard AccuDraw.

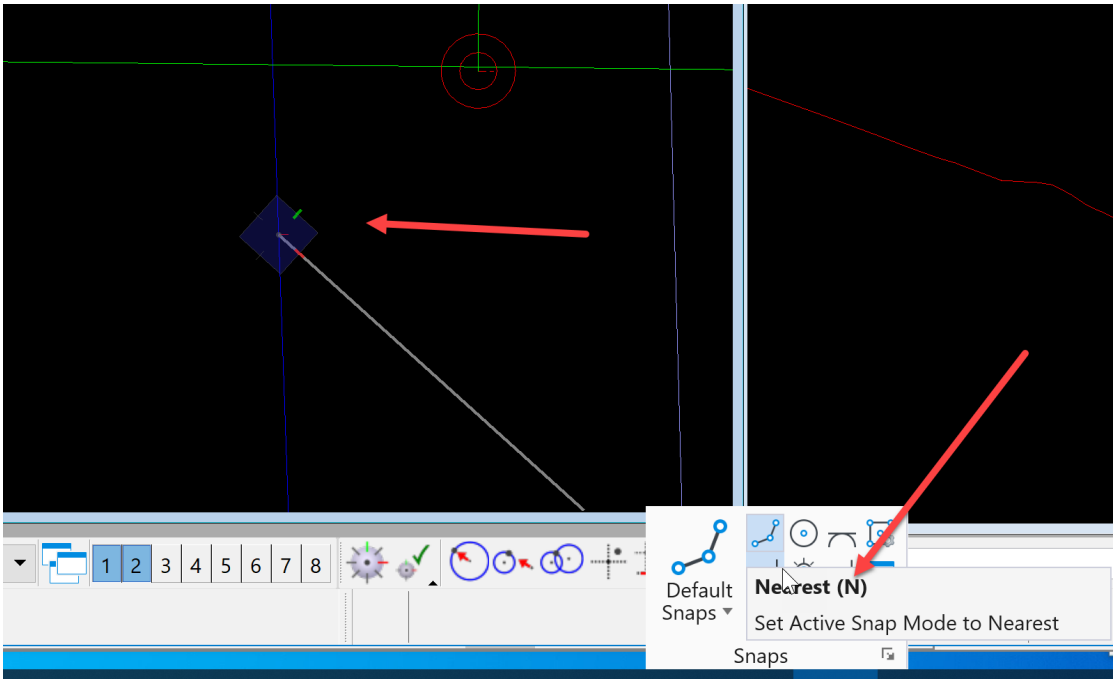
Note: When using Civil AccuDraw make sure standard AccuDraw is turned off before toggling on Civil AccuDraw. MicroStation does not perform well with both toggled on at the same time.

The standard AccuDraw method will be covered in another chapter.

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.



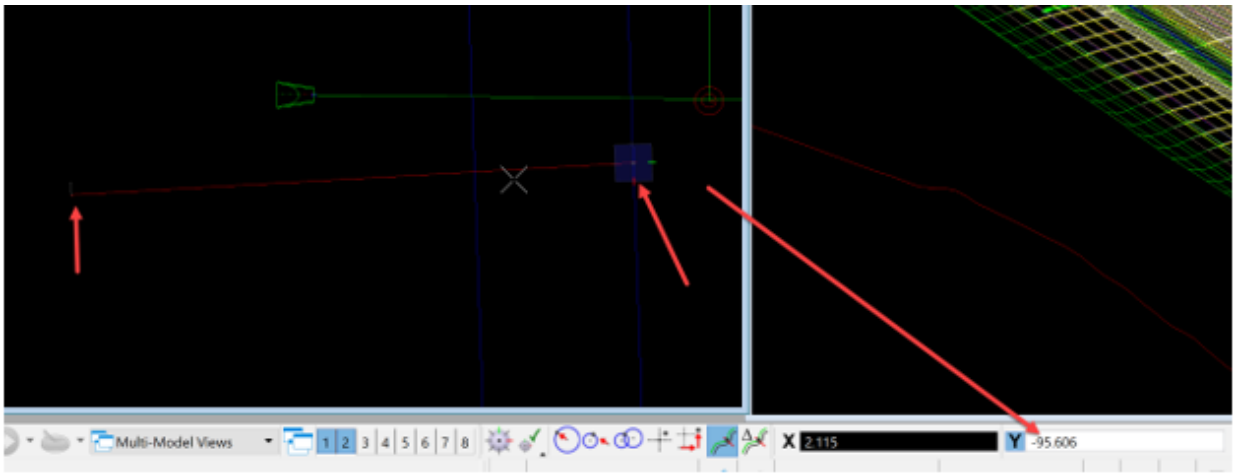
With the line started, type R Q on the keyboard to rotate quick the AccuDraw compass. Then with a Nearest snap, snap to the alignment.



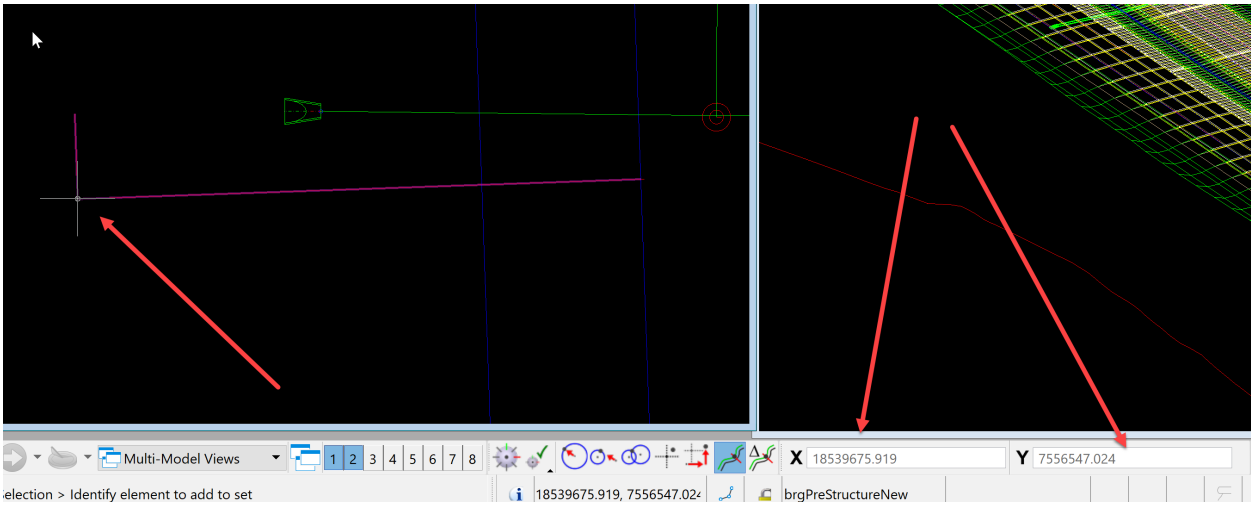
This will rotate the AccuDraw compass so that it is set to the alignment's axis. Pull the line in the direction needed to calculate the coordinate and type in the distance of the offset of that point.

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.

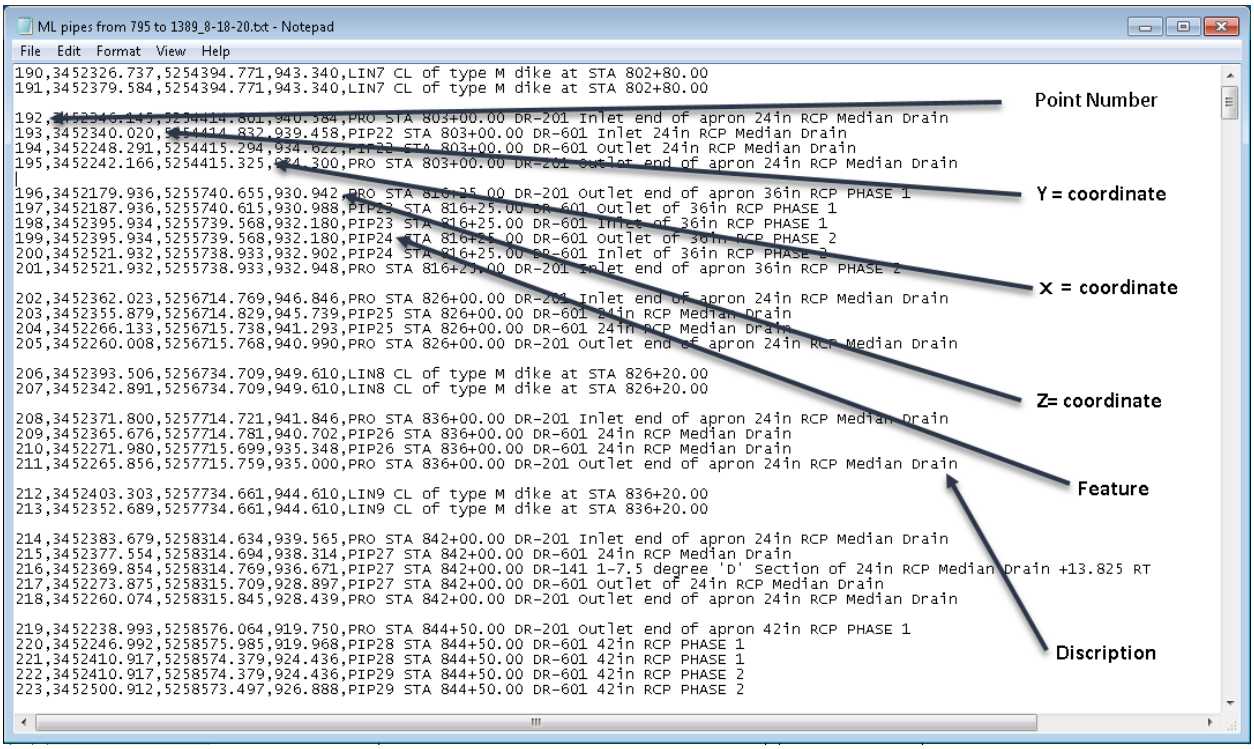
Then place these coordinates in the ASCII graphics input file. Repeat this process for each input point.

ASCII Graphics Import Input File

Once the invert coordinates of the culverts to be modeled are determined, there are two options to place it. 1st is with Civil AccuDraw; 2nd is with the ASCII graphics.

The format of the ASCII graphics input file will be covered first. In a Notepad 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 ASCII file. It is a good idea not to repeat it per project either. 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 survey feature for pipes. To make each feature unique, add a number to the feature so that the application knows what features points should be connected.

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. A space between it and the feature is used instead. Also, 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 ASCII 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
```

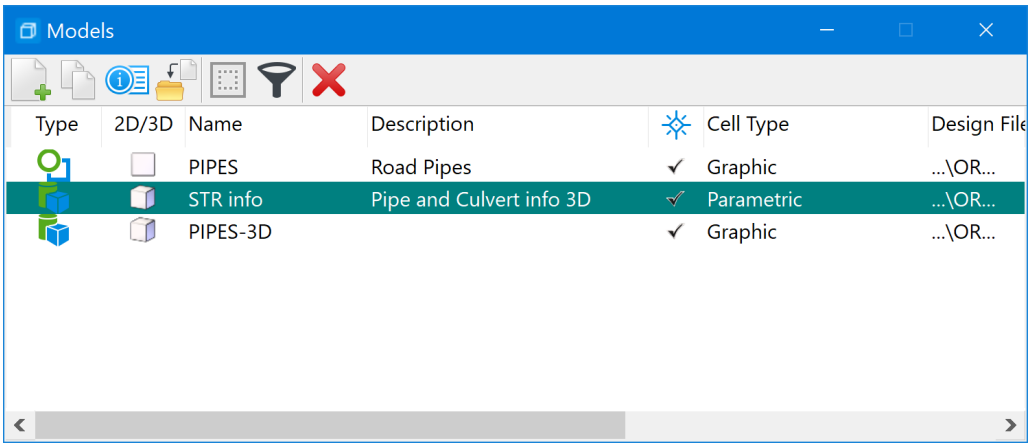
Once the input file is complete then it can be loaded in the application file.
CW04_Loading_ASCII Graphics Input File into ORD File.

Loading the ASCII Graphics Input File into ORD File

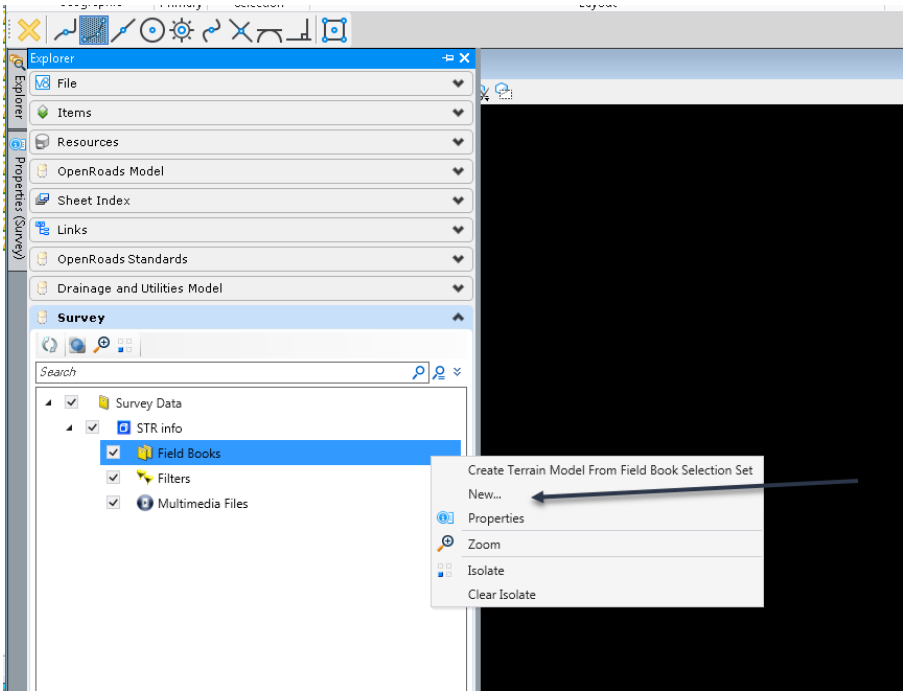
These instructions were created on 3/23/2021. These instructions were created with:

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

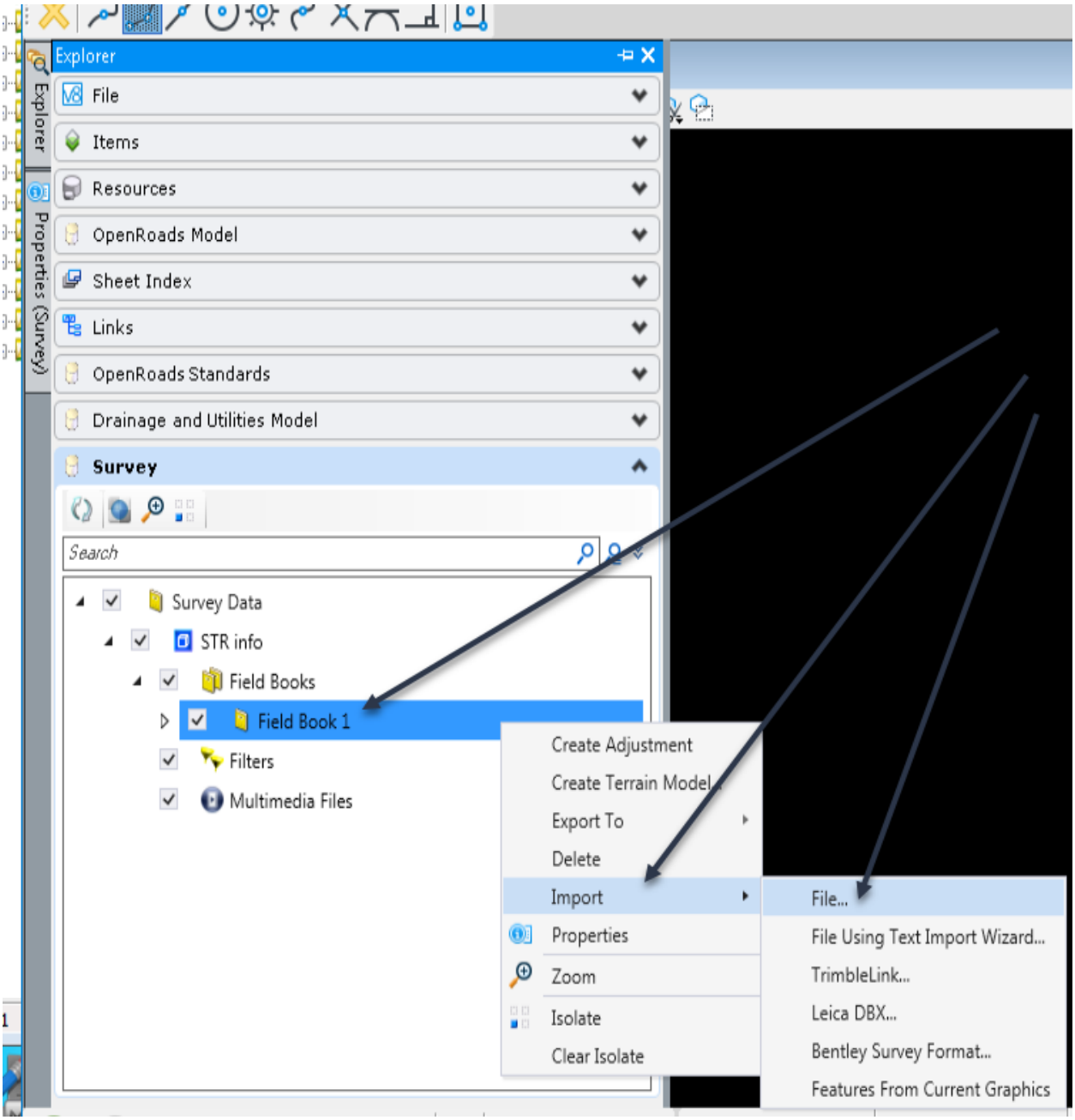
Once the ASCII graphics input file is done then the file is ready to load in the OpenRoads Designer file. With the file open, go to the Models dialog box and select the STR info to make it the active model.



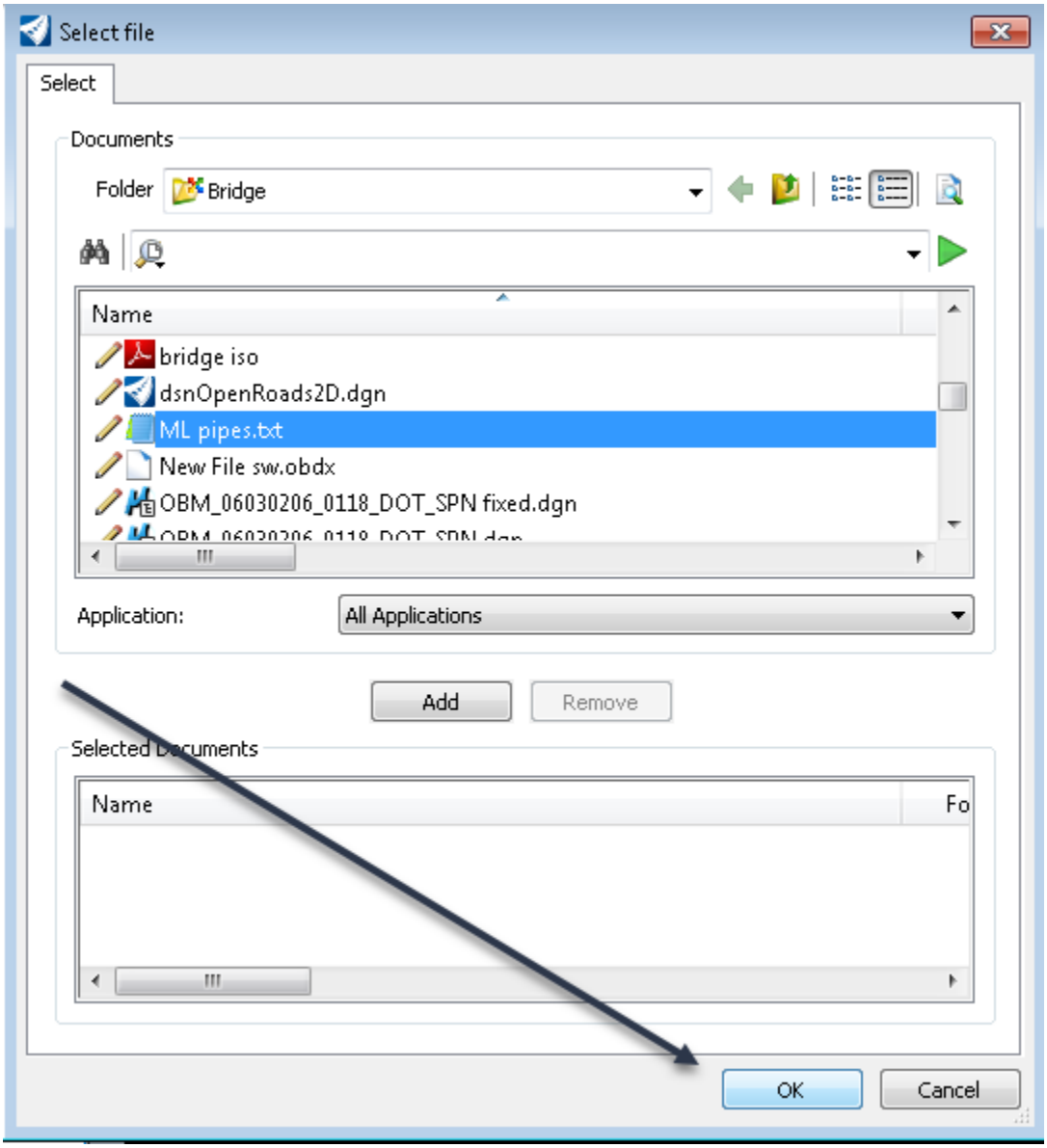
In Project Explorer under the Survey tab select Field Books under STR info, then right click and select New. The name of the Field Book is automatic using a sequential number starting with 1. This will make a new field book that will be used to load the ASCII graphics input file that contains the invert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



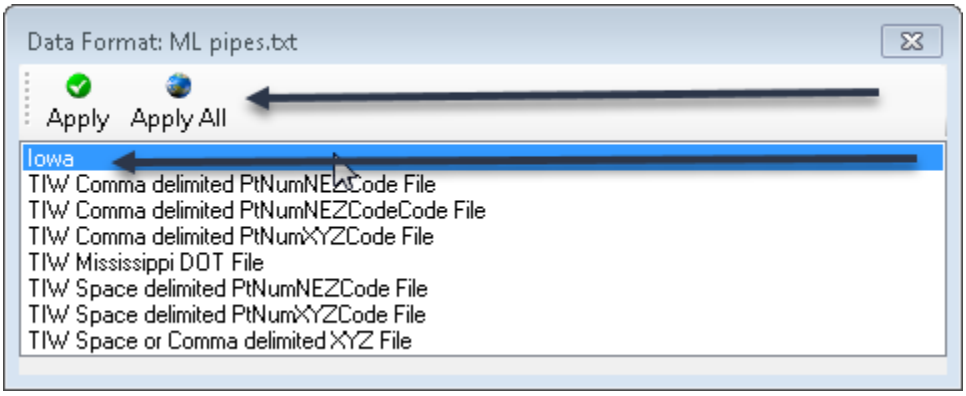
Next select the new field book, then right click and select import. Select the ASCII graphics input file that was created.



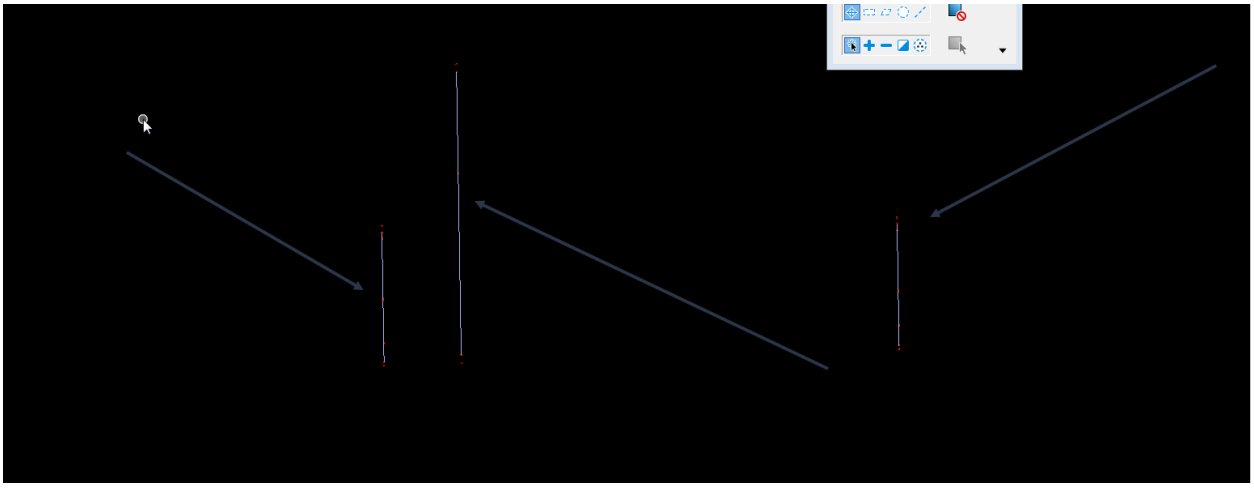
Then browse to where the Survey input file that contains the invert coordinates is stored. Click OK.



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



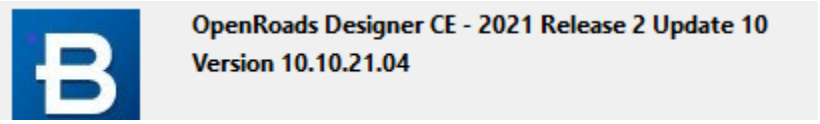
This will map all the points and lines in the survey input file.



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

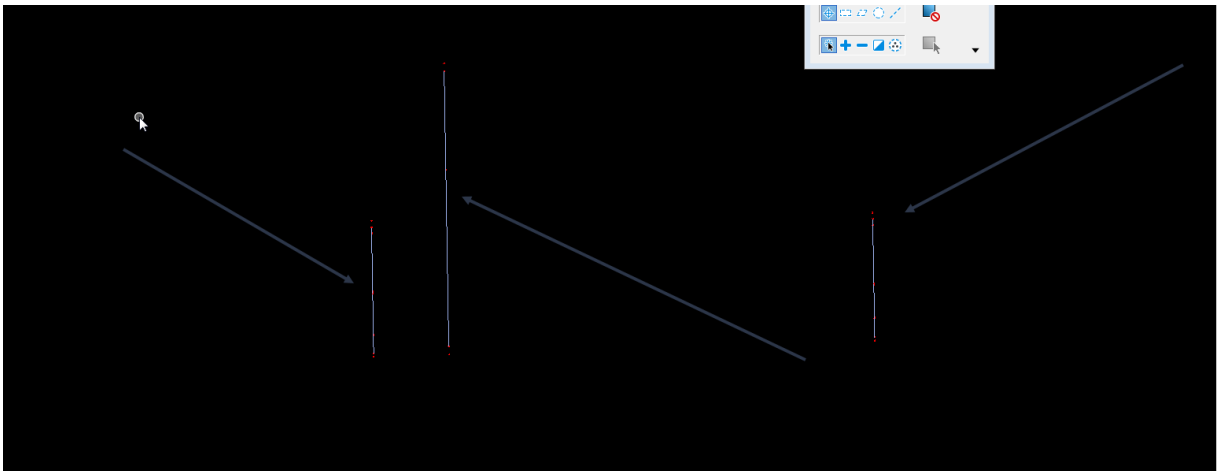
How to place Box Culverts with the Drainage and Utilities tools Connect Edition

These instructions were created July 2023. These instructions were created with:



Reference everything that will be used to design the structure, all the source information that will be needed and/or wanted displayed on the TSL sheet in the plan view. The TXT_CCRRRPPP.dgn file from the Design folder will be needed to get the station and tick marks for the alignment. For more information on this, please refer to CW01_Setting up ORD File for Drainage Design.

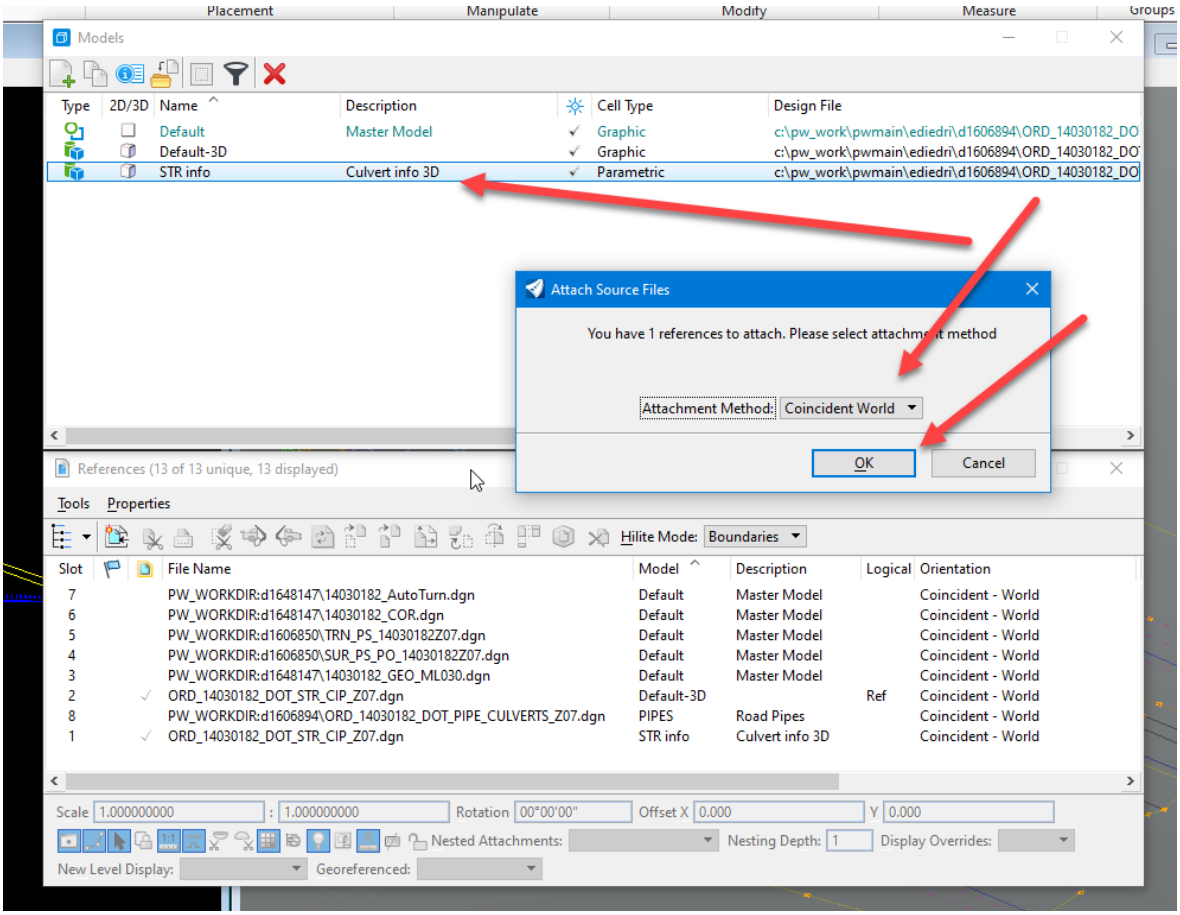
Once the invert coordinates of the RCB to be modeled are determined, there are two options to place it. Place nodes with civil AccuDraw or ASCII graphics. The method used in these instructions will be the ASCII graphics file. Refer to CW04_Loading_ASCII Graphics Input File into ORD File for the instructions on importing this information.



Once the points and lines from the ASCII input file are loaded, then verify that the locations are correct. At this point, you are ready to start creating the structures.

Open the correct model that the RCB will be modeled in and reference in the STR info model.

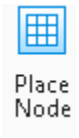
For this example, a CIP RCB will be modeled so it will be placed in the file named ORD_CCRRRPPP_DOT_STR_CIP_ZZZ.dgn. Refer to the CONNECT Seed Files and the CONNECT Models for more information on correct file naming and structure of the files. The modeling should always be done in the Bridge folder.



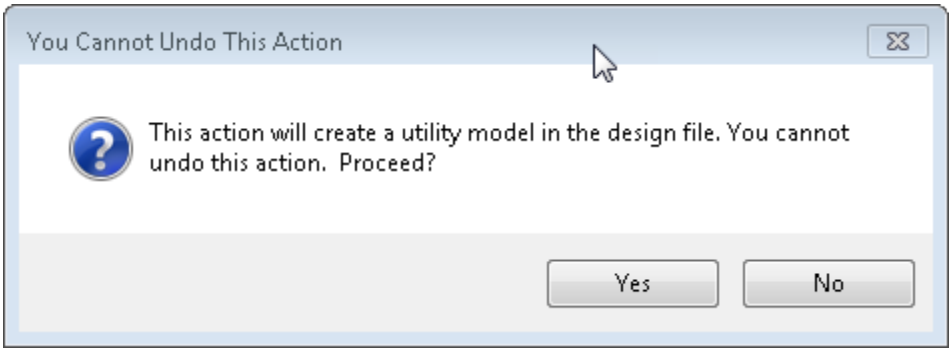
In the Default 2D model, create the structures.

Note: Creation of the structures needs to be done in the 2D model not the 3D model.

Activate the utility model by clicking on the Place Node tool on the Drainage and Utilities workflow on the Lay out tab.



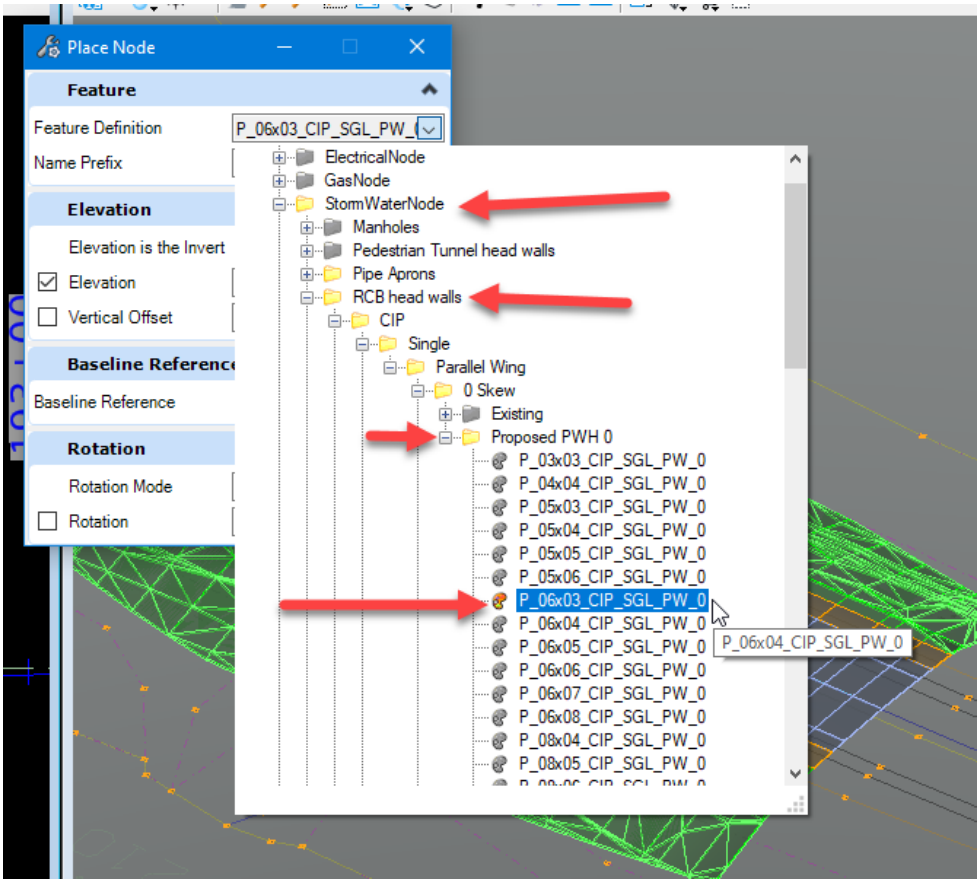
A warning will display.



Click Yes button. This will create the utility model database that will store all the utility information.

Next, start placing the headwalls. With the STR info model referenced to the CIP model, select the Place Node tool.

Then select the feature of the node to be placed. For this example, place a P_06 x 03_CIP_SGL_PW_0



Use the description field from the ASCII file to fill in the Name Prefix.

06,7450175.351,17517388.285,1172.450,PRO STA 190+72.65 Inlet end of apron 6ft x 3ft Single RCB -63.587 LT Remove existing headwall to face of parapet Extend 19’ RT ditch to inlet. Design#0225

107,7450186.351,17517388.179,1172.450,PIP3 STA 190+72.65 Inlet 6ft x 3ft Single RCB -52.587 LT

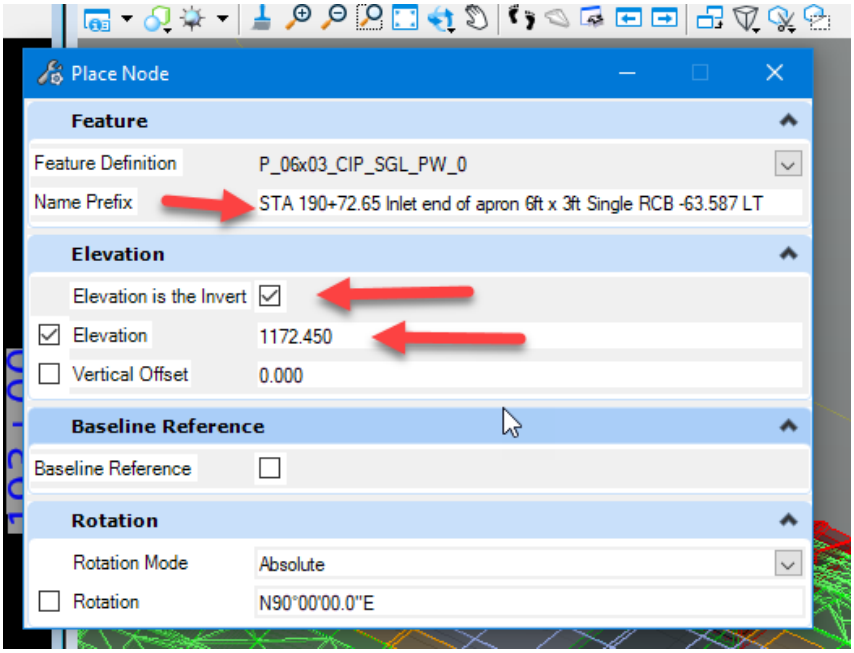
108,7450205.350,17517387.995,1172.450,PIP3 STA 190+72.65 Inlet face of parapet of existing 6ft x 3ft Single RCB -33.587 LT

109,7450261.877,17517387.447,1172.340,PIP4 STA 190+72.65 Outlet face of parapet of existing 6ft x 3ft Single RCB +22.886 RT

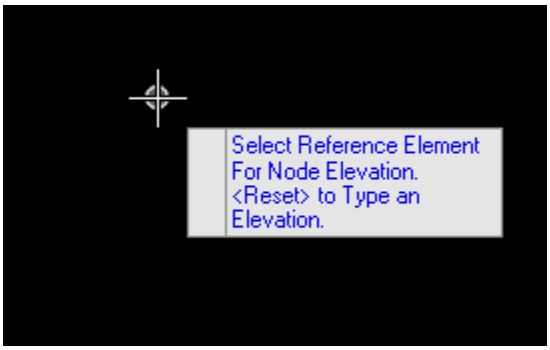
110,7450279.866,17517387.273,1171.732,PIP4 STA 190+72.65 Outlet 6ft x 3ft Single RCB +40.932 RT

112,7450290.866,17517387.166,1171.732,PRO STA 190+72.65 Outlet end of apron 6ft x 3ft Single RCB +51.932 RT Remove existing headwall to face of parapet Extend 18’ LT ditch to Outlet. Design#0225

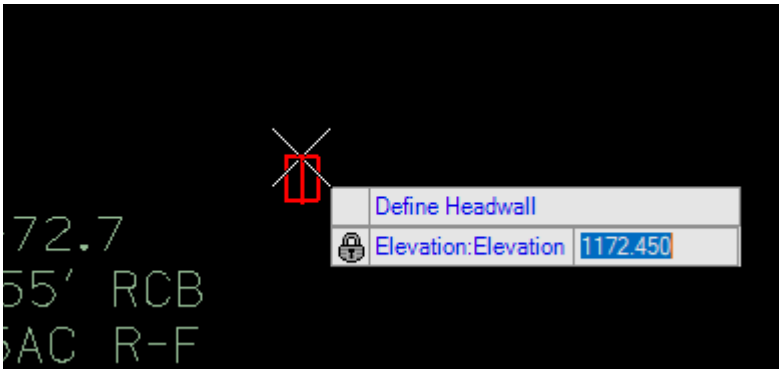
It should look something like this:



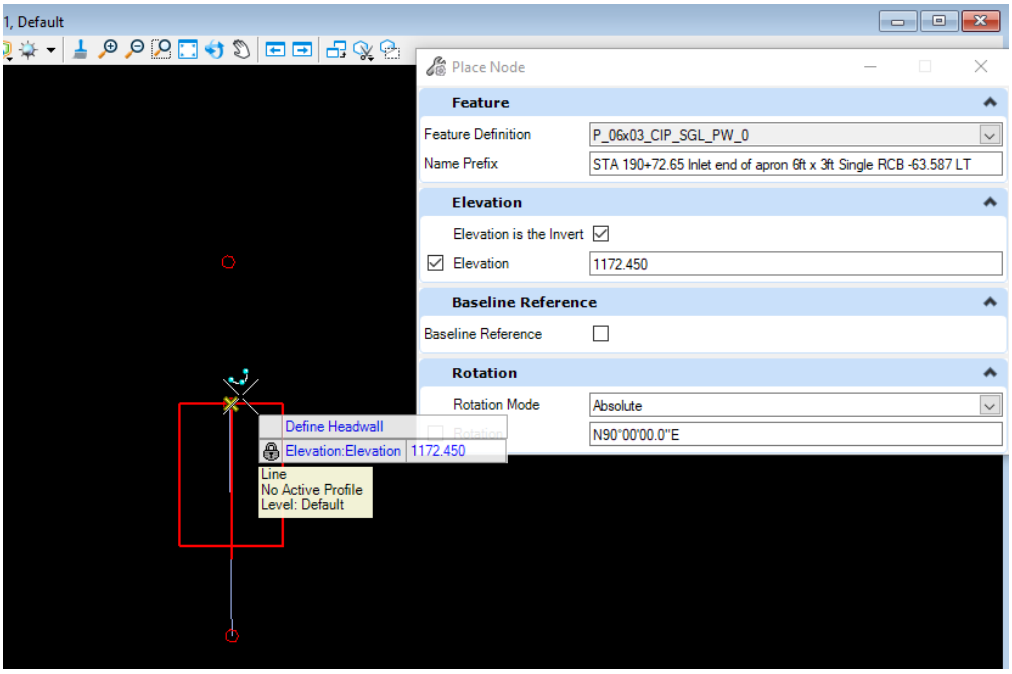
Once that is set, then move the cursor to the 2D view. It will prompt to Select Reference Element or to Reset to Type an Elevation. Reset and type the elevation.



For this example, use 1172.450, the invert flowline elevation of the design structure. Then, hit the enter key and it will lock this elevation.

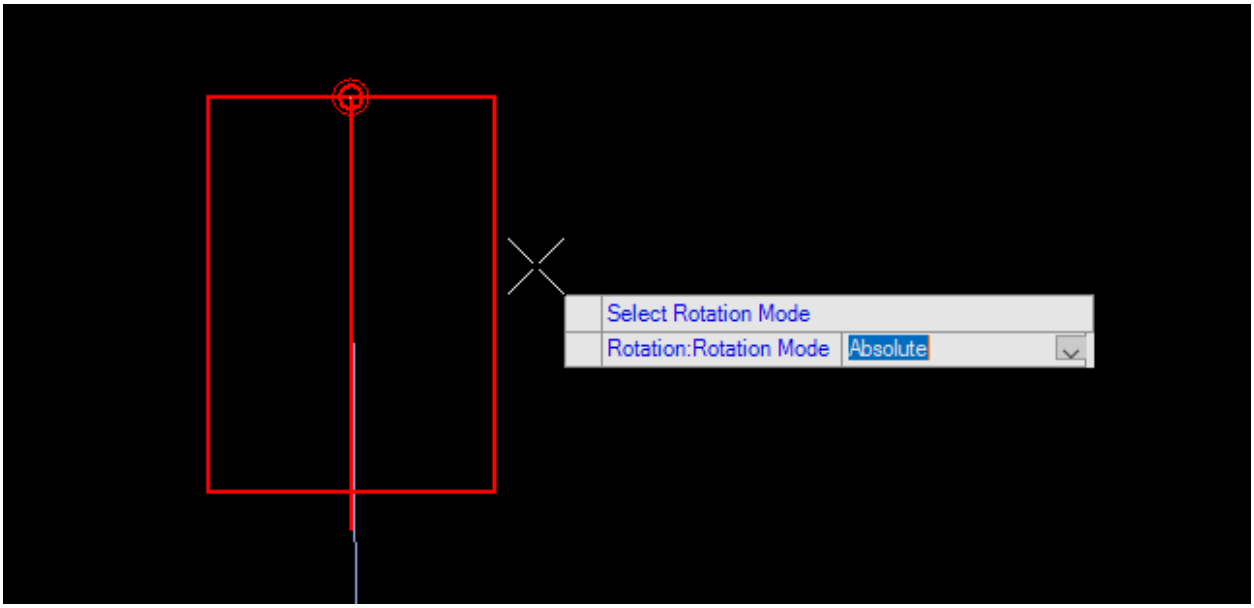


Snap to the ASCII graphics to place the apron or node.

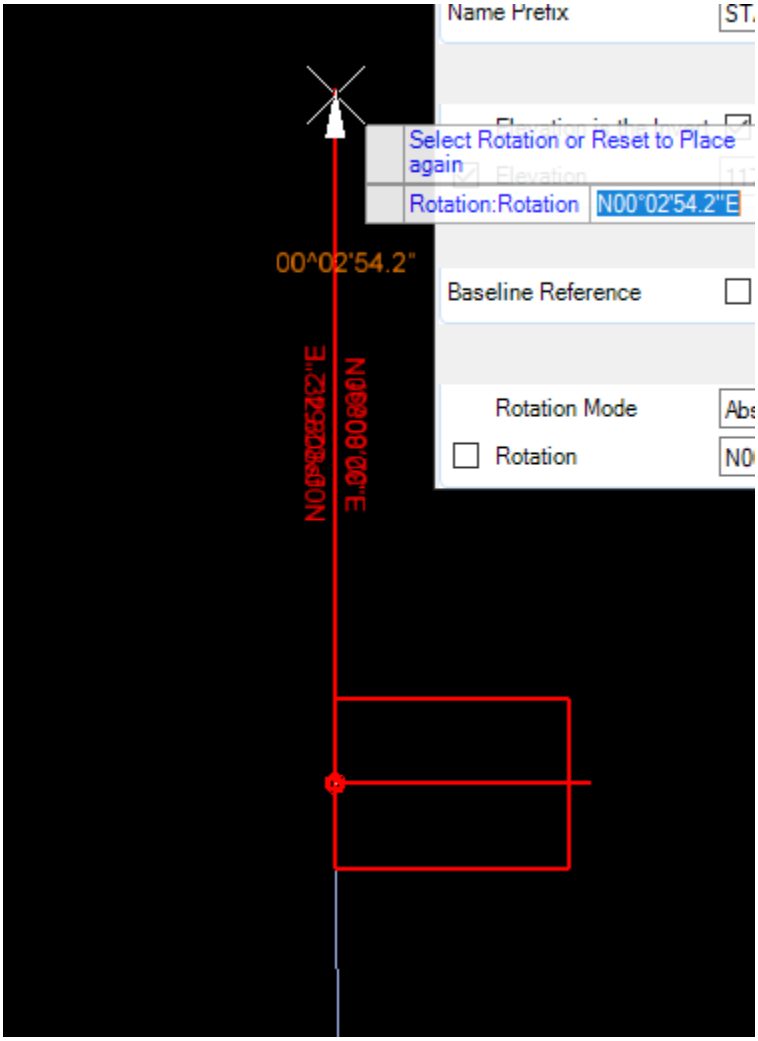


Data point to accept it and it will prompt to select which rotation mode.

For this example, use the absolute mode.



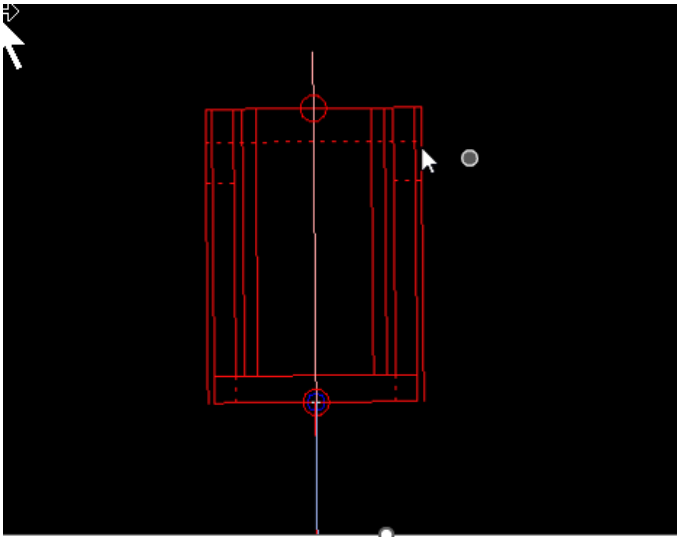
Data point again and the apron will rotate until the data point to accept the rotation is entered.



Snap to the ASCII graphics to set the rotation to the PRO graphic from the ASCII input. Then data point to accept.

Once it is done placing the node, hit the escape key to exit the tool.

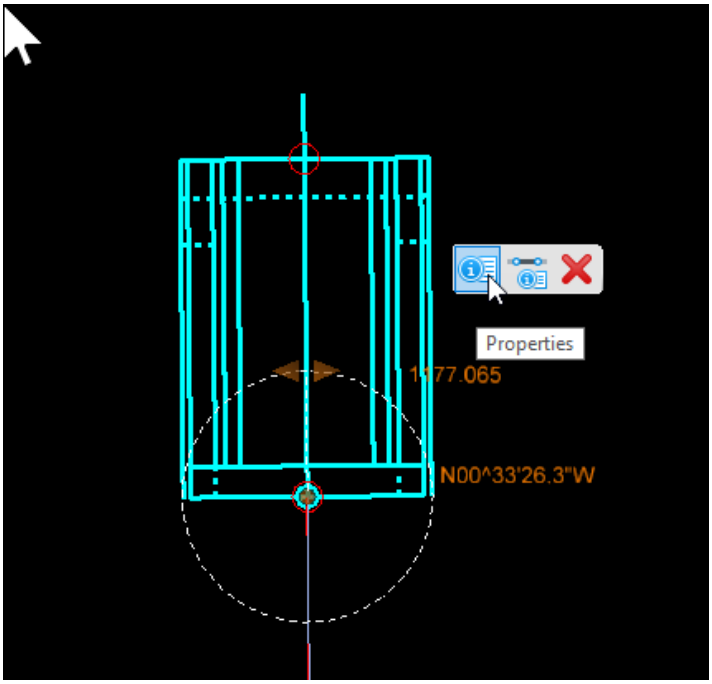
It should look like this:

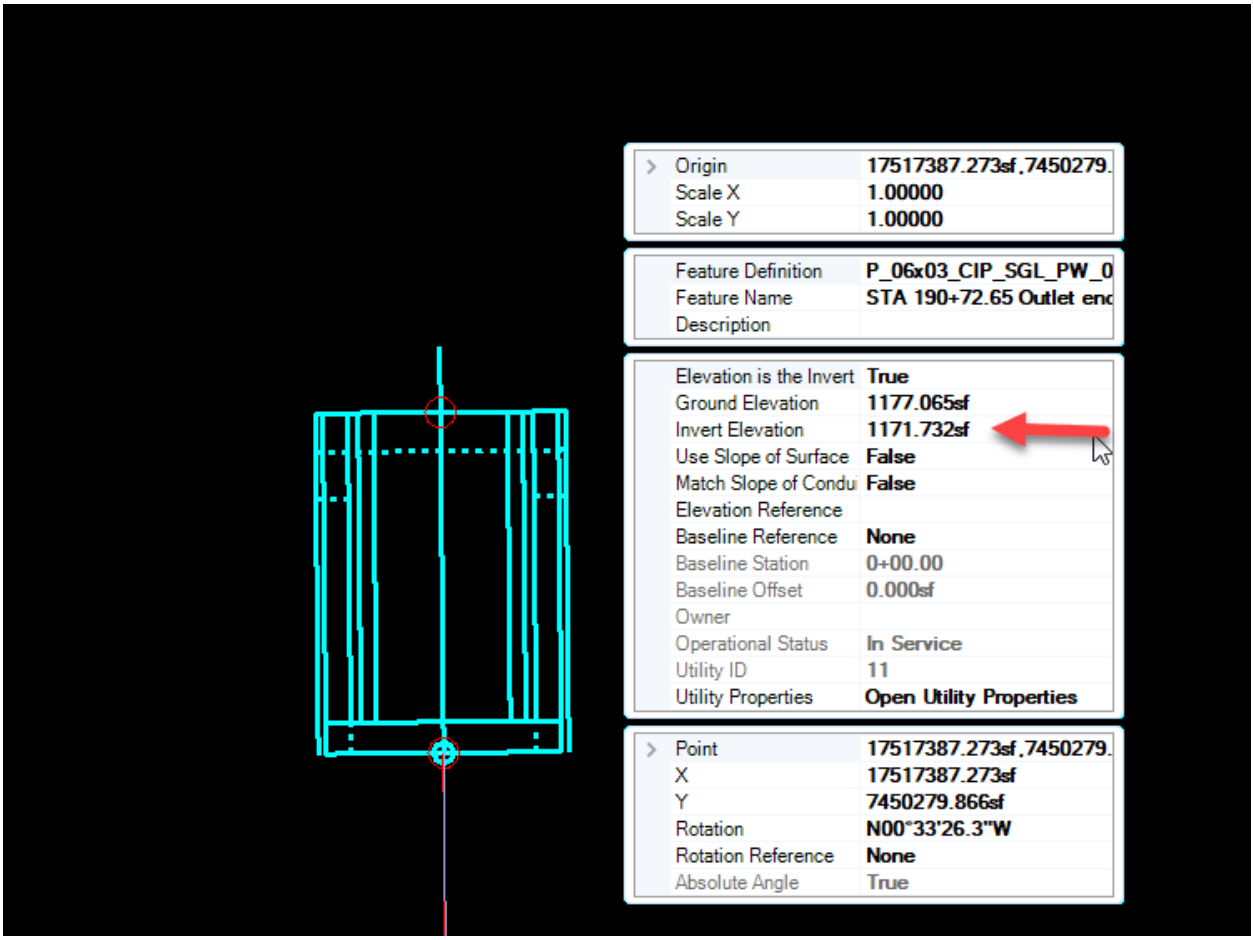


Repeat this on the other end and/or at any vertices along the conduit using the appropriate node in each location.

Keep in mind, that the elevation typed in is the invert elevation not the ground elevation that the software is asking for.

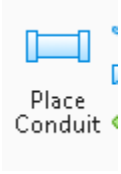
Hint: If a bad elevation is used, look at the node in the 2D view and select it with the element selection tool. Bring up the properties of the element and edit the invert elevation to match the design invert elevation.





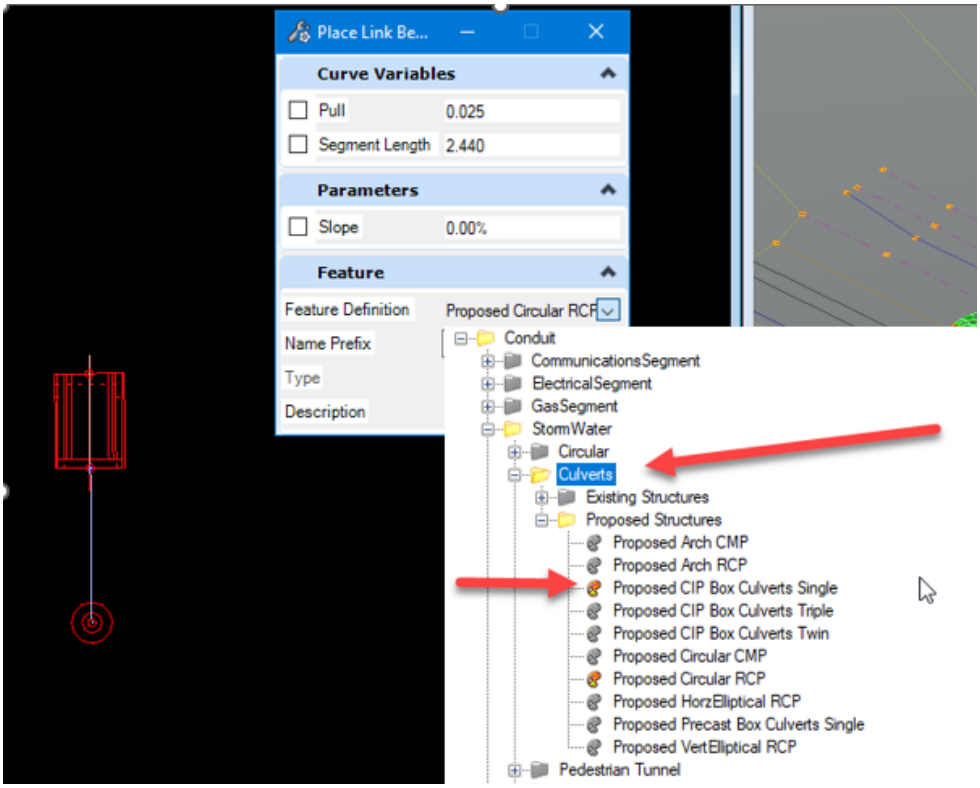
This will correct the elevation placement.

Once nodes are placed at each end of the structure, then connect the nodes with the appropriate conduit. To do this, select the place conduit tool.

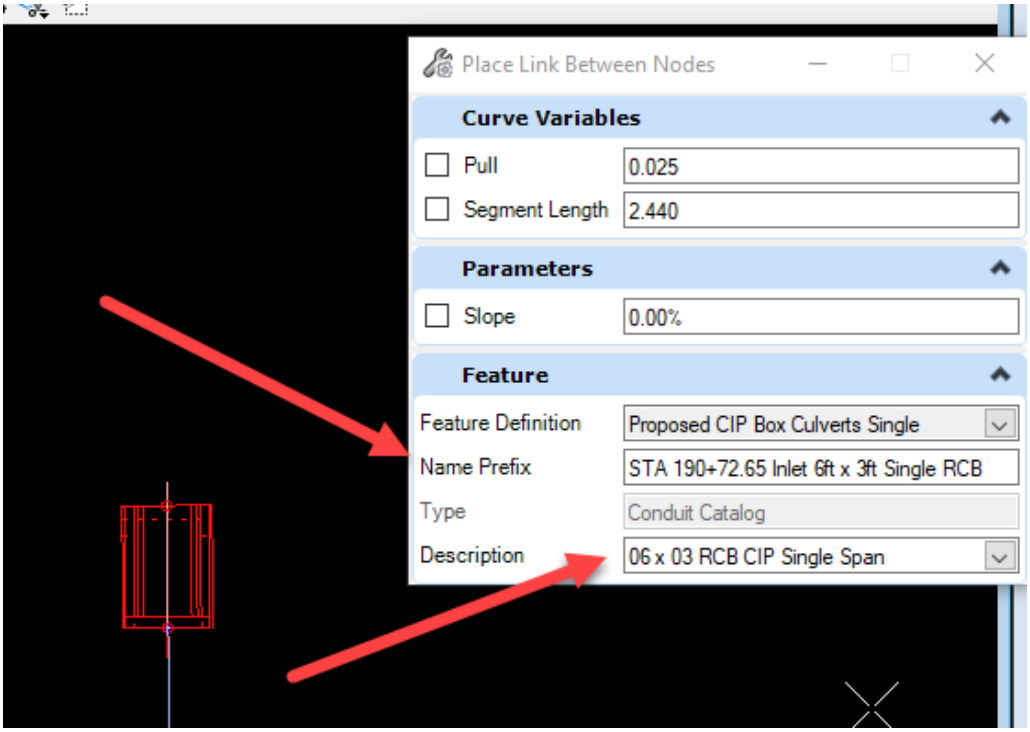


Then select the feature that is needed to model the structure.

For this example, use the Proposed CIP Box Culverts Single.

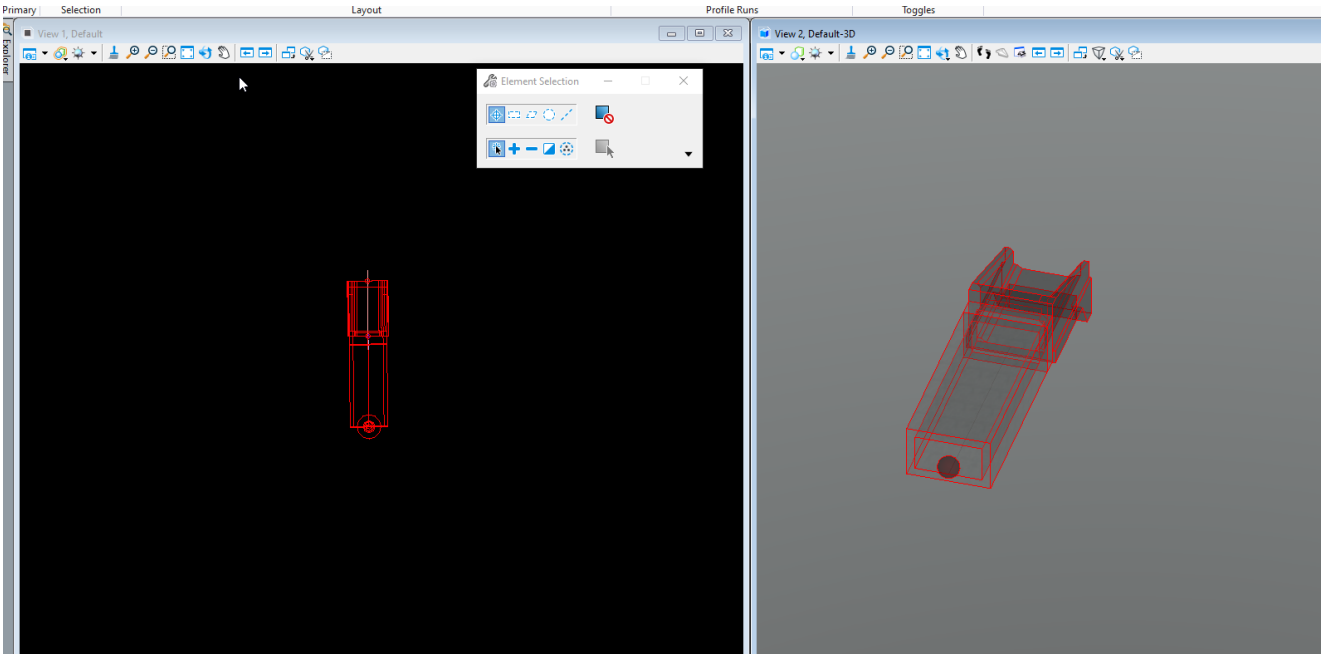


Use the description field from the ASCI file and place it in the name prefix field. Then select the size of the structure in the description field.

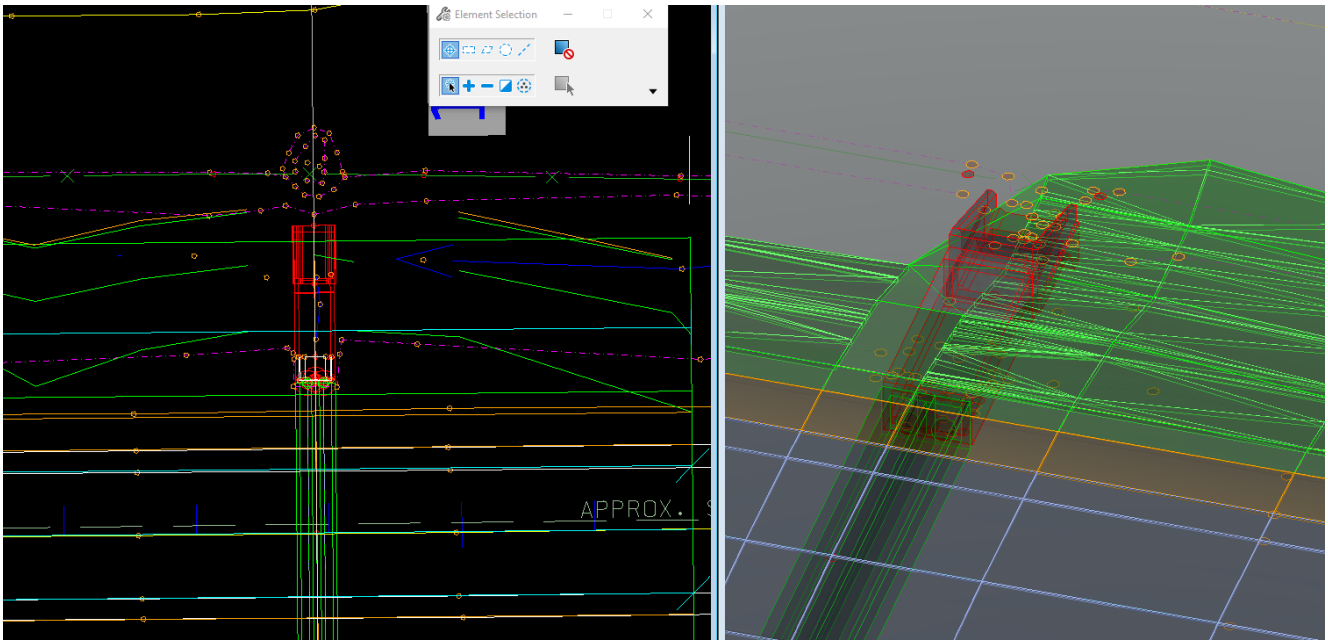


Select the inlet node to start from and then select the next node along the structure.

It should look something like this:



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



If everything looks good, then proceed to making the TS&L sheet of the structure.

Refer to [CW06_ How to Create Culvert TSL Sheet and Annotate Structures]

How to make Culvert TSL Sheet and annotate the structures

These instructions were created July 2023 These instructions were created with:

This is the step in the workflow where the Create Drawing dialog to automate the drawing and sheet model creation and place the views in them is used.

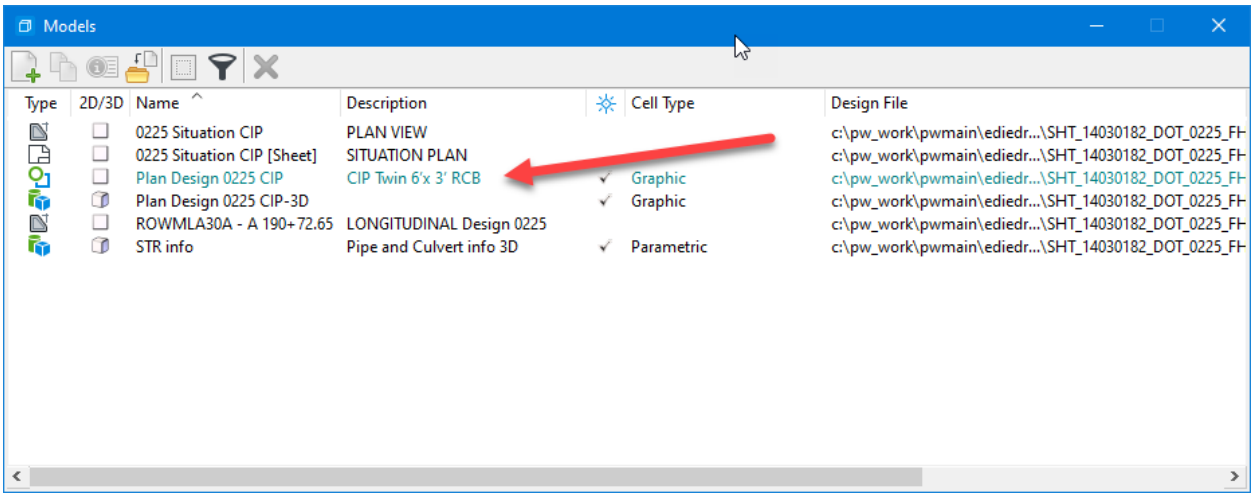
To create a Culvert TSL sheet, open the DGN file. This example will use the SHT_14030182_DOT_0225_FHWANO_CIP_Z07.dgn

For proper file naming please refer to CONNECT Seed Files and Naming Conventions and CONNECT Models and Naming Convention.

Note: To do this properly, establish the Design numbers for each design to name each sheet and named boundary correctly. Request design numbers and Asset ID numbers, if applicable, before proceeding with these instructions.

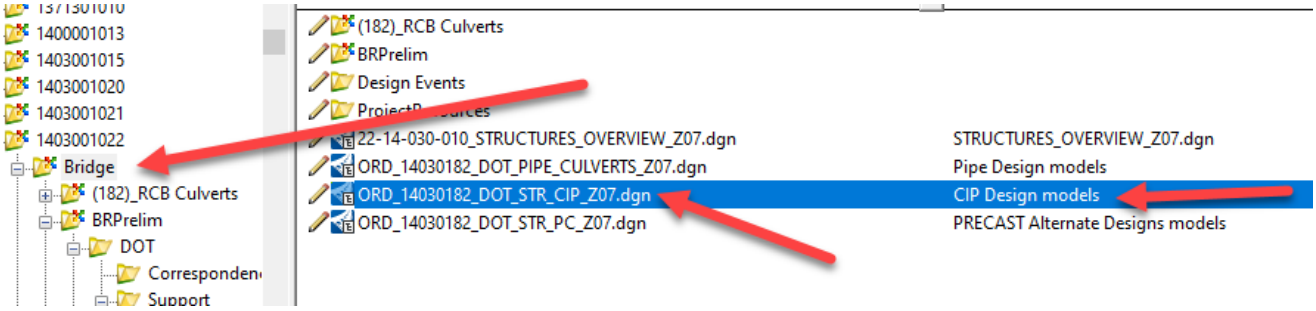
Note: Keep in mind that this process is for B01 work and not B02 work. B01 event work is for RCBs and other structures that will require Final Design detailing done to them. If designing crossroad pipes, that is B02 work and sheeting is done differently. Please refer to the PW workflow documents for instructions.

Rename the Default 2D model to Plan Design 0225 CIP model.

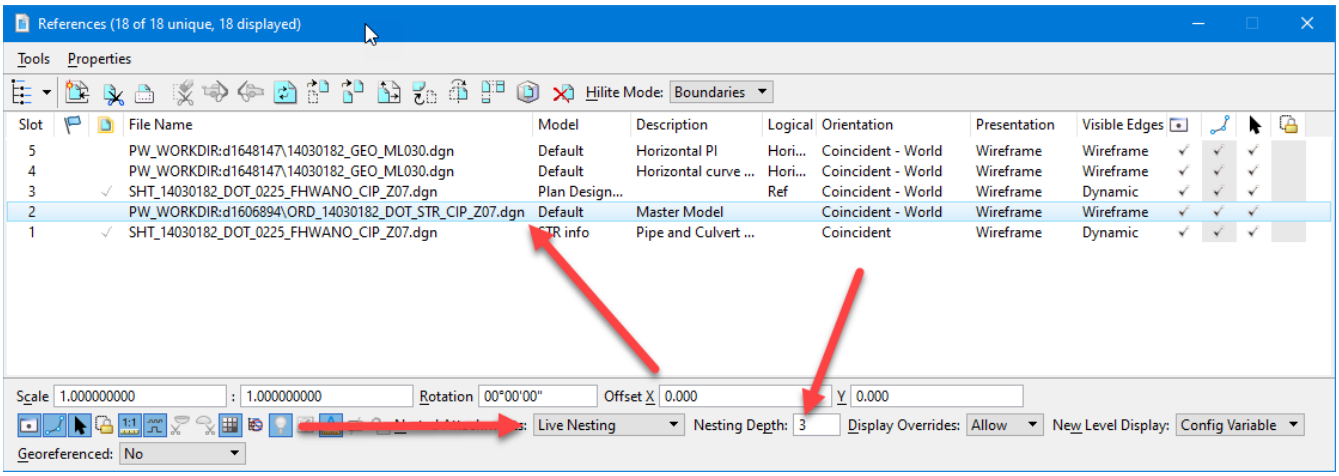


Reference the corresponding structure model file under the Bridge folder that goes with that sheet file.

For this example, ORD_14030182_DOT_STR_CIP_Z07.dgn

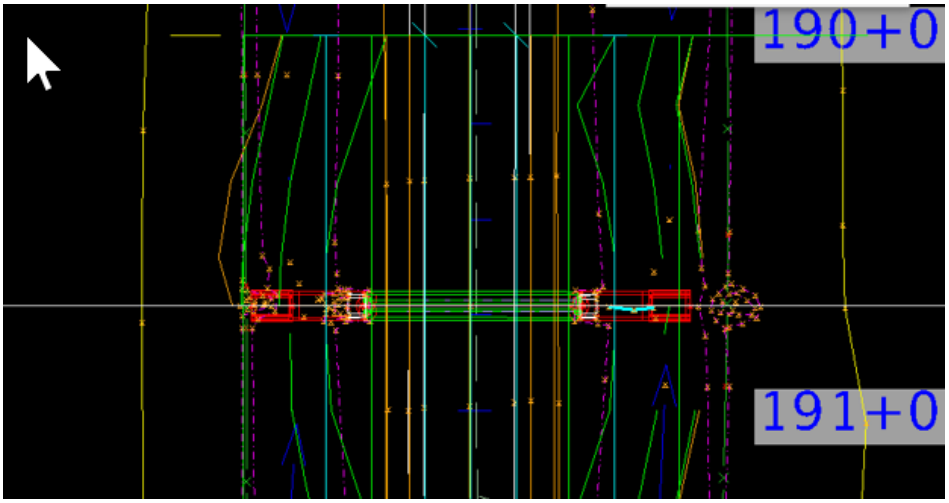


Set to Live Nesting with Nest Depth of 3



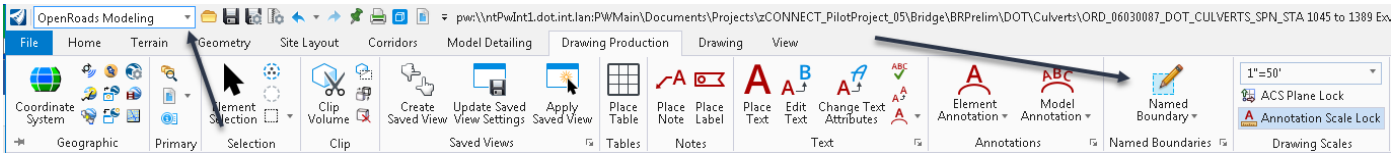
Next rotate the view in the 2D Model into the orientation that is needed to be displayed on the TSL sheet.

It should look something like this:

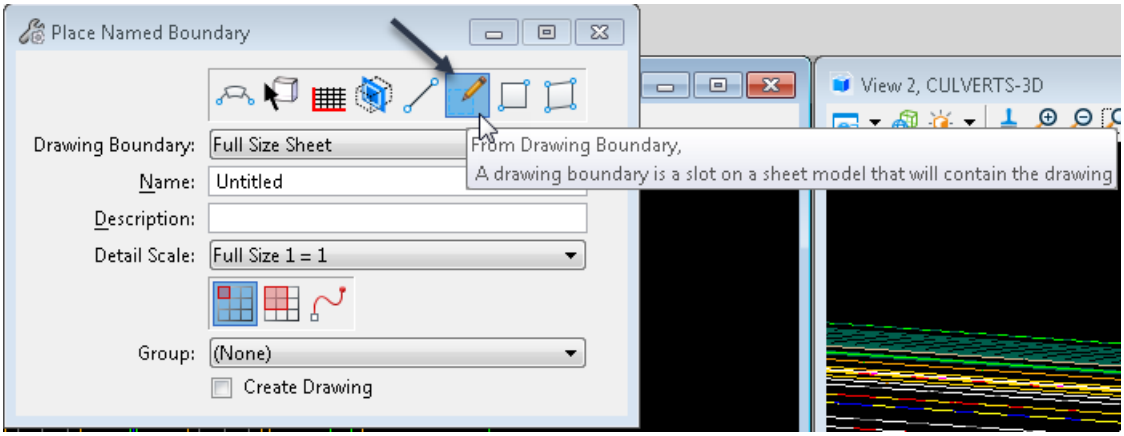


Next, under the OpenRoads Modeling workflow, select the **Named Boundary** tool.

Note: Working in a Multi-Model View, be sure to have the 2D view active when placing the boundary in the 2D view. Also make sure to have all the references turned on in the 3D view for the information to properly display on the plan sheet.



Selecting the Named Boundary tool will open the Place Names Boundary dialog box, select **From Drawing Boundary** option at the top.

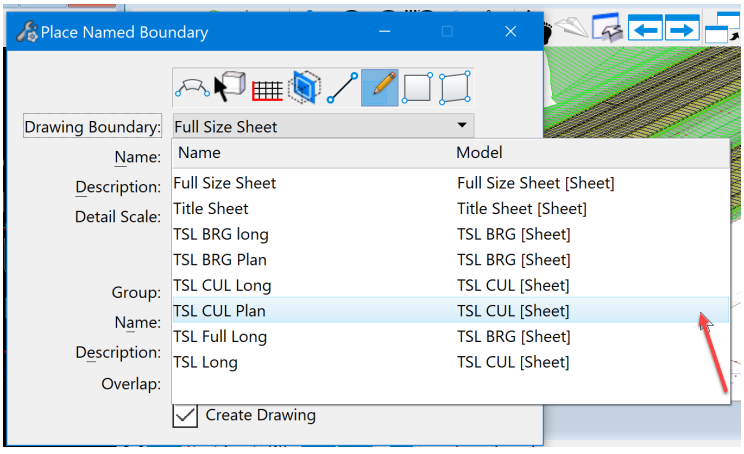


In the From Drawing Boundary pull down, select the sheet seed that will best fit the desired output.

The first Drawing Boundary needed is the **TSL CUL Plan.** This will place the traditional plan view and will leave space on each side of the plan view for extra notes.

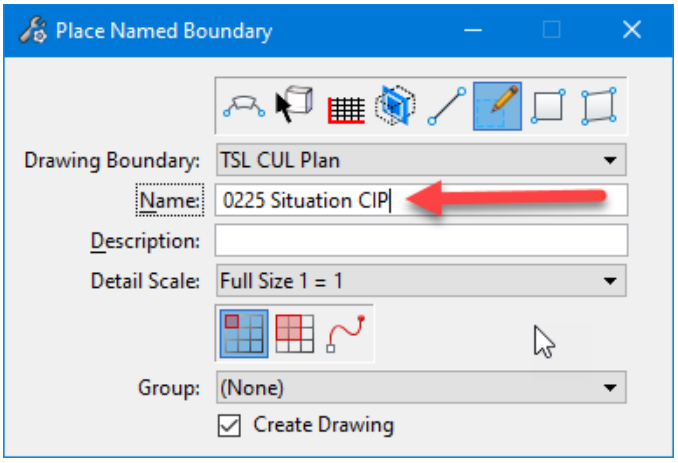
The second Drawing Boundary needed is the **TSL BRG Plan**. This will place a plan view that will cover the full width of the TSL page and is intended to be used in the bridge TSL creation process.

Decide what plan view is ideal for the design and sheet layout. For this example, use the TSL CUL Plan boundary.



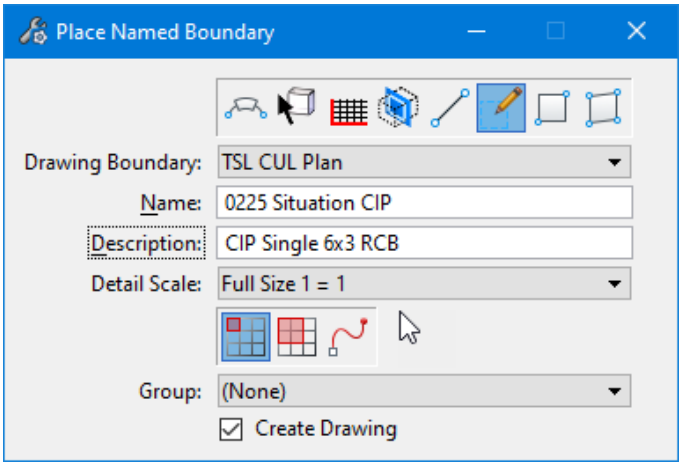
In the **Name** field, name it the County number, Design number and Situation Type of structure.

For this example, it will be 0225 Situation CIP.

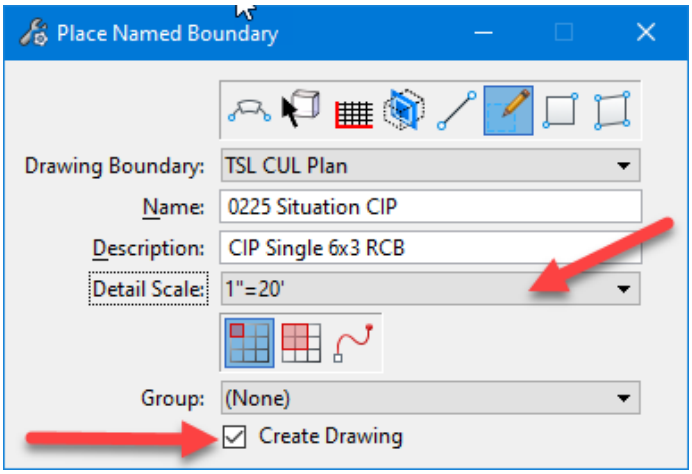


In the **Description field**, describe the structure.

For this example, use CIP Single 6x3 RCB.

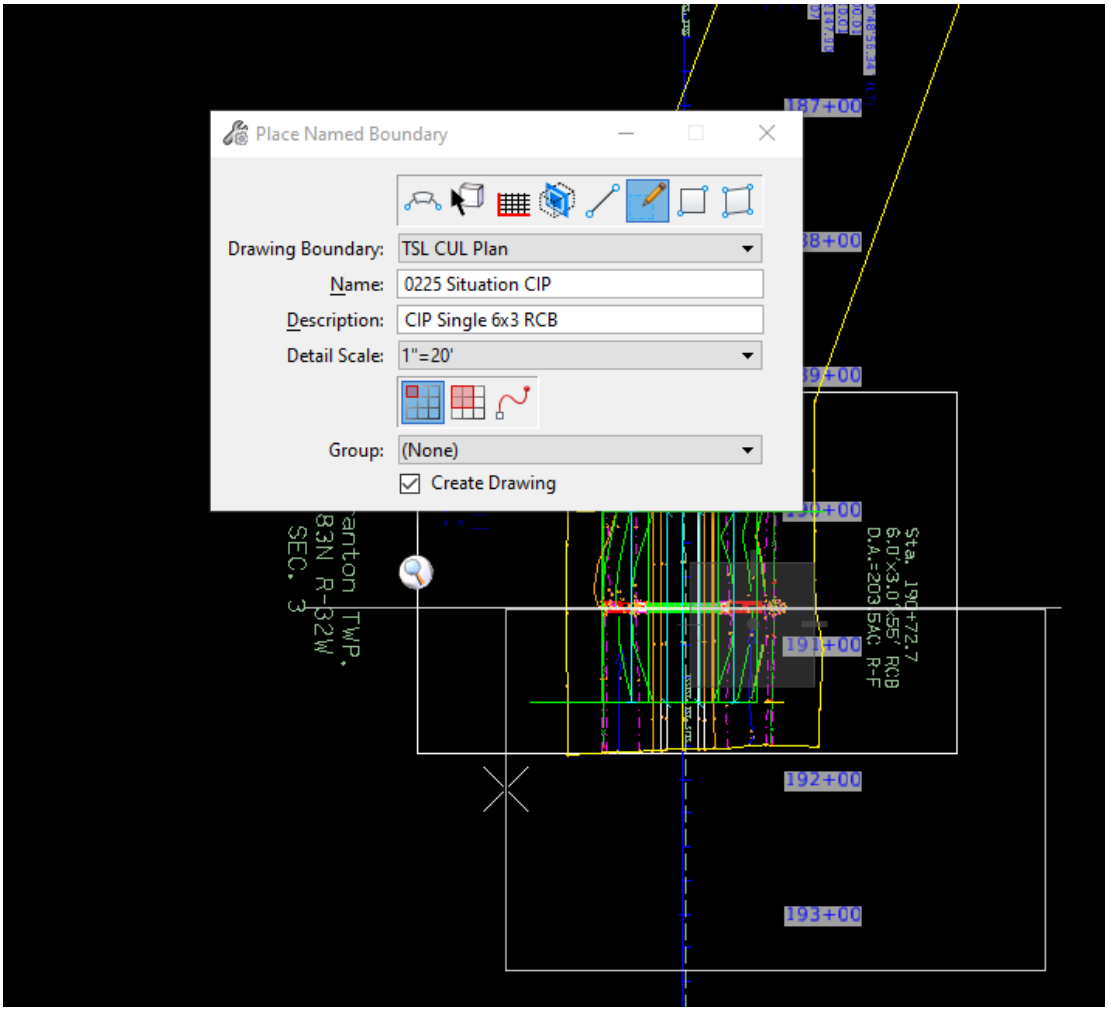


Select the detail scale of 1” = 20’.

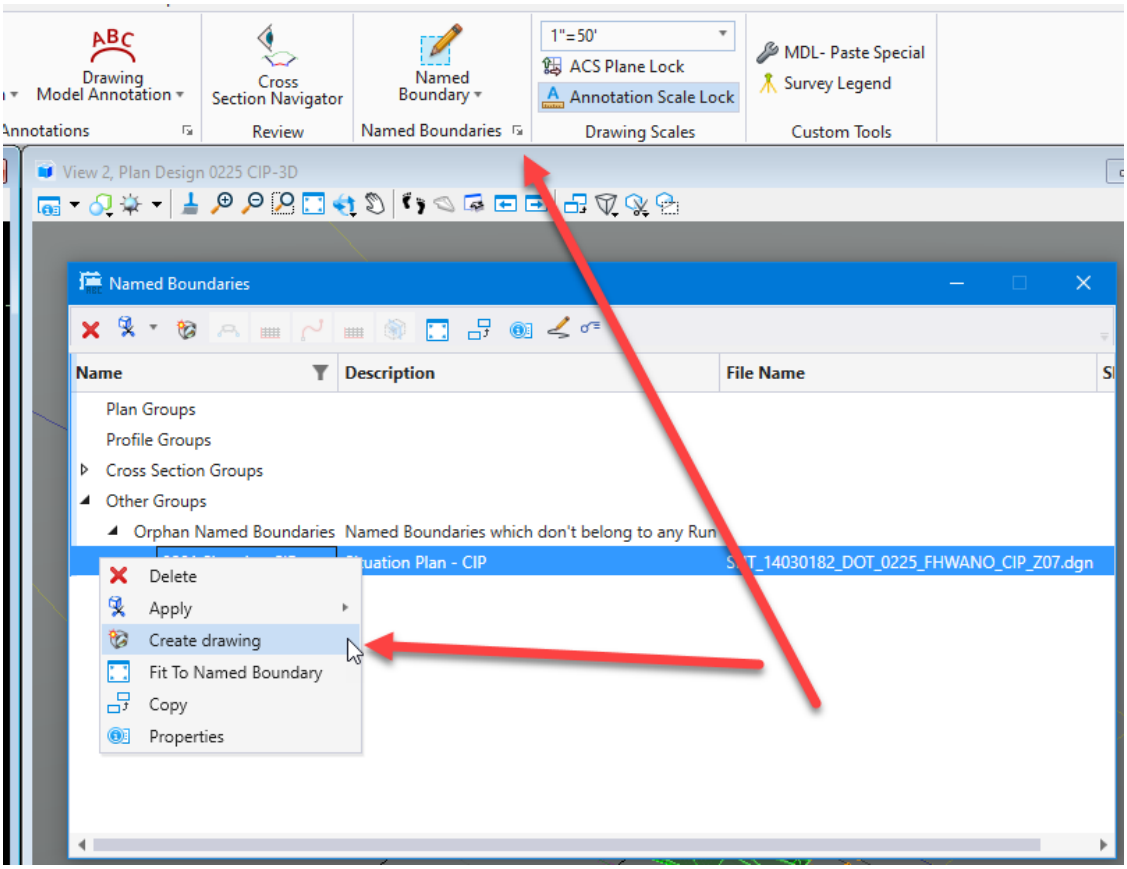


Now place the boundary. It will appear at the end of the cursor.

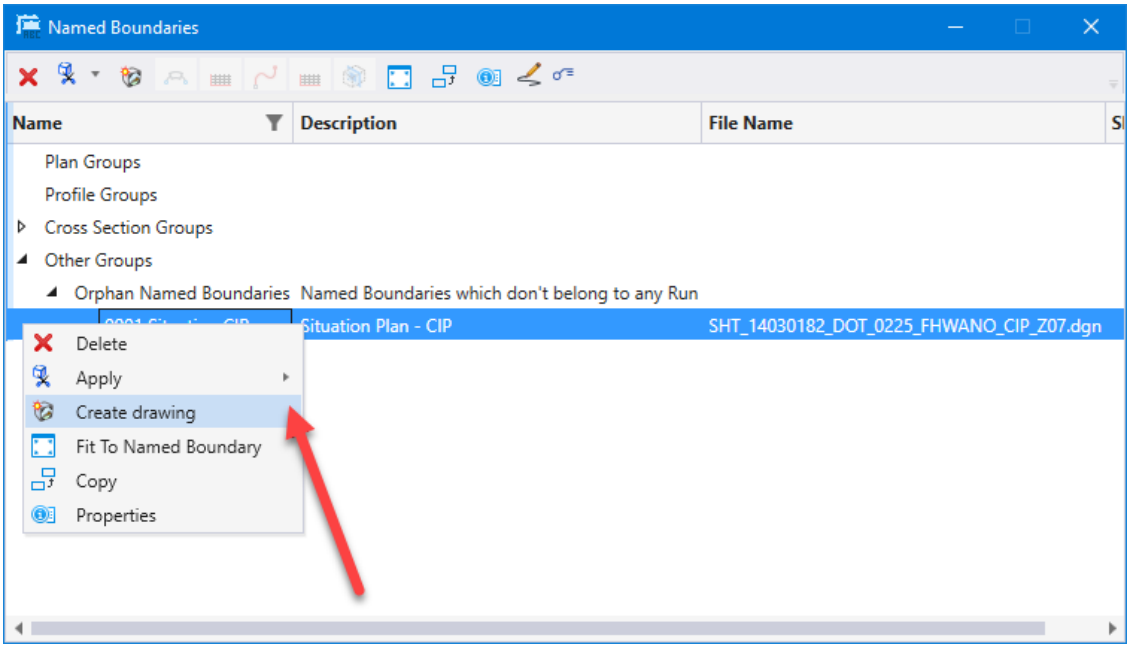
Note: It may be preferred to place it on the outer edge of the structure layout and then move it to the correct location to ensure that the center of the plan view detail on this sheet will be at the centerline of the structure = centerline of the roadway. Move the boundary before making the drawing model and sheet. Make sure to <u>not</u> have “Create Drawing” toggled on so that the named boundary can be moved after it is placed to enable an ideal position in relationship to the structure. Then the drawing and sheet model will be created. This is what will be done in the following example. If there is confidence in the initial placement of the boundary, have “Create Drawing” toggled on and skip the next few steps after placing the boundary.



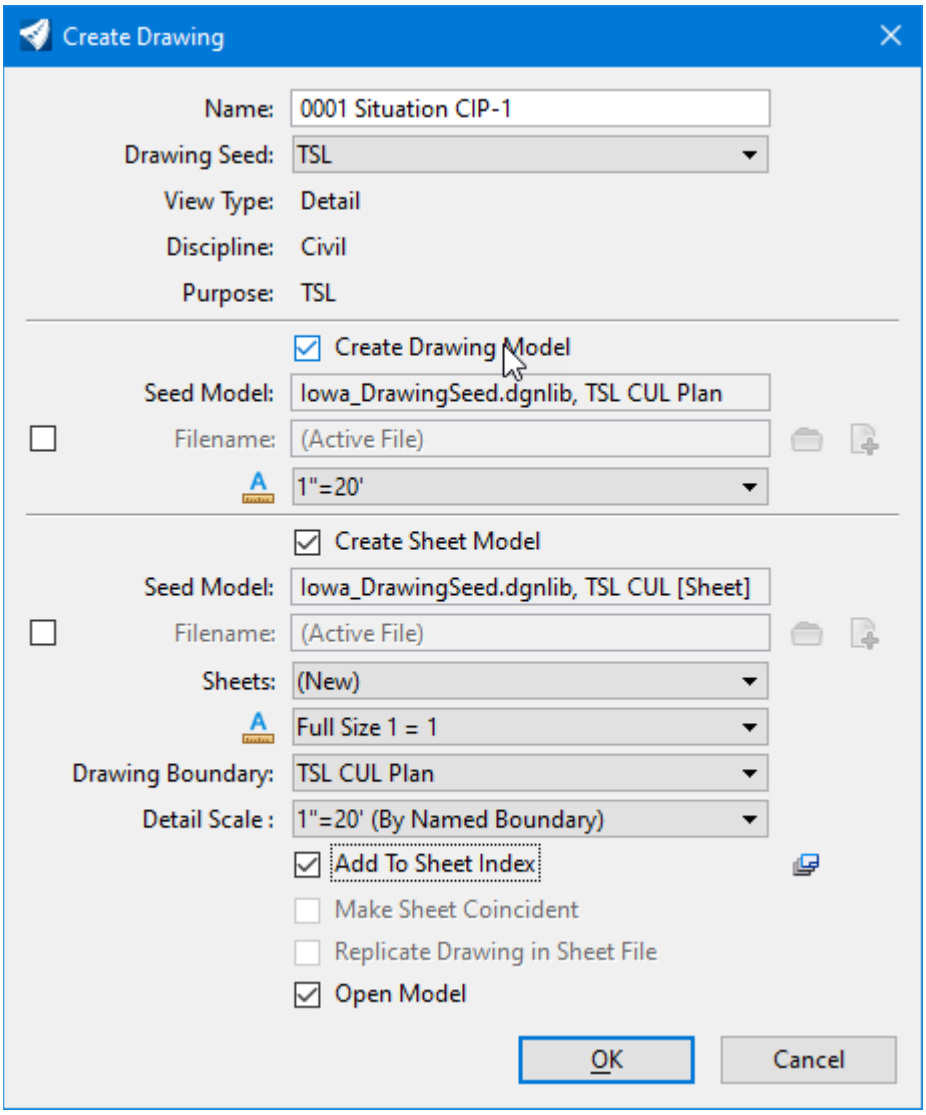
To move the boundary after it is placed, use the Element Selection tool and select the boundary. Use the move command to move the boundary to the position that is needed. Once placed, then select the Named Boundaries tool to open the dialog box.



Select the boundary that was created and right click on it. Select the **Create Drawing** option.



This Create Drawing dialog box will open. The name will be filled out based on the name of the boundary. For this example, used STA 2179+27.00).



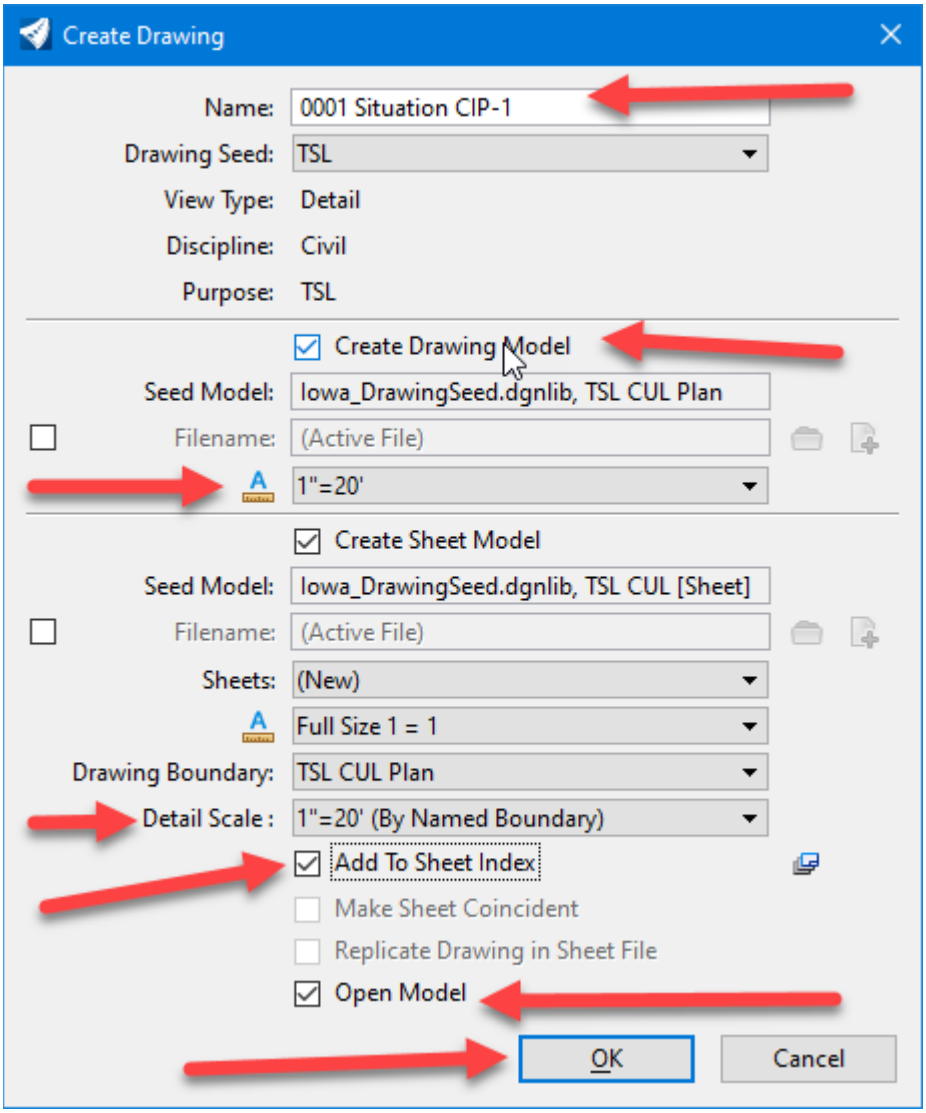
Next, ensure the scales are set correctly for the sheet.

1. Under the Create Drawing Model section set this to 1“=20’. The scale is set to match the scale used when referencing the Drawing Model details into the Sheet Model.

2. Under the Create Sheet Model section set this to Full Size 1 = 1 and ensure that the Detail Scale is set to 1” = 20’ (By Named Boundary). The scale is set to match the scale used when referencing the Drawing Model details into the Sheet Model.

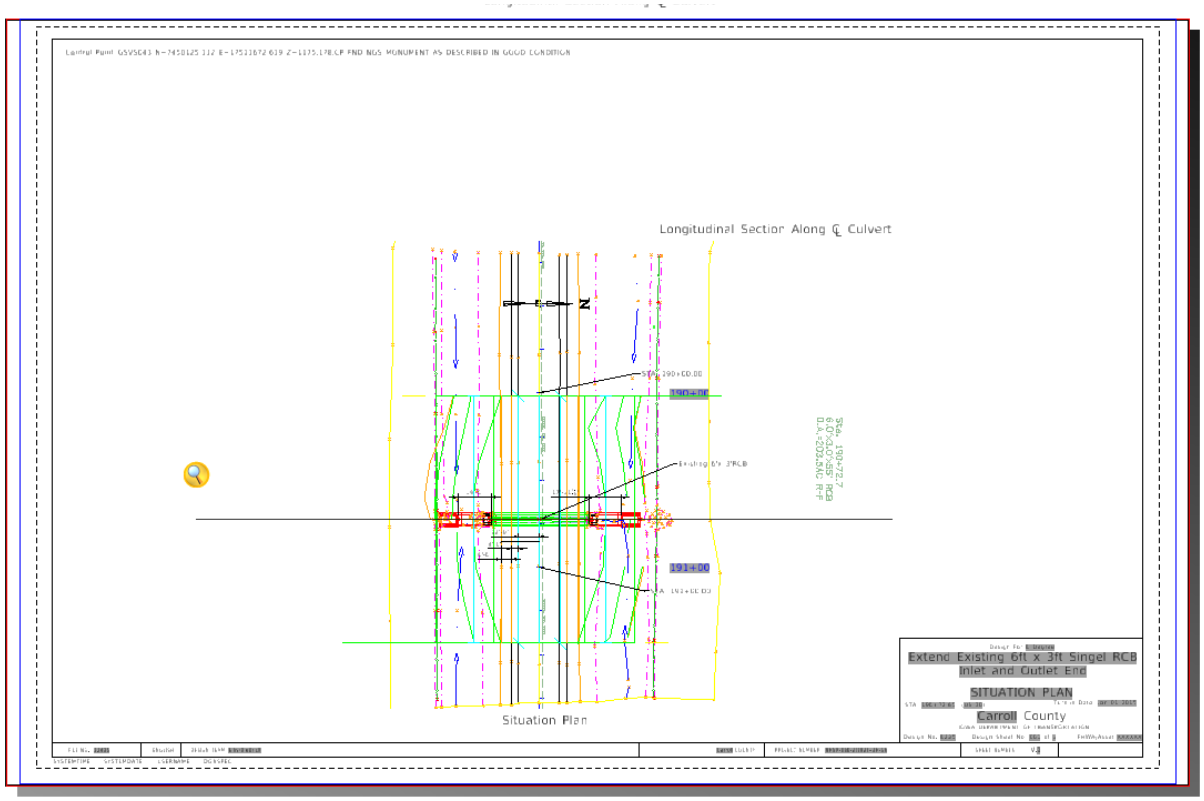
Toggle on Open Model, if desired. Add to Sheet Index may be toggled on also. Sheets may be added to the Sheet Index later in the plan sheet development process.

If everything is correct, then click OK.



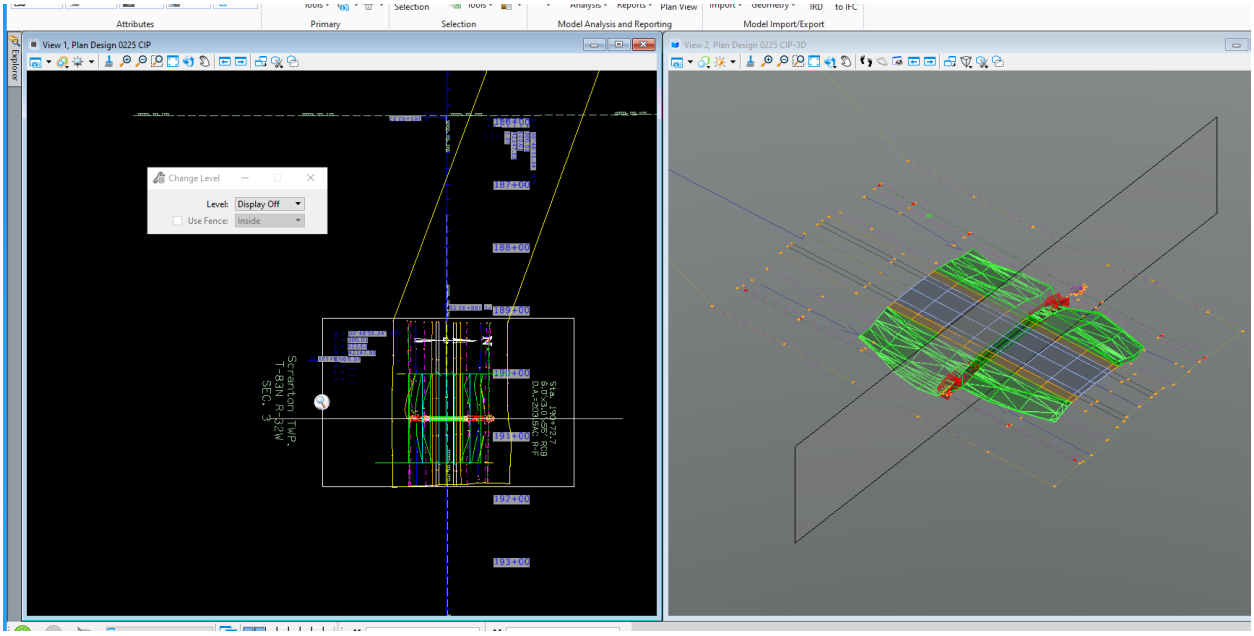
This will create the plan sheet.

It should look something like this:



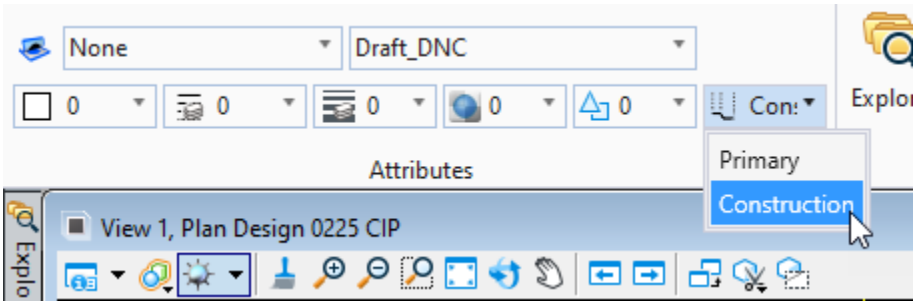
Situation Plan

Next, go back to the Multi-Model View to make the Longitudinal Cross Section for the sheet.

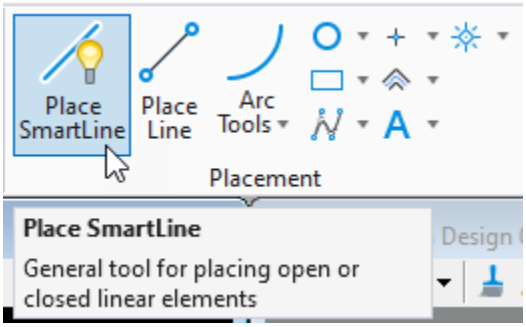


It is recommended to place a guideline for placing this cut. Work in the 2D view.

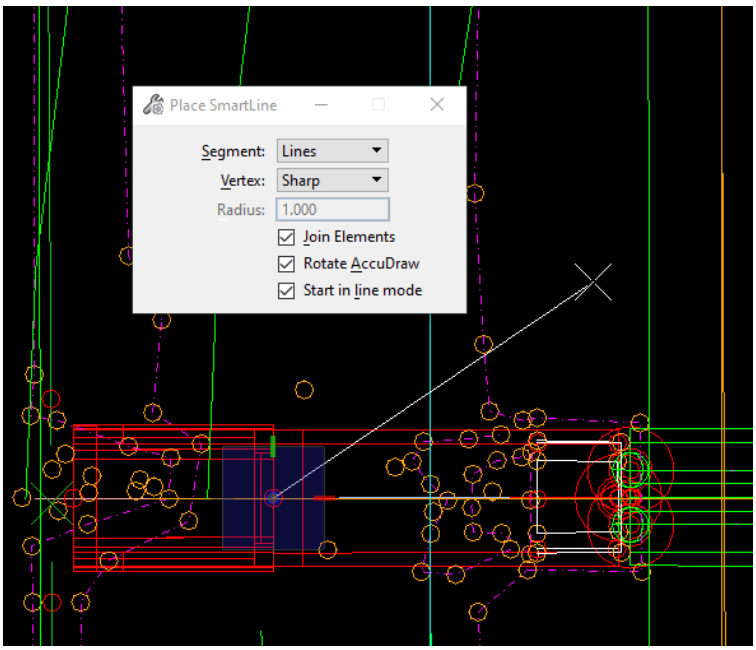
First set the symbology to level Draft_DNC which means Draft Do Not Construct and the class to Construction. The guideline will not show on the sheet and will appear as part of the design.

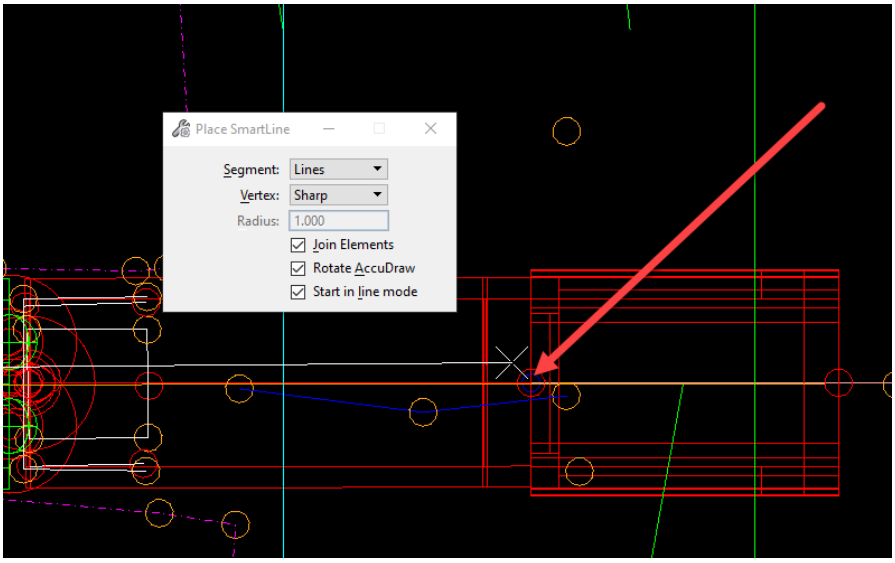


Use the place smart line tool to place the guideline.

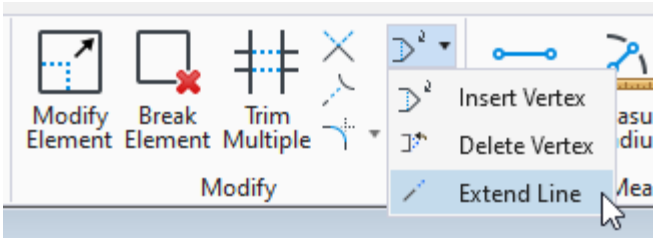


Start by placing the line at the calculated invert at one end of the structure then ending it at the other invert. The purpose of this is to ensure cutting the section at the true center of the structure.

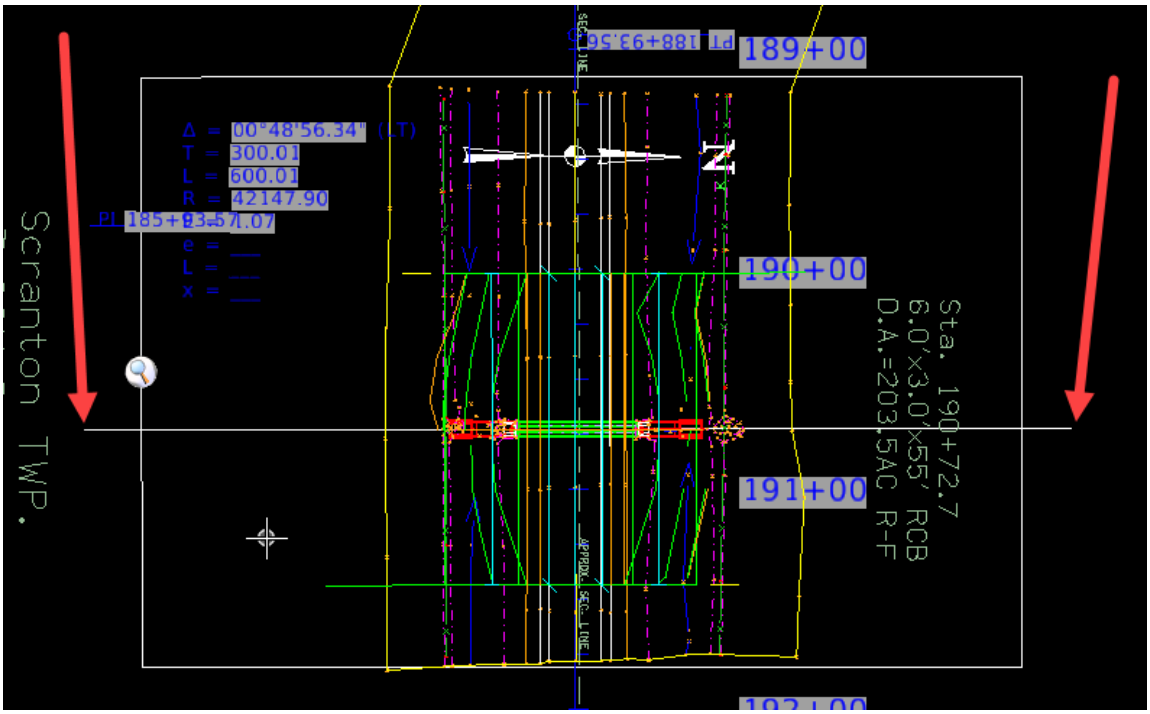




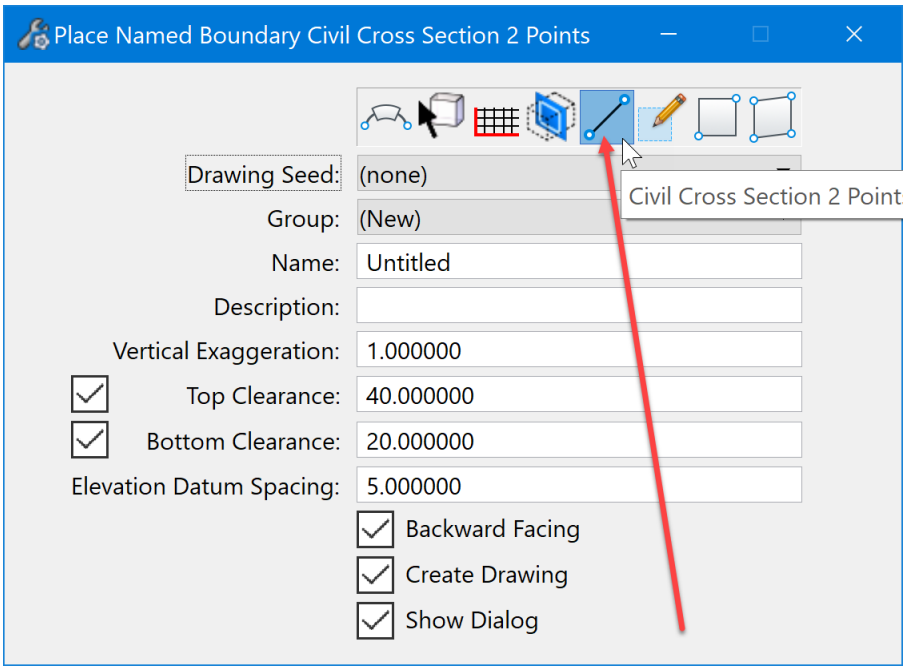
Use the Extend line tool to stretch the line past the plan view name boundary.



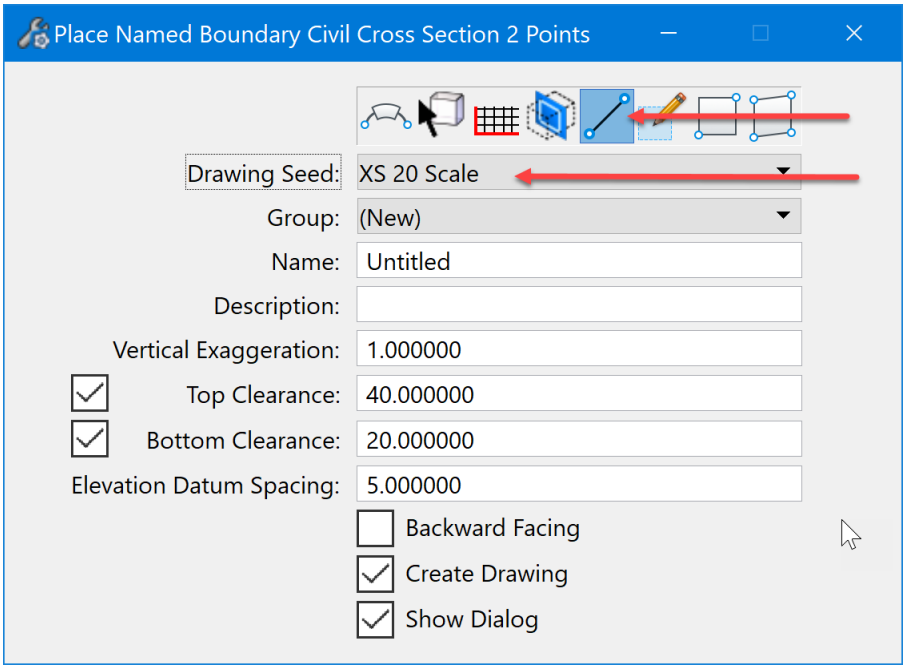
It should look something like this:



Next, make the Longitudinal Cross Section for the sheet using the **Civil Cross Section by 2 Point** boundary. This tool is also located on the Place Named Boundary dialog box.

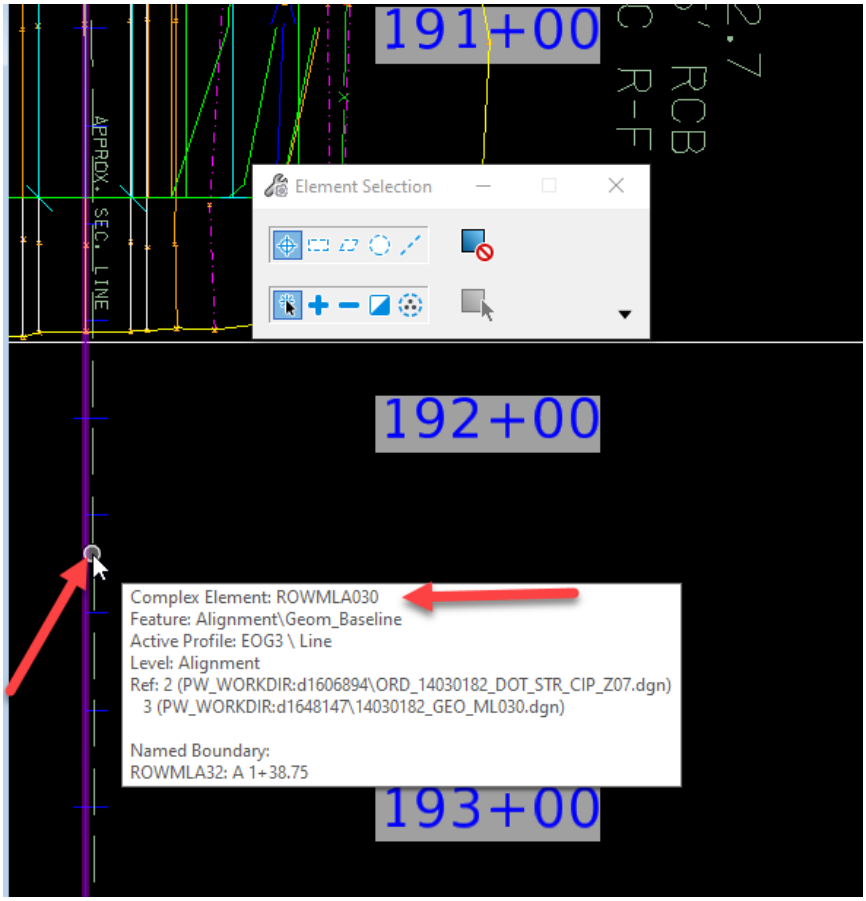


Select a **Drawing Seed.** For this example, use the XS 20 Scale seed to make a 1” = 20’ scale cross section.

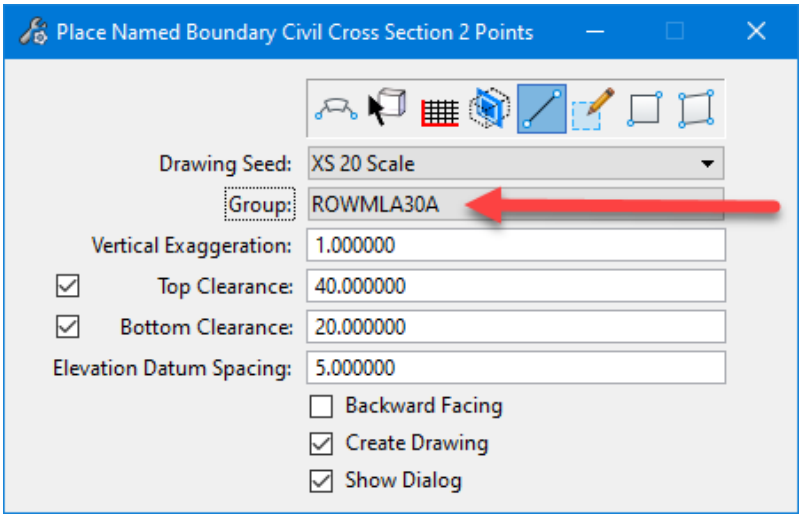


Next identify the path element. For this process, it will be the roadway horizontal alignment that intersects the structure shown on the sheet.

Note: Selecting the alignment will also set the Group. It is very important to set this so that in a large corridor project the cross sections can be placed on their own sheets when the drainage design is complete. To identify the path element, select it in the 2D view.

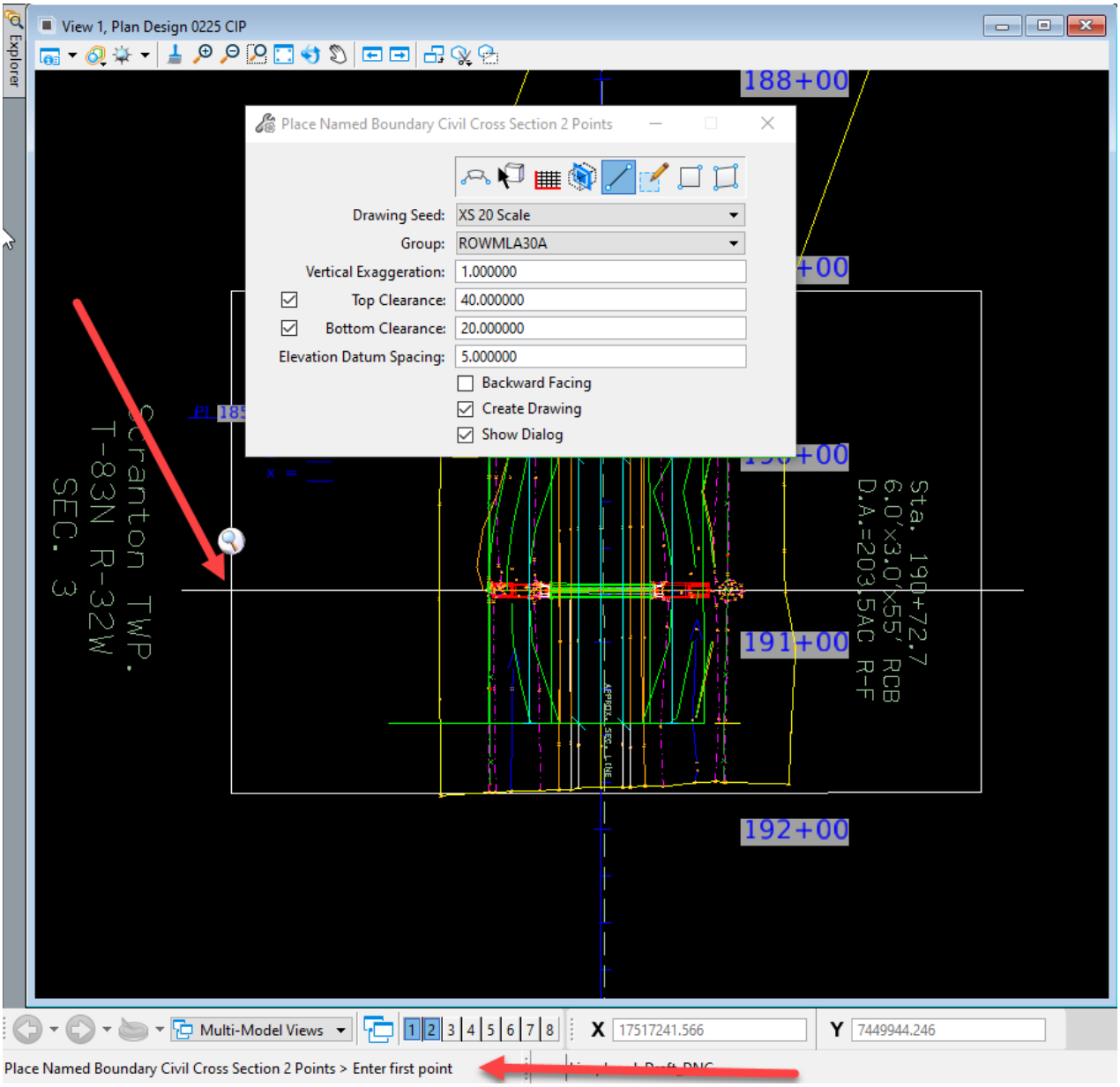


The **Group** should be named the same as the alignment.



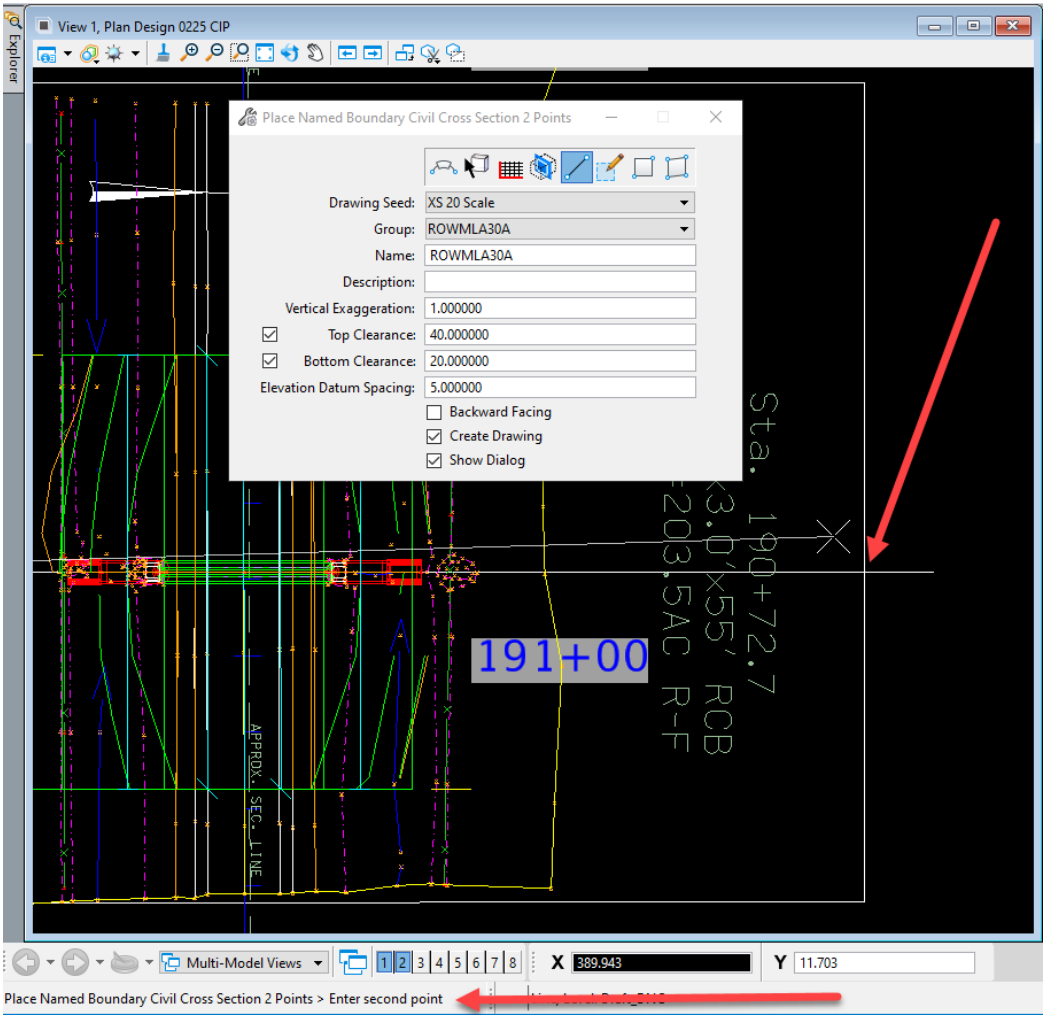
Next, identify the start point.

Snap to the intersection point of the structure centerline and the edge of the plan view boundary placed earlier.

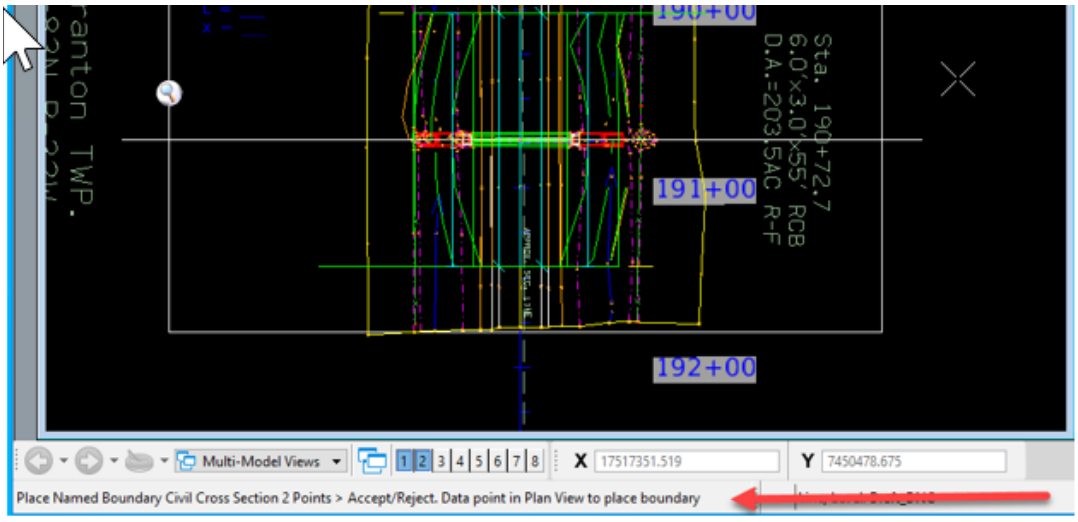


Then, identify the end point.

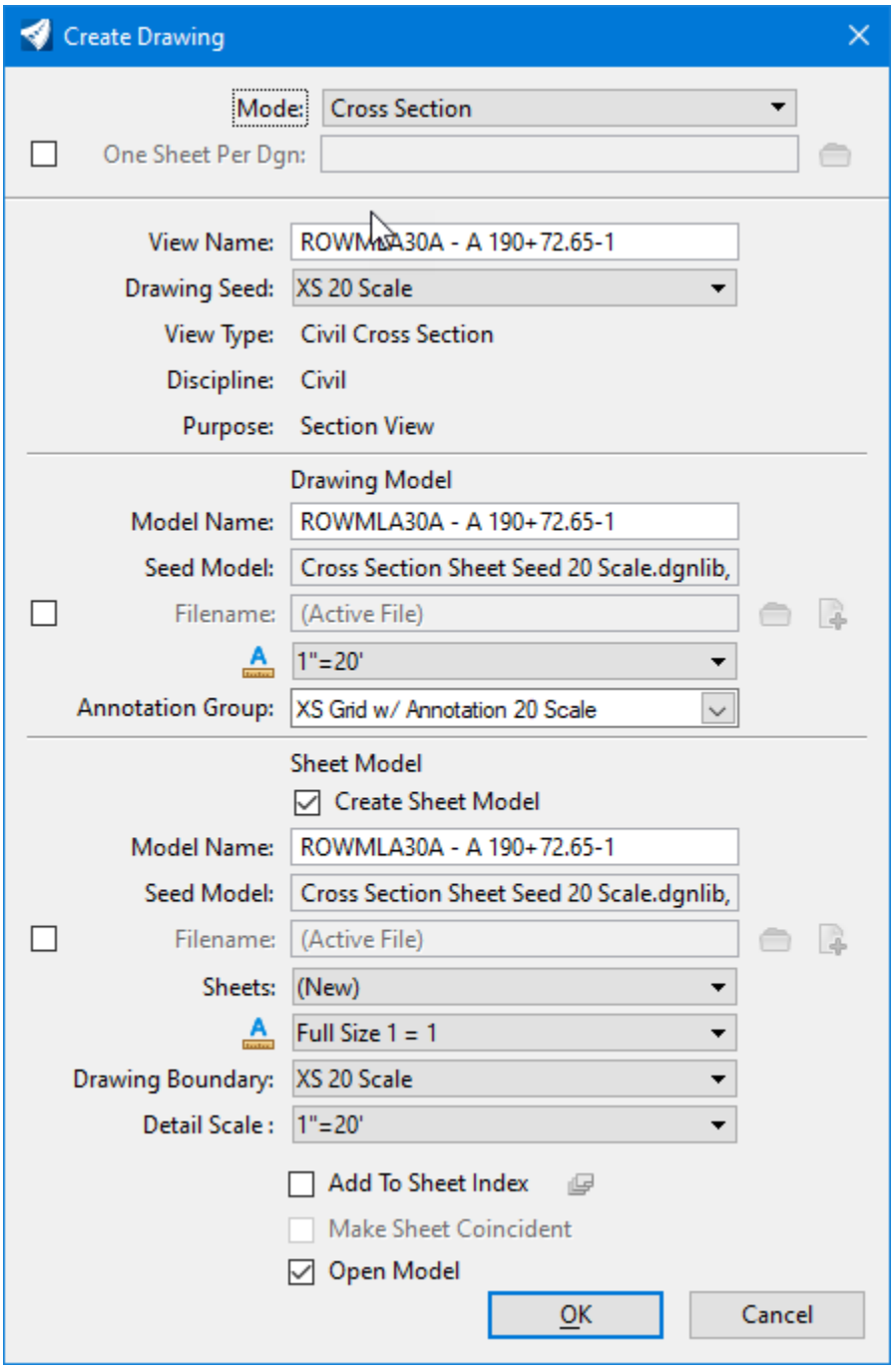
Snap to the intersection point of the structure centerline and the edge of the plan view boundary placed earlier.



It will prompt to Accept or Reject.

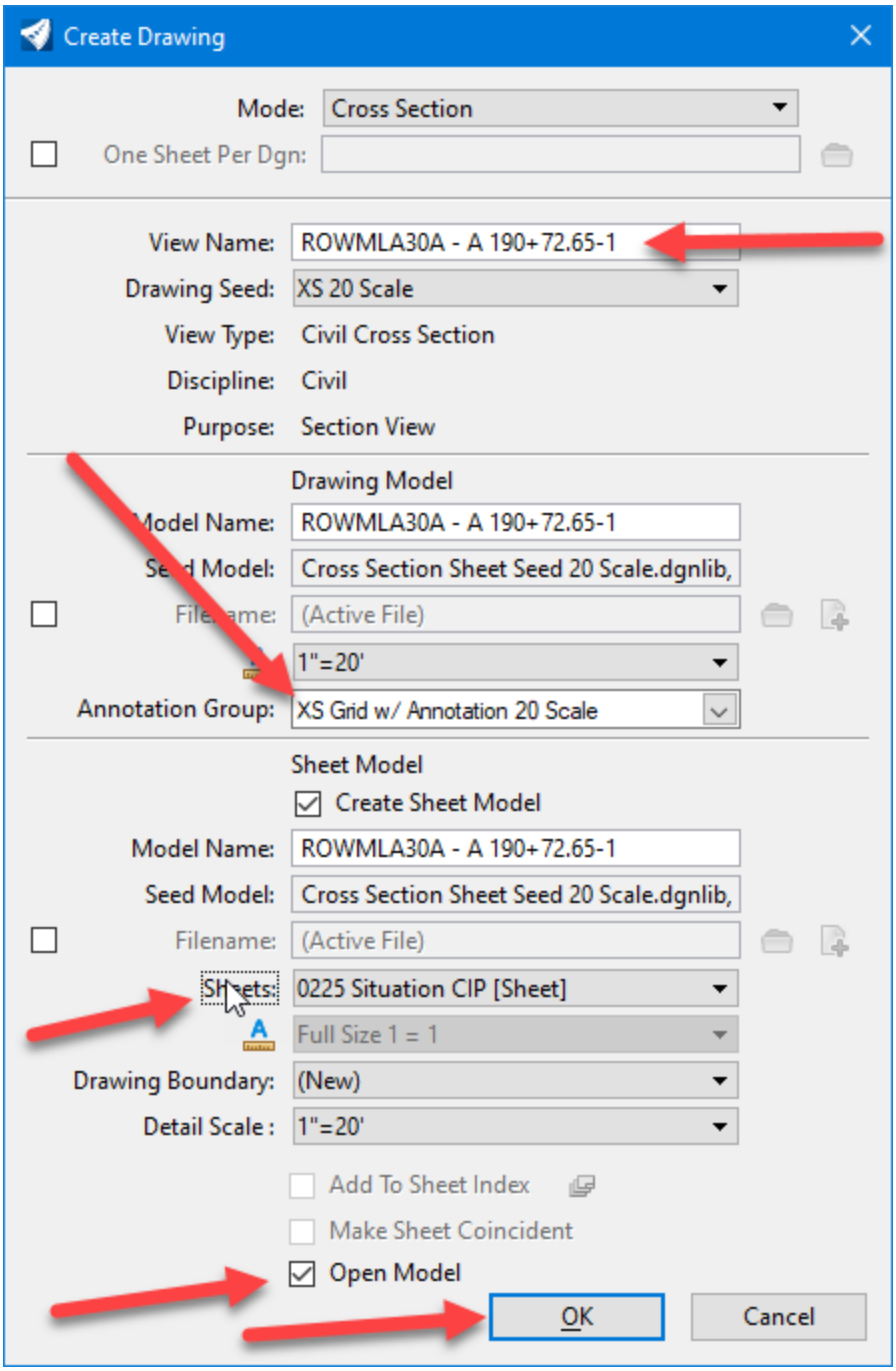


Once everything is set correctly, Data point in the plan view to accept the settings and this will open the Create Drawing dialog box.



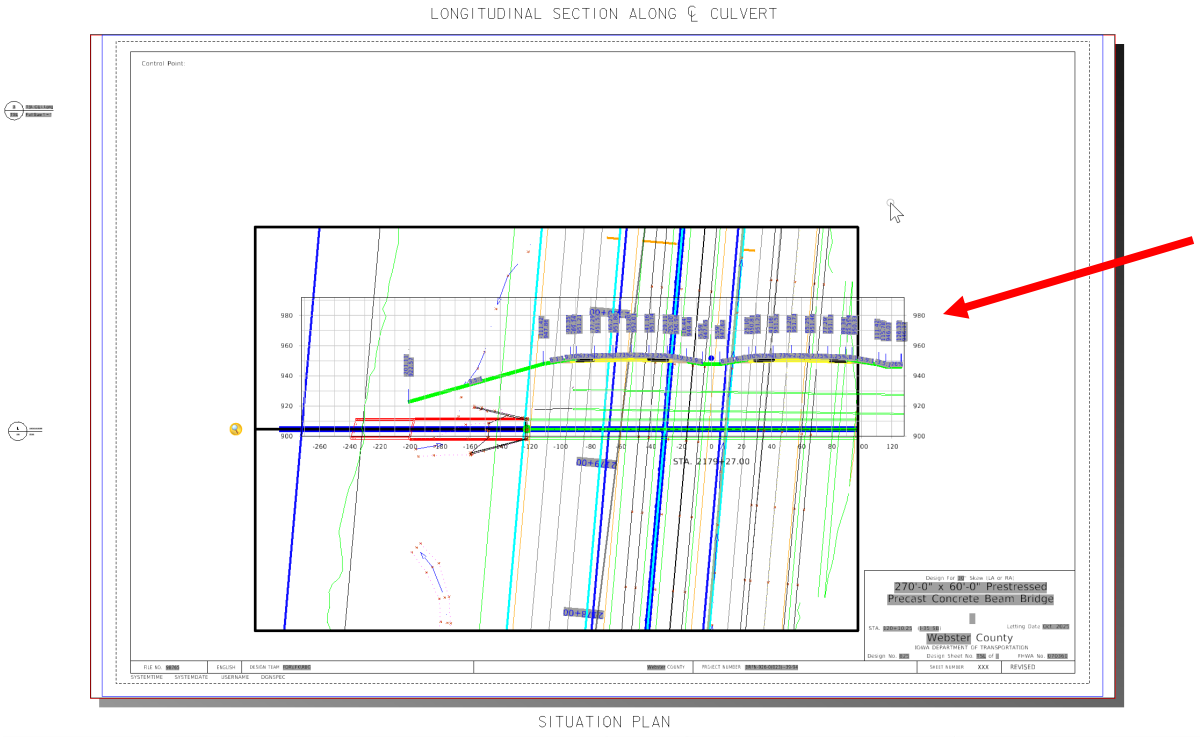
Select an **Annotation Group** and select the **Sheet** that the section will be placed on. Toggle on Open Model.

When adding a detail/cross section to an existing plan sheet, the Add to Sheet Index option is grayed out. When creating a new plan sheet, the Add to Sheet Index option will appear selectable.

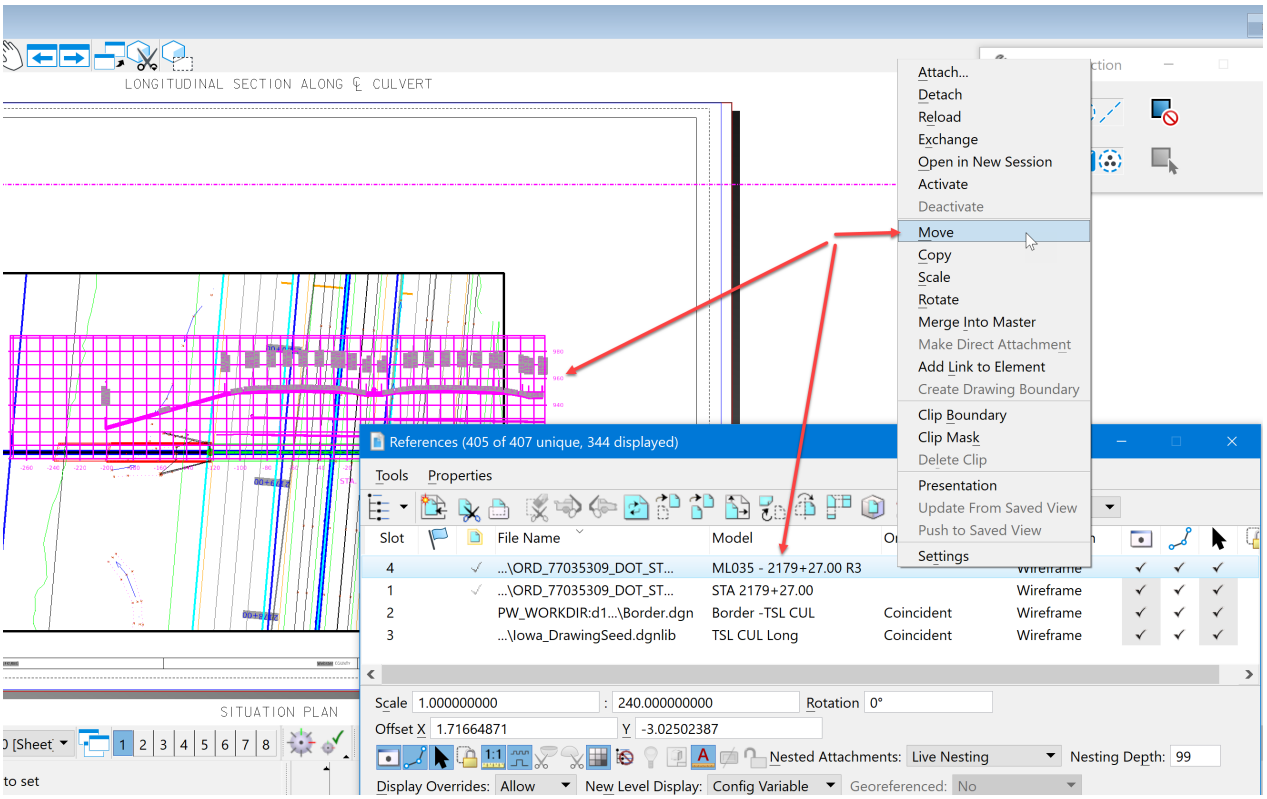


Click OK.

This will place the cross section on the sheet as the Longitudinal Cross Section. It will appear in the center of the sheet.

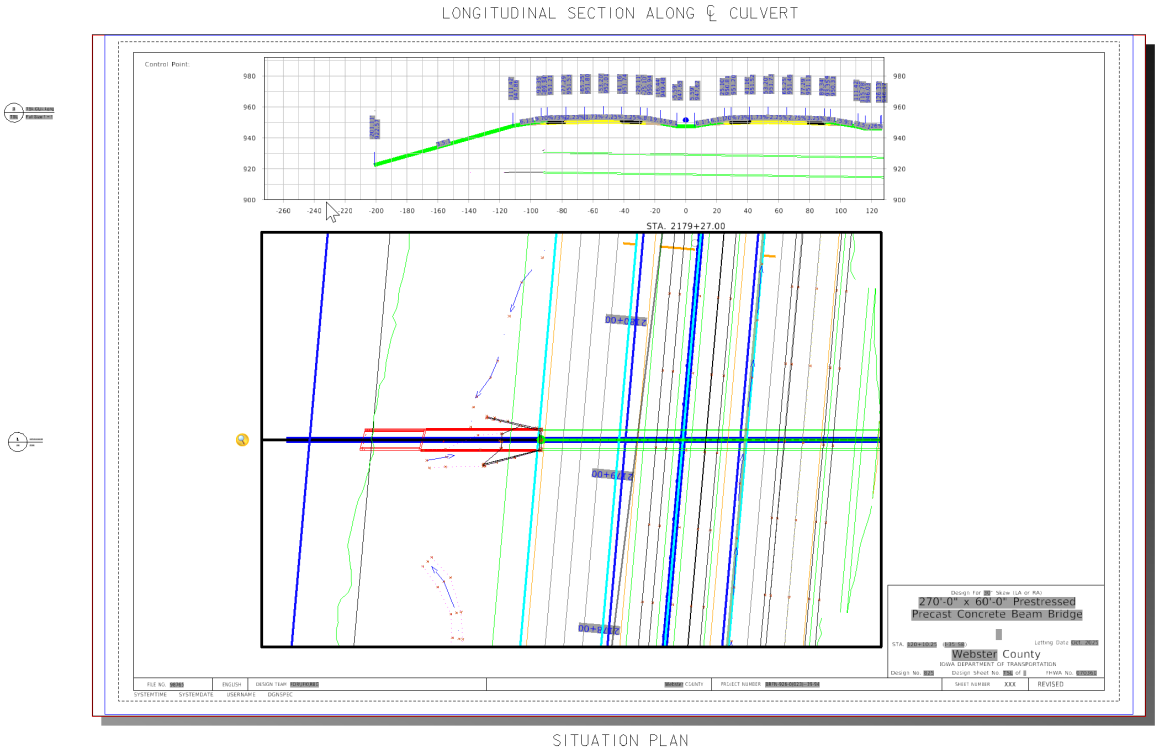


To move it to the proper placement, open the Reference dialog box. Then select it in the list, right click and select move. This is a reference so the reference move tool is used.



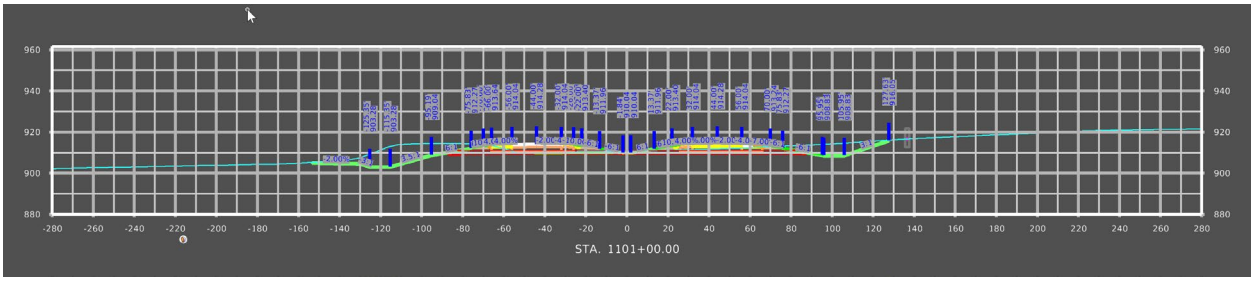
Data point somewhere outside of the sheet and with the AccuDraw compass locked vertically, move it up into the correct position.

The sheet should look something like this:



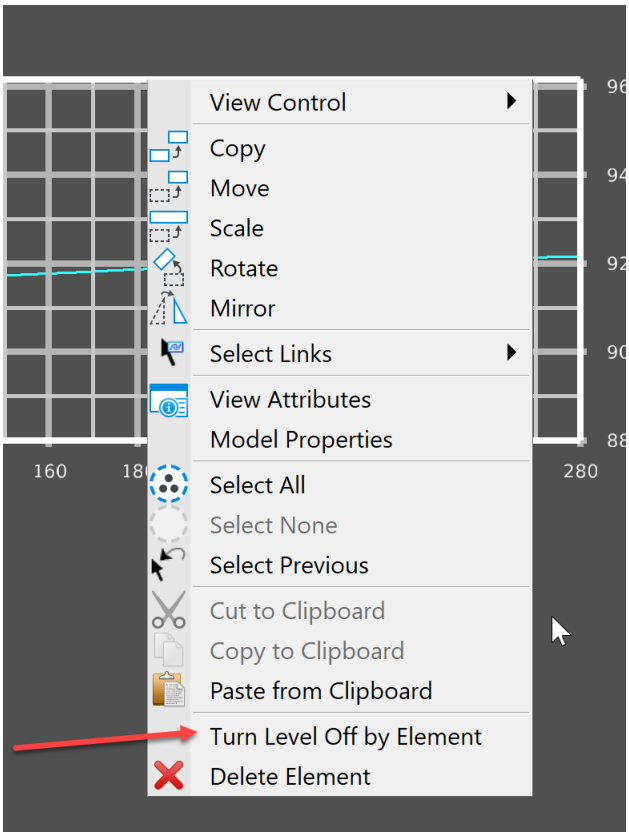
Next, annotate the structure in the Plan View drawing model and in the Longitudinal Cross Section drawing model.

For this example, start with the Longitudinal Cross Section drawing model.



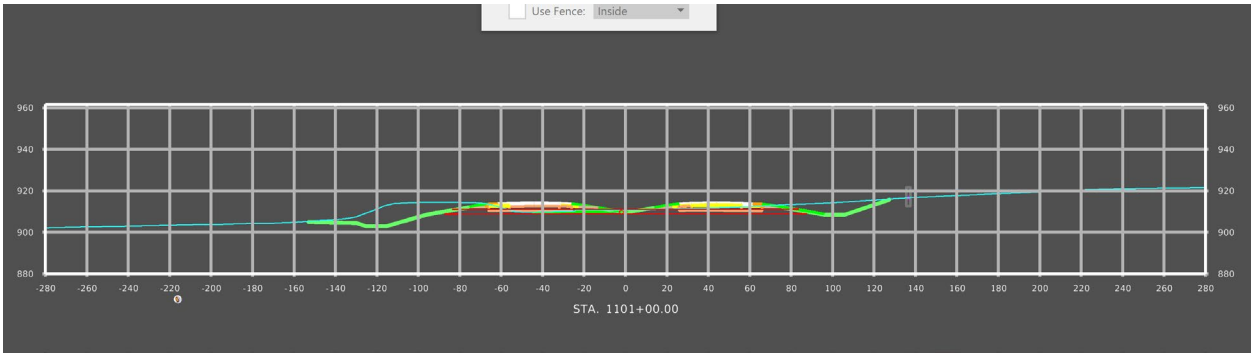
Turn off some of the automatic annotations of this Longitudinal Cross Section to make room for some of the information that needs to be displayed.

To turn off some of the automatic annotations, right click and hold to bring up the context sensitive menu.



Then select the Turn Level Off by Element option, click on the items not needed for the sheet.

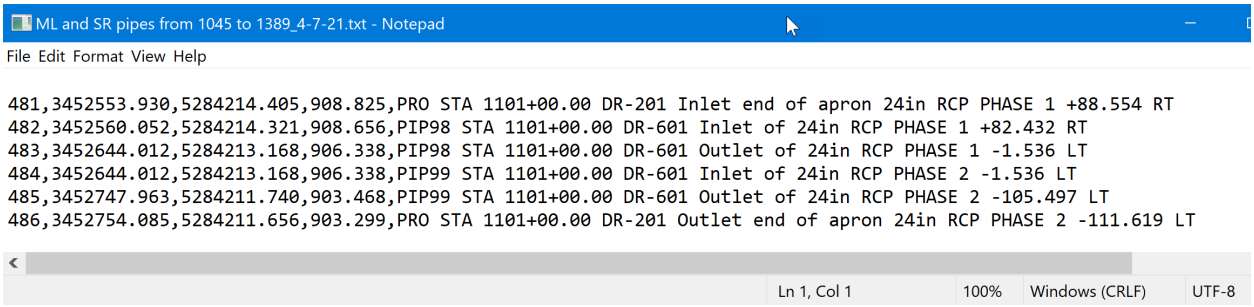
It should look something like this:



When annotating a structure in the Longitudinal Cross Section, label these items listed below.

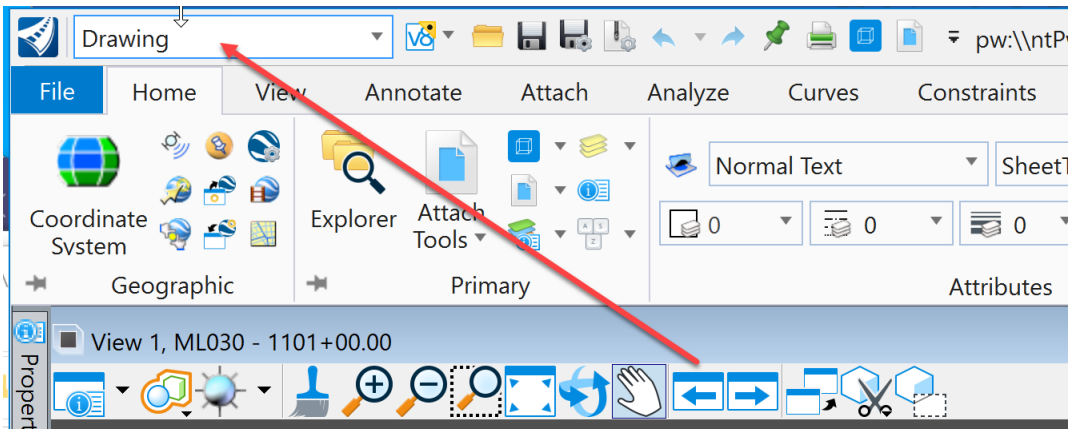
1. Design Cover.
2. Profile Grade Elevation.
3. Distance from centerline right.
4. Distance from centerline left.
5. Flowline Elevation at each critical point in the structure.
6. Structure description and any other unique items that need to be called out.
7. Total Distant Left and Right (if an offset baseline is need for that standard).
8. Also any other items that apply from the Preliminary Design RCB Checklist.

Some of this information is stored in the ASCII graphics input file. It is helpful to have that file open for the structure that is being annotated when doing this process. Copy and paste information from it to the Place Note tool to help save on typing.



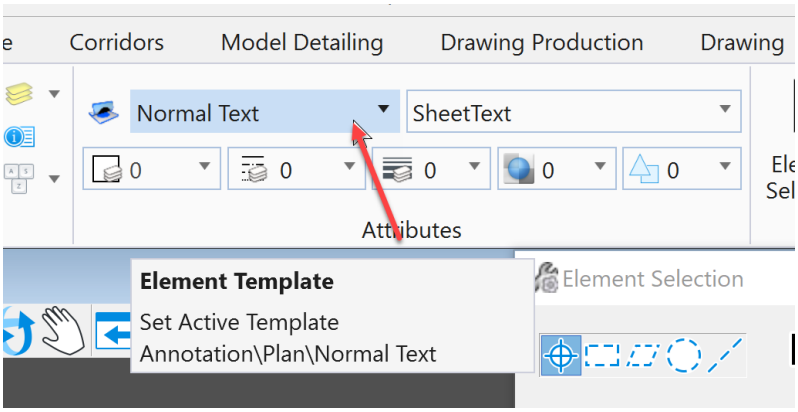
Before starting to place annotations, some settings need to be selected. The first is to change the workflow to the Drawing workflow.

Note: This may be a user's preference because some users find it easier to locate the tools to annotate in this workflow. These tools are available on other workflows as well.



The second is to select the correct Element Template for placing the annotations.

Click on the Element Template pull down in the Attributes toolbox on the home tab.



Browse down to the Annotation Plan folder and select the Dimension Text Element Template.

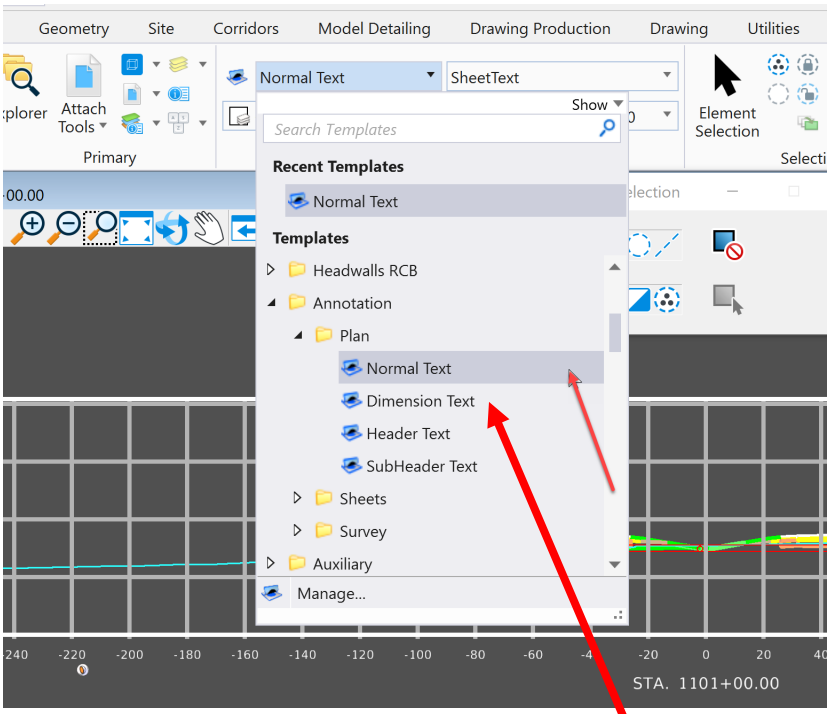
Typical use of the options is:

Normal Text - Use for any notes that are not dimension leader notes.

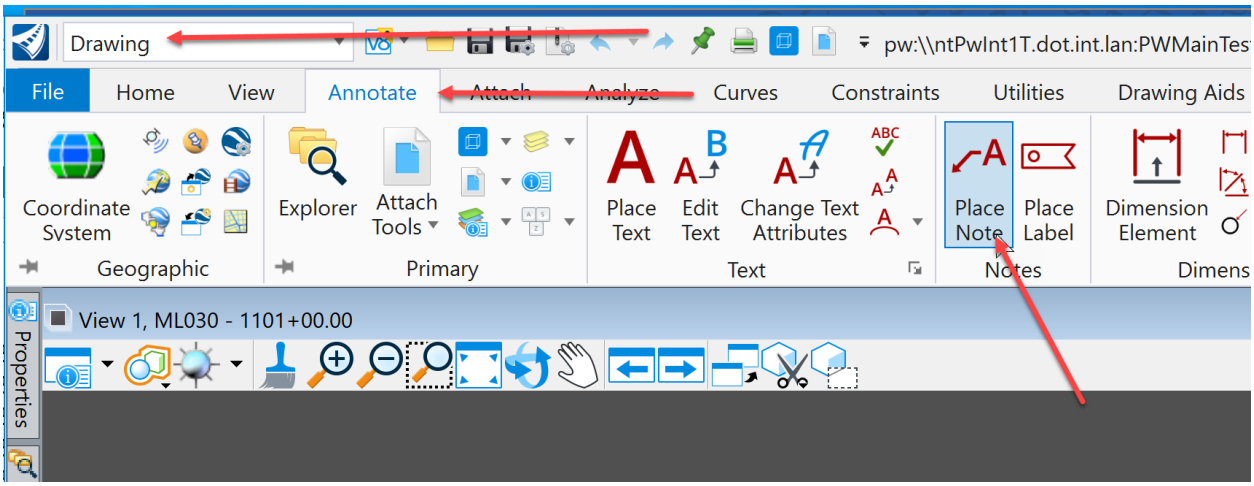
Dimension Text - Use for all dimensions, leader notes and dimensional numerical values and text used in tables or fields. See tables used on Iowa DOT Culvert Barrel Details standard sheets as an example.

Header Text - Use for all headers and title blocks.

SubHeader Text - Use when Header and Normal text do not seem appropriate. An appropriate case would be the word Notes used when labeling a group of notes or instructions.

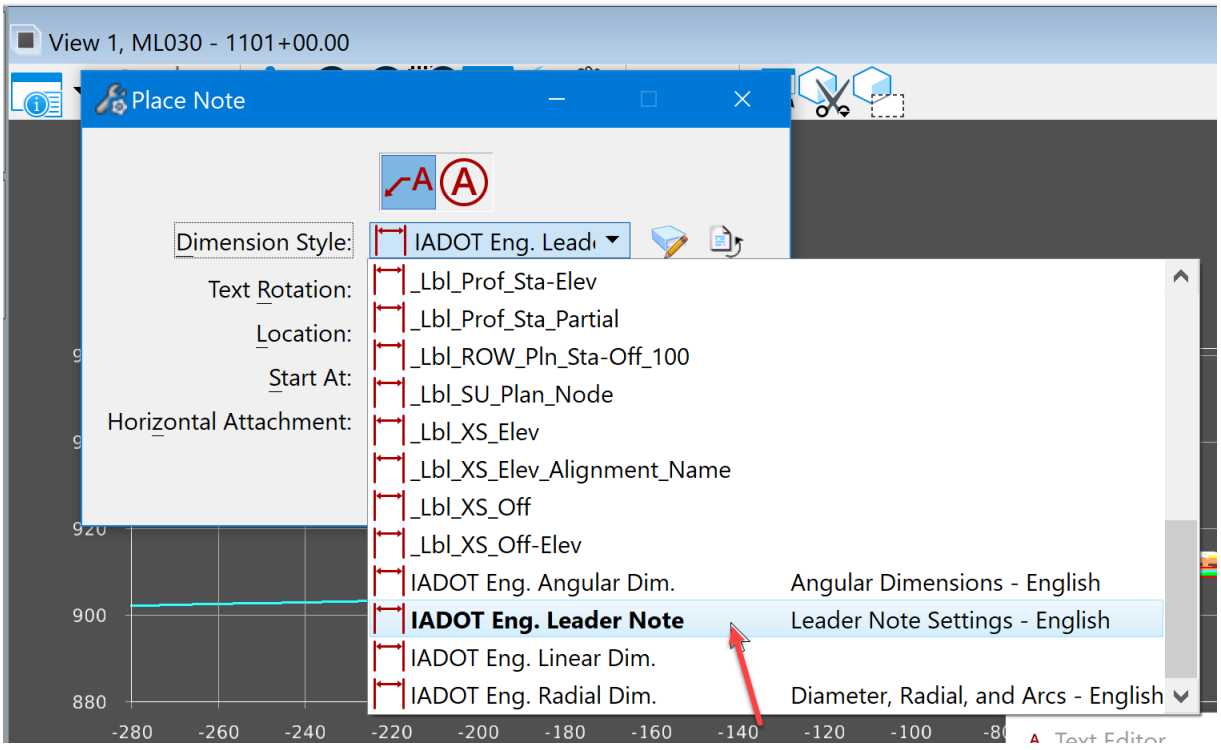


Next, select the correct annotation tool. This example will be for placing the Flowline Elevation at the Inlet end of the apron and the offset from centerline. Use the Place Note tool.



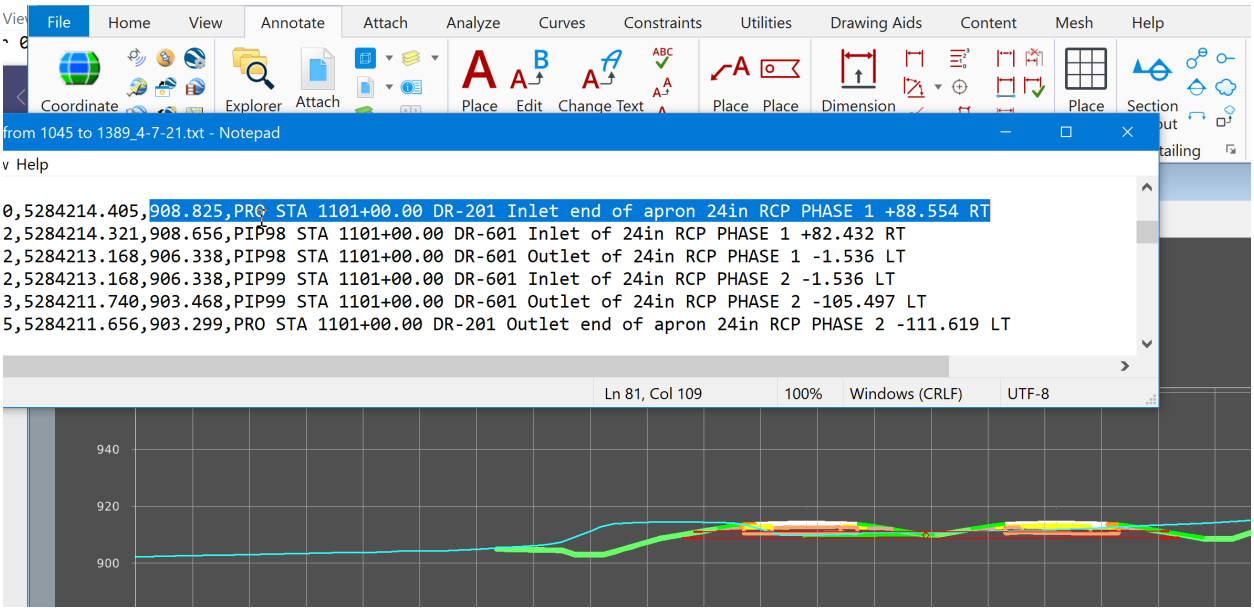
Selecting the Place Note tool will open the dialog box. Select the correct Dimension Style.

For this example use the IADOT Eng. Leader Note style.

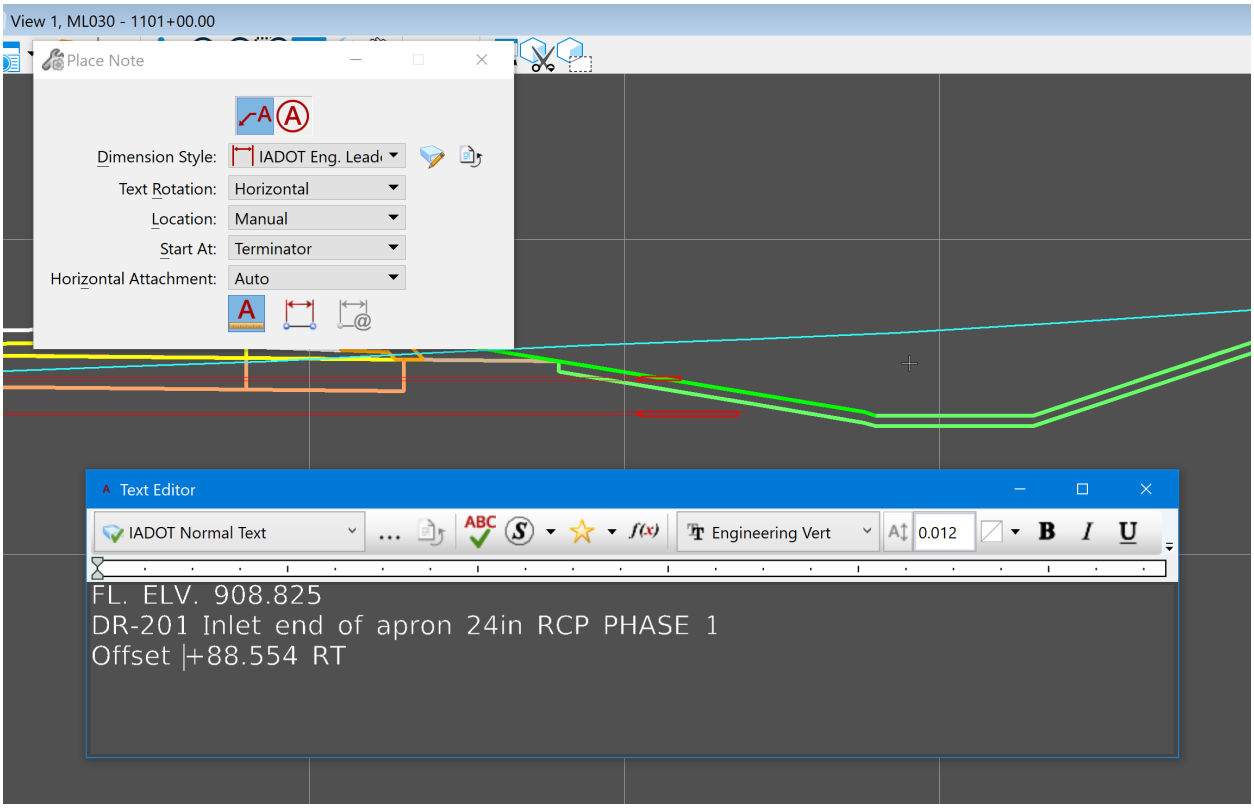


By selecting the correct Dimension Style and Element Template, this ensures the notes are placed with the correct settings. Once this is set, type in the note needed.

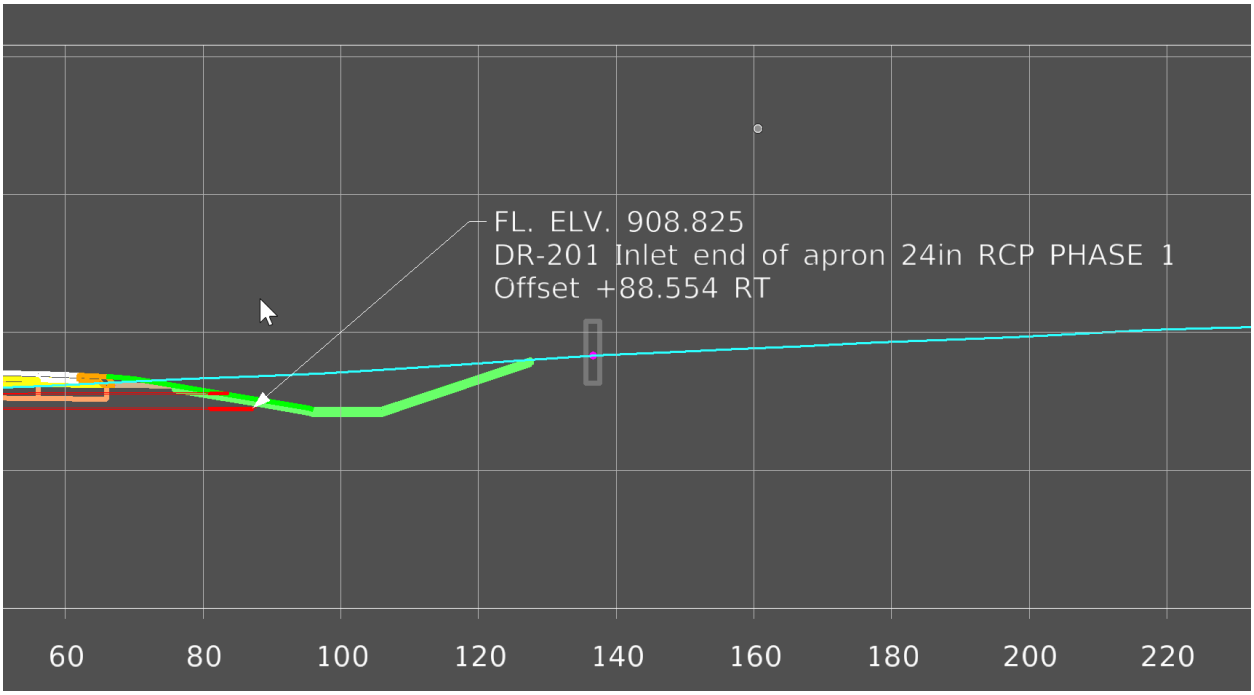
This is where the ASCII graphics input file may be used. With it opened to the specific structure, highlight the information needed to be placed and copy it from the ASCII graphics input file.



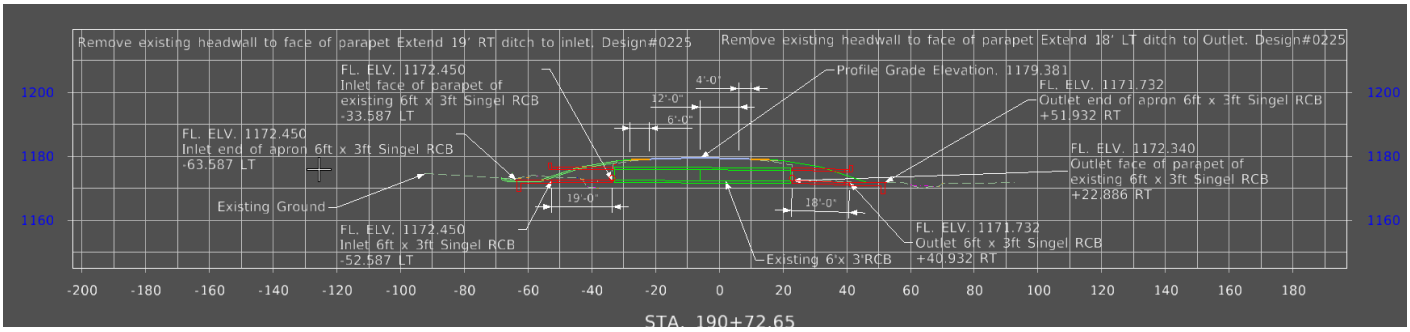
Then paste it into the text window.



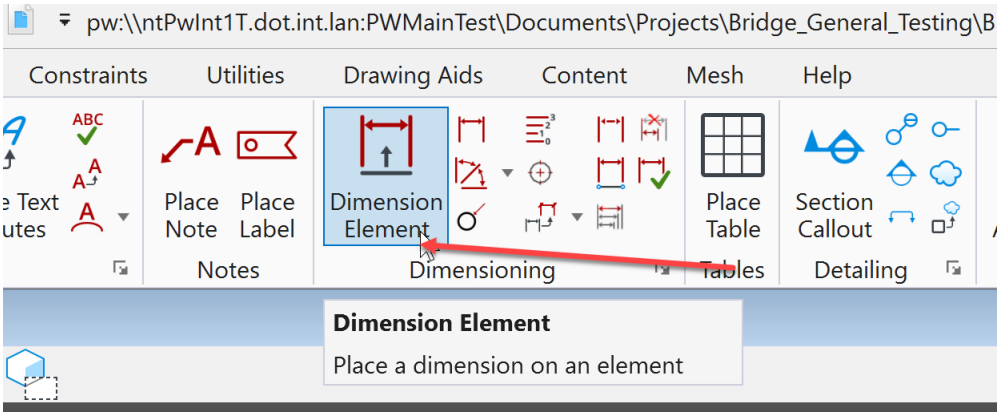
Snap to the appropriate point to locate the note and place the note.



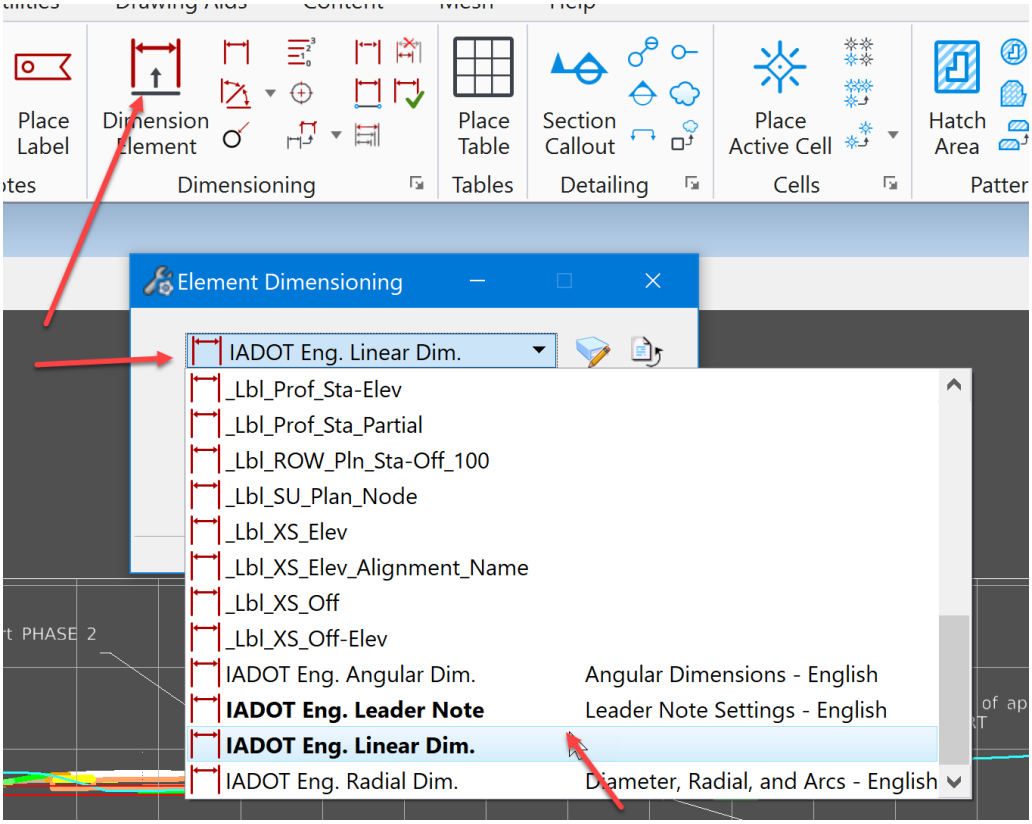
Then repeat the same process to place all the annotation notes needed. When complete it should look something like this:



Once done placing the notes, then dimension the structure. Select the Dimension Element tool on the Annotate tab in the Drawing workflow.

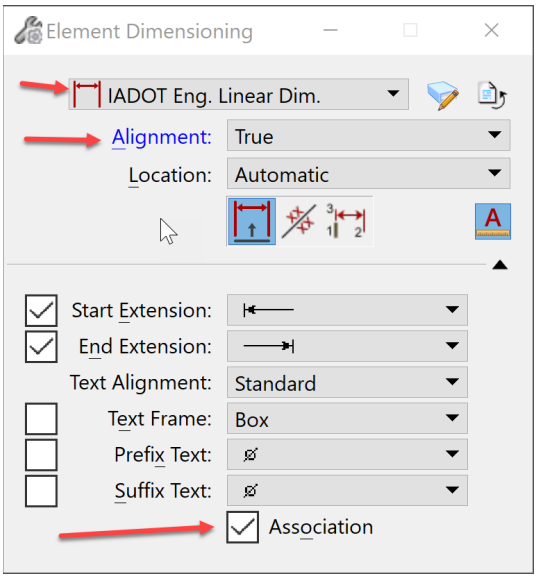


Next, select the correct Dimension Style. This example will use the IADOT Eng. Linear Dim style.

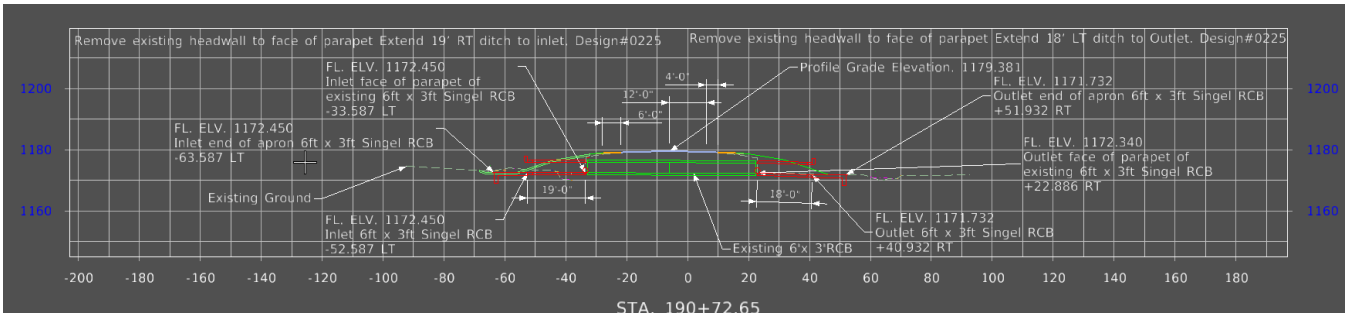


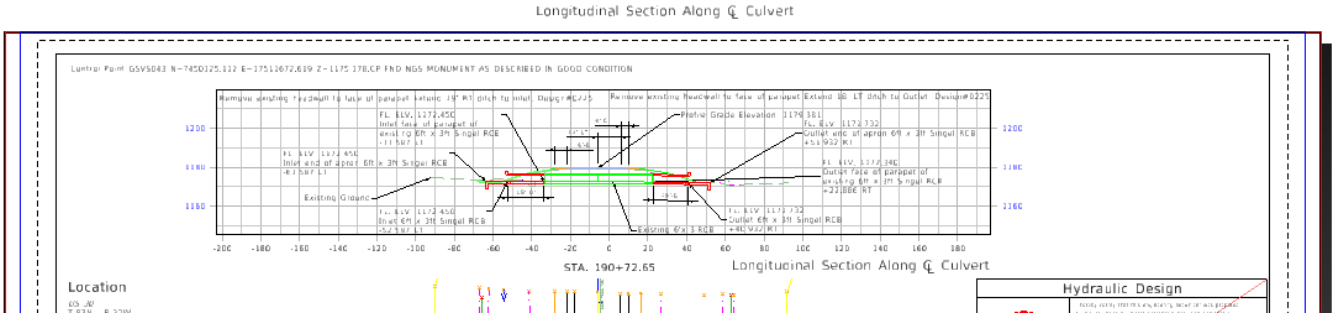
By selecting the correct Dimension Style and Element Template, this ensures the dimensions are placed with the correct settings.

Next, set the **Alignment** to True and the **Location** to Automatic. If Association is toggled on, it will make the dimension capable of auto correcting if the structure is adjusted.



It should look something like this:



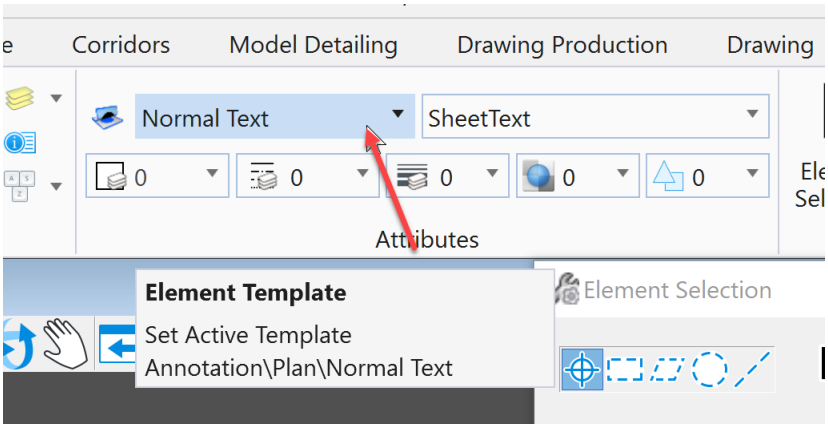


Next, annotate the Plan View portion of the TSL Sheet.

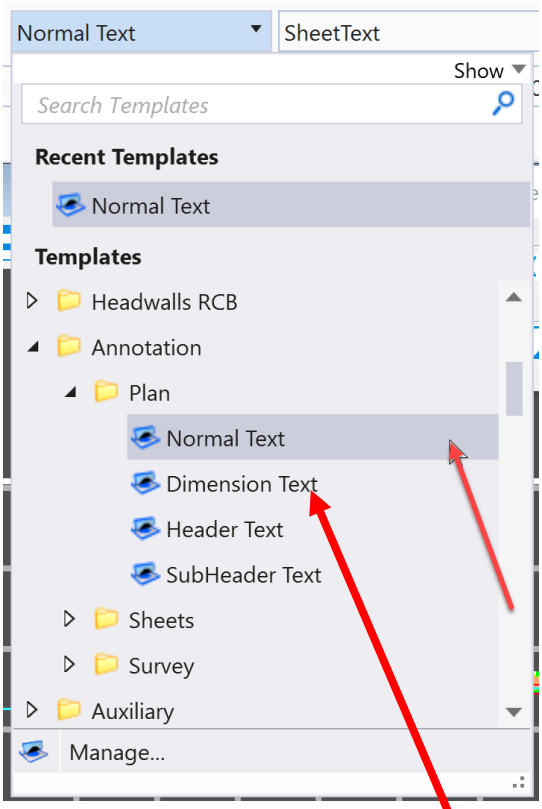
When annotating a structure in the Plan View, label these items listed below.

1. Station at centerline of structure = centerline of the alignment.
2. Station at Even Station tic marks before and after the structure.
3. Station of the outside corners of the proposed revetment.
4. Dimension distance from centerline left.
5. Dimension distance from centerline right.
6. Dimension to length of new structure.
7. Also any other items that apply from the Preliminary Design RCB Checklist.

Similar to annotating the Longitudinal Cross Section, make sure to select the correct Element Template for placing the annotations.

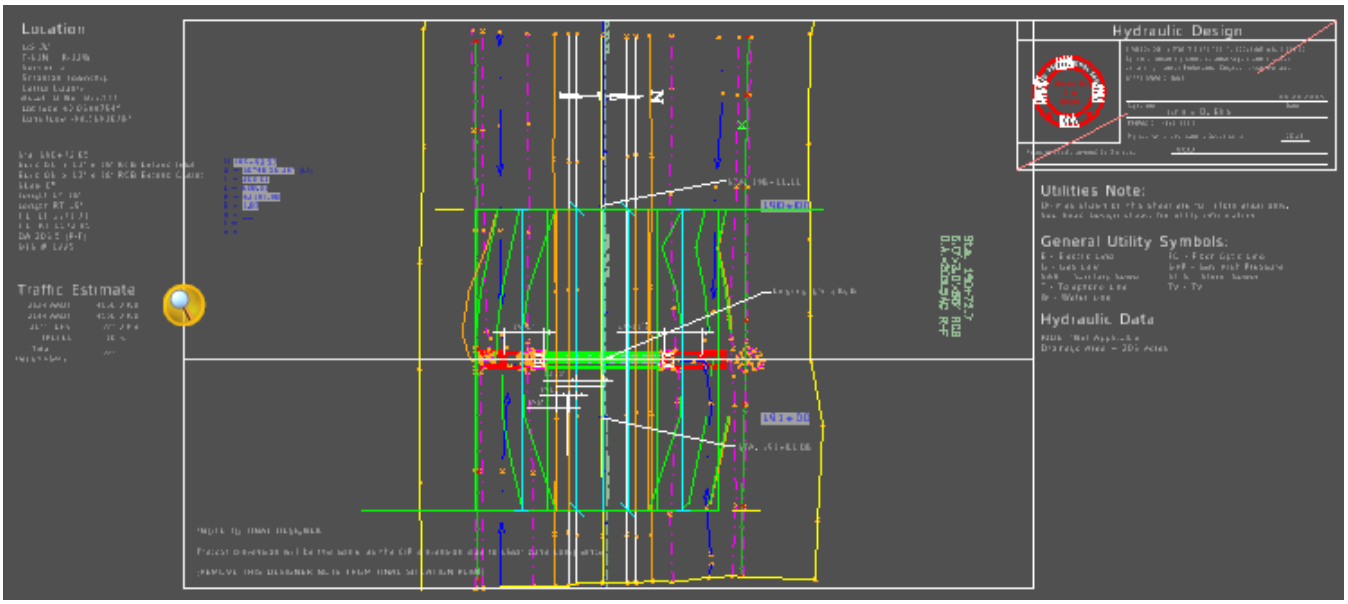


Browse down to the Annotation Plan folder and select the Dimension Text Element Template.

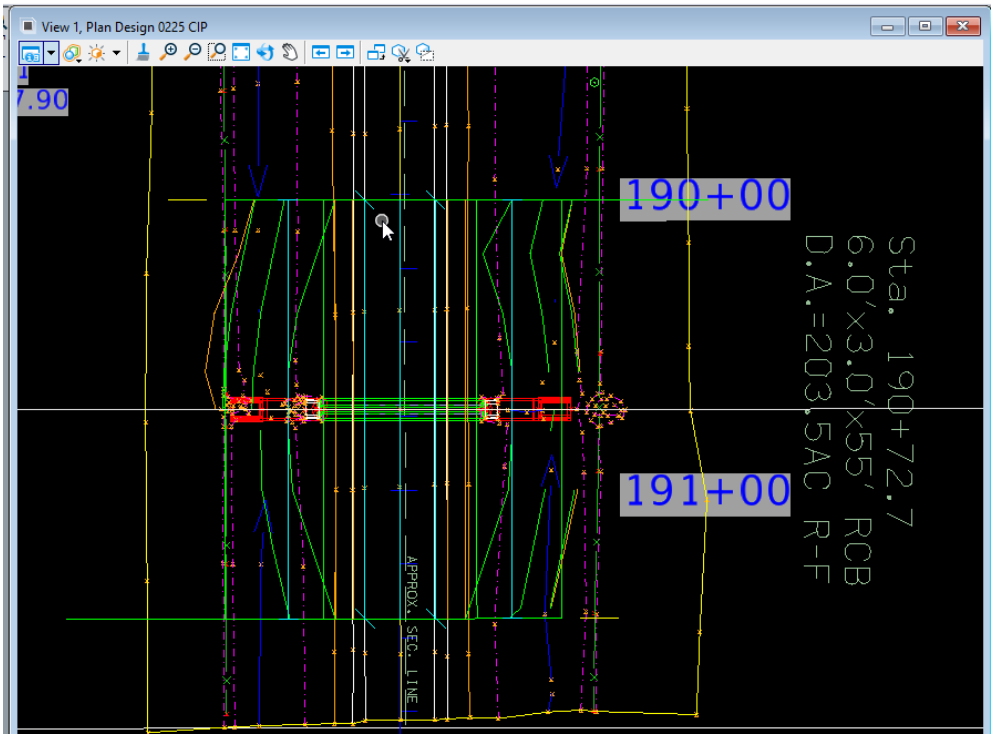


By selecting the correct Dimension Style and Element Template, this ensures the notes are placed with the correct settings.

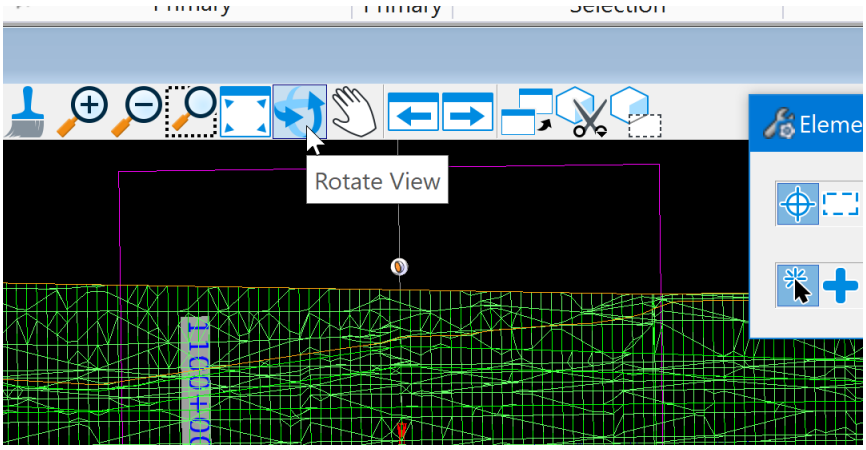
It should look something like this:



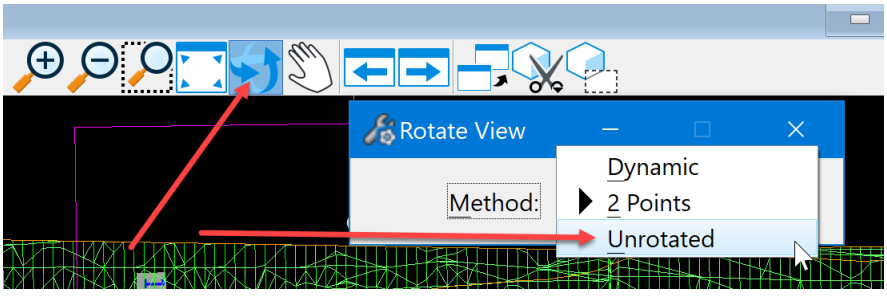
Once all the annotation is complete, then place the North Arrow in the Plan View. Go to the Multi-Model View in the 2D Design model in the SHT file.



Then reset the rotation of the view to unrotated. Select the Rotate View tool at the top of the view.

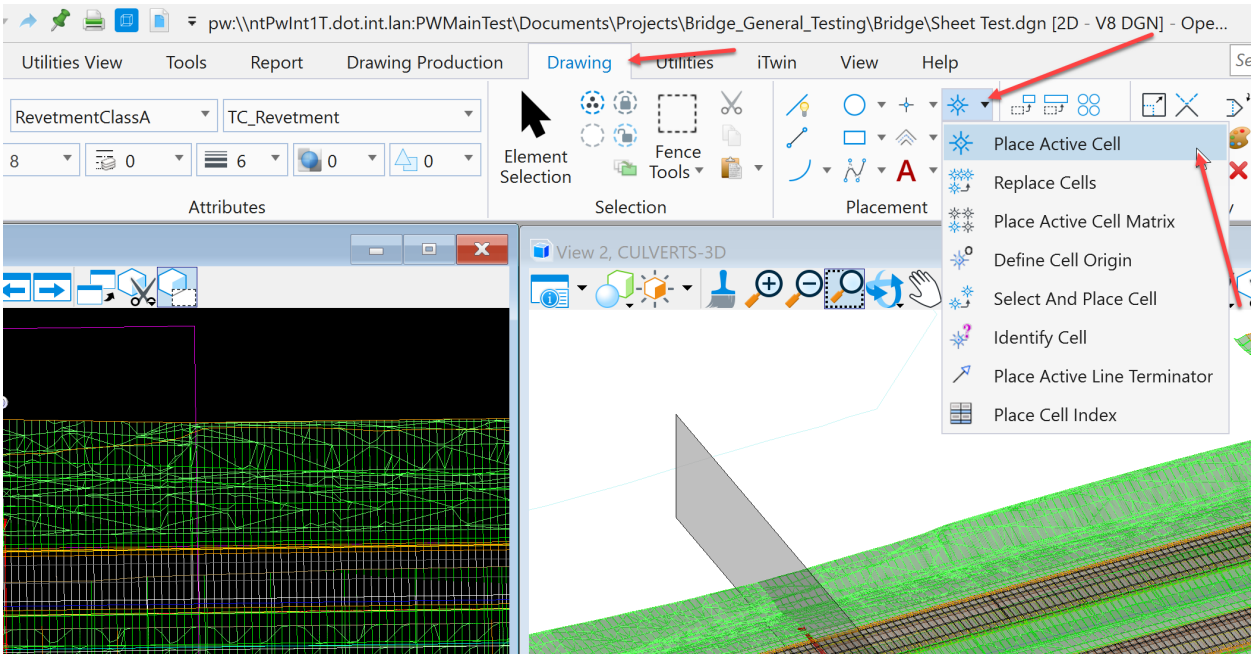


Select the Unrotated Method.

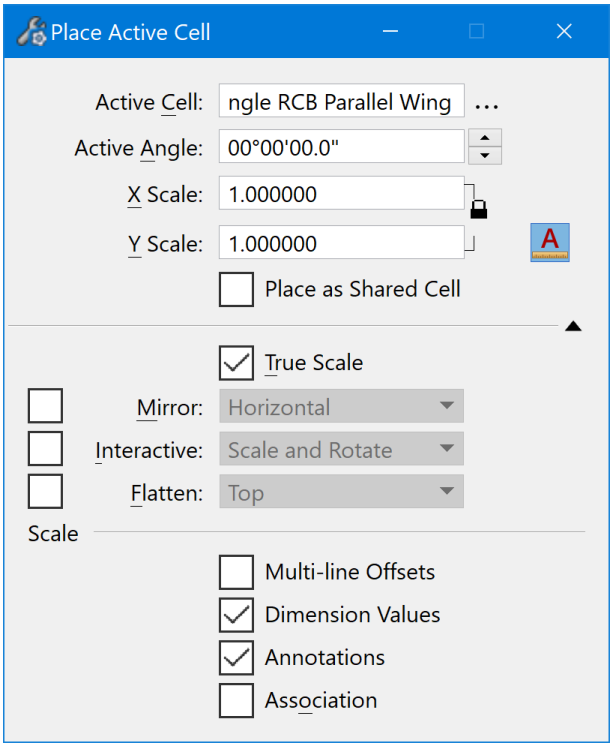


This will set it so that the Design model will have North to the top of the view.

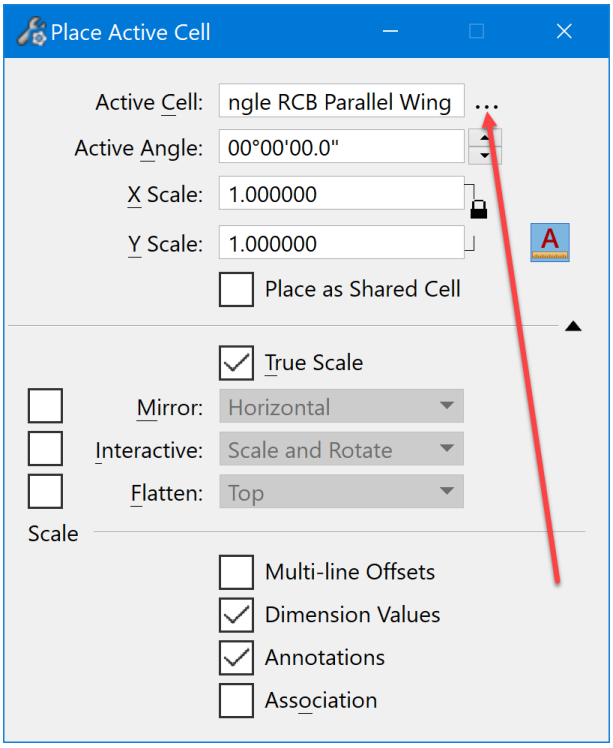
Next, choose the Place Active Cell tool on the Drawing tab in the placement toolbox.



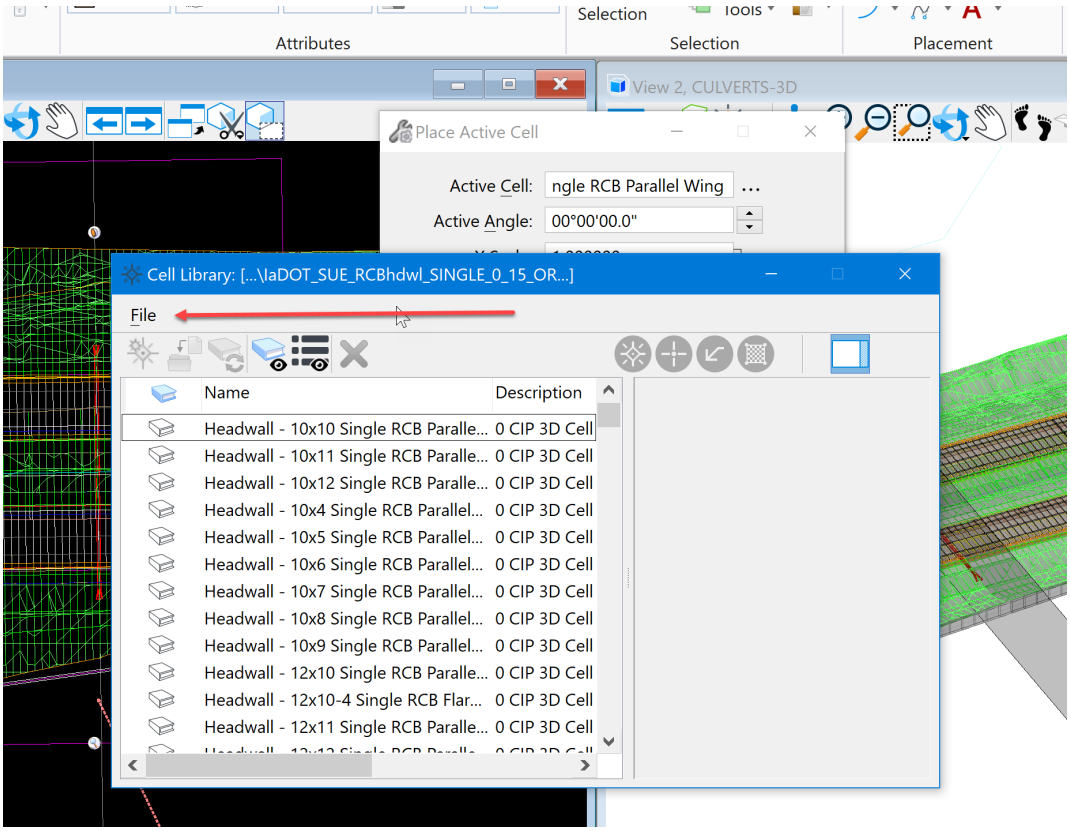
It will open the Place Active Cell dialog box.



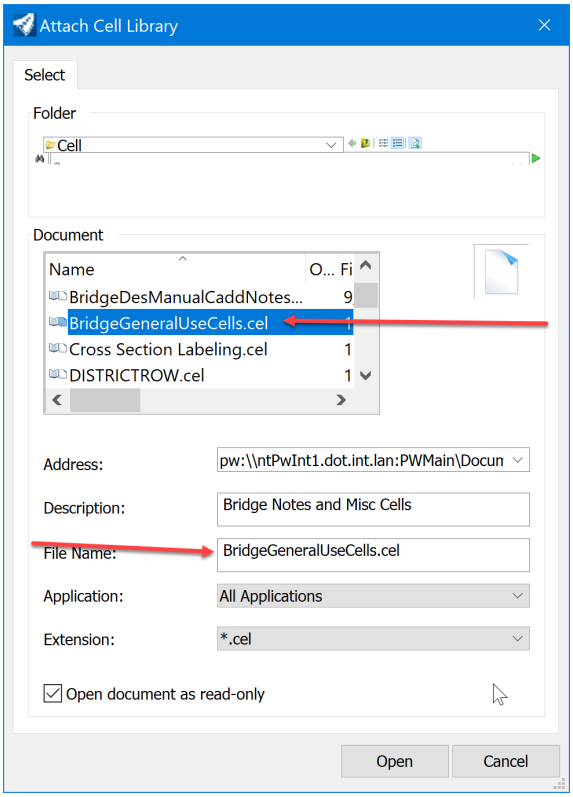
Make the North Arrow cell the active cell. Click on the three dots next to the Active Cell field.



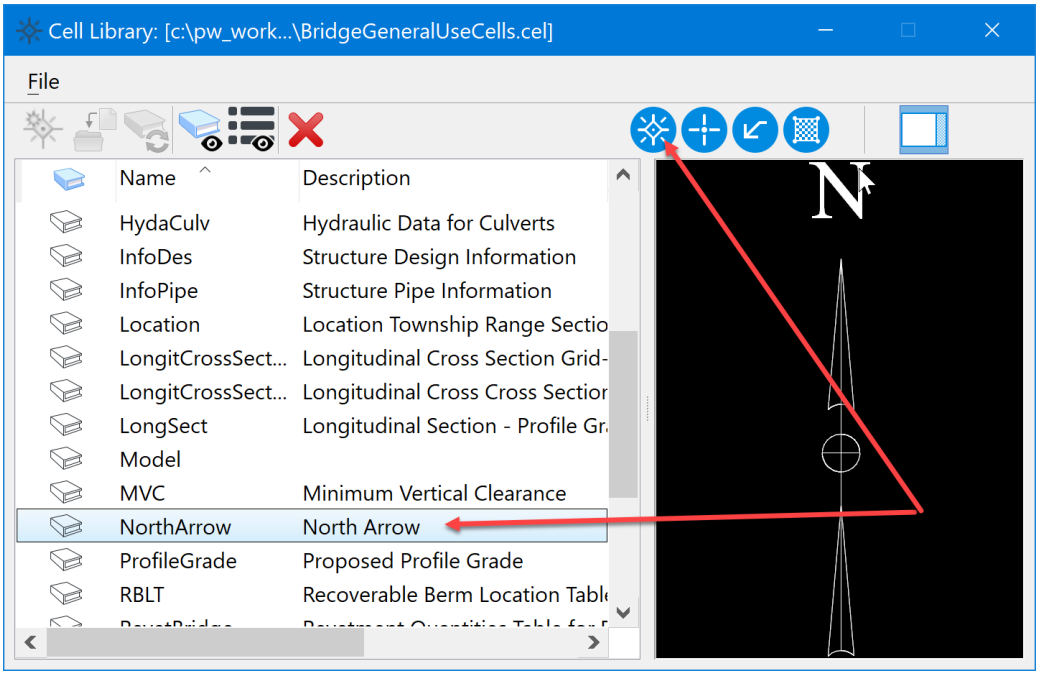
It will open the Cell Library dialog box.



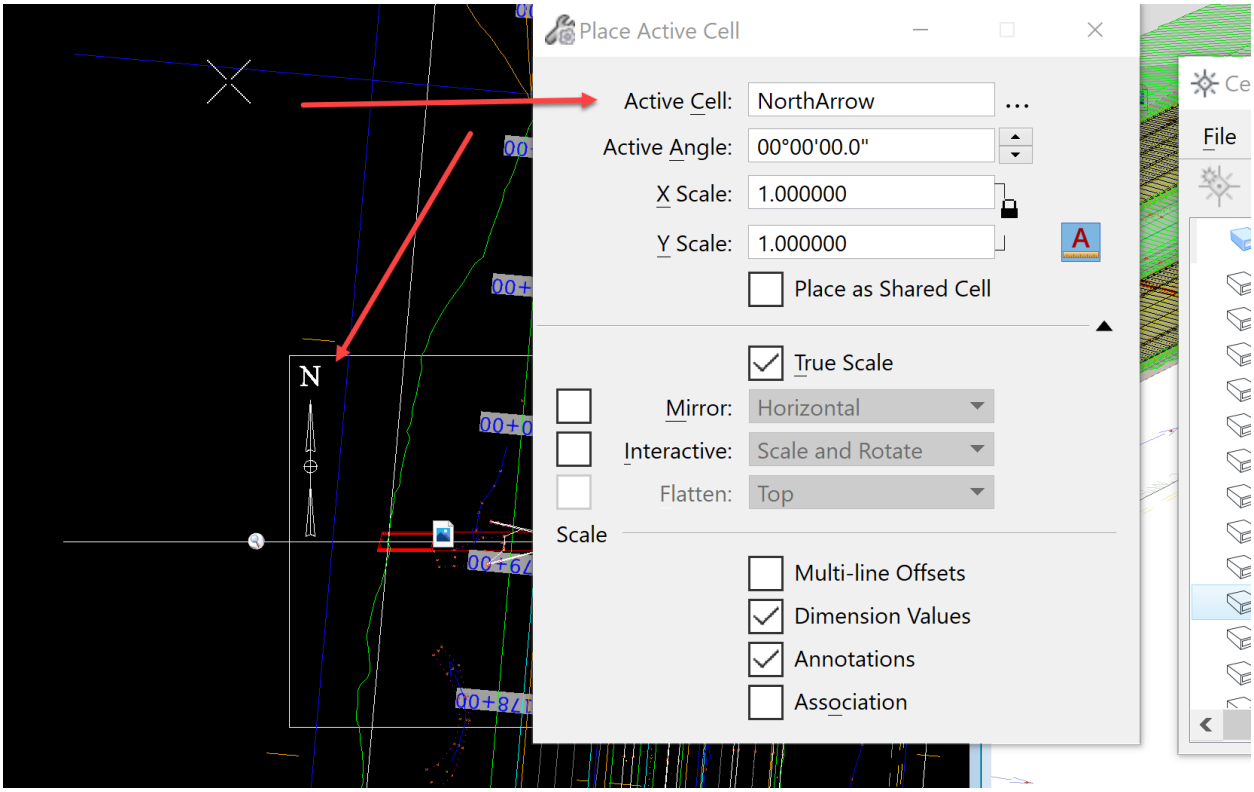
Click on the File menu to browse to the BridgeGeneralUseCell.cel file under PWMain\Documents\IowaDOTStandardsConnect\Configuration\Organization-Civil\IowaDOT_Standards\Cell\BridgeGeneralUseCells.cel and select the North Arrow cell.



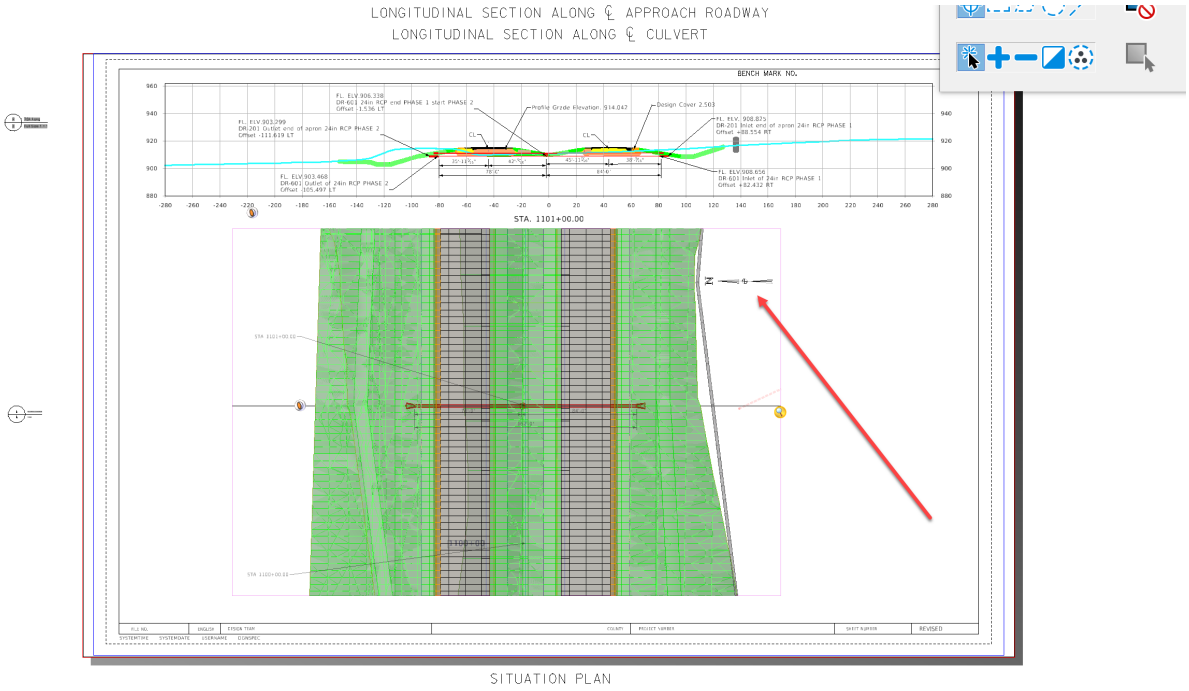
Then click on the Place Active Cell tool.



Place it in the Unrotated 2D design model within the plan view boundary.



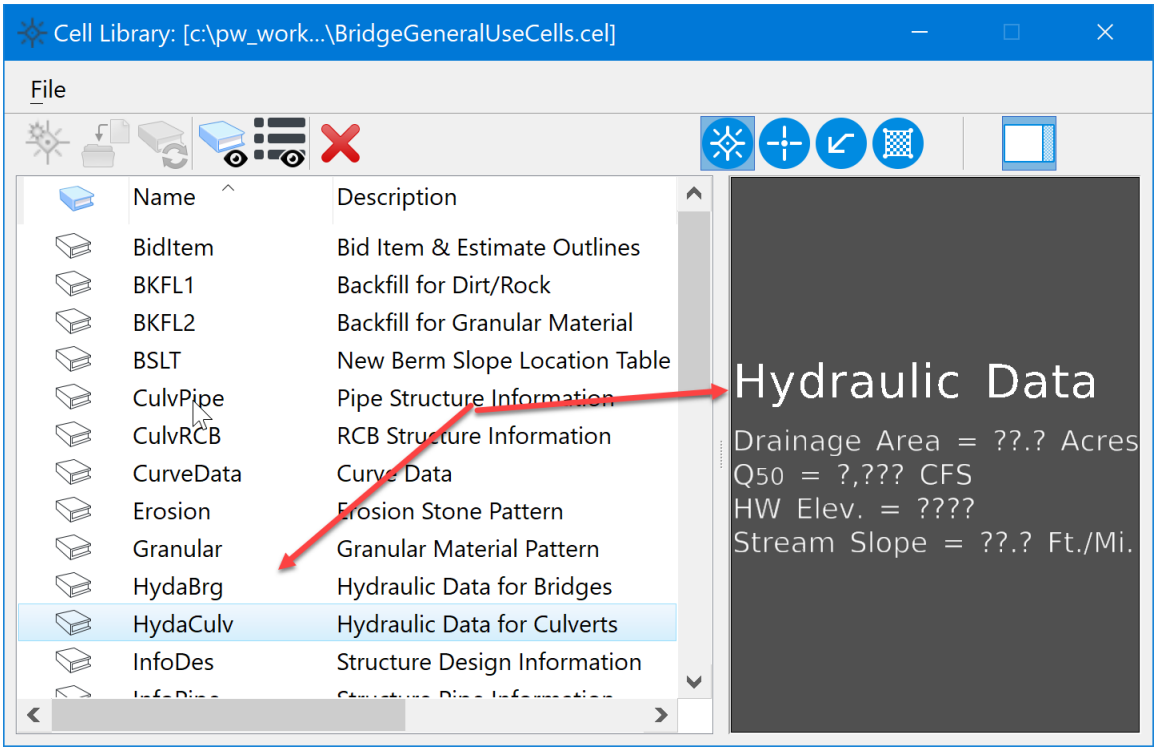
This will make it appear on the sheet at the correct scale and true North Azimuth of the Design file.



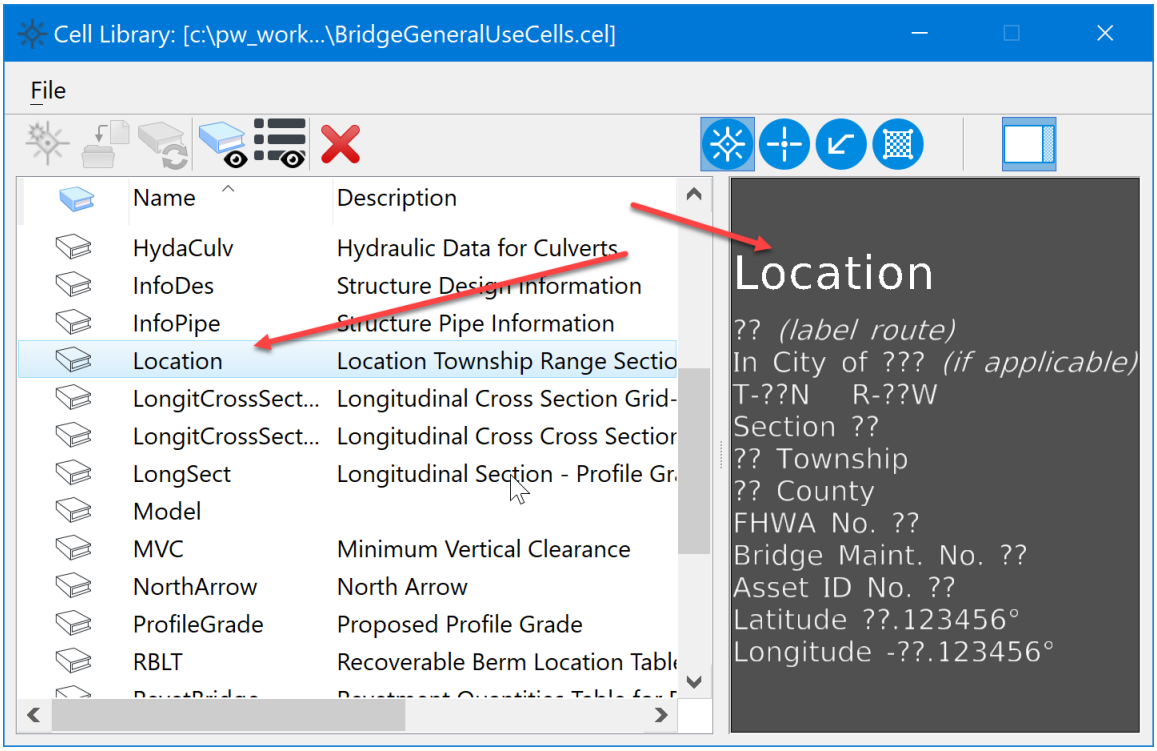
Next, place any of the other notes that need added to this sheet model to properly convey the design intent of the structure.

In the plan view Drawing model, place the following cells.

1. Hydraulic Data.

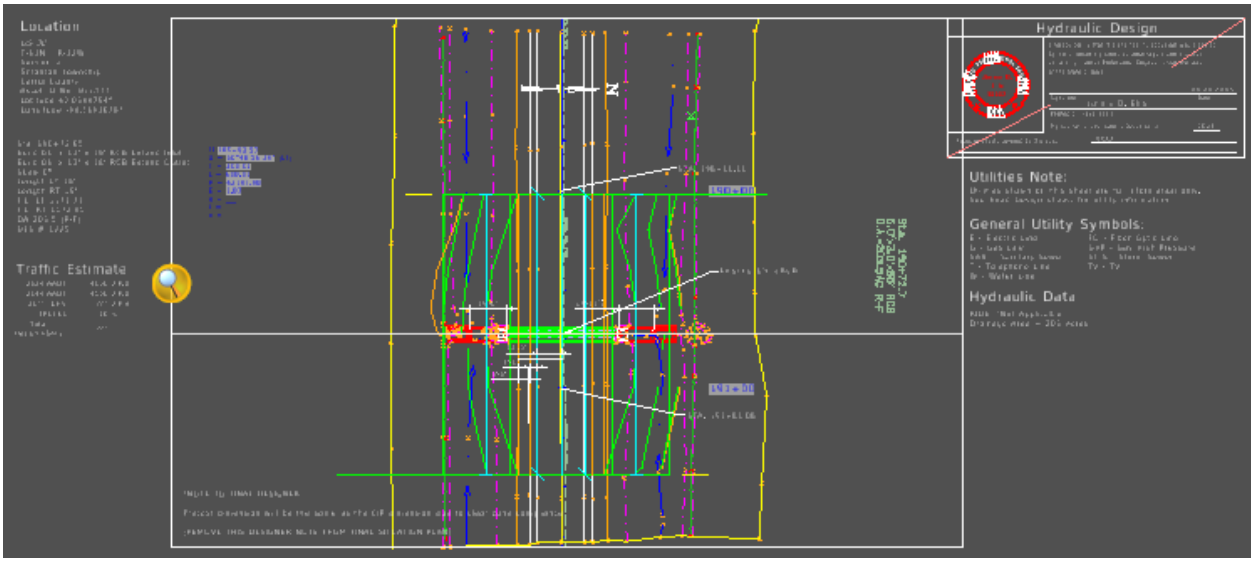


2. Site location.

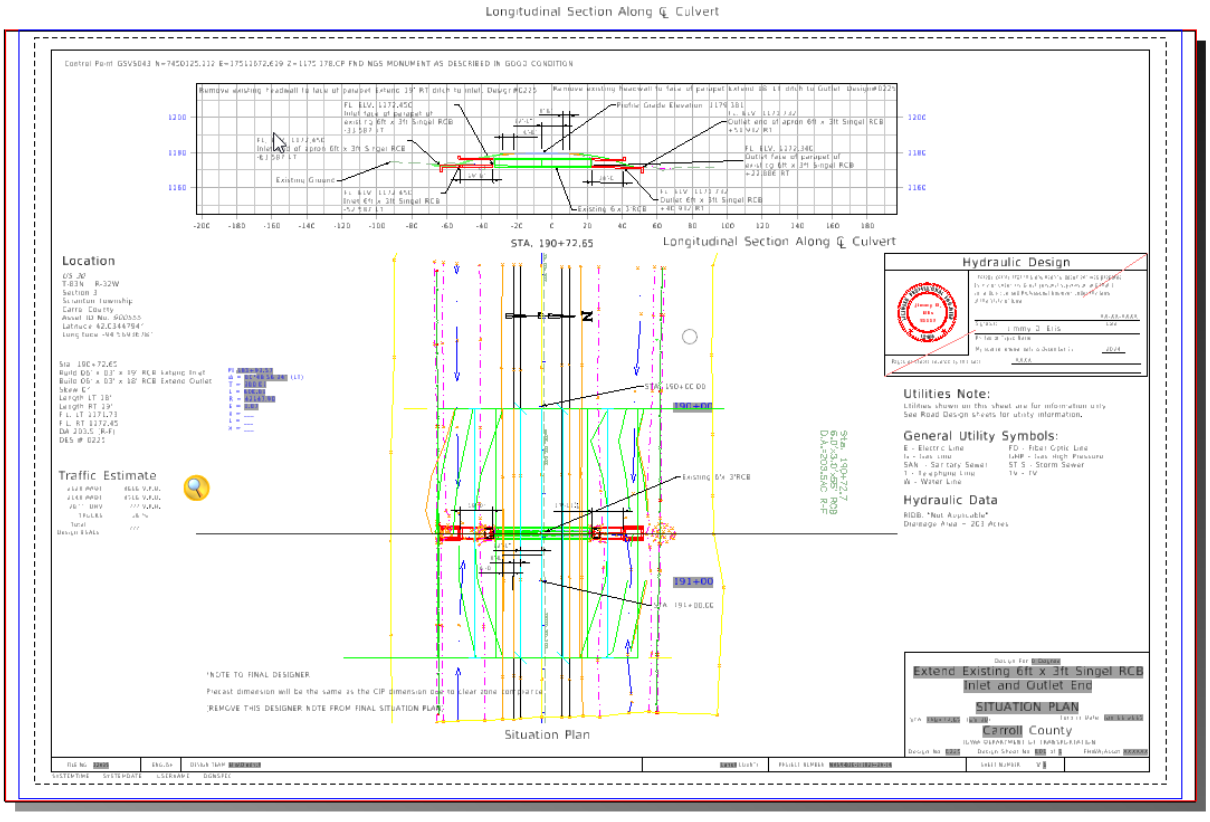


3. Any other notes needed to convey the design intent of the structure. Also any other items that apply from the Preliminary Design RCB Checklist.

Once completed, it should look something like this:



The sheet model should look something like this:



Situation Plan

Next, enter the Control Point information on the sheet. This information is in the SHT_PS_CCRRRPPPZ00.dgn file in the PrelimSurvey directory in ProjectWise. Once the correct control point for the structure is determined, edit the text on the sheet model of the TSL sheet to add this information.

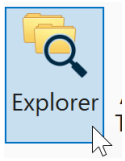
The last steps in completing the TSL sheet is the Title Block information and working with the Sheet Index in the IaDOT_WS file that is accessed thru the Project Explorer. Refer to the next chapter CW07 Editing Title Block Information on TSL Sheets and Printing

Editing Title Block information on TSL Sheets and Printing Sheets

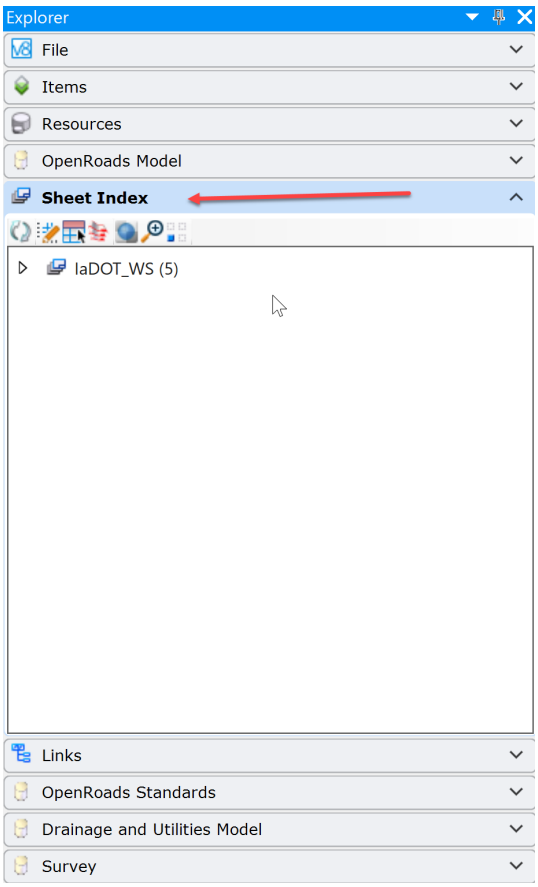
These instructions were created with:

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

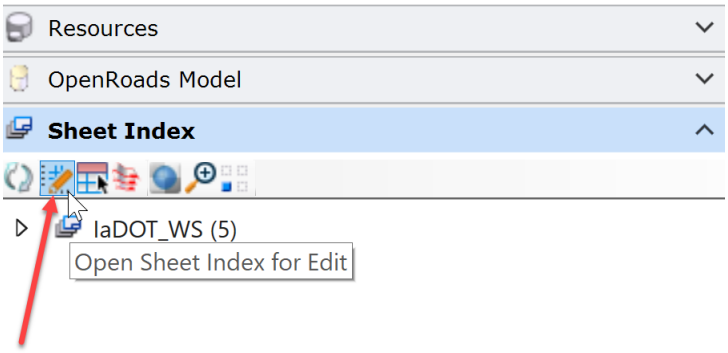
When using the Sheet Models in the Iowa DOT Bridge Bureau seed files, the Title Block and sheet border have text fields that are set up to work with the **IaDOT_WS.dgnws** Sheet Index file. This file is in the **ProjectResources\Workset** folder of every Bridge Project Directory. The IaDOT_WS.dgnws Sheet Index file is specific to each WorkArea that it resides in. The Sheet Models are added to the Sheet Index to autofill the text fields. Access the Sheet Index thru the Project Explorer. The Sheet Index can only be edited by one user at a time.



Project Explorer displays the Sheet Index as shown below.

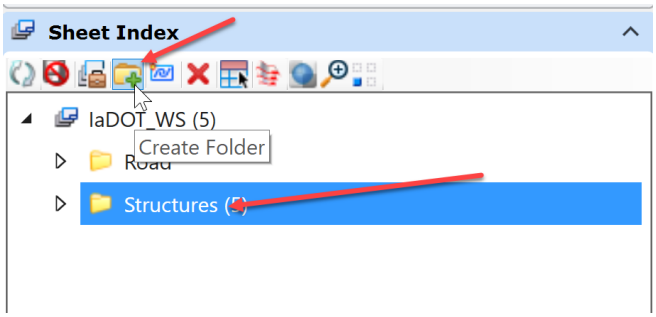


Next, open the Sheet Index for editing. Click on the Open Sheet Index for Edit button.

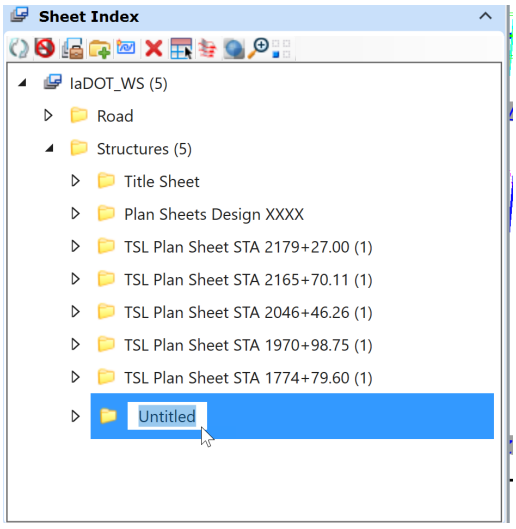


Add the folders that the sheets will reside in. Typically, the process is to create a folder for each Structure Design Number.

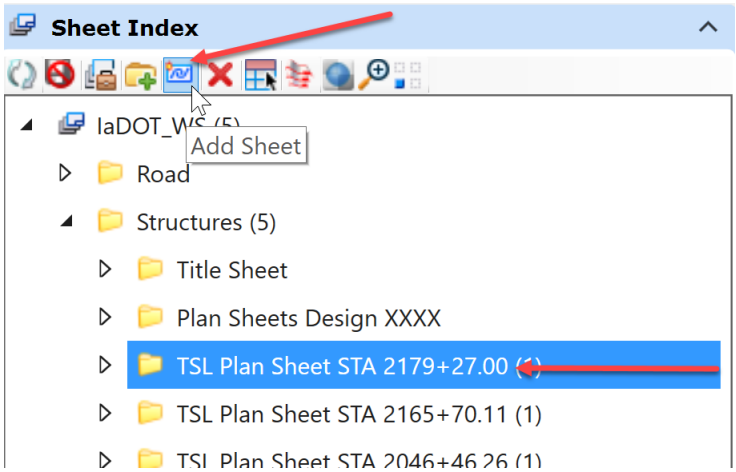
Note: At this stage the design number may not be known for each structure, so name it something specific to the structure. Once the design number has been assigned then rename the folder. This example will use the Design Station of the structure. To add a folder, click on the structures folder so that it is highlighted and click on the create folder button.



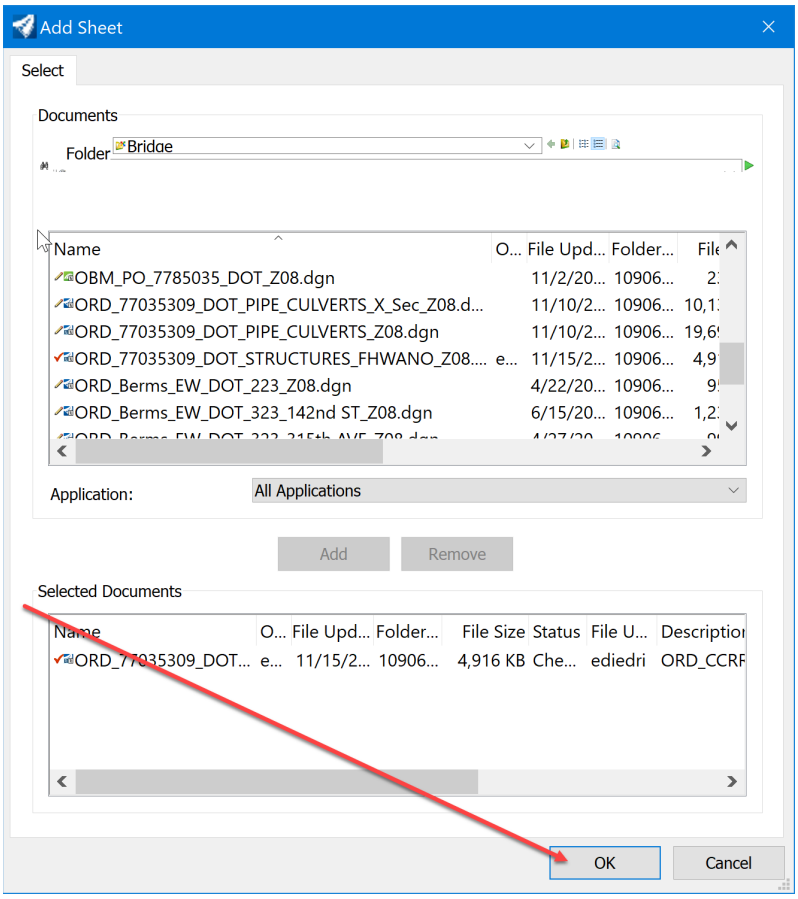
The folder will be added and named Untitled. To rename the Untitled folder, either right click and select Rename or edit it in the folder properties. Rename it the Design Number or the Station of the structure.



Once the folder is created for the design then add the sheets to it. Select the folder that the sheet will reside in and click on the Add Sheet button.



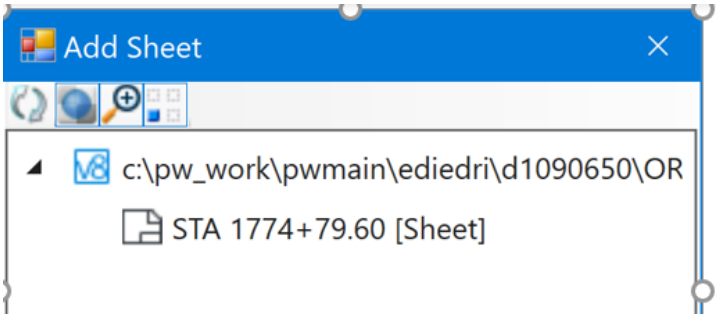
The Add Sheet dialog box will open. Browse to and select the DGN file the sheet is in thru the Select tab.



Click the Add button.

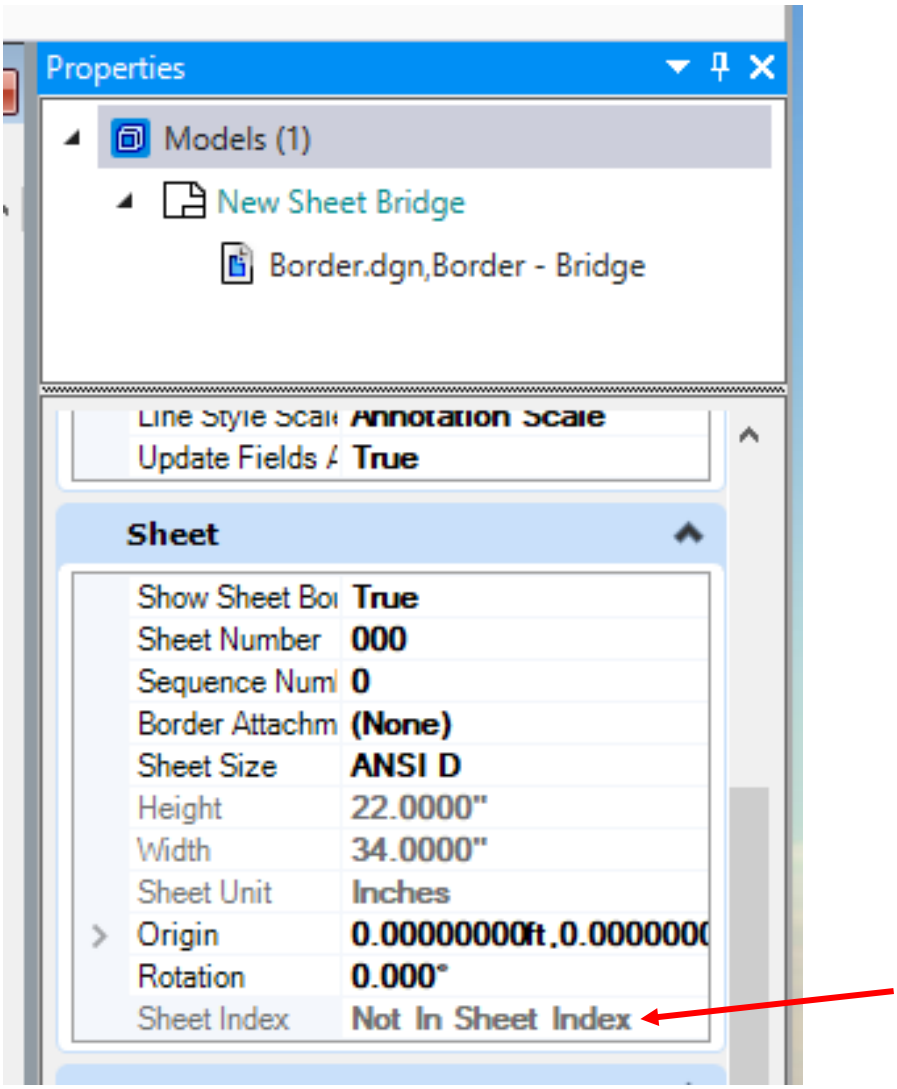
Click the OK button.

The list of available sheets will display. Select the sheet that will reside in this folder. The Add Sheet list will only show Sheet Models that are not part of any Sheet Index. A Sheet Model is only allowed to be assigned to one Sheet Index, not multiple indexes.

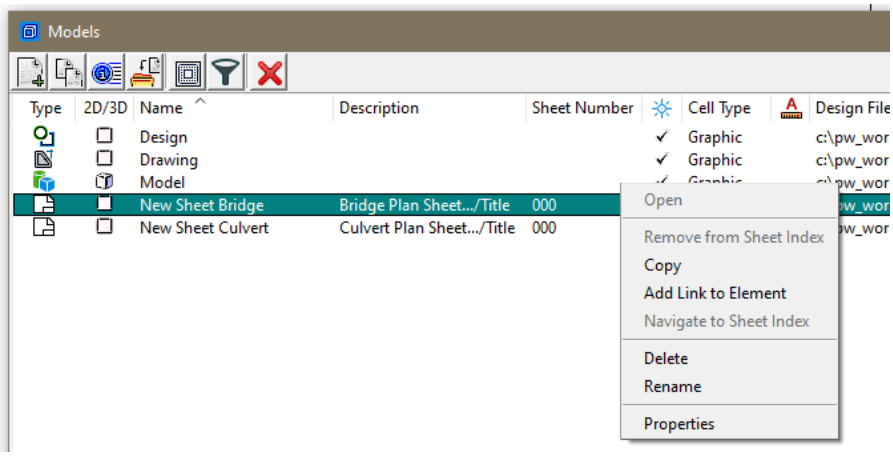


In the Properties of the Sheet Model it will show if the sheet is part of a Sheet Index or not.

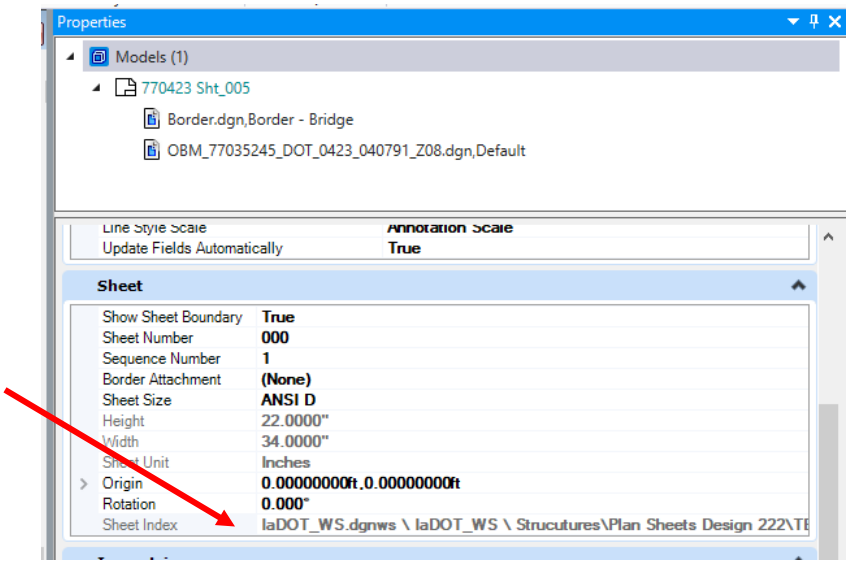
Example below is showing the Sheet Model is Not in a Sheet Index.



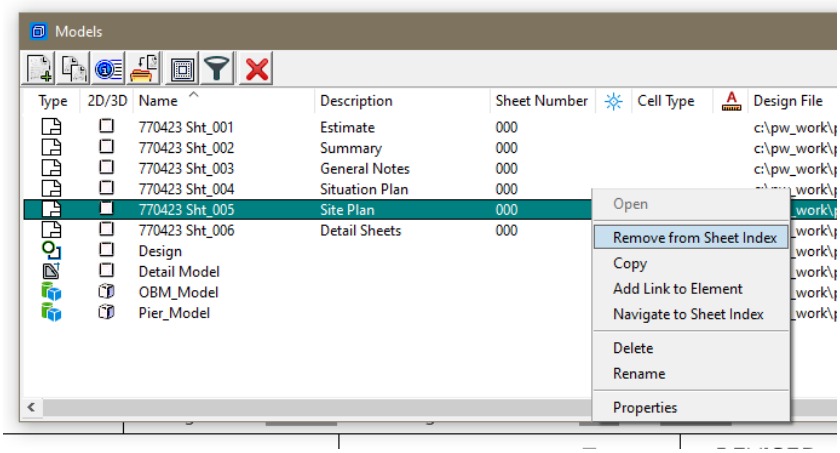
If the Sheet Model was in a Sheet Index then the Remove from Sheet Index option would be selectable.



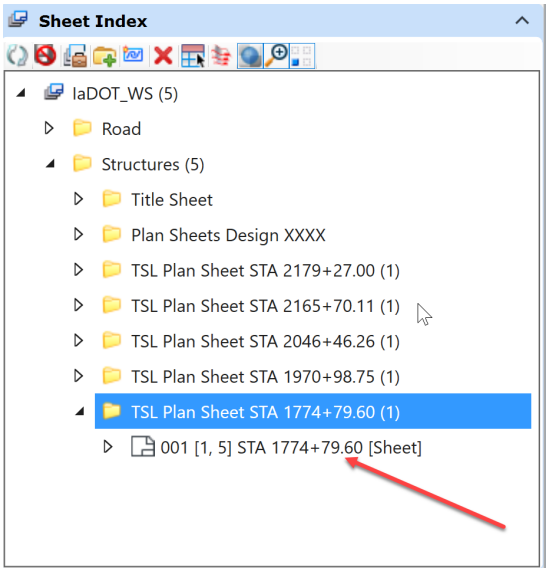
The image below shows the Sheet Model is in a Sheet Index.



Right clicking on the Sheet Model it can be removed from the Sheet Index, if desired. Sheet Models may also be removed from the Sheet Index through the Sheet Index Explorer.

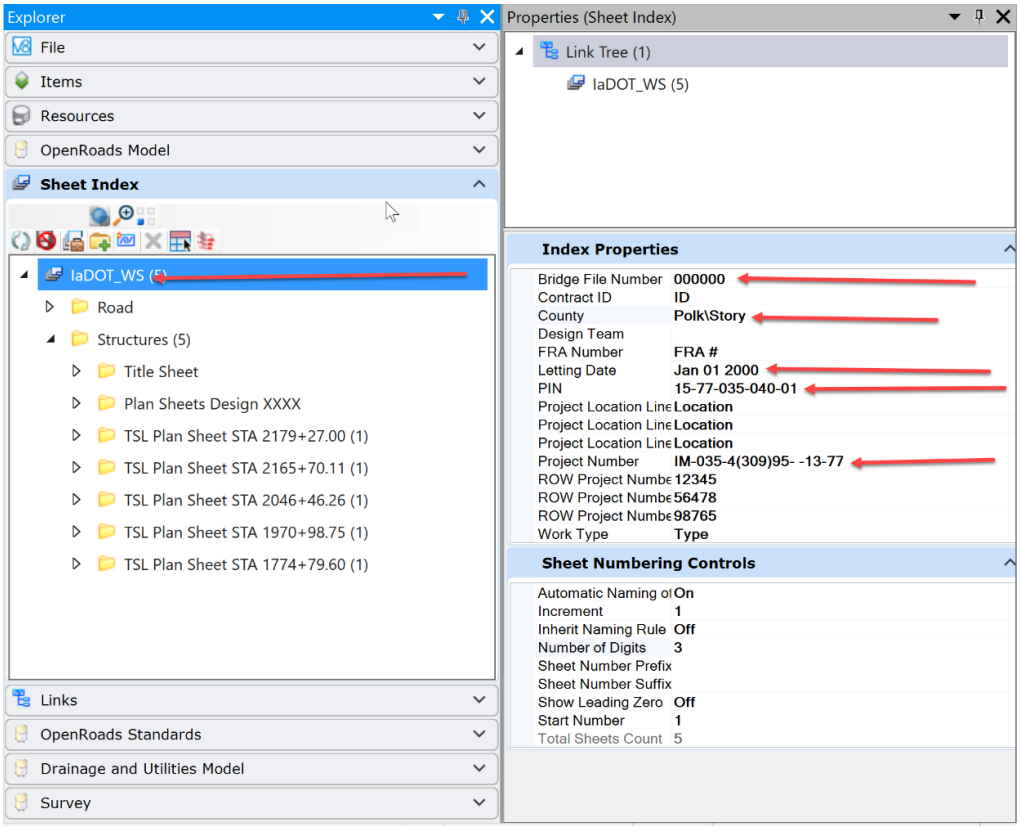


The sheet will appear in the index as shown below.

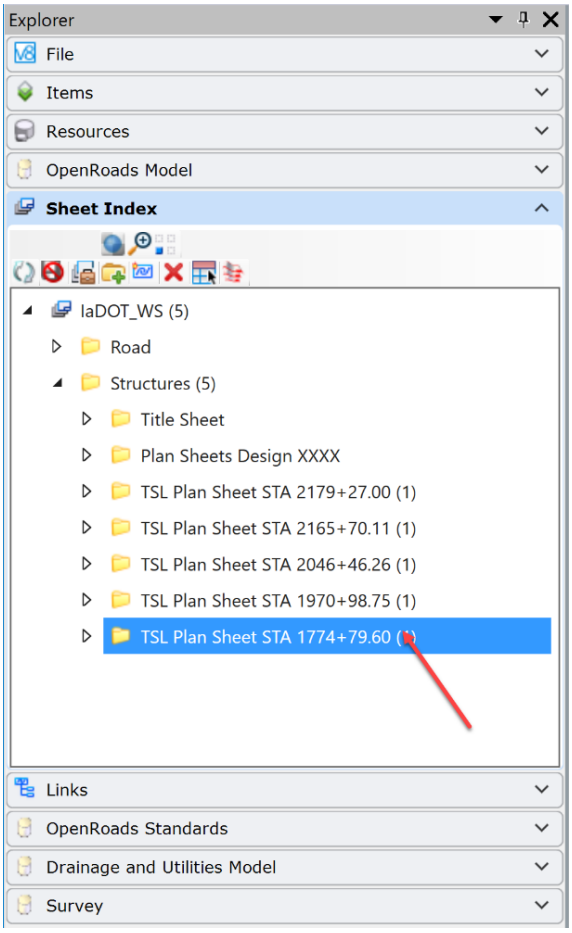


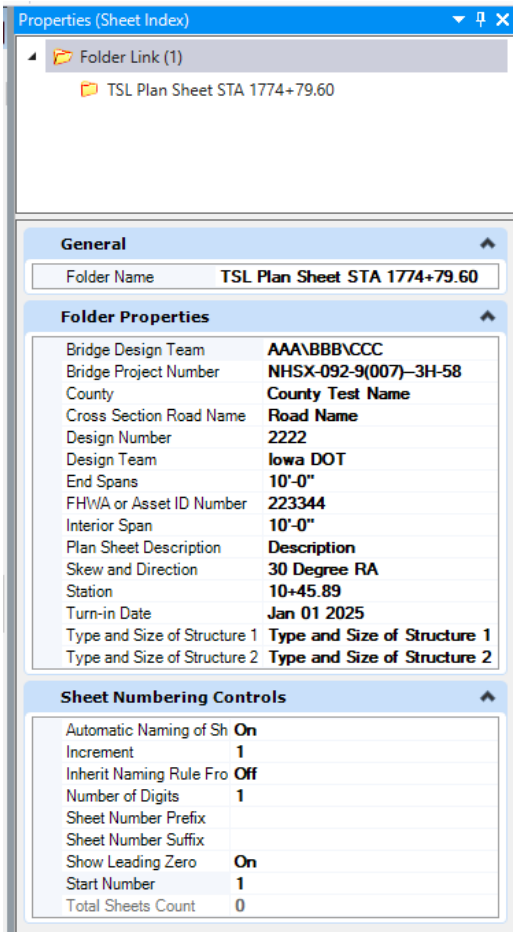
Next, set the Index Properties at the index level. Click on the **IaDOT_WS** in the Sheet Index Explorer so that it is highlighted and open the Properties. Set the Bridge File Number, County, Letting Date, PIN Number and Project Number. Completing these values will fill out the corresponding text fields in the Border and Title Block of the plan sheet, as well as the corresponding text fields on the Title Sheet.

The 3 Project Location Lines and 3 ROW Project Number lines are used to populate text fields on the Title Sheet. The Index Properties will set these fields in **all** the sheets in this index.



Next, set the text fields that are design number specific for each structure. Select the folder created earlier for each structure in Project Explorer so that it is highlighted and open the Folder Properties.





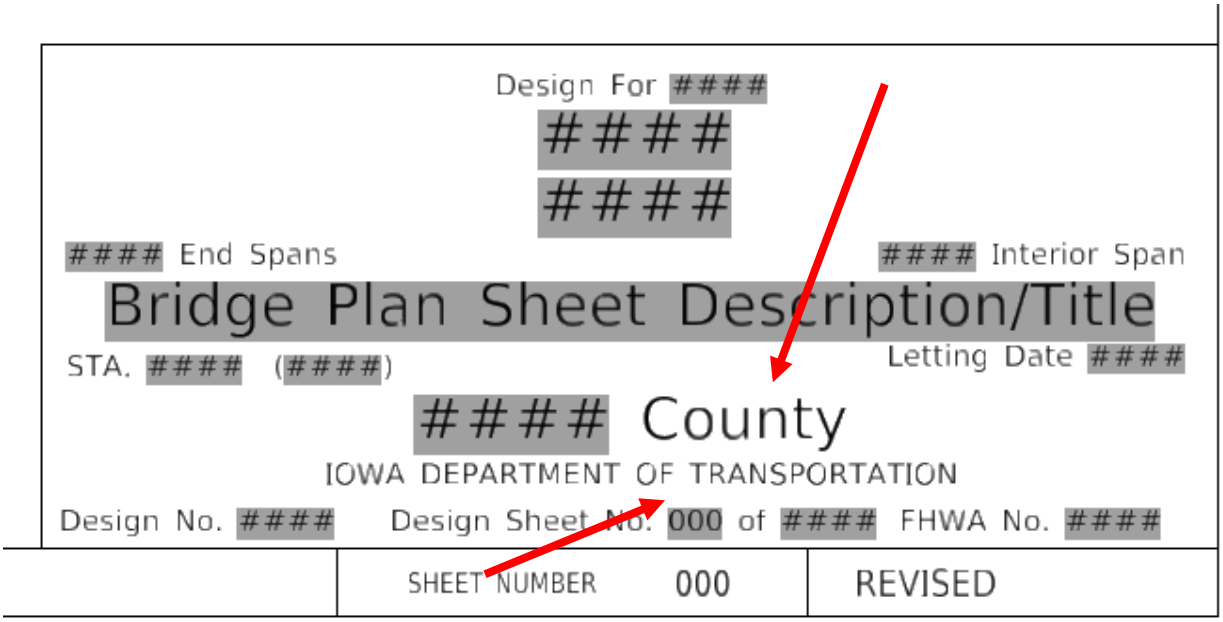
Edit the following Folder Properties:

- Bridge Design Team
- Bridge Project Number
- County
- Cross Section Road Name
- Design Number
- Design Team - Use Iowa DOT or Consultant Name
- End Spans and Interior Span - Culvert sheets will not use the Span fields.
- FHWA or Asset ID Number
- Skew and Direction (e.g. 30 Degree RA)
- Station of structure
- Turn-in Date
- Type and Size of Structure - There are two fields for Type and Size of Structure.

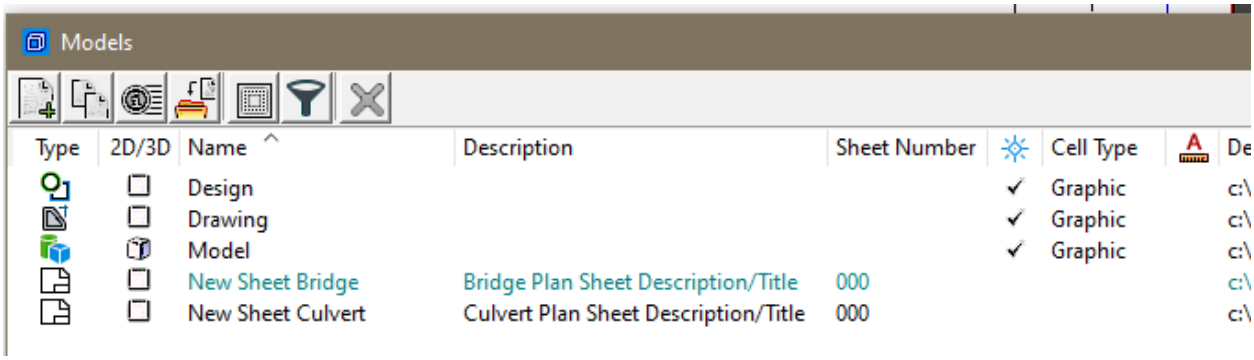
Some of the text fields may not be used on every sheet.

Completing these properties will fill out the corresponding text fields in the Title Block on each sheet that resides in this folder. Each folder must be edited for the specific information that applies to each structure.

The Plan Sheet Title Block below shows all text fields.

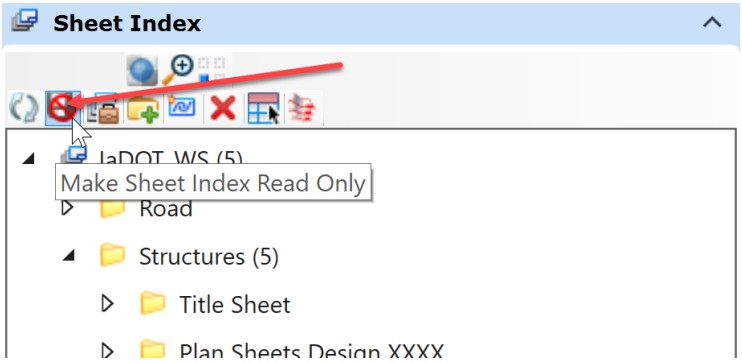


The **Plan Sheet Description** and **Design Sheet No.** text fields are linked to the model properties of the sheet model.

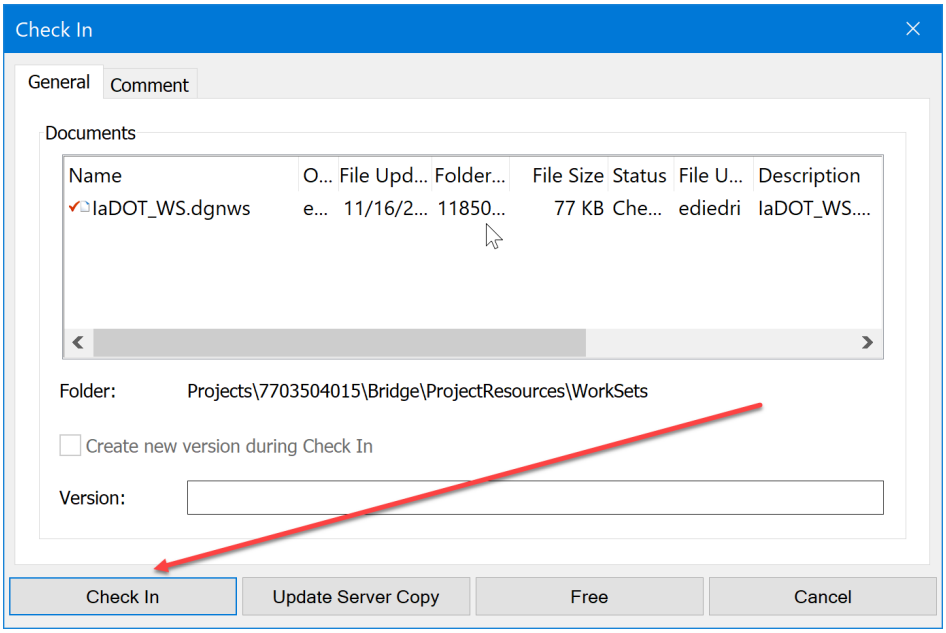


All other text fields in the Title Block are linked to the Sheet Index Folder Properties.

Once this information is set, stop editing of the Sheet Index. Click on the Make Sheet Index Read Only icon in Project Explorer. The Sheet Index can only be edited by one user at a time.

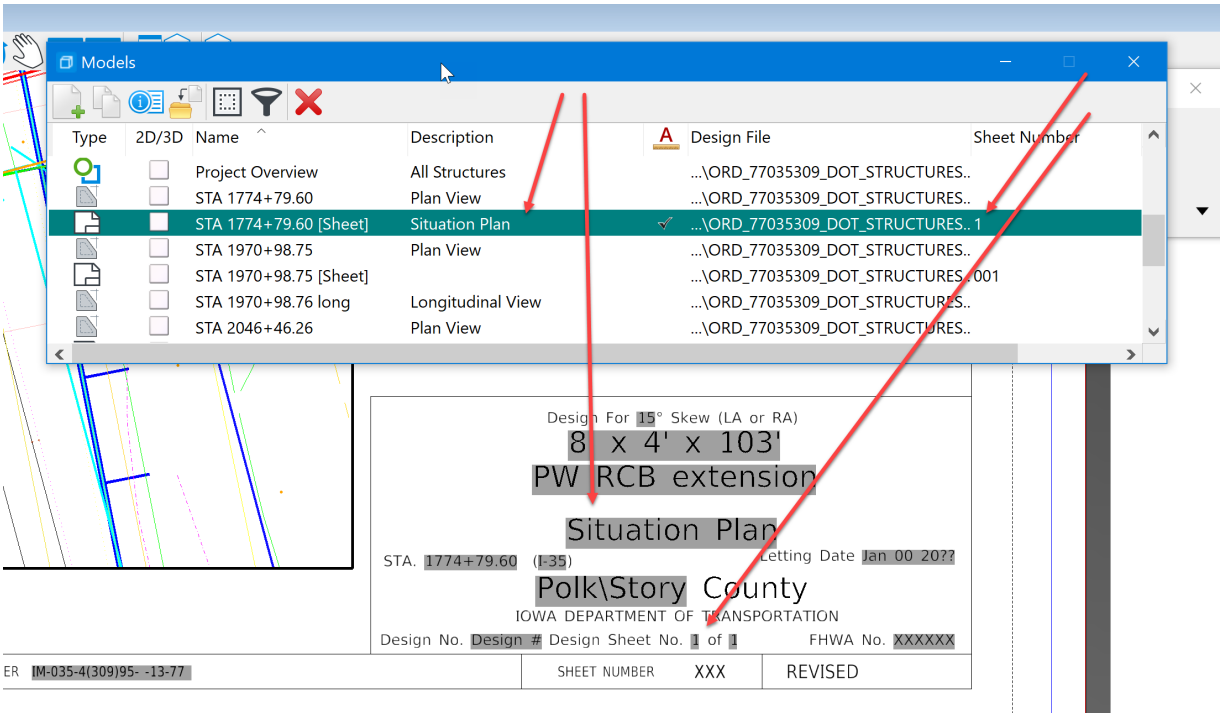


ProjectWise will notify the user to Check In the index. Click on the Check In button.

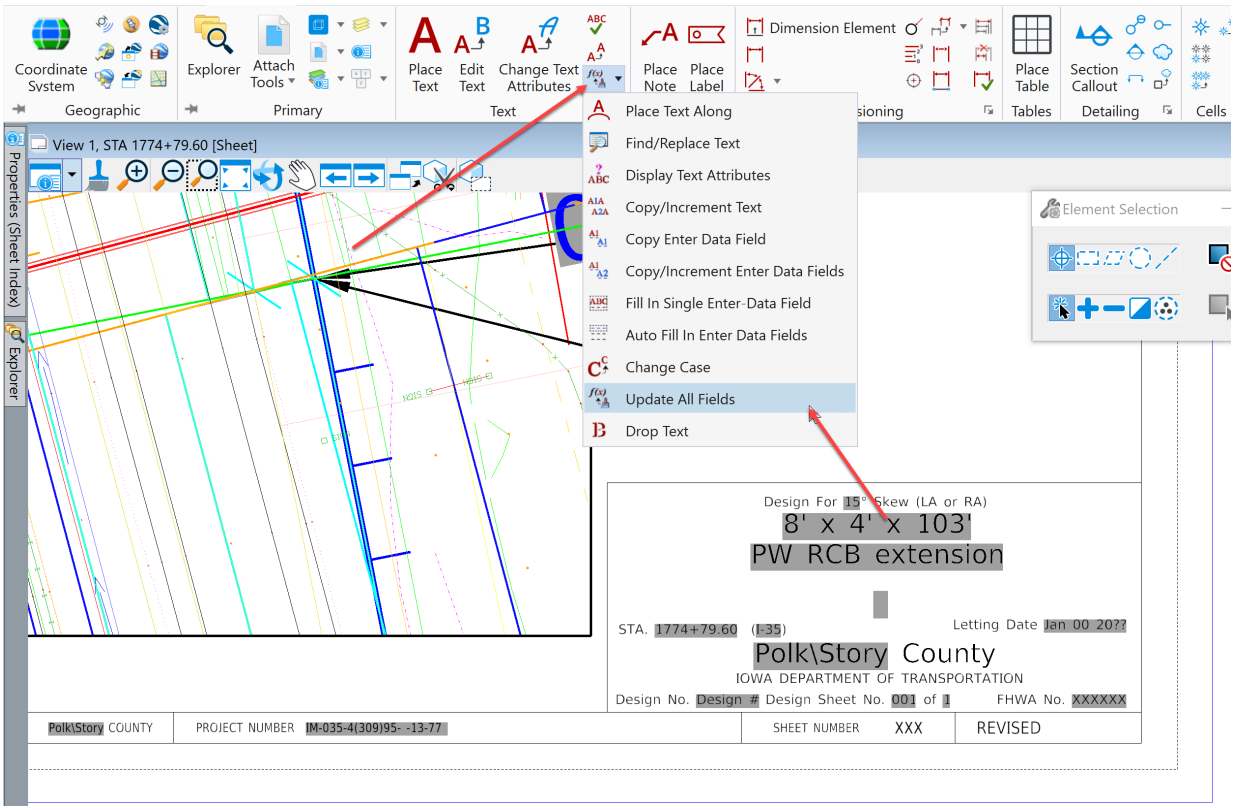


Next, set the Sheet Title and Design Sheet Number by opening the Models dialog box to set these two text fields that are configured to read the model properties. The Sheet Title is reading the sheet model Description.

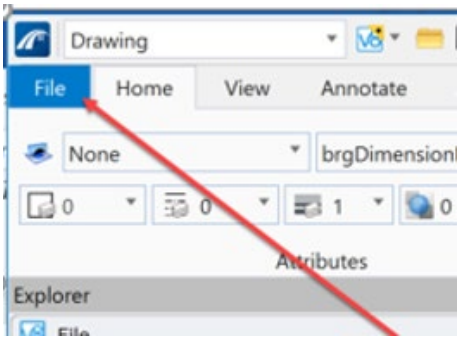
For this example, it is a Situation Plan sheet, and the Design Sheet No. is sheet 1.



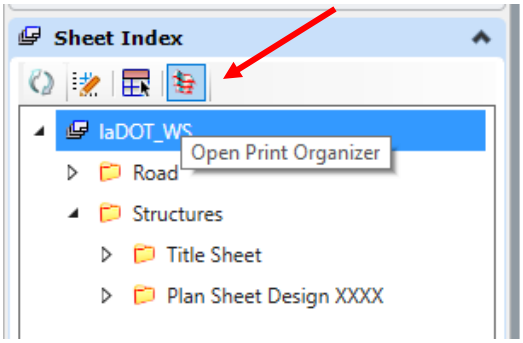
Note: If all the values that are entered are not reflecting the same data on the sheet, use the Update All Fields tool. This will reread all the assigned text fields.



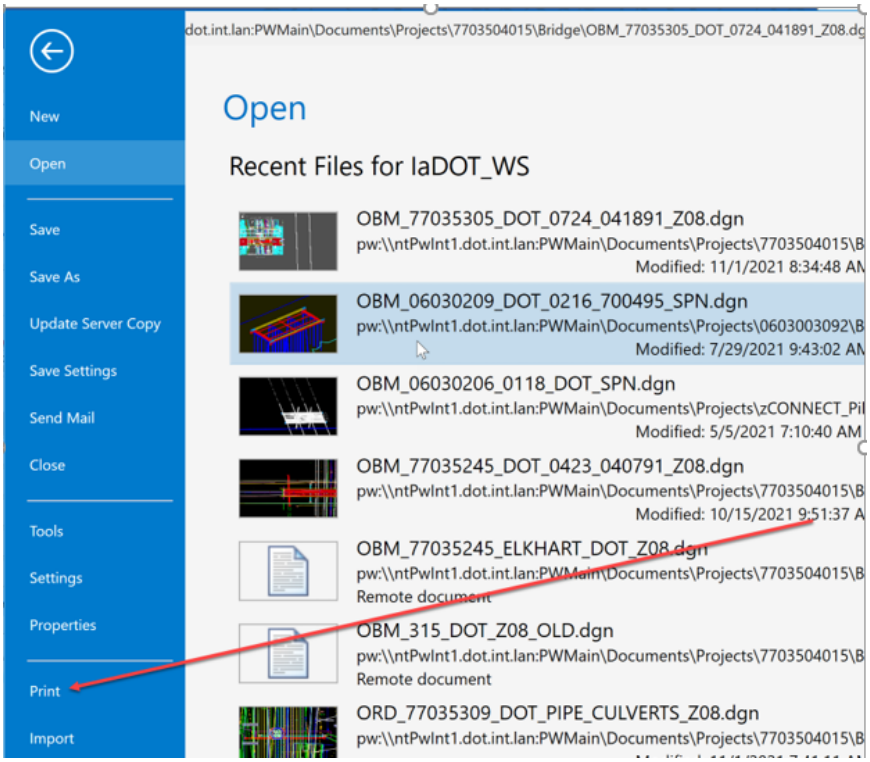
To print the TS&L sheet, use the Print Organizer. To access this tool thru the backstage, click on the **File** menu in the file the sheets are in.



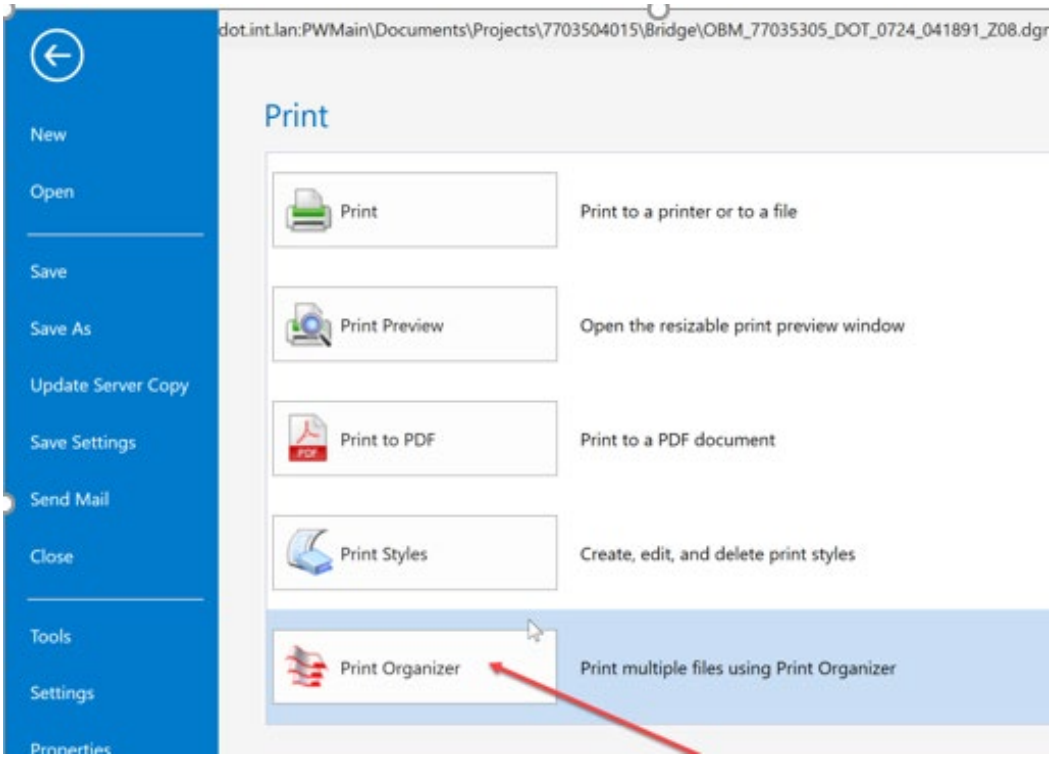
The Print Organizer may also be accessed through the Sheet Index which will be covered in a future document.



The backstage will show the Print option, select **Print**.



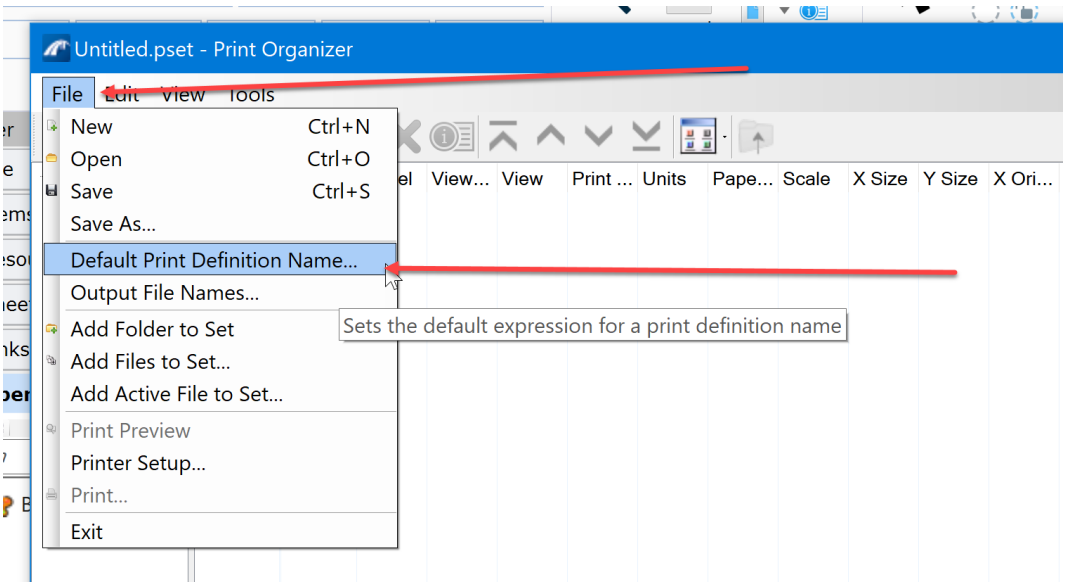
Select Print Organizer.



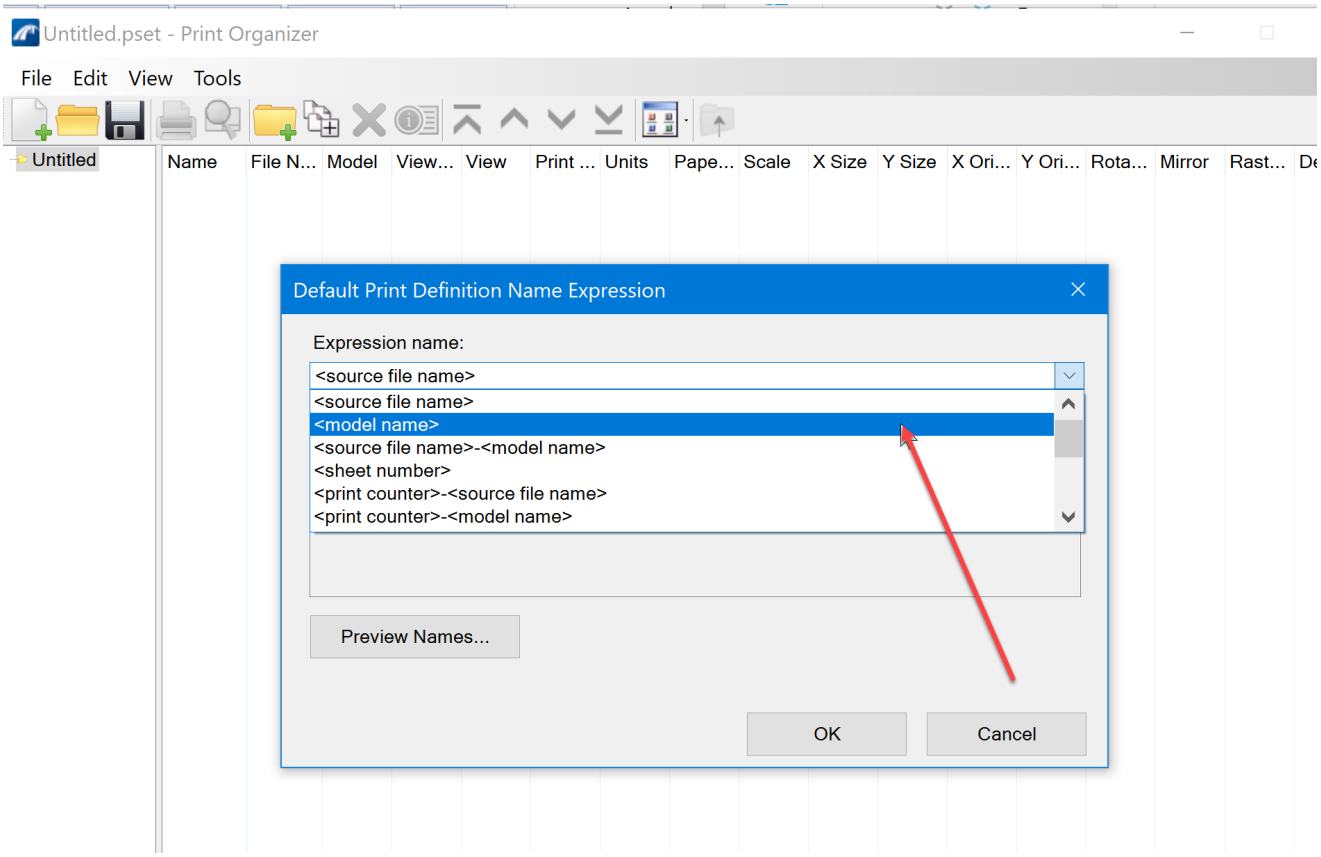
In Print Organizer set the **Default Print Definition Name** and **Output File Names** expressions to use **<model name>** before printing the sheets to the PDF.

Select **File** menu.

Select **Default Print Definition Name...**.



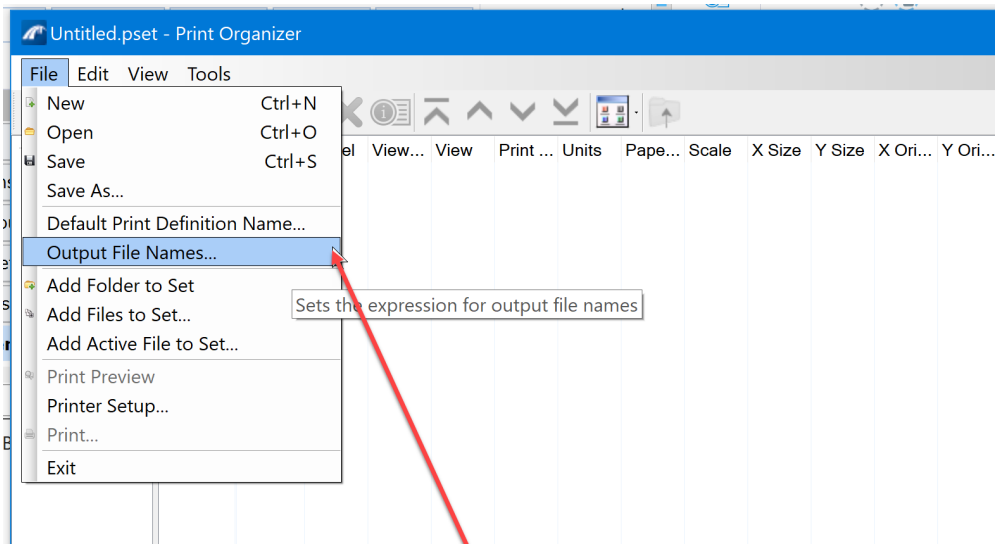
The **Default Print Definition Name Expression** dialog box will display, select **<model name>** option.



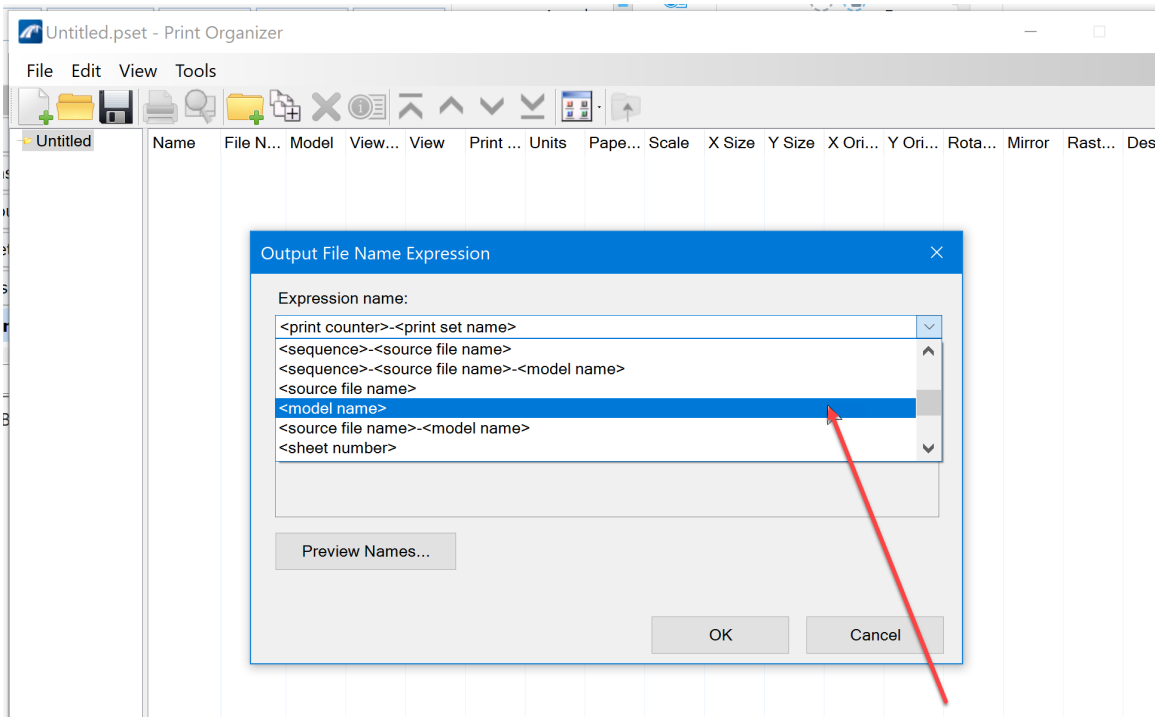
Click the OK button.

Then select File menu again for the second setting.

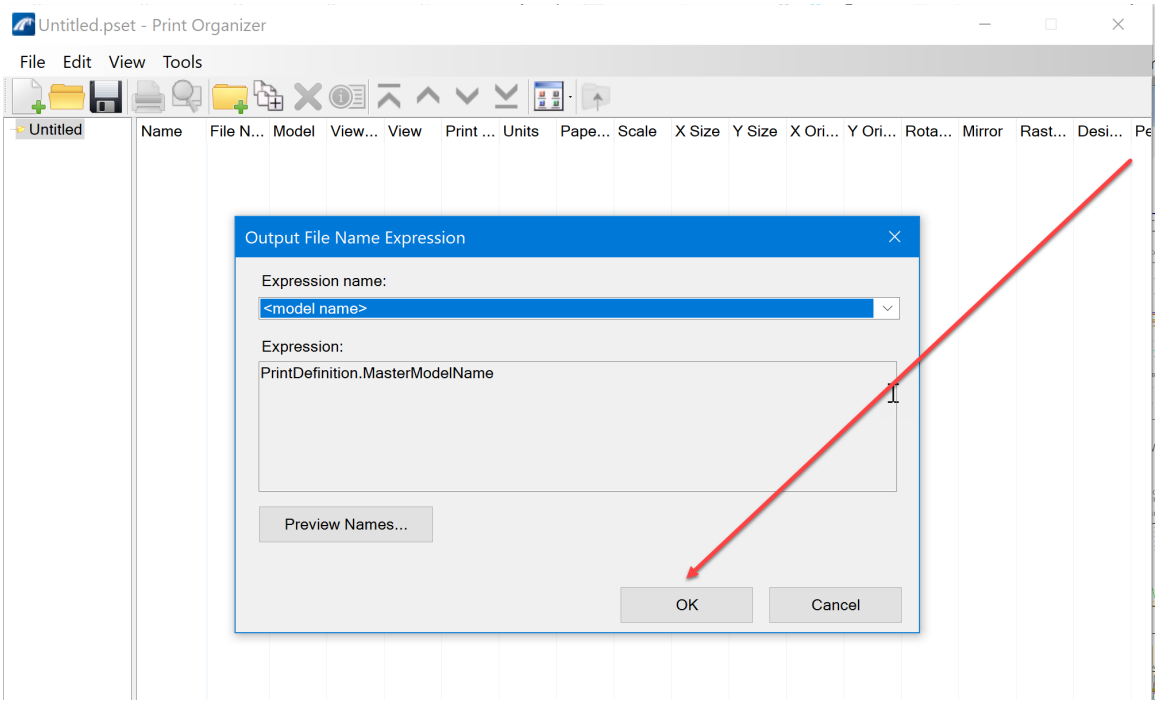
Select **Output File Names...**



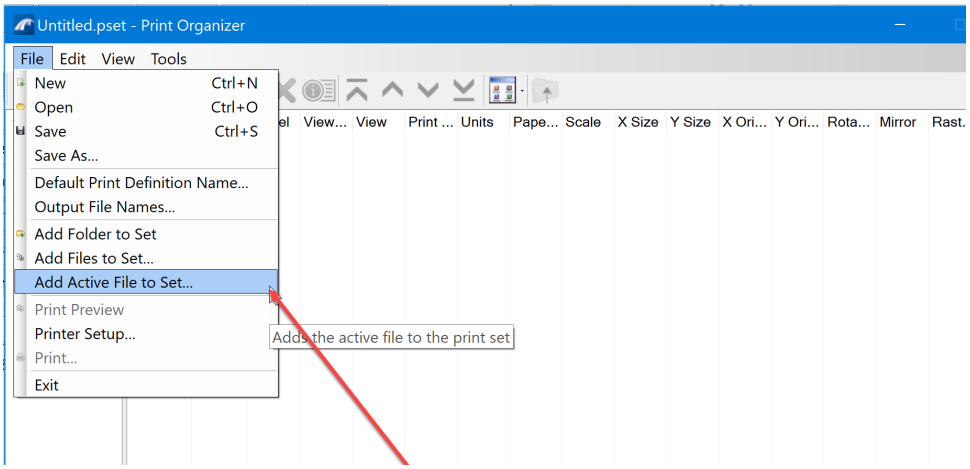
The **Output File Name Expression** dialog box will display, select **<model name>** option.



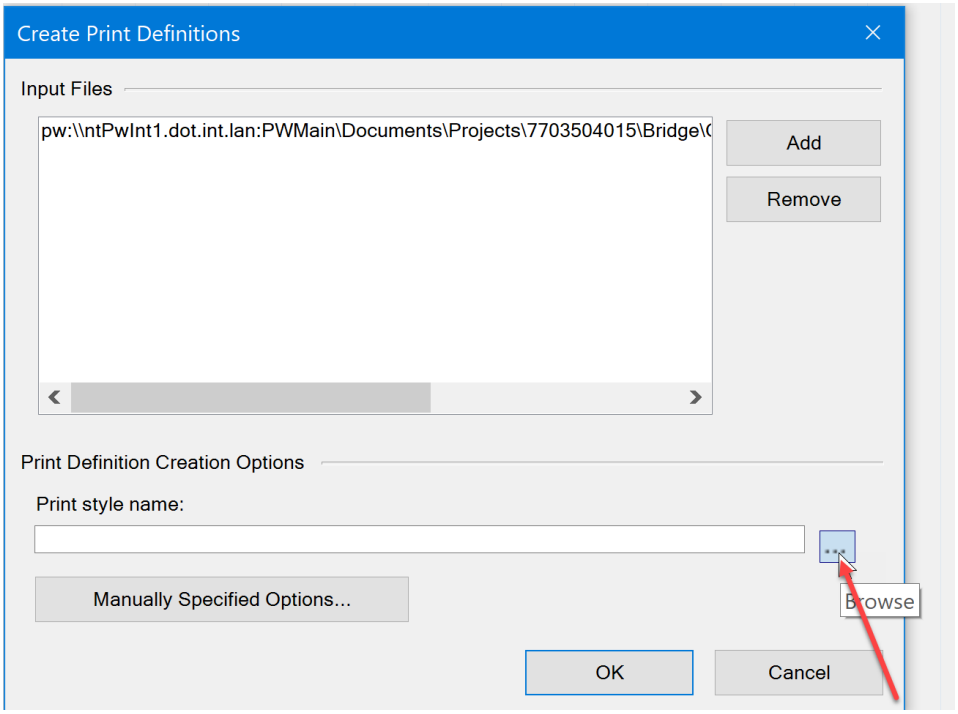
Click the OK button.



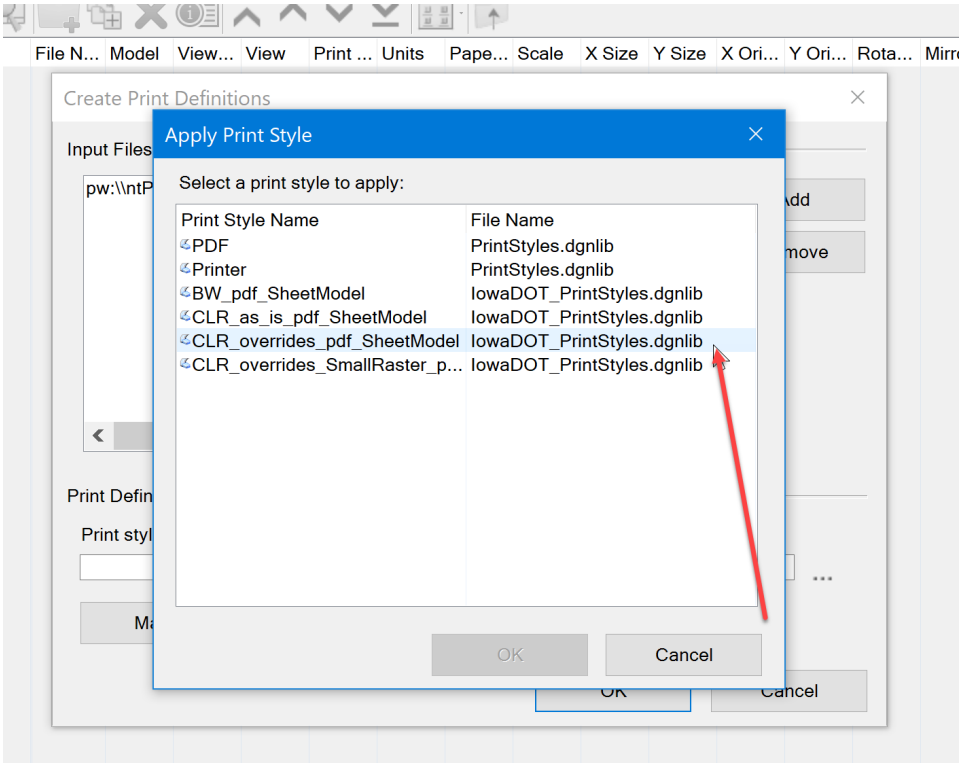
Next, select the **Add Active File to Set…** option thru the File menu.



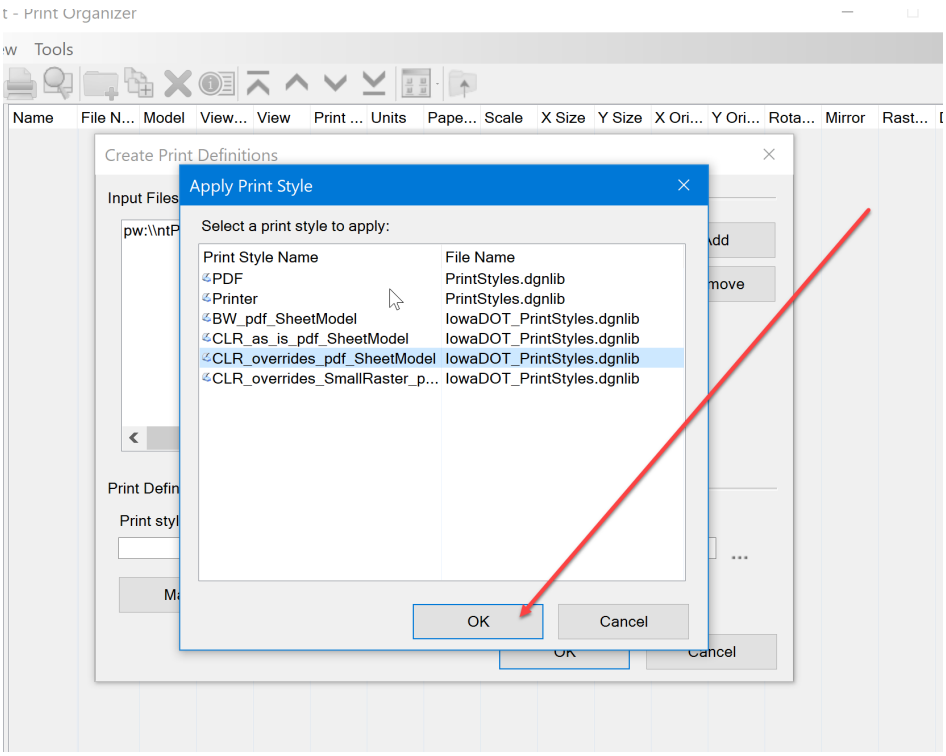
The Create Print Definition dialog box will open to select the print style. Click on the browse button next to the Print style name.



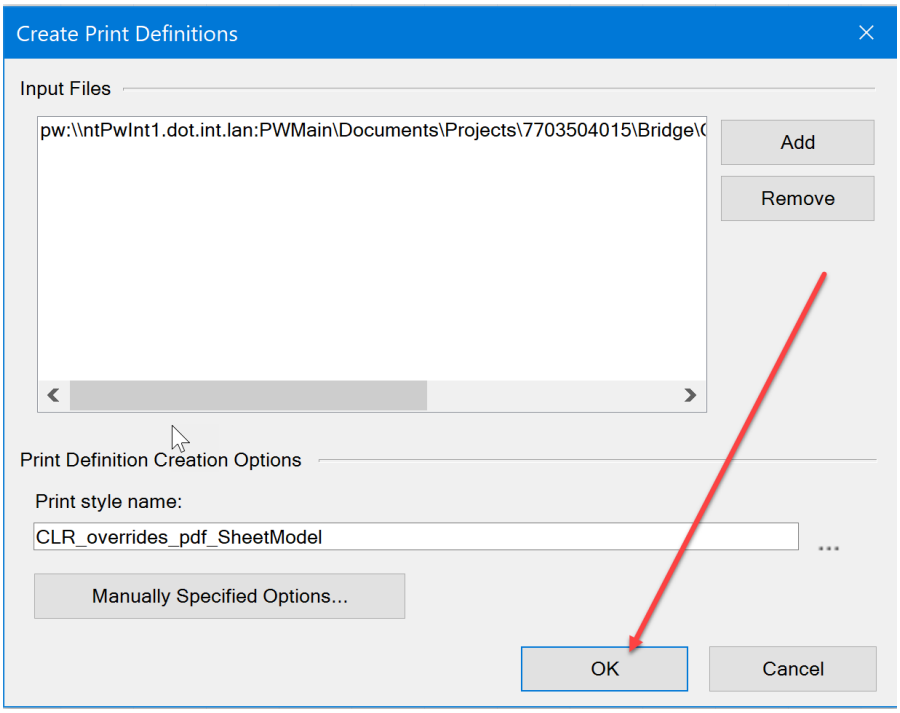
Then select the desired print style option from the Apply Print Style list. For this example use CLR_overrides_pdf_SheetModel.



Click the OK button.

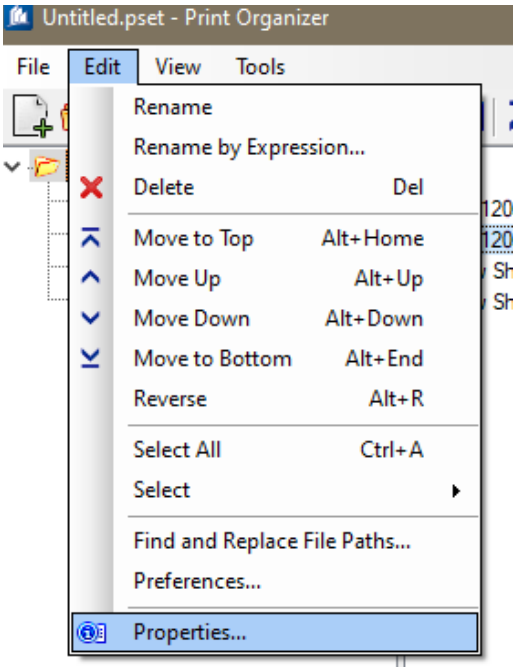


The selected print style should display in the field as shown below. Click the OK button.

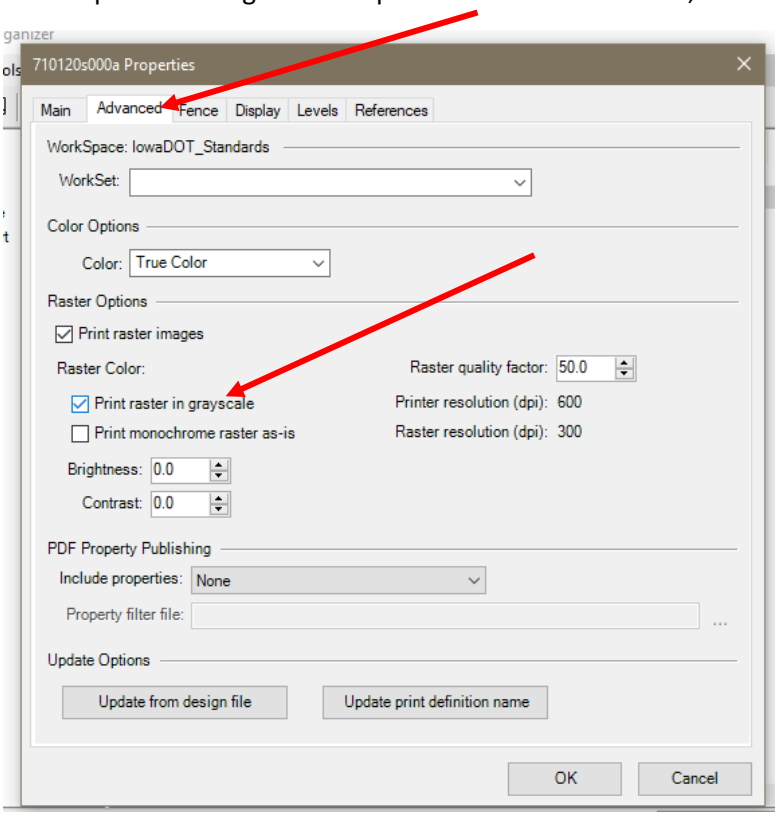


After the Print Organizer compiles the sheets with the model name output, adjust the print property setting for rasters. Currently the print styles are set to print raster images in grayscale. This will need changed in the Properties of the print styles to have the raster images print in color.

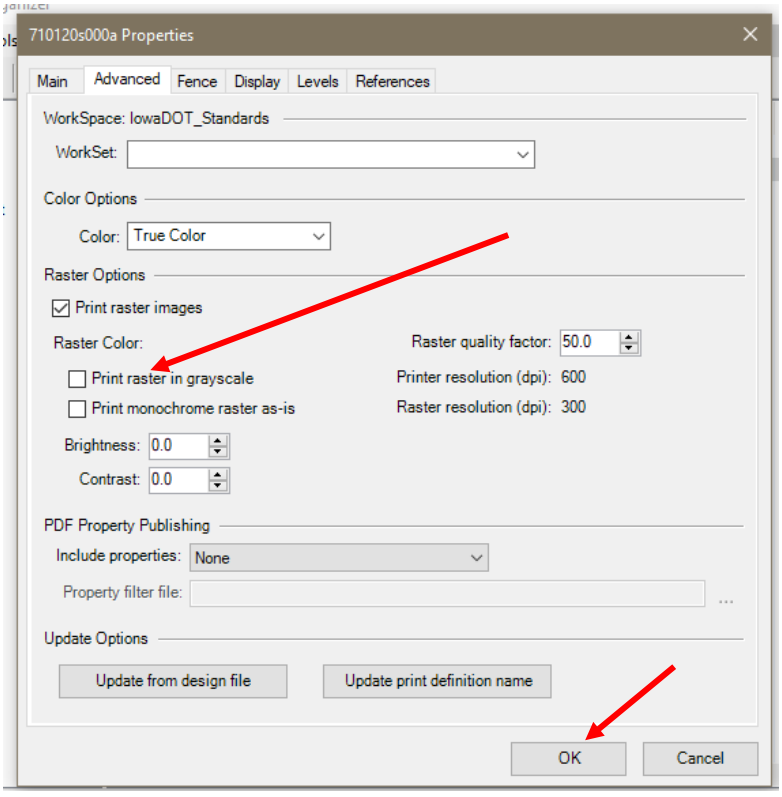
Select all the sheets to print, select **Edit** menu and select the **Properties** option.



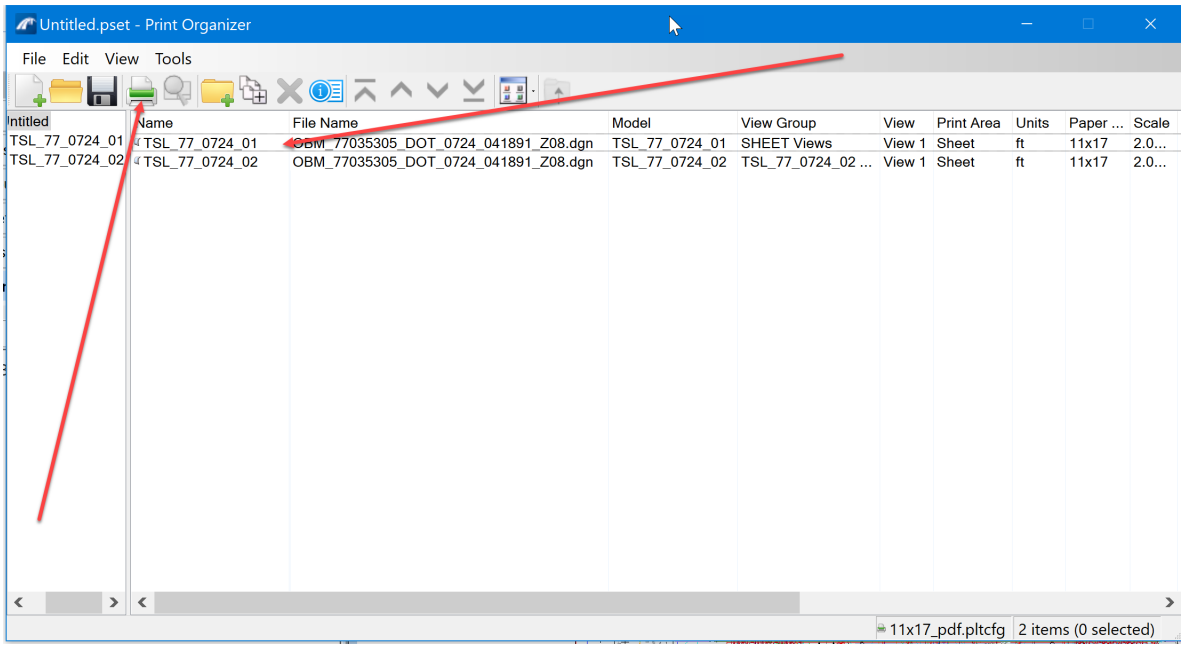
The Properties dialog box will open. Select **Advanced tab**, then uncheck **"Print raster in grayscale"**.



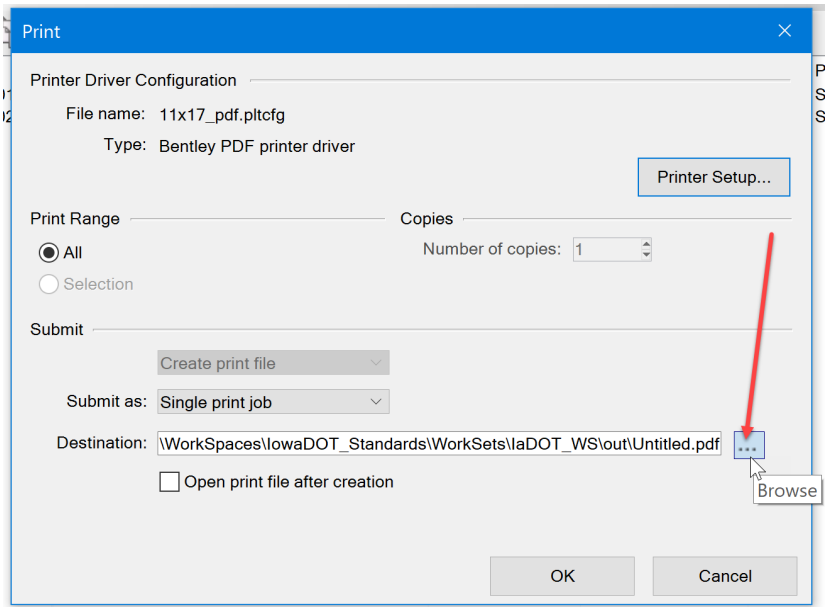
Click the OK button.



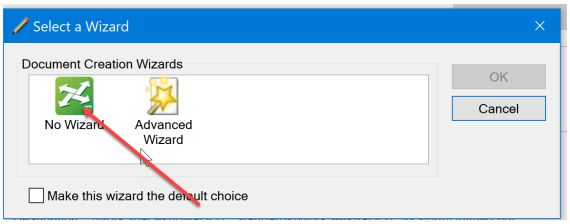
The Print Organizer will display the sheets it will be printing to the PDF. Confirm the sheets needed to print are listed and click on the printer icon at the top of the Print Organizer.



Next set the destination of the PDF file. Click on the Browse button next to the Destination field.



This will open the Select a Wizard dialog box. Select the No Wizard option.



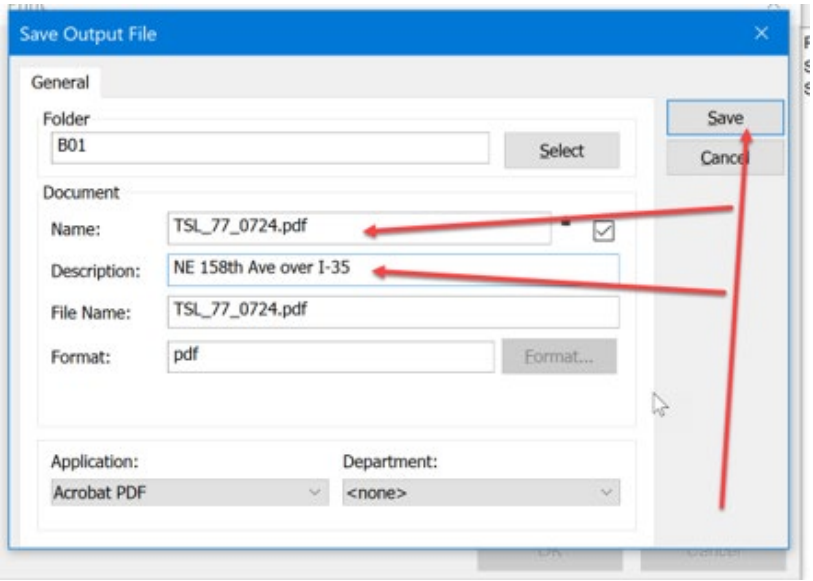
Click the OK button.

The Save Ouput File dialog box will open. Verify the folder is set to the correct location for the PDF. Then Name the PDF.

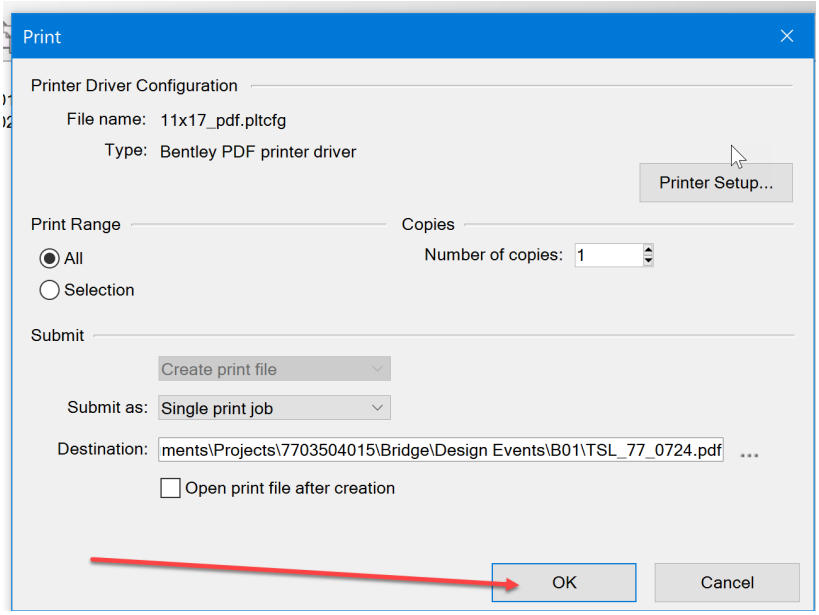
For this example, it is a bridge TS&L sheet so name it TSL_County #_Design#.pdf or TSL_77_0724.

Next, enter a short description so that users know that this is for the bridge over I-35 on NE 158th Ave.

Click the Save button.

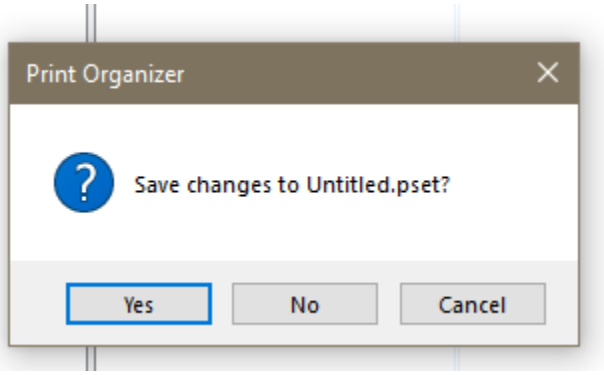


Click the OK button.



Then Print Organizer will create the pdf of the plan sheets.

When closing, Print Organizer will display a message asking if the pset needs to be saved. This is optional.



Saving a pset may be helpful when choosing to reprint the set again. However, if sheets have been added or there are changes to existing sheets, then the existing pset will need to be edited. Sheets may need added to be included and the existing sheets with changes may need updated from design file to see changes. The recommendation is not to save the pset and just recreate a new one, as needed. This ensures all changes to the Sheet Models are read from the CADD file.

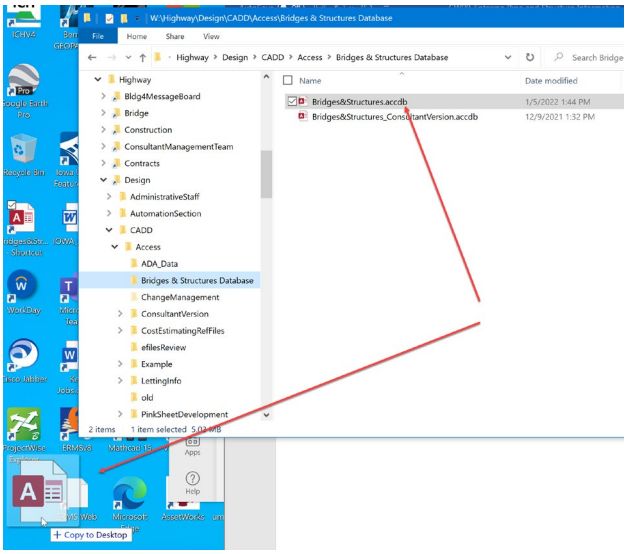
Entering Structure Information into Database

Once the cross sections are cut on each culvert and have been annotated as described in *CW06 How to Create Culvert TSL Sheet and Annotate Structures*, then input the annotated information in the Bridges&Structures.accdb.

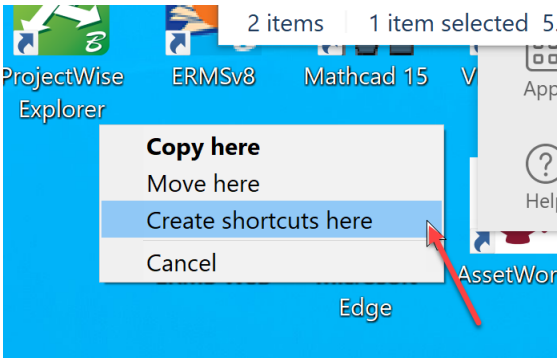
There are two ways this can be done. The first way is intended for internal Iowa DOT employees and the other way is for outside employees or consultant projects.

How to get started for internal Iowa DOT employees is covered first.

First place a short cut of the Bridges&Structures.accdb database on to the desktop. Open a Windows file explorer and browse to W:\Highway\Design\CADD\Access\Bridges & Structures Database. Select the Bridges&Structures.accdb and right click and drag to the desktop.



Then select Create shortcuts here.



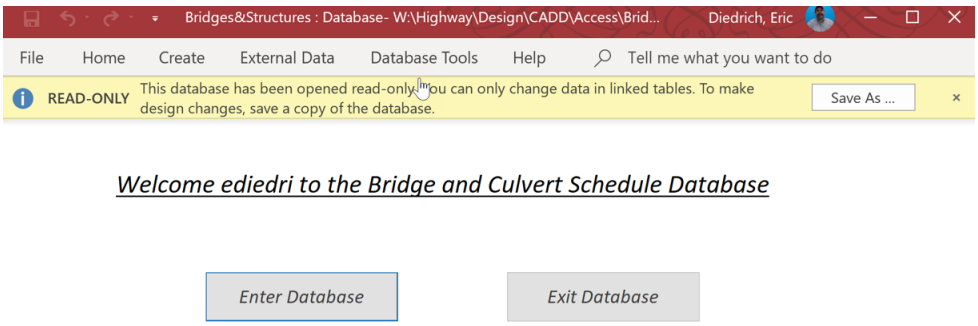
Note: By making a short cut, the system administrators can make changes to the database, and it will always open the latest version.

The second way to use the Bridges&Structures.accdb is intended for outside employees or consultant projects. A different consultant version of the database is located in ProjectWise at: pw:\\NTPwint1.dot.int.lan:PWMain\Documents\Resources\ClientWorkspaces\IowaDOT\IowaDOTProduction\Organization-Civil\IowaDOT_Standards\Seed\Access\Bridges&Structures_ConsultantVersion.accdb.

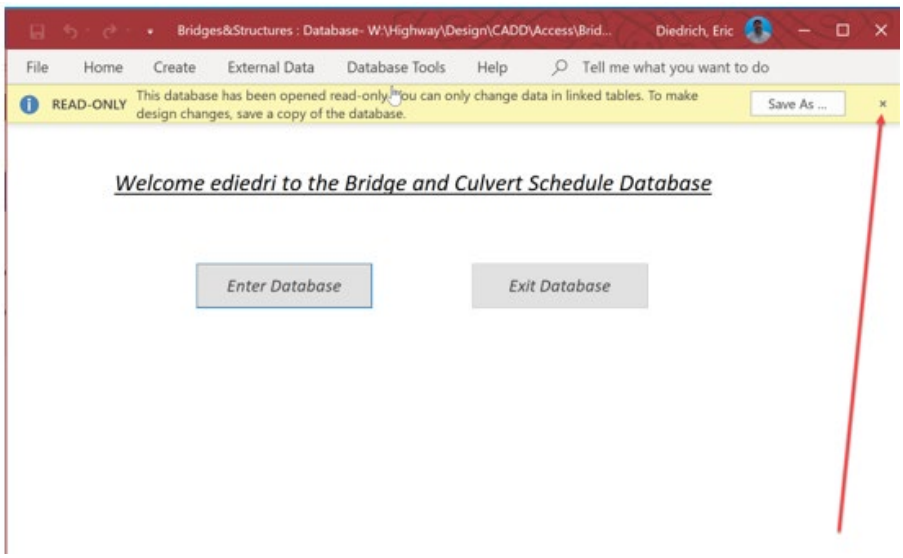
This file should be copy to a local work directory then renamed to Bridges&Structures_CCRRRPPP.accdb. This is because Access does not work properly in ProjectWise.

Once the data entry is completed in this database, it should be placed in the project directory that it corresponds with.

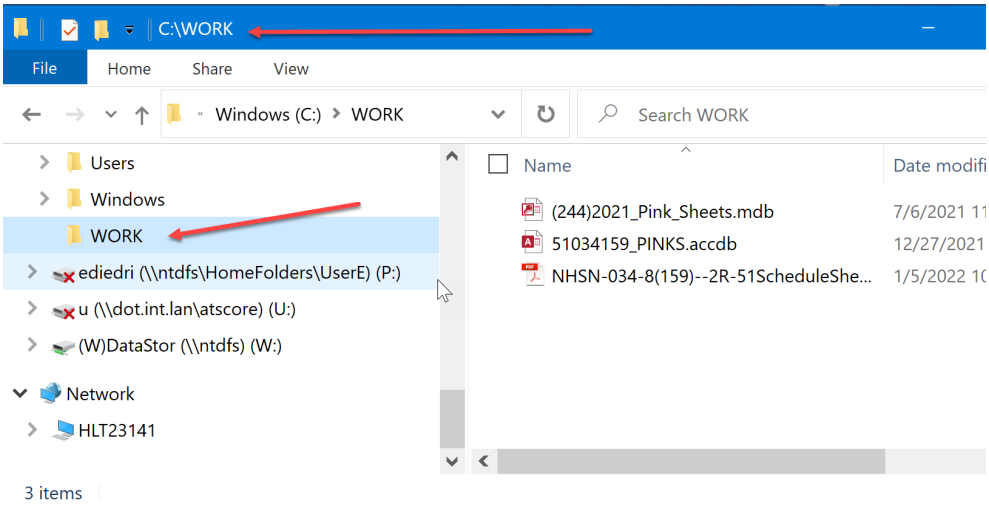
Now that the correct database for both internal and external users has been explained, open it and get started with data entry. The welcome screen appears as shown below.



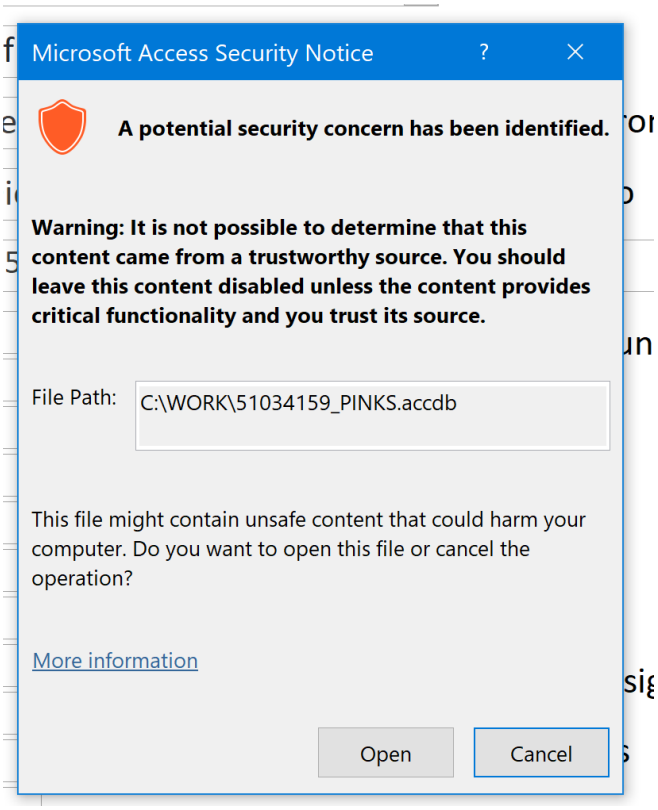
It will display a warning that it is READ-ONLY. Don't be concerned, this is normal. This is indicating that the database design can't be changed. However, the data entry will be stored in a table that is read by this database. Click on the X to close the warning.



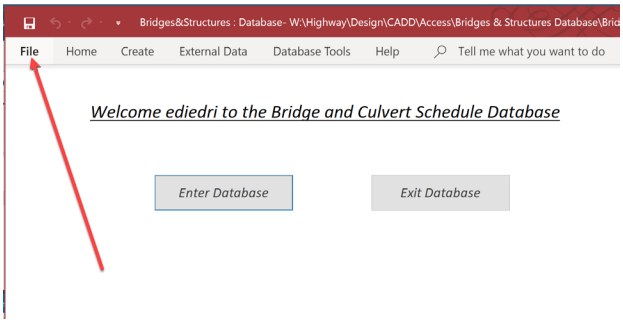
The next step is to make a working directory on the local C:\ drive. For this example, a folder named WORK was created.



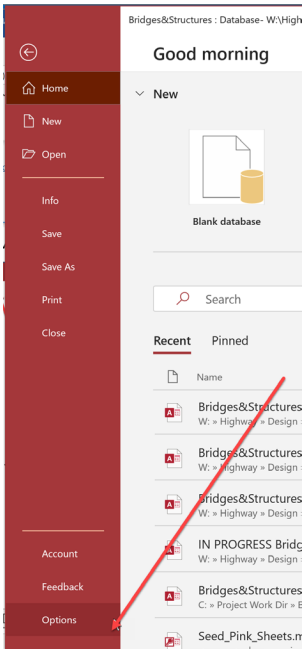
Next, change a few security settings in Access to avoid seeing the warning shown below when the survey information is imported.

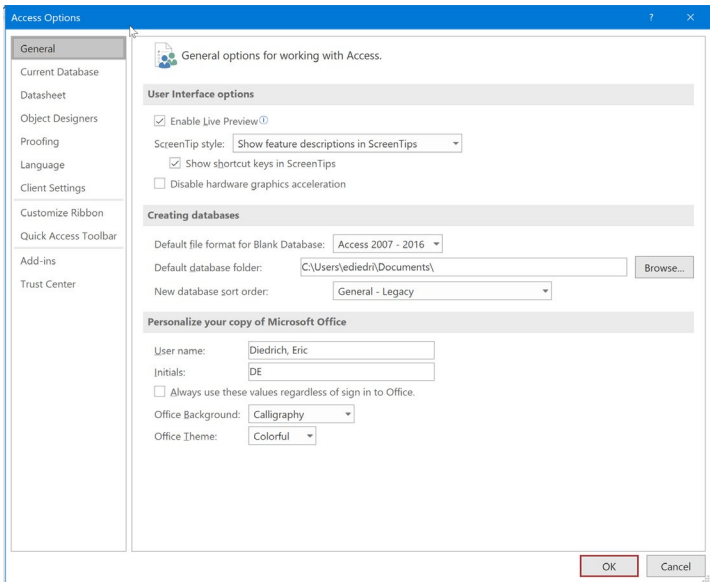


Click on the File tab at the top of the database.

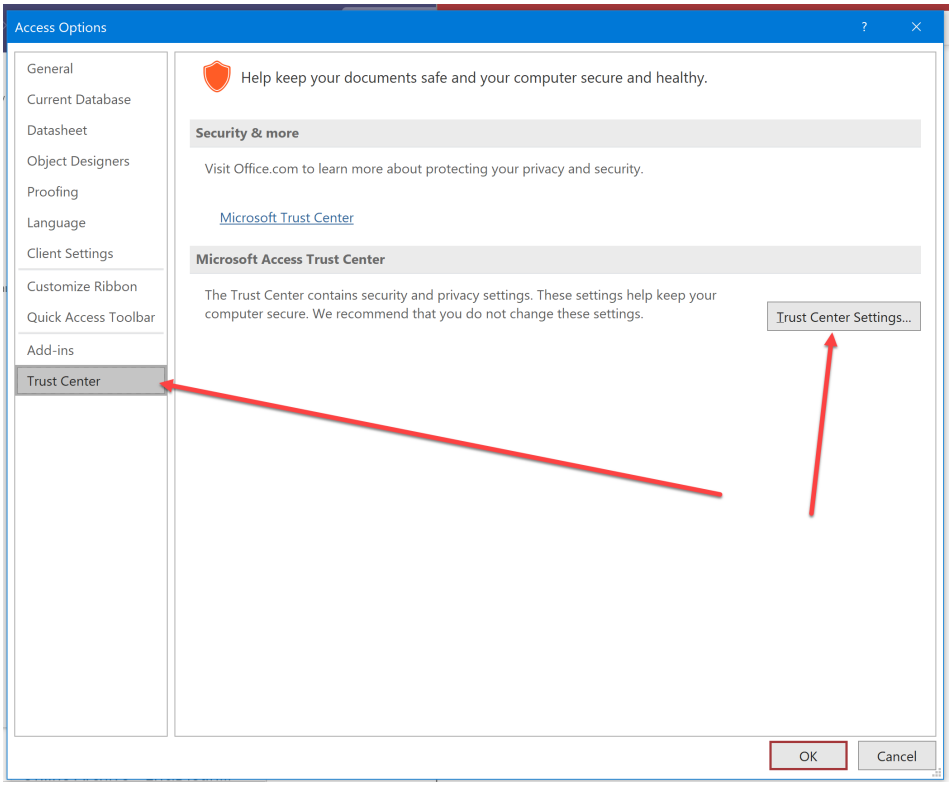


This will open the backstage to access Options. Click on Options to open the Access Options dialog box.

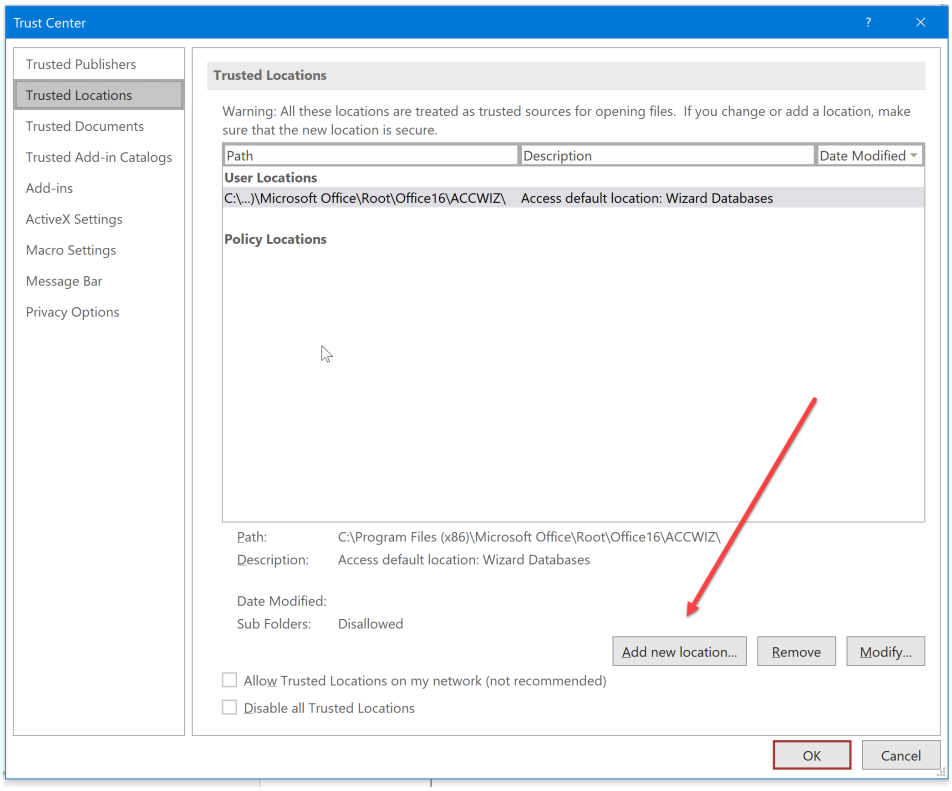




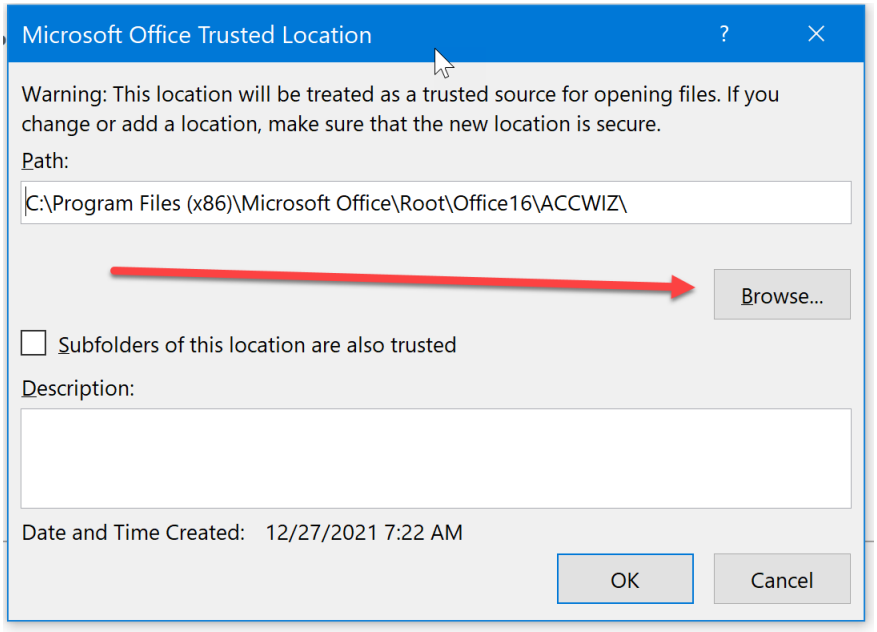
Next, click on the Trust Center option and then click on the Trust Center Settings button.



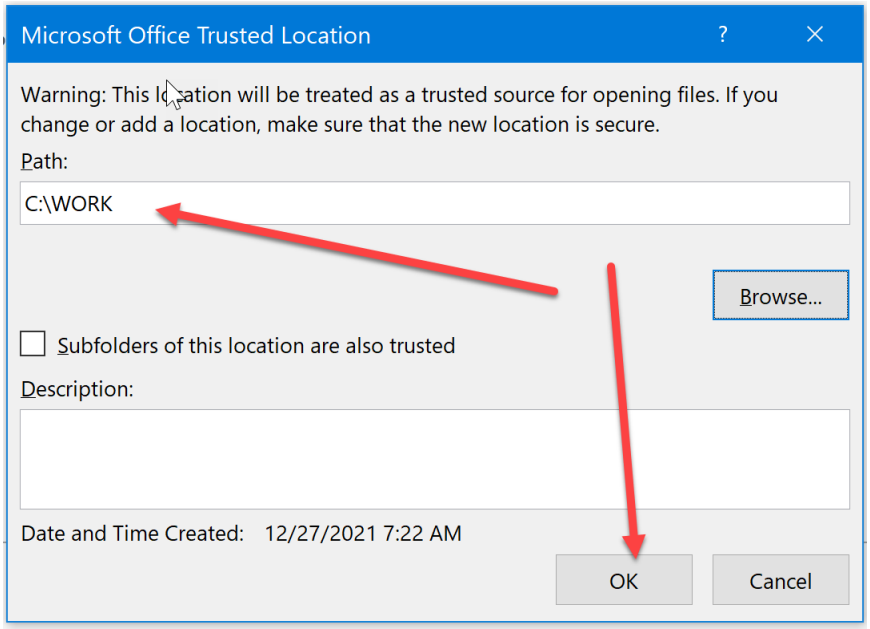
That will open the Trust Center dialog box. Click on the Add new location button.



This will open the Trusted Location dialog box. Click the Browse button to navigate to the temporary work directory created to place the survey information in.



For this example, select the WORK folder that was created.

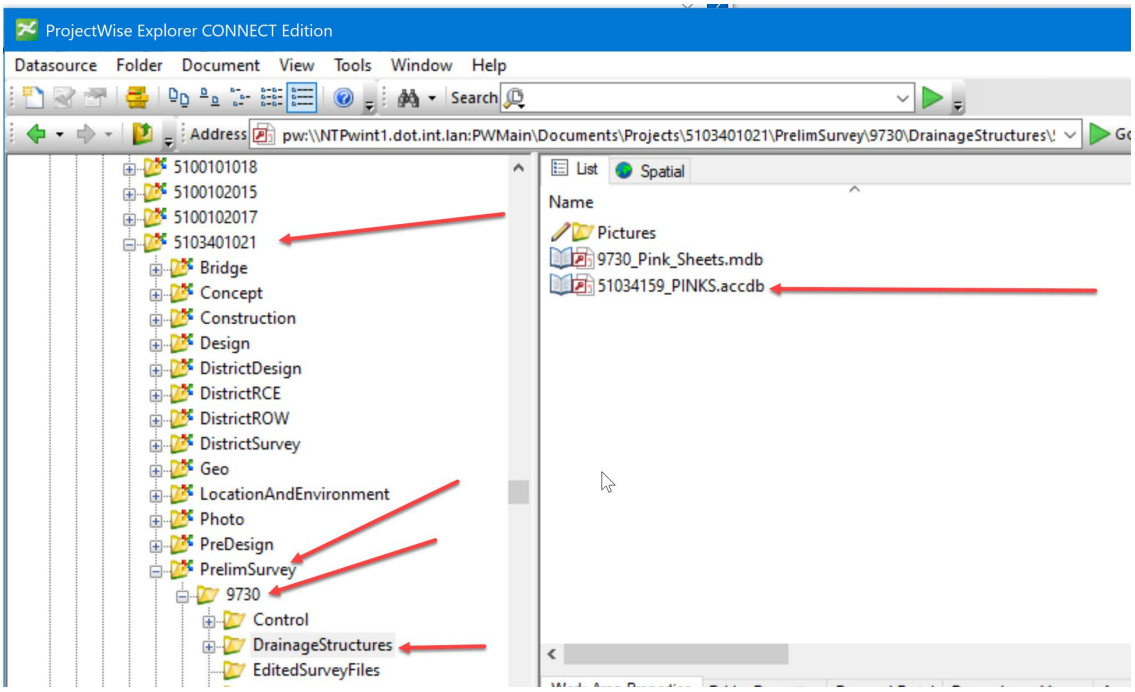


Then click OK.

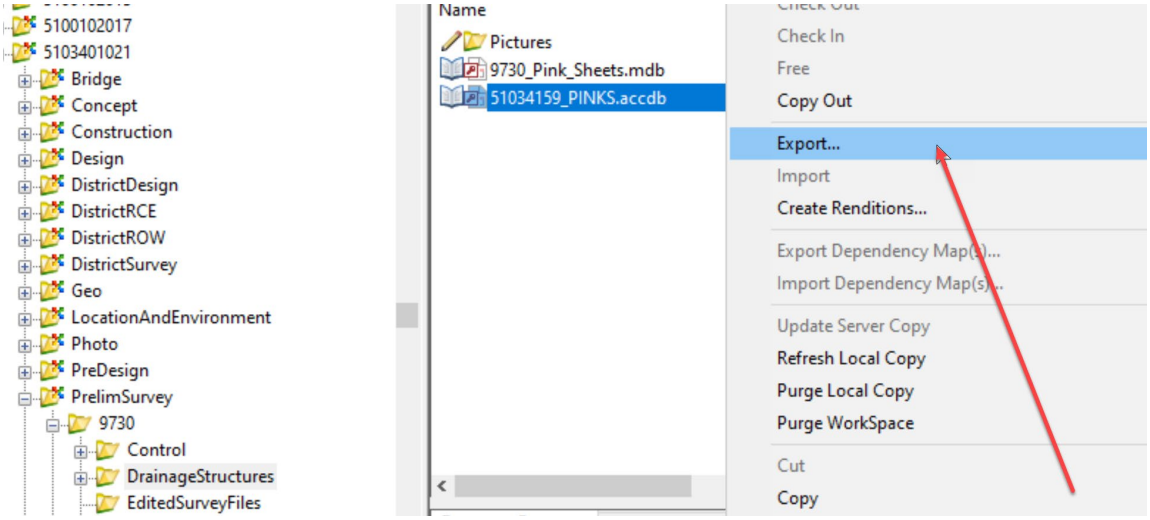
Note: If the same working directory is available and used for all projects, this will only need set once.

The next step is to check for the file to import the survey records for the project. The file is also a database that should be located in the project directory in the PrelimSurvey folder structure under the unique id number SAP folder in the DrainageStructures subfolder.

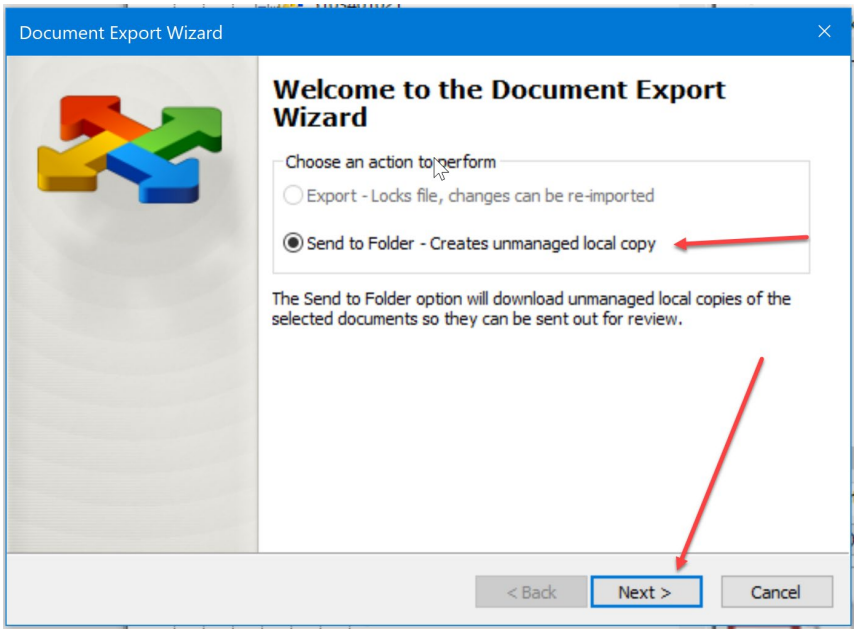
For example: PWMain\Documents\Projects\5103401021\PrelimSurvey\9730\DrainageStructures\
The file will be named CCRRRPPP_PINKS.accdb or for this example it will be 51034159_PINKS.accdb



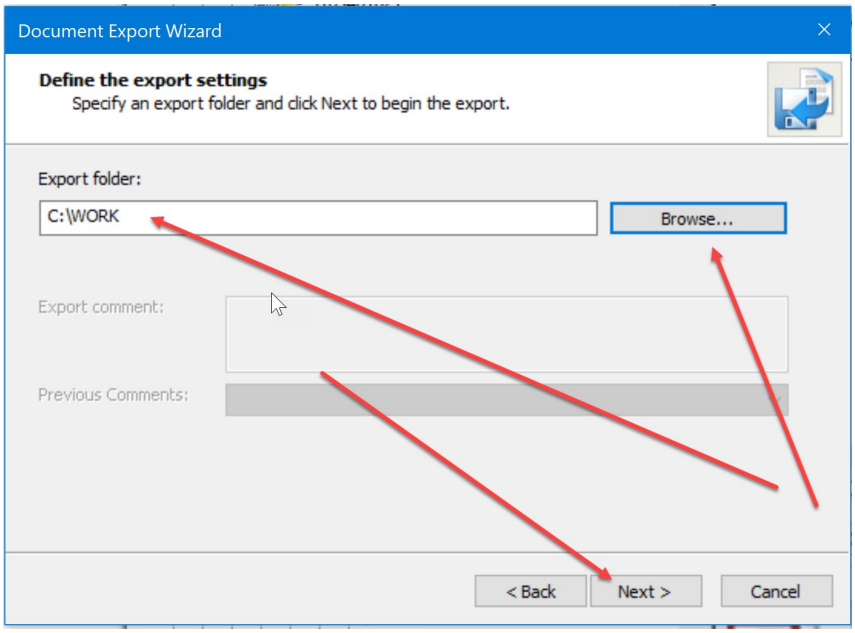
Once the Survey Records are located, export to a local work directory. Select the file, right click and select the Export option.



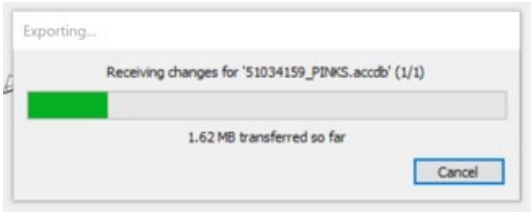
When the Document Export Wizard opens, select the Send to Folder with unmanaged local copy option. Then click the Next button.



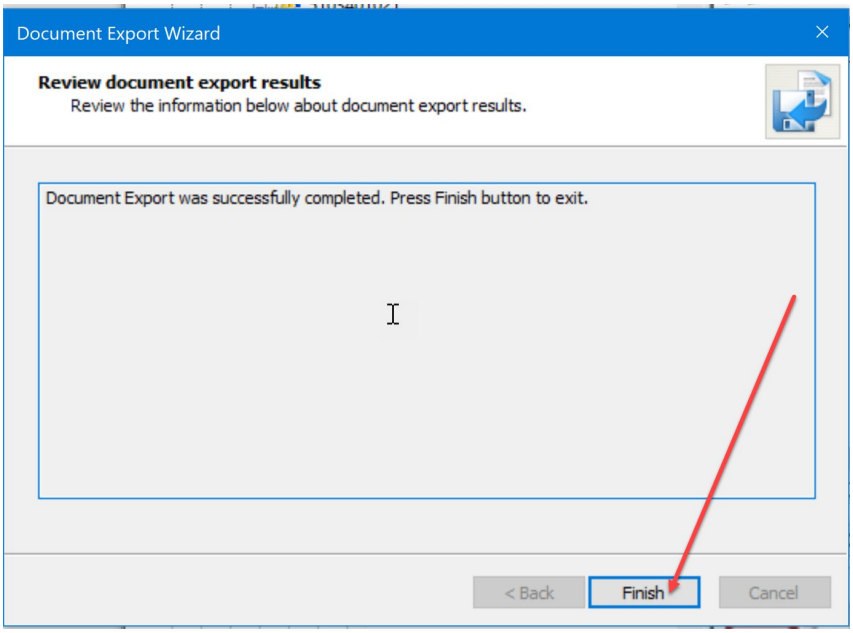
Browse to the local WORK folder created earlier. Then click the Next button.



A progress bar for exporting will display.

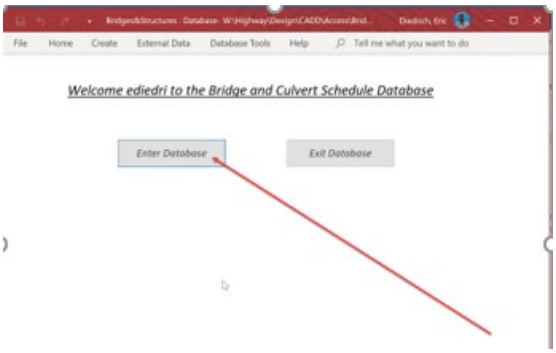


When it is finished, it will display a message indicating a successful export. Click on the Finish button.

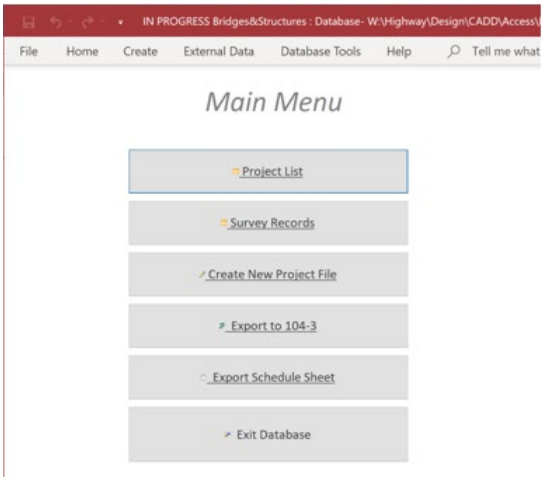


Now return to the Bridges&Structures.accdb database.

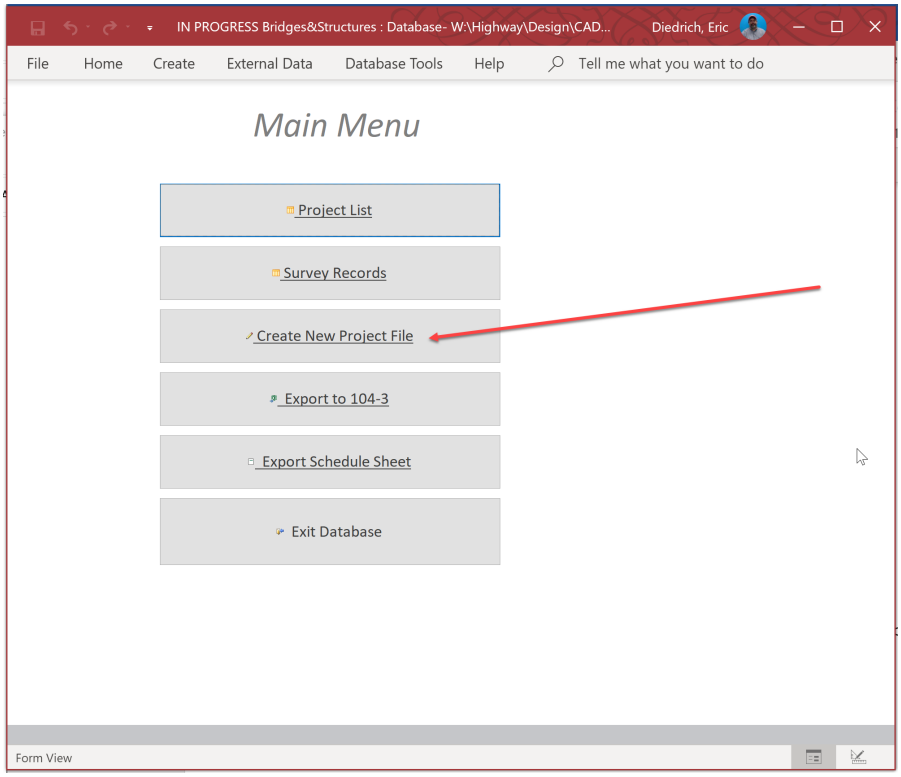
The next step is to Create New Project File. Click on the Enter Database button.



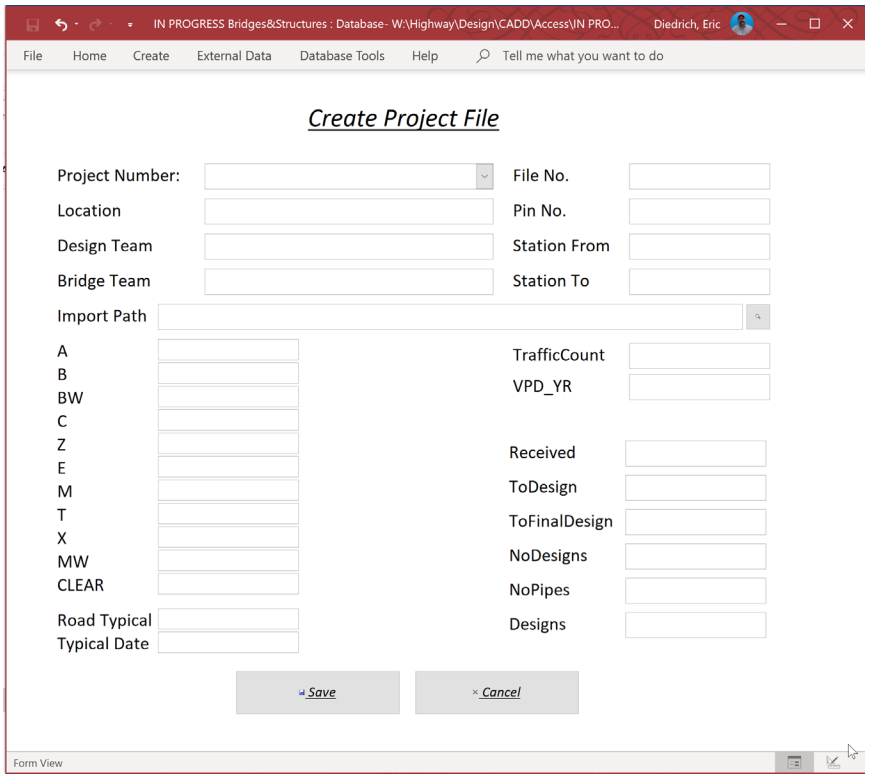
The Main Menu will display.



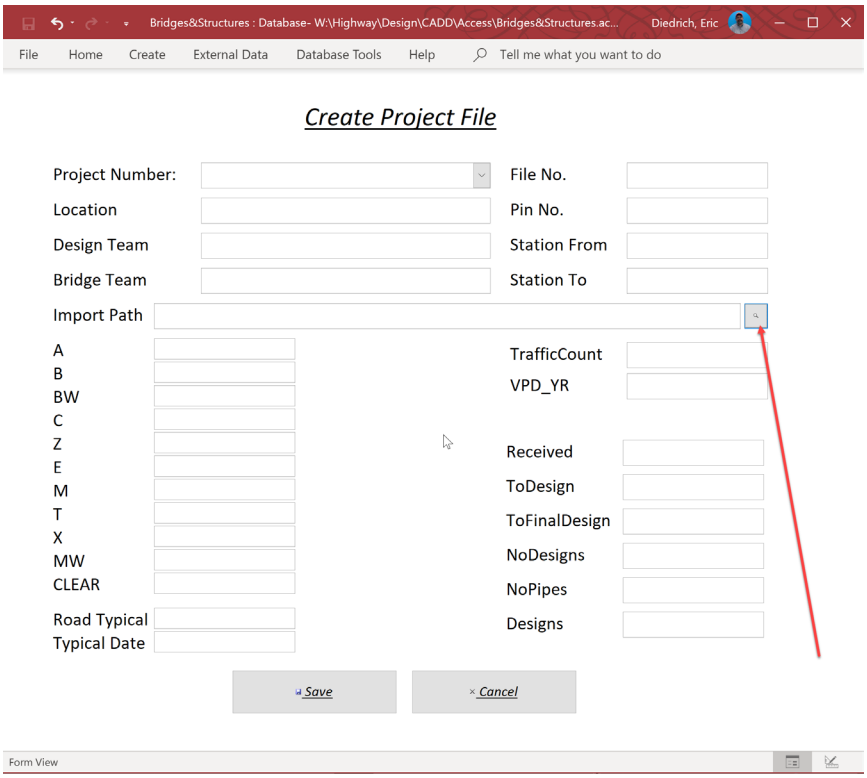
Next, click on the Create New Project File button.



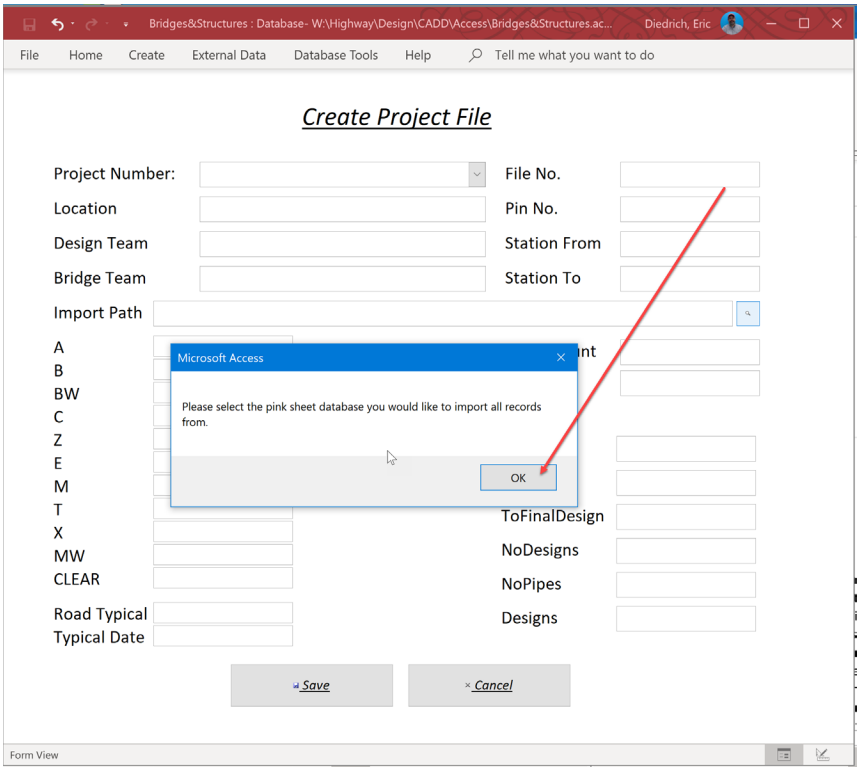
The data entry form will display as shown below.



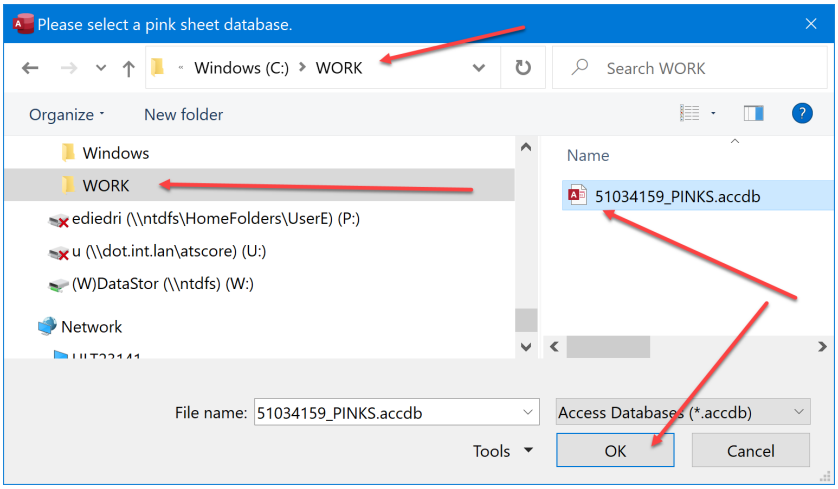
The first step to start a new project is to import the Survey Records into the new project. Click on the magnifying glass next to the Import Path field.



It will open a message to select the database. Click on the OK button.



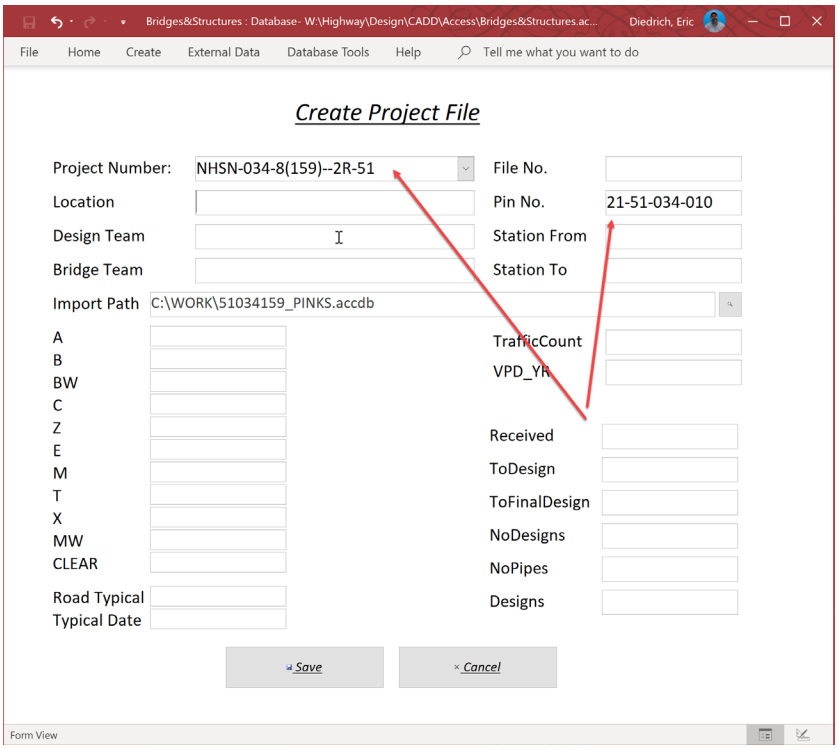
Next, browse to the location that was used to export the Survey Records to and select the CCRRRPPP_PINKS.sccdb file that corresponds with the project. For this example, it will be 51034159_PINKS.accdb in the C:\WORK folder.



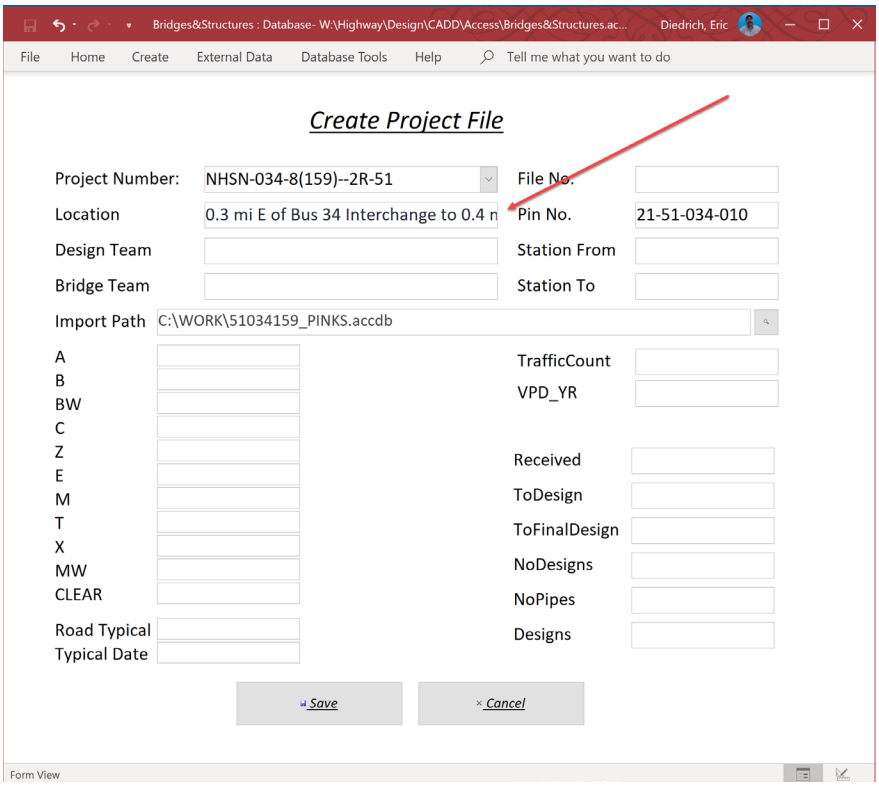
Then click the OK button.

Next, set the project number.

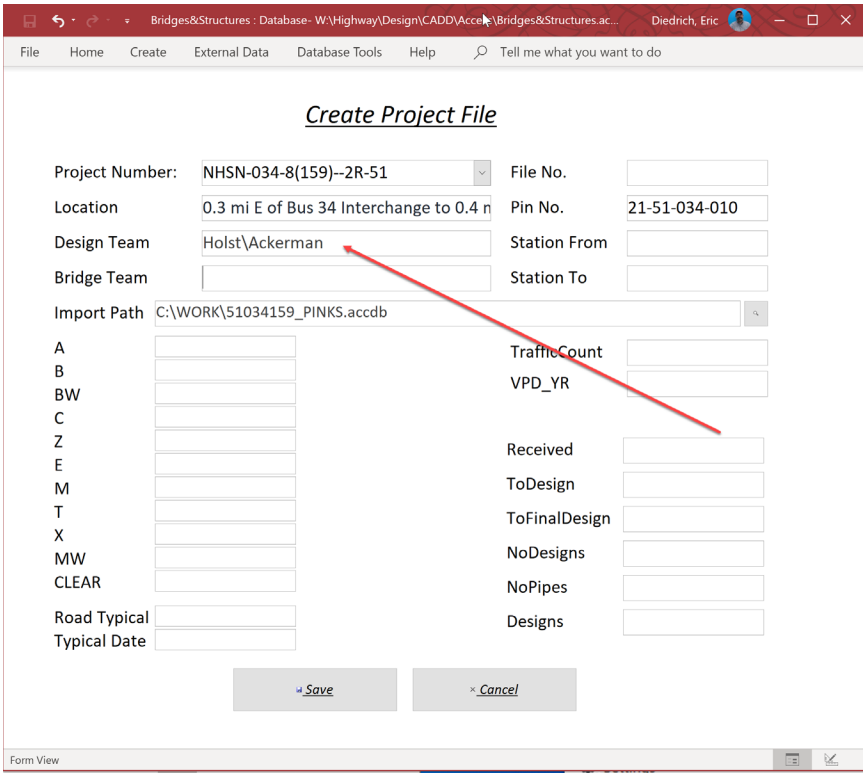
Click on the pulldown in the Project Number field and find the project number from the list and select it. Otherwise, start typing the project number in the Project Number field and the number should autofill as it is typed. Select the correct number. For this example, the project number is NHSN-034-8(159)—2R-51. This will also autofill the PIN No. field once selected since these numbers are tied to each other. It should fill in as shown below.



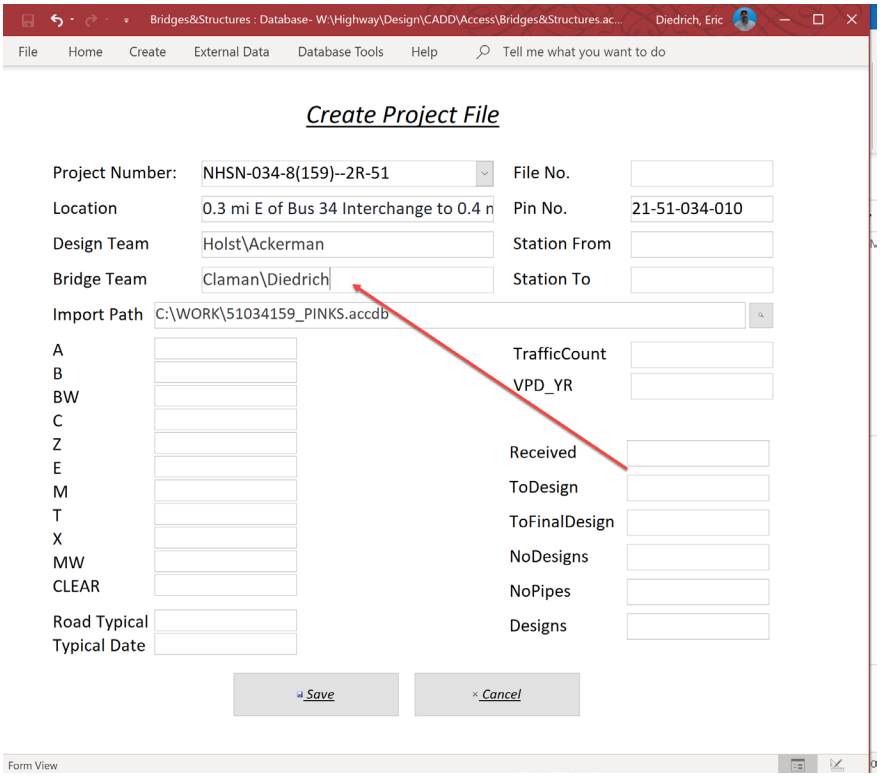
Next, fill out the Location field with the project description. For this example, it will be 0.3 mi E of Bus 34 Interchange to 0.4 mi E of Umber Ave (5 Locations).



Next, fill out the Design Team. For this example, it will be Holst\Ackerman.



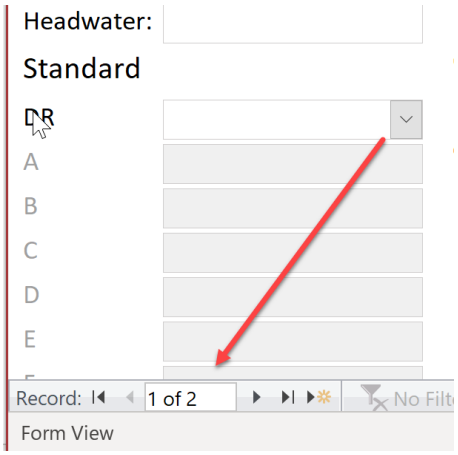
Next, add the Bridge Team. For this example, it will be Claman\Diedrich.



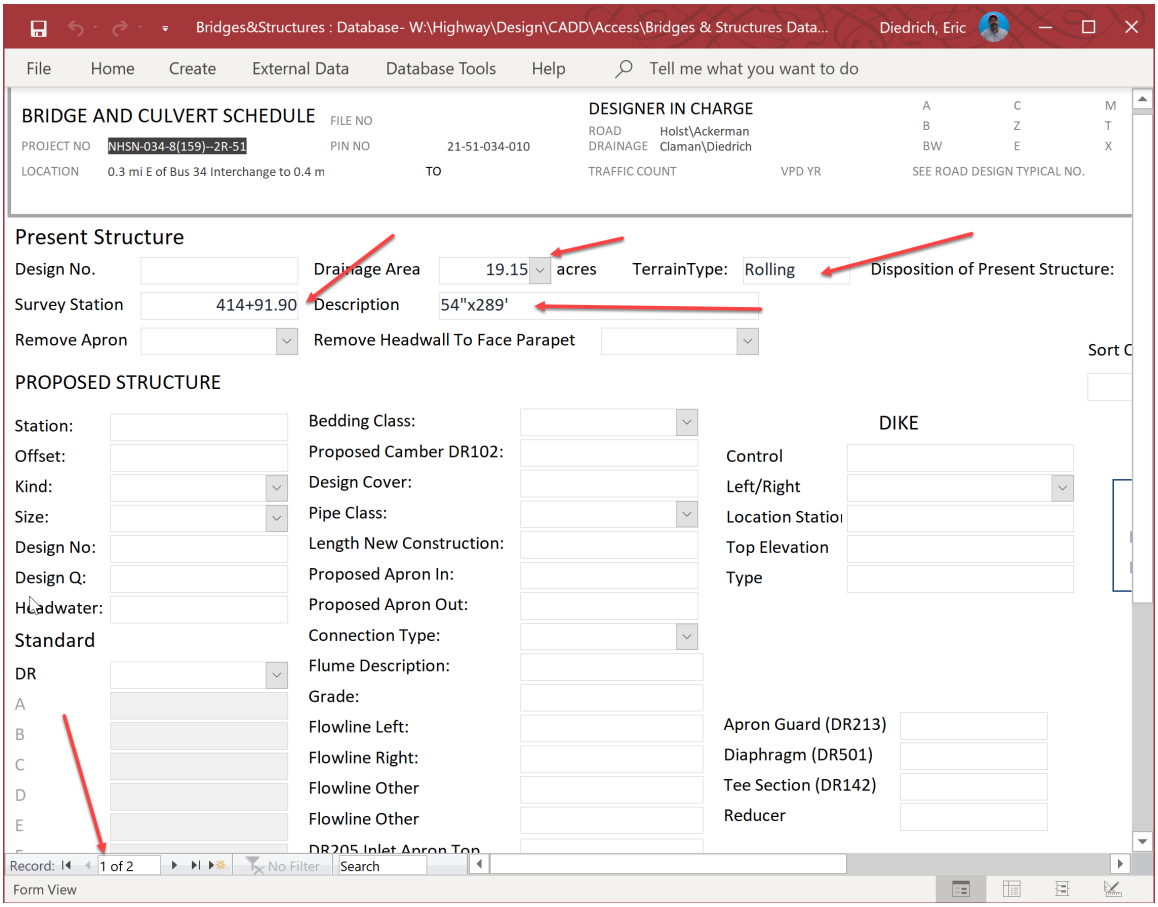
Next, fill out the File No. and Station From and Station To.

Note: If the File No. and Station From and Station To are not known at the time of the project creation, leave it blank and fill it in later. Also, creation of the project as a new project is only need once. It will be accessed from the list button from then on.

Click the save button. The New Project will open at the first record. If the Survey Records (CCRRRPPP_PINKS.sccdb) was imported, it will open at the first record that was imported. For this example, the imported Survey Records (CCRRRPPP_PINKS.sccdb) contained two structures so it will show record 1 of 2 as shown at the bottom left.

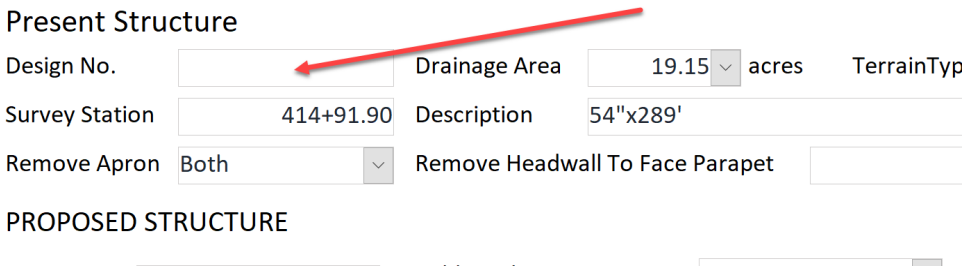


If survey records were not imported, it will show 1 of 1 records. Since the survey records were imported, the Survey Station, the Drainage Area, Terrain Type and Description of the existing structure are shown.



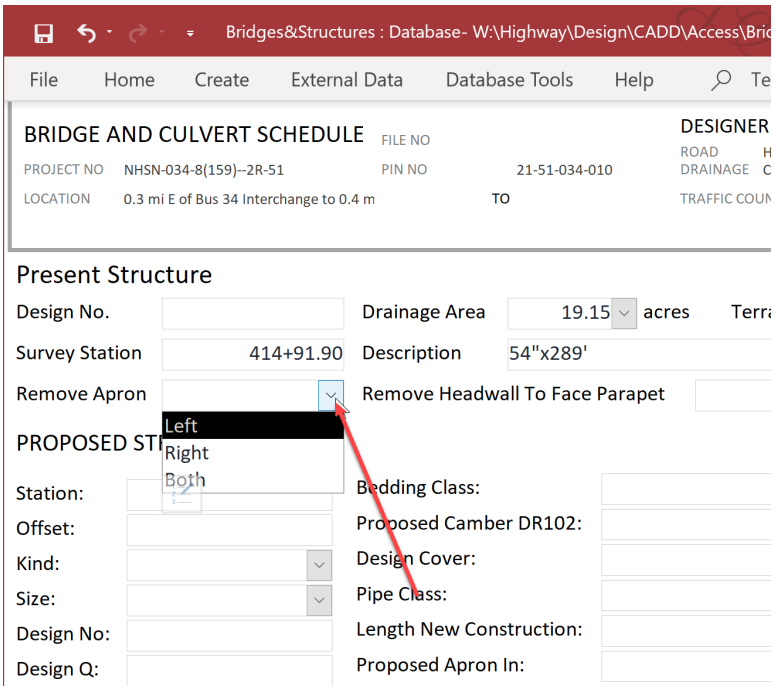
This is the form that will need to be filled out for each structure in the new drainage design. If the existing structure is being replaced with a new one, fill out the proposed structure information on the record of the existing structure that will be replaced. If the existing structure will be left in place and used as constructed in the new drainage design, leave the proposed structure portion of this record blank. For this example, the existing structure (54” pipe) is being replaced with a new 54” pipe and the Proposed Structure information needs filled out on this record.

The first thing to fill out is the Design number of the existing structure if it is an RCB. This information can be acquired from the as-builts and entered here.

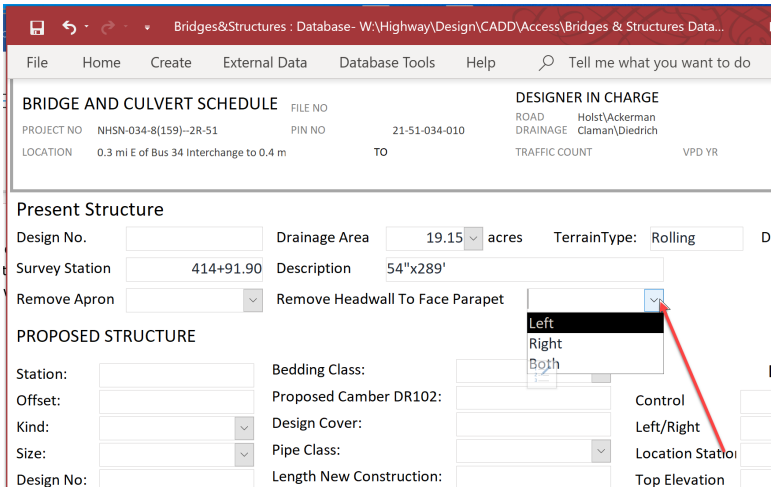


This example is a pipe, so there is not a design number. Leave it blank.

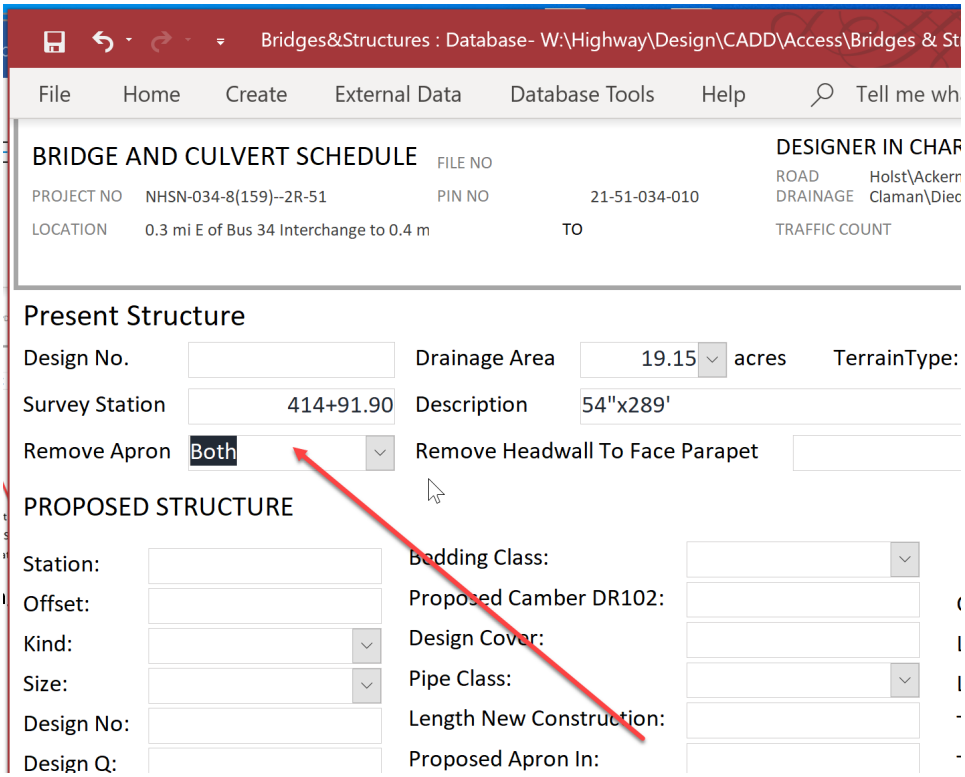
The next thing to do is decide what will be done with the existing structure. If the structure is a pipe, click on the pulldown on the Remove Apron field. This will provide 3 options, Left, Right and Both. If the pipe is being extended, select the end that is being extended. However, if the pipe is being replaced select Both.



If the structure is an RCB, click on the pulldown on the Remove Headwall field. This will provide 3 options, Left, Right and Both. If the RCB is being extended, select the end that is being extended. However, if the RCB is being replaced select Both.

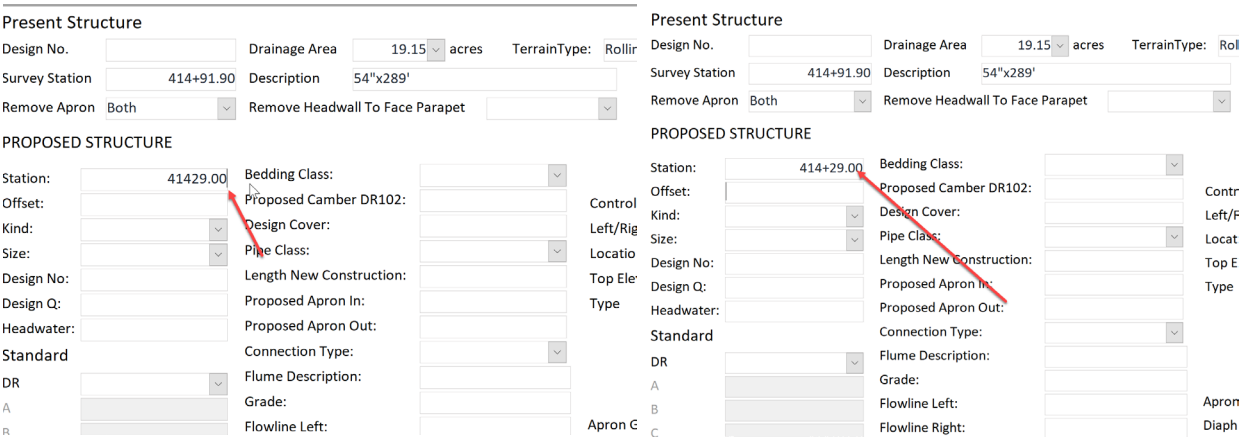


For this example, it is a 54-inch pipe and is being replaced with a new structure so select Both.

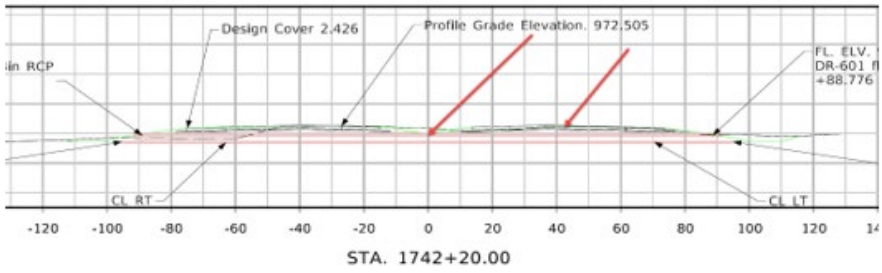


Next, fill out the Station of the Proposed Structure. This is the station value that is the intersection point at the centerline of the Proposed Structure and the centerline of the design alignment. For this example, it will be 414+29.00.

Note: When entering this station value, do not place the plus+ just the numeric value and then click in the next field. The database will put in the plus+ as shown below.

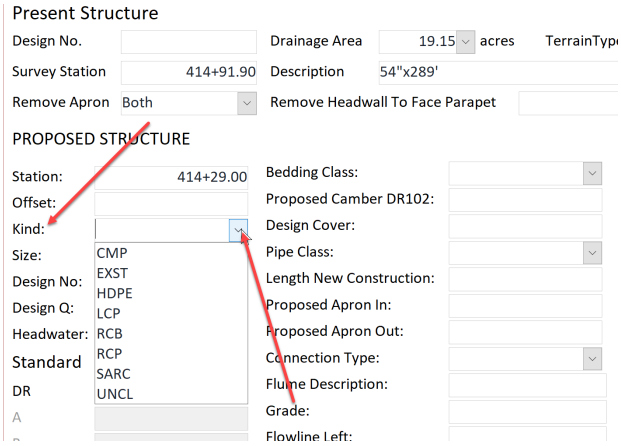


The next field is Offset field. This is used if the structure is on a divided highway. This will be the distance from the mainline centerline to the Base Line as described in the standards.



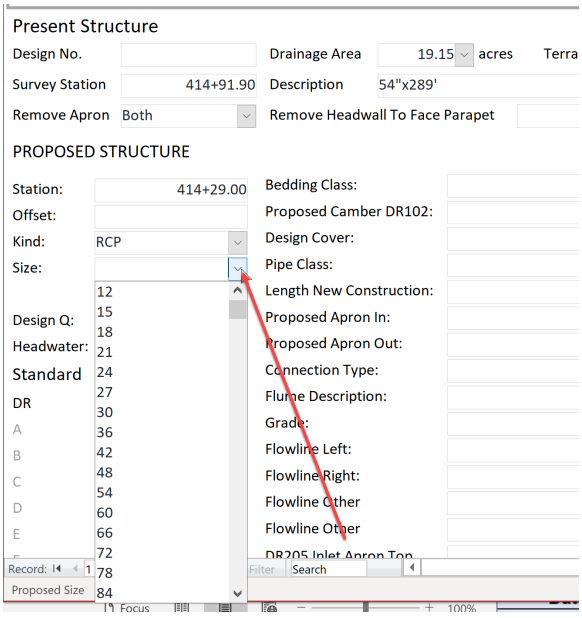
If designing a two-lane highway like in this example, leave this blank.

The next field is the Kind of structure. This refers to what kind of structure is the proposed structure.

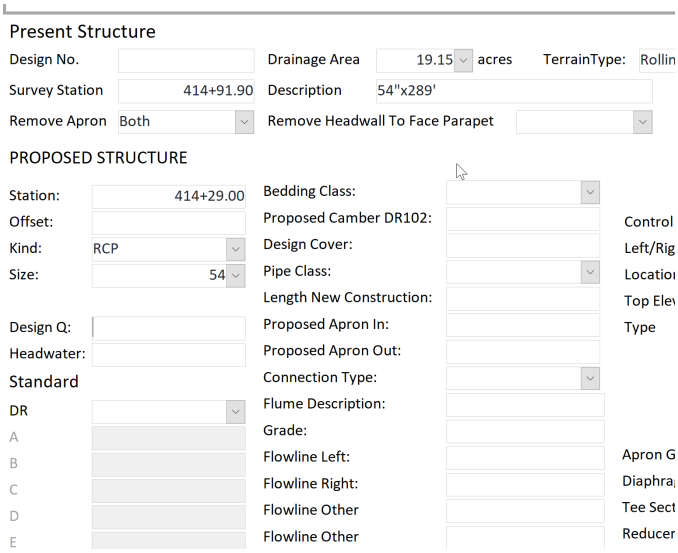


For this example, select RCP.

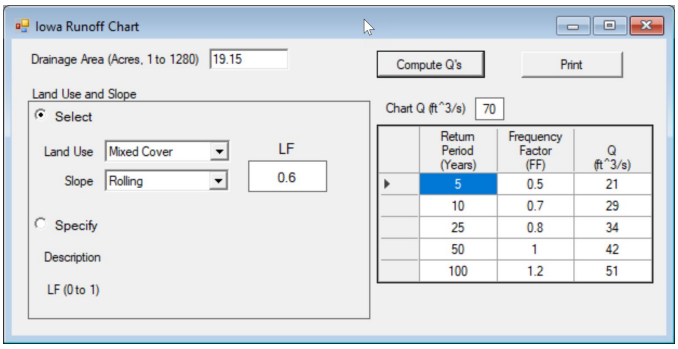
Next, select the size.



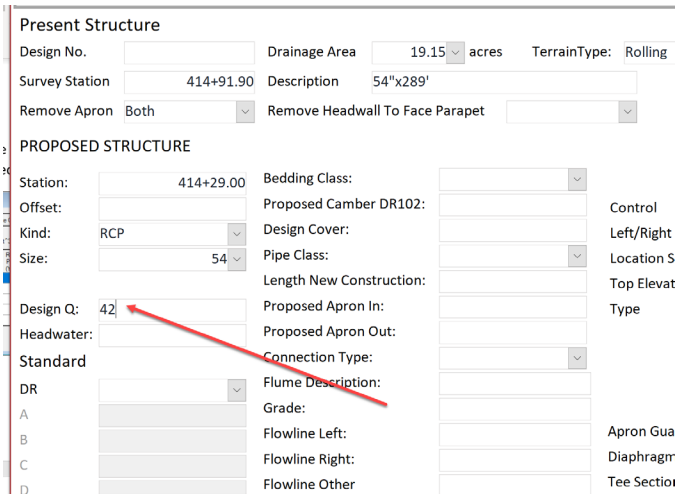
For this example, it will be 54”



The Next field is the Design Q. Obtain the value from the ICH program that is used to determine the size of the proposed structure. This comes from the Iowa Runoff Chart.

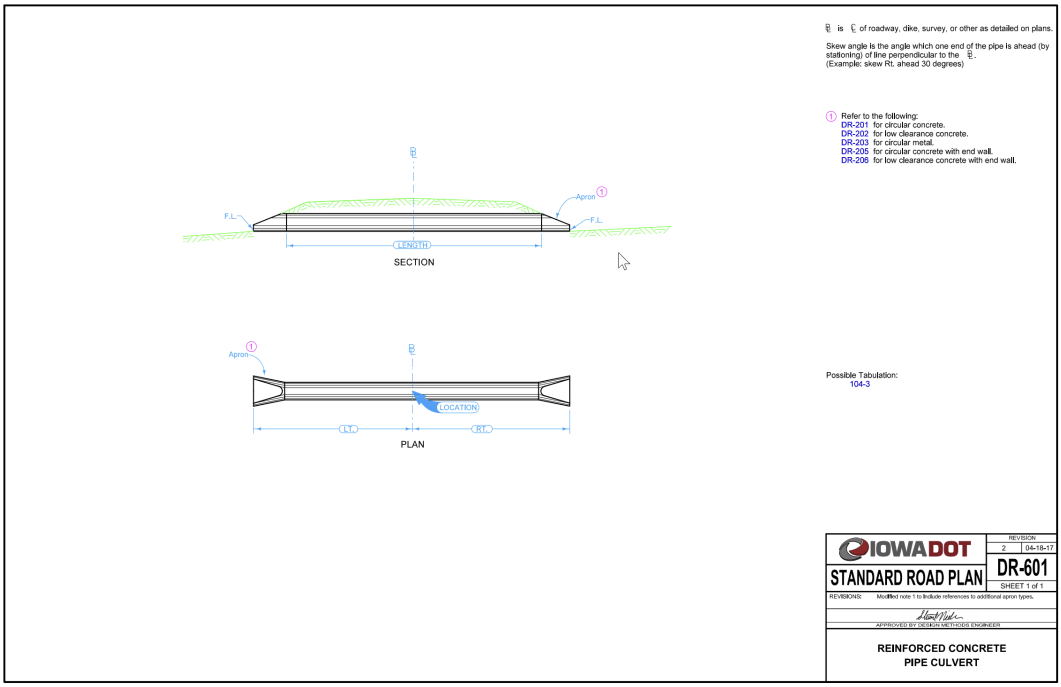


For this example, it will have a Design Q of 42 because it is designed for the 50-year flood event.

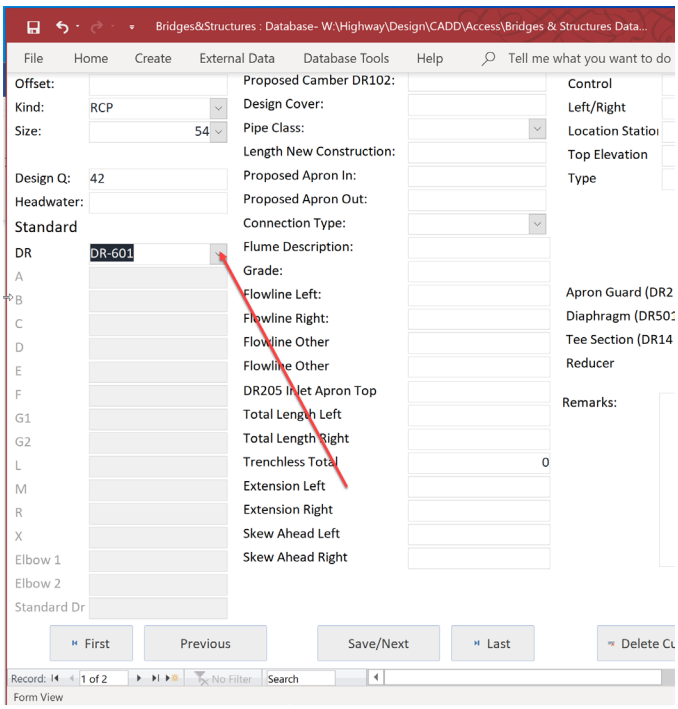


The Next field is the Headwater. This will need to be calculated for the larger structures. However, the example is small enough it is left blank.

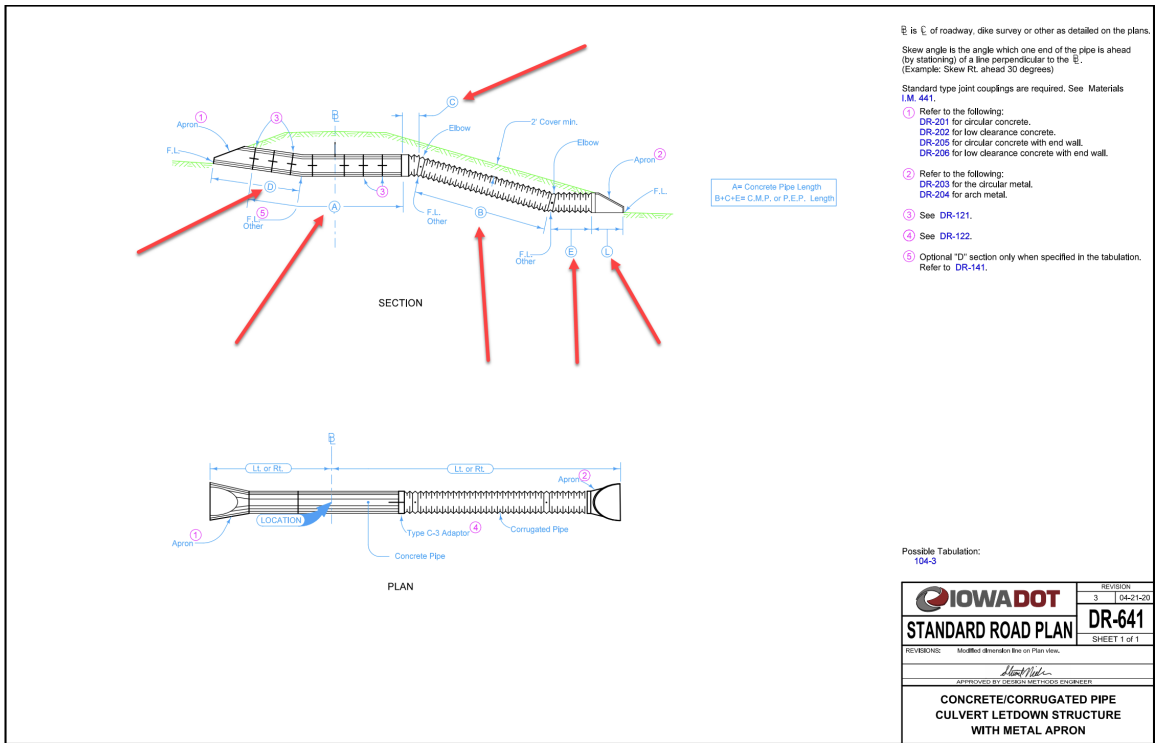
The next field is the design Standard of the proposed structure. Select the correct Standard from the Proposed Structure field by clicking on the pulldown in the DR field. For the example it will be a DR-601.



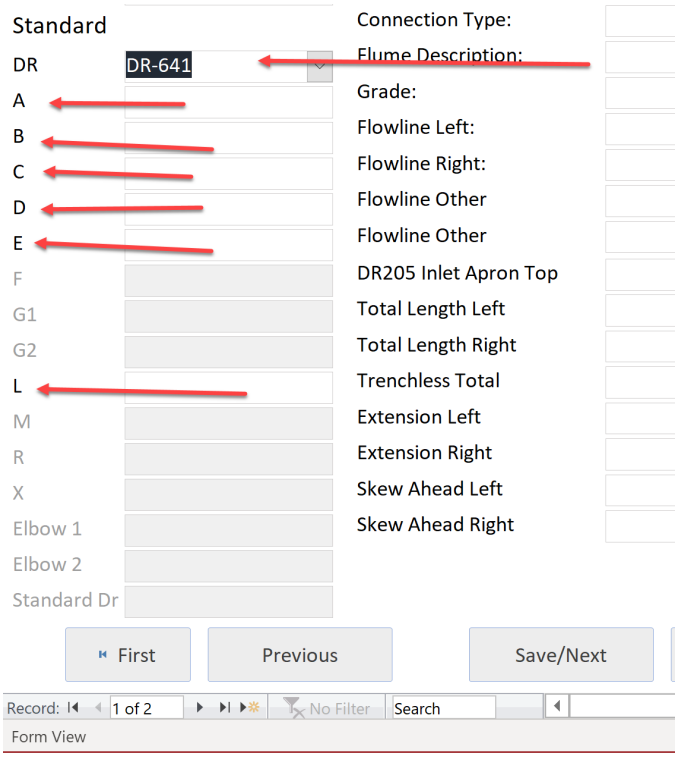
Note: For more information on the Iowa Department of Transportation drainage standards see the web page at this link. https://iowadot.gov/design/stdplne_dr



Depending on the DR Standard that is selected the appropriate information fields will become active. For example, assume the standard used is DR-641



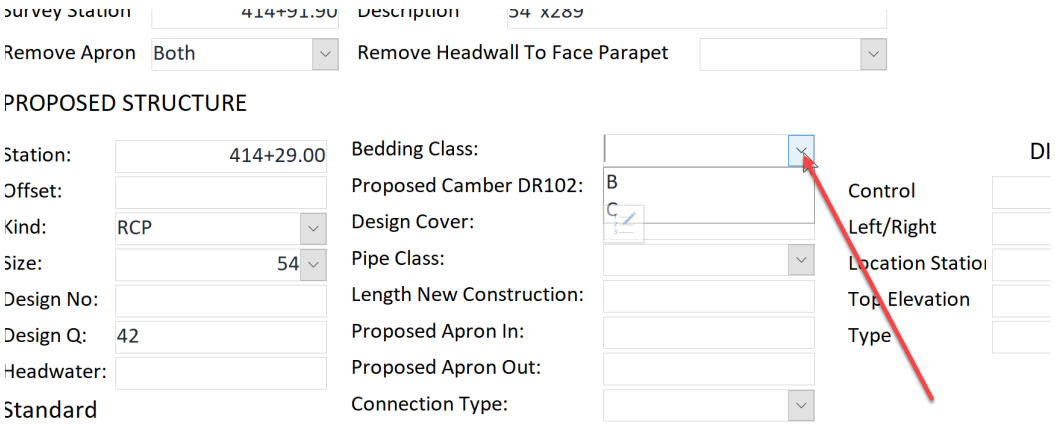
The information fields A,B,C,D,E and L are now active and the corresponding information will be filled in.



Note: When entering a DR-641 use two records in the database. One for the concrete or RCP portion of the structure and one for the CMP or plastic letdown section of the structure. Enter RCP portion on the first record with all special dimensions. Then just the letdown dimensions on the second record. This will allow the structure to be tabulated correctly.

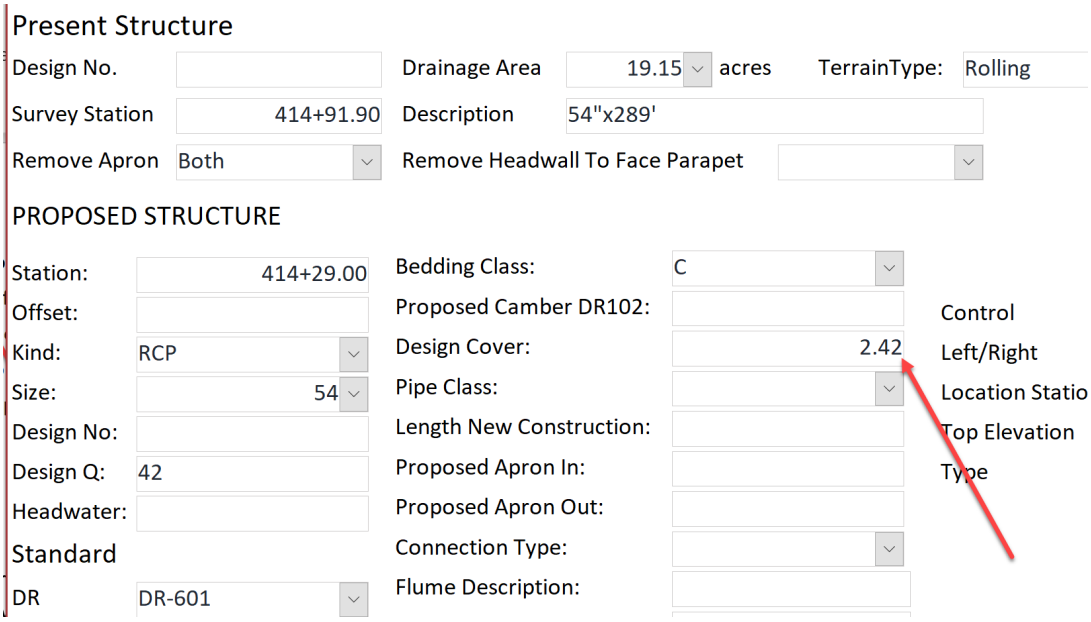
For this design example, use a DR-601.

Next, select the Bedding Class:

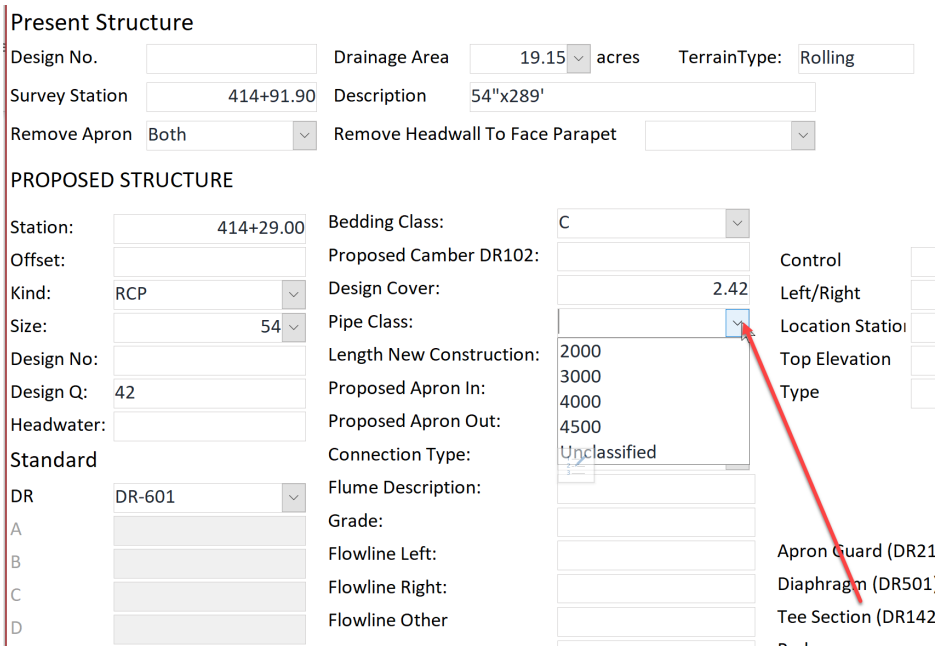


For pipes it will usually be Class C. However, refer to the DR-101 to verify.

Next, enter the Design Cover for the pipe design. This is the distance from the top of the pipe to the shoulder of the roadway. Refer to the DR-102 to verify. For this example, it will be 2.42

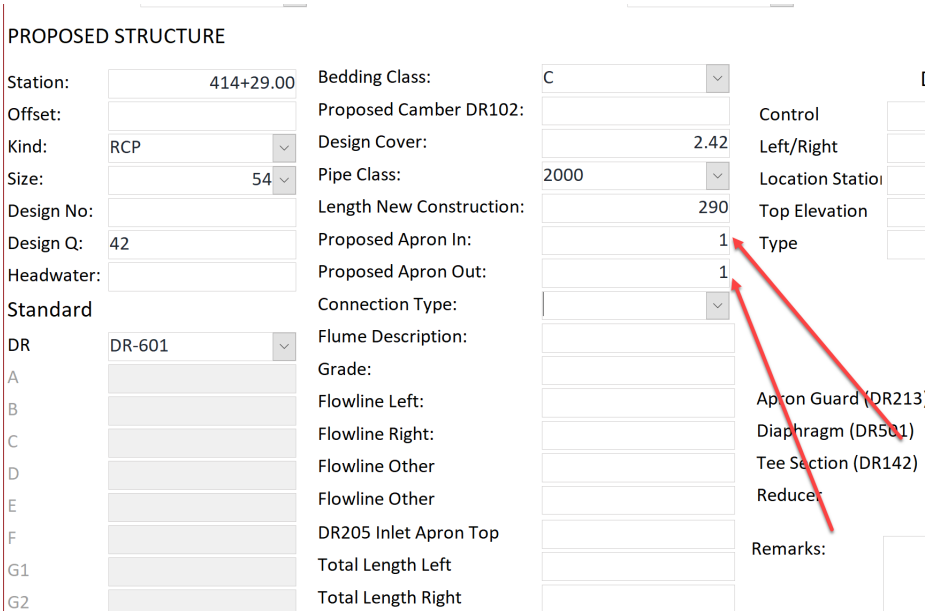


Next, decide what class of pipe is used for this design. This is determined by the design cover and Bedding Class. Refer to the DR-104 to verify. Use 2000 for this example.



Next, enter the Length New Construction value. This is the total length from connection point of inlet apron to connection point of outlet apron. For the example it will be 290'.

The next two fields are Proposed Apron In and Proposed Apron Out. This is used to determine how many aprons will be needed to construct the new pipe. So, for the example place a (1) in each field so that there are two 54" pipe aprons on the 104-3 tab sheet. If the design was to only extend the pipe, place a (1) in the field of the end of the pipe that was being extended, Inlet or outlet.

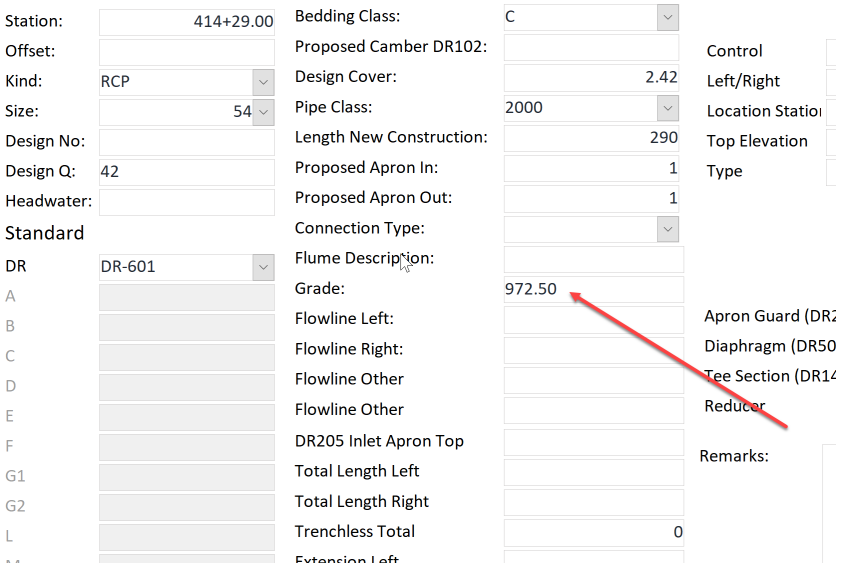


The next field, Connection Type, is for indicating if the design requires a connection type, either a DR-122 or DR-141. Select the correct standard and the additional field will appear for the corresponding information for that standard. This will not be used for this design.

The next field is if the design uses a flume. Enter the size and type of flume in this field. This will not be used for this design.

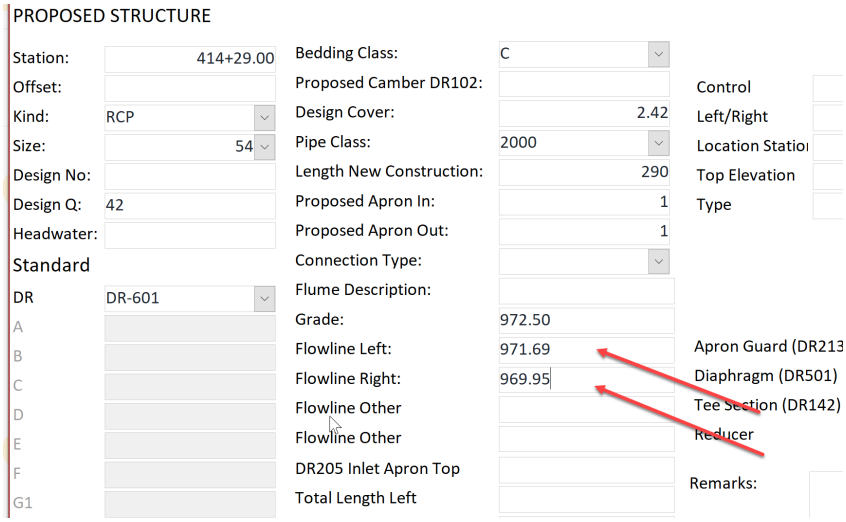
The next field is for the Grade. This is going to be the Profile Grade Elevation that was determined while designing the structure and annotated on the cross section. For this example, it will be 972.50.

Note: The cross section is a great source to use to fill out the following data.

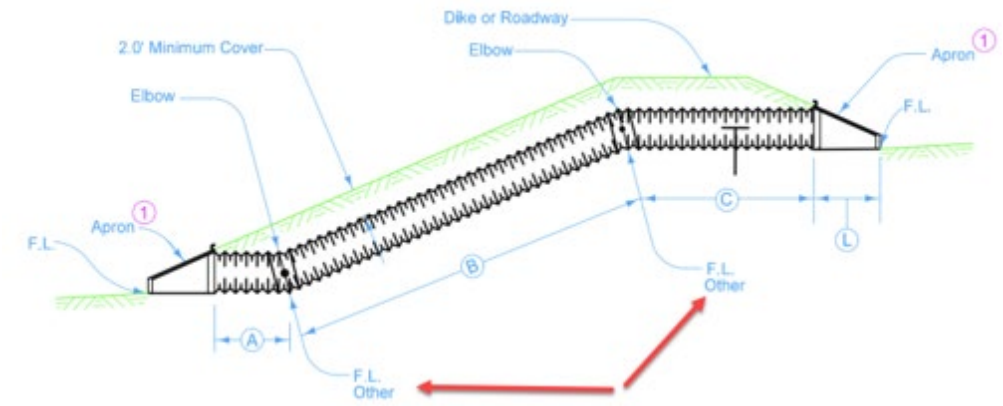


The next 2 fields will be Flowline Left and Flowline Right. This is the elevation of the flowline at the end of the pipe apron.

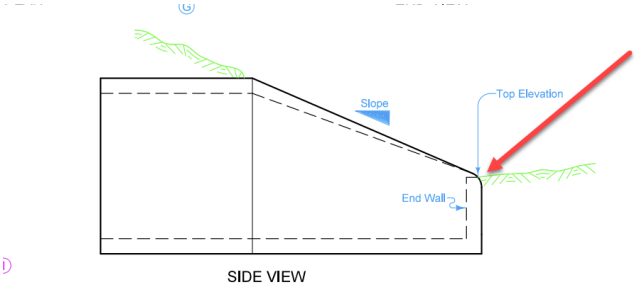
Note: The information was determined during the design process and annotated on the cross section for the next several fields. The cross section is a great source to use to fill out the following data.



The next fields are used if the standard requires other flowline elevations to be reported, for example a DR-632.

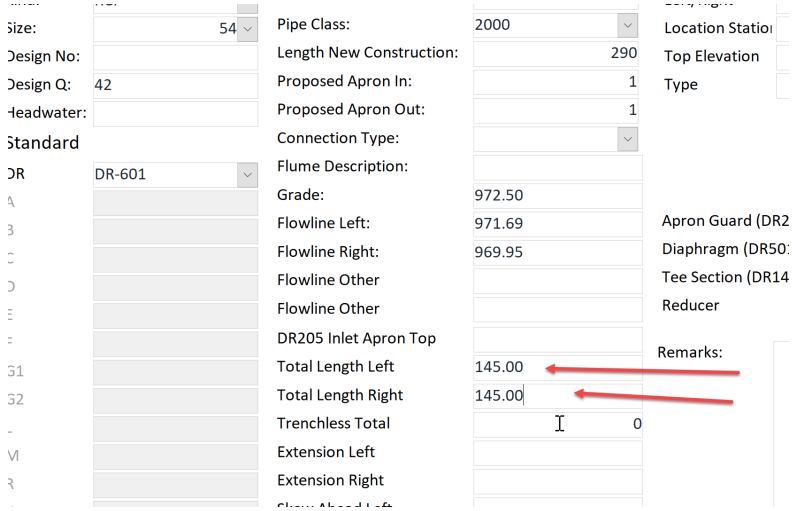


The next field , DR205 Inlet Apron Top, is for the elevation at the top of the end wall of a DR-205. If this apron is used in the design, enter the elevation here.

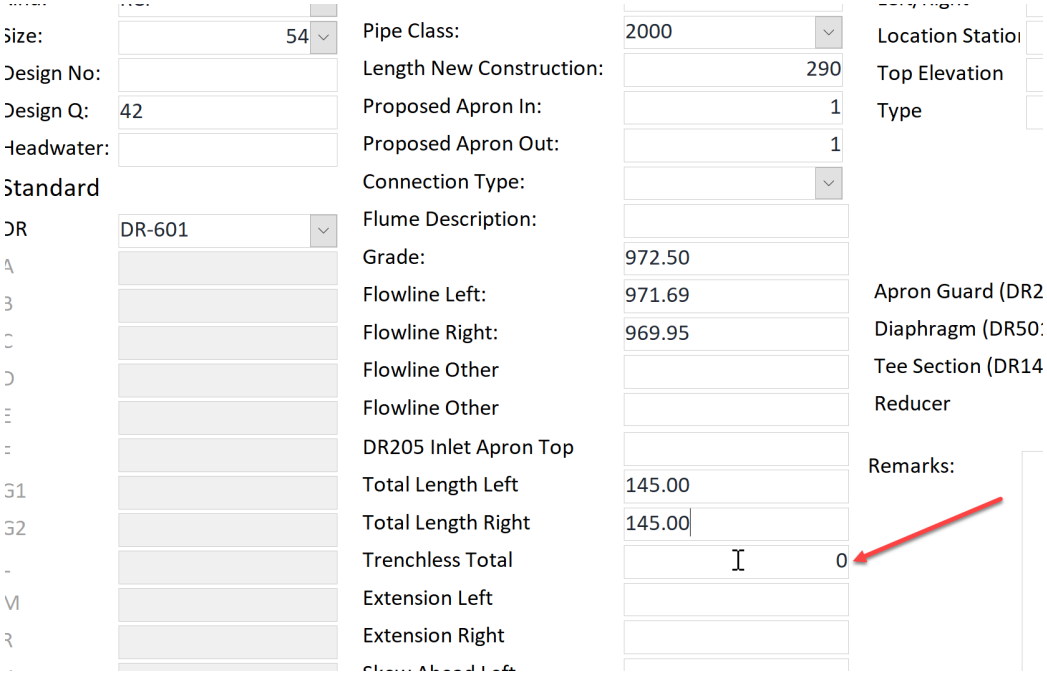


The next two fields are to report on the Total Length Left and the Total Length Right. This is the distance from center line to end of the apron.

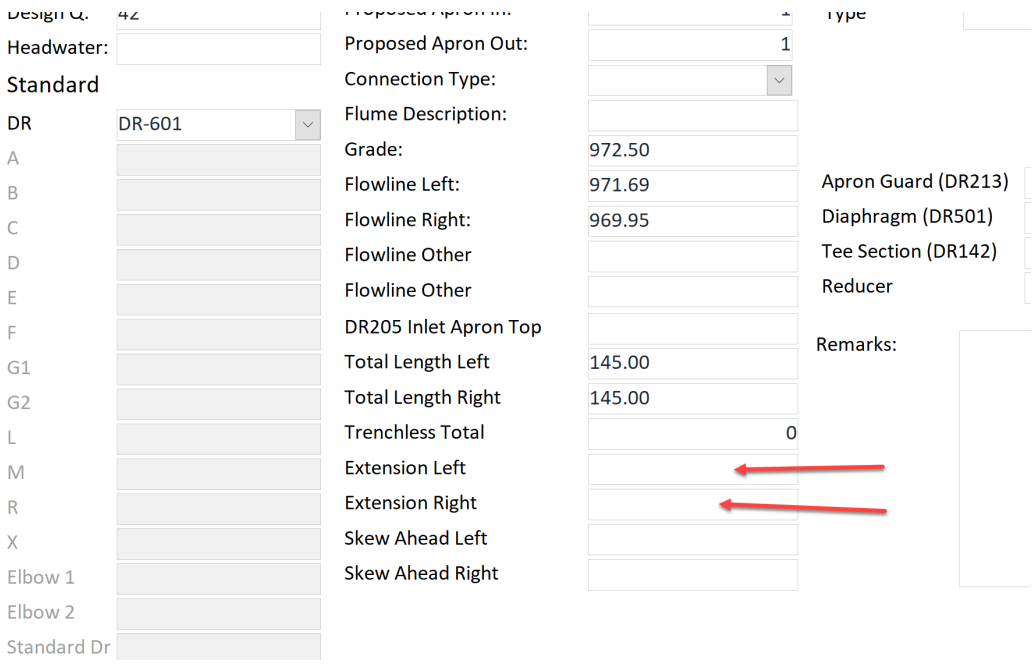
Note: If there is not an offset base line, this will be the offset of the point at the end of the apron.



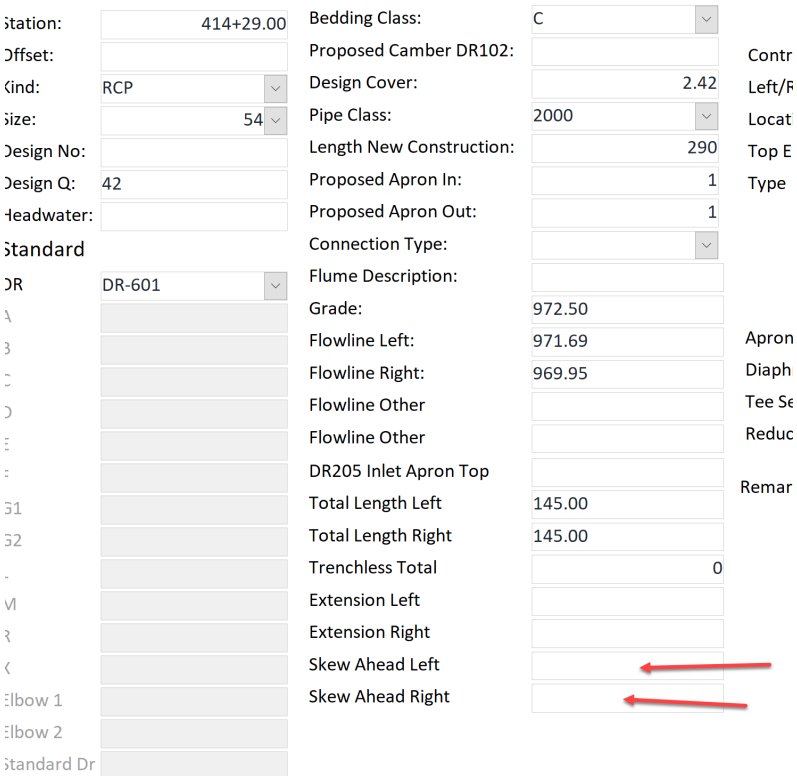
The next field is for reporting the Trenchless Total. This will refer to a pipe that requires to be jacked in place during installation as opposed to being replaced by cut and cover. This field is to enter the total distance of that pipe that is to be jacked.



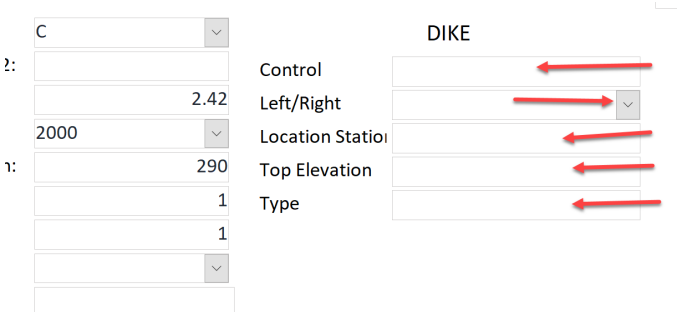
The next two fields are for if the design is to extend the existing structure. Enter the total distance in the direction of the extension that is to be constructed.



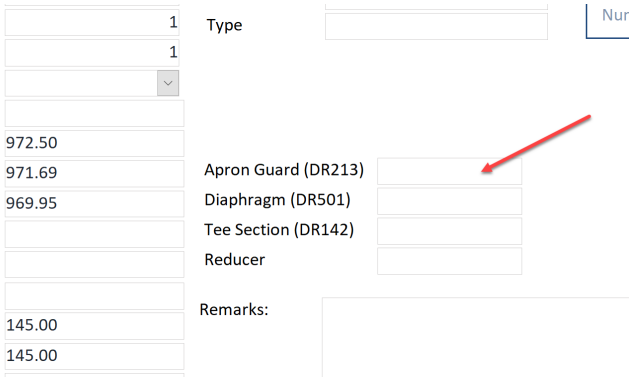
The next two fields are for if the structure is skewed, enter the degree of the angle of the skew in the appropriate field Right or Left.



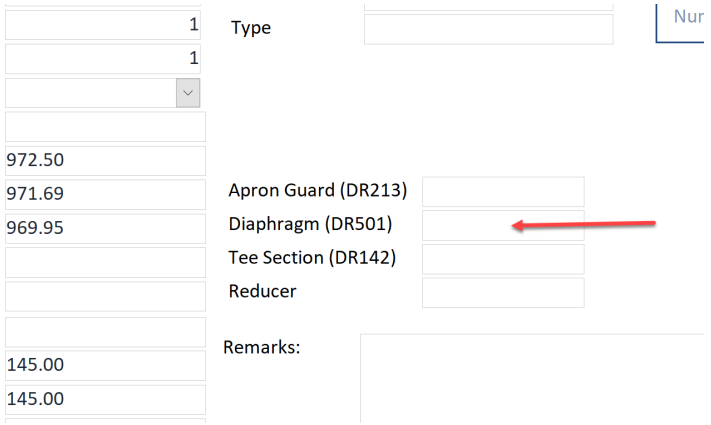
The next five fields are for when a dike is included in the drainage design.



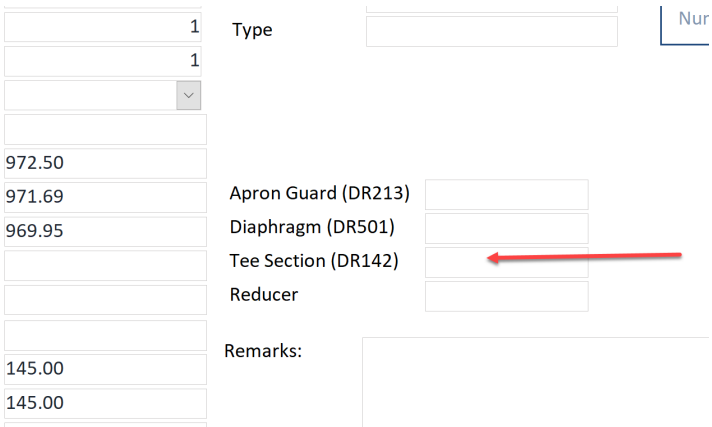
The next field is for if the design has an [DR-213](). Enter the number that is needed for that structure.



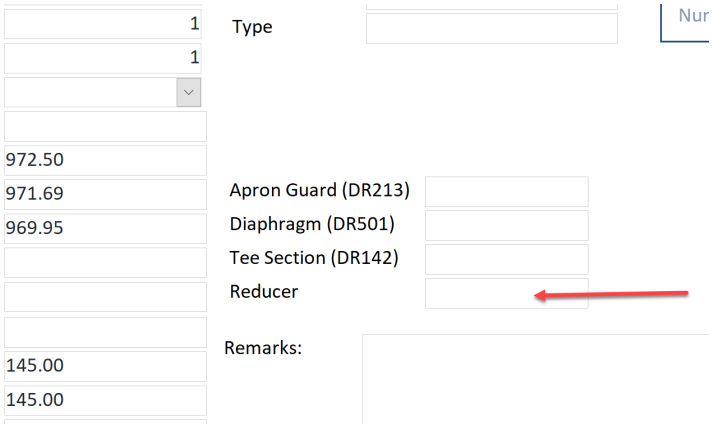
The next field is for when the design has an DR-501. Enter the number that is needed for that structure.



The next field is for when the design has an DR-142. Enter the number that is needed for that structure.



The next field is for when the design has a Reducer. Enter the number and size that is needed for that structure.

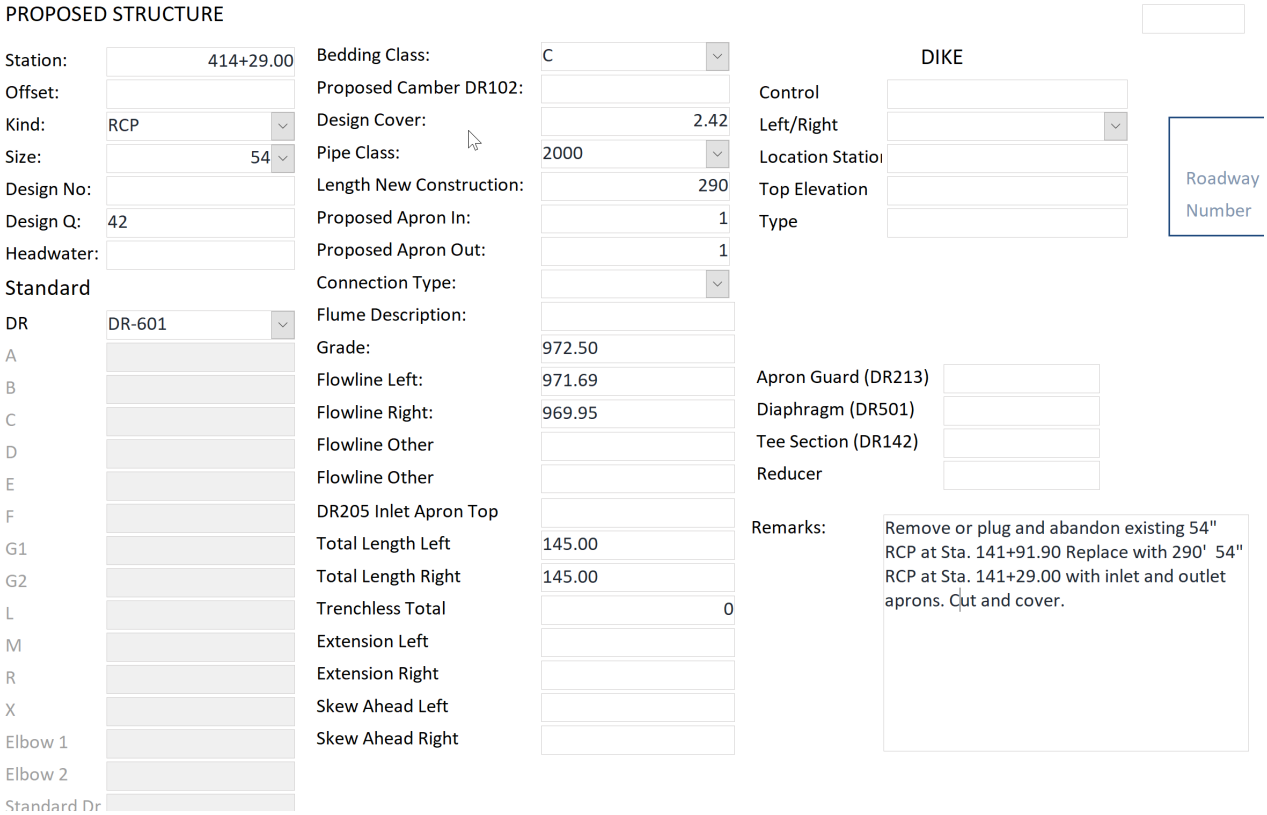


The next field is for Remarks. This is intended for the designer to include the design intent and direction on the staging of the replacement for the proposed structure.

Examples of typical remarks:

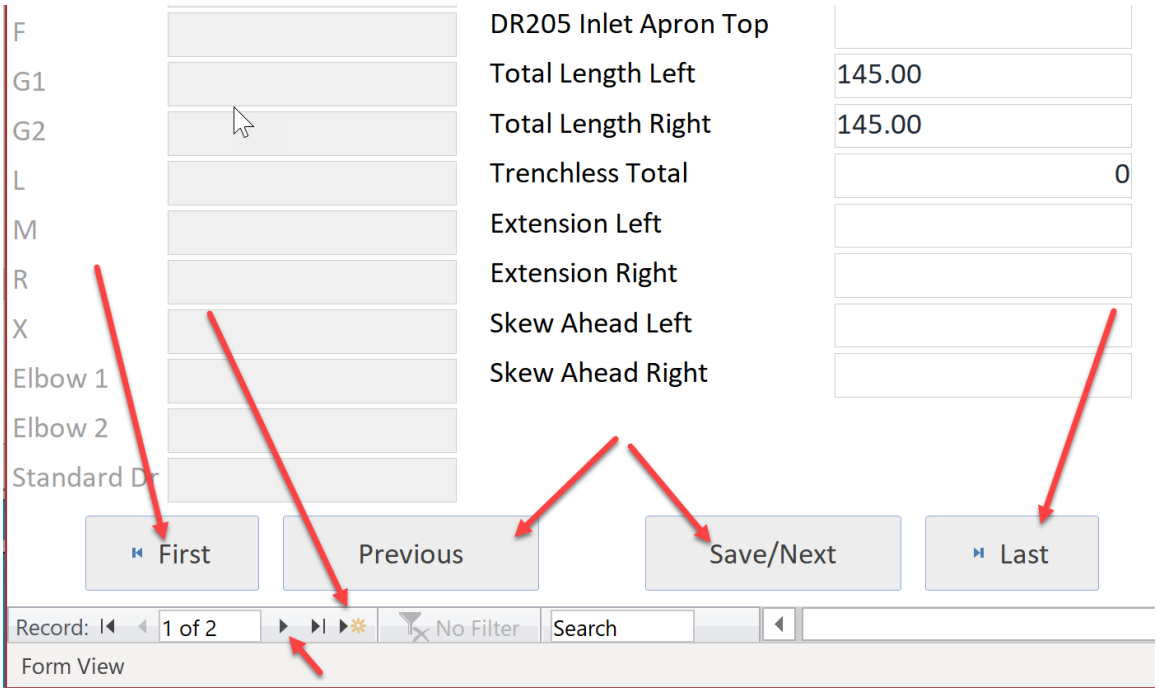
Plug and abandon exist median drain at Sta 1451+26. Jack 78’ of 24” RCP then lay one 6’ DR141 Type “D” double bevel section + apron on inlet end at Sta. 1452+25 – 51’ Lt
or
Remove 30 ft of existing 36 in RCP. Replace with 42 ft of 36in RCP with one DR-141 7.5-degree D section beveled end to the RT. Tie new pipe to old pipe with longitude tie bars.

The purpose of the remarks is to eliminate questions during the construction phase of the project.

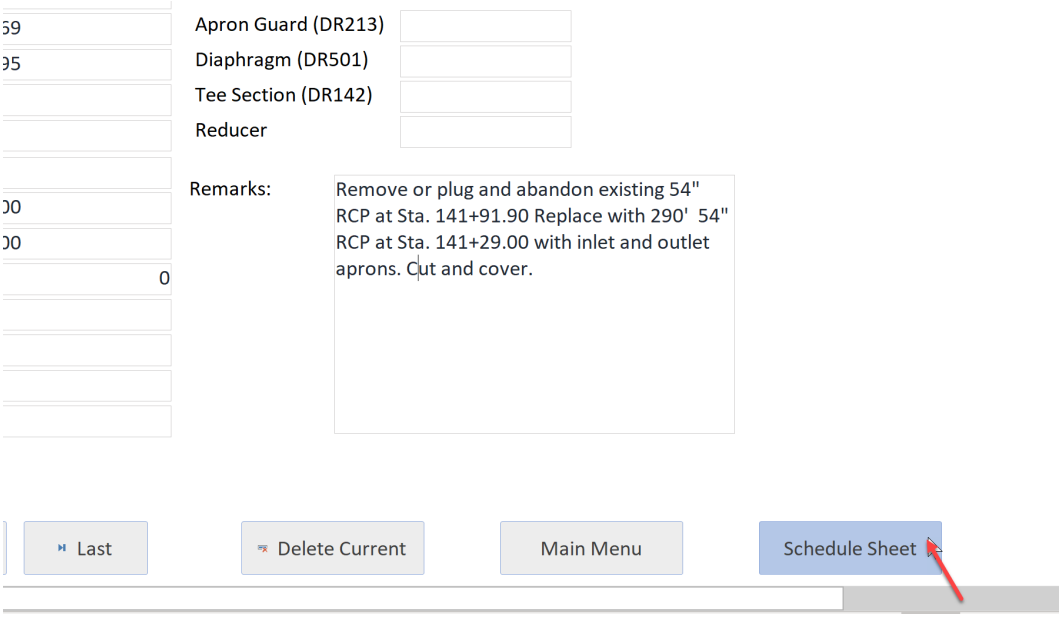


Once all the correct fields that corresponds with that structure standard are entered in the record, move to the next record and repeat the process. If the next structure is to be replacing an existing structure, find the records that were imported from the CCRRRPPP_PINKS.sccdb that corresponds with that structure. If the next structure does not replace an existing structure, make a new record.

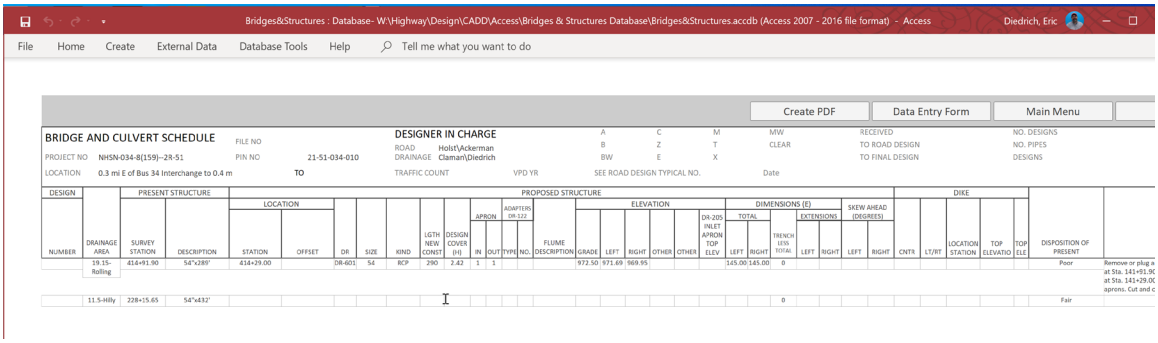
Click the buttons at the bottom of the record or the arrow buttons in the access database task bar to navigate to the desired record.



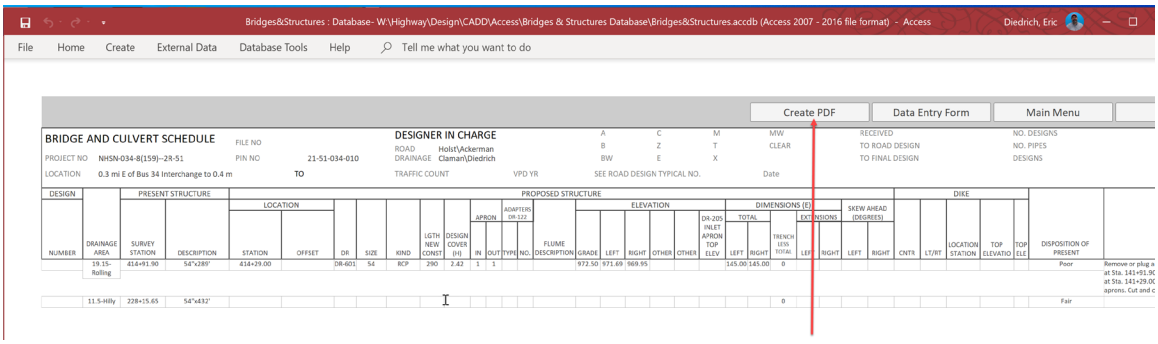
Once a record for each structure in the drainage design is finished, create the Schedule Sheet. Click on the Schedule Sheet button at the bottom of the record.



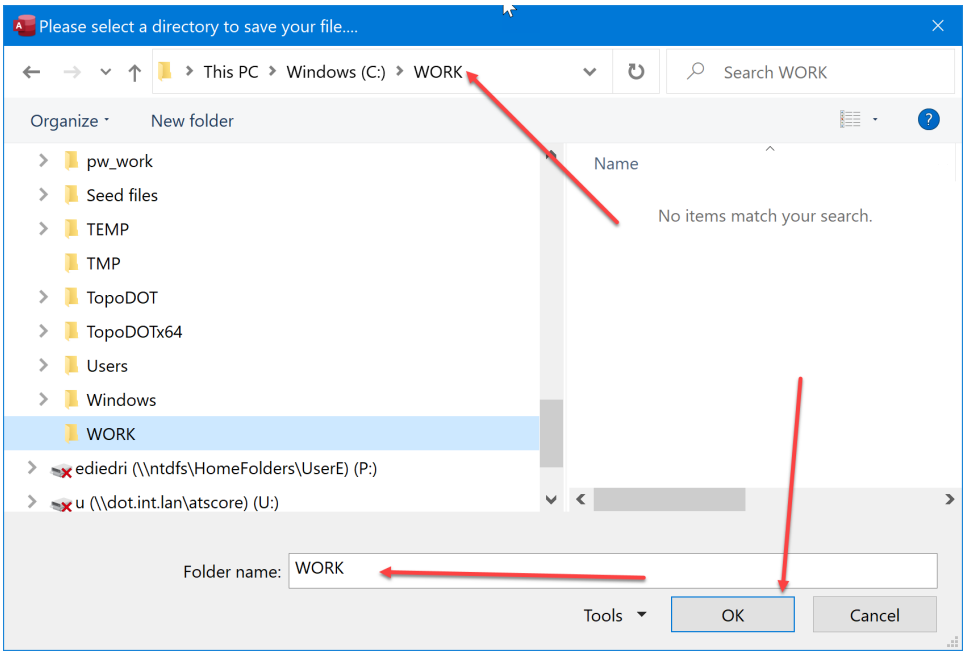
All the records in the project are compiled onto a Schedule Sheet.



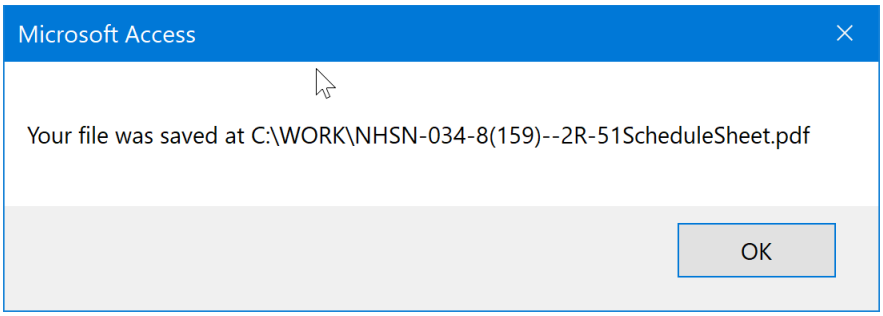
The next step, will be to create a PDF of the Schedule Sheet. Click on the Create PDF button at the top of the Schedule Sheet.



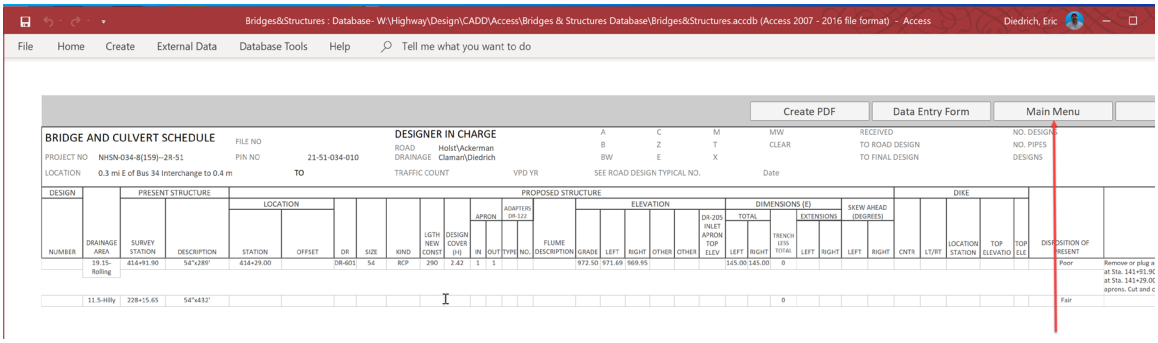
It will open the dialog box asking to select a directory to save the PDF file. For this example, use the C:\WORK directory that was created to download the CCRRRPPP_PINKS.sccdb to. Once the directory is selected, click the OK button.



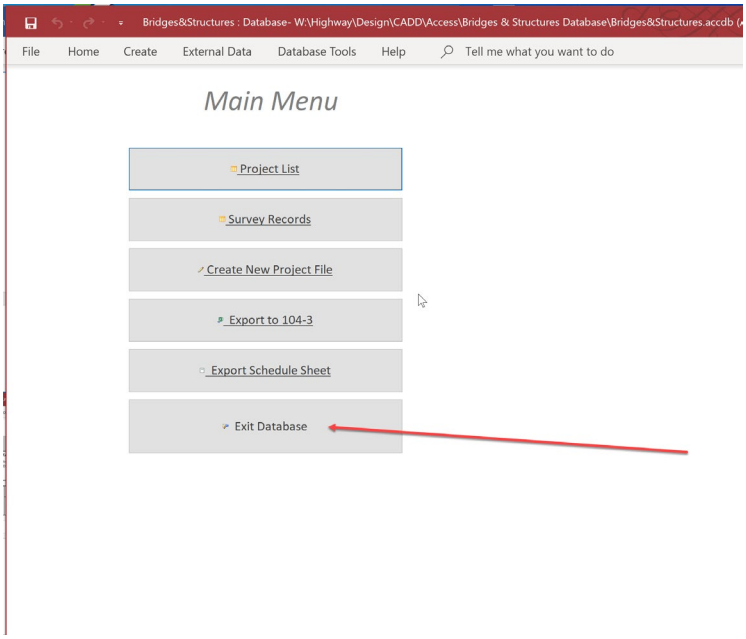
It will create the PDF of the Schedule Sheet in that directory and name the file Project NumberScheduleSheet.PDF. For this example it would be named “NHSN-034-8(159)—2R-51ScheduleSheet.pdf”. It will display this message to indicate when it is done. Click the OK button to dismiss.



Next, exit the database. Click on the Main Menu button at the top of the Schedule Sheet.



Once in the Main Menu, click on the Exit Database button.



Place the Project NumberScheduleSheet.pdf file in the Bridge\Design Events\B01\ folder of the project directory in project wise.