


*State of Florida*  
*Department of Transportation*



**FDOTConnect**  
*for*  
**OpenRoads Designer**

**Pond Design &  
Plans Development**

Training Guide

2021

PRODUCTION SUPPORT CADD OFFICE

TALLAHASSEE, FLORIDA

<https://www.fdot.gov/cadd/>

Pond Design & Plans Development

## Description

This course was developed to introduce the OpenRoads Designer CONNECT Edition tools for Pond Design and modeling on Florida Department of Transportation (FDOT) projects. The curriculum was developed within the FDOTCONNECT Workspace to provide sample exercises for many of the Pond Design Tools on a sample project data set. Participants of this course will be introduced to the newest OpenRoads environment and a Workflow for designing two dimensional (2D) plans, profiles, and three dimensional (3D) models for Pond Design Construction Deliverables.

## Objectives

- Finding additional learning resources and training materials for OpenRoads Designer CONNECT Edition and the general process using Drainage and Utilities Workflow for Pond Design
- How to create and prepare a Pond Design file for use in construction Deliverables
- Laying out a simple Pond
- Tools to evaluate and edit the Pond Design
- Producing a NexGen Storm Water Facilities sheet (according to FDM 917)

## Audience

**HINT** FDOT Drainage Designers and Engineers.

## Prerequisites

Participants need to have a basic understanding of Computer Aided Drafting and Design (CADD) using MicroStation, a basic understanding of OpenRoads Designer CONNECT Edition - OpenRoads Technology tools and a solid understanding of the engineering necessary to design Ponds on a Roadway.

Duration: 4 Hours

Professional Credit Hours: \*\*\*\*\*

**Note** PDH Credits will only be available with Instructor lead or Computer Based Training (CBT) thru Learning Curve.

# Table of Contents

<b>TABLE OF CONTENTS.....</b>	<b>3</b>
OBJECTIVES .....	5
INTRODUCTION .....	5
DOCUMENT STYLE .....	6
<b>1 POND DESIGN .....</b>	<b>7</b>
OBJECTIVES .....	7
EXERCISE OVERVIEW .....	7
Exercise 1.1 Create The Pond Design File .....	7
Exercise 1.2 Create The Pond Control Line.....	10
Exercise 1.3 Place A Pond Design Linear Template .....	20
Exercise 1.4 Manipulate Pond Dimensions And Elevations.....	23
Exercise 1.5 Create A Pond Design Surface .....	26
<b>2 STORMWATER FACILITIES SHEET.....</b>	<b>27</b>
OBJECTIVE.....	27
EXERCISES OVERVIEW.....	27
Exercise 2.1 Create The Stormwater Facilities Detail Sheet .....	28
Exercise 2.2 Cutting Pond Sections.....	33
Exercise 2.3 Placing Special Details .....	45
Exercise 2.4 Cutting Control Structure Sections .....	50
Exercise 2.5 Control Structure Form .....	55

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# OpenRoads Designer Pond Design

## OBJECTIVES

The objective of this manual is to provide the user with a general understanding of Open Roads Designer Technology that can be used to design and model drainage ponds. It also will demonstrate the basic plans production procedures for creating the Stormwater Facilities Sheet as per FDM 917. It will not attempt to instruct on proper engineering methodologies for pond design. That is beyond the scope of this manual.

## INTRODUCTION

OpenRoads Designer CONNECT Edition is the common technology for Bentley Systems civil products that has been developed in partnership with users. It combines data acquisition/survey, geometry corridor, terrain modeling, dynamic sections, and much more into a comprehensive set of tools within a common footprint. The FDOTConnect Workspace and tools used in the exercises were developed to aide users in completing FDOT Projects on the ORD Connect platform to meet FDOT Standards.

# DOCUMENT STYLE

Style conventions used throughout the course guide are shown in the following table.

Item	Convention	Example
Menu names and commands	Bold N <i>(Names separated with &gt; symbol)</i>	<ul style="list-style-type: none"> <li>• <b>File &gt; Open</b></li> <li>• <b>File &gt; ComSelect &gt; Design</b></li> </ul>
Dialog box Actions	Bold	<ul style="list-style-type: none"> <li>• Click the <b>Apply</b> button.</li> <li>• Click the <b>Graphic Select</b> button to the right of the <i>Horizontal Alignment Include</i> box.</li> <li>• In the <i>Segment Type</i> list, click <b>Lines</b>.</li> </ul>
Dialog box Field Names	Italic	<ul style="list-style-type: none"> <li>• Key in <b>Hemfield Road</b> in the <i>Alignment Name</i> field.</li> <li>• Click the <b>Graphic Select</b> button to the right of the <i>Horizontal Alignment Include</i> field.</li> <li>• In the <i>Segment Type</i> list, click <b>Lines</b>.</li> </ul>
Key-ins	Bold	<ul style="list-style-type: none"> <li>• Key in <b>Hemfield Road</b> in the <i>Alignment Name</i> field.</li> </ul>
File Names	Italic	<ul style="list-style-type: none"> <li>• Open the file <i>ALGNRD01.dgn</i> in the C:\WorkSets\FDOT\22049555201\Roadway.</li> </ul>
File Paths	Non italic	<ul style="list-style-type: none"> <li>• Open the file <i>_Blank.dgn</i> in the C:\WorkSets\FDOT\22049555201</li> </ul>
New Terms or Emphasis	Italic	<ul style="list-style-type: none"> <li>• The Template Library contains <i>templates</i>, which represent typical sections of the proposed roadway.</li> </ul>

Additionally, a new workflow terminology using the Ribbon is used throughout the course guide. If you see a direction like this:

DRAINAGE AND UTILITIES > LAYOUT > LAYOUT > **Place Node**

This means we are in the **Workflow** of **Drainage and Utilities** which has a **Tab** named **Layout** and has tools that are located in the **Layout Group**. Now that we are in the right workflow, Tab and Group we may need to click on a tool that has more than one option.

# 1 Pond Design

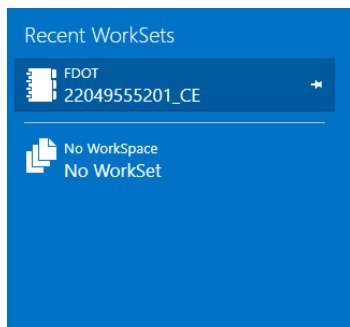
## OBJECTIVES

## EXERCISE OVERVIEW

<a href="#">Exercise 1.1</a>	<a href="#">Create The Pond Design File</a>	7
<a href="#">Exercise 1.2</a>	<a href="#">Create The Pond Control Line</a>	9
<a href="#">Exercise 1.3</a>	<a href="#">Place A Pond Design Linear Template</a>	18
<a href="#">Exercise 1.4</a>	<a href="#">Manipulate Pond Dimensions And Elevations</a>	22
<a href="#">Exercise 1.5</a>	<a href="#">Create A Pond Design Surface</a>	Error! Bookmark not defined.

### *Exercise 1.1 Create The Pond Design File*


1. From the desktop FDOTConnect folder double left click on the **FDOTConnect for OpenRoads Designer** icon. Make sure to set the Workspace to FDOT and the Workset to 22049555201\_CE. Open the *\_BlankFile.dgn* or any dgn file within the 22049555201\_CE Workset.

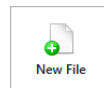
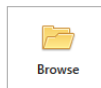


### OpenRoads Designer CONNECT Edition

FDOT ▾ 22049555201\_CE ▾

#### Recent Files

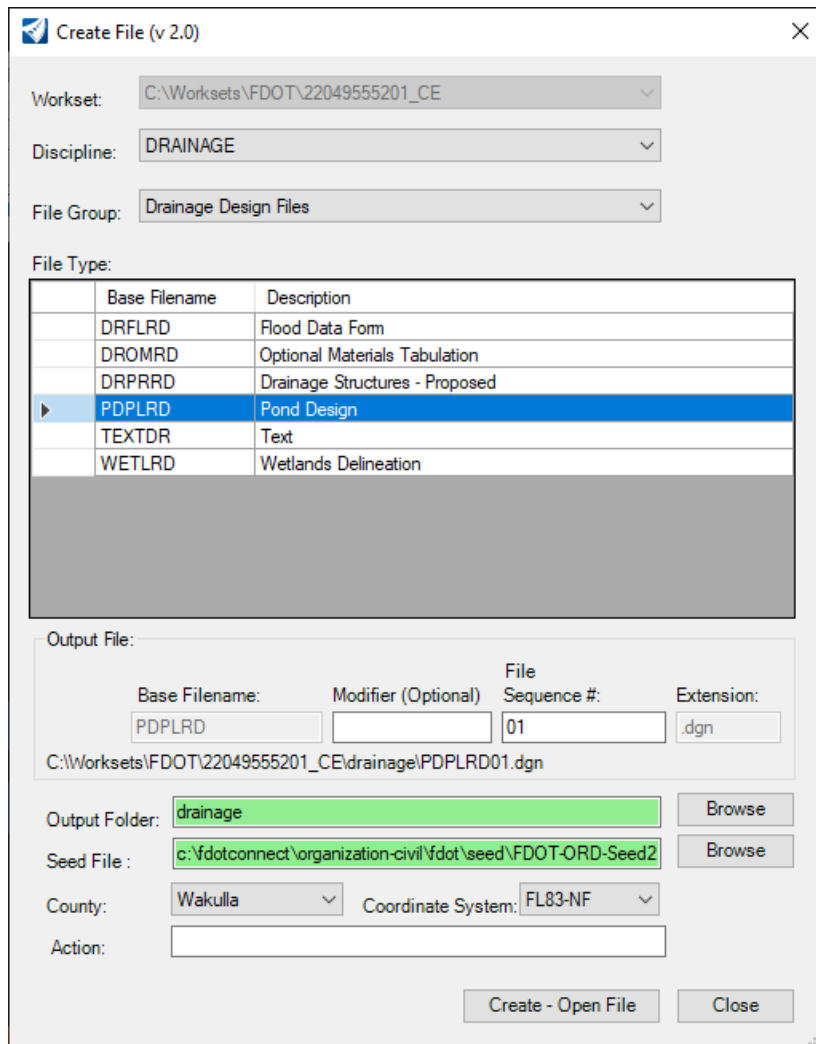
 *\_BlankFile.dgn*  
C:\Worksets\FDOT\22049555201\_CE\



- From the **OpenRoads Modeling Workflow**, navigate to the **FDOT Tab** of the **Ribbon**, then the **Actions Group** and left click on the **Create File icon**.

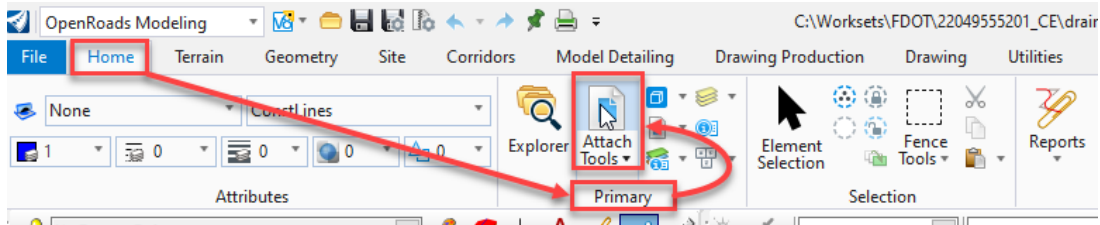


- The **Create File** dialog displays. On the **Create File** dialog, set the *Discipline* to **Drainage** and the *File Group* to **Drainage Design Files**. From the **File Type** list, select **PDPLRD Pond Design**. On the **Output File** section of the dialog, be sure to set the County to **Wakulla** and the Coordinate System to **FL83-NF**. Once everything is set up to match the image below, left click the **Create – Open File** button to create and open the **Pond Design** file. Now left click on the **Close** button to close the dialog.



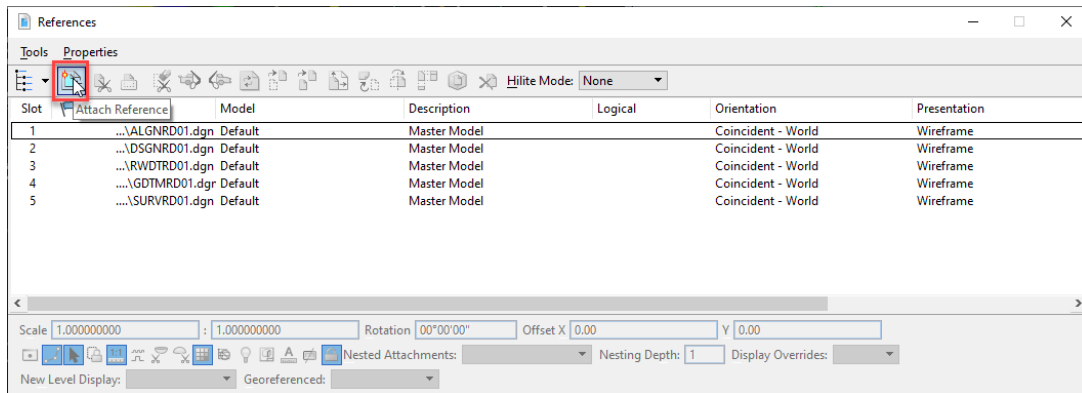


4. Navigate to the **Home** tab and in the **Primary Group** left click on the **Attach Tools** icon to open the **References** dialog.

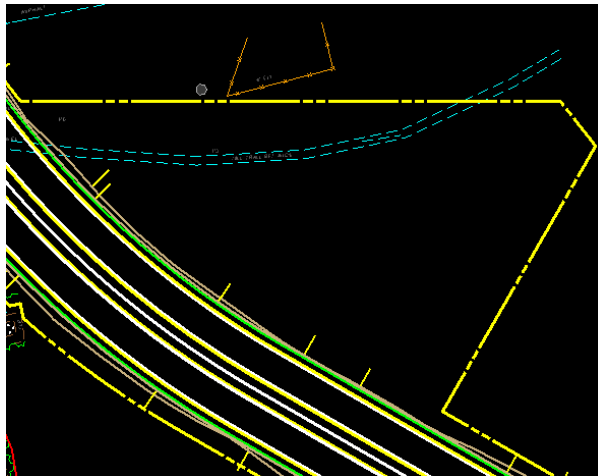


This will open the **References** dialog. Left click on the **Attach References** button in the upper left of the dialog. Navigate to and reference in the following design files:

- ✓ C:\worksets\FDOT\22049555201\_CE\roadway\ *ALGNRD01.dgn*
- ✓ C:\worksets\FDOT\22049555201\_CE\roadway\ *DSGNRD01.dgn*
- ✓ C:\worksets\FDOT\22049555201\_CE\roadway\ *RWDTRD01.dgn*
- ✓ C:\worksets\FDOT\22049555201\_CE\survey\ *GDTMRD01.dgn*
- ✓ C:\worksets\FDOT\22049555201\_CE\survey\ *SURVRD01.dgn*



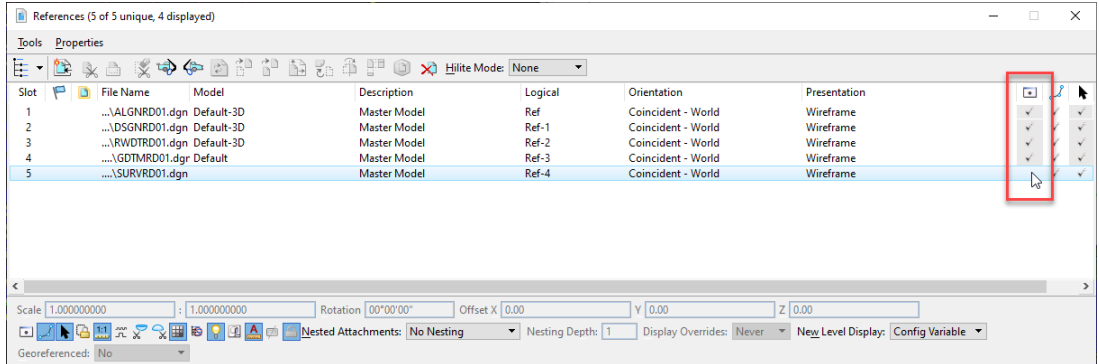
5. The pond will be constructed in the area of the proposed R/W to the right of SR61.



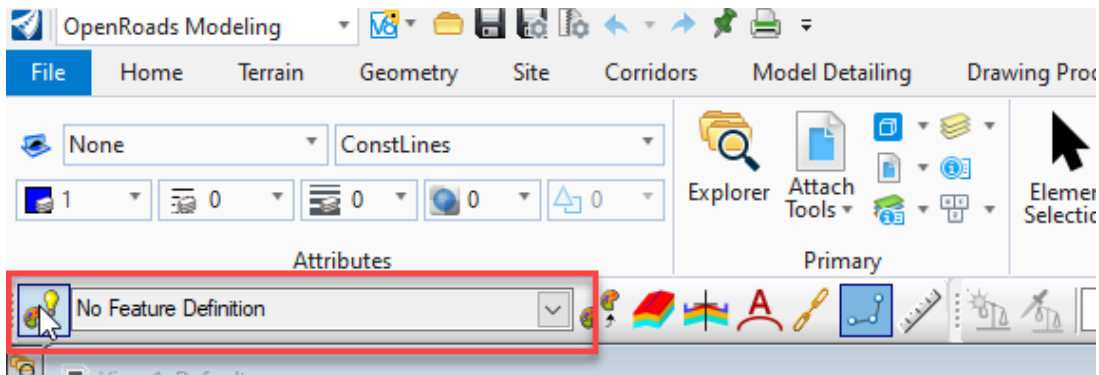
## Exercise 1.2 Create The Pond Control Line

Use the Roadway and R/W Lines to Create a Pond Boundary.

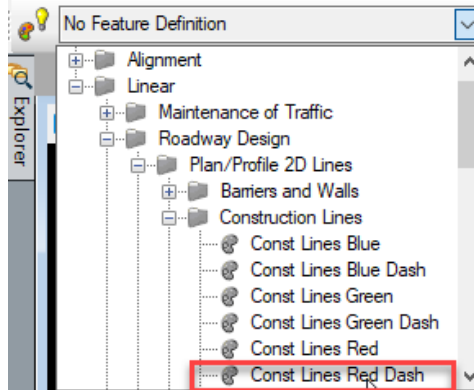
1. Verify that the workflow is set to the **OpenRoads Modeling Workflow** and on the **Home Tab** in the **Primary Group** click on the **Attach Tools** icon. This will open the **References** dialog box. In the **References** dialog box left click on the *SURVRD01.dgn* reference file in the list and un-check the **Display** option to turn this file off for now.



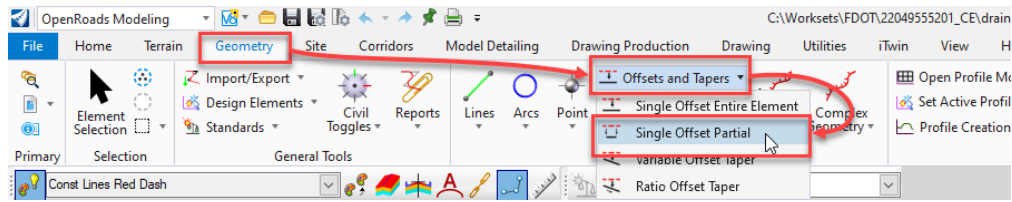
2. Construction lines will be used to create the **Pond Control** line. Setting **ORD** to use the **Active Feature Definition** will make things a little more streamlined. Left click on the **Use Active Feature** button.



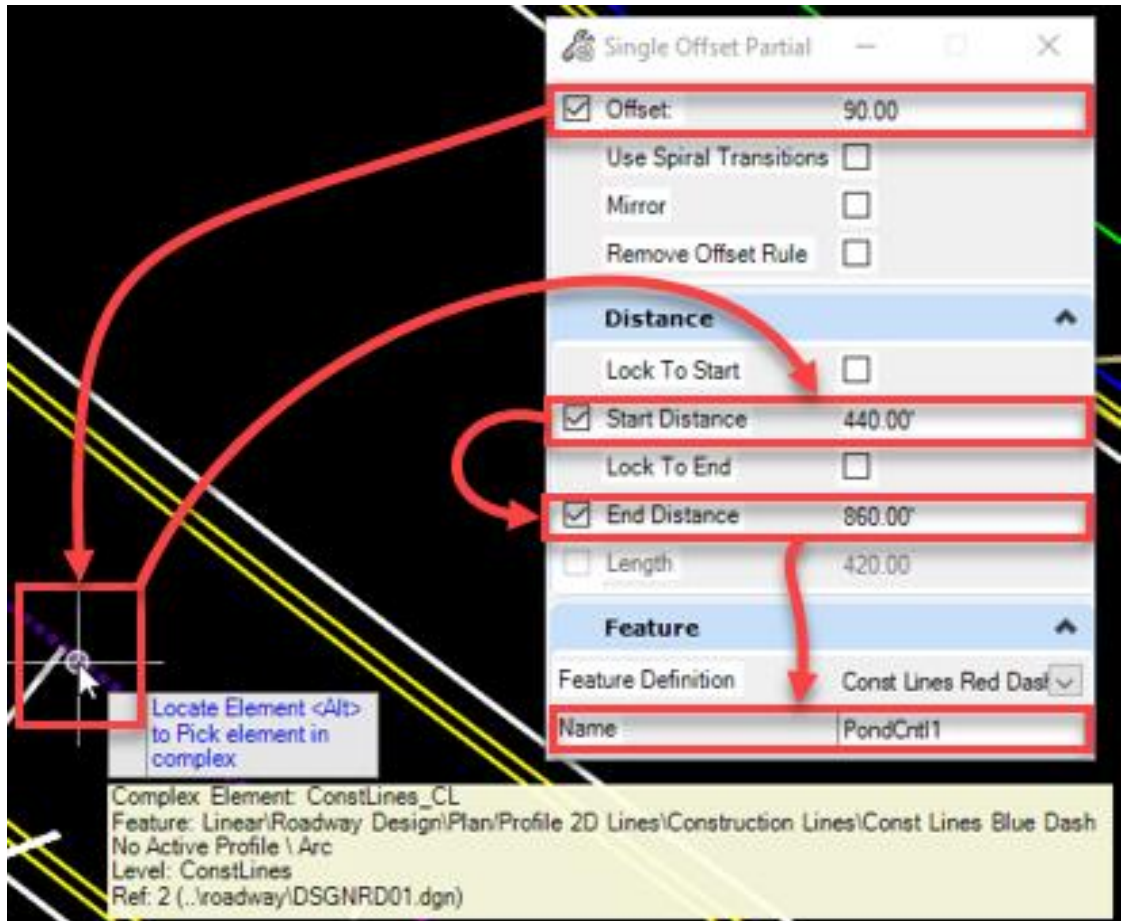
3. Now left click on the Feature Definition drop down. Expand the **Linear** folder then the **Roadway Design** folder followed by the **Plan/Profile 2D Lines** folder and the **Construction Lines** folder. Select **Const Lines Red Dash** feature definition from the list.



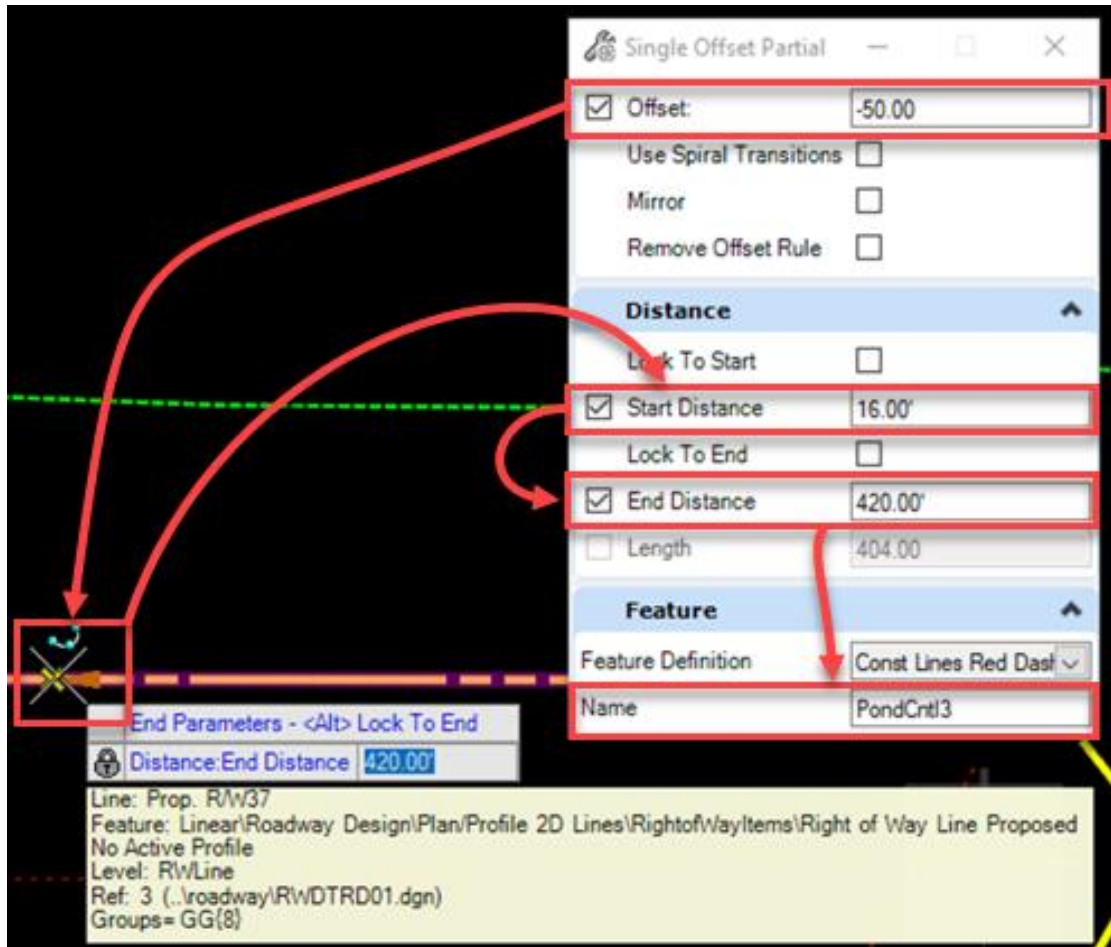
- Under the Geometry tab in the Horizontal group, left click on the Offsets and Tapers dropdown and select the Single Offset Partial tool.



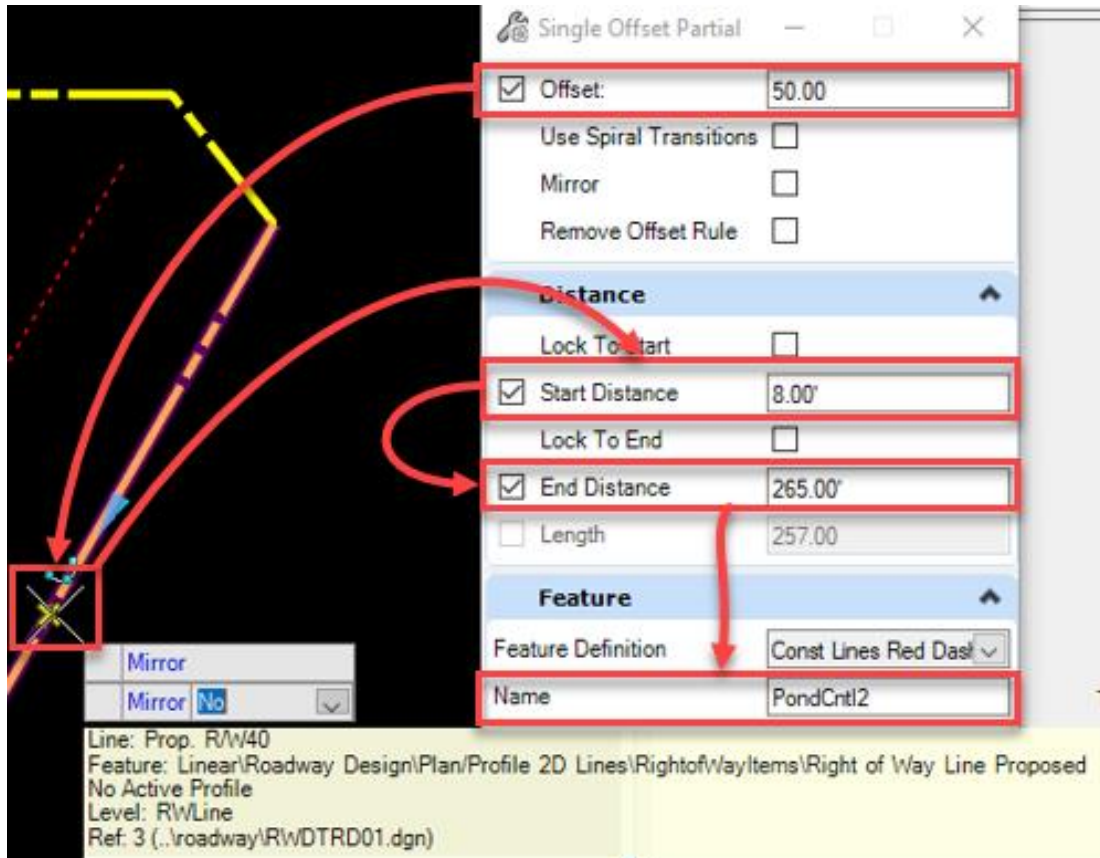
- This will open the Single Offset Partial dialog box. Check the box to lock the Offset. Type 90 in the Offset field and hit Enter on the keyboard. Now left click (Data Point) on the Centerline of the roadway. Check the box to lock the Start Distance. Type 70440 in the Start Distance field and hit Enter on the keyboard. Now check the box to lock the End Distance. Type 70860 in the End Distance field and hit Enter on the keyboard. Left click in the Name field and type PondCntl1. Hit Enter on the keyboard. Now left click (Data Point) in the open 3 times to create the first Pond Control construction line.



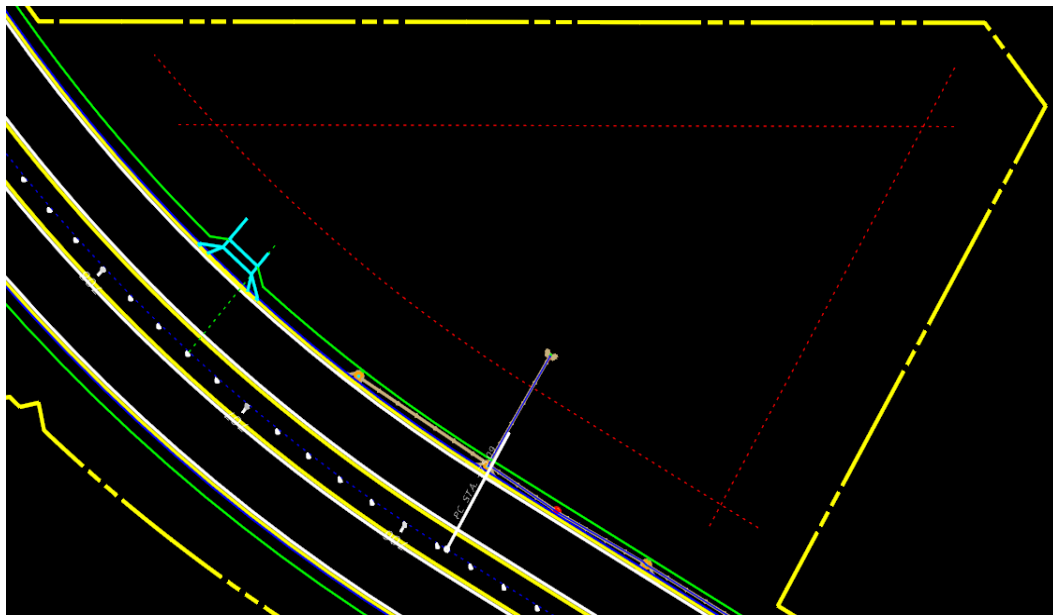
- Using the same tool, Change the Offset value to -50 and hit Enter on the keyboard. Left click (Data Point) on the horizontal proposed right of way line. Type 16 in the Start Distance field and hit Enter on the keyboard. Type 420 in the End Distance field and hit Enter on the keyboard. Change the Name field to PondCntl2 and hit Enter on the keyboard. Now left click (Data Point) in the open 3 times to create the second Pond Control construction line.



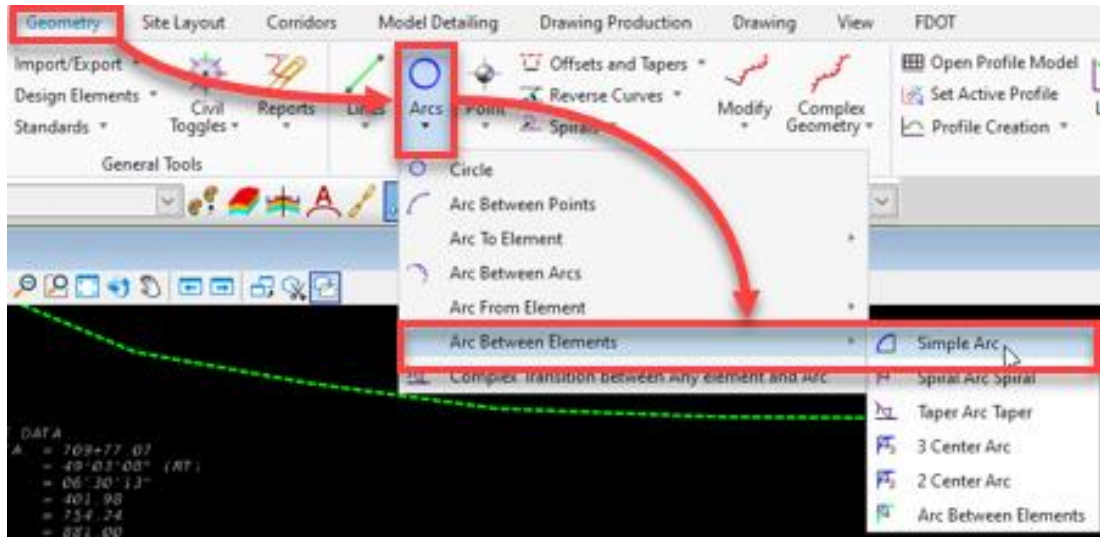
- Using the same tool, Change the Offset value to 50 and hit Enter on the keyboard. Left click (Data Point) on the diagonal proposed right of way line at the bottom of the two other Pond Control construction lines. Type 8 in the Start Distance field and hit Enter on the keyboard. Type 265 in the End Distance field and hit Enter on the keyboard. Change the Name field to PondCntl3 and hit Enter on the keyboard. Now left click (Data Point) in the open 3 times to create the third Pond Control construction line.



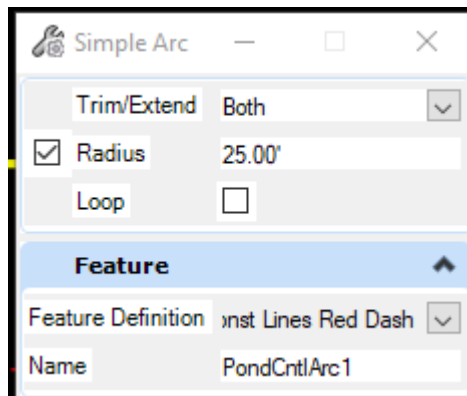
- There should be 3 red dashed lines placed inside the proposed R/W.



- Under the Geometry tab in the Horizontal group left click on the Arcs dropdown and while hovering on the Arc Between Elements flyout left click on the Simple Arc tool. This will open the Simple Arc dialog box.



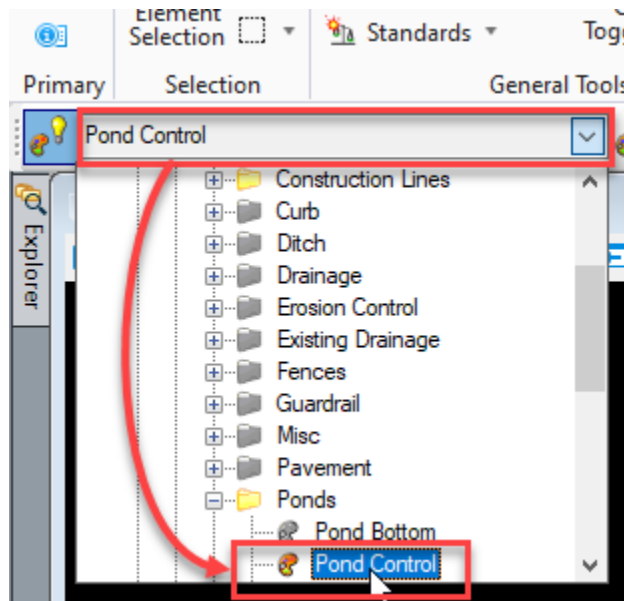
- Set the Trim/Extend dropdown to Both. Check the Radius check box to lock the radius and type 25 in the field and hit Enter on the keyboard. Leave the Loop check box un-checked. Change the Name field to PondCntlArc1 and hit Enter on the keyboard. Left click (Data Point) on the PondCntl1 line and then left click (Data Point) on the PondCntl2 line. Left click (Data Point) 2 times in the middle of the proposed pond area to create the first arc.



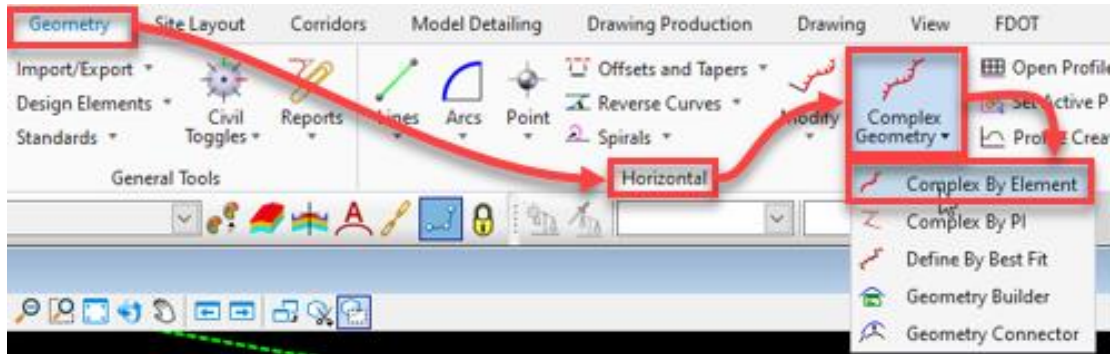
11. Change the Name field to PondCntlArc2 and hit Enter on the keyboard. Left click (Data Point) on the PondCntl2 line and then left click (Data Point) on the PondCntl3 line. Left click (Data Point) 2 times in the middle of the proposed pond area to create the second arc. Now change the Name field to PondCntlArc3 and hit Enter on the keyboard. Left click (Data Point) on the PondCntl3 line and then left click (Data Point) on the PondCntl1 line. Left click (Data Point) 2 times in the middle of the proposed pond area to create the third arc. There should now be an outline of the Pond Control shape.



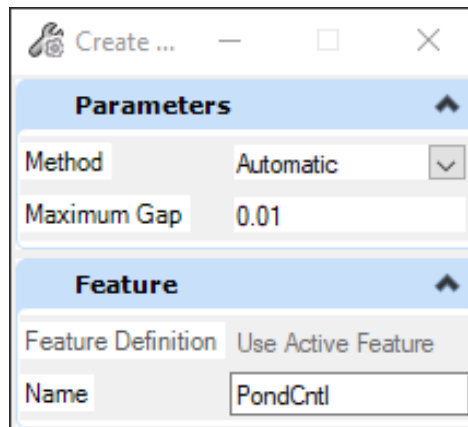
12. Left click on the Feature Definition dropdown. Collapse the Construction Lines folder and expand the Ponds folder. Select Pond control feature definition from the list.



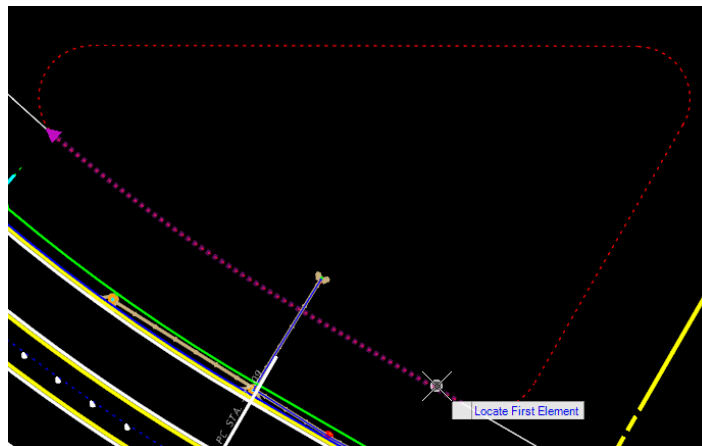
13. Under the Geometry tab in the Horizontal group left click on the Complex Geometry dropdown and left click on the Complex By Element. This will open the Create Complex By Element dialog box.



14. Set the Method to Automatic and the Maximum Gap to 0.01. Change the Name to PondCntl and hit Enter on the keyboard.

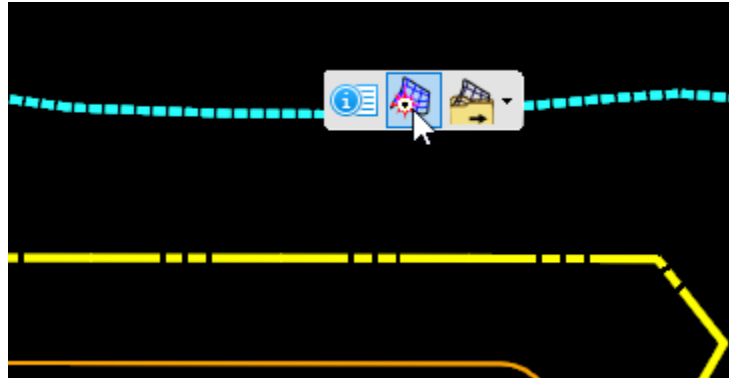


15. Left click (Data Point) on the PondCntl1 construction line and Left click (Data Point) in the open below the line to accept the new Pond Control complex element. Now hit the Esc key on the keyboard to terminate the command.

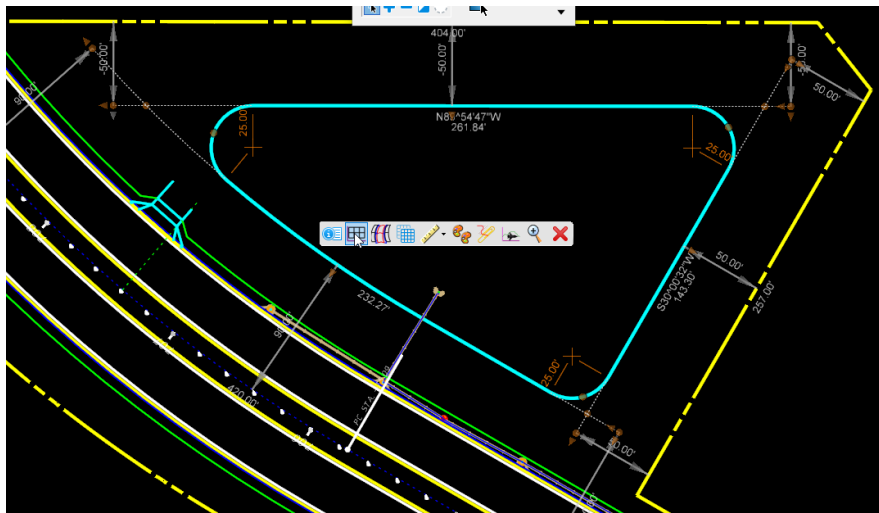




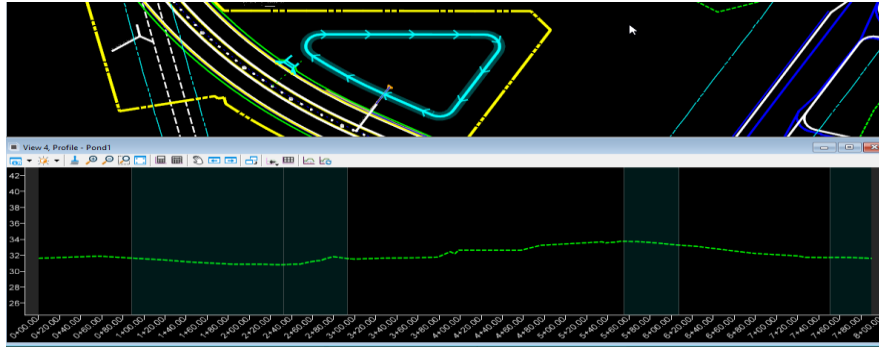
16. Zoom out so the **Existing Ground Boundary** is visible. Using the element selector tool, left click (Data Point) on the green dashed Existing Ground Boundary Element. Hover over the line to cause the pop-up menu to appear. Select the middle icon to set this as the Active Terrain Model and left click (Data Point) in the open to clear the selection set.



17. Using the element selector tool again, select the Pond Control shape. Hover over the selected shape and choose the second icon to Open a Profile Model of the existing ground along the Pond shape.



18. Now left click on the Open or Close a View button for view 4 and left click (Data Point) inside the newly open view 4 window. This will create a Profile view of the Existing Ground surface along the Pond Control Shape.



- Under the Geometry tab in the Vertical group left click on the Element Profiles dropdown and left click on the Profile By Constant Elevation tool. This will open the Create Element By Elevation dialog box.



Set the Elevation to 33 and the Name to PondCntlProf1. With view 1 active left click (Data Point) on the Pond Control shape to select it and right click in the open to accept it.

**Create ...**

**Parameters**

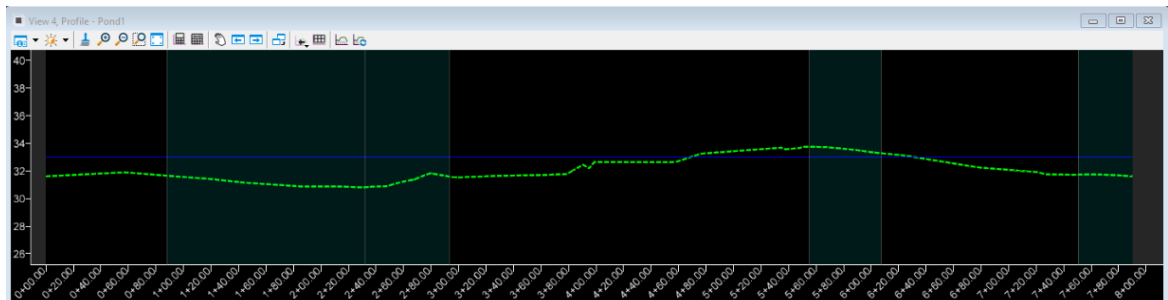
Elevation

**Feature**

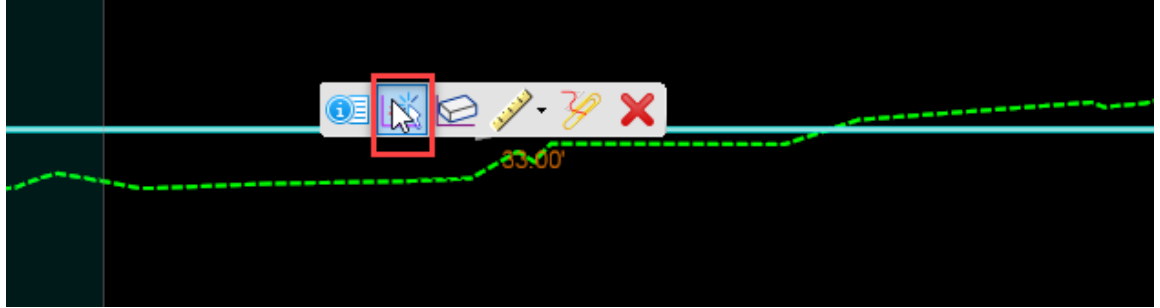
Feature Definition

Name

- Now left click (Data Point) one more time to create the new Pond Control Profile. It will appear in the view 4 Profile view as a flat line at an elevation of 33 feet. Hit the Esc key on the keyboard to exit this tool.

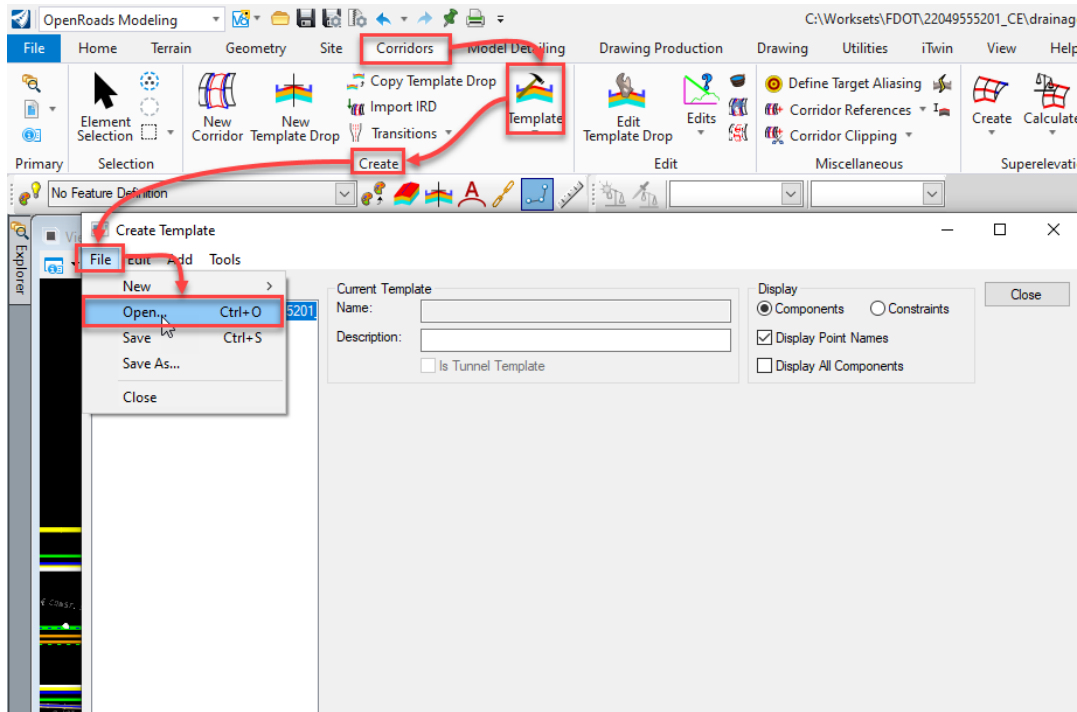


- Now left click (Data Point) two times in view 4 to activate it. Using the Element Selector tool, select the new Pond Control Profile line. Hover over the Pond Control Profile line until the context menu pops up and move the cursor to the second icon. Left click (Data Point) to set this as the Active Profile. Now left click (Data Point) in the open to clear the selection set.

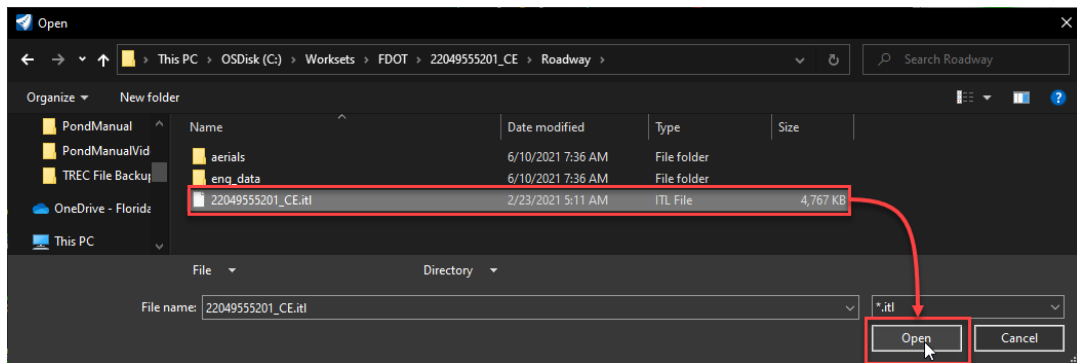


### Exercise 1.3 Place A Pond Design Linear Template

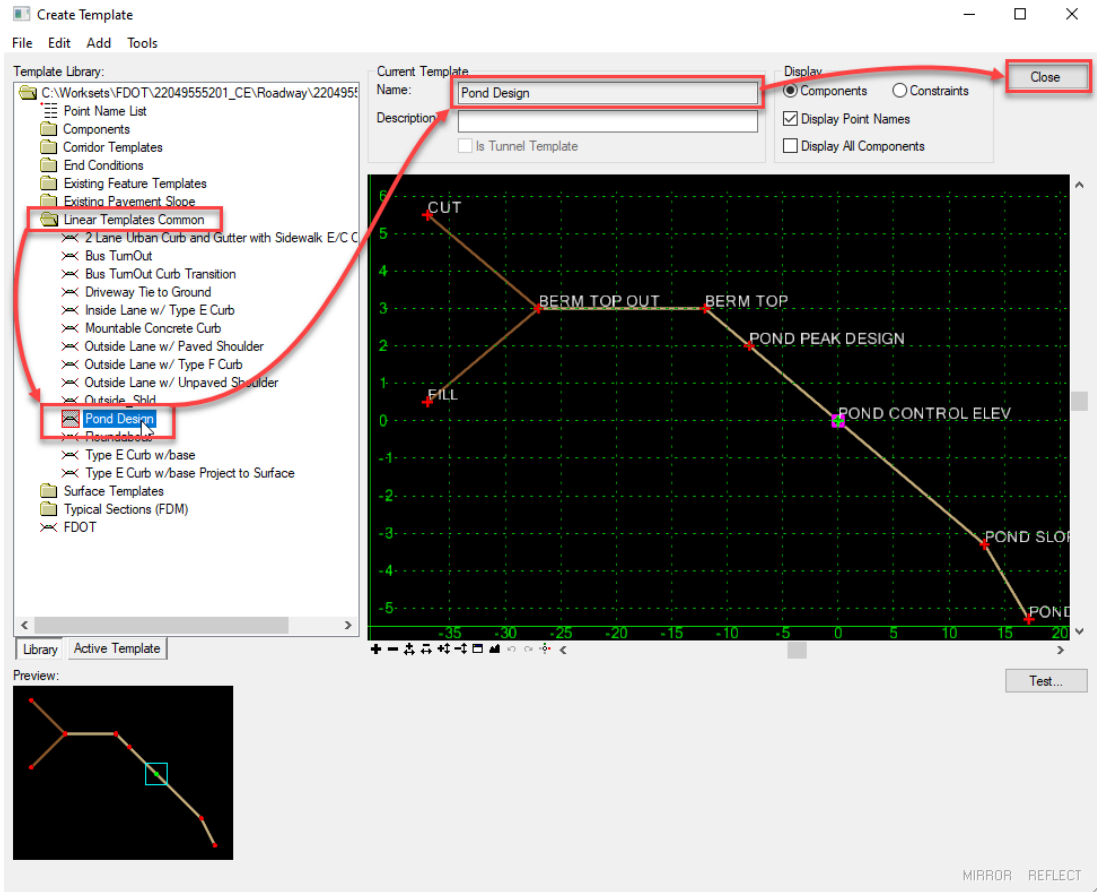
1. In preparation for the use of a Linear Template later in this exercise, it is necessary to make sure the proper Template Library is available. Choose the **Corridors** tab and in the Create Group left click on the **Create Template** tool. The Create Template dialog box will open. On this dialog left click on the File menu and choose the Open option. This will open the Open File dialog.



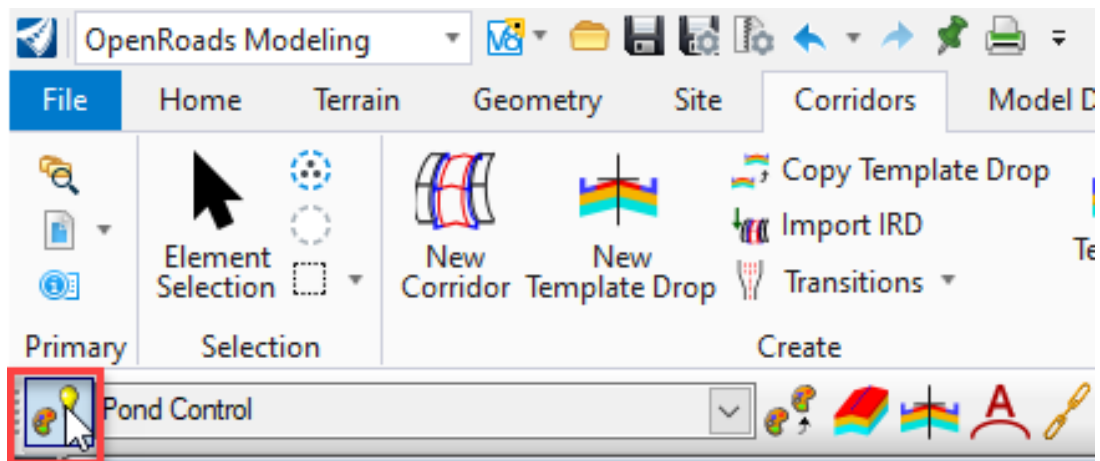
2. In the Open File dialog navigate to the Rodway folder of the current Project folder and select the 22049555201\_CE.itl file. Now left click on the Open button in the lower right corner of the dialog box.



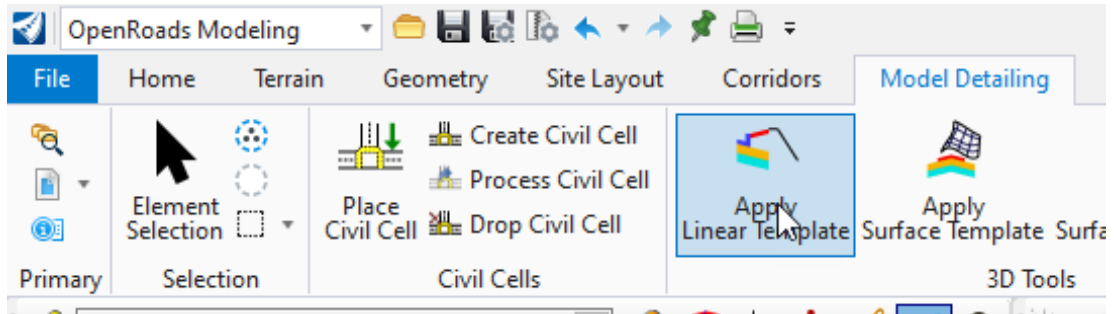
- On the Create Template dialog box in the Template Library list, open the Linear Templates Common folder and double left click on the Pond Design linear template. The Current Template field should now be Pond Design. Left click on the Close button in the upper right corner of the dialog box.



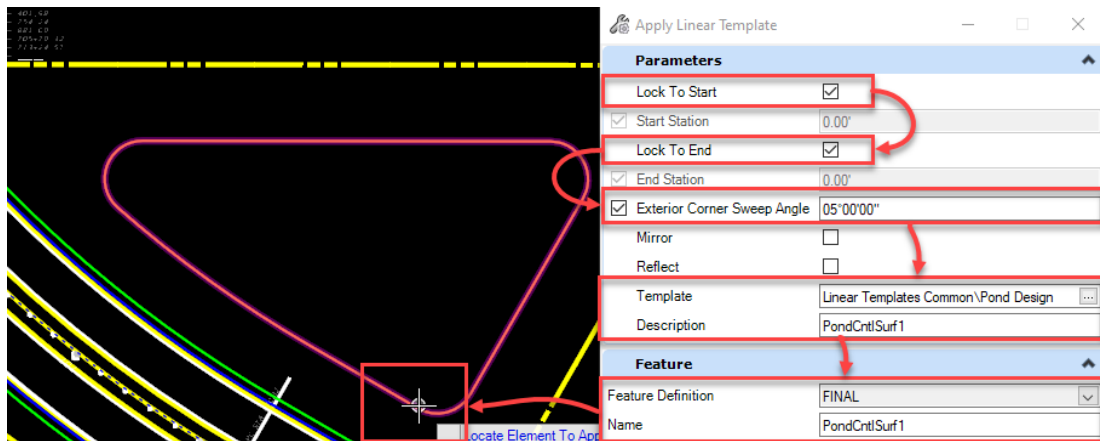
- Now left click on the Use Active Feature Definition button next to the Feature Definition drop down to deactivate this setting.



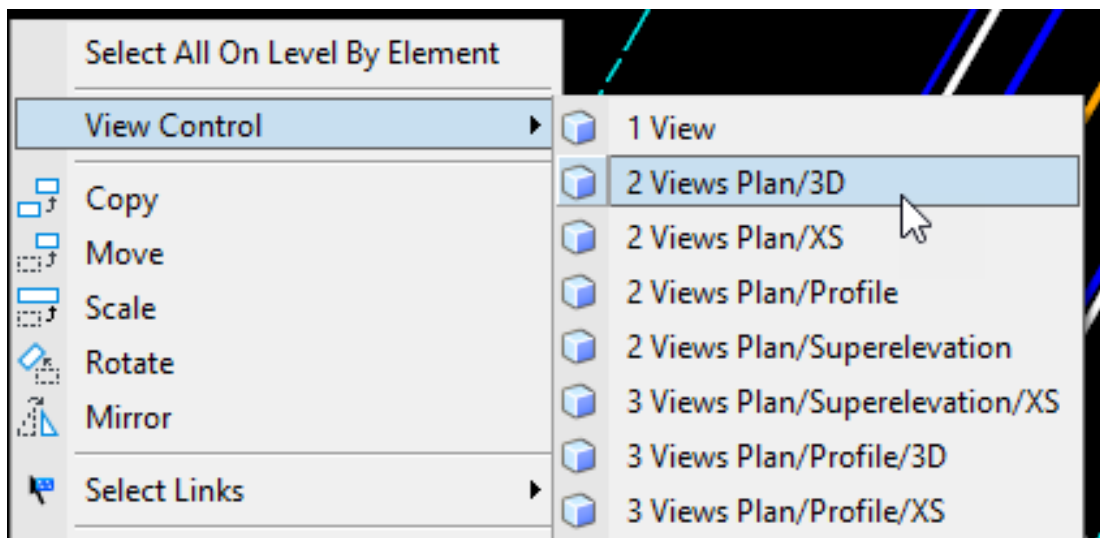
- Change to the Model Detailing tab and in the 3D Tools group left click on the Apply Linear Template tool. This opens the Apply Linear Template dialog box.



- On this dialog make sure that only the Lock To Start, Lock To End and Exterior Corner Sweep Angle check boxes are checked. The Exterior Corner Sweep Angle should be set to 5 degrees and the Template should be set to Linear Templates Common\Pond Design. The Description field should be set to PondCntlSurf1. The Feature Definition should be set to Final and the Name should be set to PondCntlSurf1. Now left click (Data Point) on the lower right corner of the Pond Control shape and left click (Data Point) in the center of the shape 6 times to apply the Pond Design Linear template. Hit the Escape key to close the Apply Linear Template dialog box and exit the tool.

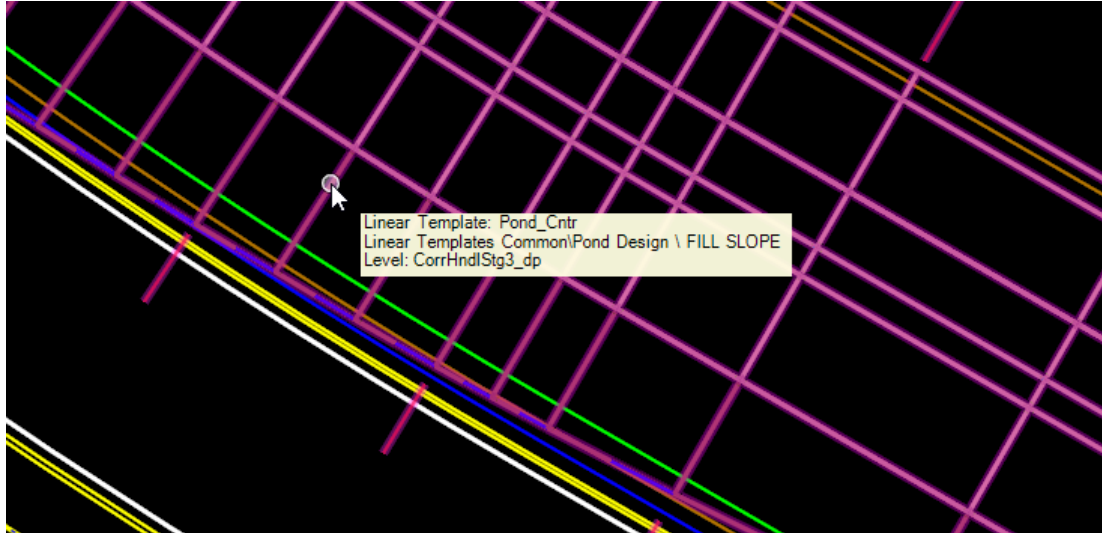


- With view 1 active right click and hold until the pop-up menu appears. Hover over the View Control flyout and choose the 2 Views Plan/3D option.

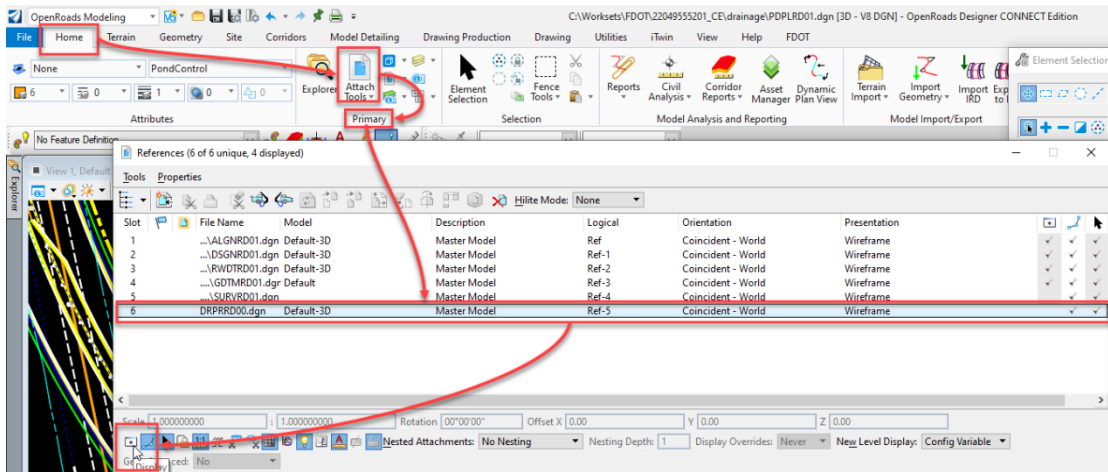


### Exercise 1.4 Manipulate Pond Dimensions And Elevations

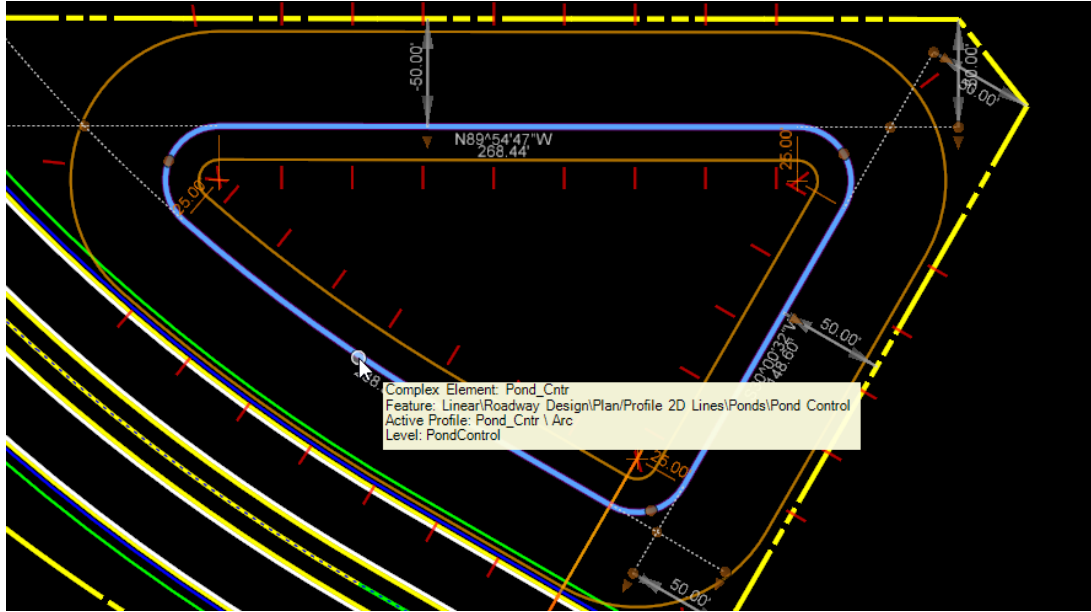
1. The example Pond's fill slope extends too far and is encroaching on the proposed sidewalk. Fixing this will be simple and easy to do. First thing to do, is to make it easier to see what can be changed by turning off the 3D view reference in the 2D view. Make sure that the 2D view, view 1 is the active view. Zoom to the side of the proposed roadway design that runs alongside the Pond fill slope. There is a portion of the proposed sidewalk that is covered by the Pond fill slope.



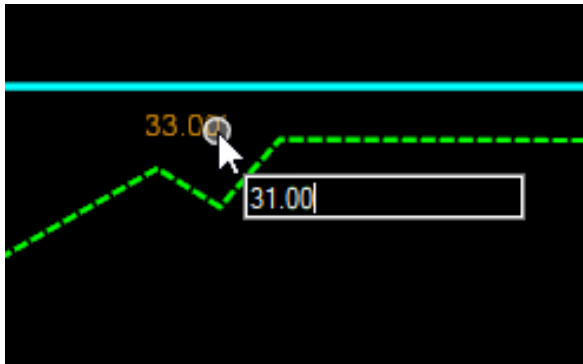
2. Under the Home tab in the Primary group left click on the Attach Tools icon. This will open the References dialog box. Find the Default-3D model reference and select it. Now just turn off the display by either removing the check mark under the Display column or left clicking on the Display button in the bottom left corner of the dialog. Close the References dialog box.



- Zoom view 1 out so the entire Proposed pond is visible. Left click (Data Point) on the Pond Control line to see all its parameters that can be changed in the 2D plan view. Dimensions, angles, bearings, offsets and even the radius of the arcs can be manipulated in this view.

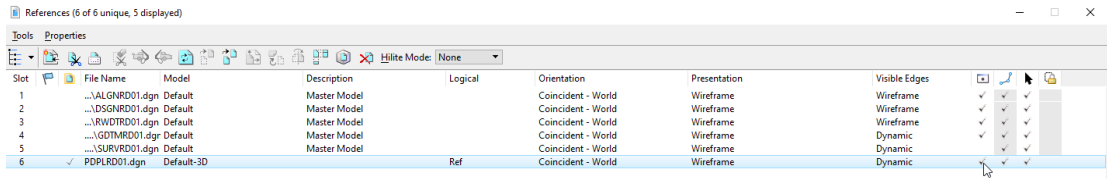


- Open and activate view 4, the profile view. This is the view that will be used to change the elevation of the Pond Control Profile to fix the encroachment issue with the proposed sidewalk. Use the Element Selector to left click (Data Point) on the Pond Control profile line. Once selected there will be a value of 33 feet located near the center of the profile line. Left click on the number and enter the change in the field provided next to the cursor. Type in 31 and hit the Enter key on the keyboard. The level of the Pond Control Profile will update.

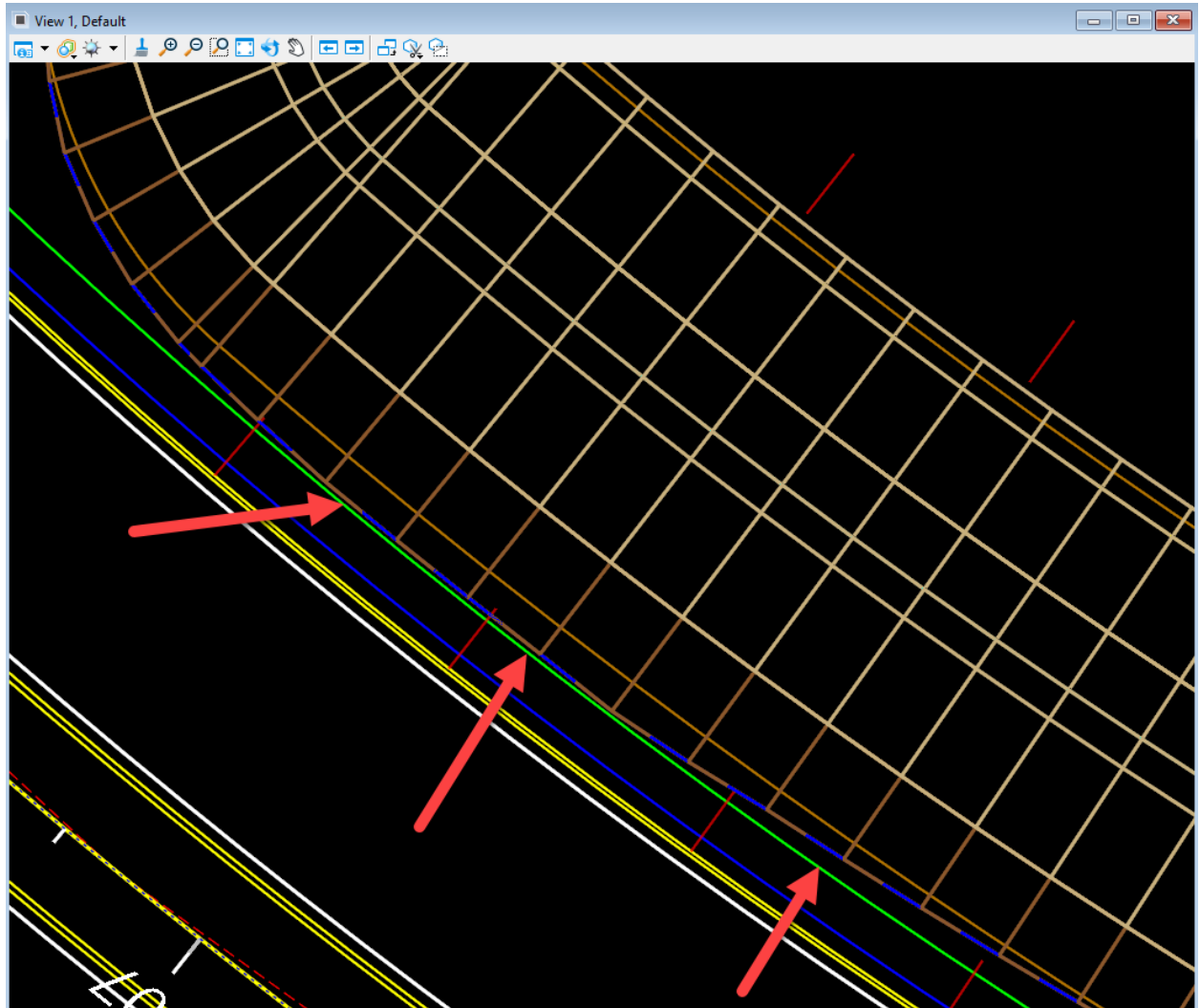




5. Activate view 1, the 2D plan view and reopen the References dialog box by hitting the F9 key on your keyboard. Select the Default-3D model reference. Now just turn on the display by either left clicking to replace the check mark under the Display column or left clicking on the Display button in the bottom left corner of the dialog. Close the References dialog box.

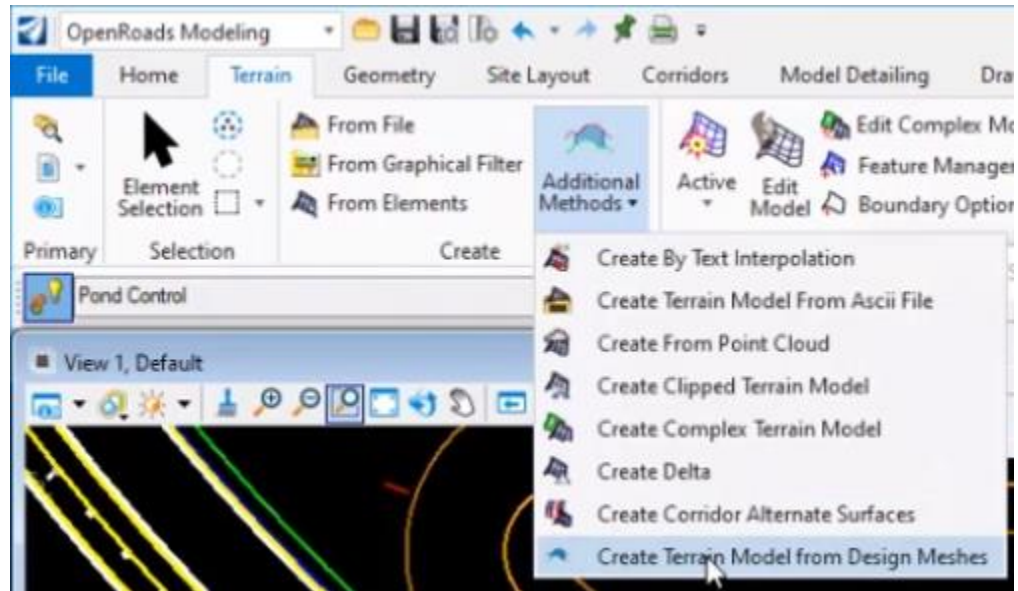


6. Left click (Data Point) in view 1 and zoom in close to where the problem was with the fill slope. The fill slope no longer encroaches on the proposed sidewalk.

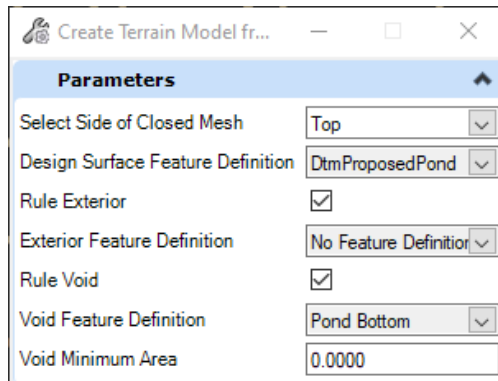


### Exercise 1.5 Create A Pond Design Surface

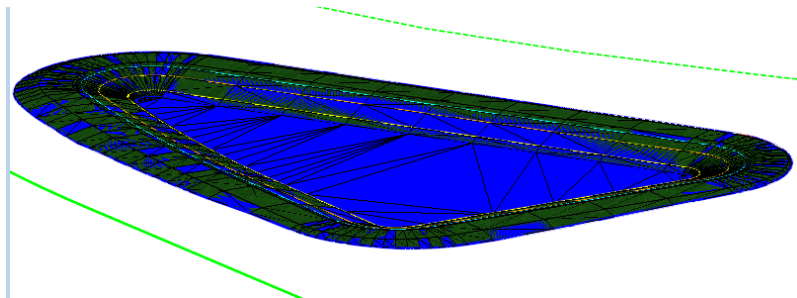
- Using the OpenRoads Modeling Workflow under the Terrain tab in the Create group left click on the Additional Methods dropdown and select the Create Terrain Model from Design Meshes option. The Create Terrain Model from Design Meshes dialog opens.



- Set the Select Side Of Closed Mesh dropdown to Top. Set the Design Surface Feature Definition dropdown to DtmProposedPond. Check the Rule Exterior check box. Set the Exterior Feature Definition dropdown to No Feature Definition. Check the Rule Void check box. Set the Void Feature Definition dropdown to Pond Bottom. Set the Void Minimum Area field to 0.



- Left click (Data Point) on the fill slope area of the proposed pond and then left click (Data Point) in the open 6 more times to complete the command. It will take a few seconds, but the new terrain element will appear, including the pond bottom that was not present before.



# 2 Stormwater Facilities Sheet

## OBJECTIVE

The objective of this chapter is to demonstrate the basic plans production procedures for laying out the Stormwater Facilities Detail Sheet as per FDM 917.

## EXERCISES OVERVIEW

<a href="#">Exercise 2.1</a>	<a href="#">Create The Stormwater Facilities Detail Sheet</a> .....	28
<a href="#">Exercise 2.2</a>	<a href="#">Cutting Pond Sections</a> .....	33
<a href="#">Exercise 2.3</a>	<a href="#">Placing Special Details</a> .....	45
<a href="#">Exercise 2.4</a>	<a href="#">Cutting Control Structure Sections</a> .....	50
<a href="#">Exercise 2.5</a>	<a href="#">Control Structure Form</a> .....	55

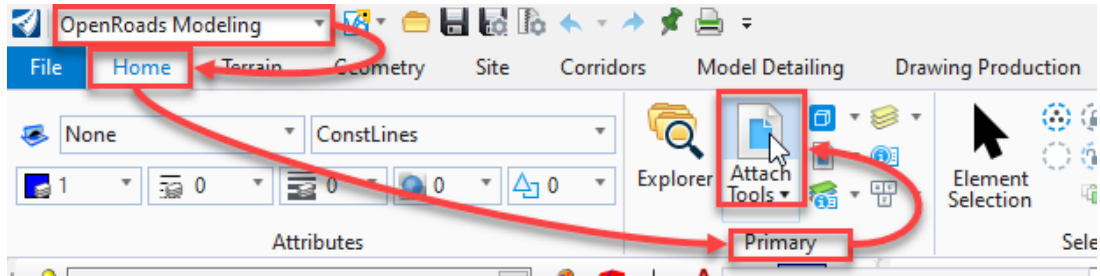
**Exercise 2.1 Create The Stormwater Facilities Detail Sheet**

1. From the desktop FDOTConnect folder double left click on the **FDOTConnect for OpenRoads Designer** icon. Make sure to set the Workspace to FDOT and the Workset to 22049555201\_CE. Open the *PDPLRD01.dgn* file within the 22049555201\_CE Workset.

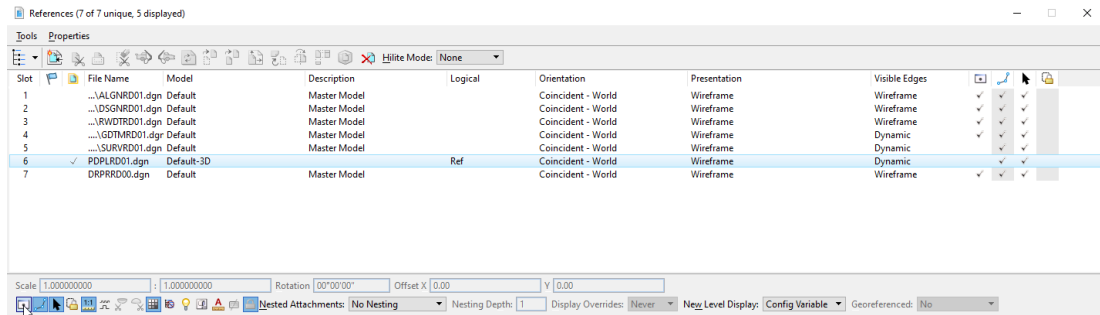


A screenshot of the OpenRoads Designer CONNECT Edition software interface. The window title is 'OpenRoads Designer CONNECT Edition'. Below the title bar, the workspace is set to 'FDOT' and the workset to '22049555201\_CE'. A 'Recent Files' list is visible, containing two entries: 'PDPLRD01.dgn' located at 'C:\Worksets\FDOT\22049555201\_CE\drainage\' and '\_BlankFile.dgn' located at 'C:\Worksets\FDOT\22049555201\_CE\'. The second entry includes a timestamp 'Modified: 5/13/2021 12:36:15 PM' and a size of 'Size: 46 KB'. At the bottom of the interface, there are two buttons: 'Browse' and 'New File'. On the left side, a blue sidebar contains a search icon and the text '\_Vern' and 'e'.

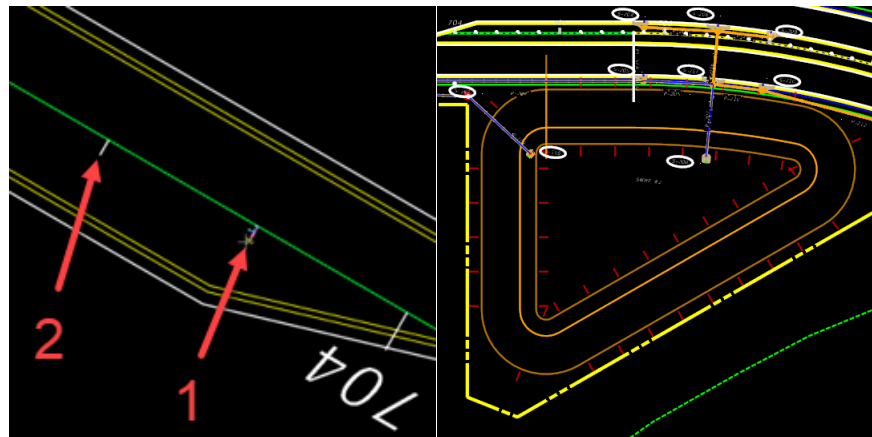
- In order to create the Stormwater Facilities Detail Sheet the DRPRRD00.dgn file will need to be referenced. Verify the Workflow is OpenRoads Modeling and the focus is on view 1. From the Home tab in the Primary group left click on the Attach Tools icon to open the References tool dialog.



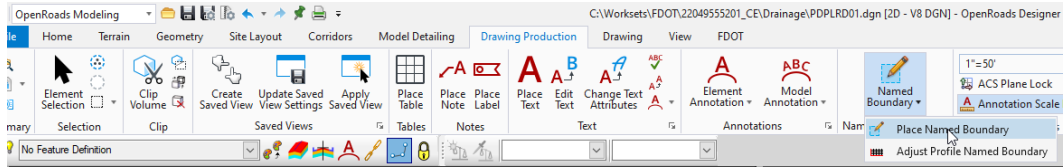
- Using the References dialog attach the DRPRRD00.dgn file in the Drainage folder of the current project. Now turn off the view of the Default-3D reference by selecting it in the list and left clicking on the view button in the lower left corner of the dialog. Close the References dialog. Other drainage elements of this project will now be visible.



- Left click on the Rotate View tool in the view controls bar. Select the Two points method in the Rotate View dialog box. For the first point, snap to the end of the Minor Tic Mark nearest to station 704 of the roadway centerline alignment. Left click (Data Point) to accept. For the second point, snap to the next Minor Tic Mark and left click (Data Point) to accept. The view will rotate to a more useful orientation for sheet creation.



- Go to the Drawing Production tab and in the Named Boundary group left click on the Named Boundary dropdown. Select the Place Named Boundary tool to open the Place Named Boundary dialog box.



- Choose the Civil Plan option and left click on the Drawing Seed dropdown. Select the 36x48 Plan Only option from the list. Now left click on the Detail Scale dropdown and choose 1" = 20'. Now set the Name field to Pond 1 and the Description field to Pond Plan View. The Group dropdown will automatically be set to (New). Using the Tab key on the keyboard, tab down until the second Name field is highlighted. Now select the Roadway Alignment element in view 1. The current Name field will change to CL\_SR61, the name of the Roadway Alignment. Tab to the Description field and type in Stormwater Facility Detail Sheet. Check both the Start Location and Stop Location check boxes. Set the Start Location field to 70400 and the Stop Location field to 70920. Set the Length field to 520. The Left Offset field should be set to 0 and the Right Offset field should be set to 400. Set the Overlap field to 0 and the Boundary Chords field to 5. Make sure the check boxes for Create Drawing and Show Dialog are checked. Left click (Data Point) in open space in view 1 to see a preview of the boundary. Left click (Data Point) again in open space to accept this boundary and the Create Drawing dialog box will open.

**Place Named Boundary Civil Plan**

Drawing Seed: 36x48 Plan Only

Detail Scale: 1"=20'

Name: Pond 1

Description: Pond Plan View

Group: (New)

Name: CL\_SR61

Description: Stormwater Facility Detail Sheet

Start Location: 704+00.00

Stop Location: 709+20.00

Length: 520.000000

Left Offset: 0.000000

Right Offset: 400.000000

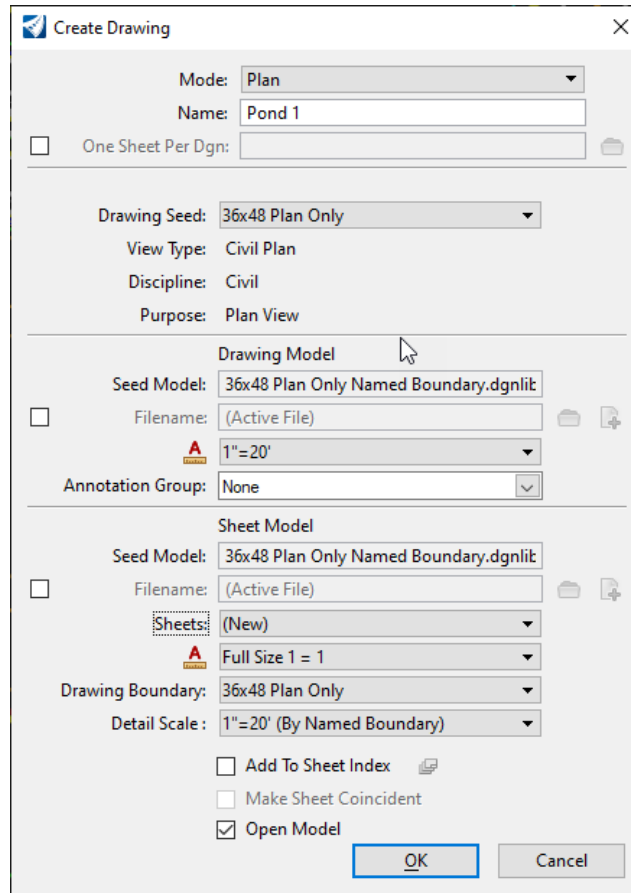
Overlap: 0.000000

Boundary Chords: 5

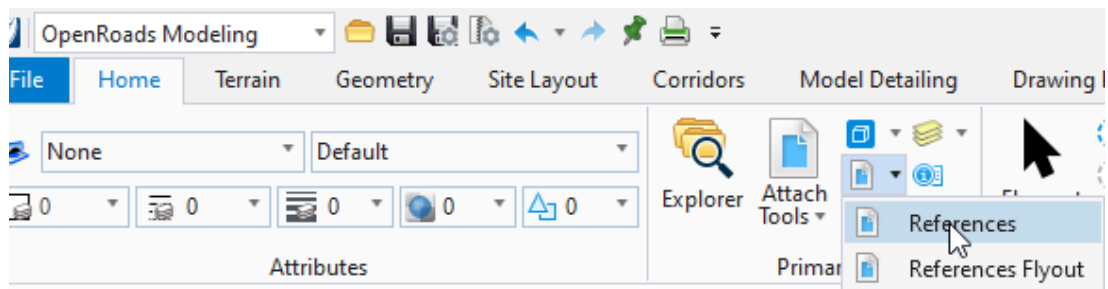
Create Drawing

Show Dialog

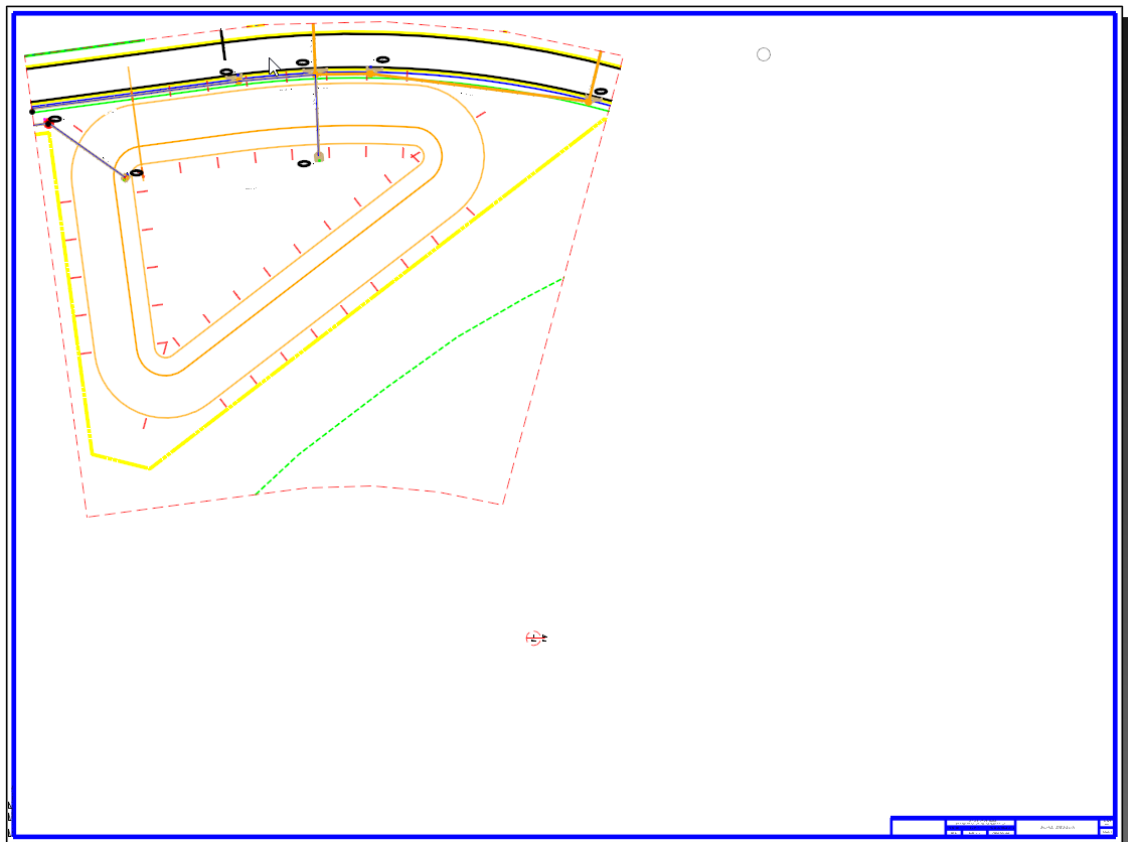
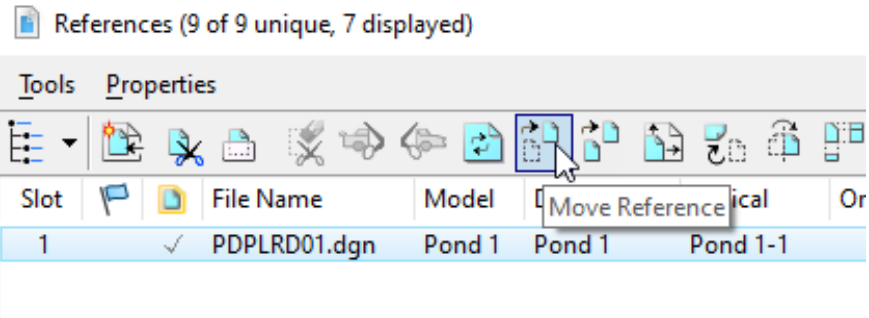
- Make sure the Mode dropdown is set to Plan and the Name field is set to Pond 1. Verify that the Drawing Seed dropdown and the Drawing Boundary dropdown both say 36x48 Plan Only. Finally, the Detail Scale dropdown should read 1" = 20' by named boundary. With all this set, left click on the Ok button to create the Pond 1 Sheet Views with a Pond 1 Sheet sheet model and the Pond 1 Views with a Pond 1 design model.



- The program will now open the Pond 1 sheet view for review. Switch back to the Home tab and in the Primary group left click on the Attach Tools icon to bring up the References dialog.



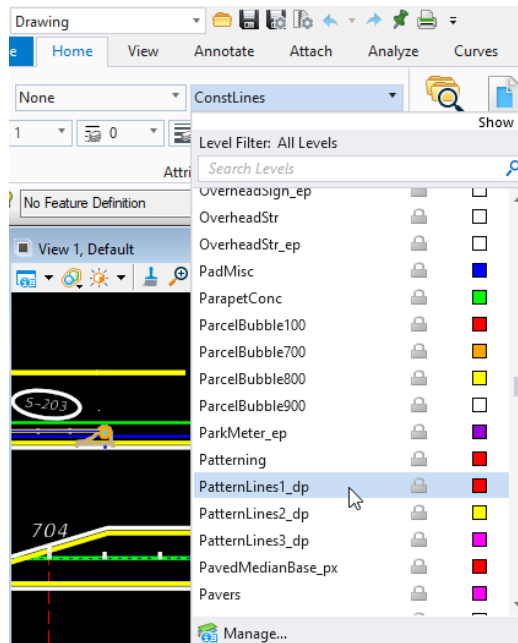
9. In the References dialog select the Pond 1 Model. Choose the Move command from the button bar and left click (Data Point) in the middle of the proposed pond. Move the reference to the upper left corner of the sheet and left click (Data Point) to accept the move. Close the References dialog and switch back to the Multi-Model view.



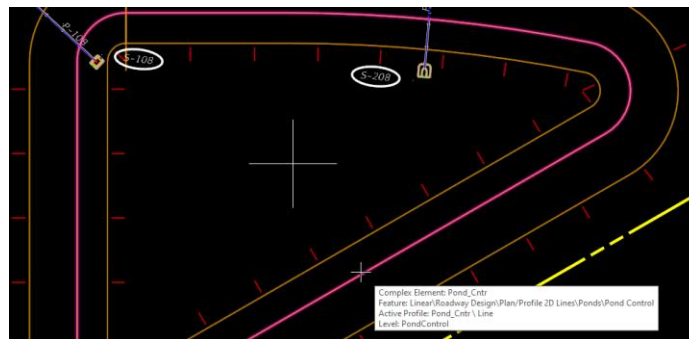


## Exercise 2.2 Cutting Pond Sections

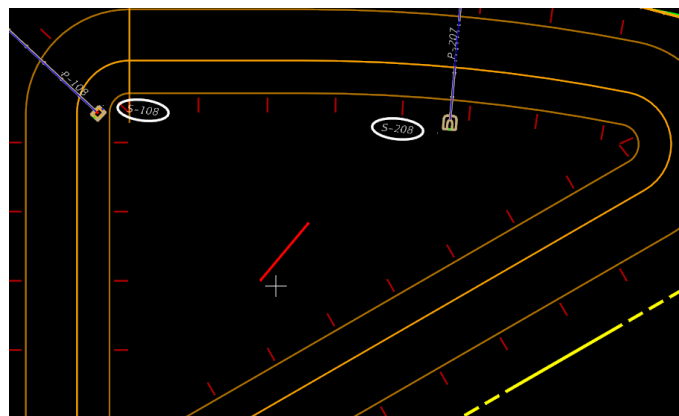
1. Change the Active Workflow to the Drawing Workflow and select the Home tab. In the Attributes group left click on the Active Level dropdown and choose PatternLines1\_dp from the list.



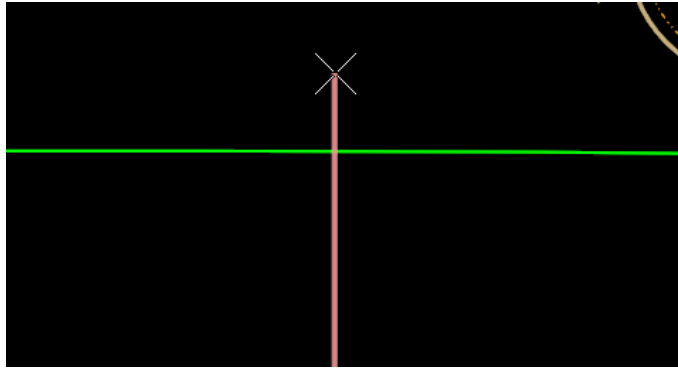
2. Draw a line to use as a start point for the section pattern lines. Click the **Place Line** tool. Now using the **Center Snap** option Tentative click on the **PondCntl** shape.



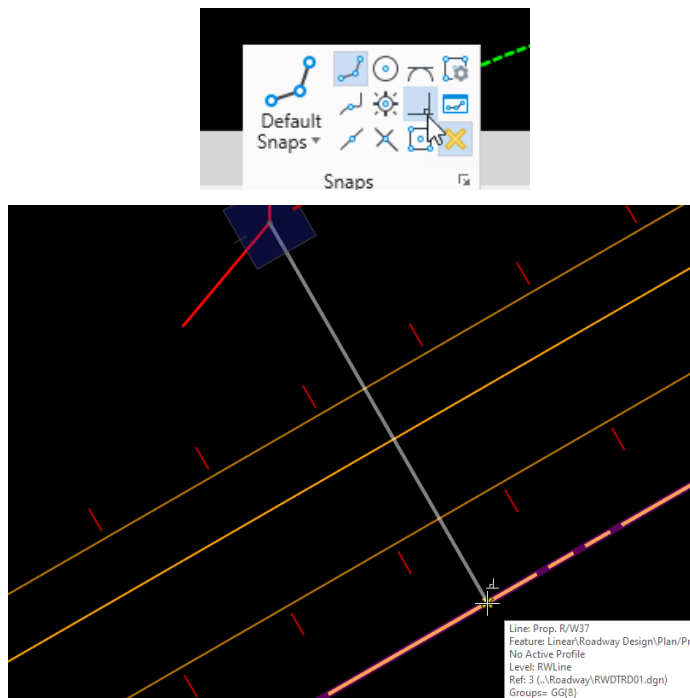
3. Left click (Data Point) to start drawing the temporary line. Move the cursor to the lower left and left click (Data Point) to complete drawing the temporary line.



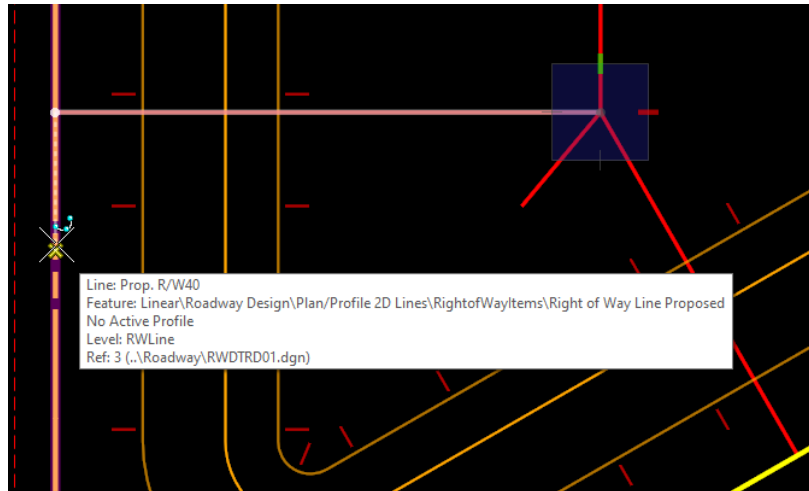
- Using the temporary line as a start point, draw a line going straight up ending just past the **BSW2** line.



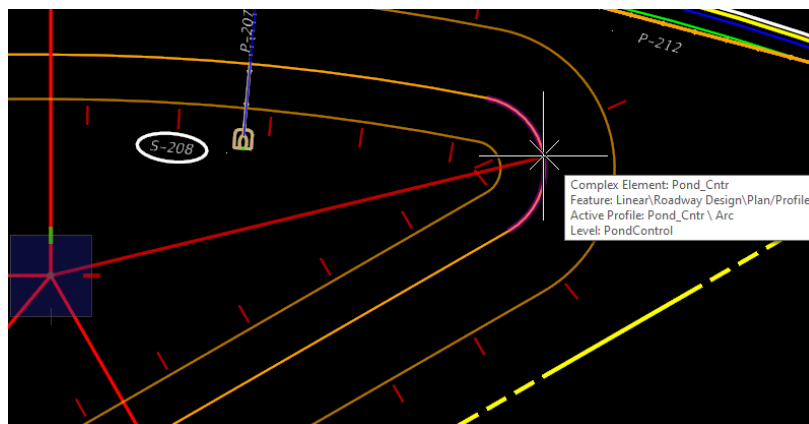
- Once again, start drawing a line at the upper end of the temporary line. Using the **Perpendicular** snap option, **Snap** on the yellow property line to the lower right, left click (Data Point) to finish the line.



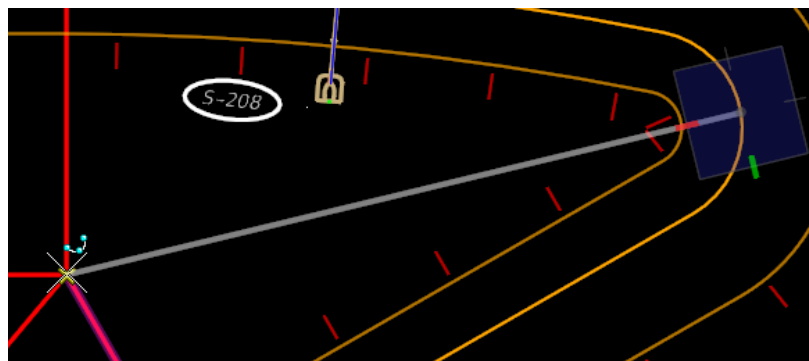
- The next line will start at the upper end of the temporary line and run horizontal extending to the left, so **Snap** to and left click (Data Point) on the upper end of the temporary line. Drag to the left and press the Enter key on the keyboard to lock AccuDraw to the Horizontal Axis. Tentative click on the vertical yellow property line to the left of the pond and left click (Data Point) to complete the line.



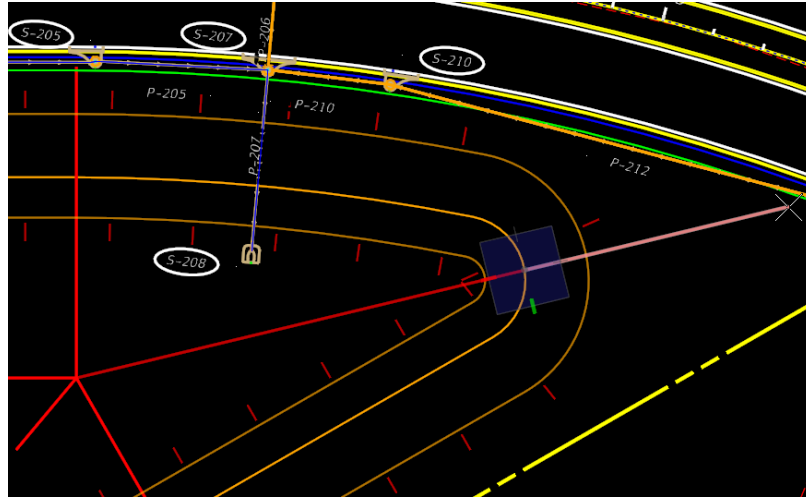
7. The final line needed will go from the upper end of the temporary line through the upper right corner of the pond and extend just shy of the **SidewalkBack** line. There is a small bit of setup to make this line much easier to draw, with the **Place Line** command active change to the **Drawing Aids** tab. Left click (Data Point) on the upper end of the temporary line to start drawing the line and tentative click on the midpoint of the **Pond\_Cntr** arc in the upper right corner of the pond.



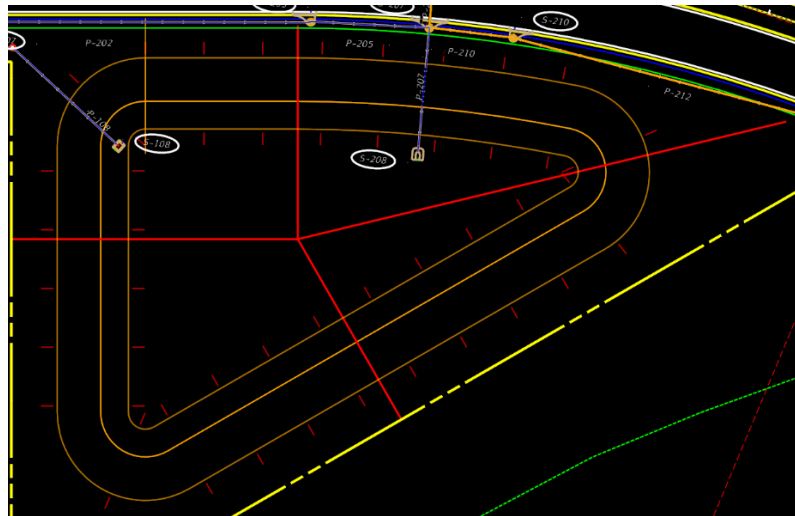
8. Switch to the **AccuDraw** section of the **Drawing Aids** tab and click on **Set Origin**. Next press **R** then **Q** on the keyboard to begin to rotate **AccuDraw**. **Snap** back to the upper end of the temporary line and Left click (Data Point) on it. This will orient **AccuDraw** to the proper angle as shown below.



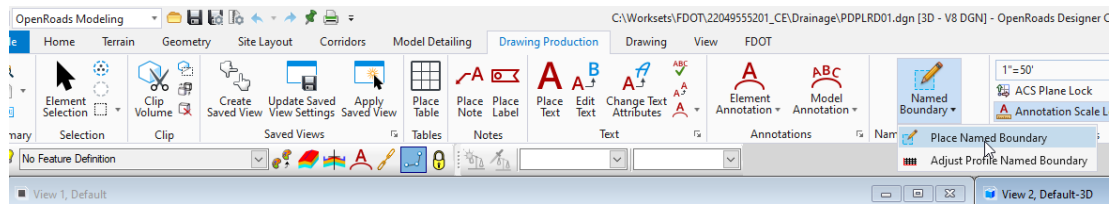
- Once this is done, move the cursor up and right just past the **AccuDraw Origin** and press the **Enter** key on the keyboard to lock the direction of the line being drawn. Now left click (Data Point) near the green **SidewalkBack** line to the upper right of **Pond 1** to complete this line.



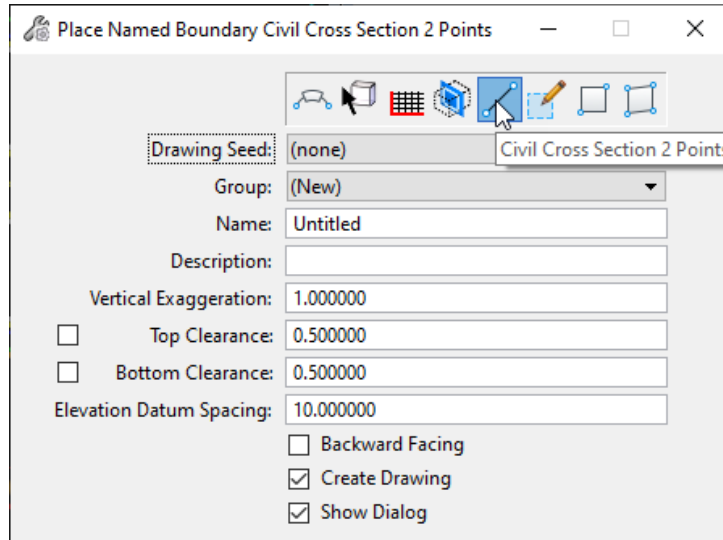
- All the pattern lines are now drawn. Delete the temporary line. **View 1** should look like the picture below once the temporary line is deleted.



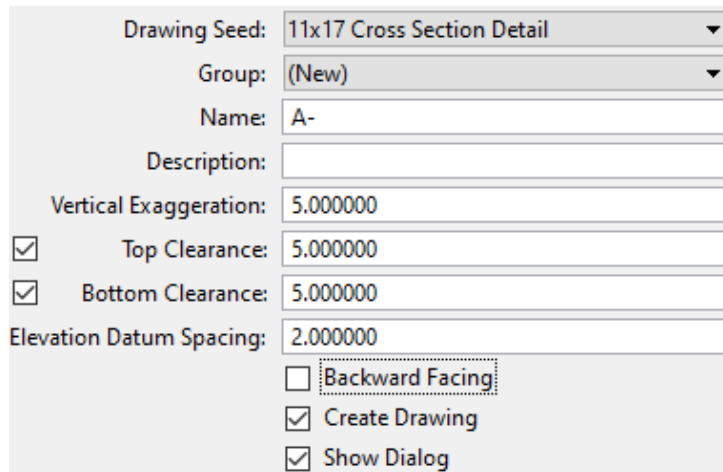
- Switch back to the **OpenRoads Modeling Workflow** and click on the **Drawing Production** tab. Then click on **Place Named Boundary** tool in the **Named Boundaries** group.



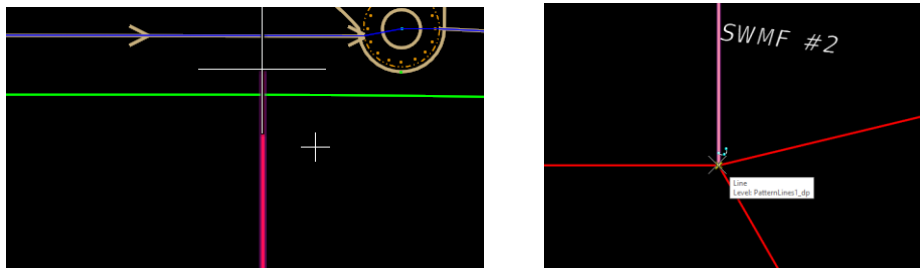
- This will bring up the **Place Named Boundary** dialog box. Click on the **Civil Cross Section 2 Points** tool.



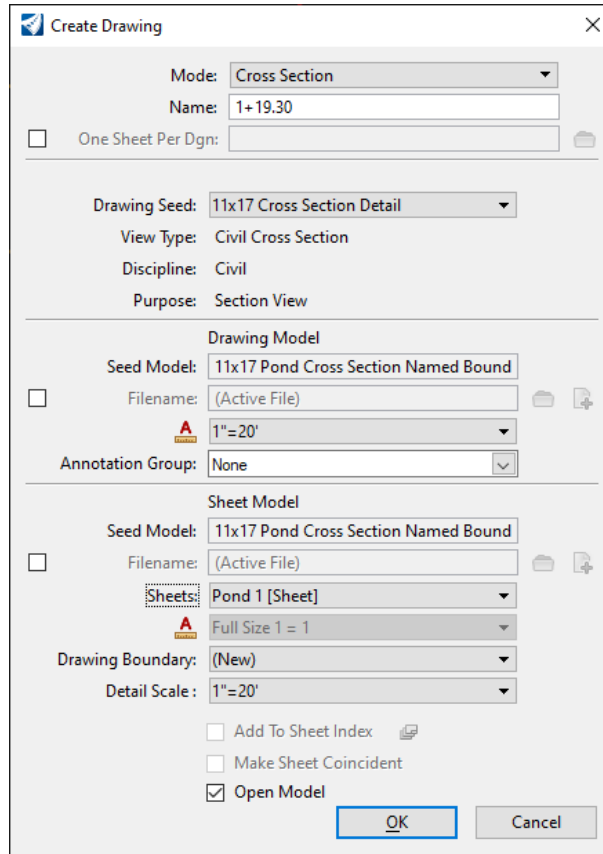
13. Set the values in the dialog as shown below.



14. The dialog is now waiting on a **Path Element** to be identified. Left click (Data Point) on the vertical pattern line. Then tentative click on the top end of the line and left click (Data Point) to accept this as the **First Point**. Next tentative click on the other end of the line and left click (Data Point) to accept this as the **Second Point**. Finally left click (Data Point) in open space near the line to accept the selection.

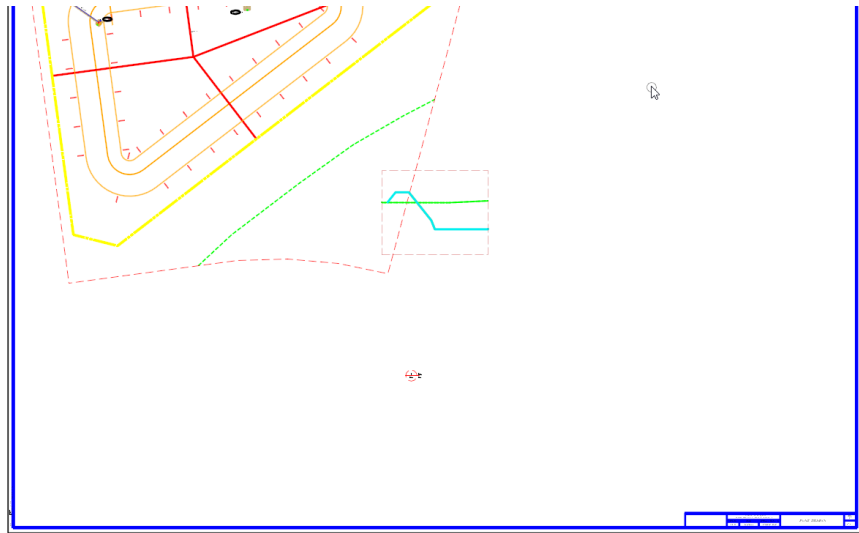


15. The **Create Drawing** dialog now appears. Most of the settings on this dialog will be set correctly when it appears, but check all of them against the image below and set any values that differ to the values provided. **The dropdown value for Sheets will need to be set to Pond 1 [Sheet].**



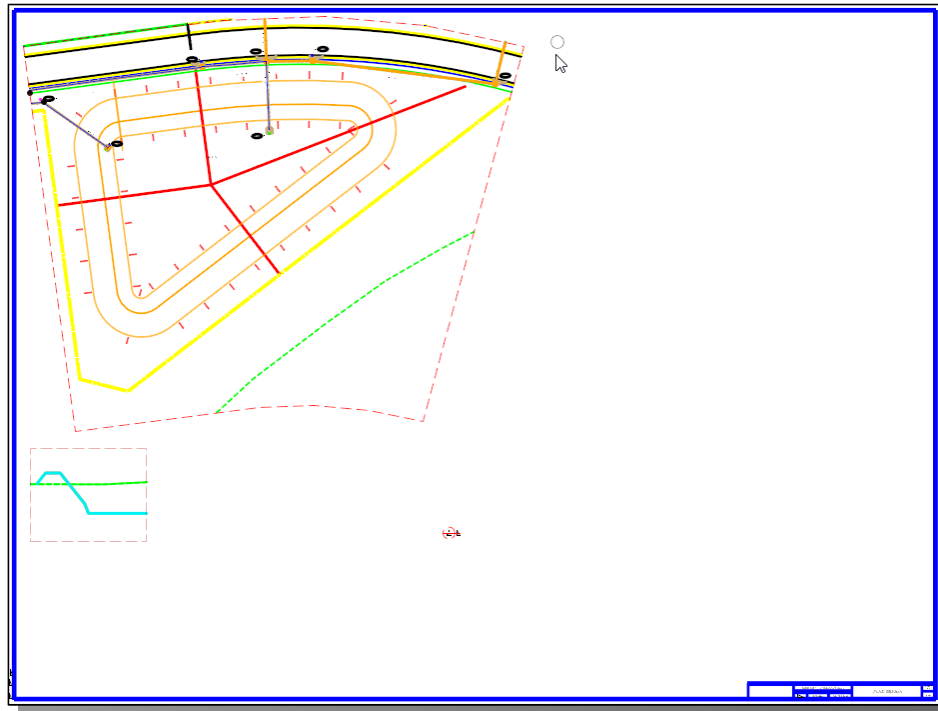
Click the **Ok** button.

- This will process the section and open the **Pond 1 [Sheet]**. The new section will be located as shown in the image below. It will need to be moved using the **Reference File** tools.

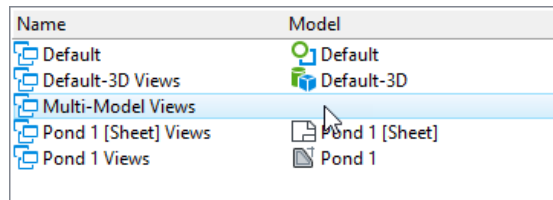


- Click on the **Home** tab. Then click on the **Attach Tools** in the Primary group to bring up the **References** dialog box. Choose the newly created reference for the section and click on the **Move Reference** tool.

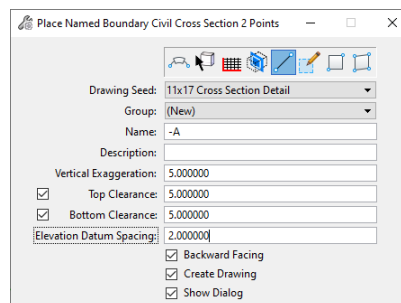
Now left click (Data Point) in the reference boundary for the new section and move it below the **Plan View** boundary and close to the left edge of the sheet similar to the example below.



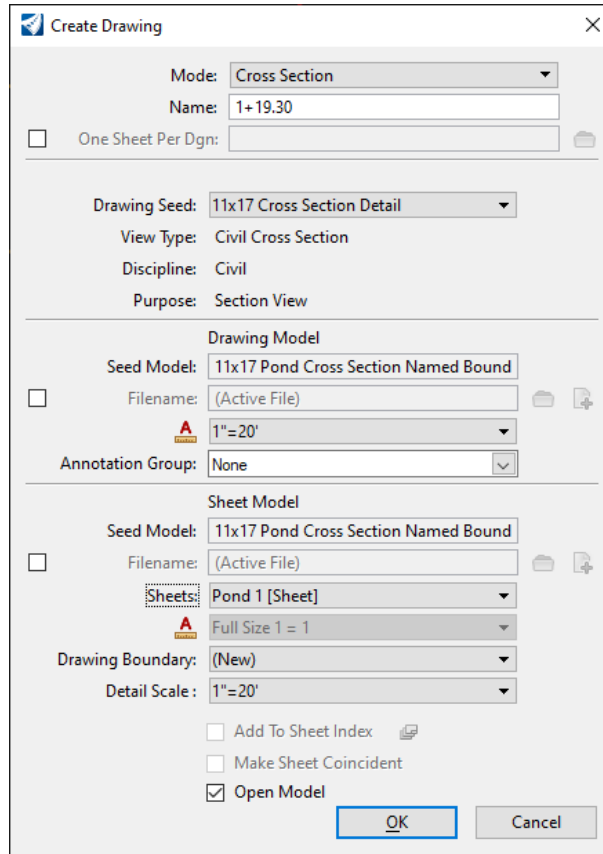
18. Once again change back to the **Multi-Model Views View Group**.



19. Switch to the **Drawing Production** tab and click on the **Place Named Boundary** tool once again to bring up the **Place Named Boundary Civil Cross Section** dialog. Set all values as indicated below, be sure the Backwards facing checkbox is checked. In **View 1** select the lower pattern line and **Snap** to the top point of that line. Left click (Data Point) to accept the **First Point**. Now **Snap** to the other end of the pattern line and left click (Data Point) to accept the second point. Left click (Data Point) in the open to finish the command.

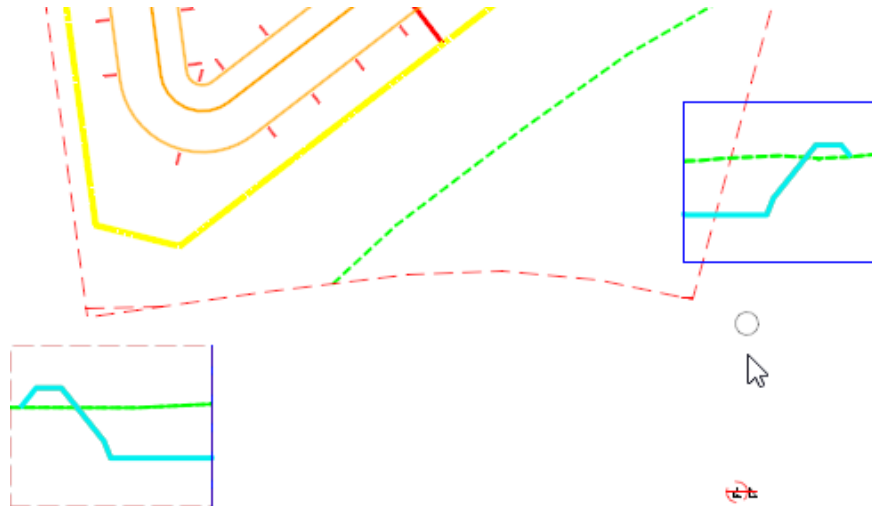


20. The Create Drawing dialog now appears. Most of the settings on this dialog will be set correctly when it appears, but check all of them against the image below and set any values that differ to the values provided. **The dropdown value for Sheets will need to be set to Pond 1 [Sheet].**



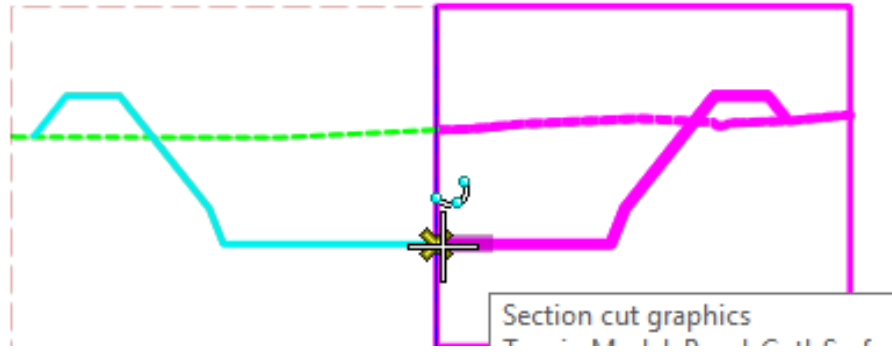
Click the **Ok** button.

21. This will process the section and open the **Pond 1 [Sheet] Model**. The new section will be located as shown in the image below. It will need to be moved using the Reference file tools.

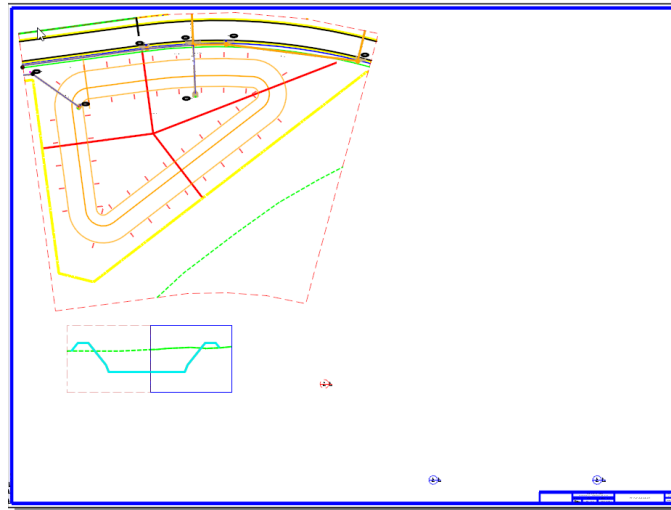


22. Click on the **Home** tab. Then click on the **Attach Tools** in the **Primary** group to bring up the **References** dialog box. Choose the newly created reference for the section and click on the **Move Reference** tool. Now **Snap** to the left end of the pond bottom of the new section and move it to align with the first section as shown in the example below.





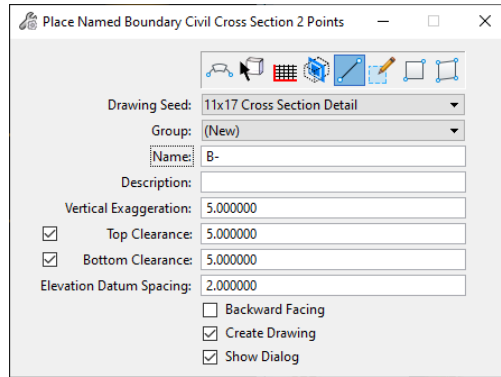
23. The **Pond 1 [Sheet]** should now look like this example.



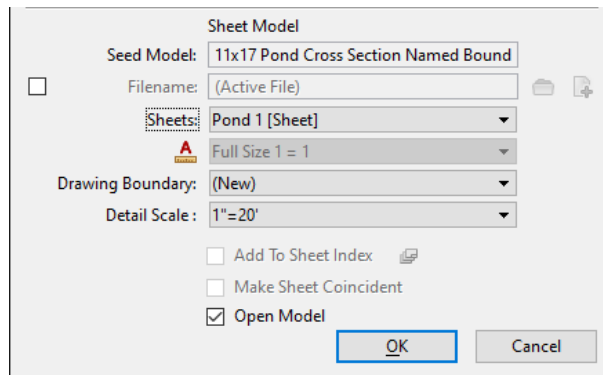
24. Change back to the **Multi-Model Views View Group**.

Name	Model
Default	Default
Default-3D Views	Default-3D
Multi-Model Views	
Pond 1 [Sheet] Views	Pond 1 [Sheet]
Pond 1 Views	Pond 1

25. Switch to the **Drawing Production** tab and click on the **Place Named Boundary** tool once again to bring up the **Place Named Boundary Civil Cross Section** dialog. Set all values as indicated below. In **View 1** select the left most pattern line and **Snap** to the left end of that line. Left click (Data Point) to accept the **First Point**. Now **Snap** to the other end of the pattern line and left click (Data Point) to accept the **Second Point**. Left click (Data Point) in the open to finish the command.

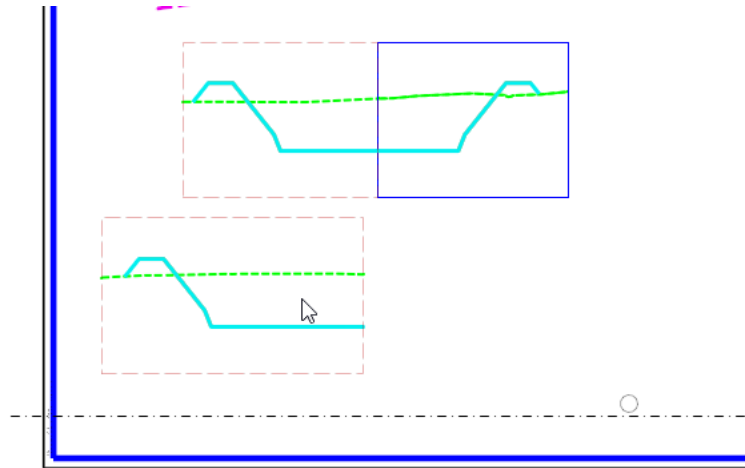


26. The **Create Drawing** dialog now appears. **Make sure that the dropdown value for Sheets is set to Pond 1 [Sheet].**

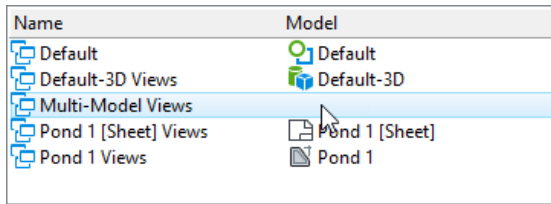


Click the **Ok** button.

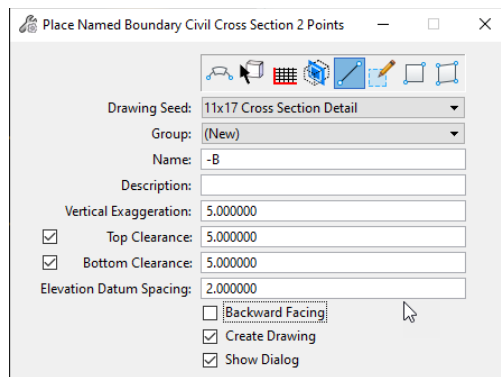
27. This will process the section and open the **Pond 1 [Sheet] Model**. The new section will need to be moved using the **Reference** file tools to the location below.



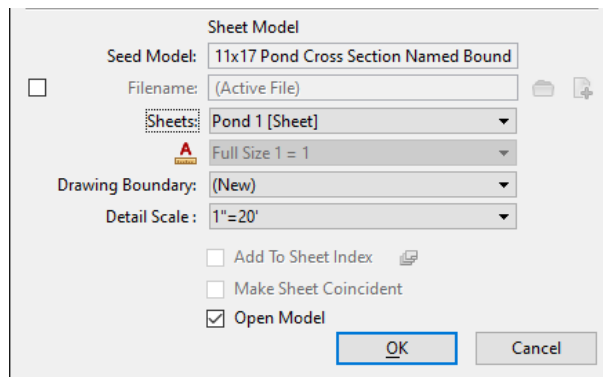
28. Change back to the **Multi-Model Views View Group**.



29. Switch to the **Drawing Production** tab and click on the **Place Named Boundary** tool once again to bring up the **Place Named Boundary Civil Cross Section** dialog. Set all values as indicated below. In **View 1** select the remaining pattern line and **Snap** to the left most end of that line. Left click (Data Point) to accept the **First Point**. Now **Snap** to the other end of the pattern line and left click (Data Point) to accept the **Second Point**. Left click (Data Point) in the open to finish the command.

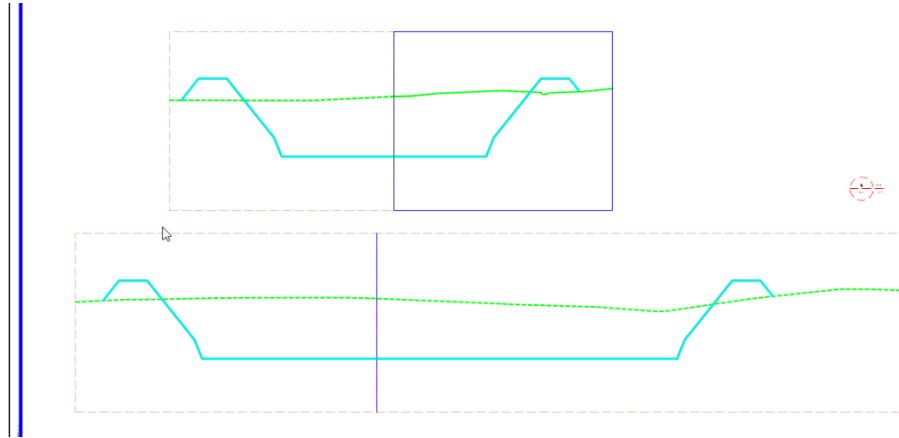


30. The **Create Drawing** dialog now appears. **Make sure that the dropdown value for Sheets is set to Pond 1 [Sheet]**.



Click the **Ok** button.

31. This will process the section and open the **Pond 1 [Sheet] Model**. The new section will need to be moved using the **Reference** file tools to the location below. When done the **Pond 1 [Sheet] Model** should look like the example below.

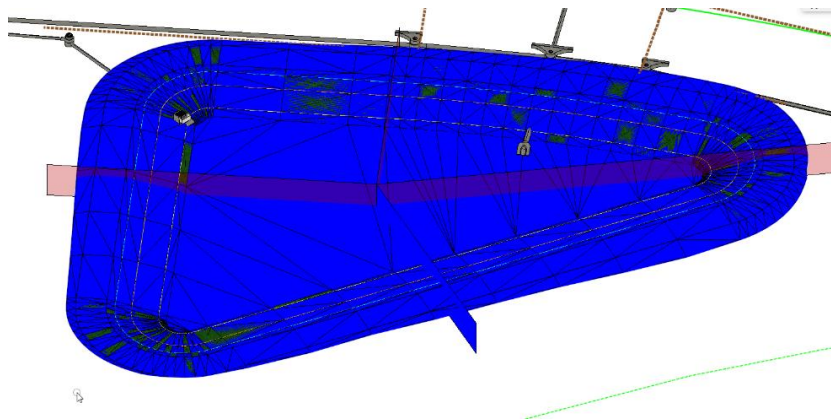


### Exercise 2.3 Placing Special Details

1. Continuing in the **PDPLRD01** file, make sure that the **Default-3D Views** is the active **View**.

Name	Model
0+00.00 Views	0+00.00
0+00.1 Views	0+00.1
1+19.30 Views	1+19.30
1+60.25 Views	1+60.25
Default	Default
Default-3D Views	Default-3D
Multi-Model Views	
Pond 1 [Sheet] Views	Pond 1 [Sheet]
Pond 1 Views	Pond 1

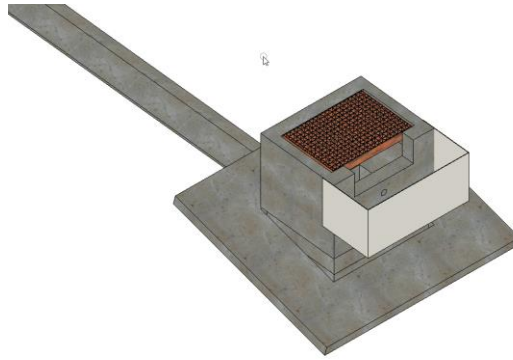
2. Using the Rotate View tool's Rotate 3D method, rotate and zoom the view until it is similar to the one below.



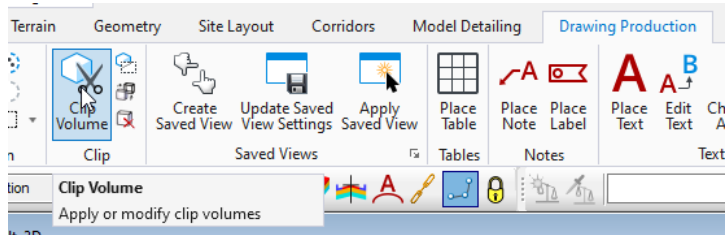
3. Using the **OpenRoads Modeling Workflow** go to the **Primary Group** and select the **Level Display** tool. This will open the **Level Display** dialog. Highlight the **PDPLRD01.dgn** file in the file list. Turn off all but the active level in this file. Close the dialog box. The view should look like the one below.



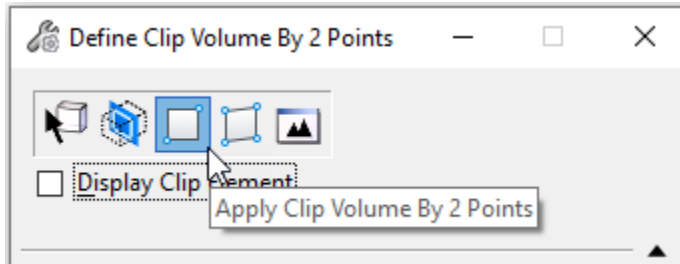
4. Now zoom in to the structure to be detailed.



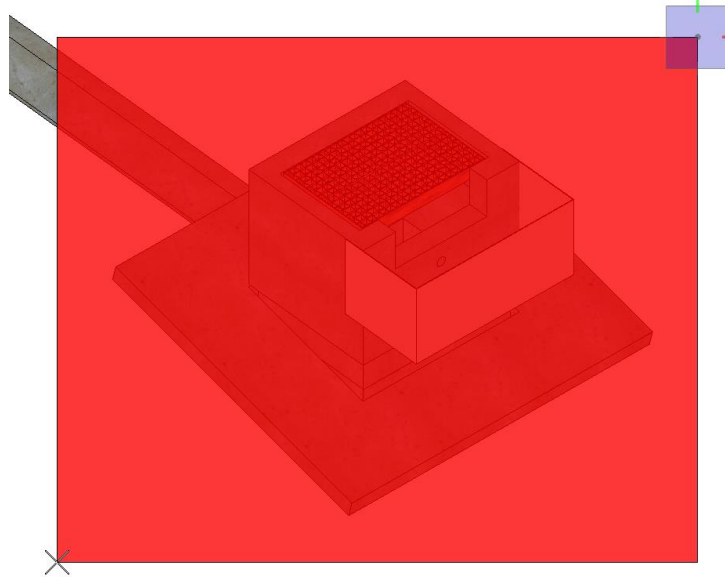
5. Change to the **Drawing Production** tab and select the **Clip Volume** tool.



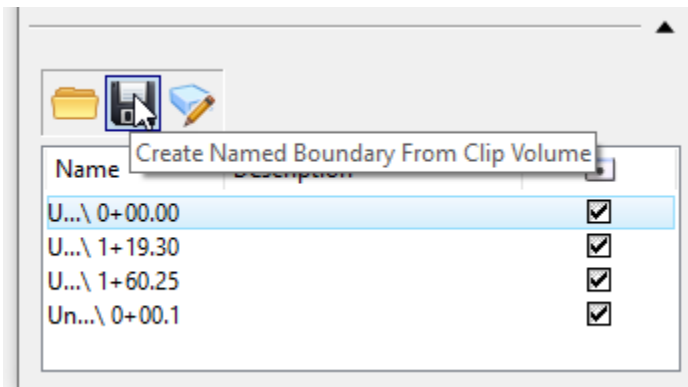
6. The **Create Clip Volume** dialog will display now. Select the **Apply Clip Volume By 2 Points** tool. Make sure the **Display Clip Element** checkbox is unchecked.



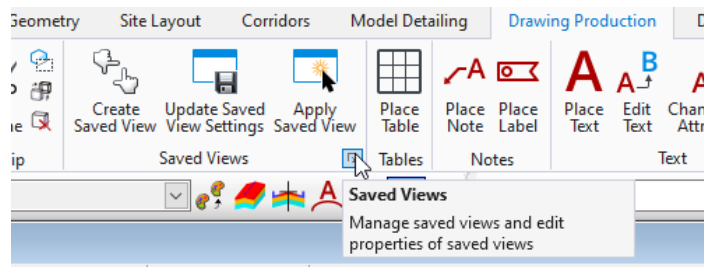
7. Left click (Data Point) in open space and drag down and left to create a **Clip Volume** like the example.



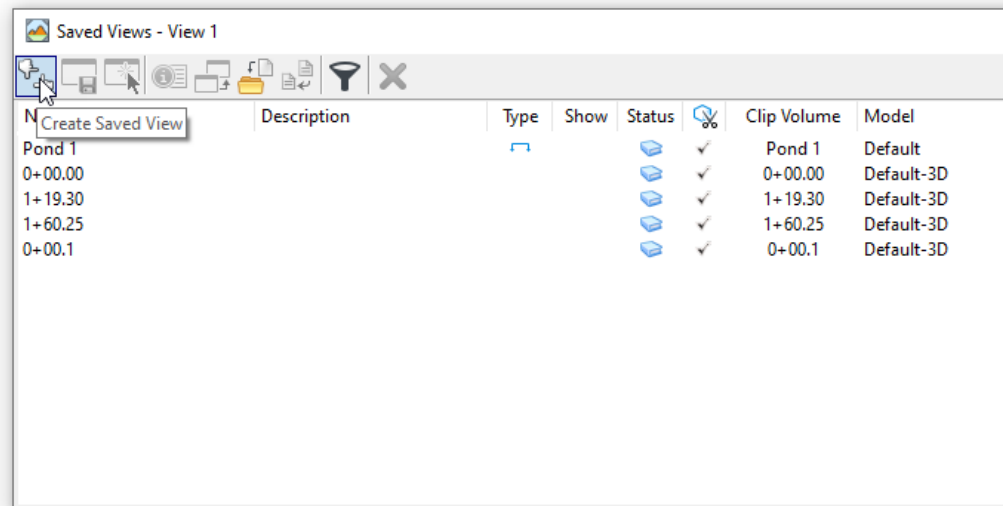
8. Now click on the icon to **Create Named Boundary From Clip Volume**. Name it **SpecialDetail**.



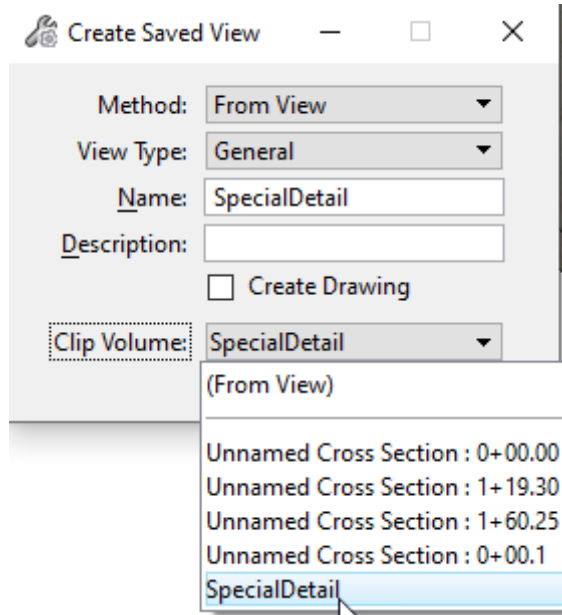
9. Open the **Saved Views** dialog by clicking in the lower right corner of the **Saved Views** group of the **Drawing Production** tab.



10. On the **Saved Views** dialog click the **Create Saved** view icon in the upper left of the dialog box.

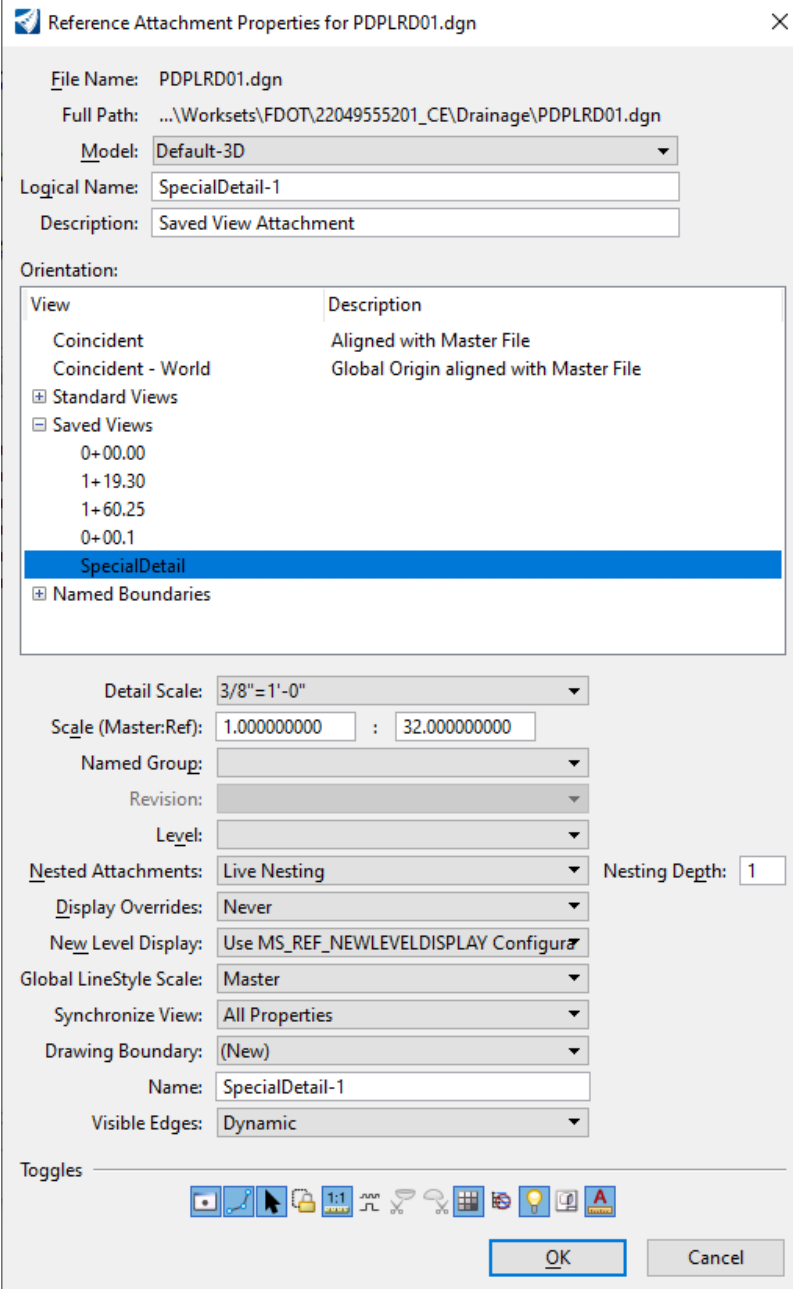


11. Set the values of the **Create Saved View** dialog box as follows.





- Close the dialog and change to the **Pond 1 [Sheet] Views View Group**. Open the **References** dialog from the **Primary** group on the **Home** tab. Click on the **Attach Reference** icon in the upper left of the dialog box. This will bring up the **Attach Reference** dialog. Choose the **PDPLRD01.dgn** file in the list and click the **Open** button. Set the values in the **Reference Attachment Properties** dialog box as follows and click the **Ok** button to accept.



Reference Attachment Properties for PDPLRD01.dgn

File Name: PDPLRD01.dgn  
 Full Path: ...\\Worksets\\FDOT\\22049555201\_CE\\Drainage\\PDPLRD01.dgn  
 Model: Default-3D  
 Logical Name: SpecialDetail-1  
 Description: Saved View Attachment

Orientation:

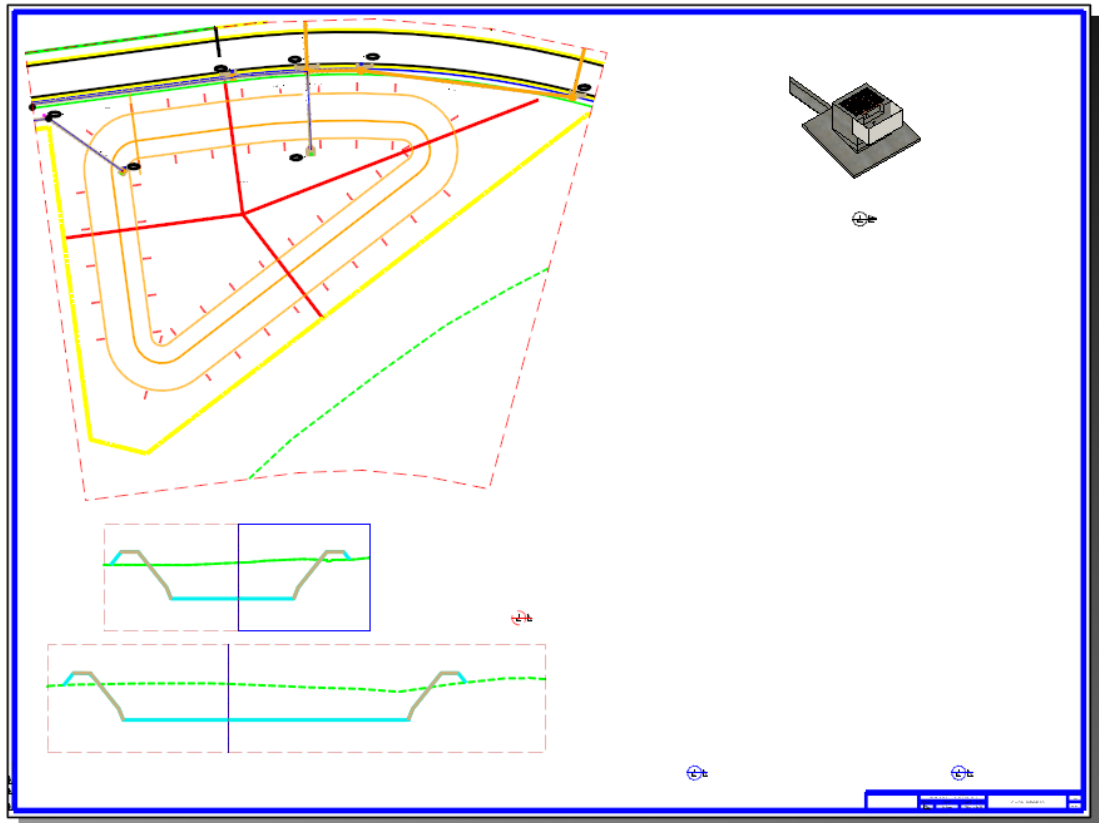
View	Description
Coincident	Aligned with Master File
Coincident - World	Global Origin aligned with Master File
Standard Views	
Saved Views	
0+00.00	
1+19.30	
1+60.25	
0+00.1	
SpecialDetail	
Named Boundaries	

Detail Scale: 3/8" = 1'-0"  
 Scale (Master:Ref): 1.000000000 : 32.000000000  
 Named Group:  
 Revision:  
 Level:  
 Nested Attachments: Live Nesting Nesting Depth: 1  
 Display Overrides: Never  
 New Level Display: Use MS\_REF\_NEWLEVELDISPLAY Configur  
 Global LineStyle Scale: Master  
 Synchronize View: All Properties  
 Drawing Boundary: (New)  
 Name: SpecialDetail-1  
 Visible Edges: Dynamic

Toggles

OK Cancel

13. Now place the **Reference** in the upper right corner of the **Pond 1 [Sheet] Views**. The sheet should now look like the image below.

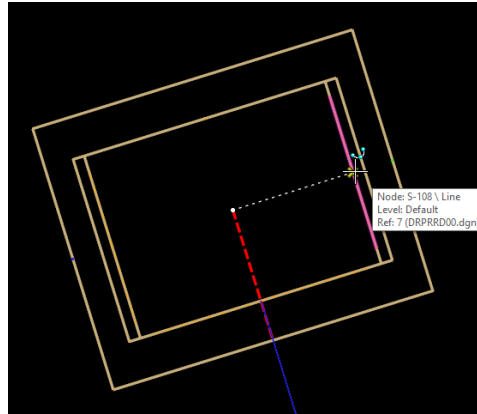


### *Exercise 2.4 Cutting Control Structure Sections*

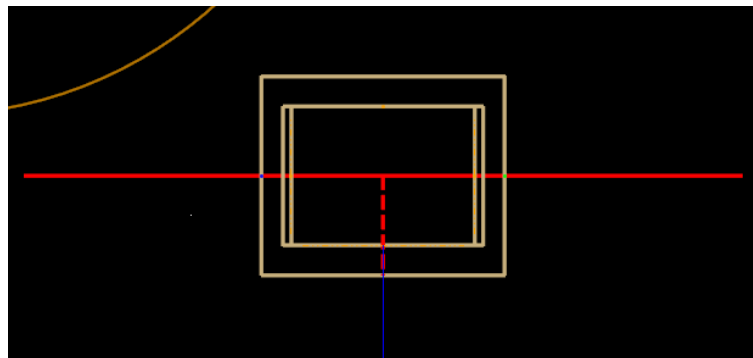
1. Continuing in the **PDPLRD01.dgn** file, switch to the **Drawing Workflow**. While in the **Multi-Model Views View Group** make **View 1** active and click on the **Rotate View** icon. Using the **2 Points Method** tentative click on the end of the red dashed line in the center of the 2D structure as shown.



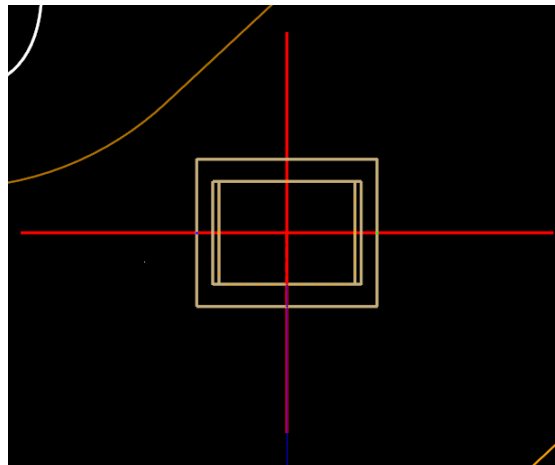
2. Now **Snap** to the midpoint of the tan line to the right as shown and click to complete the view rotation.



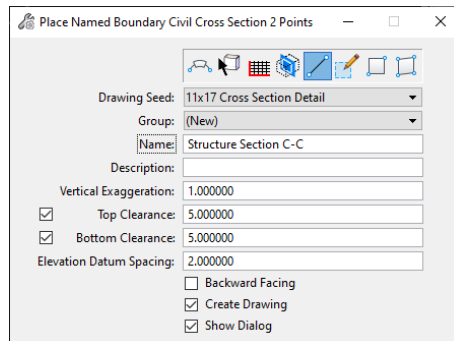
3. Using **Place Line** tool from the **Placement** group on the **Home** tab. Tentative click on the end of the red dashed line. Switch to the **Drawing Aids** tab and choose the **Set Origin** tool in the **AccuDraw** group. Move the cursor horizontally to the left and press the **Enter** key on the keyboard to lock the **Axis** of **AccuDraw**. Type the number **8** on the keyboard and left click (Data Point) to start drawing the pattern line. Move the cursor horizontally to the right and press the **Enter** key to lock the axis. Type the number **16** on the keyboard and left click (Data Point) to finish placing the pattern line.



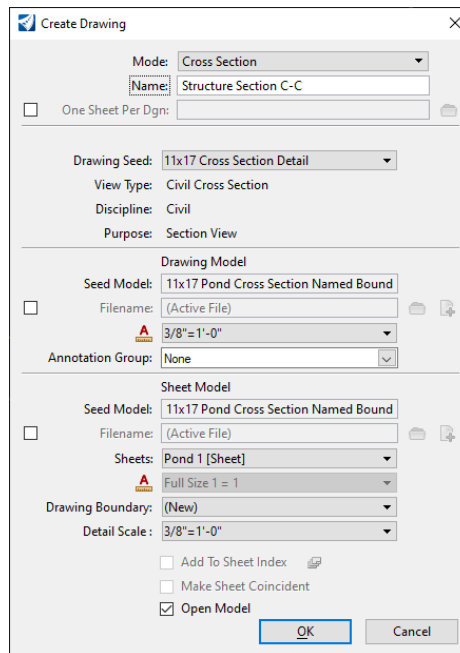
4. Once again, use the **Place Line** tool on the **Home** tab. Tentative click on the end of the red dashed line. Switch to the **Drawing Aids** tab and click on the **Set Origin** tool. Move the cursor vertically up from the end of the line and press the **Enter** key to lock the **Axis** to vertical movement. Type the number **6** and left click (Data Point) to start drawing the pattern line. Move the cursor down through the center of the 2D structure. Press the **Enter** key to lock the **Axis** to vertical movement and type the number **12**. Left click (Data Point) to complete the pattern line. The structure should look like the example below.



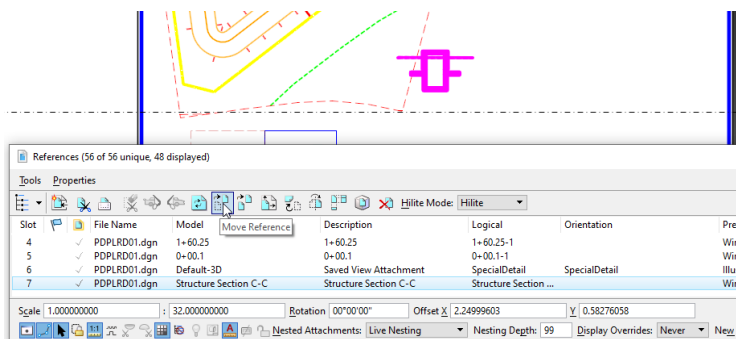
- Switch back to the **OpenRoads Modeling Workflow**. Use the **Place Named Boundary** tool to bring up the **Place Named Boundary Civil Cross Section 2 Points** dialog. Set the values as shown.



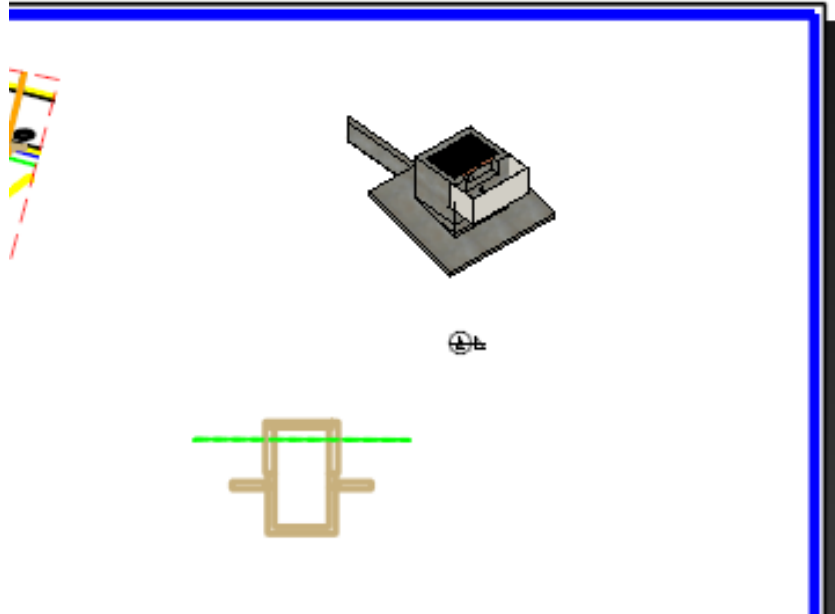
- Select the horizontal pattern line and **Snap** to the left end of the line. Left click (Data Point) to accept the **First Point**. Now **Snap** to the right end and left click (Data Point) to accept the **Second Point**. Finally left click (Data Point) in the open to bring up the **Create Drawing** dialog. Set the values as shown.



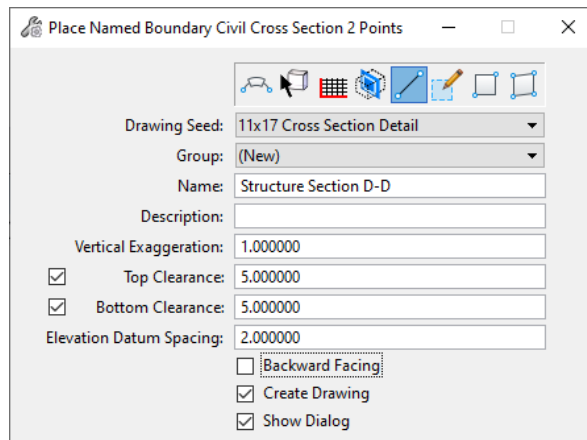
- This will process the section and open the **Pond 1 [Sheet] Views Group**. The new section will be located as shown in the image below. It will need to be moved using the **Reference File** tools.



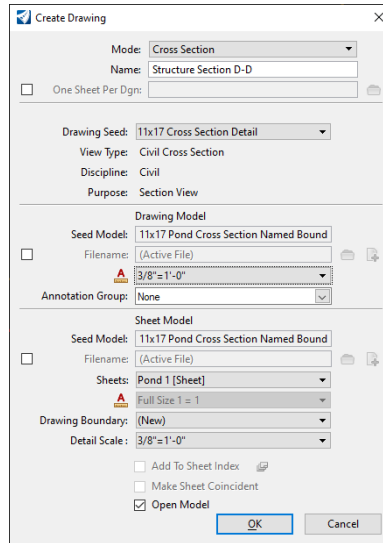
8. Using the **References Move Reference** tool, move the new section to the location just below the **Special Detail** in the upper right of the **Pond 1 [Sheet] Views**, as shown below.



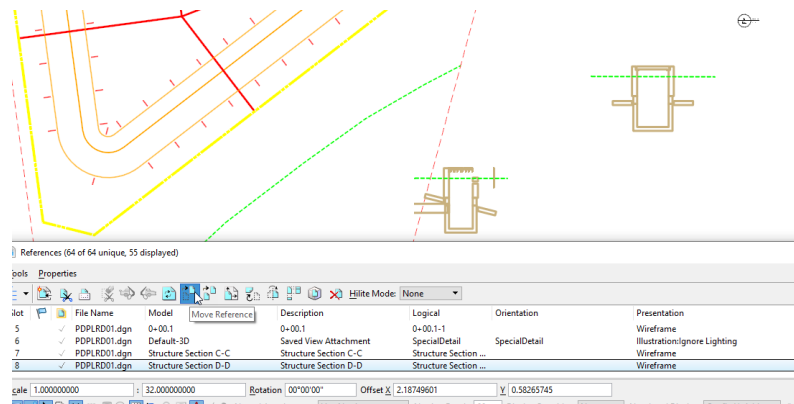
9. Switch back to the **Multi-Model Views View Group** and make **View 1** active. Use the **Place Named Boundary** tool to bring up the **Place Named Boundary Civil Cross Section 2 Points** dialog. Set the values as shown.



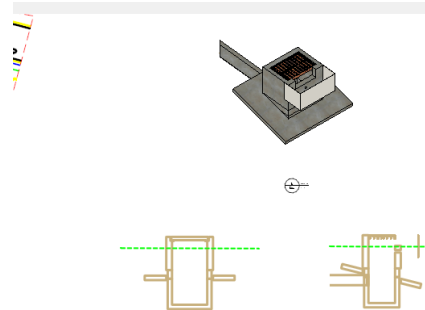
- Select the vertical pattern line and **Snap** to the top end of the line. Left click (Data Point) to accept the **First Point**. Now **Snap** to the bottom end and left click (Data Point) to accept the **Second Point**. Finally, left click (Data Point) in the open to bring up the **Create Drawing** dialog. Set the values as shown.



- This will process the section and open the **Pond 1 [Sheet] Views Group**. The new section will be located as shown in the image below. It will need to be moved using the **Reference File** tools.

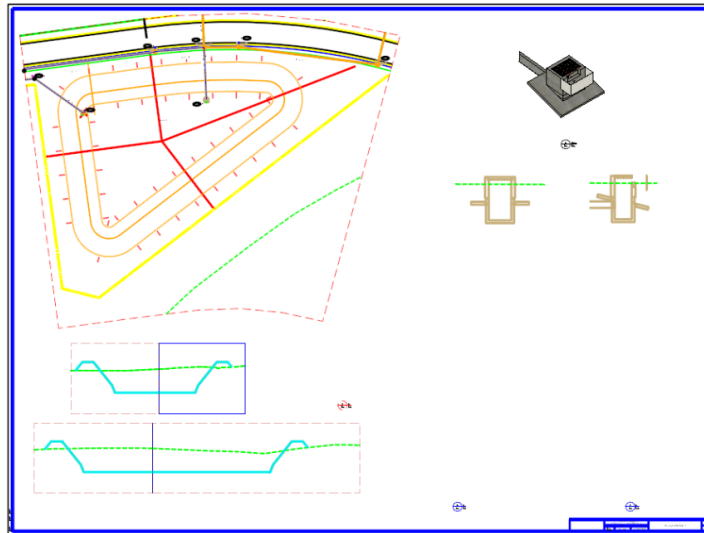


- Using the **References Move Reference** tool, move the new section to the location just below the **Special Detail** in the upper right of the **Pond 1 [Sheet] Views**, as shown below.

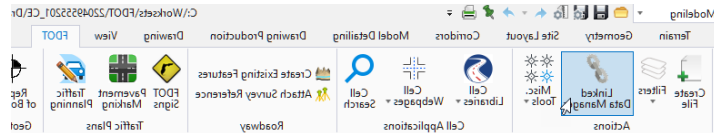


## Exercise 2.5 Control Structure Form

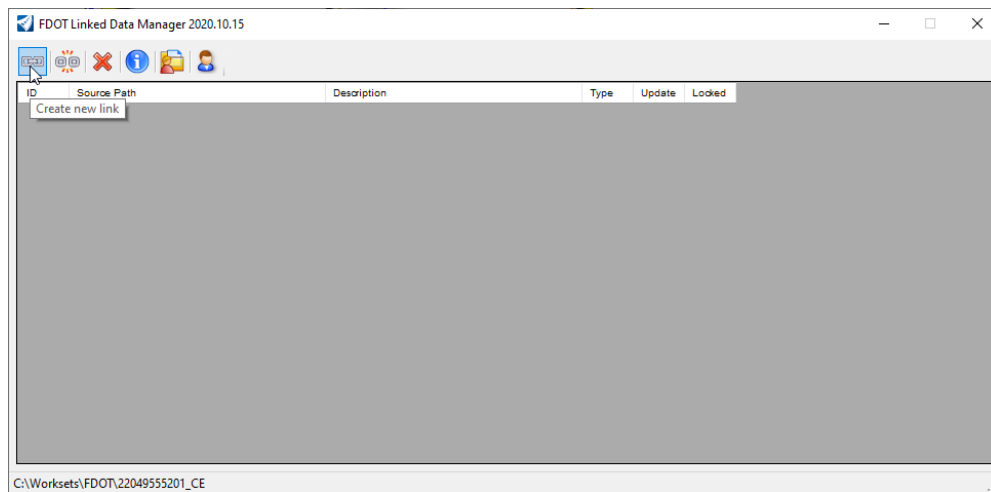
1. Continuing in the **PDPLRD01.dgn** file, switch to the **Pond 1 [Sheet] Views Group** and open the **FDOT** tab.



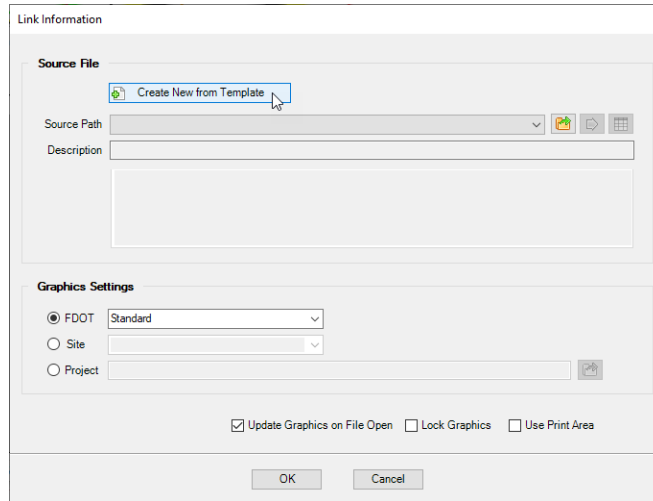
2. Click on the **Linked Data Manager** tool in the **Actions** group.



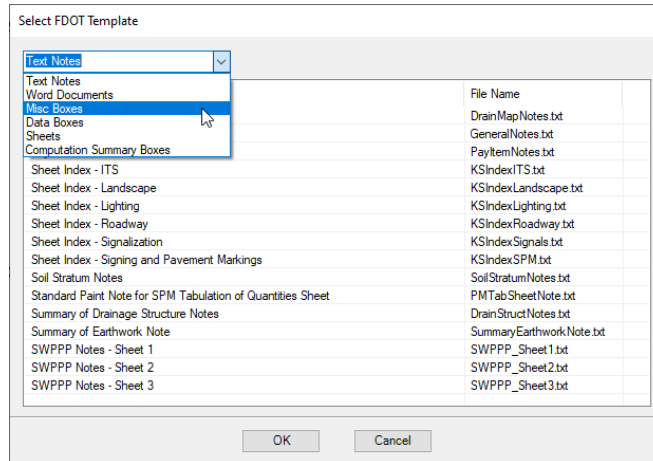
3. This will bring up the **FDOT Linked Data Manager** dialog. Click on the **Create new link** button in the upper left corner of the dialog.



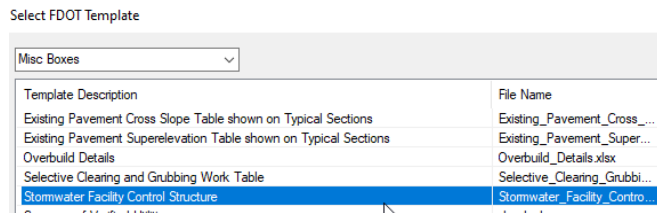
- On the **Link Information** dialog box click the **Create New from Template** button.



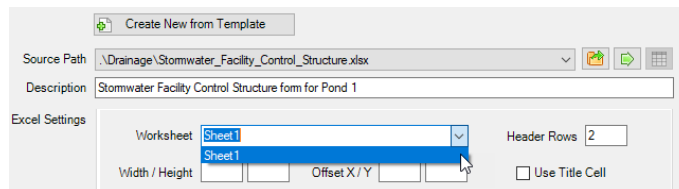
- This will open the **Select FDOT Template** dialog box. Click on the dropdown menu and choose **Misc Boxes**.



- Now select **Stormwater Facility Control Structure** from the list of templates and click the **Ok** button to save the newly created file to the **Drainage** directory of the current project.

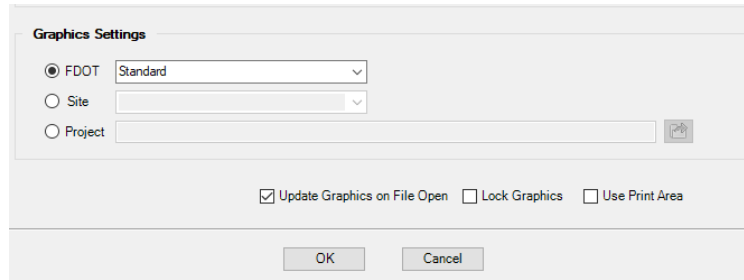


- Type **Stormwater Facility Control Structure form for Pond 1** in the **Description** and set the **Worksheet** dropdown to **Sheet 1**.

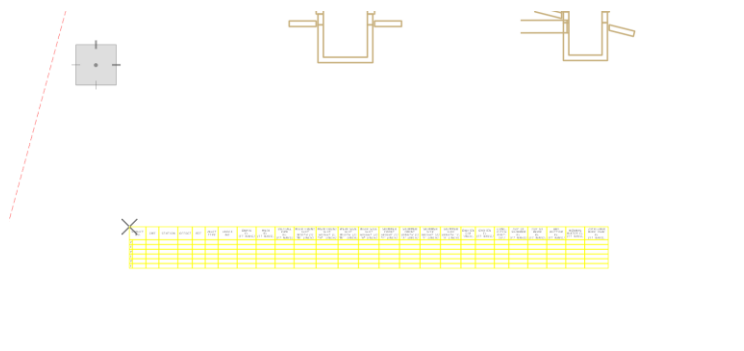




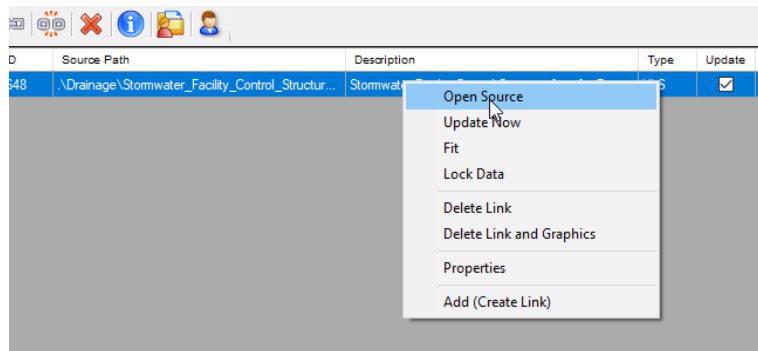
- Set the remainder of the dialog as shown below and click the **Ok** button to begin placement of the **Control Structure** form.



- It will take a bit of time for the program to create the new blank Excel file and then begin the process for the placement of the form in the drawing, so be patient. Eventually you will have a form attached to the cursor to be placed. Move it near the location show below and left click (Data Point) to place.



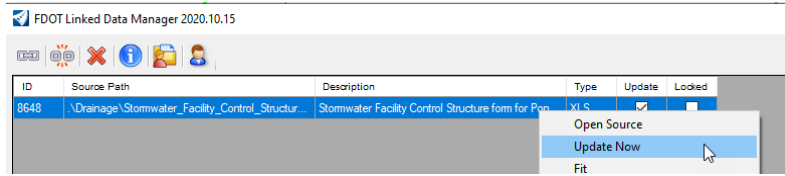
- Back in the **FDOT Linked Data Manager** dialog, select and right click on the entry for the new form. Select **Open Source** from the list. This will open Excel and allow editing of the new blank form.



- Fill out the form and hide unused columns as shown in the example below. Once edits are made save the file and close Excel.

STRUCT. NO.	SWF	STATION	OFFSET	REF	INLET TYPE	INDEX NO.	GRATE EL. (FT NAVD)	WEIR EL. (FT NAVD)	OUTFALL PIPE EL. (FT NAVD)	ORIFICE DIA. (INCH)	ORIFICE EL. (FT NAVD)	CONC. DITCH PAVT. (SY)	TOP OF BERM EL. (FT NAVD)	SWF BOTTOM EL. (FT NAVD)	NORMAL WATER EL. (FT NAVD)	25YR/24HR WMD DHW EL. (FT NAVD)
1																
PI S-108	#2	704+74.45	99.15	CL SR81	D	425-052	33.00	32.00	26.50	3.00	31.00		34.00	25.75	31.00	33.00

12. Finally, right click on the new form in the **FDOT Linked Data Manager** and choose **Update Now**. This will update the placed version of the form to the latest saved version of the Excel file. Anytime a change is needed follow these steps to update the form.



13. The **Pond 1 [Sheet] View** should now look like the following example.

