FDOTConnect for OpenRoads Designer

Automated Quantities

COURSE GUIDE

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State of Florida

Department of Transportation

FDOTConnect

for

OpenRoads Designer **Automated Quantities Workflow**

Course Guide

2026

PRODUCTION SUPPORT / CADD OFFICE

TALLAHASSEE, FLORIDA

http://www.fdot.gov/cadd

FDOTConnect

for

OpenRoads Designer

Automated Quantities Workflow

Description

This training course details the Florida Department of Transportation (FDOT) Quantity Workflow developed for the Summary of Quantity Tables required for the Estimated Quantities Report. The participants will learn the use of FDOT and OpenRoads Designer tools required in the workflow. This includes tools used to assign pay item information to 2D and 3D design elements, calculate quantities, and export quantity tables. This course also covers the Designer Interface Quantity Builder, used to generate an XML file compatible for upload to Designer Interface for AASHTOWare Project Preconstruction.

This course includes, but is not limited to the following:

- Item Types
- Picklists Manager
- Pay Items and Quantities
- Quantity Takeoff Manager
- Generating Summary Tables
- Summary Reports Builder
- Estimated Quantities Report
- Exporting Data to Designer Interface

This training guide was developed with FDOTConnect2024. Any reference to FDOTConnect within this document should indicate either FDOTConnect2024 or the currently supported FDOTConnect version

Objectives

Students will learn how to use FDOTConnect's Quantity Takeoff Manager, Summary Reports Builder, and the Designer Interface Quantities Builder tools to draw, calculate, and document design quantities.

Audience

FDOT Designers and Engineers

Prerequisites

The following courses are required:

FDOT Roadway Design 3D Modeling and Roadway Design 2D Basics. Participants need to have a basic understanding of Computer Aided Drafting and Design (CADD) using MicroStation, a basic understanding of OpenRoads Designer concepts and a solid understanding of the engineering necessary to design a Roadway.

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1 INTRODUCTION

OBJECTIVES

Review the workflow and components of computing quantities.

- Define the Workflow for Project Quantities and Recommended Tools
- Requirements of Florida Department of Transportation (FDOT)

DOCUMENT STYLE

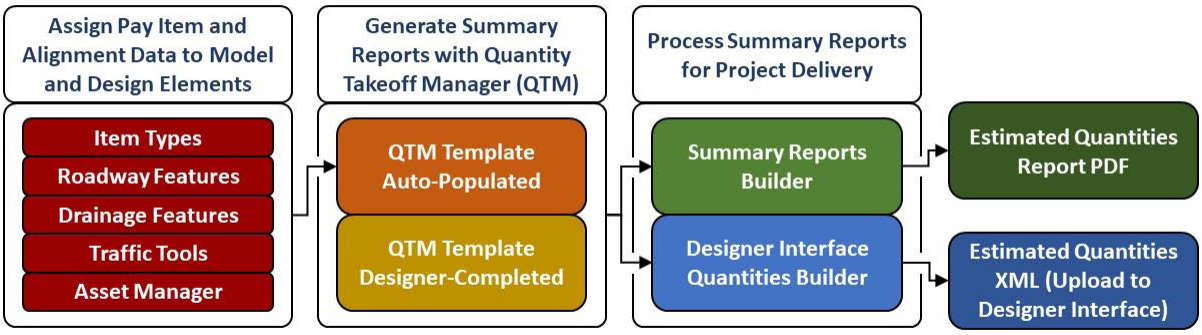
The following table shows the style conventions used throughout the course guide.

Item	Convention	Example
Menu names, Commands, and Ribbon Navigation	Bold (Names separated with > symbol)	• General form is **Workflow > Tab > Group > Tool** • **File > Open** • **File > Settings > User > Preferences** • **OpenBridge Modeler > FDOT > Actions > Create File**
Dialog actions	Bold	• Click the **Apply** button. • Click the **Graphic Select** button to the right of the *Horizontal Alignment Include* box.
Dialog field names	Italic	• Key in **Hemfield Road** in the *Alignment Name* field. • Click the **Graphic Select** button to the right of the *Horizontal Alignment Include* field.
Key-ins	Bold	• Key in **Hemfield Road** in the *Alignment Name* field.
File names	Italic	• Open the file *Working Graphics.dgn* in the C:\Bentley Training\GEOPAK 101\Project Setup\ Practice\ folder.
File paths	Not Italic or Bold	• Open the file *Working Graphics.dgn* in the C:\Bentley Training\GEOPAK 101\Project Setup\ Practice\ folder.

AUTOMATED QUANTITIES WORKFLOW

Shown in the figure below, is a workflow that represents the process of creating and providing pay item quantities for FDOT projects. Bentley OpenRoads applications include an element property called an Item Type which can be used to define meta-data as a property of drawing and/or model elements. The FDOTConnect Workspace uses these Item Types to assign pay item information to those elements. Once the elements are drawn and pay items assigned to the Item Types, the Quantity Takeoff Manager (QTM) tool can then be used to compute quantities and export them to Excel Summary of Quantities Tables. For Tables which do not have Item Types or automated Tables defined for the quantities, QTM will also create a blank Excel Summary of Quantities Table that may be completed by the designer.

When all project Summary Tables are complete, the quantity information is then processed into PDF and XML format. The Summary Reports Builder tool converts the data from the Excel Summary of Quantities Tables into the Estimated Quantities Report which is then submitted with the project. The Designer Interface Quantities Builder tool converts the same data from the Excel Tables into an XML file which may be used to upload the quantity data through Designer Interface into AASHTOWare Project Preconstruction.



The Quantity Takeoff Manager, Summary Reports Builder, Designer Interface Quantities Builder, and all associated resource files were developed by the Production Support CADD Office for use with Bentley OpenRoads applications. Additional automation and process enhancements are expected, and the workflows documented herein are subject to change.

This document will focus mostly on the workflow for Roadway quantities. Other disciplines, such as Drainage and Traffic Plans, will have similar processes that will be detailed further in their respective Training Guides.

FDOT STANDARDS

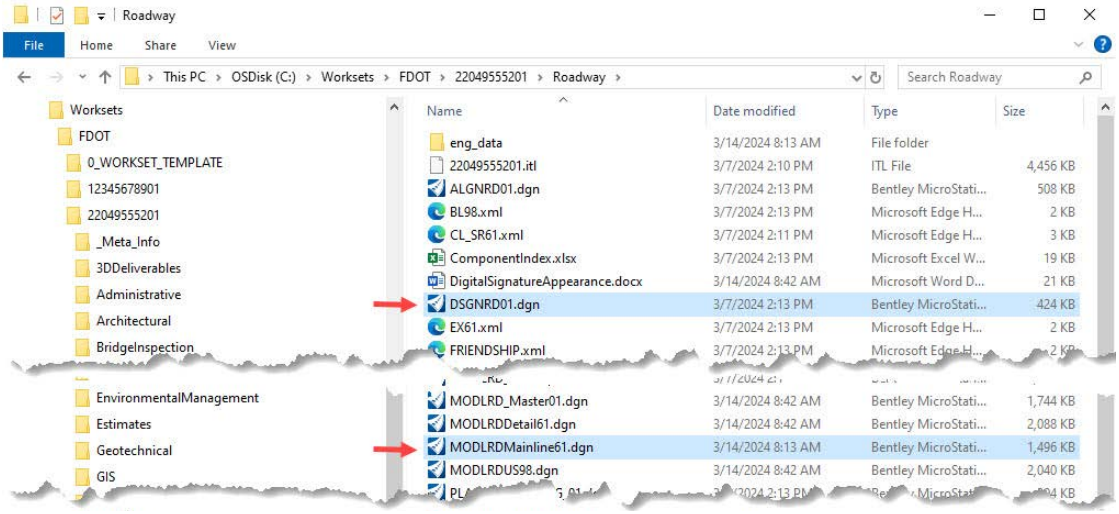
FDOT provides several resources to instruct and aid designers in processing pay item quantities. The Estimates Office publishes the ***Basis of Estimates Manual***, the governing document that specifies how to compute each pay item. The Estimates Office also provides a ***Master Pay Item*** list containing every pay item available for use in Florida. The Production Support CADD Office provides resources and tools to simplify the process of generating quantities. Item Types for pay items are delivered in the FDOTConnect workspace and are defined in dgn libraries for Roadway and Drainage features, in application resources for the Traffic Plans tools, and may be applied through a template formatted for use with Bentley's Picklists Manager tool or directly from the Item Types tools.

FDOT recommends the use of Civil Features for all linear feature drafting and 3D Modeling to ensure that each element is on the correct symbology and that the correct quantity Item Types are applied. The Roadway and Drainage features and Traffic Plans tools are pre-set to comply with drafting standards specified by the ***CADD Manual***. The Item Types are used by Quantity Takeoff Manager which is configured to compute quantities based on the computation methods defined in the ***Basis of Estimates Manual***.

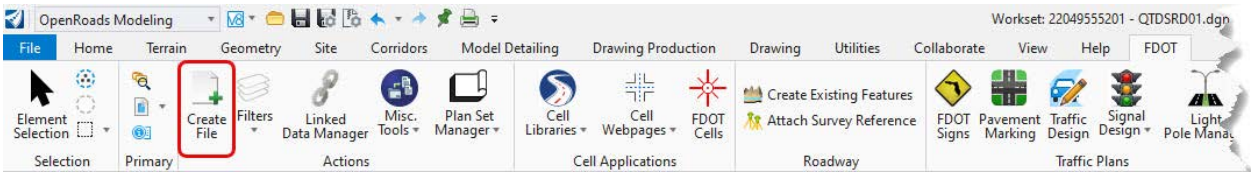
FDOT STANDARD FILES

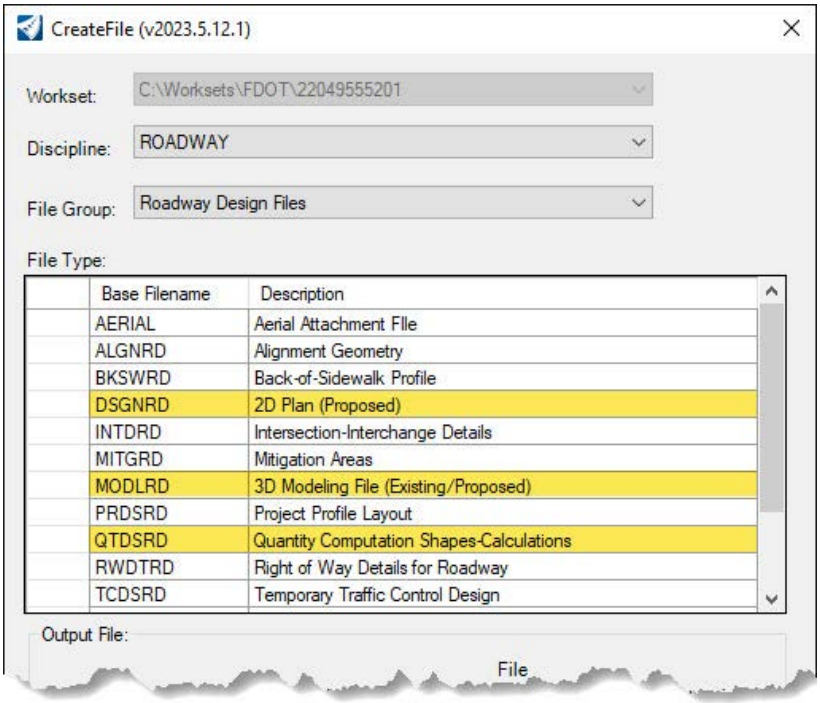
Quantity information is stored in CADD files designated with one of three standard FDOT File Names, located in the appropriate discipline directory:

- **DSGN**** – for Linear/Each Features (where ** indicates the 2-letter characters for the discipline)
- **MODLRD** – for 3D modeled Linear/Area/Tonnage/Cubic Yard Features
- **QTDSRD** – for 2D Area/Tonnage/Cubic Yard Features that are not modeled and quantity references



The FDOT tool **Create File** available from the **FDOT** Ribbon creates these files.





2 ITEM TYPES

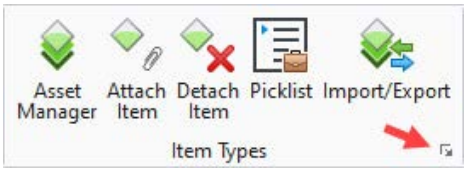
OBJECTIVES

- Introduce Item Types and Item Type Tools
- Explore the Item Types Dialog
- Set Item Types on Drawing Elements

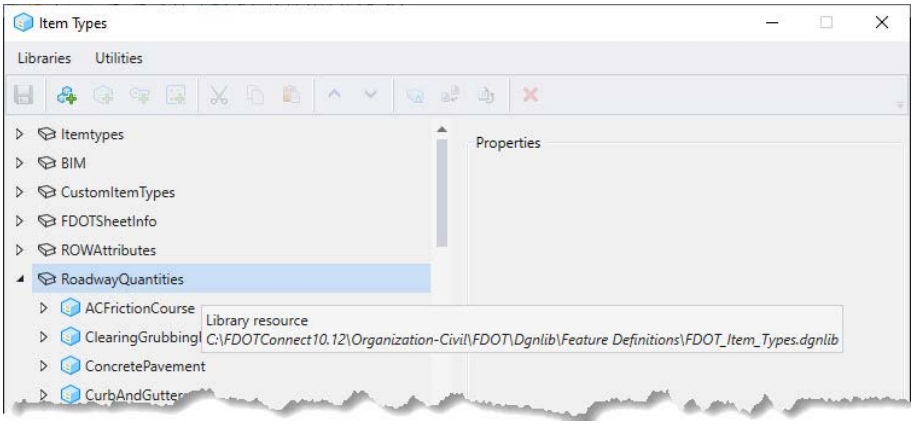
ITEM TYPE BASICS

Much like AdHoc values in previous versions, Item Types in ORD are tags of meta information attached to a MicroStation element. For the Automated Quantities workflow, we will use the Item Types to apply pay item quantity information.

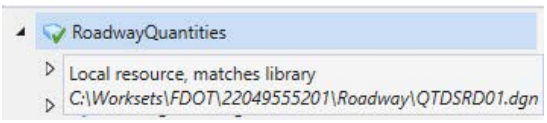
The Item Types tool group is in the **OpenRoads Modeling Workflow > Utilities** tab, and may also be found in the **Drawing Workflow > Attach** tab or **Drawing Workflow > Content** tab.



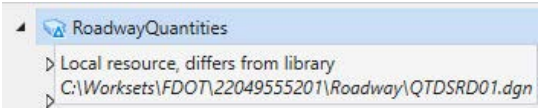
Item Types that are defined in dgn libraries or are active in the current dgn file may be accessed through the Item Types dialog. To open the Item Types dialog, click on the dialog fly-out button in the bottom right corner of the tool group.



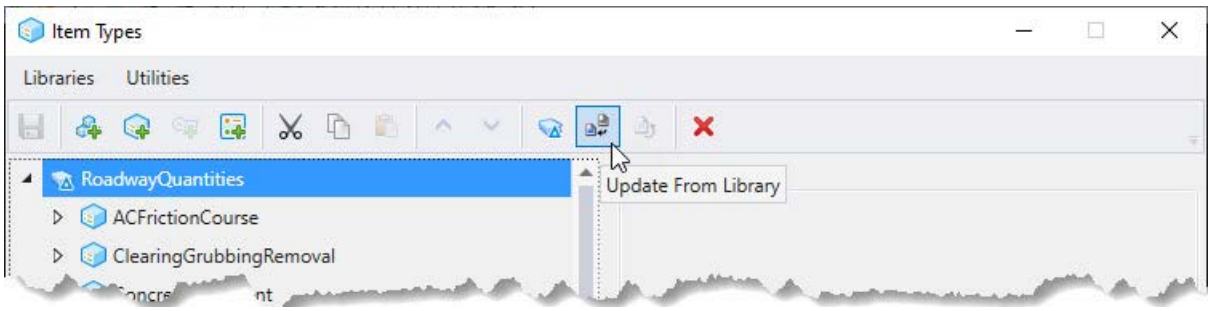
If there are active Item Types in the file, the Library Resource (book icon) should display with a green checkmark, and the tool tip will indicate that “Local resource, matches library”.



If the Item Types in the file have been changed, or the dgn library has changed or been updated, the Library Resource will display with a blue triangle, and the tool tip will indicate “Local resource, differs from library”.



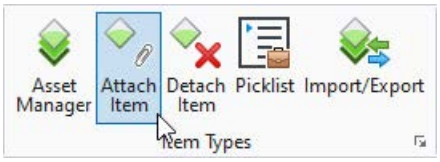
To update the Item Types in the active file, select/highlight the Library Resource, and two tools that were previously grey will now be active. You can choose to Show Differences, or Update from Library.

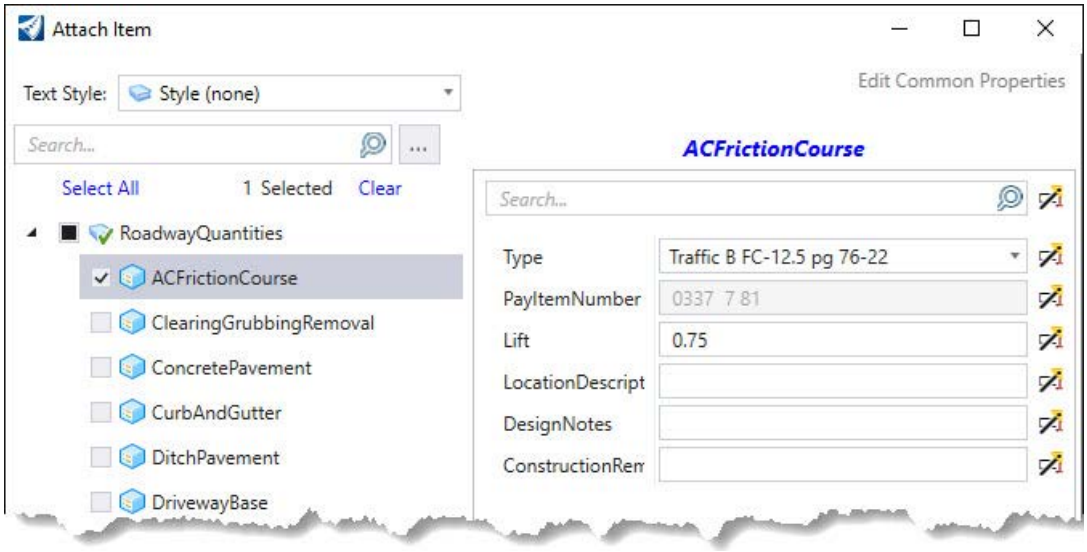


ITEM TYPES TOOLS

Item Types can be managed through the **Item Types** tools. They can be added or deleted, Pick Lists may be edited, and Item Types may be imported or exported to Excel files.

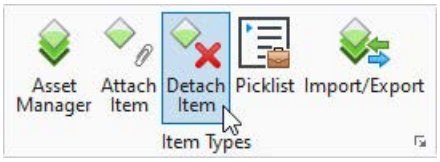
When an element is either not placed with a Civil Feature, or if it needs an additional Roadway or Drainage Item Type added, the **Item Types > Attach** Item tool may be used.

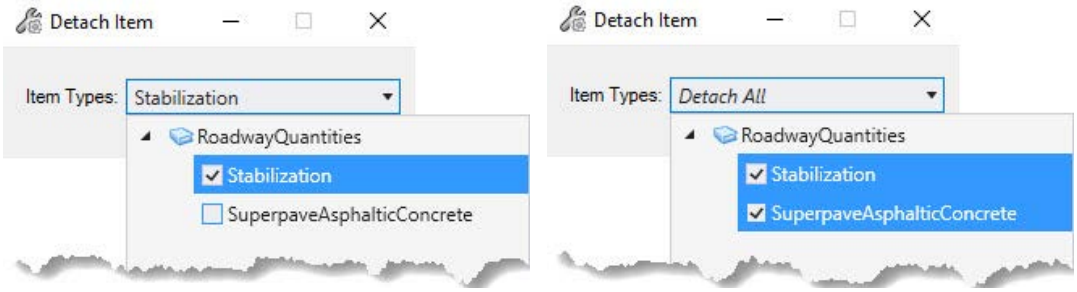




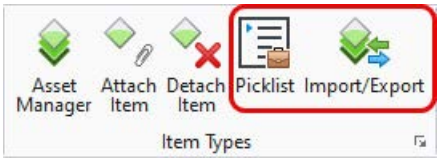
NOTE ***In ORD 2024, selecting property options or adding property values in the Attach Item dialog may cause the program to crash. To avoid this, attach the item, then set the Item Type properties in the Properties dialog.***

If an Item Type needs to be removed from a given element, the **Detach** Item tool may be used to remove any individual Item Type or all Item Types from an element. Only the items checked will be removed, any items that remain unchecked will remain attached to the element.





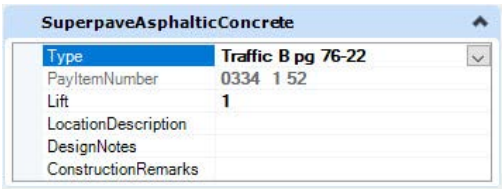
Pick Lists may be created and managed through the **Pick List** tool and Item Types may be imported or exported to an Excel file if necessary. Editing Pick Lists or importing/exporting Item Types is only recommended in certain limited circumstances, since the automated quantity tools rely on specifically formatted FDOTConnect resource files.



Additional information on these tools may be found through Bentley's Connect Advisor or Bentley Learn, or contact the Production Support CADD office for assistance.

ITEM TYPES FOR QUANTITIES

FDOTConnect utilizes Item Types to assign data to elements that identify quantity pay item information to be used to compute and generate Summary Tables. Each Item Type consists of multiple fields called Property Definitions. Item Type Property Definitions will vary depending on the requirements of the pay item(s) and/or Summary Table they are designed for.



Item Types for Roadway and Drainage may have one or more Property Definitions that require selections from a Pick List to select a property that is pre-defined in resource files delivered with the FDOTConnect tools. When the Property Definition is selected from a Pick List, the value may then be used in conjunction with lookup table resource files or defined expressions to populate other properties. If a Property Definition is grey, it is set by other property values and may not be directly edited. When viewing Item Types of elements in a referenced file, all properties will be grey and cannot be edited.

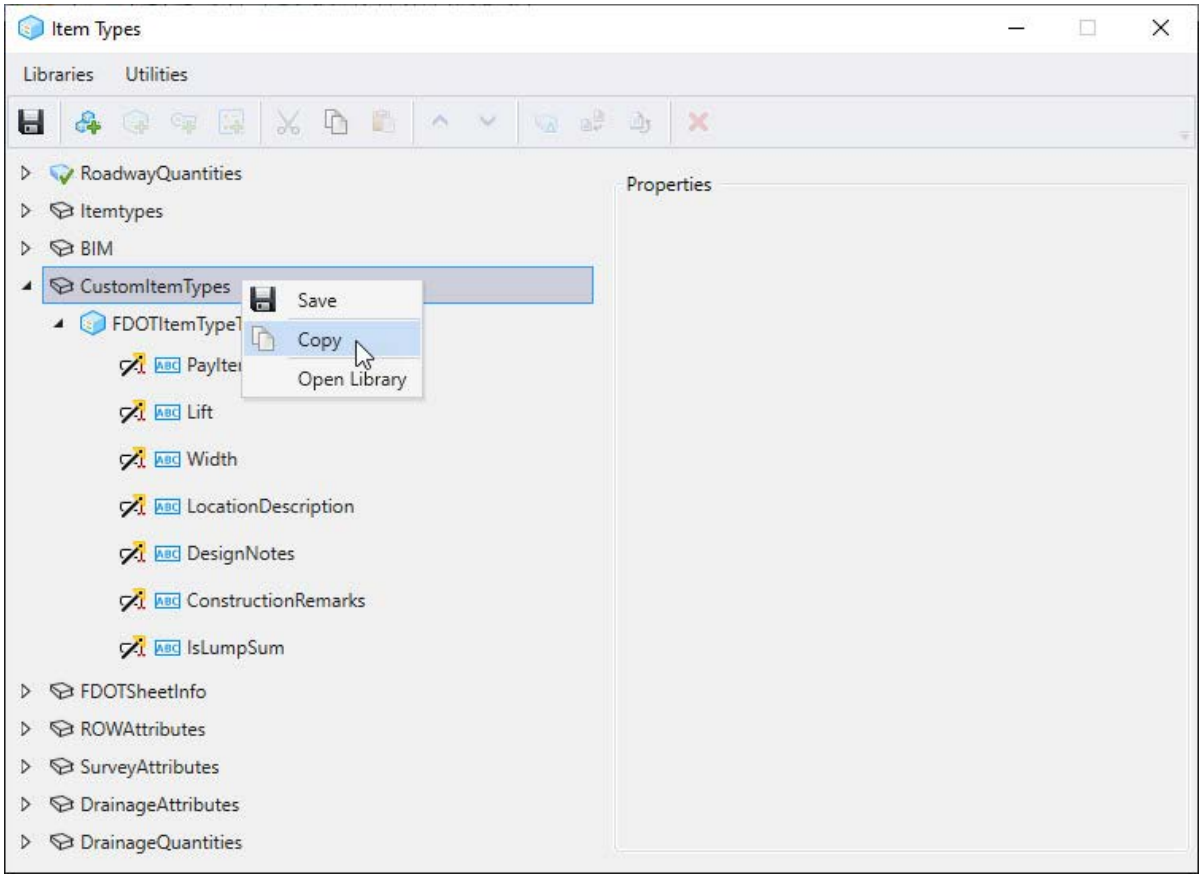
Other Property Definitions may be completed by typing values directly in the Property Definition field. These may be required to complete computations or to include information in the Summary Table. The *ConstructionRemarks* Property Definition should always be left blank by the designer and is intended only for As-Built remarks.

Any drawing element may have as many Item Types as necessary to define all pay items associated with that element. However, each Item Type must have a unique name. An element cannot have the same Item Type applied more than one time.

CUSTOM ITEM TYPES FOR NON-STANDARD PAY ITEMS

Beginning with FDOTConnect2024 automation for non-standard pay items is possible through the use of the new **Summary Reports Manager** and **Pay Item Editor** tools, which will be covered later in this guide. Since non-standard pay items are not included in the delivered Item Type resources, a **Custom Item Type** library template has been included along with the standard Item Types that is compatible with the FDOT automated quantities workflows. When needed, this library template should be copied and renamed based on the intended use, then edited to create project-specific Item Types. Library and Item Type names should not include spaces or special characters, but may include "_" underscore characters.

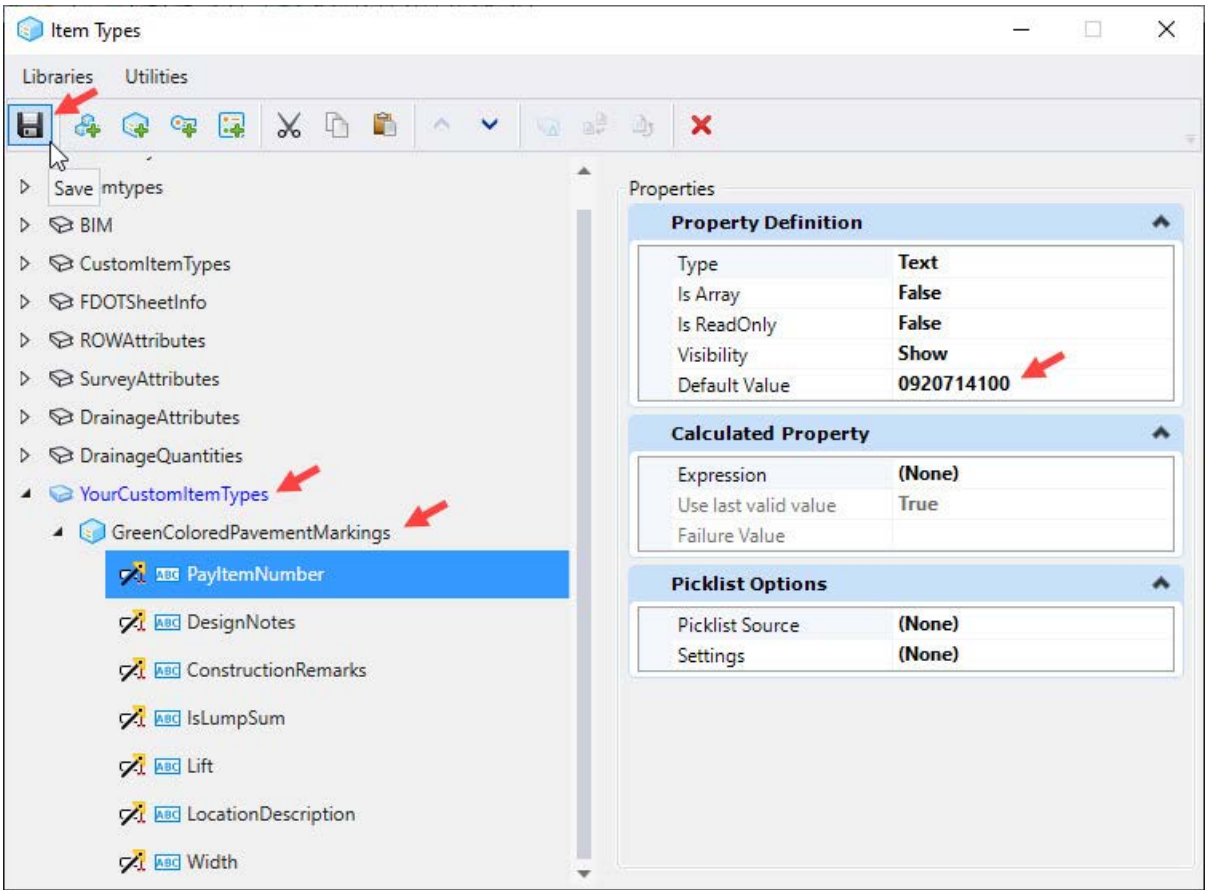
Custom Item Types and Item Type Libraries are saved locally in the dgn in which they are created. They are not saved to the FDOTConnect dgnlib resources. Once created and saved in a local dgn, they may be imported into other dgn files, but use caution when importing item types between dgn files, as all item types within a dgn are brought through with an import operation and this may affect or overwrite other existing libraries.



***NOTE** For advanced Item Type development not related to FDOT quantities, please refer to the training and documentation provided by Bentley for OpenRoads Designer.*

Once the library is copied and renamed, the Item Type template can then be copied, renamed, and modified within the library to create new custom Item Types. The template includes some of the basic properties commonly used in Item Types. The *PayItemNumber* property is required for the quantities tools. Properties such as *Lift, Width,* and *IsLumpSum* are optional and depend on the requirements of the pay item, unit of measure, and Summary Table that the Item Type is intended for. Item Type Property names must match the name format shown here or within other delivered quantity Item Types to be compatible with the quantities tools.

For simplicity, and ease of troubleshooting, it is recommended to create individual Item Types for each non-standard pay item. Custom Item Type names should reflect the name, or an abbreviated version of the name of the associated pay item. Make sure to enter the pay item number in 10-digit BOE format in the Default Value property definition field of the *PayItemNumber* Item Type property. Do not edit any other property definitions.



For pay items with dual units of measure that include LS (lump sum), the Is*LumpSum* Item Type property must be included, and the Default Value should be set to **TRUE**.

Changes must be saved, and the new custom Item Types may be attached to design elements, or appended to features within the local dgn.

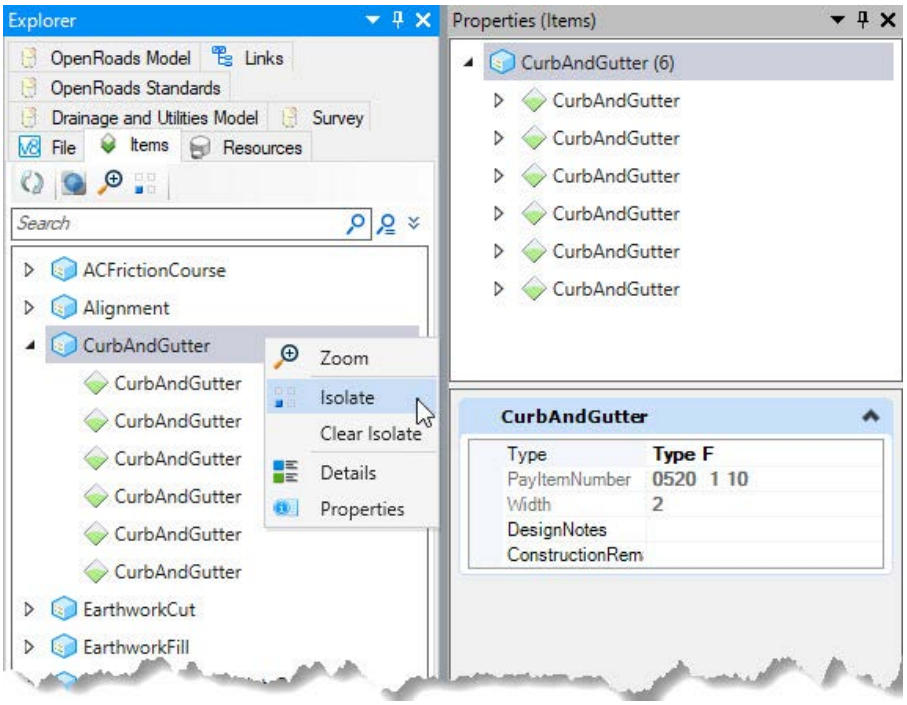
DEFINING ITEM TYPES ASSIGNED FROM FEATURES

Civil Features are recommended for all linear feature drafting and 3D Modeling to ensure that each element is on the correct symbology and that the correct quantity Item Types are applied. The Roadway and Drainage Features are pre-set to comply with **drafting** standards specified by the ***CADD Manual***. If additional Item Types are needed to fully define all pay items associated with an element, they may be applied manually with the **Item Types** tools or Picklists Manager.

Most Item Types that are assigned with Features will need Property Definitions defined in the Item Type Properties. This can be done on individual elements, or with a selection set of elements having the same Item Type.

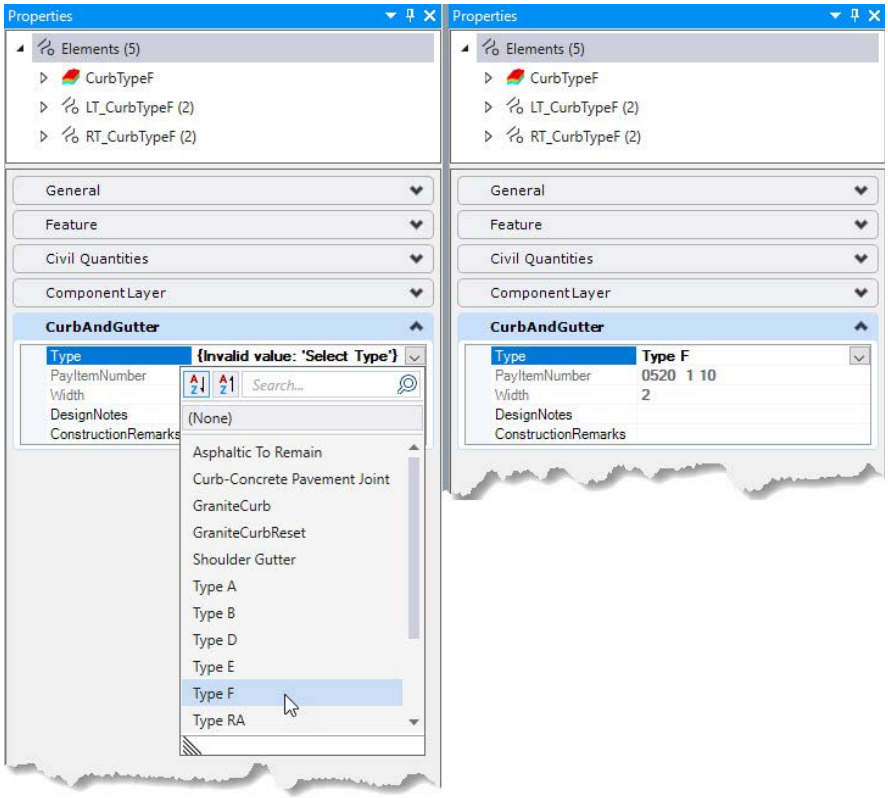
Creating the selection set can be done in many different ways. The Level Display or **Explorer > OpenRoads Standards** can be used to change the displayed elements to show only the elements having the same properties.

The recommended method of selecting and working with Item Types is through the **Explorer > Items** in conjunction with the *Properties* Dialog. If all the elements within the Item Type will not have the same definitions, the isolate option can be used to adjust the display to make it easier to create the selection set.



When the view is adjusted to easily create a selection set of all like-type elements, the Item Type should display in the *Properties* dialog. If all elements in the selection set do not have the Item Type, it will not display in the properties.

Select the correct Type from the picklist to correspond to the design intent of the element. Once the Type is selected, the Property Definition for *PayItemNumber* and any other fields dependent on the Type selection will be populated from the resource files. *Design Notes* may also be added by typing in the Property Definition field.

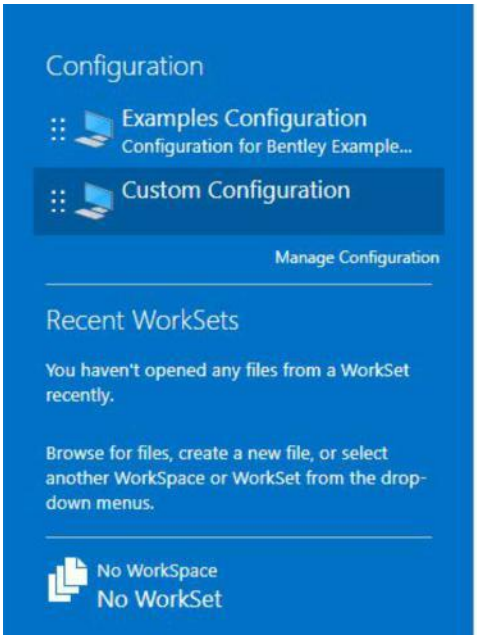


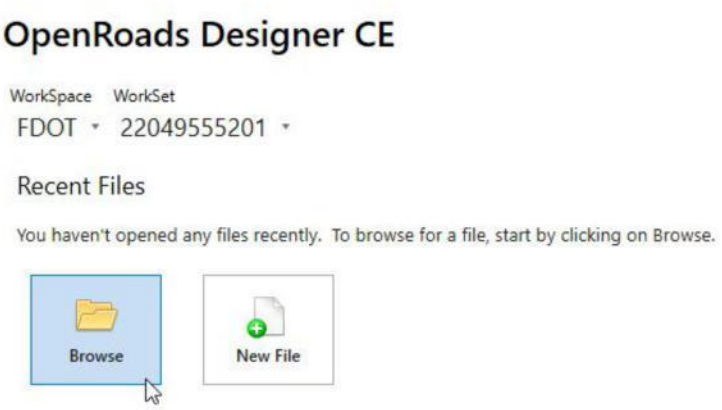
EXERCISE 2.1 *Setting Item Type Properties on 3D Meshes*

This exercise examines the mesh properties of 3D elements in model files and uses the Properties dialog to select and set the Item Type Property Definitions to match the design intent and set the appropriate pay item

1. From the desktop FDOTConnect folder, double-click on the **FDOTConnect for OpenRoads Designer** icon.

2. Select the Custom Configuration option, set the Workspace to FDOT, and the WorkSet to 22049555201. Then click the Browse button and navigate to the project's files.





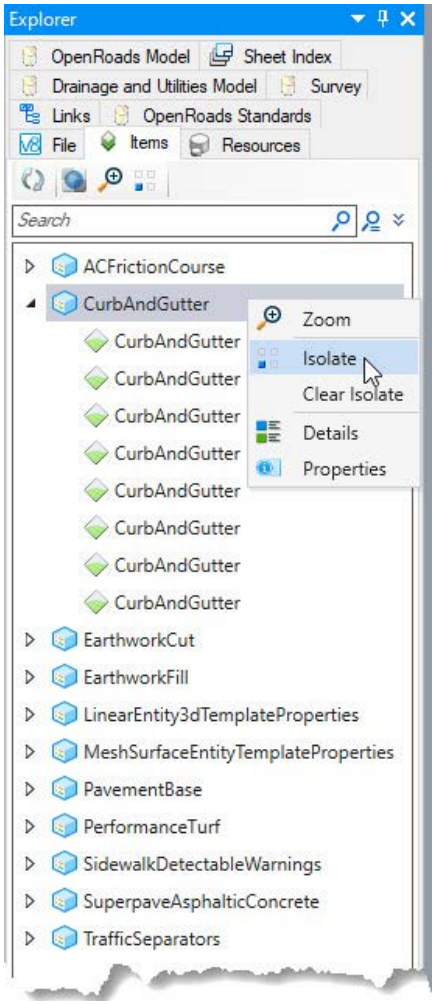
3. Navigate to the C:\Worksets\FDOT\22049555201\Roadway\Training_Files\ Automated_Quantities\ Start\ directory folder. Select all the files in this folder and right click and select copy. Navigate back to the C:\Worksets\FDOT\22049555201\Roadway folder, right click, select paste, and replace the current files. Then select and open the *MODLRDDetail61.dgn* file.

4. Long right-click in the current view to display the context menu. Select **View Control > 2 Views Plan/3D**. Adjust the window sizes and zoom as necessary to best display both views.

5. On the ribbon **Home** tab, in the **Primary** tool group, select **Explorer**, then **Properties**. You may dock these dialogs, if desired.

6. Click in the 3D view to make it the active view, then in the *Explorer* dialog, select the **Items** tab, then expand selections for *CurbAndGutter*.

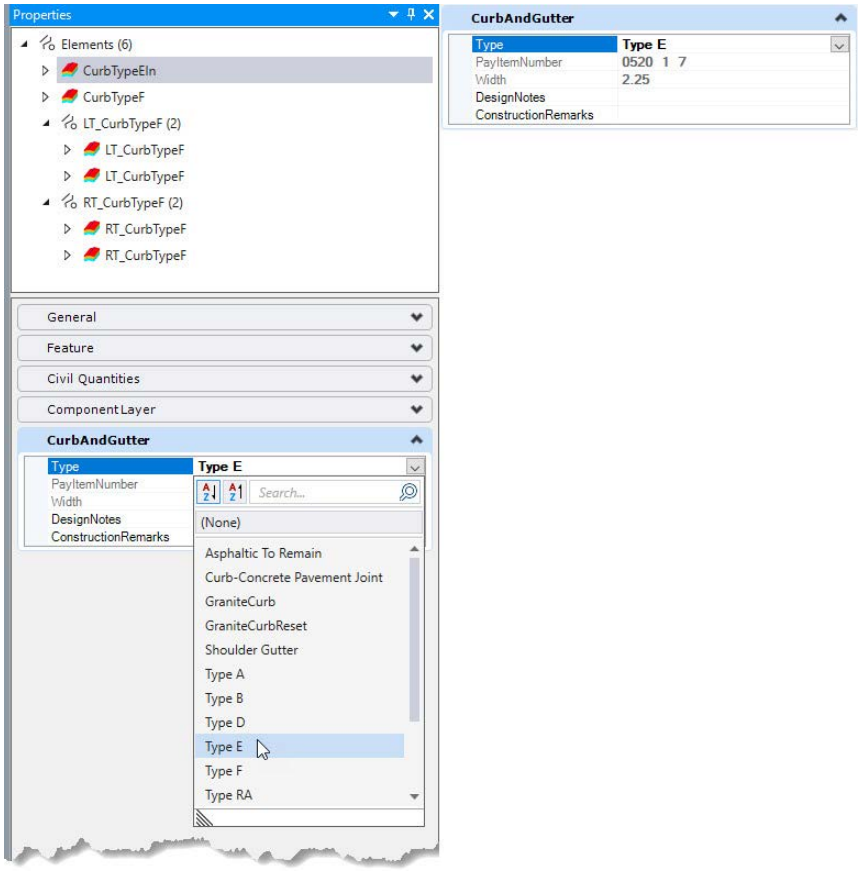
7. Right-click the *CurbAndGutter* Item Type group and select **Isolate**.

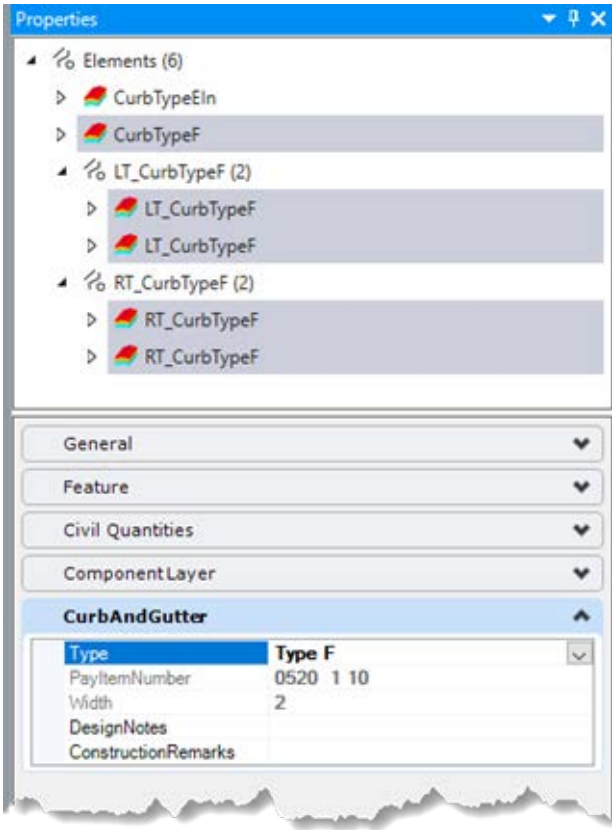


8. Select any curb mesh in the 3D view, then examine the properties displayed in the *Properties* dialog. Notice the Item Type property entry for *CurbAndGutter*. Some item types may already display *CurbAndGutter* properties that are assigned. If, so, open the *References* dialog, and turn off the display of the *MODLRDMainline61.dgn* reference before step 10.

9. Click in the field for the Item Type Property Definition*Type* and examine the drop-down pick list. (If the pick list selection group is blank, open the *Item Types* dialog and verify that the "resource matches library" as shown in the Item Type Basics section of this chapter.)

10. In the 3D view, create a selection set of the curb meshes. The properties should display five elements with a Type F Feature. Click on the **CurbTypeEIn** element in the property list, then in the *CurbAndGutter* Item Type properties select **Type E** from the pick list for the *Type* property definition. This sets the property definition of the Item Type for that element in the selection set. Notice that when the property definition *Type* is set, the *PayItemNumber* and *Width* property definitions are populated with the correct pay item number and the design width of the curb type selected. These property definitions are populated from a separate resource file and cannot be modified in the Item Type.





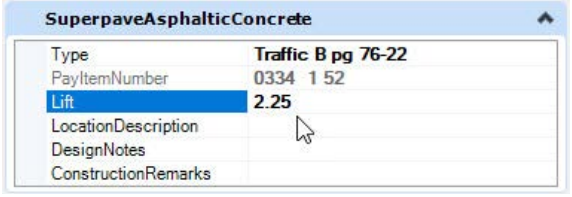
11. Clear the selection set, then right-click on any Item Type or group in the *Explorer* and select **Clear Isolate**.

12. In the **Explorer > Items** dialog, select the *ACFrictionCourse* Item Type group, right-click, and select **Isolate**. Notice that there are no elements displayed. Even though the *Explorer* recognizes and lists the item types that are included in the reference file, they cannot be modified from this file. Select any Item Type in *Explorer*, right click and select **Clear Isolate**.

13. Clear the selection set and select the **Explorer > Items** *SuperpaveAsphalticConcrete* Item Type group and examine the properties. Notice in the *Properties* dialog that the only property shown is the Item Type, not the element properties. The Item Type property definitions for all the elements with that Item Type may be applied by selecting it in this way, without using the *Isolate* option, if no additional QC check is needed and no additional modifications are needed to adjust the selection set of the elements included (i.e., all the elements within that Item Type are assigned the same Type/pay item number).

14. In the *SuperpaveAsphalticConcrete* Item Type property definition for *Type* select the pick list entry for **Traffic B pg 76-22.** This sets the Item Type for all elements in the selection set/Item *Type* group. Verify that the pay item number is populated. Notice that there is a property definition for *Lift*. This property definition is only needed when the Item Type is applied to a 2D element and a numerical thickness value in decimal inches is required to compute the quantity. When applied to a 3D mesh, the 3D volume is used to compute the quantity and the *Lift* value is ignored. Even though it won't affect the calculation here, to ensure that the Item Type properties match the 3D mesh design, enter **2.25** in the *Lift* property definition field.

NOTE ***The property definition name was changed from "Thickness" to "Lift" in FDOTConnect 10.09.01.01 due to a conflict with Bentley element property names. If the Item Type contains a property called "Thickness" and is opened in the current version of FDOTConnect, the Item Type library will need to be updated to match the delivered dgnlib.***



15. Repeat the above steps to set the Item Type property definitions for *Type* as follows:

EarthworkCut – **Regular Excavation**

*EarthworkFil*l – **Embankment**

NOTE ***If the earthwork meshes do not display, make sure the view attributes for constructions are turned on in the 3D view, as earthwork meshes are on a construction level.***

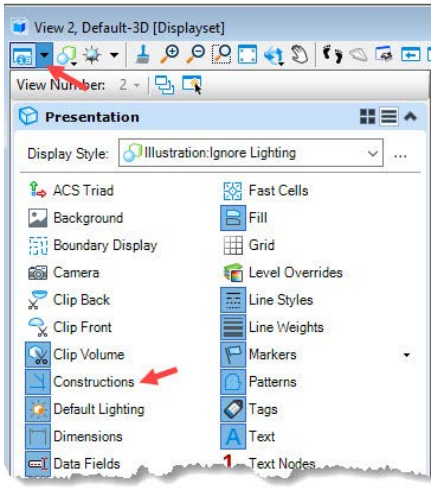
PavementBase – **Optional Base Group 6**

PerformanceTurf – **Performance Turf Sod**

SidewalkDetectableWarnings – **4" Conc SW**

TrafficSeparators – **Type I 4' Wide Opt 1**

NOTE ***Traffic Separator that is placed with a corridor template displays as a single element, even though it stops and restarts along the corridor. The quantities tools will report the true quantity/length of the segments but will only give a single line item with the begin station of the first segment and end station of the last segment. This may be corrected in future versions of ORD, but in the current release, to report separate quantities for each segment requires creating separate template drops for each segment.***



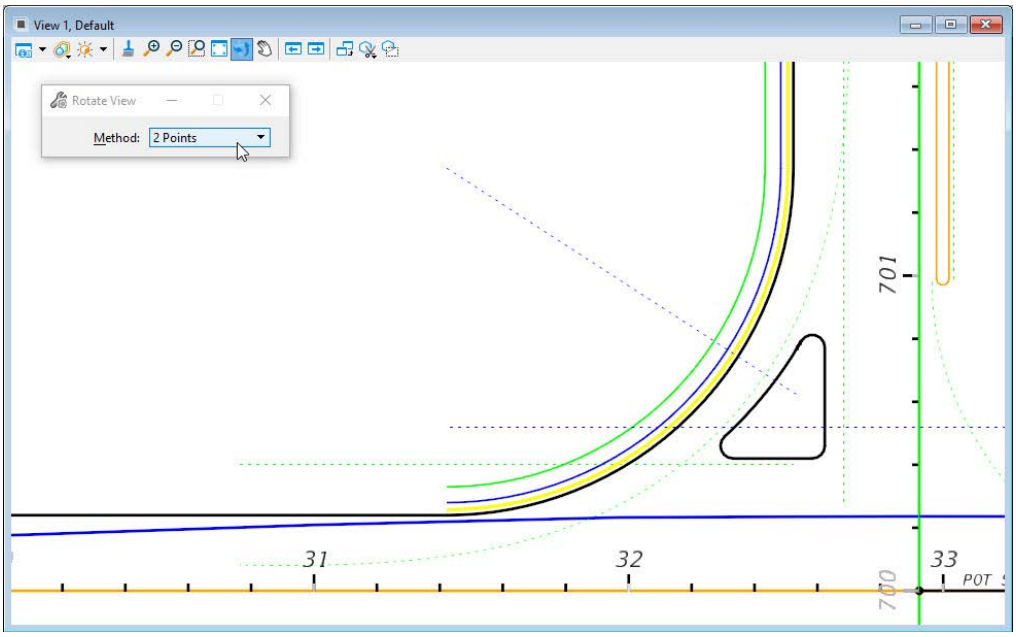
16. Right-click on any Item Type or group and **Clear Isolate** if needed. Save settings.

EXERCISE 2.2 *Setting Item Type Properties on 2D Elements placed with Features*

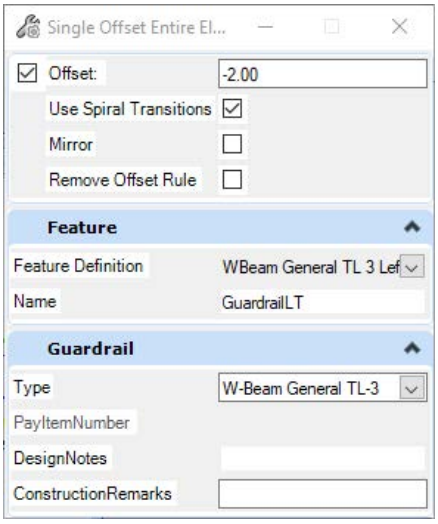
This exercise will use the **Geometry > Offsets and Tapers** tool with the Guardrail Feature active to place a segment of Guardrail in the DSGNRD file, then utilize the **Properties** and **Item Types** tools to set the Property Definitions for the primary Item Type and place a secondary Item Type for a Pipe Rail on the same element.

NOTE ***This project location does not require guardrail. Guardrail placement is for training demonstration purposes only.***

1. Navigate to the C:\Worksets\FDOT\22049555201\Roadway directory folder and locate the *DSGNRD01.dgn*. (This file should have been replaced in Step 3 of the previous exercise.).
2. Fit view then zoom in to the intersection. Rotate the view and zoom to the upper left quadrant of the intersection as shown below.

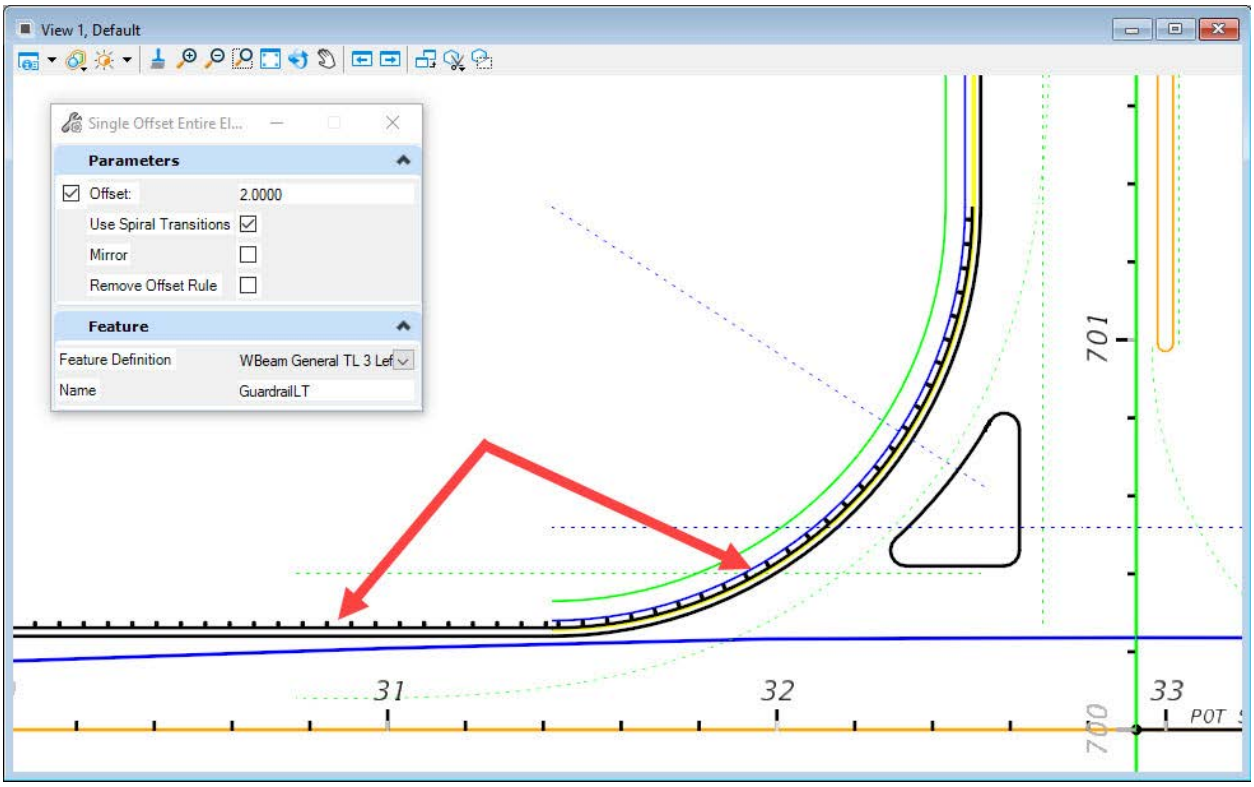


3. On the **OpenRoads Modeling > Geometry** tab, locate the **Horizontal** tool group and use the **Offsets and Tapers** tool set to **Single Offset Entire Element**.
4. In the dialog, set the *Offset* to **2.00** and set the *Feature Definition* to **Linear > Roadway Design > Plan/ Profile 2D Lines > Guardrail > WBeam General TL 3** Right.

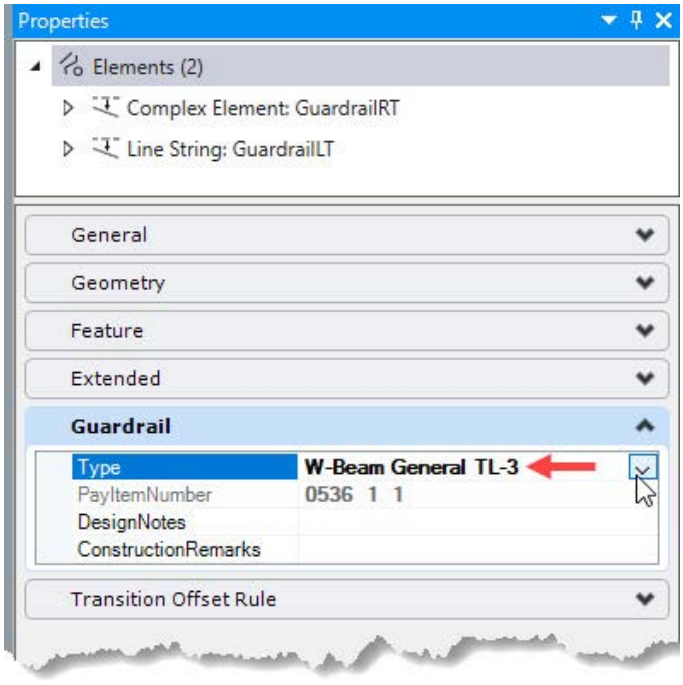


5. Locate the edge of pavement EOPA arc and select it to offset. Drag the cursor to the outside of the pavement and data point/left click to accept each of the settings.

6. Repeat the process with the EOPA line to the left of the intersection along the US98 corridor as shown below. (You may need to change the feature to **WBeam General TL 3 Left**. The guardrail side selected and the direction in which the reference line was placed affects which side of the line the posts are placed on.)

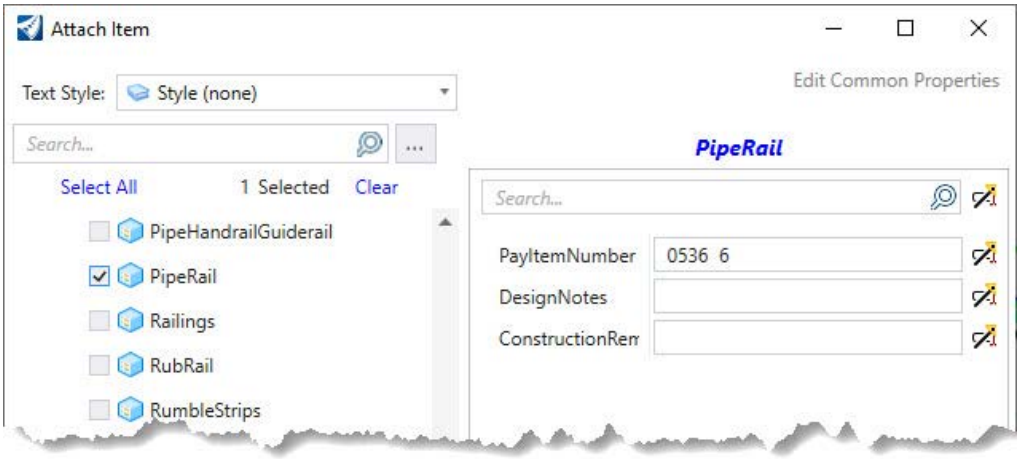


7. Create a selection set of the two segments of guardrail line and examine the properties. Set the *Guardrail Type* to **W-Beam General TL-3**.

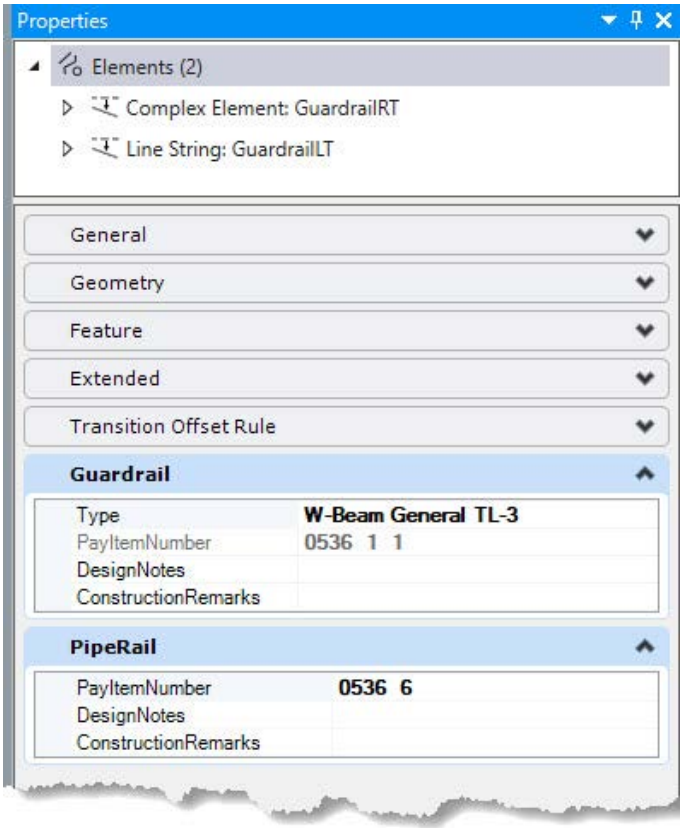


8. With the selection set still active, on the **OpenRoads Modeling > Utilities > Item Types** tool group, select **Attach Item**.

9. In the *Attach Item* dialog, In the Item Types section, select **Roadway Quantities > PipeRail** and data point/left click in the default view to accept and set the Item Type.



10. Select the two guardrail lines again and examine the properties to verify that both Item Types are attached.



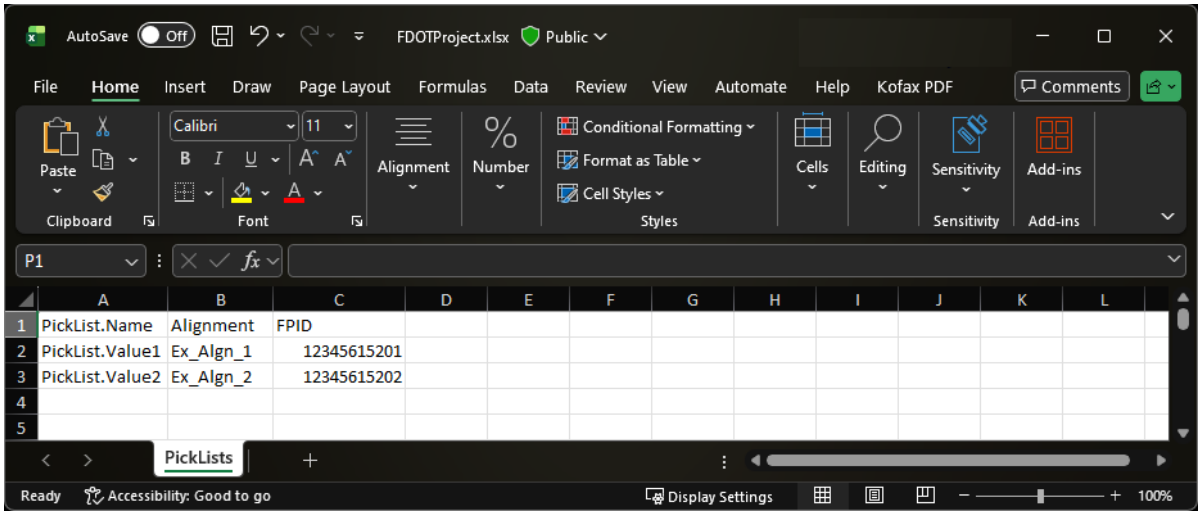
PICKLISTS MANAGER

FDOT's Summary of Quantities Reports must include location information in addition to pay items, the FDOTConnect quantities workflow utilizes Bentley's **Picklists Manager** tools and resources to assign item project-specific Item Types. These Item Types are attached to elements to identify the alignment that should be used to provide station and offset location values for each element to be quantified.

When a new project is created with FDOTConnect, a Picklists template is copied to the project's Symbology folder. This file is named *FDOTProject.xlsx*. If the file is not found, it may be copied from the FDOTConnect2024\Organization-Civil\FDOT\Picklists Manager folder to the project Symbology folder.

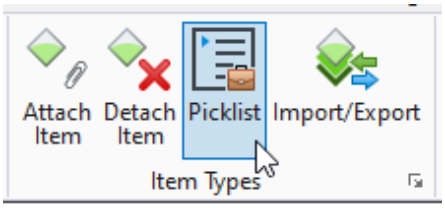
This file may be edited to add the alignment names for the project in the PickLists worksheet tab. Each alignment name should be added to the Alignment column, and the name should match the alignment Feature name exactly. When the Alignment Item Type is placed with **Picklists Manager**, this defines the contents of the Pick List selection.

For projects which have multiple funding sources (also known as sequencing), the sequenced Financial Project numbers may also be defined in this file and the FPID Item Type applied with **Picklists Manager**. When FPID Item Types are attached, the quantity tools are designed to create separate summary tables for each FPID specified as directed in the Basis of Estimates Manual, Chapter 8. If there is no sequencing on a project, the FPID Item Type is not used.

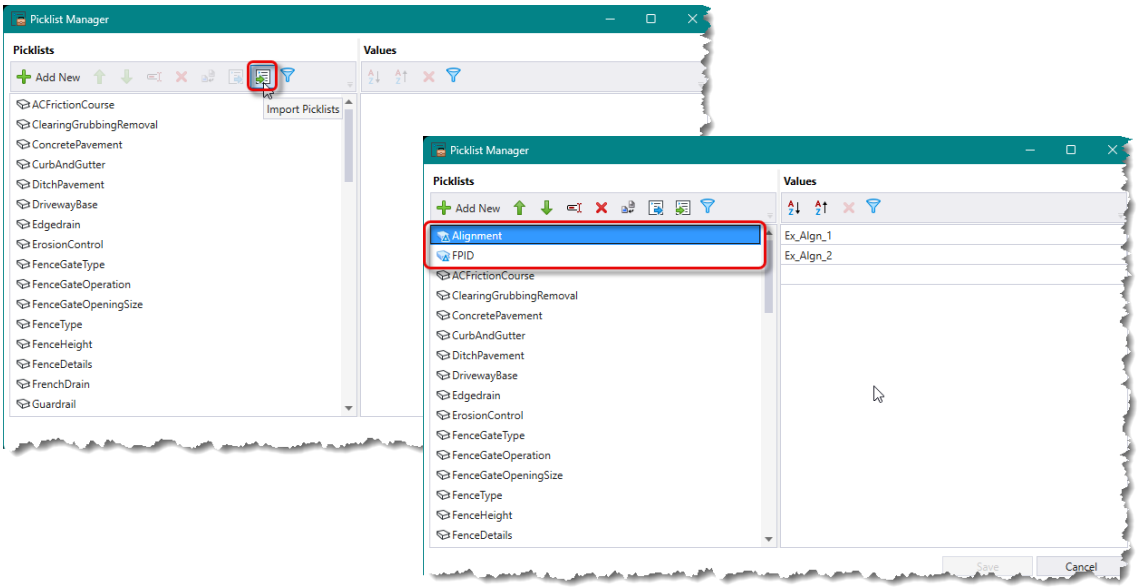


Each row in the PickLists worksheet defines a selection pick list for the associated Item Type. The values in the Alignment column do not correspond to the items in the FPID column.

The **Picklists Manager** tool may be found in the **Utilities > Item Types** tool group.



In the *Picklists Manager* dialog, select the **Import Picklists** button and navigate to the project **Symbology > *FDOTProject.xlsx*** file and click **Open**. The *Alignment* and *FPID* item types will now be added to the *Picklists Manager*.



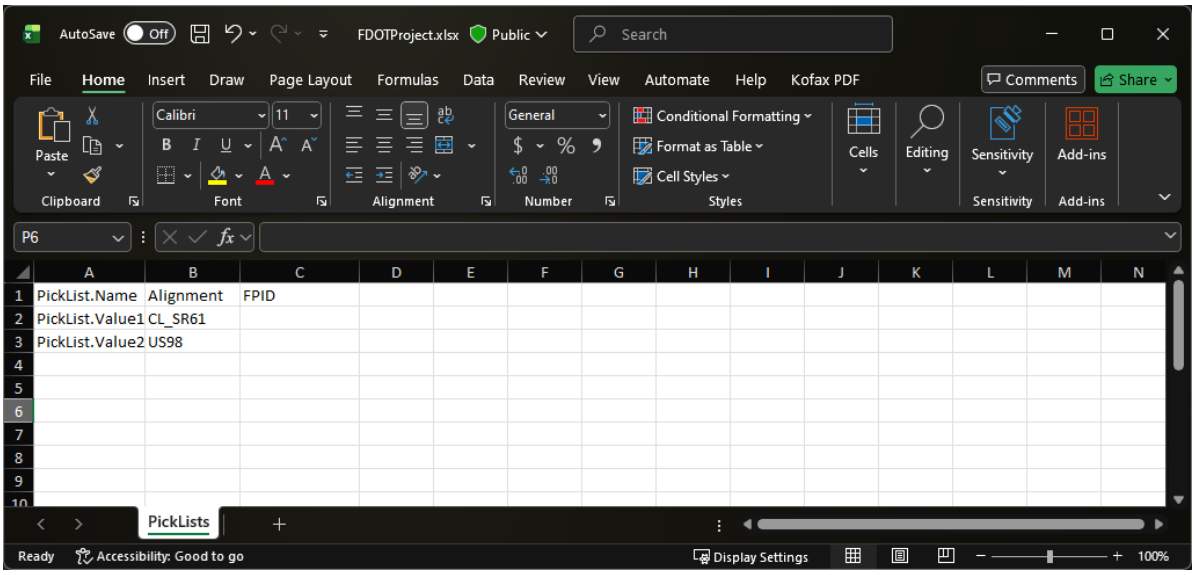
NOTE ***For elements placed with the Traffic Tools that already have an Alignment Property Definition in the Item Type, DO NOT apply the Alignment Item Type. This creates a conflict and will keep the location data from appearing in the Summary Table.***

EXERCISE 2.3 *Placing and Setting the Alignment Item Type with Picklist Manager*

This exercise will use the *FDOTProject.xlsx* file to define the alignment names to match the alignment Feature names for use with **Picklist Manager**. Then **Attach Item** will be used to apply the *Alignment* Item Type to a selection set of quantity elements. Finally, the same selection set may be used to set the Item Type Property Definition through the *Properties* dialog.

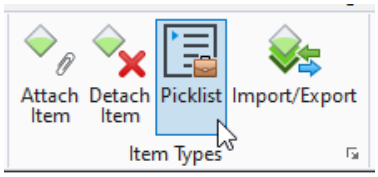
1. Navigate to the C:\Worksets\FDOT\22049555201\Symbology\Training_Files\Automated_Quantities_Start\ directory folder and locate the *FDOTProject.xlsx* file. Right click and select copy, then navigate to the C:\Worksets\FDOT\22049555201\Symbology folder, right click and select paste. Then select and open the *FDOTProject.xlsx* file.

2. In the PickLists worksheet tab, add the values for the project's alignments as shown below. These values must exactly match the Feature names of the alignments in the project.

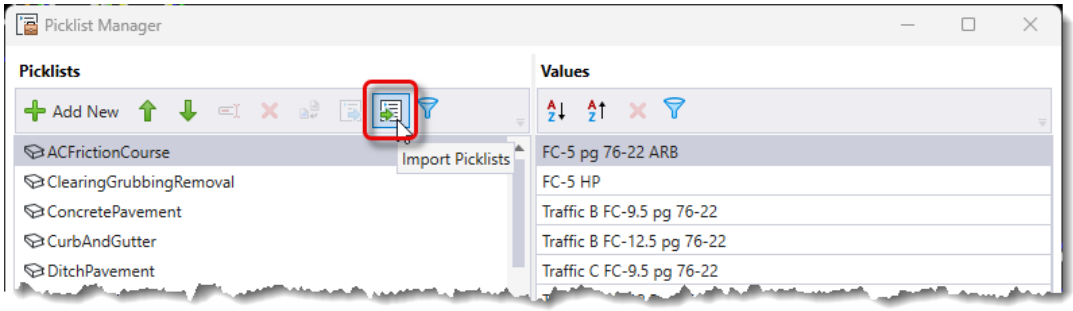


3. Once the values have been added, **Save** and **Close** the file.

4. Continuing in the *DSGNRD01.dgn* file (C:\Worksets\FDOT\22049555201Roadway\), on the **Utilities > Item Types** tool group, select **Picklist**.

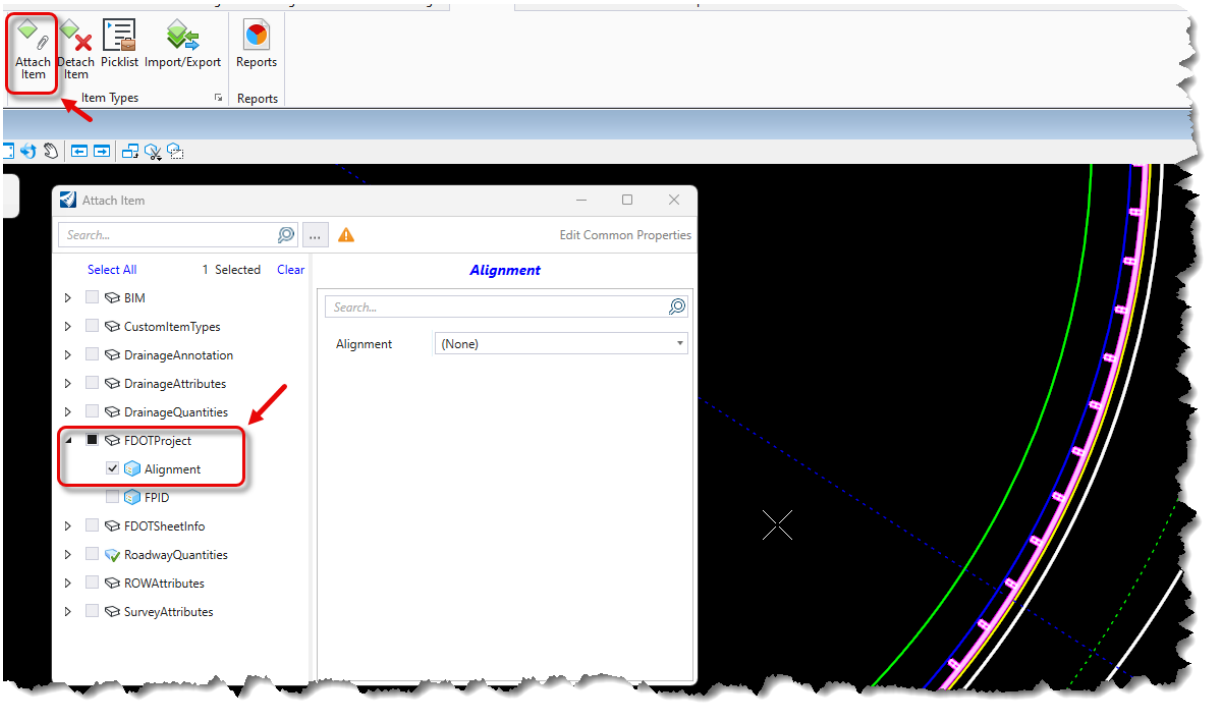


5. In the *Picklist Manager* dialog, select **Import Picklists** and navigate to the *FDOTProject.xlsx* file in the project Symbology folder, and click **Open**.

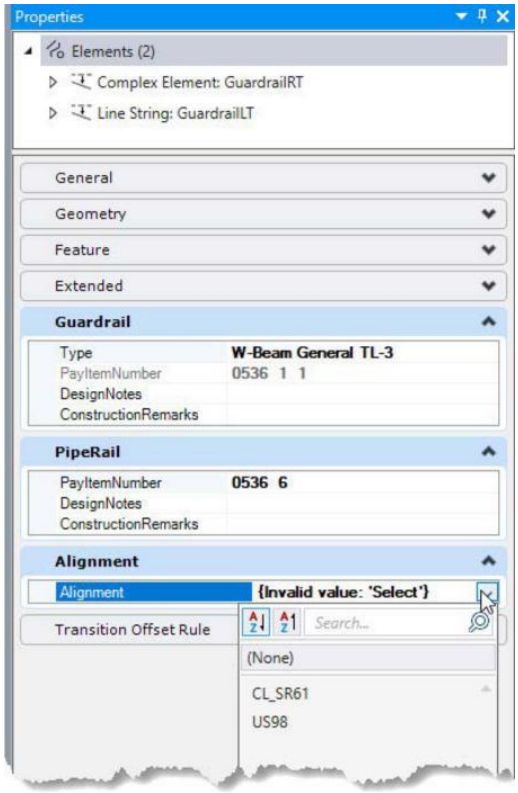


6. In the *DSGNRD01.dgn* View 1, create a selection set of the two guardrail lines created in the previous exercise.

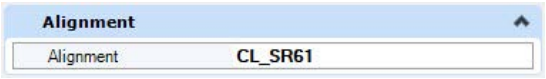
7. Once the selection set is created, open the *Attach Item and* select **FDOTProject > Alignment**, then left click twice in the drawing to accept the selection.



8. Examine the properties of the selection set. There should be an additional Item Type for *Alignment*. The properties groups in this dialog can be collapsed or expanded and you can drag any of the Item Types or property groups up or down in the *Properties* dialog to adjust the list view.



10. Clear the selection set.
11. Select the arc segment of the guardrail and set the *Alignment* property definition to **CL_SR61**.



12. Select the line segment of the guardrail and set the *Alignment* property definition to **US98**.

13. Open the *MODLRDMainLine61.dgn* file in the C:\Worksets\FDOT\22049555201\Roadway\ directory folder from Exercise 2.1.
14. In the *Explorer* dialog, with the 3D view active, select the *Items* tab, then hold the control key and select all the Item Type groups that were set in the previous Exercise. Right click and select **Isolate.** This should display all of the elements in the View 2, Default-3D view that have pay items assigned in their Item Types.
15. Create a selection set of all the elements displayed in the 3D view.
16. Open the Attach Item and select **FDOTProject > Alignment**, then left click twice in the drawing to accept the selection.
17. With the selection set still active, in the *Properties* dialog, set the *Alignment* Item Type to **CL_SR61**.

ITEM TYPES FOR 2D SHAPES

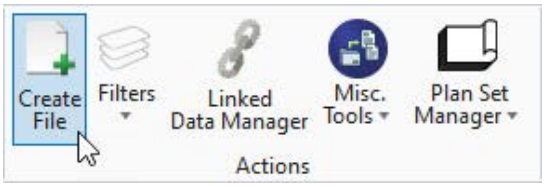
When there are area or volume quantities that need to be defined, calculated, and reported and they are not included in the 3D model, we can still compute those areas from 2D shapes. The QTDSRD is the file used to create the shapes required to calculate 2D area/volume quantities. FDOT recommends the use of models within this file instead of creating a separate DGN file for each pay item and its shapes. Each model is named using the pay item number, BOE 10-digit format or with the use of dashes. Each model should have the Alignment, Design, and Survey files referenced. These references assist with the creation of the shapes needed as well as to provide helpful information for Construction personnel who need to access this file. Do not create shapes for all the 2D area/volume quantities in one model. This makes it difficult for Construction to locate the shapes they need to verify.

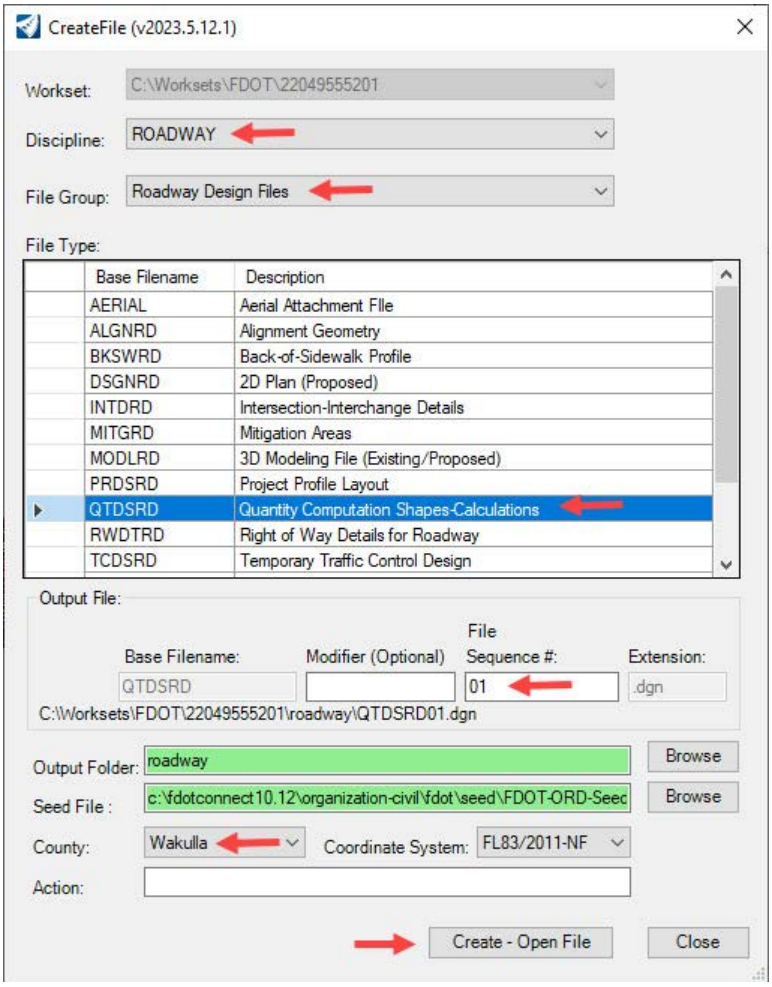
HINT ***To save time, set up the default model with the desired references, and then copy this model to create the additional models needed for the pay item shapes.***

EXERCISE 2.4 *Placing and Setting Item Types on 2D Shapes*

This exercise will create a new QTDSRD file and apply pay item and Alignment Item Types to area shapes.

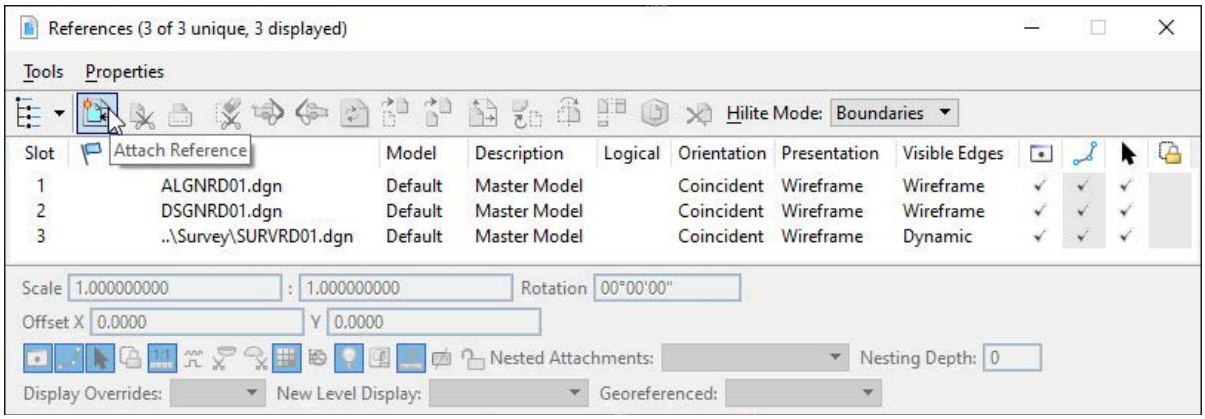
1. Continuing from the previous exercise, in the **OpenRoads Modeling > FDOT > Actions** tool group, select **Create File** and select the QTDSRD file with the settings shown below, overwriting the File Sequence # with 01. Click **Create - Open File** and replace the existing *QTDSRD01.dgn* file.





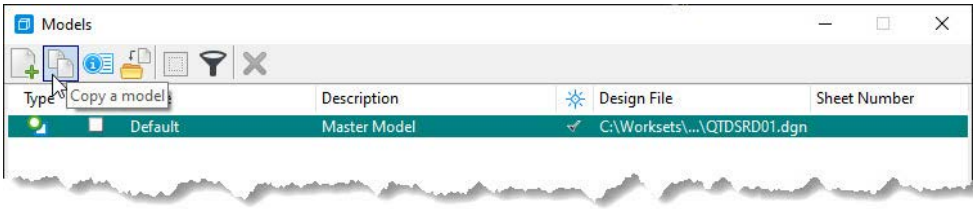
2. In the Default model of the *QTDSRD01.dgn* file, in the **OpenRoads Modeling > Home > Primary** tool group, open the **Attach Tools > References** dialog.

3. From the *References* dialog, select **Attach Reference**. From the …\22049555201\Roadway\ directory folder, attach the ALGNRD01 and DSGNRD01 files, and from the …\22049555201\Survey\ directory folder, attach the SURVRD01 file as shown below.

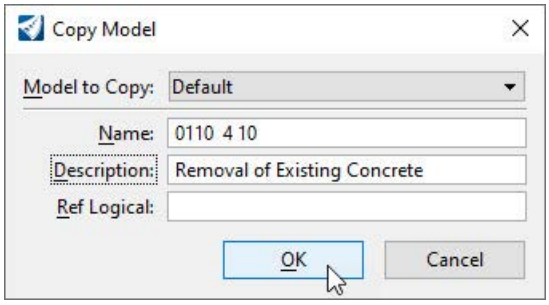


4. In the view tools, select **Fit View**, then in the Quick Access toolbar, select **Save Settings** (or press Ctrl-F).

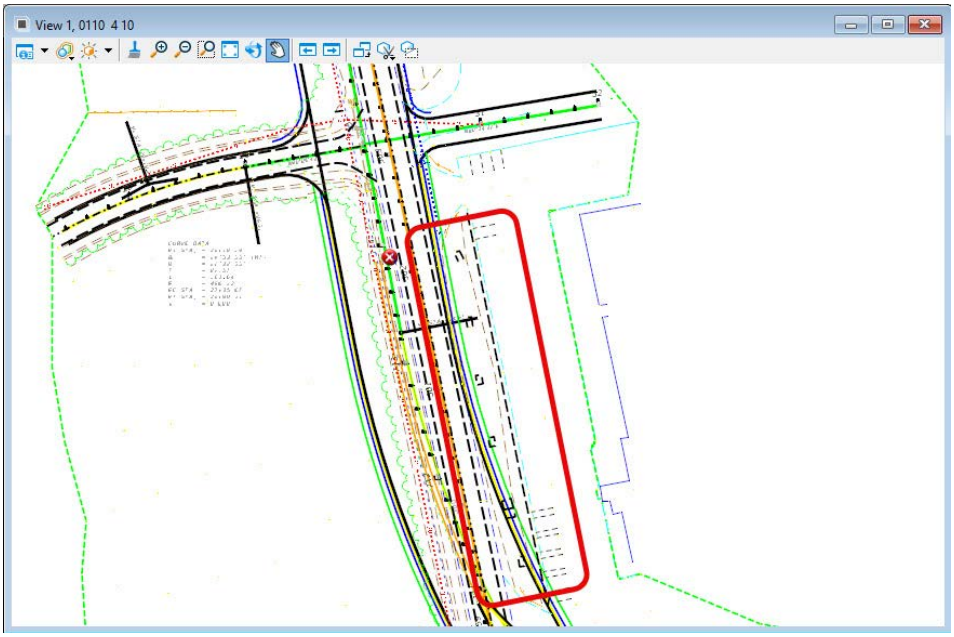
5. In the **OpenRoads Modeling > Home > Primary** tool group, open the *Models* dialog, then select the Default Model and select **Copy.**



6. Change the Name to “0110 [space][space] 4 [space] 10” (to match the BOE format) and set the Description to “Removal of Existing Concrete” as shown below. Click **OK**.

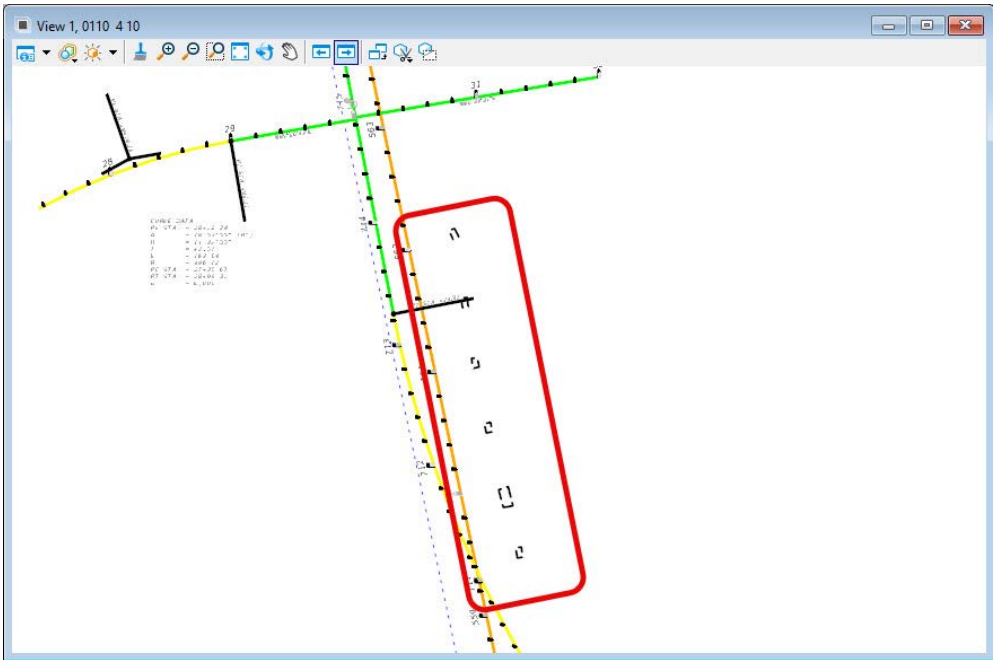


7. In the 0110 4 10 model, zoom to the intersection of the old and new SR61 roads.



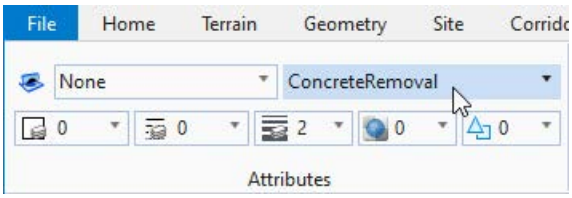
8. On the right side of the roadway, locate the existing planters referenced from the Survey file. For the purposes of this exercise, we will assume that the planters are concrete that needs to be removed for the new roadway. Create a selection set of the 6 rectangular planter shapes and copy them into the active file. (Long right click for the context menu and select **Copy** or locate the **Copy** tool in the **OpenRoads Modeling > Drawing > Manipulate** tool group.)

9. Once the shapes are copied, turn off the Reference displays of the DSGNRD and SURVRD files.

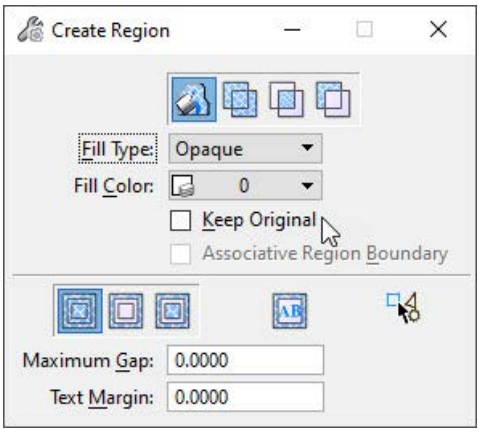


10. In the **OpenRoads Modeling > Drawing > Groups** tool group, select **Create Region**.

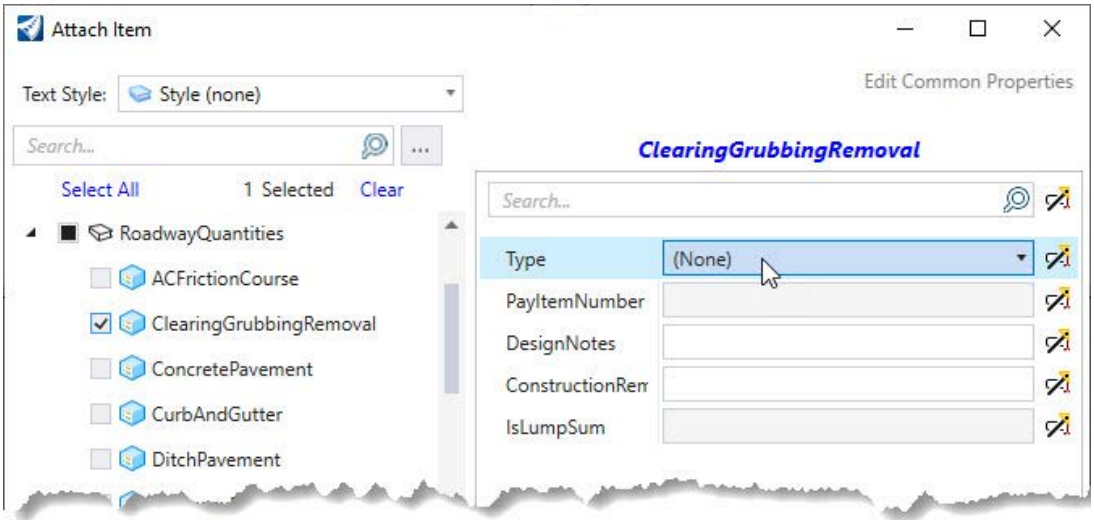
1. In the **Drawing > Attributes** tool group, set the Level to **ConcreteRemoval**.



2. Set the **Create Region** tool to *Fill*, with a *Fill Type* of **Opaque** and do not check *Keep Original*. This will remove the copied shape/level and replace it with the new shape on the ConcreteRemoval level.

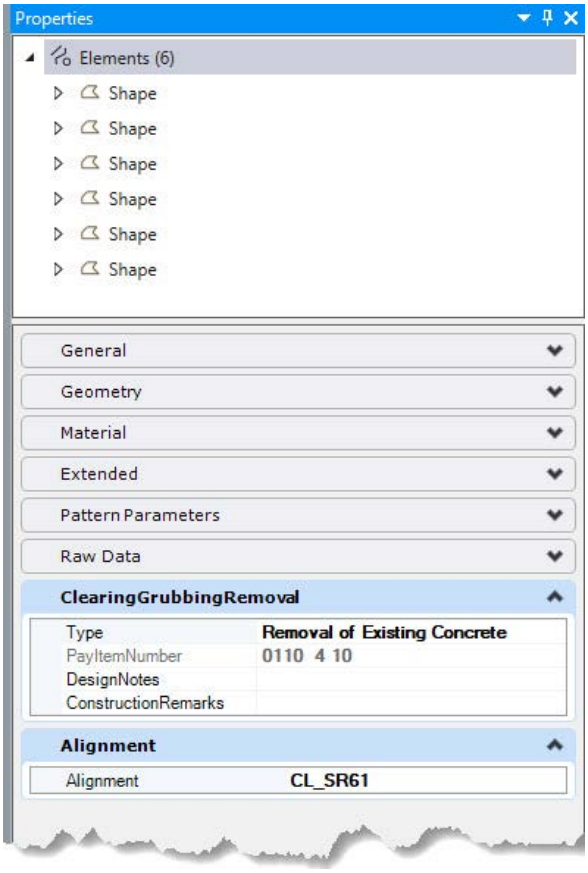


3. Data point/left click twice inside each of the 6 planter shapes to create the new concrete shapes.
4. Create a selection set of the 6 concrete shapes. In the **OpenRoads Modeling > Utilities > Item Types** tool group, select **Attach Item**.
5. In the *Attach Item* dialog, select the Item Type **Roadway Quantities > ClearingGrubbingRemoval**, then left click twice in the drawing to accept the selection.



NOTE ***In ORD 2024, selecting property options or adding property values in the Attach Item dialog may cause the program to crash. To avoid this, attach the item, then set the Item Type properties in the Properties dialog.***

16. In the Attach Item dialog, select also the Item Type **FDOTProject > Alignment**, then left click twice in the drawing to accept the selection.

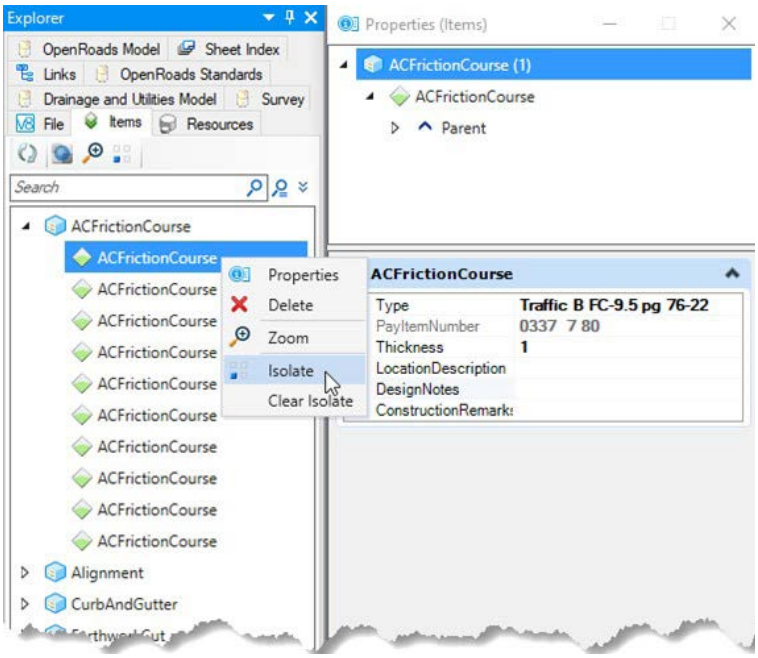


17. Save settings.

LOCATING AND TROUBLESHOOTING ITEM TYPES

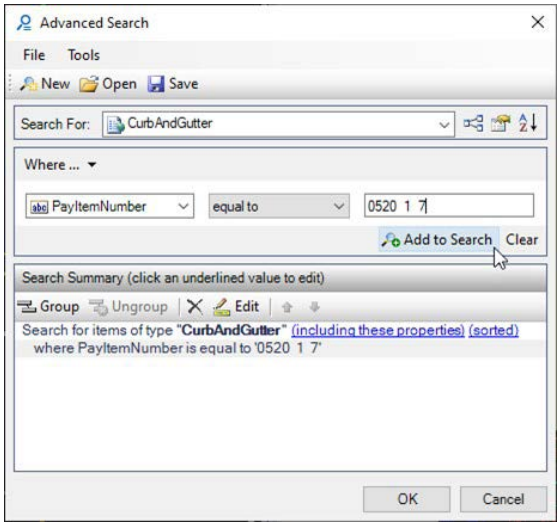
To ensure that all elements have the required Item Types, and that all Item Types are set with the correct pay item information, being able to locate and identify elements that need attention is important. As discussed in previous sections, using the **Level Display** and **Explorer** feature definitions display, along with the element properties are ways that allow us to isolate and examine elements. However, checking the properties on each individual element can be tedious and time consuming.

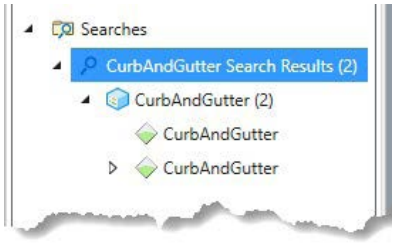
If elements have been placed with features and already have Item Types attached, but not yet set, The **Explorer > Items** tab can be helpful to view and isolate groups of Item Types or individual Item Types.



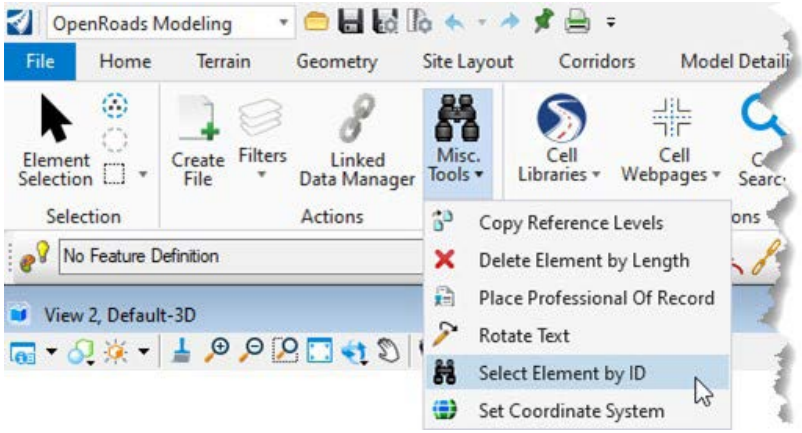
If you need to view a subset within an Item Type, the **Advanced Search** is a very helpful tool. The launch icon for this tool is located at the end of the search bar in the *Explorer* dialog box.

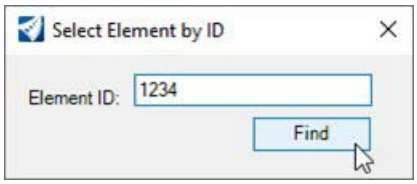
To create a search, select the Item Type in the *Search For* picklist, then set the parameters that will narrow the selection. In the *Where* section, select the Item Type Property Definition from the picklist, then set the rule for what parts to include, then set the value to search for. In the example below, the search is within **Curb and Gutter** to include only the elements where the Item Type's pay item number is equal to **0520 1 7**. Be sure to click **Add to Search** so the parameters appear in the *Search Summary* window of the dialog. Then select **OK** to complete the search. The search results will appear at the bottom of the Item Types List in the **Explorer > Items** dialog.





If the Summary Table shows an element that is missing location data, or needs to be reviewed for accuracy, and the Element ID is known, the **Select Element by ID** tool is a quick way to locate any element. The tool may be found in the **OpenRoads Modeling > FDOT > Actions > Misc. Tools > Select Element by ID**. You must have focus in/activate the correct view for the element (2D or 3D), then select the tool, enter the Element ID# and click **Find**. The element will highlight, and the properties of the element will show in the *Properties* dialog. Once the element is located, be sure to close the **Select Element by ID** dialog to continue examining the element, or before starting any other command.





NOTE ***If you have multiple files referenced, it is possible for the same element ID to exist in different files and this could cause the tool to find the wrong element or malfunction. If this occurs, you may need to re-try the search in each of the referenced files that the element might be in.***

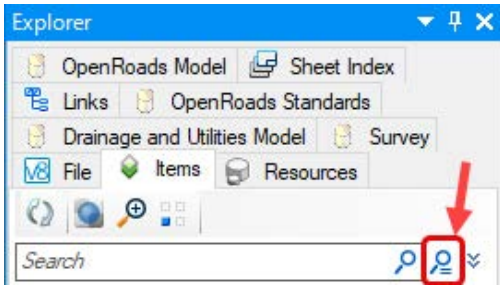
NOTE ***The Select Element by ID tool may not display element properties in FDOTConnect 2024.01.00, but has been fixed in version 2024.02.00 and newer.***

EXERCISE 2.5 *Locating Item Types with Explorer and by Element ID*

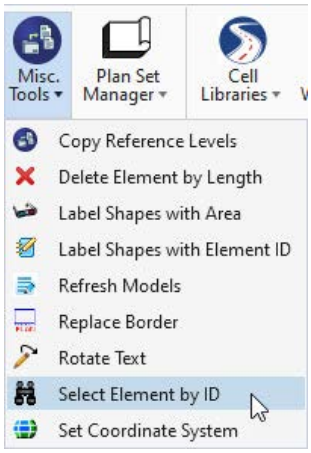
This exercise will use the *Explorer Items* tab to select and isolate groups of Item Types. Then the **Select Element by ID** tool will be used to locate an element within the drawing and examine the *Properties* and Item Types of that element.

1. Open the *MODLRDMainline61.dgn* file in the C:\Worksets\FDOT\22049555201\Roadway\ directory folder.
2. Maximize the 3D view, **Fit View** and zoom to the corridor.
3. In the *Explorer* dialog, select the **Items** tab, and examine the Item Type groups.
4. Click on any Item Type group. Review the properties. In the *Properties* dialog, click through any of the elements within the Item Type group and examine the property definitions of the Item Type.
5. In the *Explorer* dialog, right-click any Item Type group, then select **Isolate**. Notice that the display turns off everything except the group selected. Right click again and select **Clear Isolate** to return the display to its previous state.

7. In the *Explorer* dialog, locate the **Advanced Search** option and select it. In the *Advanced Search* dialog, set the parameters as shown below, making sure to select **Add to Search** so the parameters show in the Search Summary, then click **OK** to perform the search.



6. Long right-click in the current view to display the context menu. Select **View Control > 2 Views Plan/3D**. Adjust the window sizes and zoom as necessary to best display both views.
7. In the Default 2D view, open the *References* dialog and turn on the display for *MODLRDMainline61.dgn* Default 3D model. This should display the 3D shapes in the 2D view.
8. In the **OpenRoads Modeling > FDOT > Actions** tool group use the pull-down to select **Misc. Tools > Select Element by ID**.



9. Enter “2022” then click **Find**. Examine the highlighted mesh.
10. Close the *Select Element by ID* dialog.
11. In the *Properties* dialog, right-click on the ObjectSettingsRule element and select **Isolate**.
12. Click on the highlighted pavement element in the 2D view and review the properties.
13. Right-click on the LT_Pavement FC Outside element and select **Clear Isolate**.

3 SUMMARY TABLES

OBJECTIVES

- Set up the project reference QTDSRD file
- Explore the Quantity Takeoff Manager
- Create and examine the Summary of Quantities table Excel files

QUANTITY REFERENCE FILE

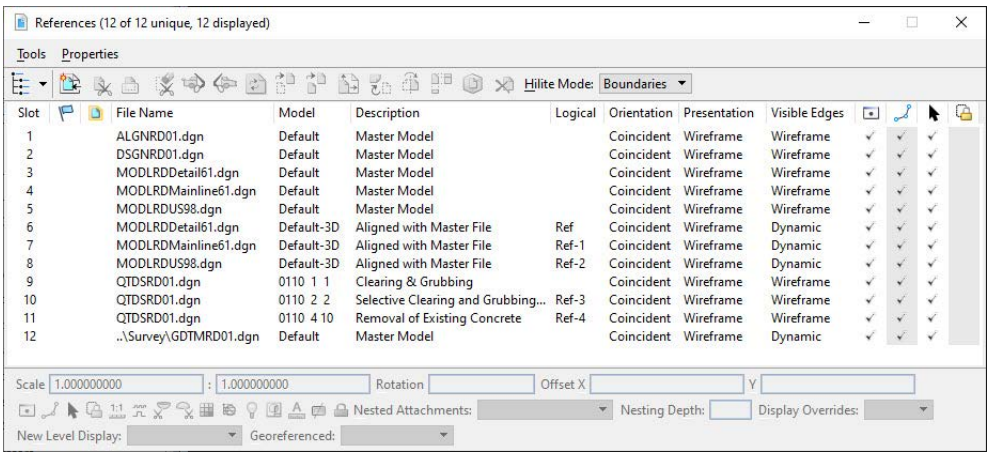
Since Item Types must be assigned to each element in its active file, we may have quantity information that is required for a single table in many different design files. For the FDOTConnect quantities workflow, we will utilize the QTDSRD file to provide a design file in which to reference all the Roadway quantity data to a single location. Note, other design components (i.e., Drainage, Signing & Pavement Marking, etc.) may generate their quantities directly from their design files if all quantity information needed for the component Summary of Quantities table is located in or referenced to a single model.

The combined reference model can be included in the same QTDSRD file as any 2D area/volume models, or it can be in a separate QTDSRD intended only for the quantity references. Whichever file is used, the combined reference model should be clearly labeled so it can easily be located by reviewers or Construction.

EXERCISE 3.1 *Creating the Reference QTDSRD*

This exercise will create a QTDSRD file that includes references of all 2D and 3D Roadway design files and models that contain quantity Item Types.

1. Continuing from the previous exercise, in the **OpenRoads Modeling > FDOT > Actions** tool group, select **Create File**and select the QTDSRD file. Notice that the File Sequence # has incremented. Verify that the output settings are correct, then click **Create - Open File**. Set the File Sequence # to 02.
2. Navigate to the C:\Worksets\FDOT\22049555201\Roadway\Training_Files\ Automated_Quantities\ Complete\ directory folder. Select the *QTDSRD01.dgn*, right click, and select copy. Navigate back to the C:\Worksets\FDOT\22049555201\Roadway folder, right click, select paste, and replace the current file. (This file contains additional quantity shape models to be used in this exercise.)
3. In the **OpenRoads Modeling > Home > Primary** tool group, open the **Attach Tools > References** dialog.
4. From the *References* dialog, select **Attach Reference** and attach the files as shown in the image below. Make sure to attach both 2D and 3D models of each of the MODLRD files and all pay item models of and replace the existing *QTDSRD02.dgn* file. Notice that the GDTMRD file is in the project's Survey folder.

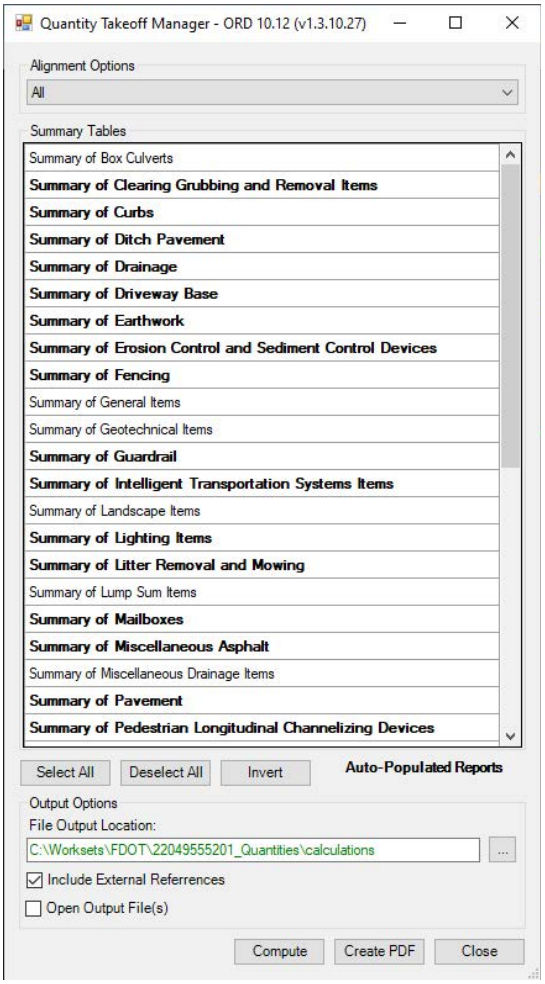


5. Locate the terrain outline, right click - hold for the context menu and select *Set as Active Terrain Model*.
6. Right click and hold anywhere in the Default view for the context menu and select **View Control > 2 Views Plan/3D**, Fit View in the Default and 3D views, and save settings (Ctrl-F).

QUANTITY TAKEOFF MANAGER

Quantity Takeoff Manager is an application created by the FDOT Production Support CADD office for use with FDOTConnect for OpenRoads Designer. This tool generates formatted Excel Summary Tables for all Summary of Quantities that may be included on a project. For select tables, it also harvests information from elements in CADD files including Item Types, Element Properties, and alignment location data, and computes and exports that data to Auto-Populated Summary Tables.

The *Alignment Options* selector may be used to generate tables based on any individual alignment, or all alignments. Since Summary Tables should contain all the quantity data from all alignments on a project, it is recommended to leave the *Alignment Options* set to **All**.



The *Summary Tables* section contains a list of all Summary Tables that can be on a project. All project Summary Tables should be created using this tool. Dark/highlighted items indicate tables which may be auto-populated from the design file element properties and Item Types. Non highlighted items are tables that, once created by the tool, must then be completed by the designer.

Summary Tables may be selected individually, all, none, or invert the current selection with the selection buttons, or multiple tables selected individually by holding the Ctrl key while selecting.

The **Output Options > File Output Location** should default to the project Calculations folder. If it does not, or if sub-folders are used, the path may be redirected as needed using the browse button ...

All Summary Table Excel files from all project components should be stored in the Calculations folder. Sub-folders may be used if necessary, but all files required for the Estimated Quantities Report must be in the same folder.

Since most quantities will be reported from reference files, the checkbox for *Include External References* should always be checked/selected.

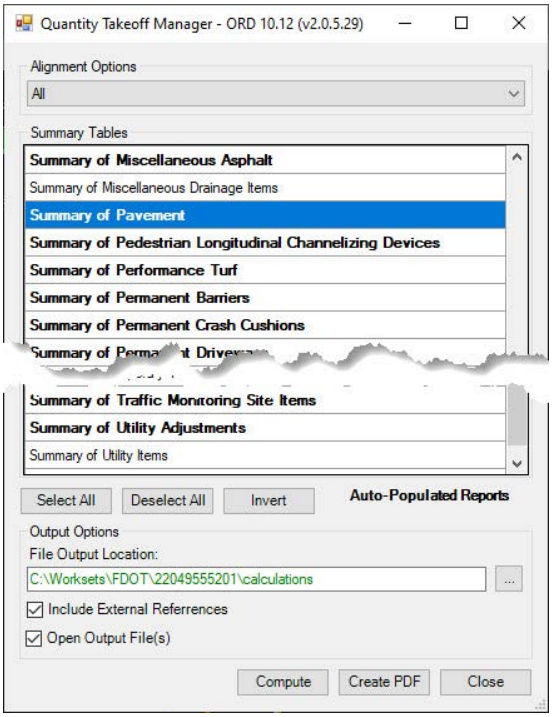
If *Open Output File(s)* is selected, each Excel file created will open a new instance of Excel. If a large number of tables are selected to compute at one time, it is not recommended to leave this option checked.

The **Compute** button will generate the Summary Table for the selected items. The **Create PDF** button launches the Summary Reports Builder that creates the Estimated Quantities Report. This tool will be discussed further in the next chapter. The **Close** button will close the application.

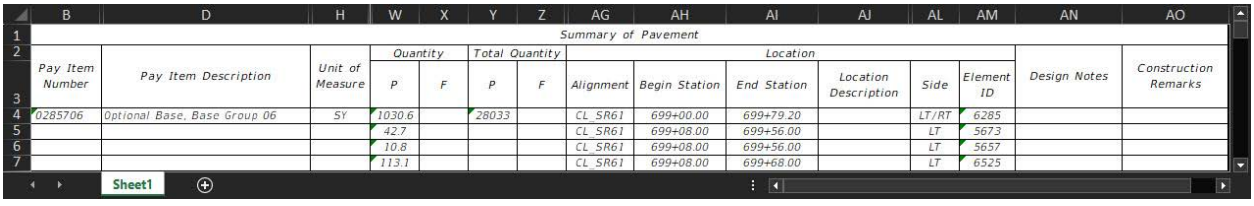
EXERCISE 3.2 *Creating Summary Tables*

This exercise will create an auto-populated Summary of Pavement.

1. Continuing from the previous Exercise, in the *QTDSRD02.dgn* file, make sure that the Default 2D model is active, then on the **OpenRoads Modeling > FDOT** tab, select the **Quantities > Takeoff Manager** tool.
2. In the *Takeoff Manager* dialog, examine the *Alignment Options* to verify that the project's alignments are included in the pull-down list. Leave the selection set to **All**.
3. Click on and highlight the Summary Table **Summary of Pavement**.
4. Verify that the *File Output Location* displays the path to the project's Calculations folder and that **Include** *External References* and *Open Output File(s)* are checked.



5. Click **Compute**, then examine the Excel file. Verify that the Summary of Pavement has the appropriate pay item data.



Summary of Pavement

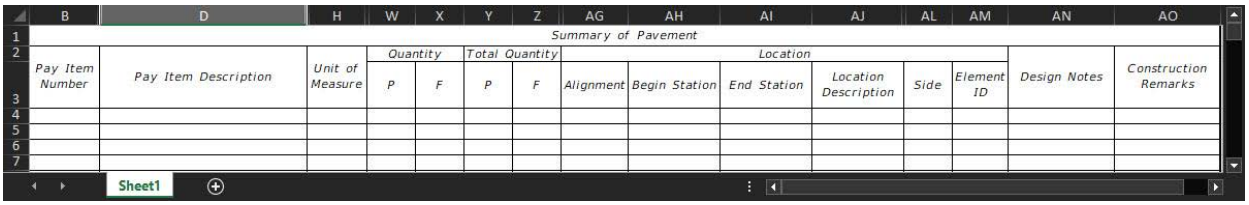
Pay Item Number	Pay Item Description	Unit of Measure	Quantity P	Quantity F	Total Quantity P	Total Quantity F	Location Alignment	Location Begin Station	Location End Station	Location Description	Location Side	Location Element ID	Design Notes	Construction Remarks
0285706	Optional Base, Base Group 06	SY	1030.6		28033		CL_SR61	699+00.00	699+79.20		LT/RT	6285		
			42.7				CL_SR61	699+08.00	699+56.00		LT	5673		
			10.8				CL_SR61	699+08.00	699+56.00		LT	5657		
			113.1				CL_SR61	699+08.00	699+68.00		LT	6525		

Sheet1

6. Close the Excel file.

SUMMARY TABLES

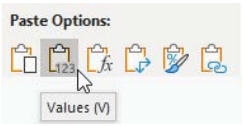
With the introduction of FDOTConnect for OpenRoads Designer, the format of the Summary Tables has been modified from previous platforms. The Summary Tables are all generated from a single master template and follow a consistent format that always has Pay Item Definition information, followed by Quantity Values, Location Information, then Notes and Remarks. The format is not only important for consistency across Summary Tables, it is also critical for the generation of the Estimated Quantities Report.



When Summary Tables are edited by the designer, there are some important rules to keep in mind to ensure that the Summary Table will be compatible with the Summary Reports Builder tool to create the Estimated Quantities Report:

IMPORTANT RULES FOR SUMMARY TABLES

1. Do not add, delete, move, or change any columns within the table.
2. Do not leave any blank rows in the table. Each row must have a value in the Quantity "P" column or the Secondary Quantity "P" column, or the row will be considered the end of the file by **Summary Reports Builder** and any data below that row will be ignored.
3. Supporting documentation may be kept in the same Excel file as long as a different worksheet/tab name is used. Any worksheet not named in "Sheet#" format will be ignored by the **Summary Reports Builder** and will not be included in the final Estimated Quantities Report.
4. Changes in column widths, word wrapping, and text format in the Excel file will not be carried through to the Estimated Quantities Report. The data is read, processed, and reformatted into PDF form by the **Summary Reports Builder**. Because of this, word wrapping and page breaks may occur at different locations in the PDF than what is seen in the Excel file.
5. Any data that is copied from another document should be pasted as "values" so that the formatting of the Summary Table is not altered.



6. All quantity values should be entered with the correct rounded precision as defined in the BOE Chapter 2. Proposed quantities should be rounded to one additional significant digit, and Total quantities should be rounded to the precision shown in BOE 2.1.

NOTE ***Using the Excel cell format to apply rounding will not carry through correctly to the PDF, as the Summary Reports Builder tool reads the cell values directly and does not honor the Excel cell rounding formats.***

7. Do not change the name of the Summary Table Excel file. The **Summary Reports Builder** will only include files with names exactly matching the definitions in the **Quantity Takeoff Manager**. The only exception is that a suffix may be added when a funding sequence FPID or Structure number is needed. In that case, the original filename and table header may be appended with space dash space and either the FPID or structure number (i.e. *Summary of Structure Quantities - 123456.xlsx*).
8. Once a file has been edited, use caution not to create the same table with **Quantity Takeoff Manager**, or the file will be overwritten, and the data lost. If a new table must be created and the existing data preserved, make sure to save the existing file to a different location before creating the new file.

QUANTITY TOOLS FOR NON-STANDARD PAY ITEMS

While there are some Summary Tables that are not automated, there are instances where a pay item is not yet automated, or there is a non-standard or project-specific pay item needed for an automated table that is not included in the FDOTConnect resources. Since the delivered FDOTConnect resources should not be modified by designers, the CADD office has developed some new tools and recommended workflows to assist with populating Summary Tables that contain pay items that are not defined in the delivered FDOTConnect workspace. Extra caution should be used when implementing these workflows to ensure that the pay items and quantities reported are valid and appropriate for the project.

For any valid, open pay item (see the BOE/DQE) that is not currently defined in the FDOTConnect workspace, follow the steps below:

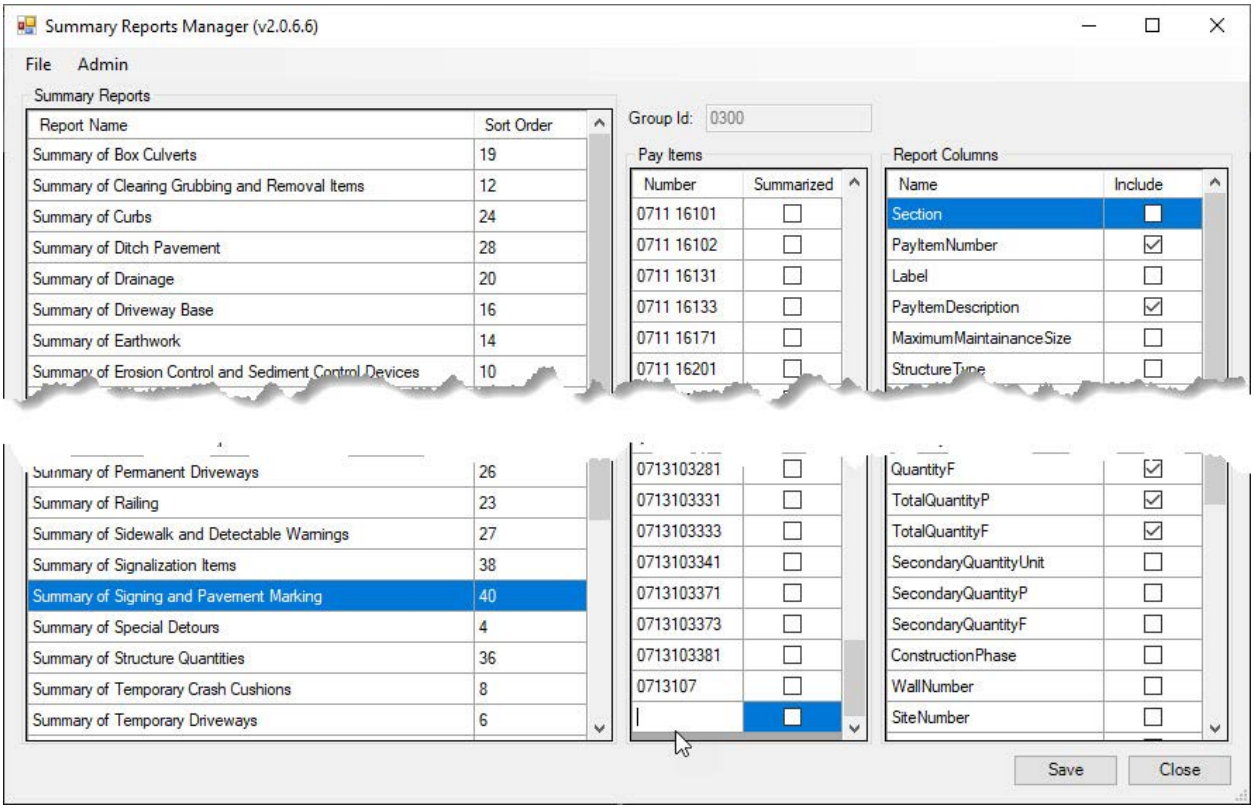
1. Identify the elements that will represent the non-standard pay item.
2. Copy and rename the *CustomItemTypes* Item Type library as shown in Chapter 2. Then copy and rename the *FDOTItemTypeTemplate* and define the pay item for each custom pay item Item Type needed on the project.
3. If the elements to be quantified are 3D meshes, apply the new custom Item Type to each mesh. Otherwise, create a model in the QTDSRD that will contain the 2D shape elements for that pay item number as shown in Exercise 2.4 and attach the new custom Item Type and alignment Item Type.
4. If the pay item number to be quantified was valid and open within the BOE/DQE prior to the most recent FDOTConnect release, use the Summary Reports Manager (see below) to add the pay item number to a local/project Summary Reports Definition for the Summary Table the pay item belongs to. (Refer to the BOE/DQE “Plan Summary Box” section for applicable Table(s)).
5. If the pay item is new, or newly opened, since the most recent FDOTConnect release, in addition to adding the pay item to the project Summary Reports Definition as described above, use the Pay Item Editor to add a local/project compute method definition (see below). This tool/step should ONLY be needed if the pay item was not active/open/valid at the time of the latest FDOTConnect release.

SUMMARY REPORTS MANAGER

When launched, the **Summary Reports Manager** displays the currently defined report definitions, including report names, Group Id, Pay Item numbers, and Report Columns. In default mode (Admin is for FDOT use only), the only field that is able to be modified is the Pay Items group, and only new pay items can be added to the bottom of the list. The summarized box may only be checked on for items such as reflective pavement markers or light poles that are allowed to be shown in the summary tables as a single line item with a summarized total.

Once pay items are added to the correct Summary Reports, selecting **Save** writes a supplemental report definition to the _Meta_Info folder in the active FDOT project folder structure. The **Quantity Takeoff Manager** will then include this data with the FDOTConnect resources to add the defined pay items in the correct Summary Tables.

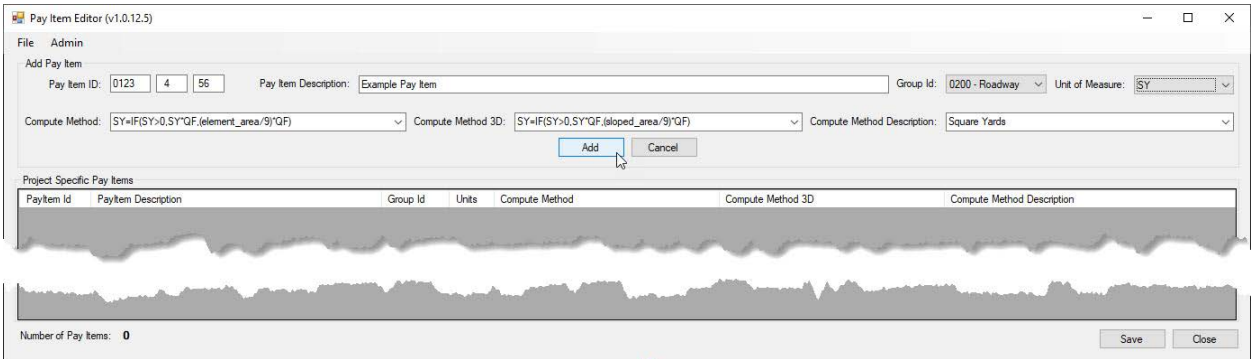
NOTE ***Since the project specific resources are saved to the project’s _Meta_Info folder and must be read by the Quantity Takeoff Manager, if the Takeoff Manager’s Output File Location path does not automatically show up in green when the tool is launched, the tool cannot locate your project and will not be able to load the project specific resources.***



PAY ITEM EDITOR

The **Pay Item Editor** is used to assign a definition and computation formula to a new pay item number that is not already defined in the FDOTConnect resources. When in default mode (Admin is for FDOT use only), it writes a local project specific file that defines the pay item number, definition, and units of measure, which must match the BOE/DQE format exactly (except the Description may be in mixed case text). The *Group Id* can remain **0200 – Roadway**, then the compute methods for 2D (and 3D if required), must be assigned and can be selected from pre-defined options, or manually entered if the correct formatting syntax is used.

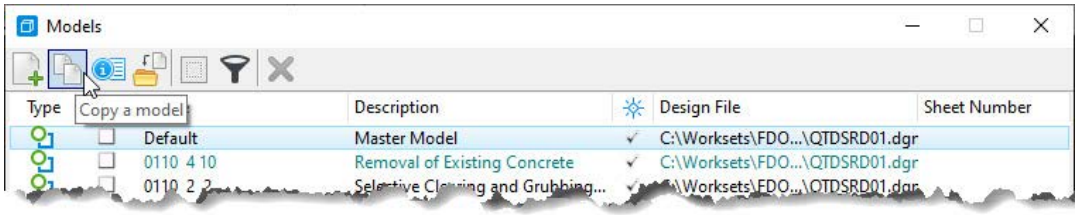
Once defined, click **Add** to add the new pay items to the Project Specific Pay Items list below. Selecting **Save** writes a supplemental Project Specific Pay Items file to the _meta_info folder in the active FDOT project folder structure. The **Quantity Takeoff Manager** will then read this data in conjunction with the project specific Summary Reports Definitions and the FDOTConnect resources to compute the defined pay items quantities.



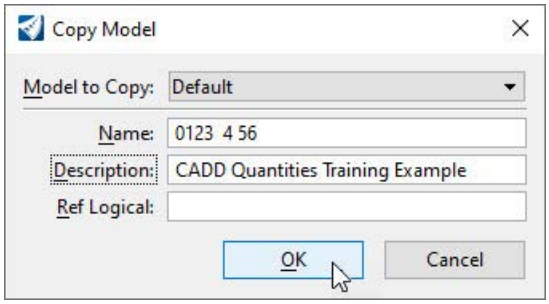
EXERCISE 3.3 *Working With Project Specific Pay Items (Optional)*

This exercise will create a hypothetical Project Specific Item Type, Report Definition, and custom pay item definition.

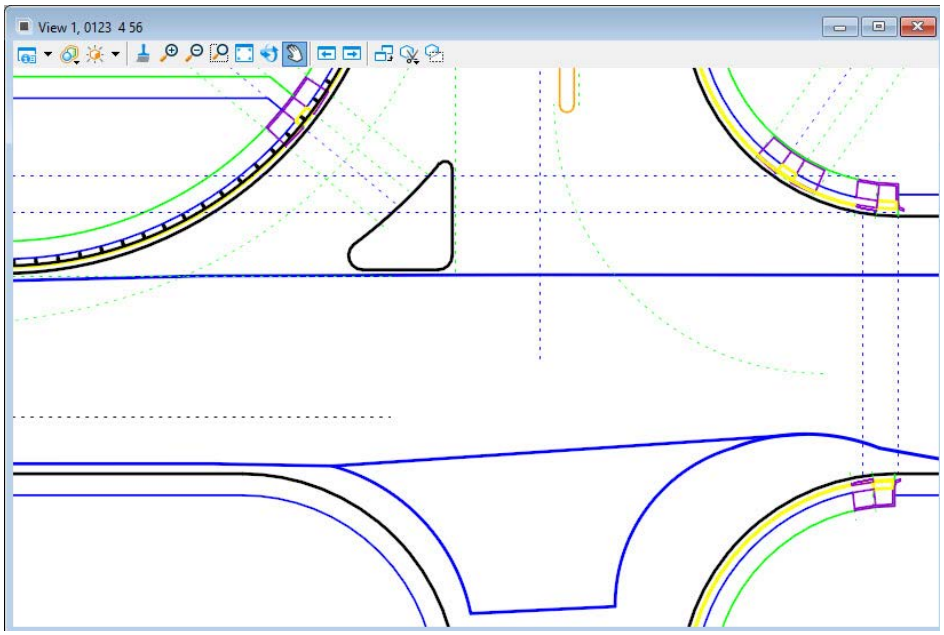
1. Open the *QTDSRD01.dgn* created in Exercise 2.4 (C:\Worksets\FDOT\22049555201\Roadway\).
2. In the **OpenRoads Modeling > Home > Primary** tool group, open the *Models* dialog, then select the *Default* Model and select **Copy**.



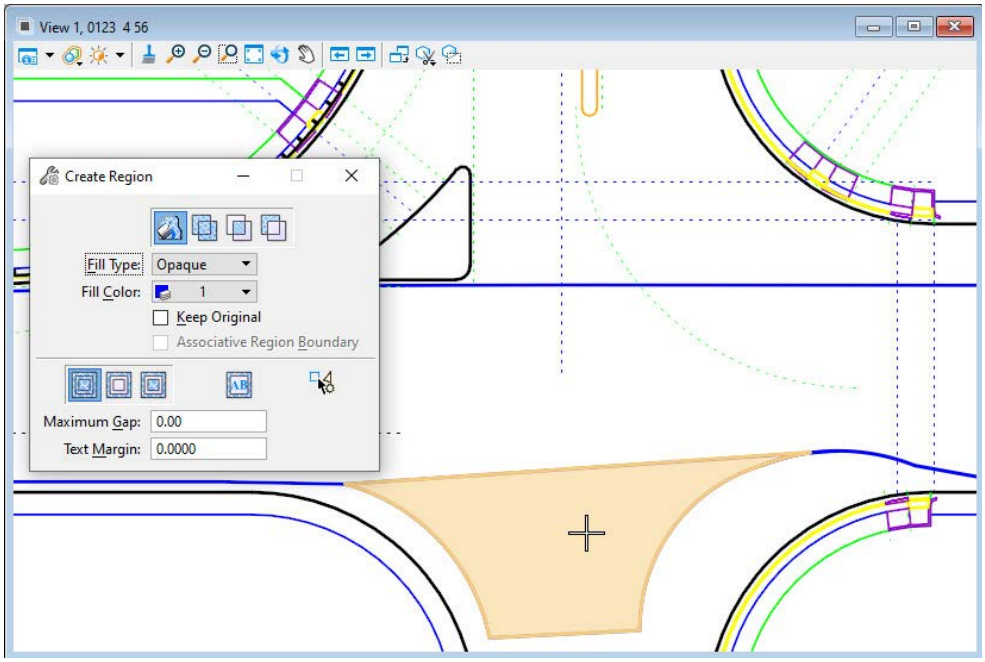
3. Change the *Name* to “0123 [space] [space] 4 [space] 56” (to match the BOE format style) and set the *Description* to “CADD Quantities Training Example” as shown below. Click **OK**.



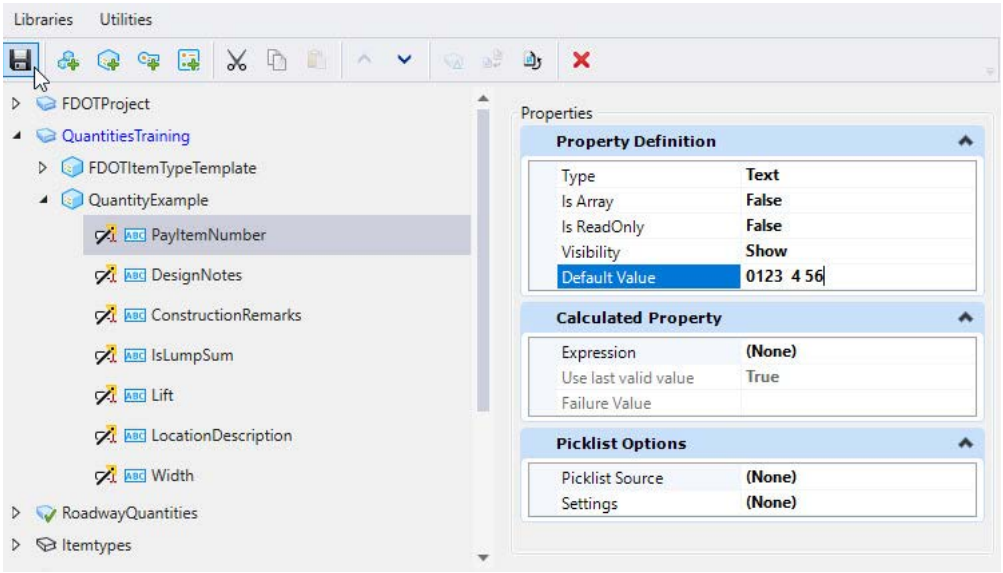
4. Adjust the display to turn off the Survey and Alignment reference displays and rotate the view to display the intersection as shown below.



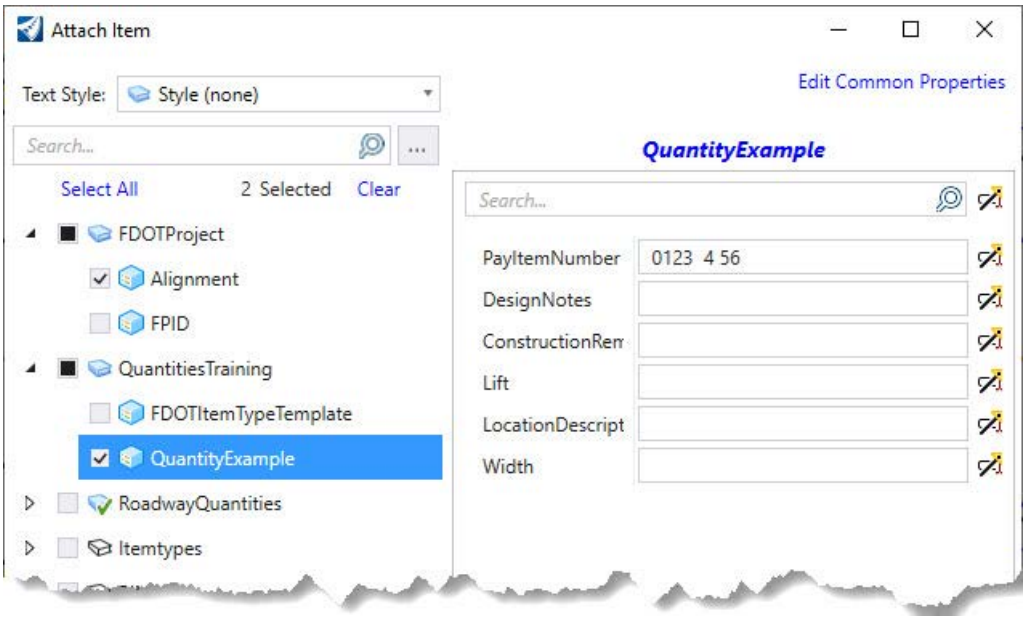
5. On the **Drawing > Groups** tool group, select the **Create Region** tool. For this example, you can leave the level set to ConstLines, but when creating quantity shapes, be sure to set the level to an appropriate level symbology for the item being quantified before creating quantity shapes.
6. Click twice in the enclosed area defined by the PavtMilling lines as shown to create a shape to quantify.



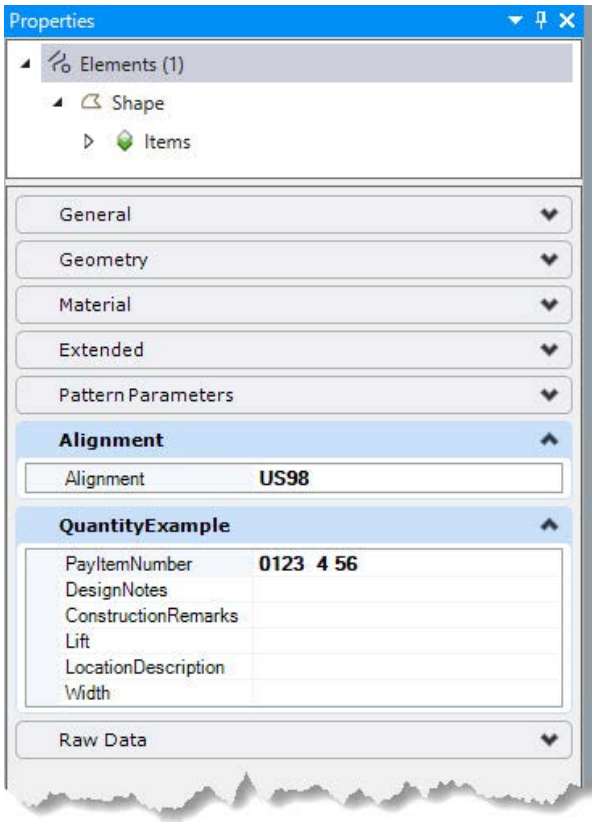
7. On the **Utilities** Ribbon, in the **Item Types** Tool Group, locate the flyout arrow in the bottom right corner of the tool group and launch the *Item Types* dialog.
8. Locate the *CustomItemTypes* library, right-click, and select **Copy**, then right-click again and select **Paste**.
9. Right-click and rename the copy of the library to “QuantitiesTraining”.
10. Click the arrow to expand the new library, then select, right-click, **Copy** the *FDOTItemTypeTemplate*, right-click again and select **Paste**.
11. Rename the Item Type template copy to “QuantityExample”.
12. Expand the *QuantityExample* Item Type, select *PayItemNumber*, then fill in the *Default Value* Property Definition with **0123 4 56**, being sure to use the correct spacing for the pay item format.



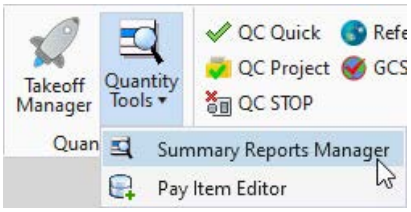
13. Click the **Save** button in the upper left corner of the Item Types dialog box and close the dialog.
14. Select the new ConstLines shape in the 2D view, then select the **Utilities > Attach Item** dialog and navigate to and select the **QuantitiesTraining > QuantityExample** Item Type.
15. Also expand the *FDOTProject* library and check the *Alignment* Item Type.



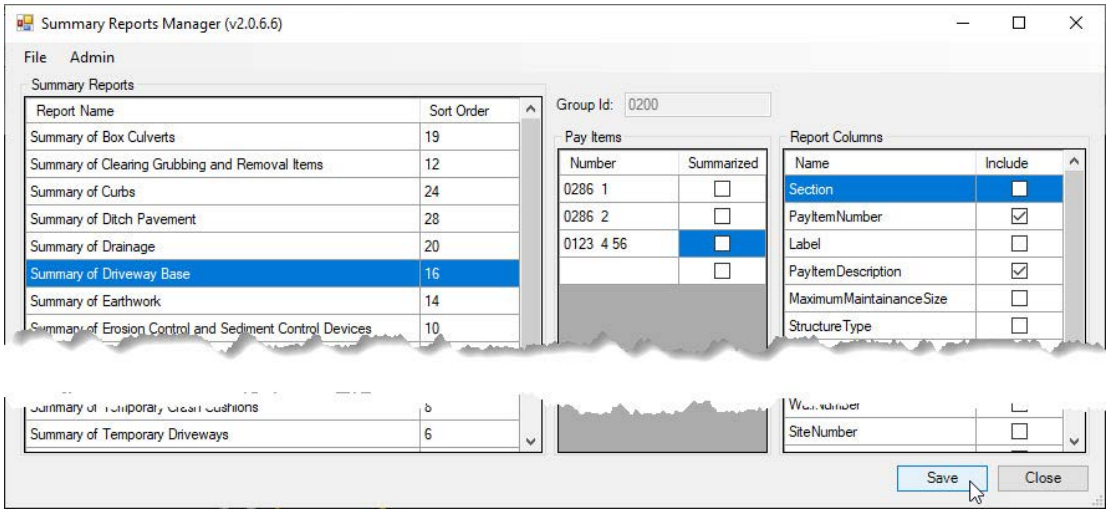
16. Left-click/data point in the 2D view to accept and attach the item type to the shape.
17. Open the *Properties* dialog box and examine the shape properties. Examine the Item Type properties and set the *Alignment* Item Type property to **US98**.

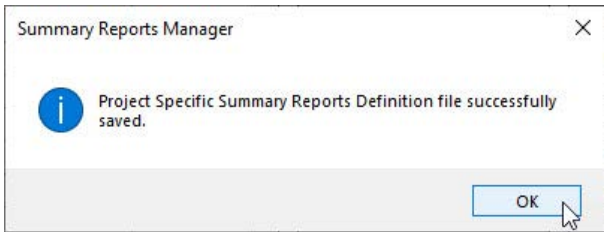


18. Select the **FDOT Ribbon > Quantities > Quantities Tools > Summary Reports Manager**.

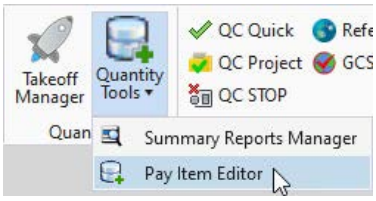


19. In the *Summary Reports Manager* dialog, select the **Summary of Driveway Base**, then click in the next empty row of the *Number* field of the *Pay Items* column and type the **0123 4 56** pay item number and click **Save**.



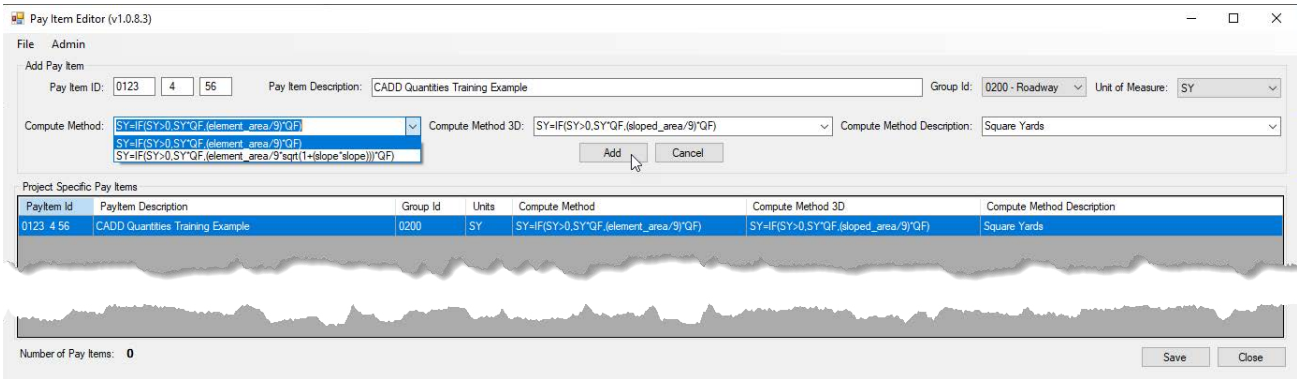


20. Click **OK** in the successful save dialog box. This has saved the project specific report definition in the -Meta_Info folder of the active project. Close the *Summary Reports Manager* dialog.
21. Select the **FDOT Ribbon > Quantities > Quantities Tools > Pay Item Editor**.

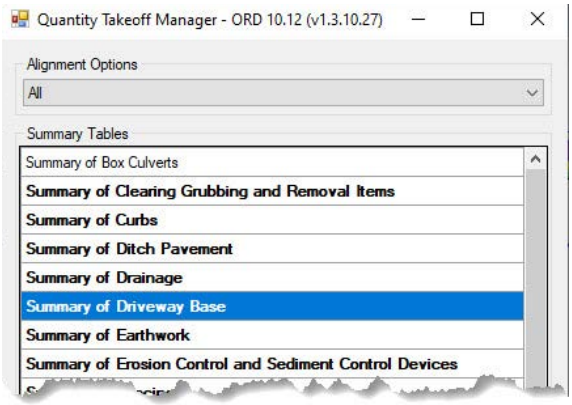


22. Enter the the **0123 4 56** pay item in the *Pay Item ID* section, and **CADD Quantities Training Example** in the *Pay Item Description* section. Select **0020 – Roadway** in the *Group Id* picklist.
23. Examine the options within the *Unit of Measure* picklist, and the *Compute Method / Compute Method 3D* picklists for different units of measure.

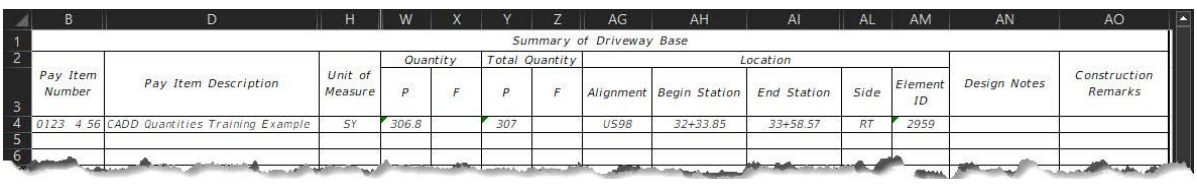
24. Select the **SY** unit of measure. Notice that the *Compute Method, Compute Method 3D, and Compute Method Description* all set to the default definitions for that unit of measure. If other computation methods are defined, they will be available in their respective picklists. (If the pre-defined formulas do not apply to the project specific pay item, please contact the CADD office for guidance on the formatting and syntax to create a new compute method.)



25. Select **Save**, then **Close** the **Pay Item Editor**.
26. Open the *References* dialog, and turn the alignment display on.
27. Launch the **Quantities > Takeoff Manager** and select the **Summary of Driveway Base**, verify that the output location is correct and the I*nclude External References* and *Open Output File(s)* options are checked.



28. Click **Compute**.
29. Examine the Summary of Driveway Base Excel file that contains the newly created pay item definition and quantity.



	B	D	H	W	X	Y	Z	AG	AH	AI	AL	AM	AN	AO
1	Summary of Driveway Base													
2				Quantity		Total Quantity		Location						
3	Pay Item Number	Pay Item Description	Unit of Measure	P	F	P	F	Alignment	Begin Station	End Station	Side	Element ID	Design Notes	Construction Remarks
4	0123 4 56	CADD Quantities Training Example	SY	306.8		307		US98	32+33.85	33+58.57	RT	2959		
5														
6														

30. Close the Excel file.

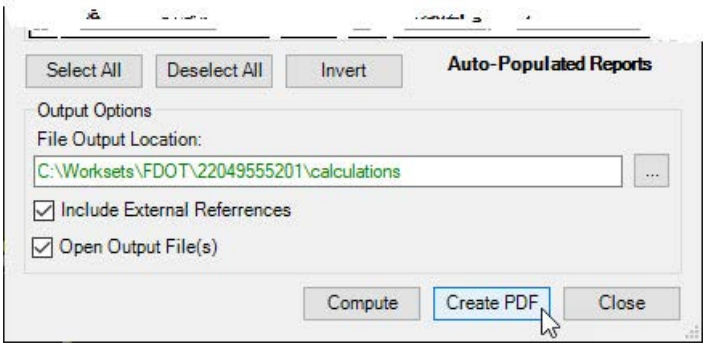
4 ESTIMATED QUANTITIES REPORT

OBJECTIVES

- Examine the Summary Reports Builder Application
- Set up the Estimated Quantities Report Signature Page
- Create and examine the Estimated Quantities Report

SUMMARY REPORT BUILDER

The **Summary Report Builder** is an application created by the FDOT Production Support CADD office for use with FDOTConnect for OpenRoads Designer. This tool generates the Estimated Quantities Report from the Summary of Quantities Excel files generated for all project components by the **Quantity Takeoff Manager**. This application may be accessed either from the Create PDF button within **Quantity Takeoff Manager**, or from a standalone icon delivered in the desktop FDOTConnect workspace folder.

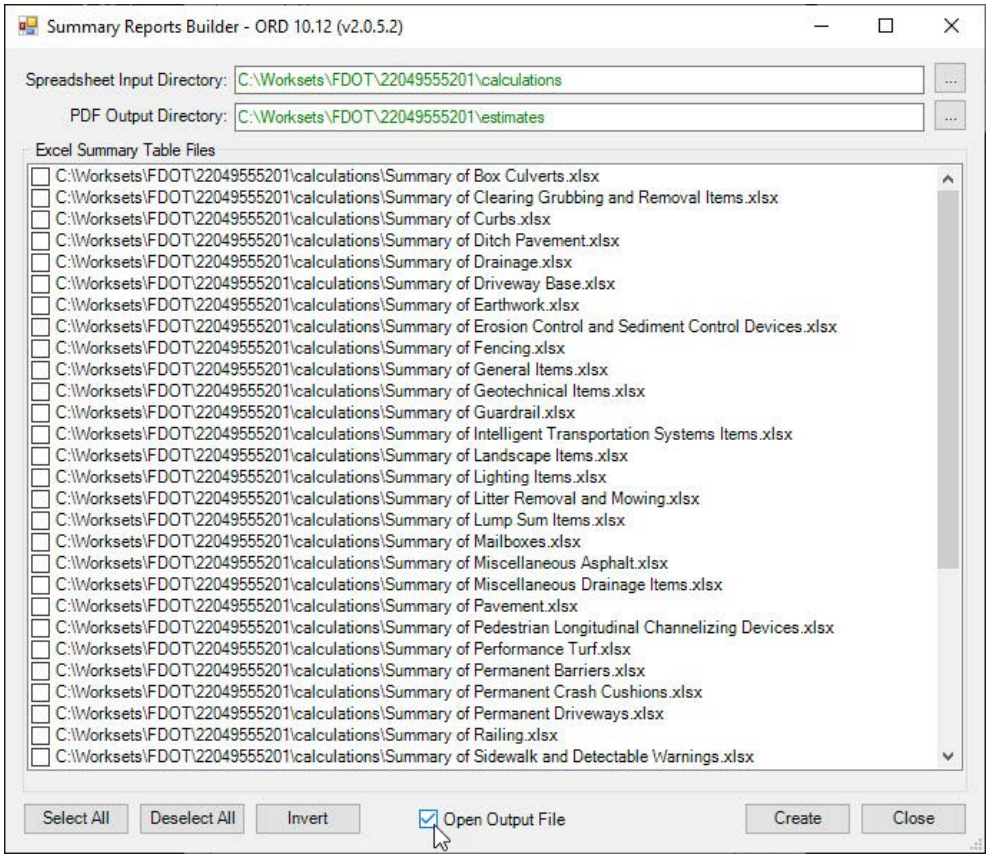


When accessed from within **Quantity Takeoff Manager,** the input and output directories are set by default to the Calculations and Estimates folders of the project, respectively. When opened from the Desktop folder icon, the folder paths to the project must be set to the correct project locations using the browse buttons ...

The *Input Directory* should be set to the Calculations folder, where all the Project Summary Table Excel files are to be kept. When this path is set, all Excel files in the folder with valid Summary Table names should be displayed in the Excel Summary Table Files window.

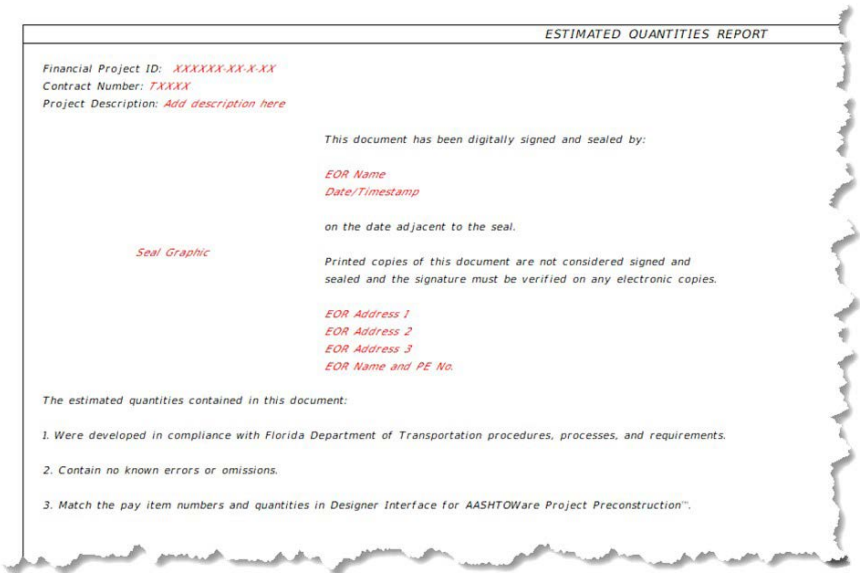
The *PDF Output Directory* should always be the Project Estimates folder, where the Estimated Quantities Report should be kept.

The Excel Summary Tables to be included in the PDF may be selected individually selecting the checkboxes, or by using the selection buttons in the bottom left corner of the dialog box. The checkbox for open output file may be selected to open the Estimated Quantities Report once its created. Once the selections are set, click **Create** to generate the Estimated Quantities Report.



ESTIMATED QUANTITIES REPORT SIGNATURE PAGE

The Estimated Quantities Report requires a signature page that identifies the Project and Engineer of Record date as shown in FDM 902. The FDOTConnect workspace delivers an Excel template for this page that must be completed outside of **Quantity Takeoff Manager** since it does not match the format of the Summary Tables. On new project the template should be in the Project Calculations folder. If the file does not appear, it may be copied from the FDOTConnect \Organization-Civil\FDOT\Asset Manager folder to the Project Calculations folder.


ESTIMATED QUANTITIES REPORT

Financial Project ID: XXXXXX-XX-X-XX
Contract Number: TXXXX
Project Description: Add description here

This document has been digitally signed and sealed by:

EOR Name
Date/Timestamp

on the date adjacent to the seal.

Seal Graphic

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

EOR Address 1
EOR Address 2
EOR Address 3
EOR Name and PE No.

The estimated quantities contained in this document:

1. Were developed in compliance with Florida Department of Transportation procedures, processes, and requirements.

2. Contain no known errors or omissions.

3. Match the pay item numbers and quantities in Designer Interface for AASHTOWare Project Preconstruction™.

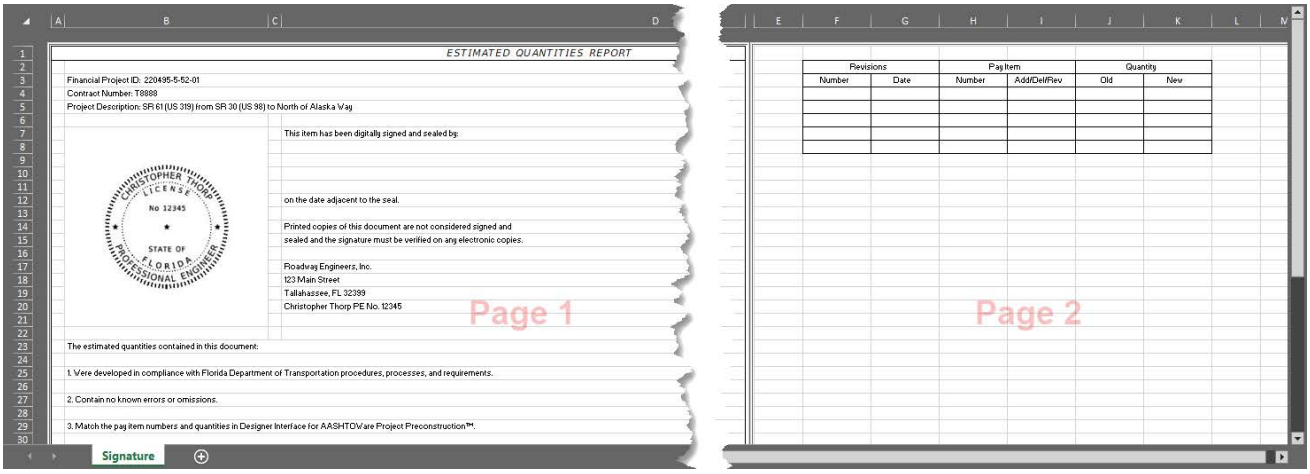
Any text shown in red italics indicates information to be completed by the designer with Project specific information. Once the data is completed, it should be changed to black vertical text to match the format of the other text. The EOR Name and Date/Timestamp text may be deleted as this indicates the location where the digital signature should be placed.

The seal graphic may be generated using the project *Seals.cel* file to print a .jpg image of the EOR's seal that can be inserted into the table cell.

Once the Excel *EQRSignature.xlsx* template is completed and saved, select **File > Save As** and change path to the Estimates folder and the file format to PDF

If the file *EQRSignature.pdf* exists in the Estimates folder, the **Summary Reports Builder** will find it and include it as the first page and bookmark in the Estimated Quantities Report. If the file is not in the Estimates folder, or does not have the correct filename, the page will not be included.

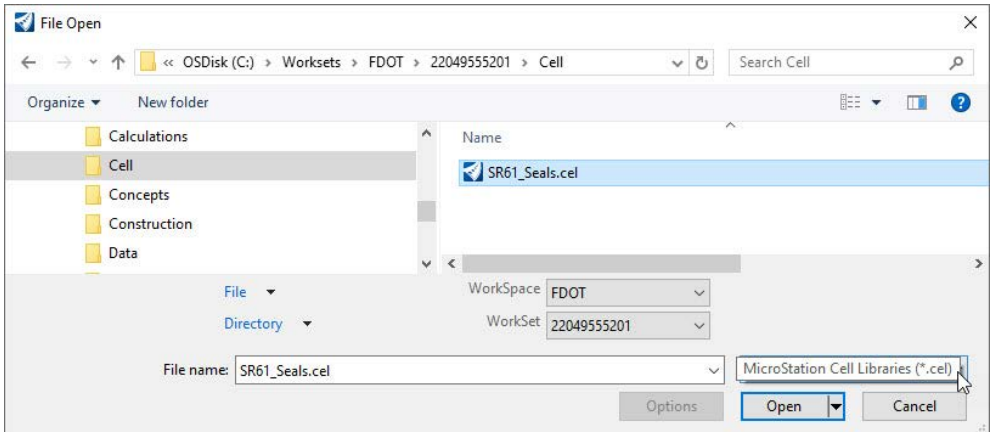
Whenever EQ Report revisions are required prior to letting of a project, you may add the revision block shown in FDM 132.4 to the EQRSignature files as shown below. It will add a second page to the *EQR-Signature.pdf* and the signature pages will be included in the EQ Report with the correct bookmarks, page numbers and date/timestamp.



EXERCISE 4.1 *Creating the Estimated Quantities Report Signature Page*

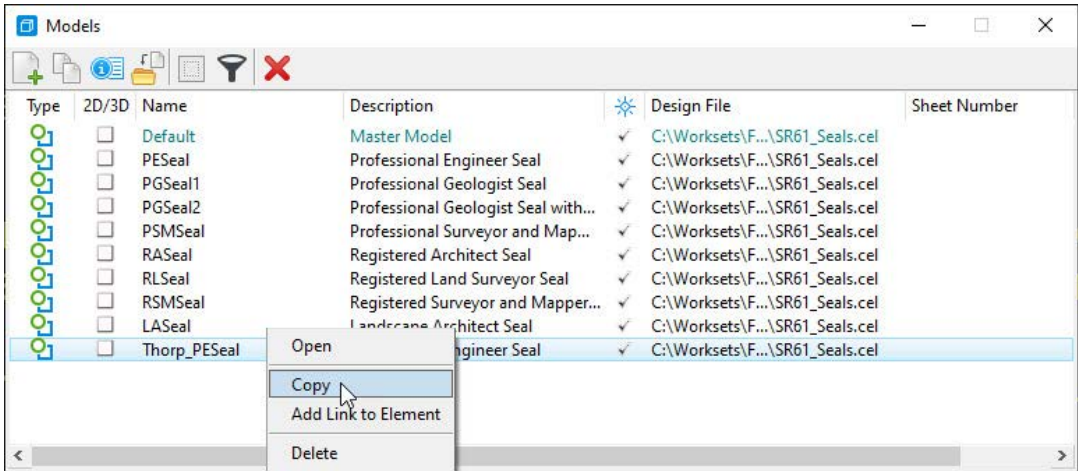
This exercise will generate the EOR Seal image from the Project *Seals.cel*, complete the *EQRSignature.xlsx*, and save the *EQRSignature.pdf* file in the Project Estimates folder.

1. Open the *Seals.cel* file in the C:\Worksets\FDOT\22049555201\Cell\ directory folder. Be sure to change the file format to .cel files.

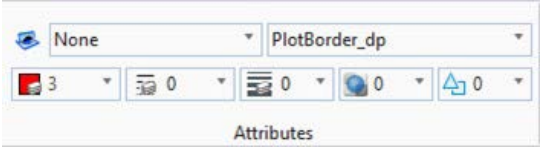


2. Open the **OpenRoads Modeling > Home > Primary** tool group, open the *Models* dialog.

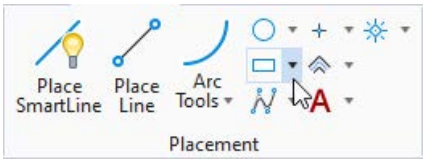
3. Right-click on the **Thorp_PESeal** model and select **Copy**.



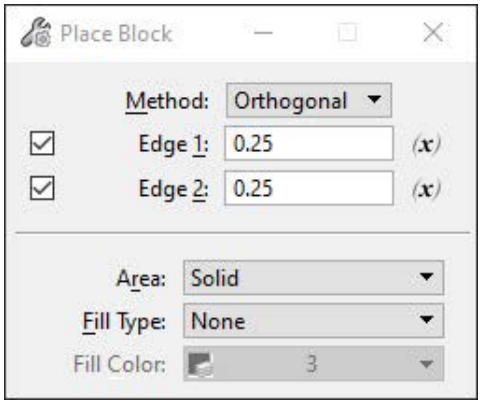
4. In the *Copy Model* dialog, change the *Name* to **Thorp_PESeal_EQR**.
5. Change the Model to the new **Thorp_PESeal_EQR** model and adjust the view.
6. On the **OpenRoads Modeling > Drawing > Attributes** tool group, set the level to **PlotBorder_dp**.



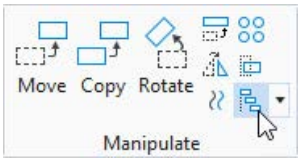
7. In the **Placement** tool group, select **Place Block**.

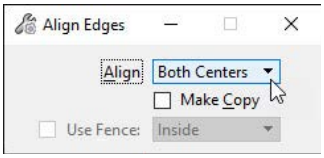


8. In the *Place Block* dialog, leave the *Method* set to **Orthogonal,** and set *Edge1* and *Edge 2* to **0.25**. Data point anywhere on the screen to place the 3" x 3" square.

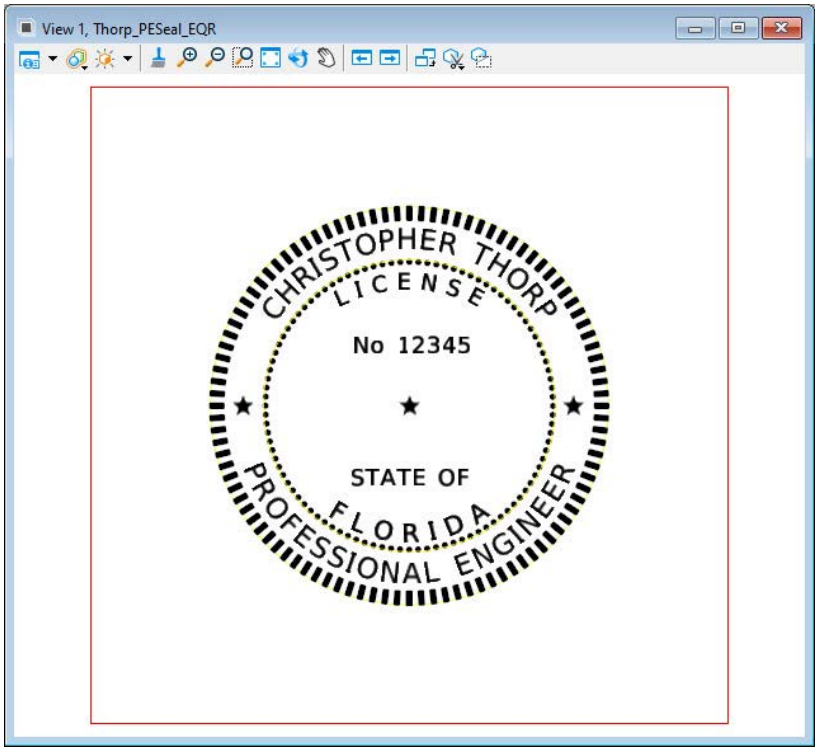


9. On the **Manipulate** tool group, select **Align Elements By Edge**, then in the **Align Edges** dialog, set the *Align* method to **Both Centers** and select the center of the center star of the seal to move the plot border so it is centered around the seal.

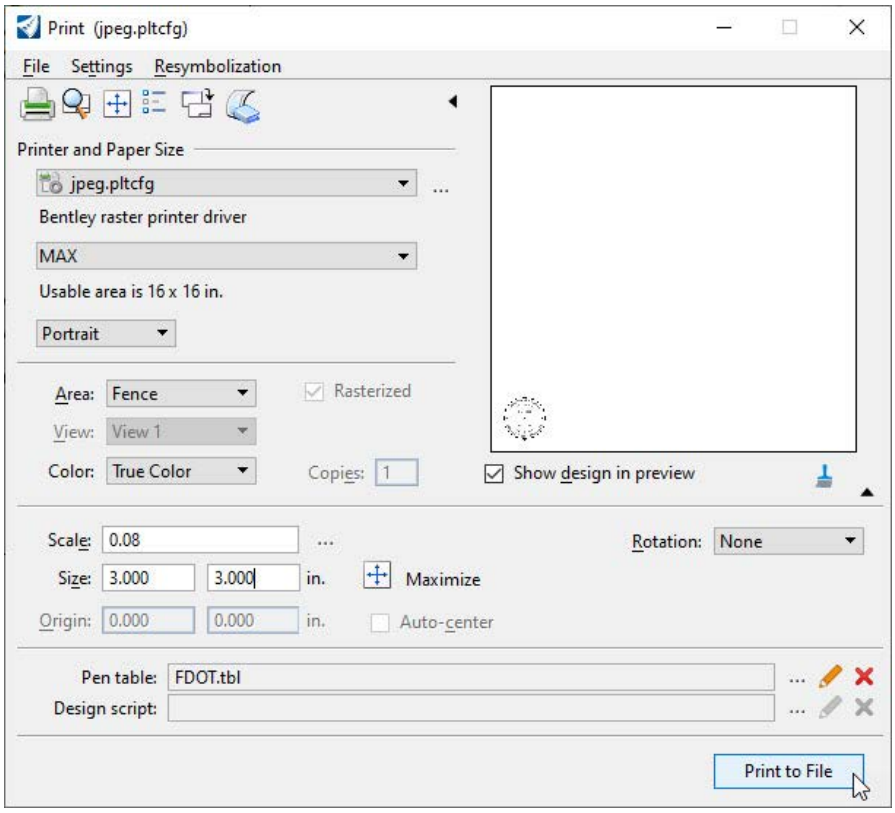




10. Change the background display of the file to white. Select **File > Settings > File > Color Table**, then double click the "B" square in the lower right of the *Color Table* dialog. Select the list tab in the *Modify Color* dialog and select "White". Click **OK** in the *Modify Color* dialog, then click **Attach** in the *Color Table* dialog. Click the back arrow in the top left of the screen to return to the file.

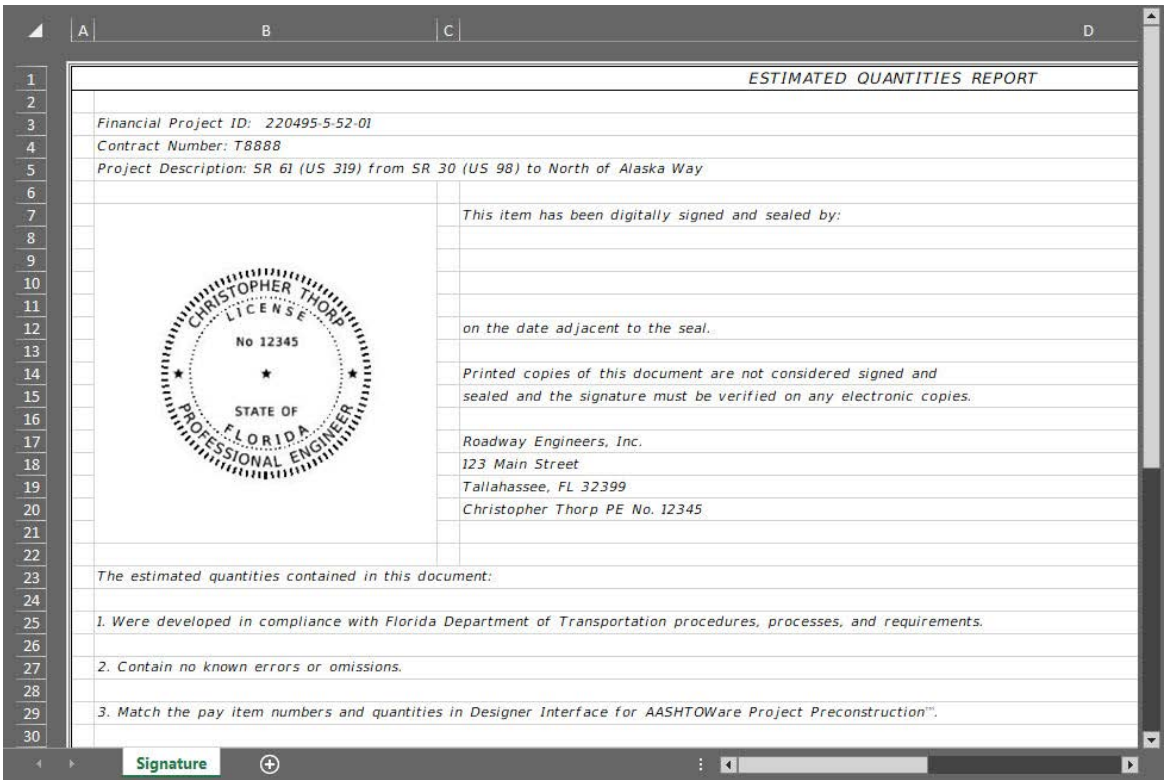


11. In the **Selection** tool group, select **Place Fence**, then snap to the corners of the plot border to create a fence.
12. On the quick access toolbar, click **Print** (or select **File > Print > Print**).
13. Set the *Printer and Paper Size* to **jpeg.pltcfg**.
14. Set the *Printer and Paper Size* to **MAX**, Set the *Area* to **Fence**, then in the Scale/Size area set the *Size* to **3in** as shown below.

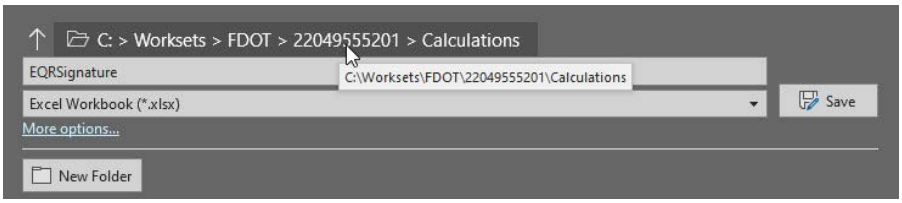


15. Click **Print to File**. This should create an image *Thorp_PESeal_EQR.jpg* file that is scaled to 3 inches square in the Cell directory folder.
16. Open the *EQRSignature.xlsx* file in the C:\Worksets\FDOT\22049555201\Calculations\ directory folder. If the template does not display as an 11x17 page, select **File > Print** and change the printer selected to a printer that supports 11x17 pages, such as Microsoft Print to PDF, then click the back arrow to return to the worksheet.
17. Edit the template to add the Financial Project ID, Contract Number, Project Description and EOR information as shown below. Change the text font to black and non-italics.
18. Delete the “Seal Graphic” text – this will be replaced with the image created in step 14. Delete the “EOR Name” and “Date/Timestamp” – this indicates the location that the EOR’s digital signature stamp will be located when the Estimated Quantities Report is signed and sealed.

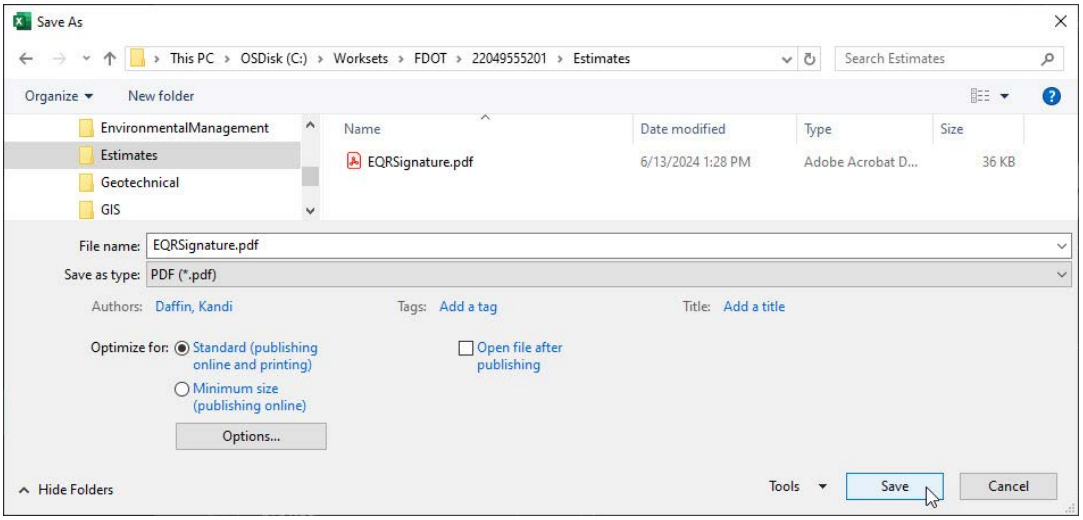
19. Click in the merged cell that was labeled “Seal Graphic”. **Select Insert > Pictures > Place in Cell >This Device**, then navigate to and select the *Thorp_PESeal_EQR.jpg* created in step 15. This should insert the seal image in the proper location and at the proper 3 inch square size.



20. Select **File > Save As**. Click on the path and navigate to the project Estimates folder.



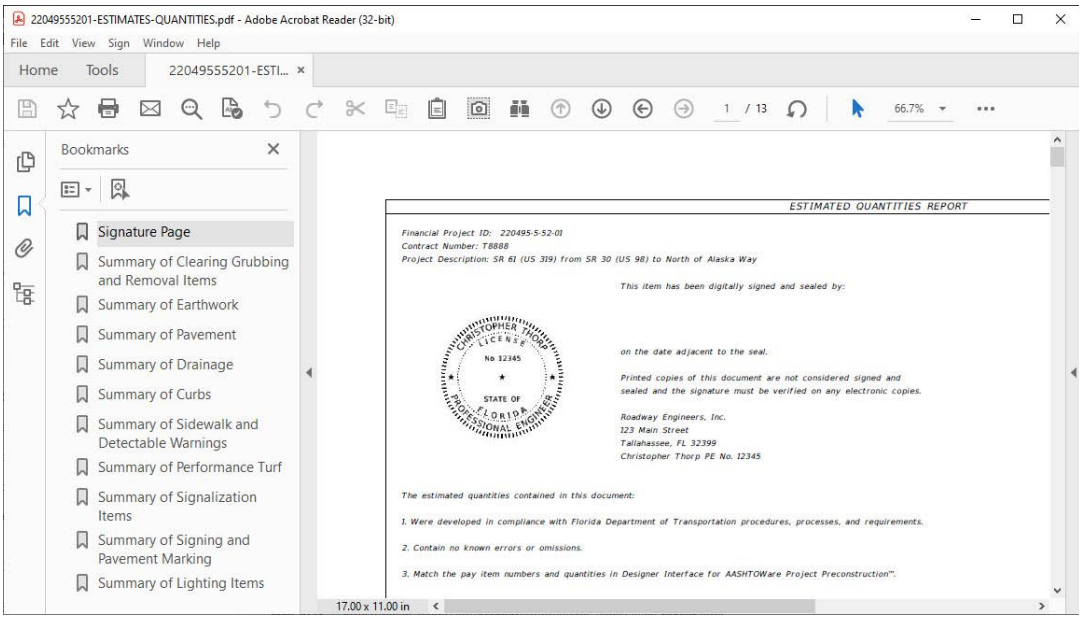
21. Change the *Save as type* to **PDF (*.pdf)** then click **Save**.



EXERCISE 4.2 *Creating the Estimated Quantities Report*

This exercise will generate and explore the Estimated Quantities Report.

1. Open the *QTDSRD02.dgn* file in the C:\Worksets\FDOT\22049555201\Roadway\ directory folder.
2. In the **OpenRoads Modeling > FDOT** tab, open the **Quantities > Takeoff Manager** and click **Create PDF**.
3. In the *Summary Reports Builder* dialog, review the *Input* and *Output Directories* and verify that they reflect the paths to the project's Calculations and Estimates folders, respectively.
4. Review the list of Excel Summary Table Files and verify all the Summary Table names match the **Quantity Takeoff Manager** Table names exactly, click **Select All**, check the box for *Open Output File*, then click **Create**. This process may take a minute.
5. Examine the *22049555201ESTIMATES-QUANTITIES.pdf* file. Test the bookmarks and verify that all Summary Tables have been included.



6. Close the file.

5 DESIGNER INTERFACE QUANTITIES BUILDER

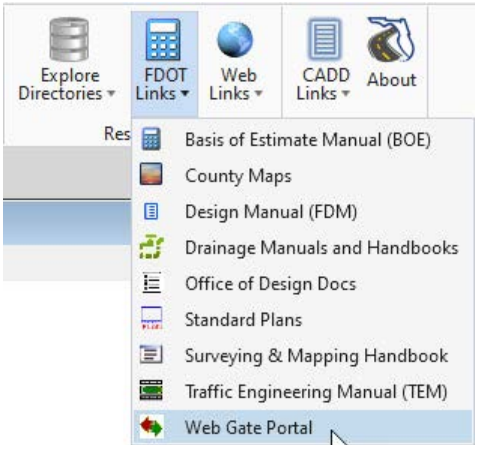
OBJECTIVES

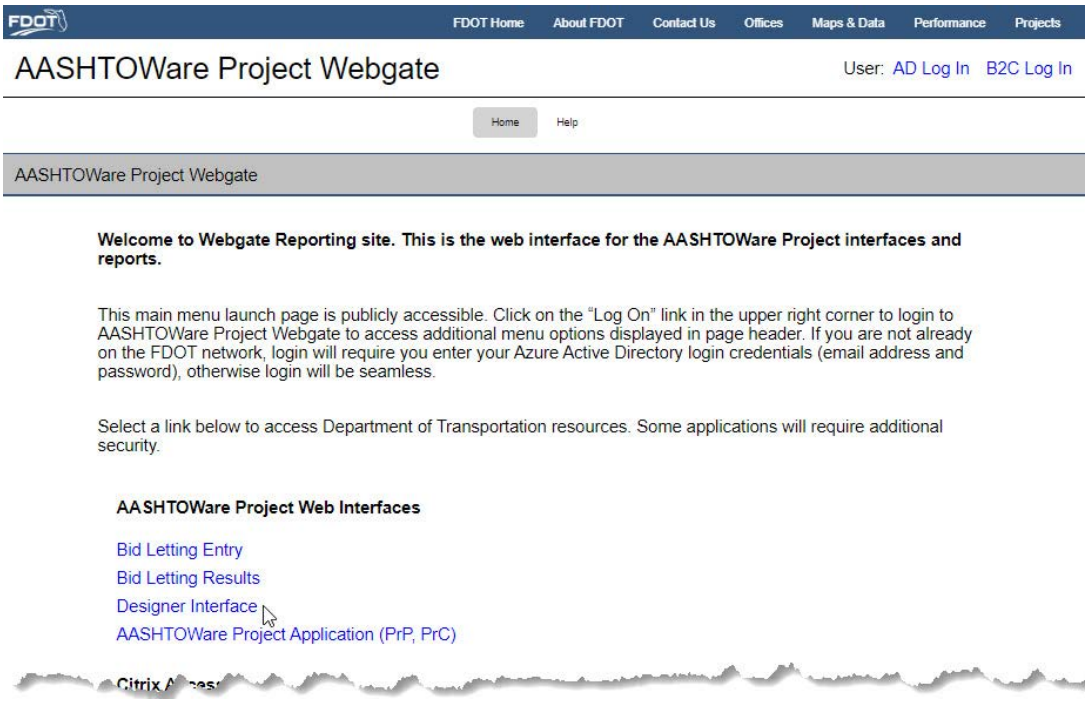
- Examine the Designer Interface Quantities Builder Application
- Review the workflow for uploading quantities to Designer Interface for AASHTOWare Project Preconstruction

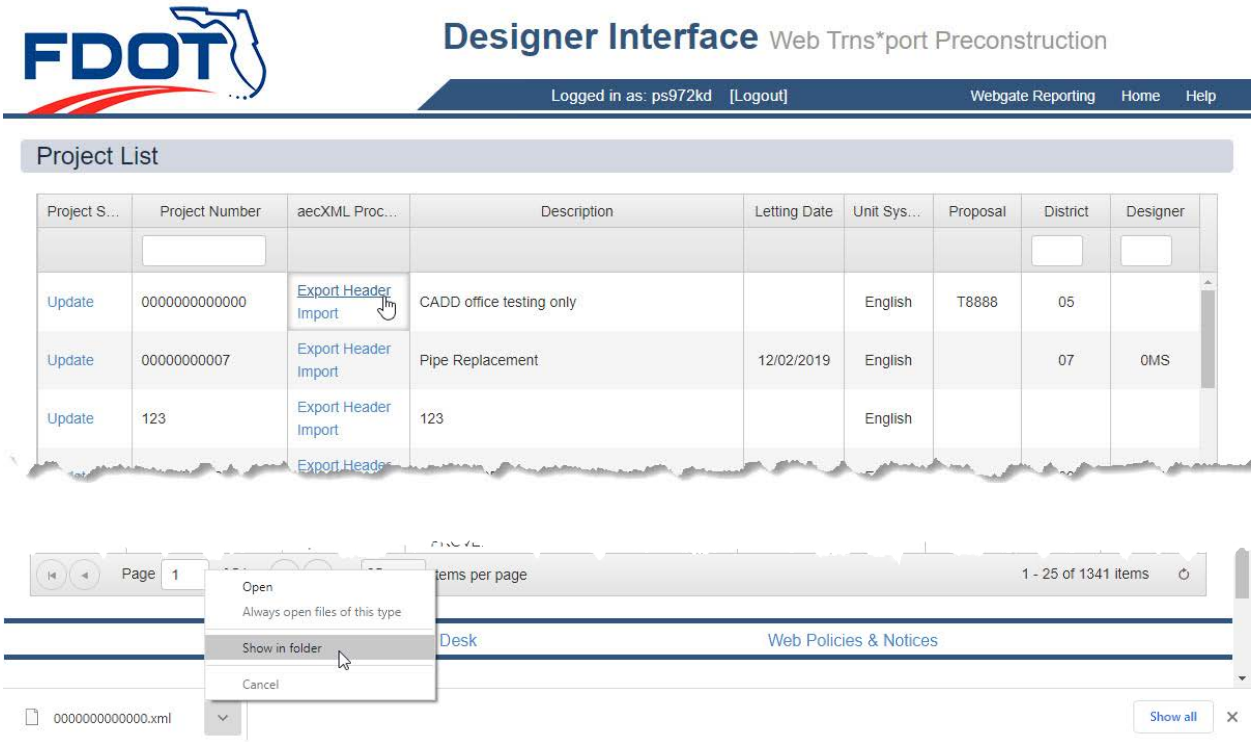
The workflow for uploading quantities to Designer Interface requires mainframe access and a RACF password. This chapter will cover the process but will not include exercises due to access restrictions.

PROJECT HEADER EXPORT

Before launching the **Designer Interface Quantities Builder**, the Project Header must be downloaded and saved to the Project's lead discipline folder. The FDOTConnect **FDOT Ribbon tab > Resources > FDOT Links** tool includes a link to the Web Gate Portal website where Designer Interface may be accessed.







In Designer Interface, locate the Project in the Project List and select *Export Header*. The file will be saved to the Downloads folder on your computer. Locate the file and move it to the lead component discipline folder, usually Roadway.

DESIGNER INTERFACE QUANTITIES BUILDER

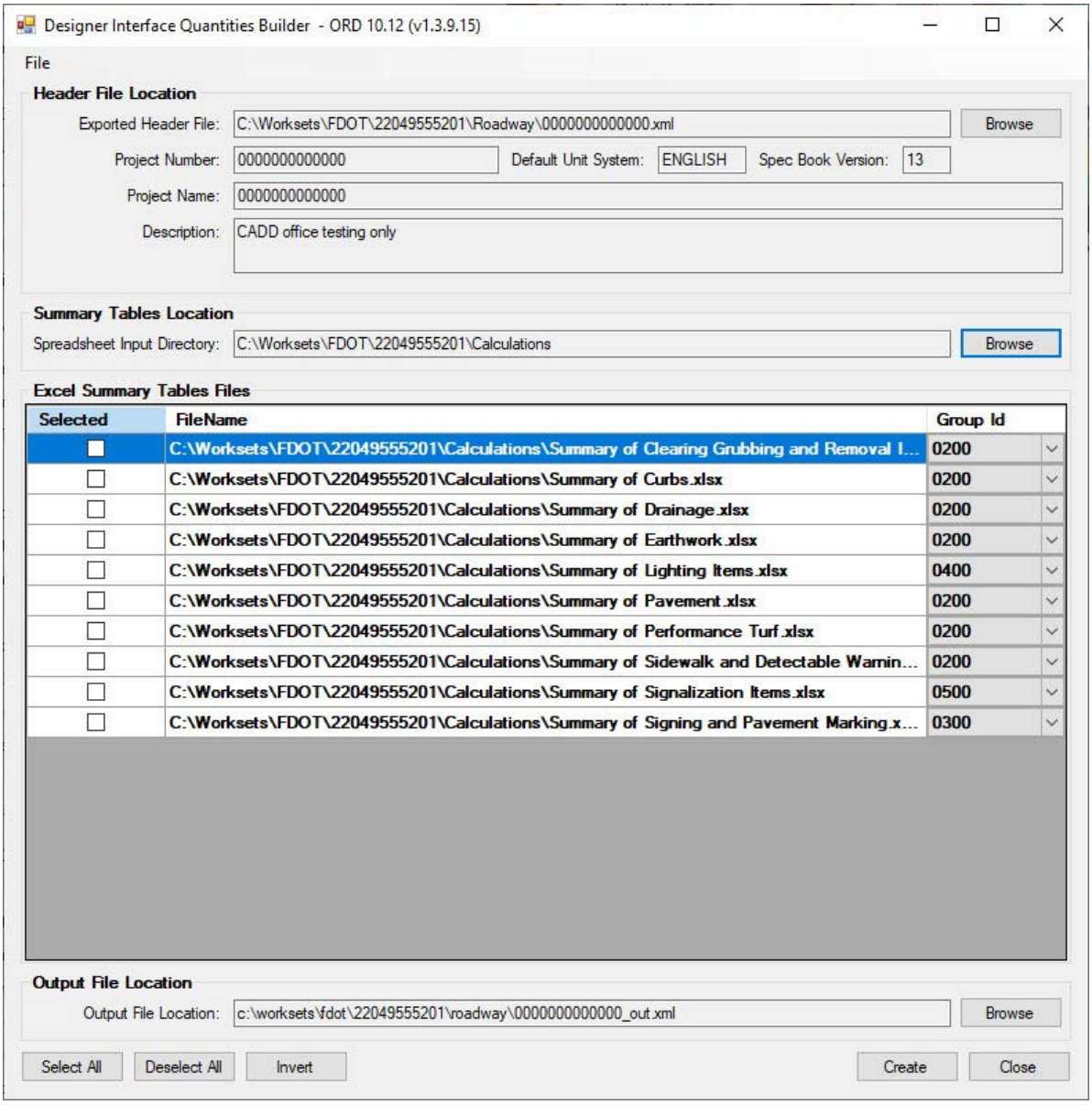
The **Designer Interface Quantities Builder** is an application created by the FDOT Production Support CADD office for use with FDOTConnect for OpenRoads Designer in conjunction with Designer Interface for AASHTOWare Project Preconstruction. This tool generates an XML file from the same Summary of Quantities Excel files used to create the Estimated Quantities Report. This application may be accessed from the icon located in the FDOTConnect Desktop folder.

In the **Designer Interface Quantities Builder** application window, in the *Header File Location*, click **Browse** and locate the Project Header file downloaded from Designer Interface.

Next, in the *Summary Tables Location*, click **Browse** and navigate to the Project Calculations folder.

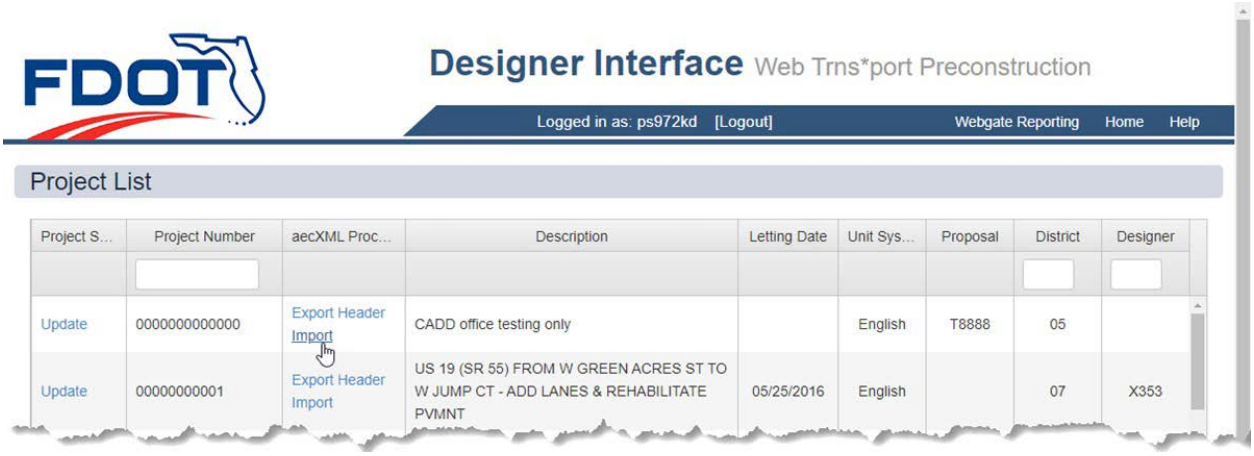
In the *Excel Summary Table Files* section, examine the *Group Id* section. Notice that each table shows with a default group Id. These each have a pick list of all the available Group Id codes that were included in the Project Header file. Verify that the correct Id is shown for each Summary Table. If the Id should be changed, select the correct Group Id from the list. The Excel Summary Tables to be included in the XML may be selected individually selecting the checkboxes, or by using the selection buttons in the bottom left corner of the dialog box.

The *Output File Location* should be directed to the lead component discipline folder and the file name should be changed to add "_out" to the filename (i.e. *0000000000000_out.xml*). Click **Create** to save the XML file.

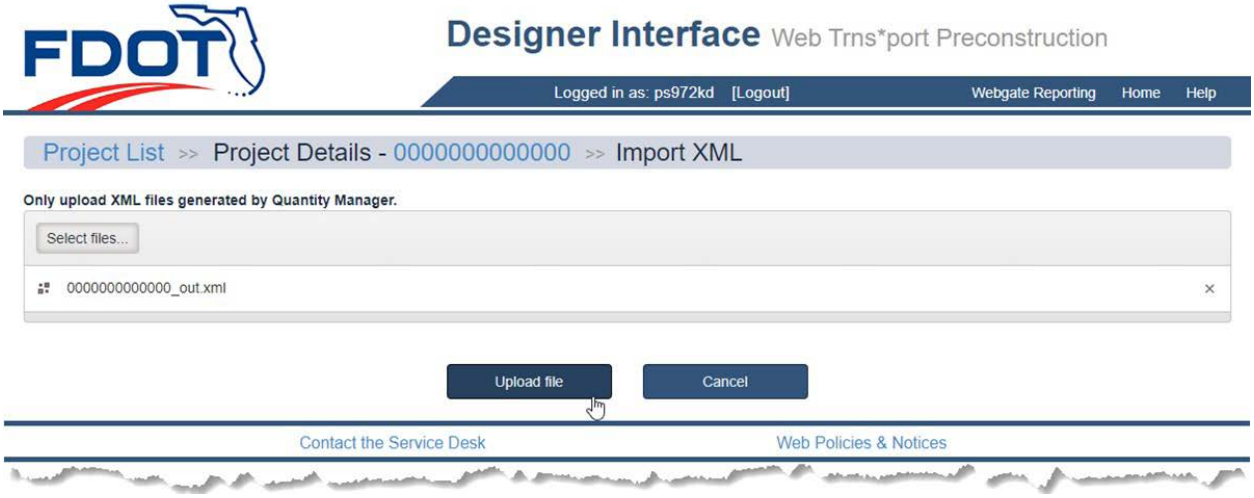


PROJECT QUANTITIES IMPORT

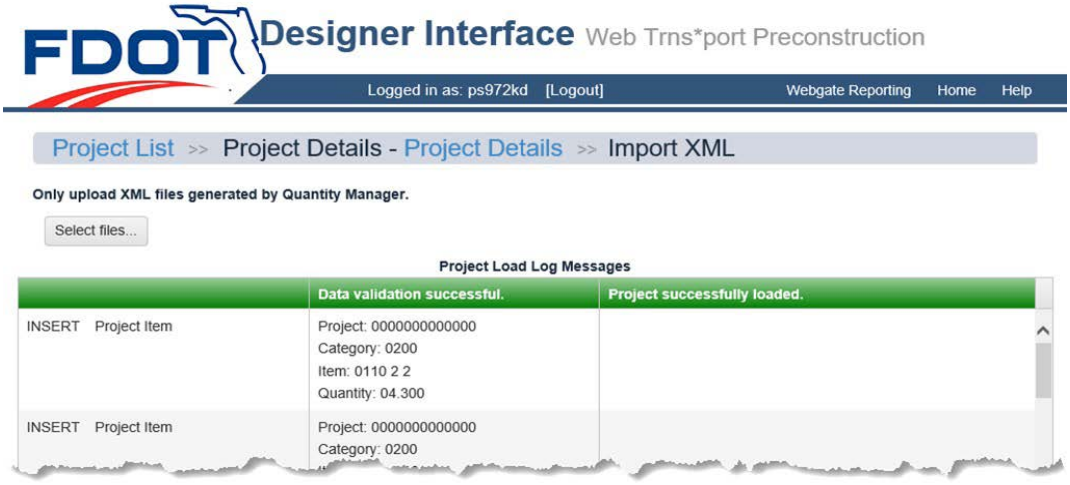
Once the Output File is created, return to the Designer Interface page, and select *Import*.



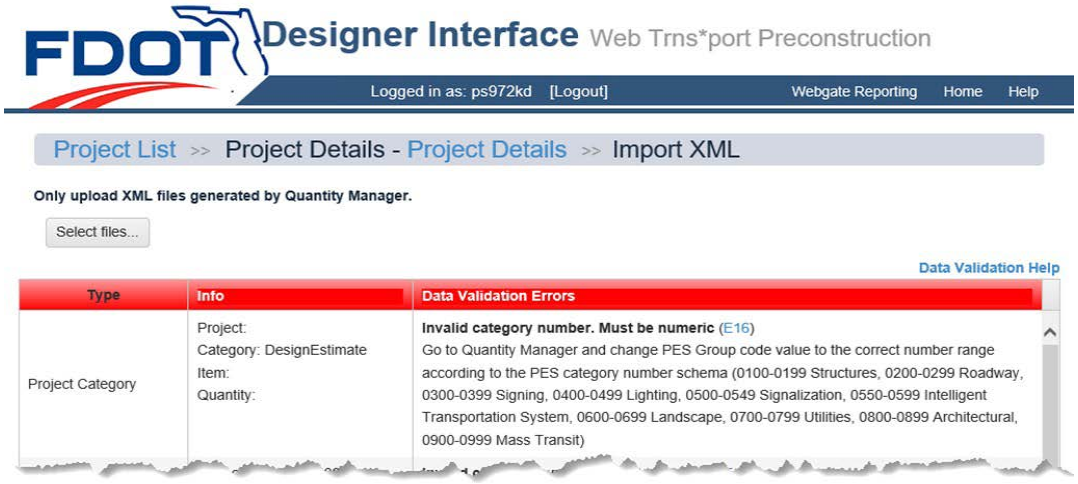
Click **Select files** and locate the *[Project]_out.xml* file. When the file appears in the window, then click **Upload file**.



If there are no errors, the Project Load Log Message should display with a green highlighted title and successful messages.



If errors exist, a Data Validation Error page will display with a red highlighted title and list all errors in the XML file. All errors must be corrected or no data will be uploaded.



6 PLATFORM INDEPENDENT QUANTITIES

OBJECTIVES

- Examine and discuss the Quantities tools installed in the FDOTConnect desktop folder.
- Identify the location of Summary templates in the Workset template and project folder structure.
- Examine Landscape and Structures Summary of Quantities Templates.

BASIC FDOTCONNECT

Occasionally, a project will have a component or discipline that does not require the full civil software to generate the CADD files required. As long as the requirements of the FDOT, and especially the CADD Manual, are met and the files produced are compatible with the civil versions of the software, basic versions of MicroStation or AutoCAD may be used to produce the plans.

In order to meet the requirements to generate and deliver quantities in an Estimated Quantities Report, consultants may still download and install the FDOT CADD software, even if the civil version of OpenRoads Designer is not present. When FDOTConnect is installed and OpenRoads civil software is not detected, the tools, applications and resources are still installed and available, but there will be no launch icons in the FDOTConnect desktop folder for the civil CADD software. (The red marked icons shown below will not be present.)

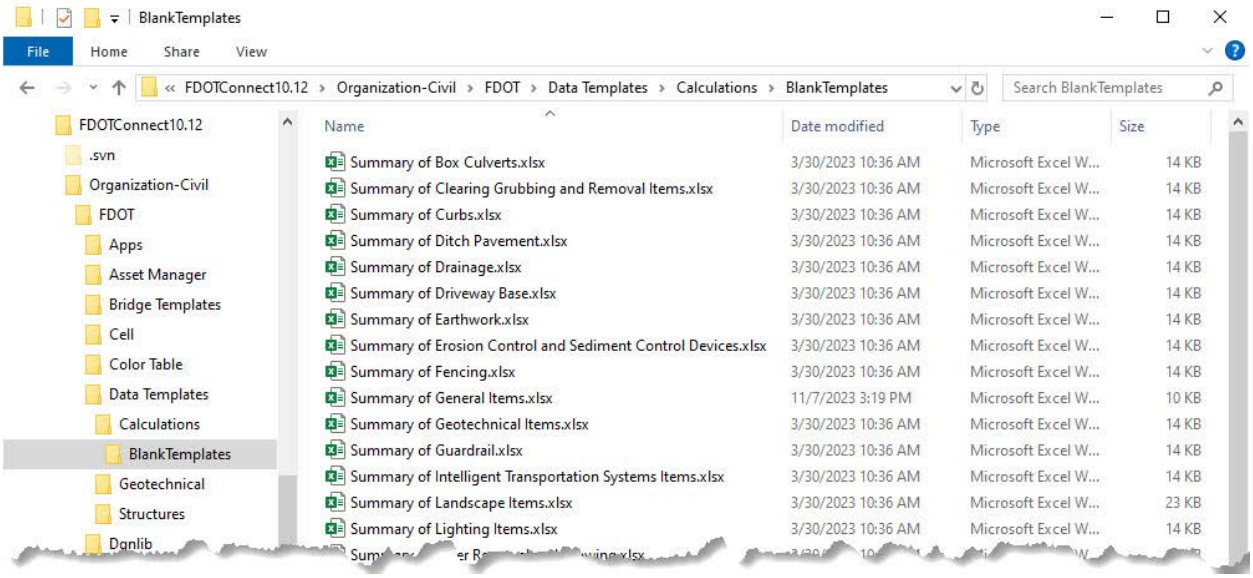
The FDOT CADD Project folder structure and templates may be provided by the lead project designer. If not, refer to the CADD Essentials Workflow training guide for the steps to set up the project and create CADD files to meet the requirements of the CADD Manual.

For the Quantities workflow, the applications that will be used are the **Summary Reports Builder** and the **Designer Interface Quantities Builder** (green circled icons shown above).

GENERATING QUANTITIES

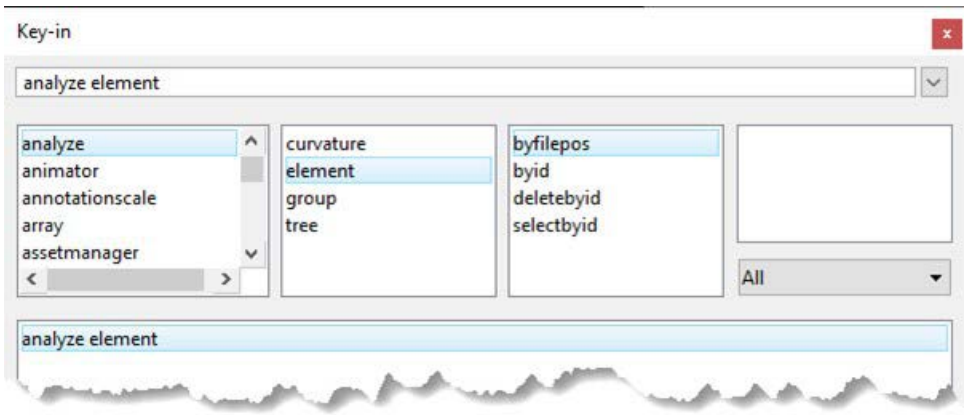
Once the component CADD files are created, the quantities must be computed, and the Summary Tables filled out manually. Blank templates for all Summary Table Excel files should already be included in a sub-folder of the Calculations folder for new projects created with the FDOT Create Project application. If the Blank Templates folder is not already included in the project Calculations folder, it can be copied there from the following location:

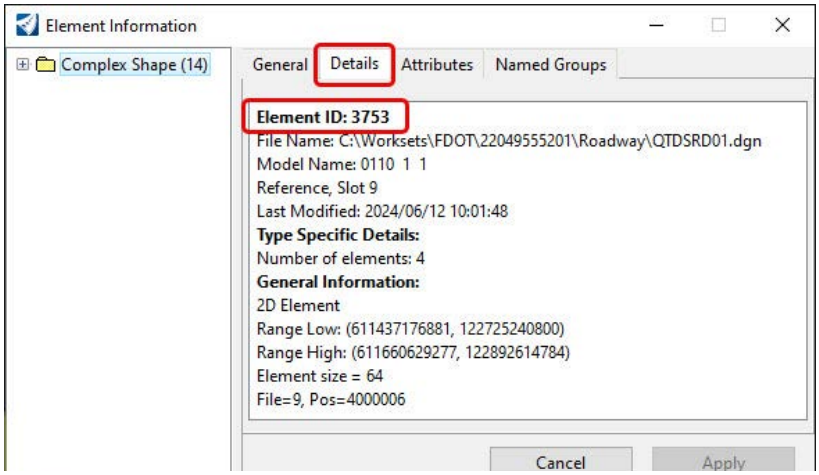
C:\FDOTConnect2024\Organization-Civil\FDOT\Data Templates\Calculations\BlankTemplates



Copy the templates needed for the project to the Calculations folder and edit them there to add the project's quantity data. Refer to the Summary Reports section of Chapter 3 in this document for rules and recommendations for completing the tables.

All elements, lines, shapes, etc. created in MicroStation CE have an Element ID associated with them, and that information can be documented in the Summary tables when necessary. One way to locate the Element ID is to use the Key-in tool and type "analyze element", then in the Element Information dialog, Details tab, the Element ID is displayed.





Including the Element ID when possible, even in a manually generated table, allows reviewers to more easily locate and check the source of the quantity data.

Completed Summary Excel files for all disciplines should be maintained in the project's Calculations folder. If a component of a project is completed by another firm or group, the Summary Table Excel files are delivered to the project lead and placed in the project's Calculation folder for processing.

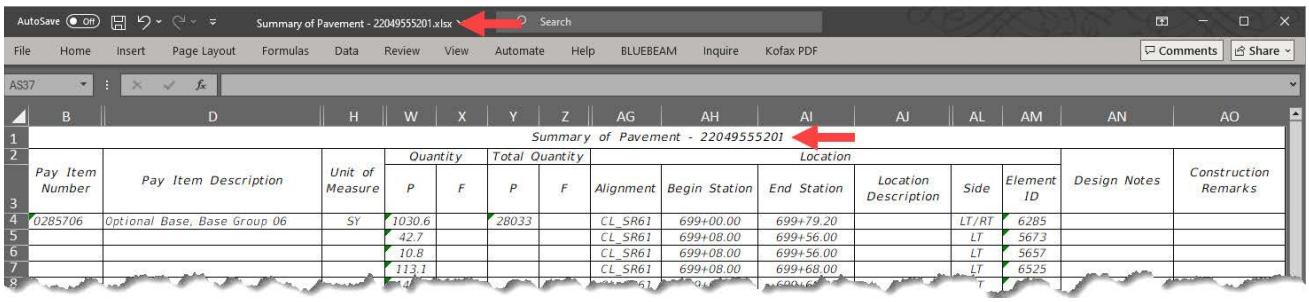
SPECIAL CONSIDERATIONS FOR MANUAL SUMMARY REPORT TABLES

There are a few instances where the workflow for manually generating a Summary Table differs from the Automated Quantities process. For any unusual situation not covered here, contact the CADD Office for additional support.

MULTIPLE FUNDING SOURCES

In the Automated Quantities workflow, when there are multiple funding sources within a project, all quantity elements are tagged with an Item Type that identifies the FPID funding source for each element and the quantities are automatically placed in separate labeled Summary Table Excel files. When quantities are generated manually for a project with multiple funding sources, the quantities must be sorted into separate Summary Tables for each FPID as required by the Basis of Estimates Manual.

Each Summary Table Excel file must maintain the filename that matches the template provided. When multiple files of the same name are created, each filename and table title must be appended with the FPID. It is important to make sure that the filename matches the correct format, or it will not be compatible with the Summary Reports Builder to generate the Estimated Quantities Report. This format requires the base template name followed by a space, dash, then another space, followed by the FPID and the file extension (i.e., *Summary of Pavement - 22049555201.xlsx*).



SUMMARY OF LANDSCAPE ITEMS AND PLANT SCHEDULE

A special template for Summary of Landscape Items, which includes a linked worksheet for a Plant Schedule, has been included in the **Calculations > Blank Templates** folder. The Sheet1 worksheet is formatted for the Summary of Landscape Items summary table and is compatible with the Summary Reports Builder and Designer Interface Quantities Builder. The PlantShedule worksheet is formatted to be compatible with the Linked Data Manager tool and is linked to Sheet1 with formulas and will automatically include the appropriate data for that table. This ensures a single source of data for both tables.

If additional worksheets are needed, copy both the Sheet1 and PlantSchedule worksheets and rename them to Sheet2 and PlantSchedule2, respectively. The name format of the Sheet worksheets is critical to the compatibility with the Summary Reports Builder and Designer Interface Quantities Builder. In the copied PlantSchedule worksheet, edit the formulas to redirect to the corresponding Sheet# worksheet. Repeat the process for any additional worksheets, maintaining the naming and numbering format. If a separate Irrigation Schedule is needed, the PlantSchedule worksheet may be copied, renamed, and edited to change the table title and modify the links to only include the irrigation items from the Sheet# worksheets.

When manually entering the data, be sure to follow the guidelines set forth in Chapter 3 of this document. Be sure to enter pay item numbers in the BOE format and match the pay item descriptions in the BOE exactly.

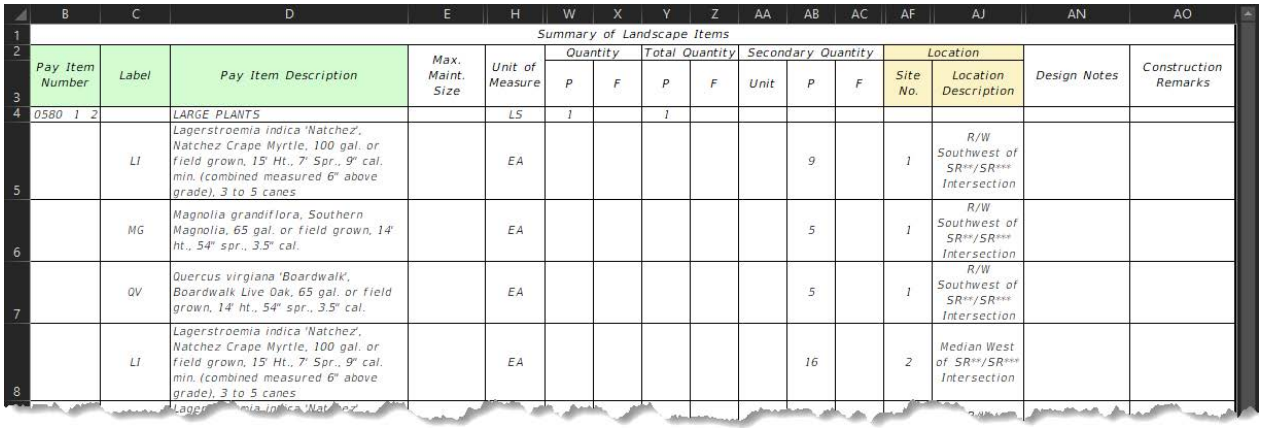
For secondary quantity item listings (plants or soil enhancement), the Label column should contain the corresponding designation or symbol indicated in the plans. The Pay Item Description column should include the following information:

Plants: Botanical Name / Common Name; Size; Spacing; Details

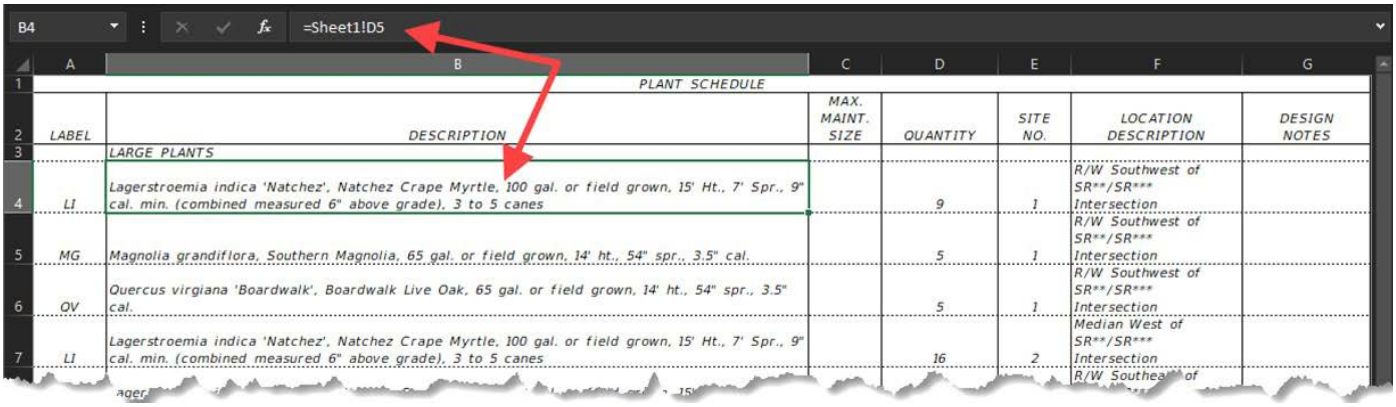
Landscape Soil: Soil Enhancement; Removal Depth; Soil Added; Amendment Added; Scarification Depth; Unit

In the past the Summary of Landscape Items quantities were generated by sheet. All other quantities for the Estimated Quantities Report are summarized by-location. The new workflow for landscape quantities allows the designer to designate locations as sheet numbers or by other parameters, depending on the needs of the project.

To give quantities by sheet, the designer should identify the Site No. corresponding to the sheet numbers of the plans. If the designer chooses to designate site locations based on intersection, planting bed, etc. they may do so by assigning Site numbers to each location. With either option, the Site No. designations should be shown on the Project Layout sheet in the Landscape Plans. The Location Description column may be used to further identify any location details to completely describe the location of the item(s) being quantified.



	B	C	D	E	H	W	X	Y	Z	AA	AB	AC	AF	AJ	AN	AO
1	Summary of Landscape Items															
2						Quantity		Total Quantity		Secondary Quantity			Location			
3	Pay Item Number	Label	Pay Item Description	Max. Maint. Size	Unit of Measure	P	F	P	F	Unit	P	F	Site No.	Location Description	Design Notes	Construction Remarks
4	0580 1 2		LARGE PLANTS		LS	1		1								
5		LI	Lagerstroemia indica 'Natchez', Natchez Crape Myrtle, 100 gal. or field grown, 15' Ht., 7' Spr., 9" cal. min. (combined measured 6" above grade), 3 to 5 canes		EA						9		1	R/W Southwest of SR**/SR*** Intersection		
6		MG	Magnolia grandiflora, Southern Magnolia, 65 gal. or field grown, 14' ht., 54" spr., 3.5" cal.		EA						5		1	R/W Southwest of SR**/SR*** Intersection		
7		QV	Quercus virgiana 'Boardwalk', Boardwalk Live Oak, 65 gal. or field grown, 14' ht., 54" spr., 3.5" cal.		EA						5		1	R/W Southwest of SR**/SR*** Intersection		
8		LI	Lagerstroemia indica 'Natchez', Natchez Crape Myrtle, 100 gal. or field grown, 15' Ht., 7' Spr., 9" cal. min. (combined measured 6" above grade), 3 to 5 canes		EA						16		2	Median West of SR**/SR*** Intersection		



B4 =Sheet1!D5

	A	B	C	D	E	F	G
1		PLANT SCHEDULE					
2	LABEL	DESCRIPTION	MAX. MAINT. SIZE	QUANTITY	SITE NO.	LOCATION DESCRIPTION	DESIGN NOTES
3		LARGE PLANTS					
4	LI	Lagerstroemia indica 'Natchez', Natchez Crape Myrtle, 100 gal. or field grown, 15' Ht., 7' Spr., 9" cal. min. (combined measured 6" above grade), 3 to 5 canes		9	1	R/W Southwest of SR**/SR*** Intersection	
5	MG	Magnolia grandiflora, Southern Magnolia, 65 gal. or field grown, 14' ht., 54" spr., 3.5" cal.		5	1	R/W Southwest of SR**/SR*** Intersection	
6	QV	Quercus virgiana 'Boardwalk', Boardwalk Live Oak, 65 gal. or field grown, 14' ht., 54" spr., 3.5" cal.		5	1	R/W Southwest of SR**/SR*** Intersection	
7	LI	Lagerstroemia indica 'Natchez', Natchez Crape Myrtle, 100 gal. or field grown, 15' Ht., 7' Spr., 9" cal. min. (combined measured 6" above grade), 3 to 5 canes		16	2	Median West of SR**/SR*** Intersection	
		ager...				R/W Southea... of	

SUMMARY OF STRUCTURE QUANTITIES

As with multiple funding sources, the Summary of Structure Quantities requires a separate Summary Table for each structure number. Also, each Summary Table must include the structure number appended to the table title and filename. This process has been added to the quantities automation within OpenBridge Modeler when a 3D model is created, but must be completed manually when a bridge is detailed in 2D.

There are minor differences in the format of the table from previous versions of the Summary of Structure Quantities, though the same data is included. Note that the Section column rows should not be merged. The section should be listed on the first row of the quantities for that section and should not be repeated, much like pay items and descriptions. Also, there are columns provided for secondary quantities such as LS/SF as shown in the example below.

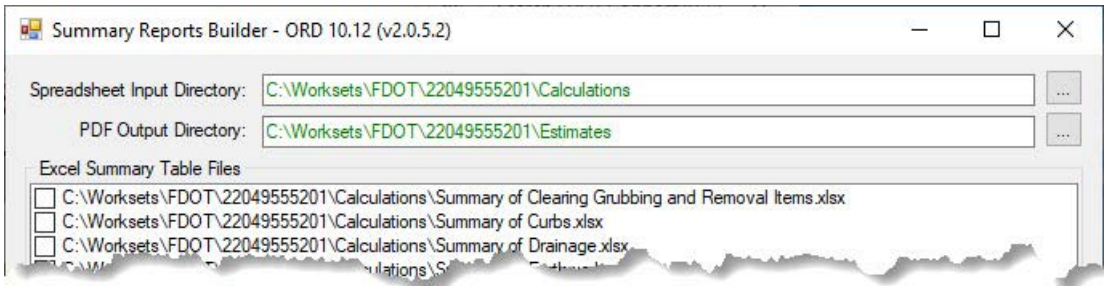
Summary of Structure Quantities - 123456

Section	Pay Item Number	Pay Item Description	Units of Measure	Quantity		Total Quantity		Secondary Quantity			Location	Design Notes	Construction Remarks
				P	F	P	F	Units	P	F	Location Description		
Lump Sum Items	0110 3	Removal of Existing Structures/Bridge	LS	1		1		SF	8580				
Approach Slabs	0400 2 10	Class II Concrete (Approach Slabs)	CY	3.00		6					App. Slab 1		
				3.00							App. Slab 2		
	0415 1 9	Reinforcing Steel (Approach Slabs)	LB	489.0		978					App. Slab 1		
				489.0							App. Slab 2		
Superstructure	0400 2 4	Class II Concrete (Superstructure)	CY	61.70		89.9					Bridge Deck		
				0.40							Thickened End Slab		
				9.80							Beam Build-Up		
				16.00							Sidewalk Overlay		

CREATING THE ESTIMATED QUANTITIES REPORT

The project Estimated Quantities Report (EQR) is generated by the project lead designer for the Engineer of Record. Only when a project is completely produced outside of the OpenRoads Designer environment would the EQR need to be generated with the standalone tools. However, a test PDF may be created to verify that all the data translates properly prior to forwarding the Excel file to the project lead.

When using the **Summary Reports Builder** as a standalone tool, the only difference from the automated workflow is that the full path to the project Calculations and Estimates folders must be entered and/or browsed-to in the dialog. The processes for creating the signature page and the Estimated Quantities Report are documented in Chapter 4 of this guide.



UPLOADING QUANTITIES TO DESIGNER INTERFACE

As with the Estimated Quantities Report, the upload of quantities to Designer Interface is managed by the project lead designer for the Engineer of Record. It also requires mainframe permissions, so access is limited. Since the **Designer Interface Quantities Builder** is a completely standalone application, the process is the same as shown in Chapter 5 of this guide. Note that all quantities must be entered in the correct format as indicated in this training guide to achieve a successful upload of quantity data.

Contact

www.fdot.gov/cadd

Address

605 Suwannee St
Tallahassee, FL. 32399

Automated Quantities