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Workshop - X13
Harvesting Quantities with InRoads V8i: Setting Up Quantity Manager

Presenter: Lisa Whitson, Bentley Systems USA

Bentley Systems, Incorporated
685 Stockton Drive
Exton, PA 19341
www.bentley.com

Lesson Name: Pay Item Manager

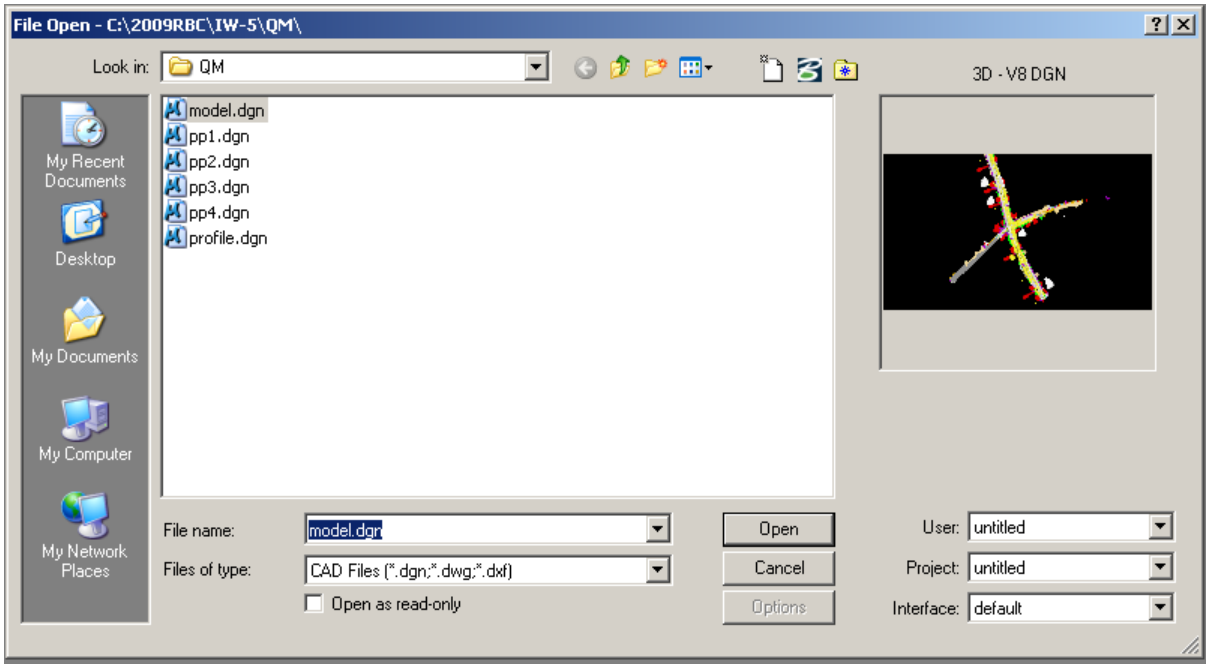
LESSON OBJECTIVE:

In this lesson you will learn how to access and edit the Pay Item database.

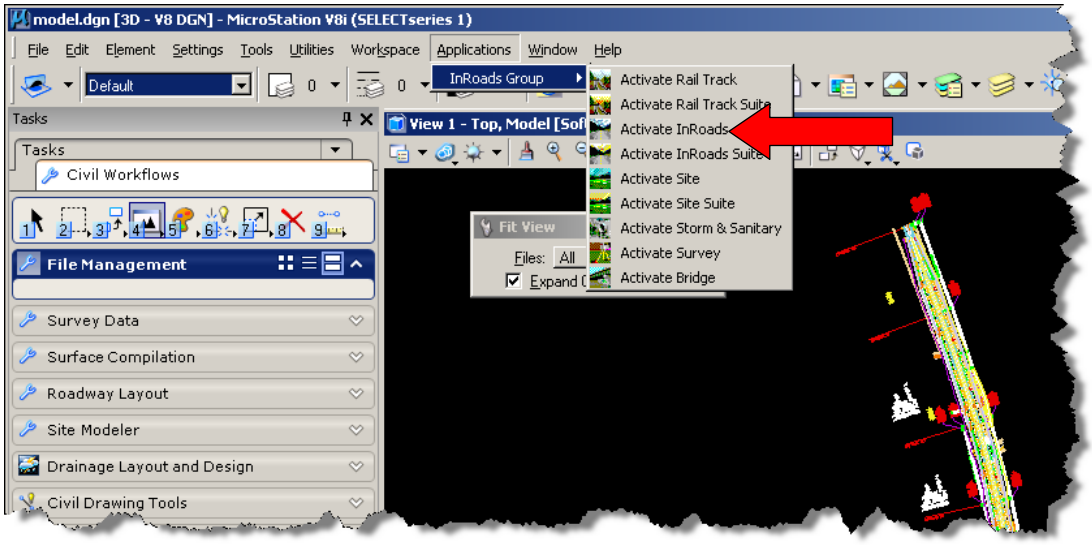
EXERCISE: GETTING STARTED

This exercise will guide you through the steps to get started

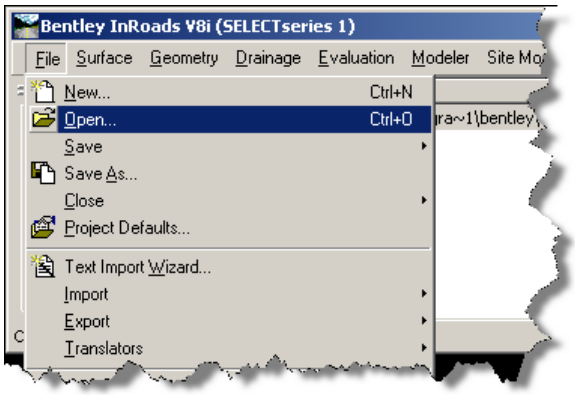
1. Start MicroStation and InRoads.
2. When the **MicroStation Manager** appears, navigate to **C:\2010 RBC Data\CI1WK1\DATA\QM\ Model.dgn**

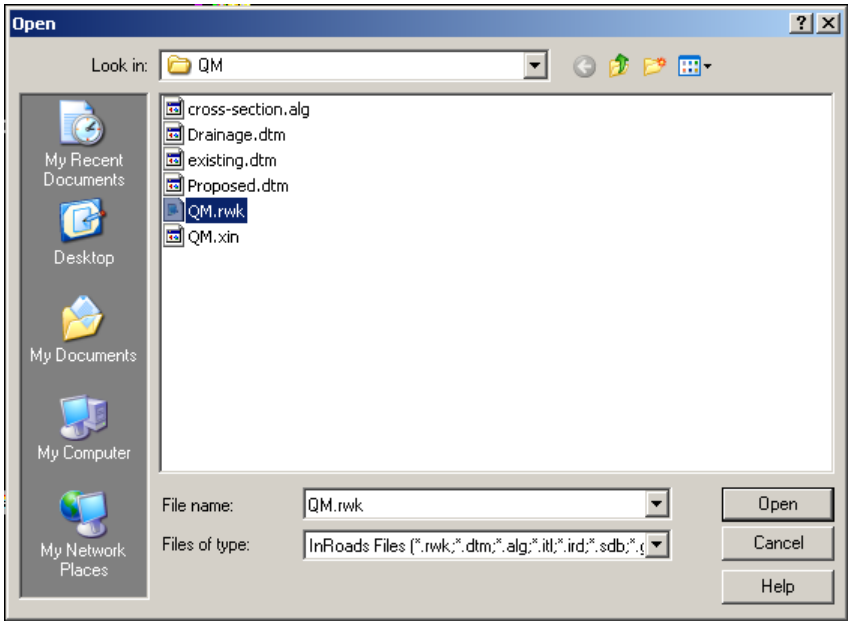


3. After MicroStation starts, activate InRoads by selecting **Applications > InRoads Group > Activate InRoads**



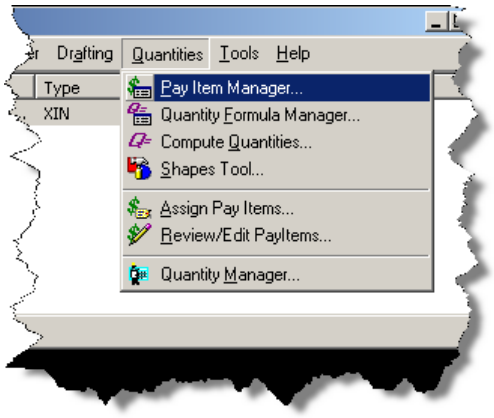
4. Open the file **C:\2010 RBC Data\CI1WK1\DATA\QM\QM.RWK** by selecting **File > Open** from the InRoads Explorer Menu.



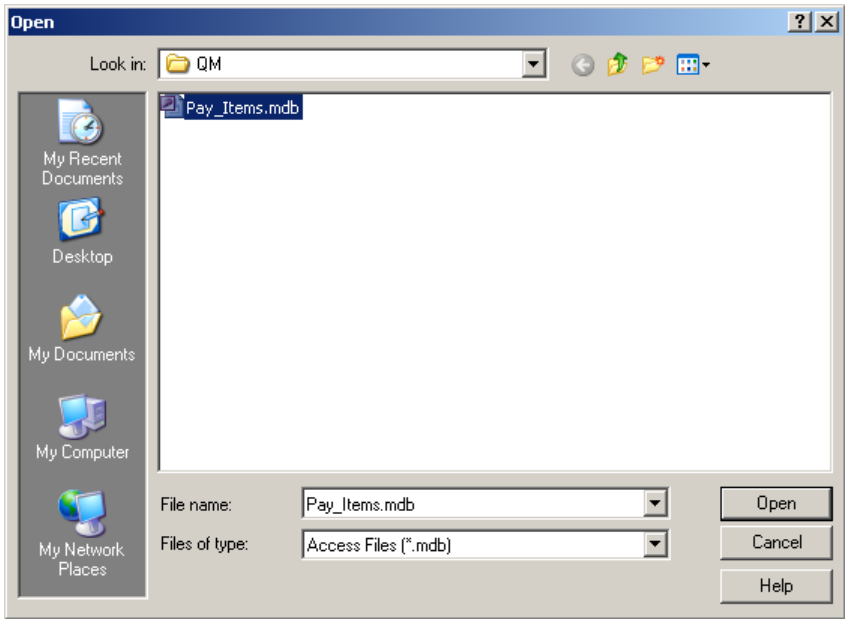


Click the **Open** button, then the **Cancel** button to close the dialog.

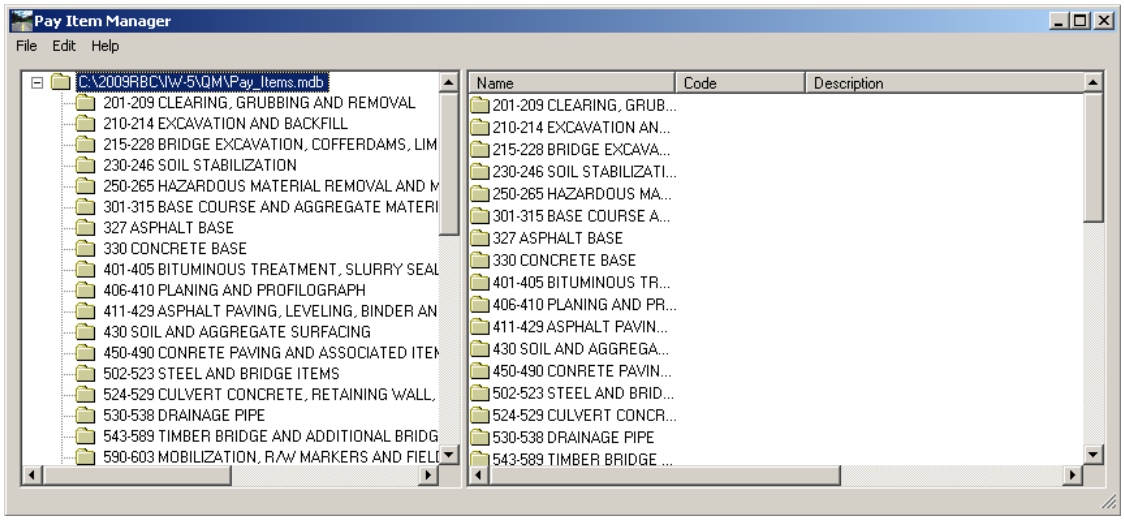
5. Open the Pay Item Database by selecting **Quantities > Pay Item Manager** from the InRoads Explorer Menu.



6. After the Pay Item Manager opens, select **File > Open** from the Pay Item Manager, click on **Pay_Items.mdb**, and click **Open**.



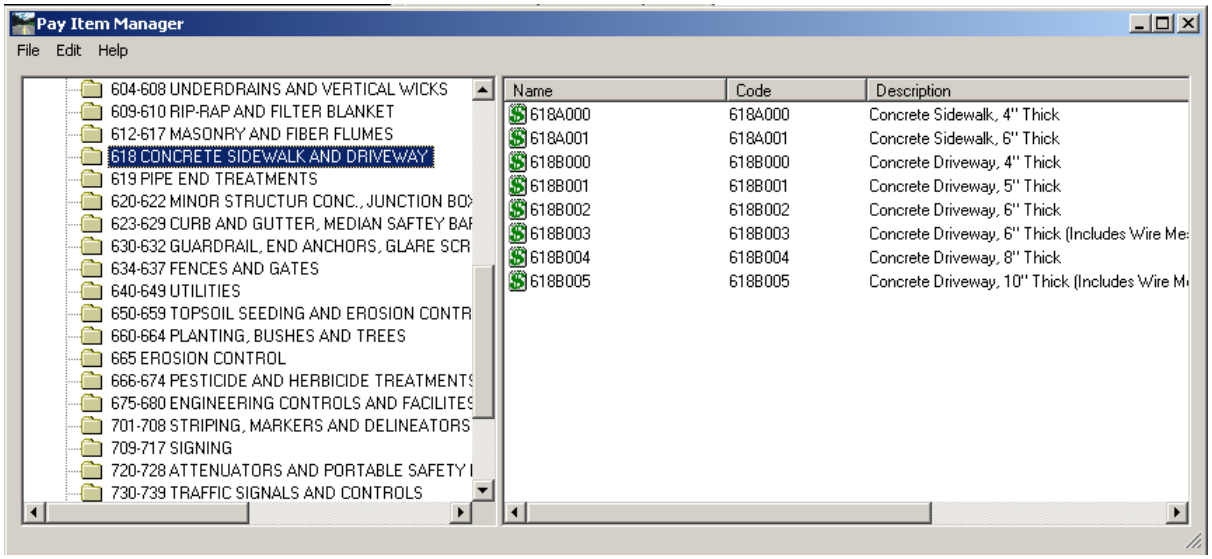
7. The following should be displayed:



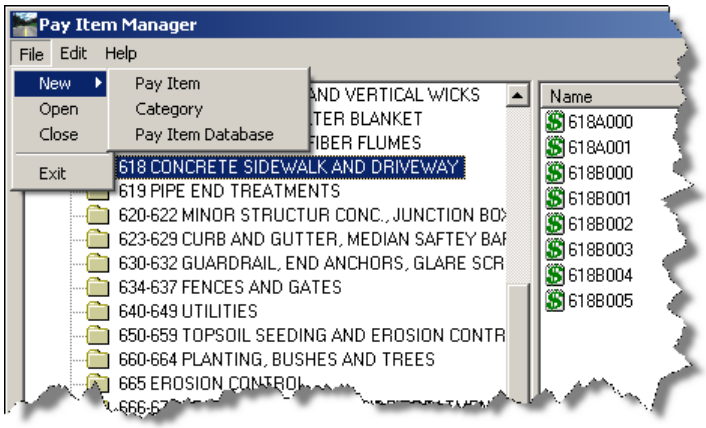
EXERCISE: CREATING A PAY ITEM

This exercise will guide you through the steps to create a Pay Item in the category 618 CONCRETE SIDEWALK AND DRIVEWAY, including how to apply a formula.

1. Navigate to and select the 618 CONCRETE SIDEWALK AND DRIVEWAY category on the left side of the Pay Item Manager. The contents of the folder will be displayed on right as shown.

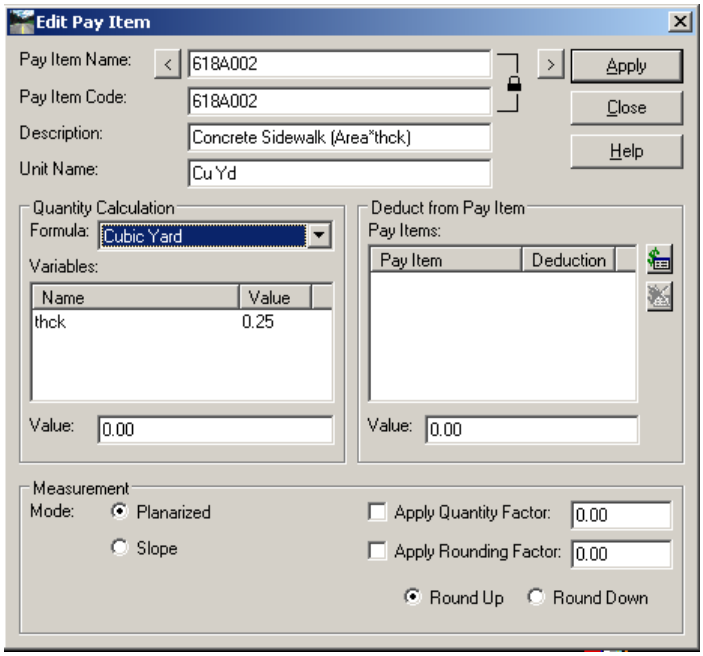


2. Select **File > New > Pay Item** from the Pay Item Manager Menu.



Note: an alternative method is to right-click in the white space of the right pane and use the pop up menu.

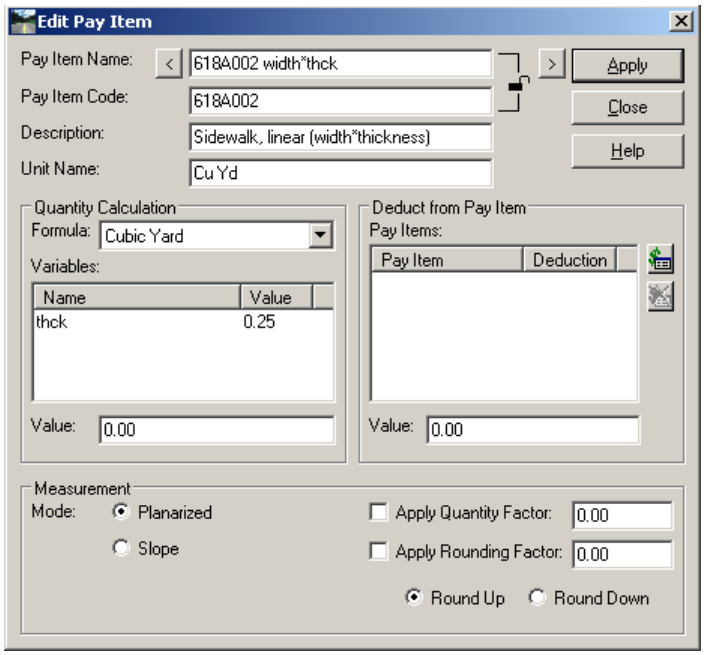
3. **Verify the lock is selected** to the right of the name and description fields before you enter any data. This will simplify the data entry process. Enter the following:
   Name: 618A002
   Description: Concrete Sidewalk (Area * thck)
   Unit Name: Cu Yd
   For **Quantity Calculation** toggle the combo box to **Cubic Yard**.



Click **Apply** and **Close** the Edit Pay Item dialog when complete.

4. Select the new item, and make a copy of it in the same folder (copy and paste – use standard Windows techniques). Note the name increments and is appended with a (2). Edit the new Pay Item.

5. Notice the lock toggle is unlocked. This allows you to have multiple definitions for the same Pay Item. Enter the following information:
   Pay Item Name: 618A002 width*thck
   Description: Sidewalk, linear (width*thickness)

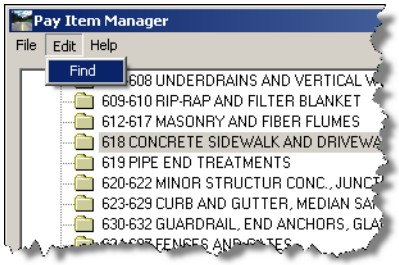


   Click **Apply** and **Close** the dialog.

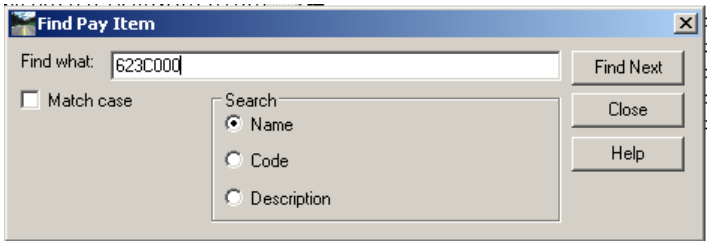
EXERCISE: CREATING ITEM DEDUCTIONS

This exercise will guide you through the method to apply item deductions to a pay item computation.

1. Use the **Find** function to locate the Item Name **623C000**. On the **Pay Item Manager** dialog, select **Edit > Find**.

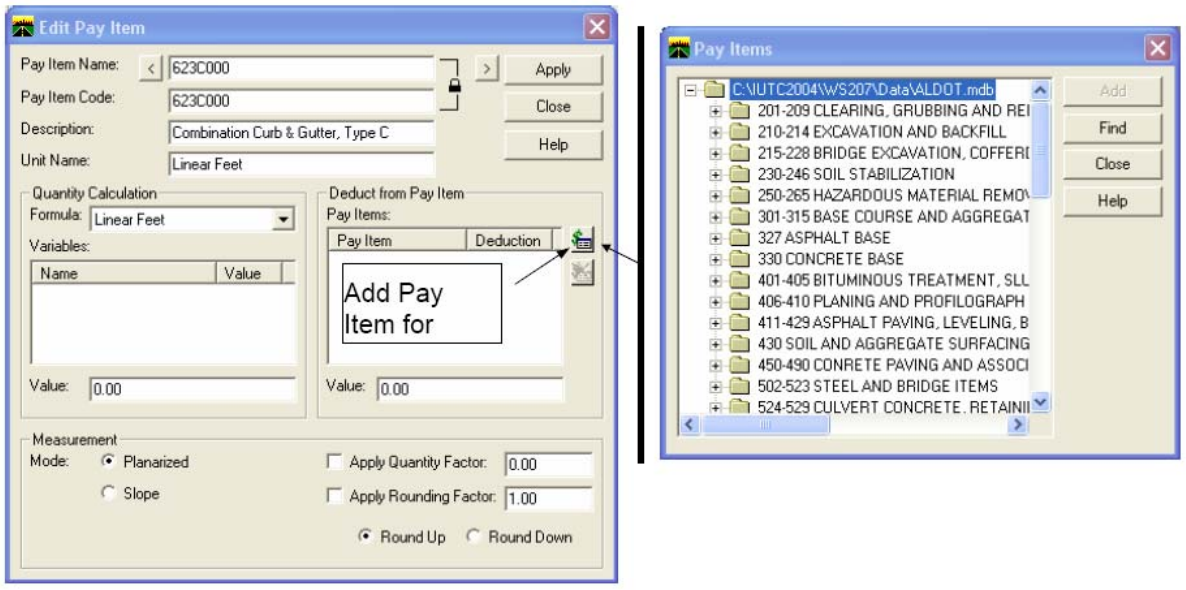


Search for 623C000 in the Find What field, select **Name** under the Search category and click **Find Next**.



Close the Find Pay Item dialog after the item has been located.

2. Right click **Edit** or double click to Edit this item.
3. Add Pay Items to be deducted from this item calculation.



4. Navigate the Pay Item tree or use the **Find** function on the Pay Items dialog to locate the following pay items to add to the deduction list.
   621C015 Inlets, Type S1 Or S3 (1 Wing)
   621C016 Inlets, Type S2 Or S4 (1 Wing)
   621C017 Inlets, Type S1 Or S3 (2 Wing)
   621C018 Inlets, Type S2 Or S4 (2 Wing)
5. For each Pay Item click **Add** to add it to the deduction list.
6. Now define a deduction value for each of these curb inlets.
   Single (1 Wing) shall have a value of 14 and double (2 Wing) shall be 20.

This is the amount of curb and gutter that will be deducted for each inlet type encountered when computing quantities.

7. Toggle on **Apply Rounding Factor** and key a value of 1.00. Toggle on **Round Up**.
   This will round the Curb and gutter computation to the nearest foot when using the **Compute Quantities** command.
8. **Apply** and **Close** the Edit Pay Item Dialog.
9. Exit the **Pay Item Manager** dialog.

Lesson Name: Quantity Formula Manager

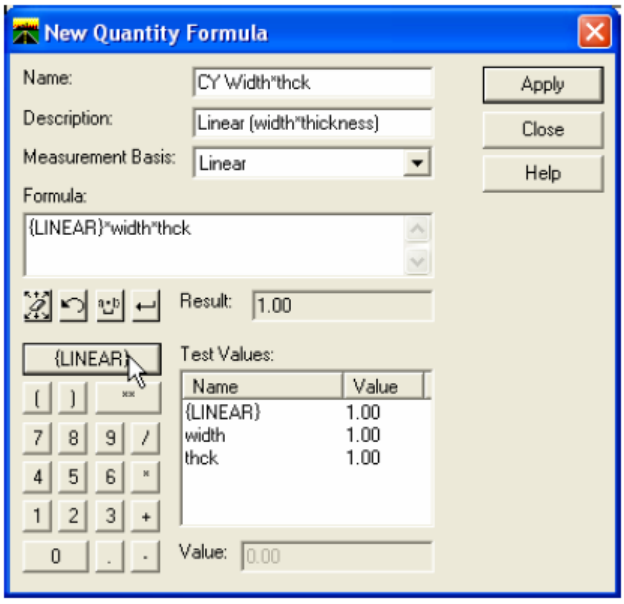
LESSON OBJECTIVE:

In this lesson you will learn how to define the mathematical operations to compute quantities.

EXERCISE: CREATING A NEW FORMULA

This exercise will guide you through the steps to create a new formula in the Pay Item Database.

1. Create a New Formula by selecting **Quantities > Quantity Formula Manager** from the InRoads Explorer menu.
2. Click **New** on the dialog. For **Name** key-in “CY Width*thck”. For **Description** key-in “Linear (width*thickness)”. Set the **Measurement Basis** to Linear, and create the formula as hown in the dialog below:

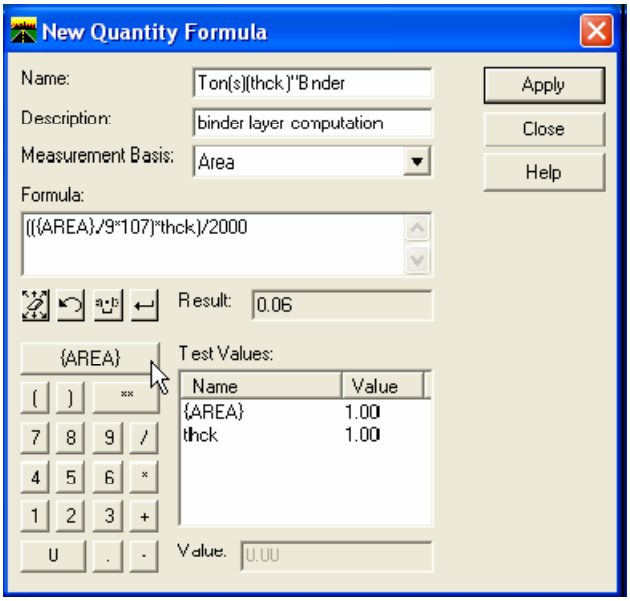


Click **Apply** when complete.

3. Create another New Formula by selecting **New** on the dialog.
4. For **Name** key-in “Ton(s)(thck)”binder”. For **Description** key-in “binder layer computation”. Set the **Measurement Basis** to Area.
5. Create the formula to compute the weight, in tons for binder/base asphalt material. For this exercise, use 107 lbs per S/Y per inch in thickness. Use a variable “thck” to allow for thickness definition within the pay item.

   The Test Values list box located in the dialog provides a means to test the mathematical operation of the Formula. The Calculator is provided to key-in numbers and operators as well as precedence parenthesis.

   The “**” is the power function.

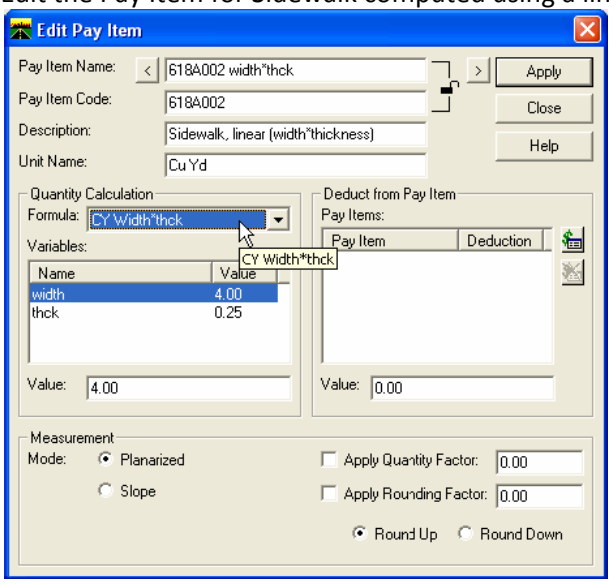


6. **Apply** and **Close** the Edit Quantity Formula dialog.
7. Close the Quantity Formula dialog.

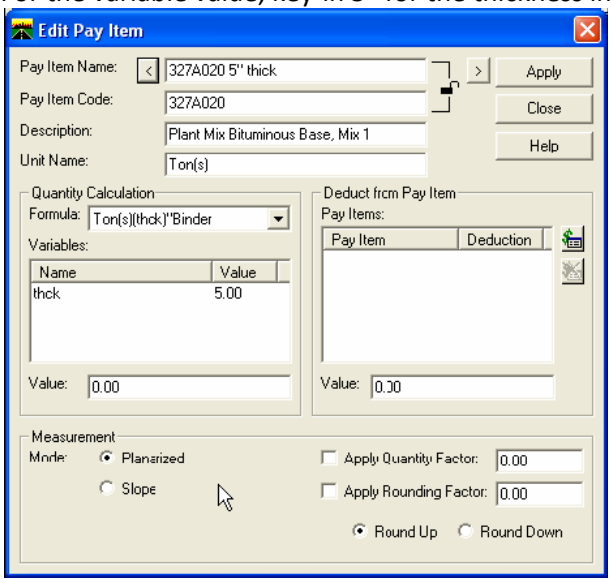
EXERCISE: ASSIGNING FORMULA AND VARIABLE ITEMS TO A PAY ITEM

This exercise will guide you through the steps to assign pay items to an item, the different methods include using the style manager, feature properties, and assigning Pay Items to graphics.

1. Edit the Pay Item for Sidewalk computed using a linear measurement, 618A002 width*thck.



2. Select the **Quantity Calculation** “CY width*thck”. This calculation computes a volume of concrete for a linear sidewalk feature using width and thickness variables instead of an Area.
3. Assign the variable values as shown in the dialog above. Select the Variable to change and key in the value.
4. Create a copy of Pay Item named 327A020 and give it a unique name of 327A020 5” thick.
5. Edit this new pay item and assign the formula defined for base computation.
6. For the variable value, key-in 5” for the thickness in inches.



7. **Apply** and **Close** to complete.

Lesson Name: Assigning Pay Items

LESSON OBJECTIVE:

In this Lesson you will learn how to link a pay item to a surface feature in the DTM. There are two methods to correlate a Pay Item to a feature in the DTM:
One way is to assign a Pay Item to a feature style and place the feature using the style that has that pay item defined. The second method is to use the Surface > Feature > Feature Properties command to manually assign pay items to an individual or group of features.

Both methods can also be utilized. An example being a culvert can have the pipe pay item defined by feature style and manually attach the pipe end treatments to the same feature.

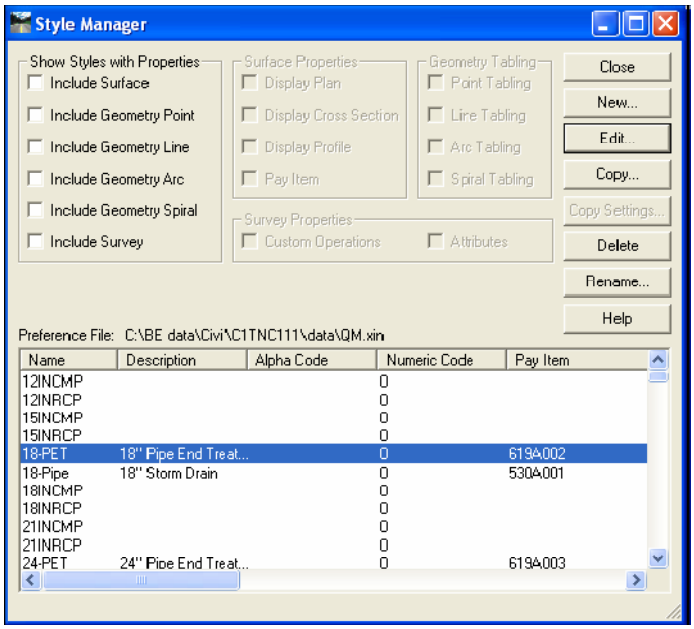
The Feature Properties will reflect the method used. It will also alert you as whether or not a database is opened or if a pay item is missing from the loaded database.

Warning If you use the automated feature style method of assigning pay items, you will need to have unique styles for each feature. This ensures that a feature that has a style of Curb won't automatically select a Curb and Gutter pay item if it is actually a mountable curb pay item. Also be aware that if a feature uses a style for pay item, it will always use that pay item and cannot be deleted from that feature unless the style is edited.

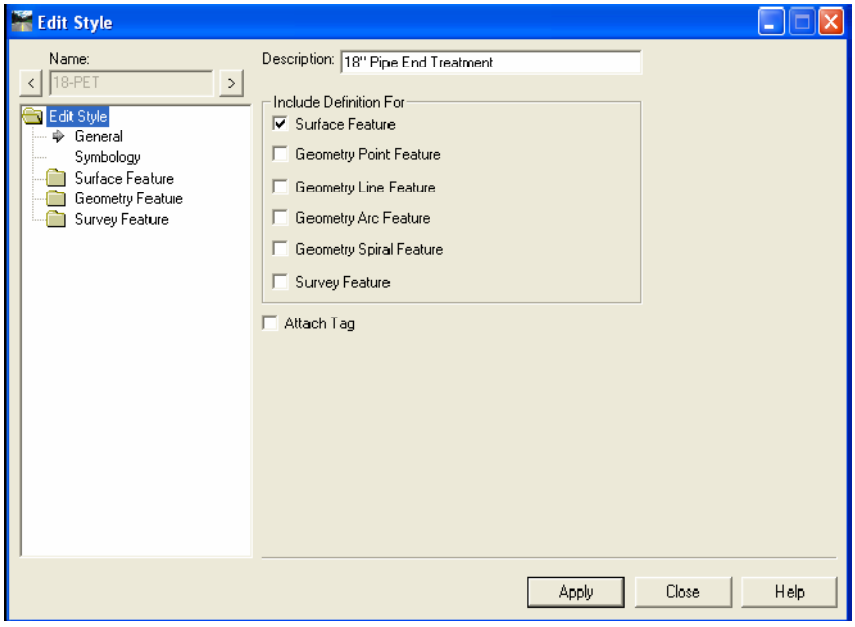
EXERCISE: FEATURE STYLE PAY ITEM DEFINITION

This exercise will guide you through the steps to assign pay items to feature styles.

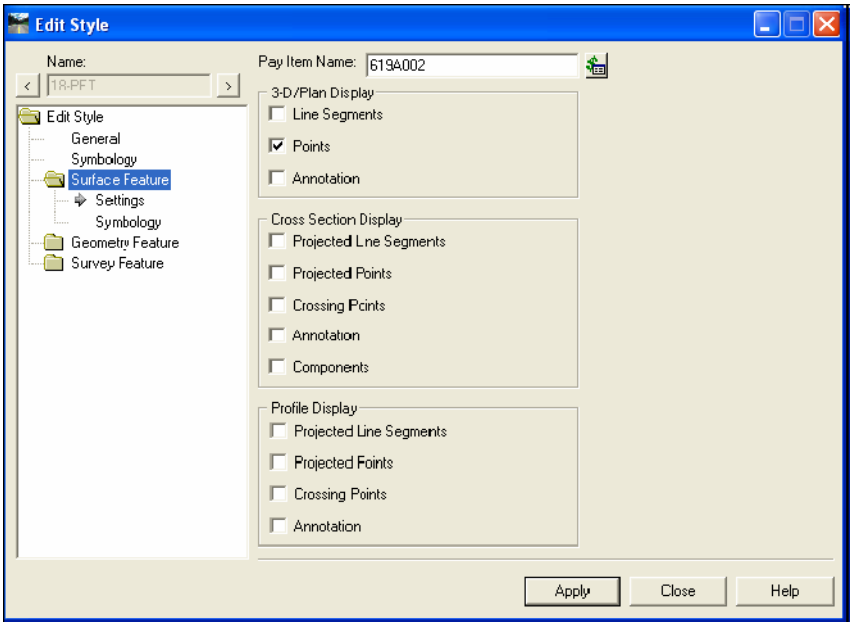
1. Select **Tools > Style Manager** from the Inroads Explorer menu. Select a feature style from the list of feature contained in the loaded XIN file.



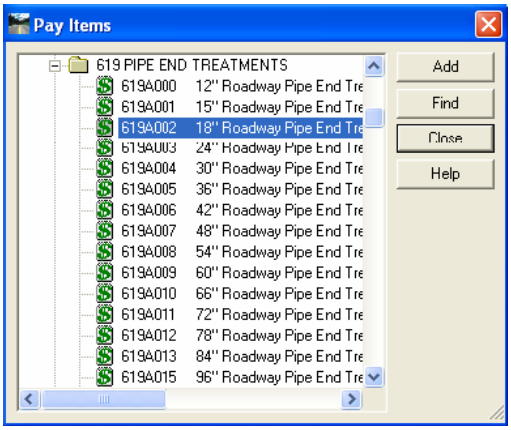
2. Select one of the features listed and click the **Edit** button (an alternative method is to double click the selection).
3. The **Edit Style** dialog will be displayed. Verify the correct feature is displayed in the description box.



4. Select the item **Surface Feature** from the tree view on the left of the **Edit Style** dialog box. The **Edit Style** dialog will reflect the Surface Feature display options.



5. Click the Pay Items icon next to the Pay Item Name field. This will access a tree view listing of the pay items contained in the database. Select the pay item for 18” Roadway Pipe End treatment. An alternate method is to use the **Find** feature.

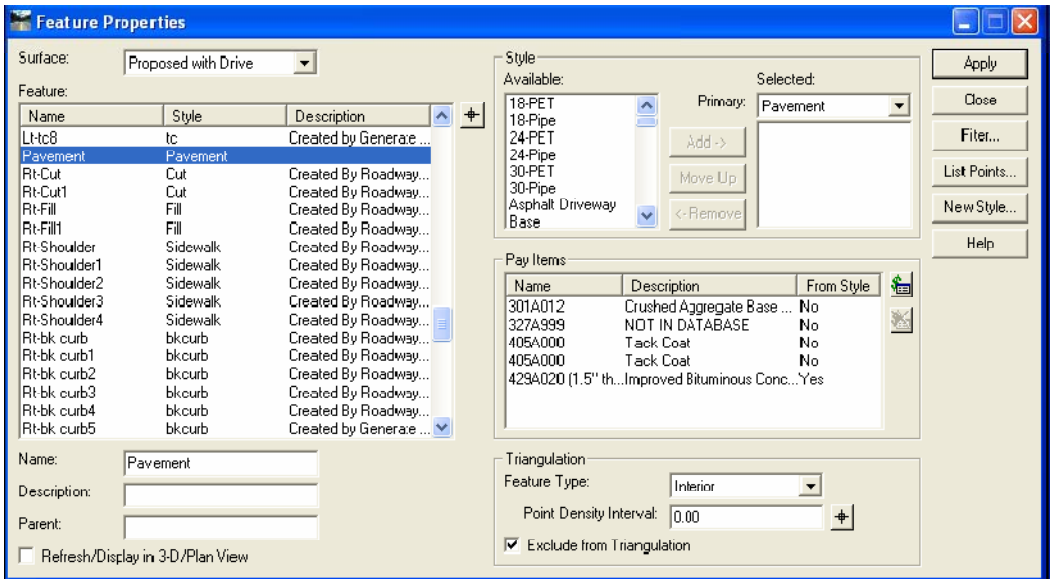


6. **Close** the **Pay Items** dialog. **Apply** and **Close** the Edit Style dialog. If prompted, indicate you wish to save the changes.
7. **Close** the Style Manager dialog.
   Any feature that uses this feature style will now use this pay item (and subsequent formula) to compute quantities for that feature.

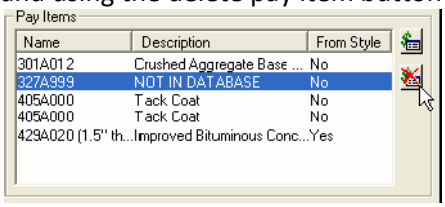
EXERCISE: DEFINING PAY ITEMS USING FEATURE PROPERTIES

This exercise will guide you through the steps to define pay items using Feature Properties.

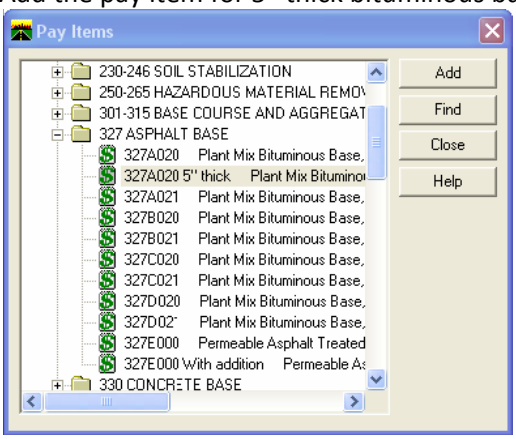
1. Assign the **Bituminous Base** pay item to the pavement feature in the **Proposed with Drive** DTM. The feature has style assigned with it that automatically assign the wearing surface item. Go to **Surface > Feature > Feature Properties**.
2. Select the **Proposed with Drive** surface from the surface combo box. Select the feature "Pavement" from the Feature list box.



3. Review the Pay Item Names listed in the Pay Items List box. The **From Style** column lists whether or not the item is from the feature style. The description is the item's description. If the item is missing from the data as is the case with Item 327A999 it will be reflected here. If there was no database open the description will reflect this as well.
4. Delete the item 327A999 since it no longer is a valid pay item name by selecting it from the list and using the delete pay item button located next to the list box.



5. Add the pay item for 5” thick bituminous base previously defined. (327A020 5” thick)



6. Select **Apply,** then **Close** the Feature Properties dialog.

   When this feature is quantified, it will contain values for crushed aggregate, bituminous base, wearing surface and two applications of tack coat. Each have their own computation methods and unit for payment but all will be based on the actual paving area.

Lesson Name: Shapes Tool

LESSON OBJECTIVE:

In this lesson you will learn how to create and store closed features in the dtm to calculate quantities.

The Shapes Tool command has been added to assist in closed feature creation. It uses functionality similar to the MicroStation Create Region command. Unlike the Create Region command, these tools create a feature in a dtm when the closed shape is created. Also, station limits (from the active alignment) can be defined to assist in shape creation.

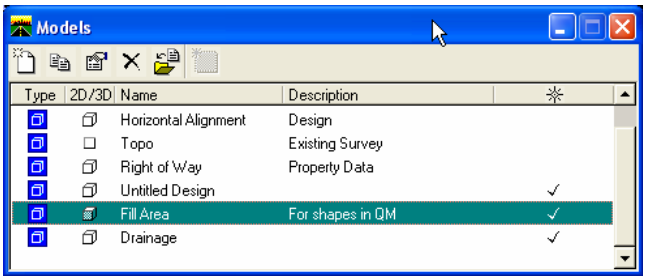
There are two methods to creating a feature shape with this command, Fill and Union. The Fill mode finds elements that encompass a region that can be closed and creates a feature from that area. Union allows selection of multiple adjacent areas to create a single area.

EXERCISE: WORKING WITH THE SHAPES TOOL

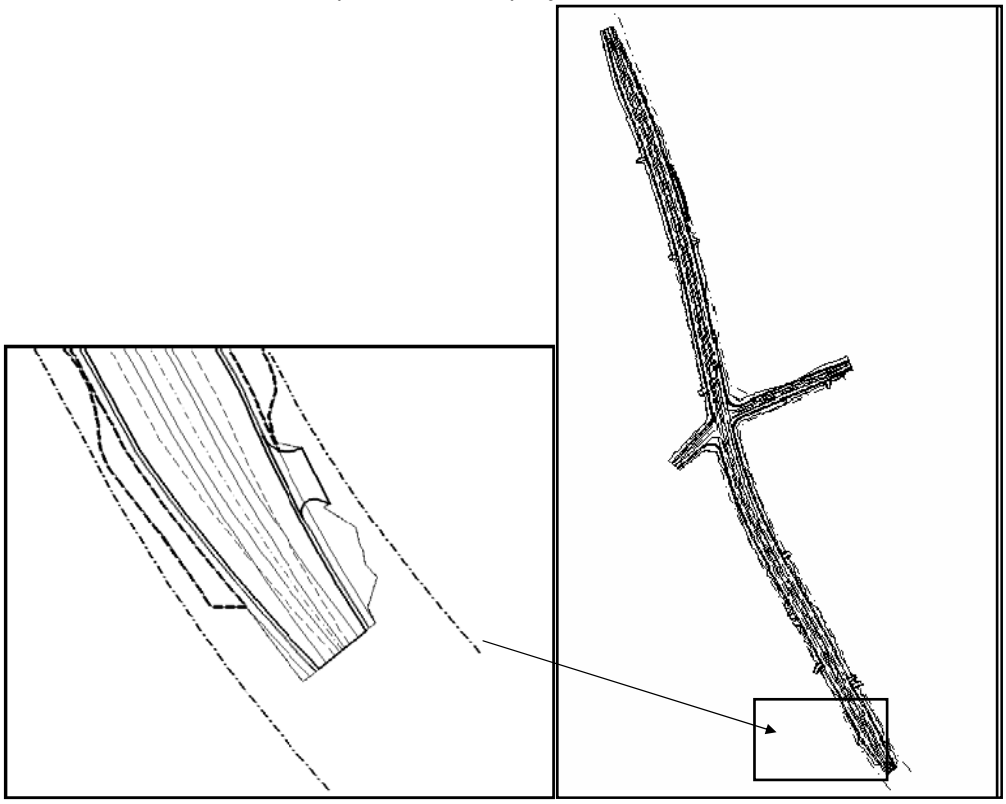
This exercise will guide you through the steps to create a shape for computing the area.

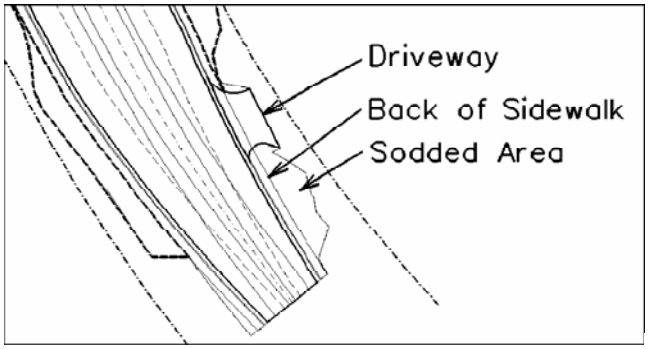
1. Switch to the Active model “Fill Area” in the DGN file. On the MicroStation Main Menu, select **File > Models**. From the Models dialog, double click on the “Fill Area” model. This will set it active and swap

to the Fill Area model views.

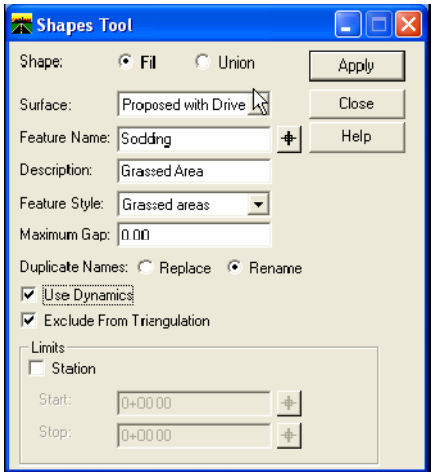


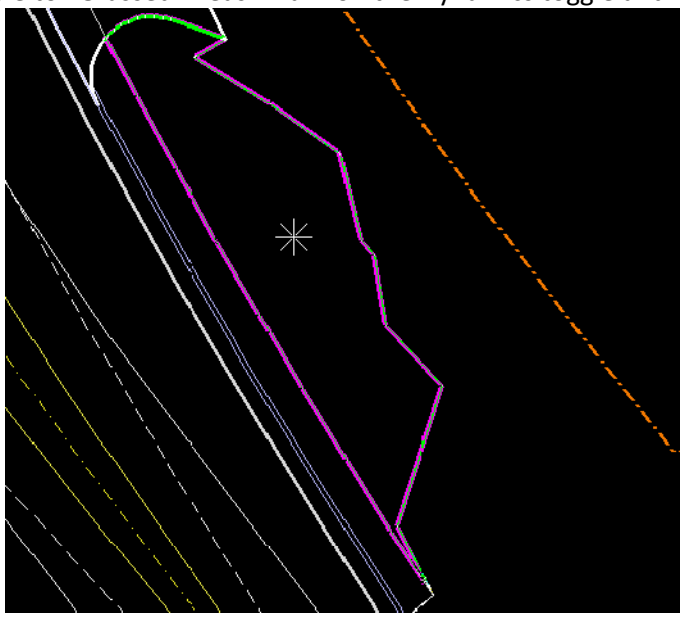
2. Window in on the southern portion of the project.



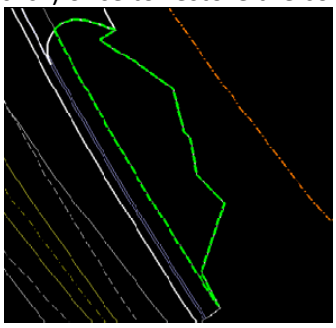


3. Create a closed feature for the area shown as Sod in the sketch above. Select **Quantities > Shapes Tool**, toggle Shape mode to ***Fill***. Verify that the Surface is "Proposed with Drive". For Feature Name, key-in "Sodding". Set the Feature style to "Grassed Areas". Turn on the Dynamics toggle and Apply.





4. Identify the sodded region by a datapoint in the area shown above. Left click to **Accept**. **Reset** (right click) once to restore the command dialog. Your results should be similar to the figure shown.

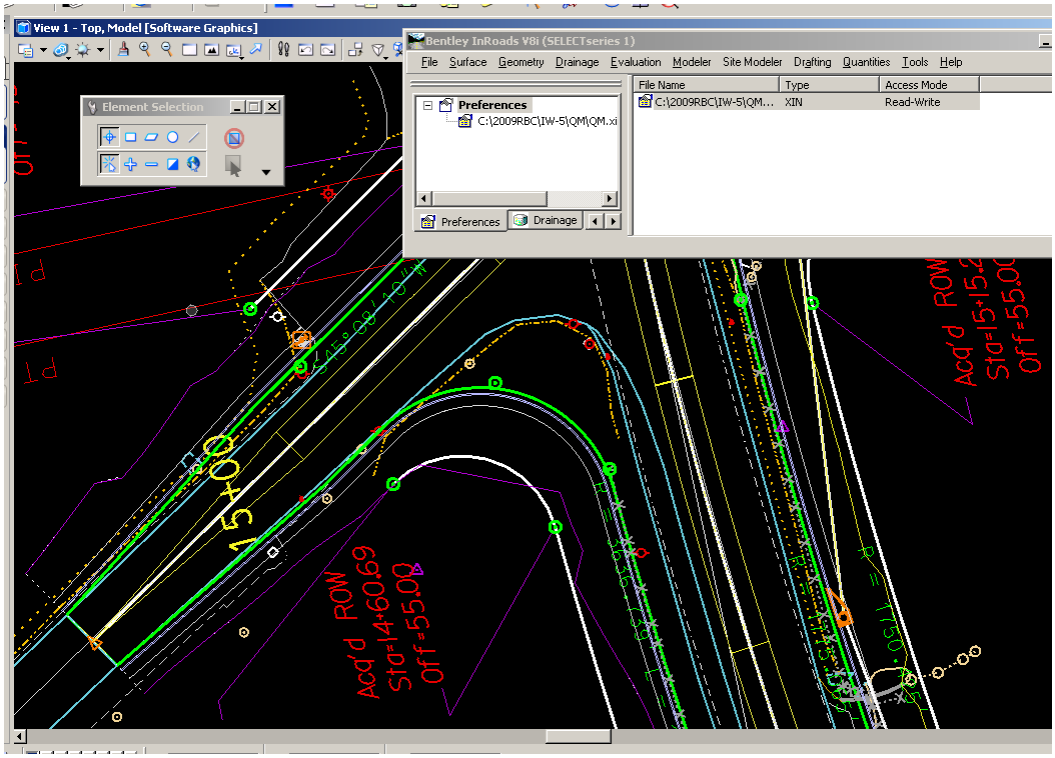


5. **Close** the Shapes Tool dialog, navigate back to the Model Views.

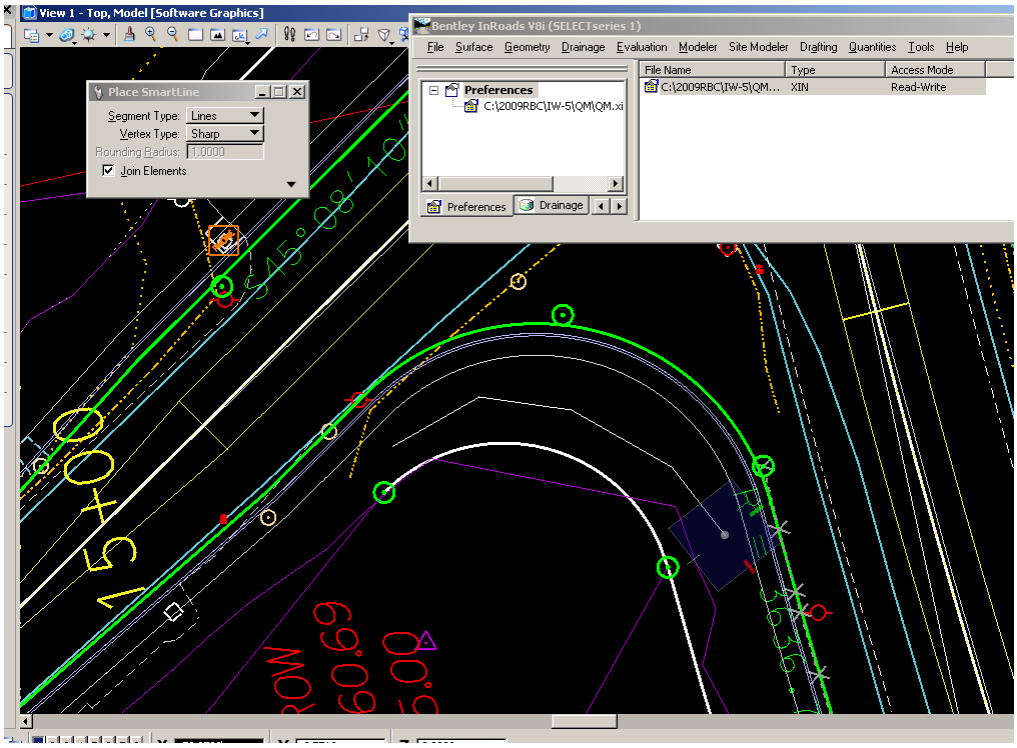
EXERCISE: ASSIGNING PAY ITEMS TO GRAPHIC ELEMENTS

This exercise will guide you through the steps to assign pay items to MicroStation Graphics.

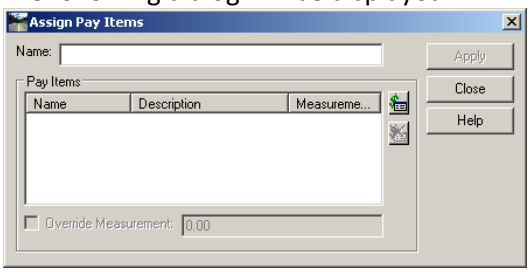
1. Window in to the intersection, as shown (approximately).



2. Place a Smartline as shown (any location will work). This is to represent a guardrail. Level/Symbology is not important.

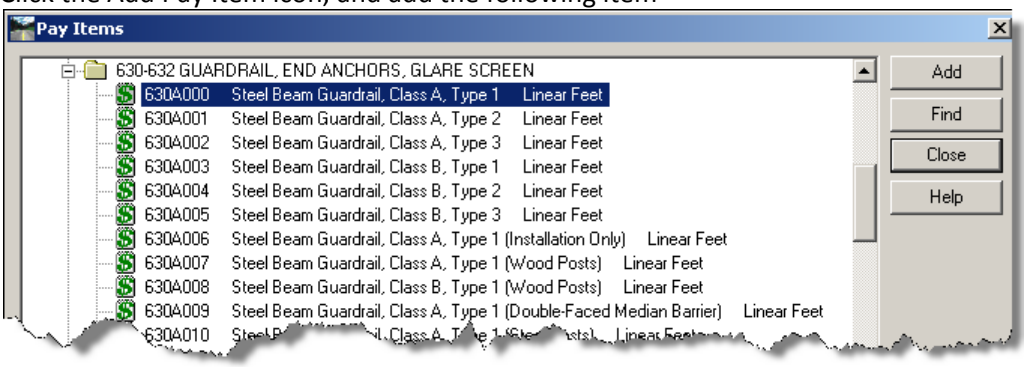


6. Select **Quantities > Assign Pay Items** from the InRoads Explorer Menu.
7. The following dialog will be displayed.



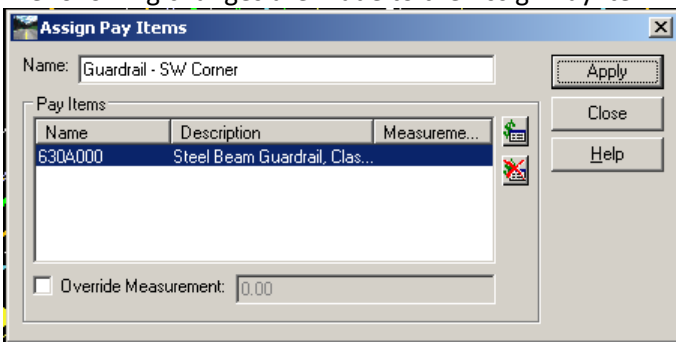
8. Enter Guradrail – SW Corner in the **Name** field.

9. Click the Add Pay Item icon, and add the following item –



Click **Add**, then **Close**.

10. The following changes are made to the Assign Pay Item Dialog.



11. Click **Apply**, and you will be prompted to identify a graphic or a feature.
Select the previously created graphic. Accept, then close the Assign Pay Items dialog.

    Notice when the cursor passes over the graphic, you get Pay Item Info presented to you.

12. Repeat as desired with other Pay Items. Utilize the Override Measurement option to “fix” the quantity.

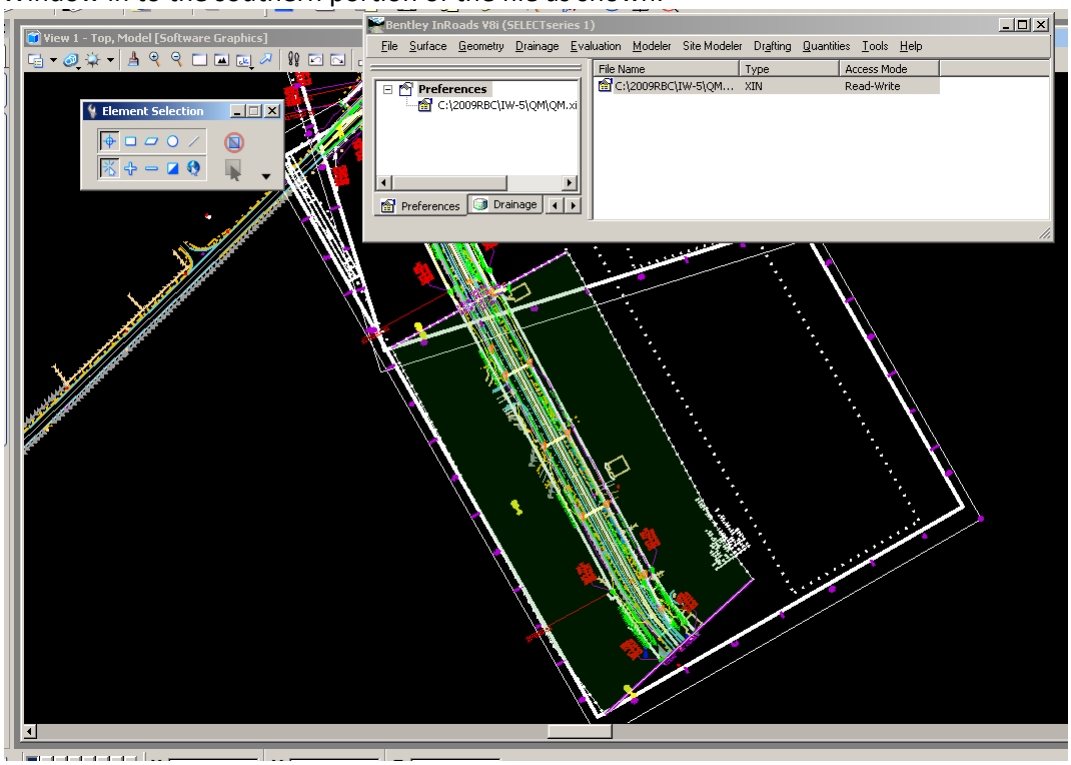
Lesson Name: Harvesting Quantities

LESSON OBJECTIVE:

In this Lesson you will learn how to compute quantities for use in Quantity Manager.

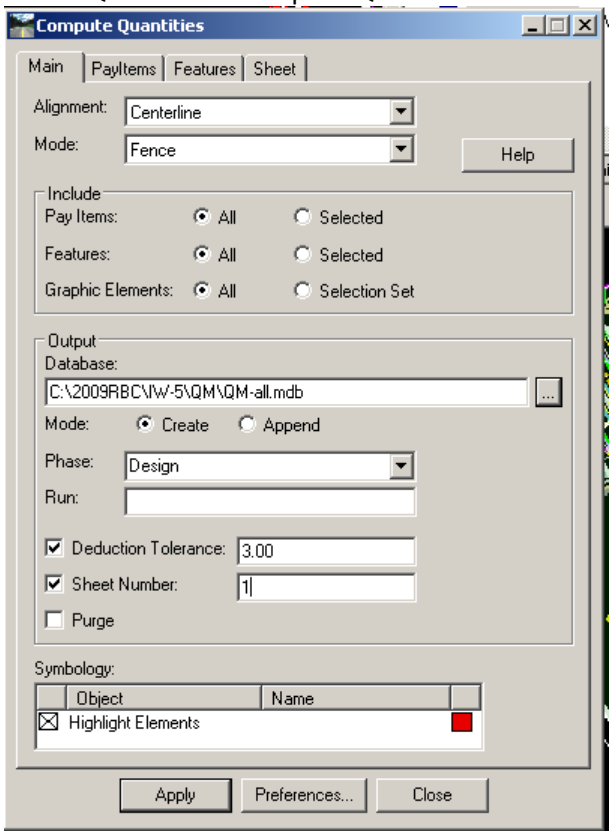
EXERCISE: HARVESTING QUANTITIES BY SHEET

1. Turn on the display of all the reference files. This will enable you to see the Plan and Profile sheets. Although we can read the information from the VDF file generated by InRoads Plan and Profile Generator, there is value to the foundation we will discuss in this lesson
2. Window in to the southern portion of the file as shown.



3. Place a Fence using the by Element method for the first (southernmost) sheet in the plan assembly. Set the Fence Mode to Clip.

4. Select Quantities > Compute Quantities. The following dialog will display.

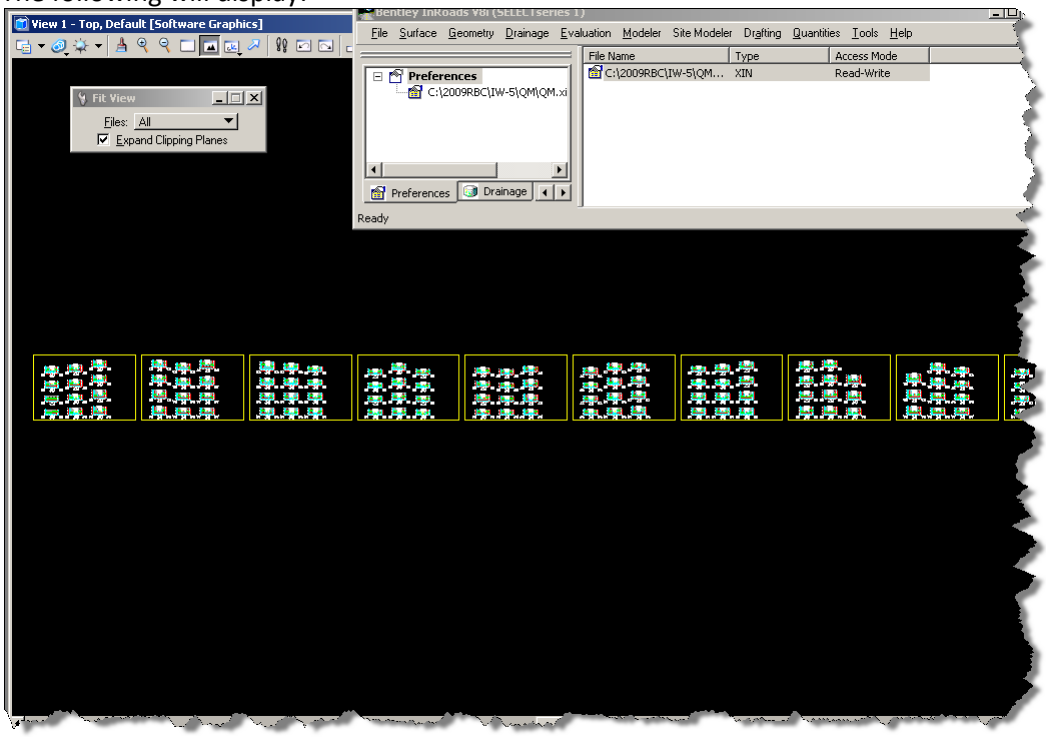


Set the output to the current working directory, make sure mode is set to Create, and toggle on the Sheet Number (1). For include, select All on each category.

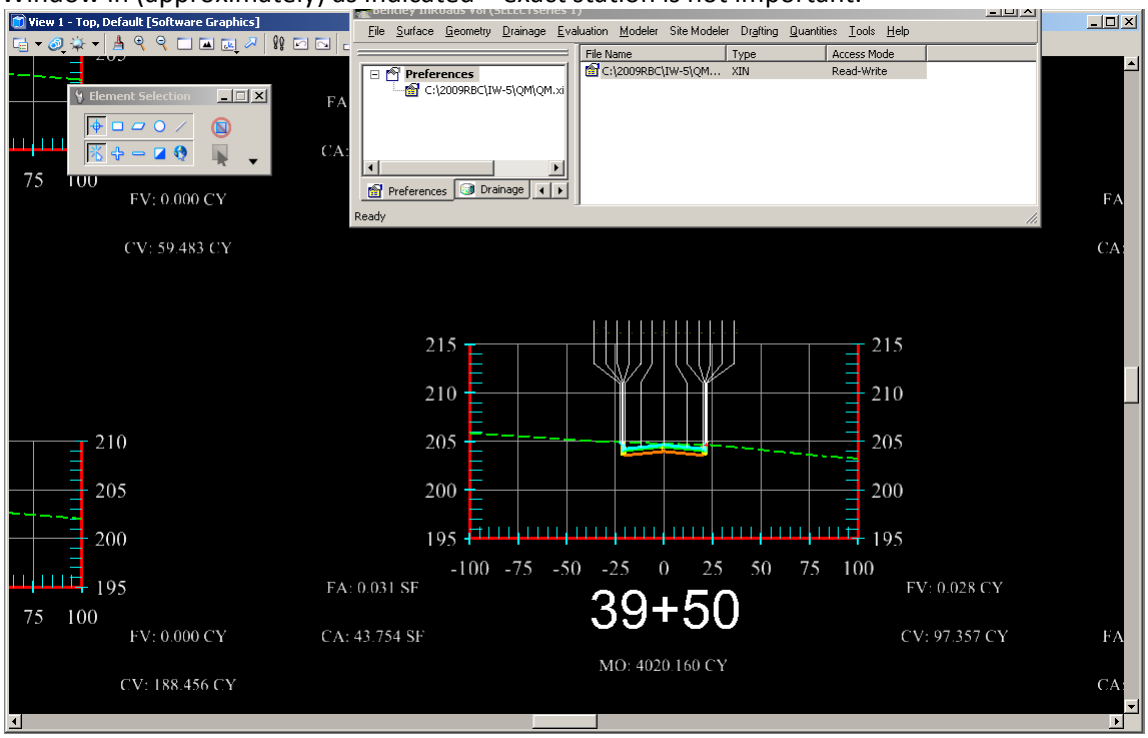
5. Pick **Apply**, then close when complete.
6. Pan up the sheet, and repeat for each of the 4 sheets, except use APPEND for the remaining sessions.
7. When complete with the last sheet, close the Compute Quantities dialog.

EXERCISE: HARVESTING END AREA VOLUME QUANTITIES

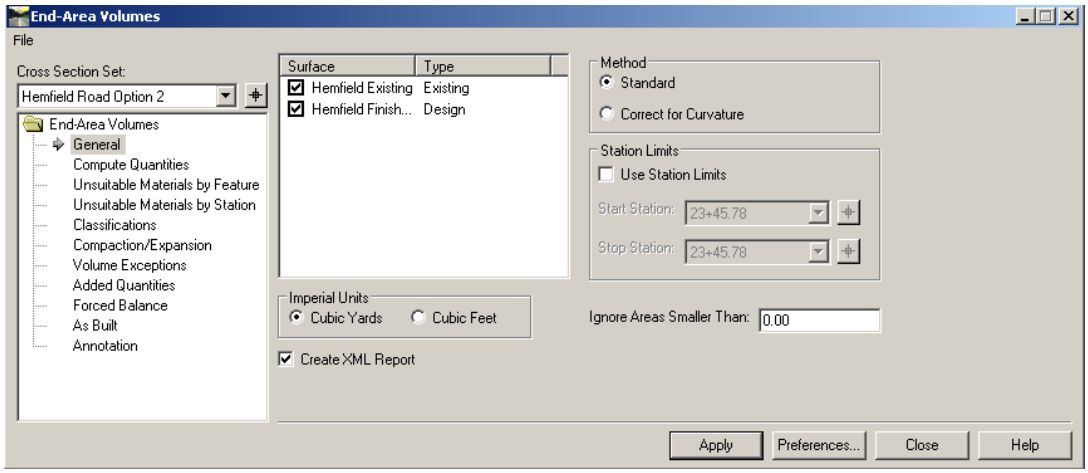
1. In MicroStation, navigate and open **C:\2010 RBC Data\CI1WK1\DATA\EA-Vol\EAVolumes.dgn**. The following will display:



2. Window in (approximately) as indicated – exact station is not important.

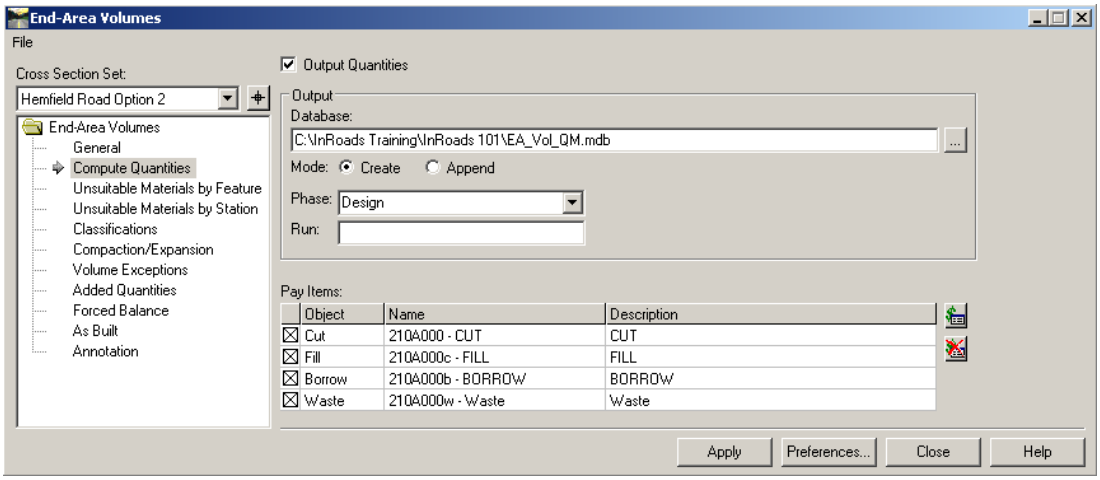


3. Select **Evaluation > Volumes > End Area Volume**s from the InRoads Explorer Menu.



Select “Create XML Report”

4. Open the “Compute Quantities” Leaf



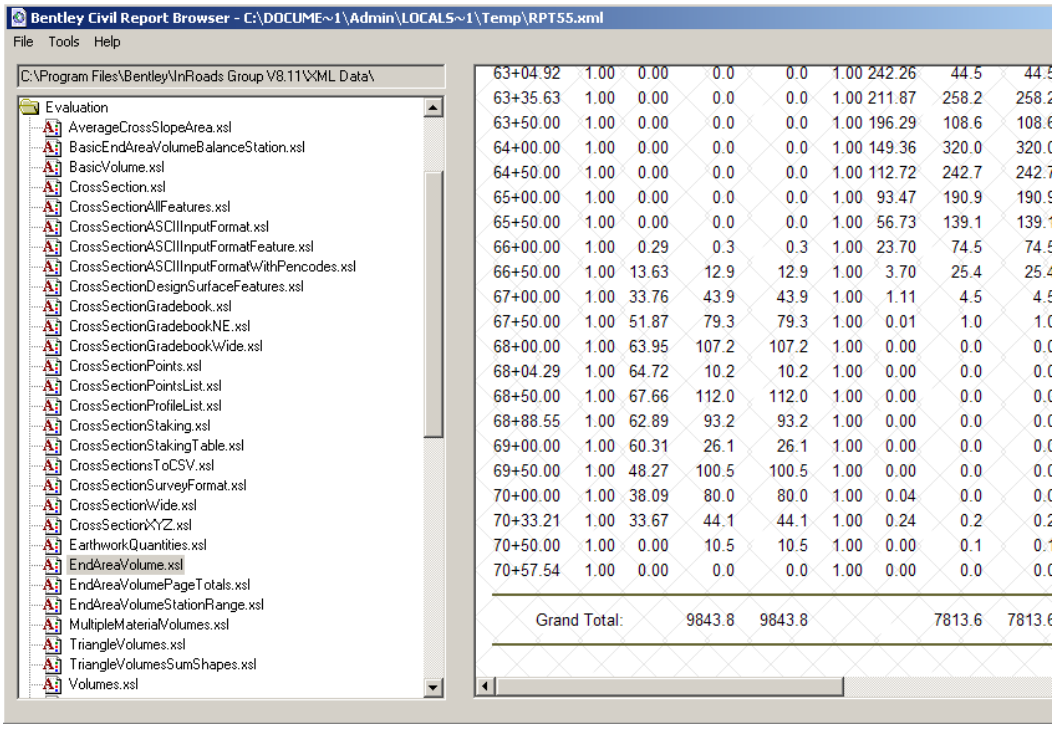
Select “Output Quantities” and specify the Output database (use the working directory – NOT the sample indicated above). Note – for this portion, we are using a Quantity DB that is NOT the “Final” (this is for your use – to enable you to see what is captured in End Area Volumes).

Make sure the Phase is populated; the basic delivered reports do not work in “All Phases” mode, and keep the phase designation consistent throughout this exercise.

Click the check box next to each of the pay items, click in the “Name” field, and using the add pay item (green $) box at the upper right of the pay item grid, add the Pay Items for Cut, Fill, Borrow, and Waste.
Note: The formulas attached to the pay items through Pay Item Manager do not apply in this case.

Regarding Borrow and Waste -
If the Mass Ordinate value is negative when completing the End Area Volumes, the Borrow field will be populated with the quantity required to balance the earthwork. If the value is positive, then the Waste field will be populated with the quantity of extra materials.

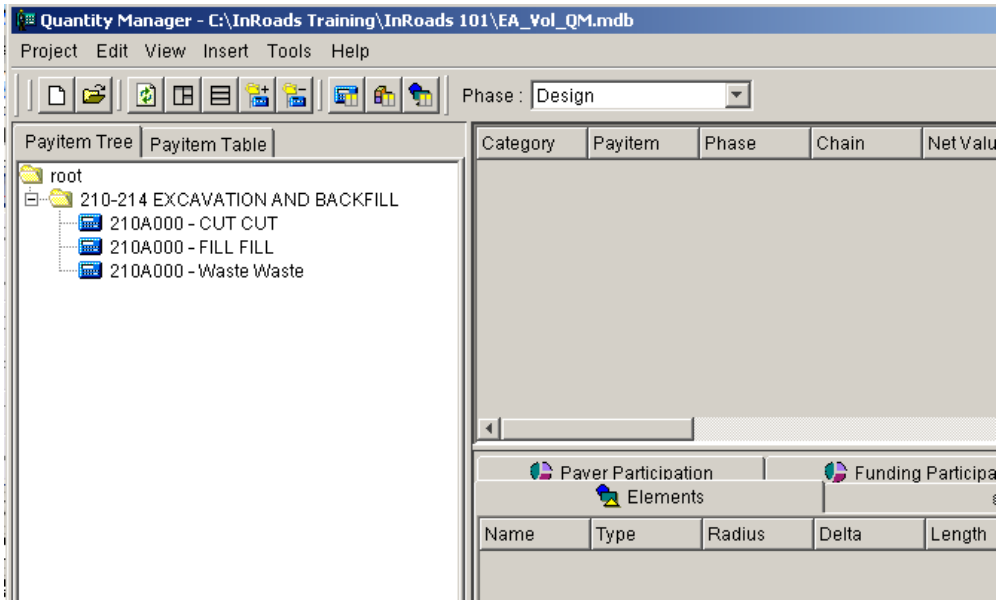
5. Click the **Apply** button and the following takes place -
The new EA Volumes Quantities DB specified will be created, and the InRoads Report Browser will open to display the EA Volumes Report. Scroll down to the bottom of the report (right side) and note the Cut and Fill Quantities.



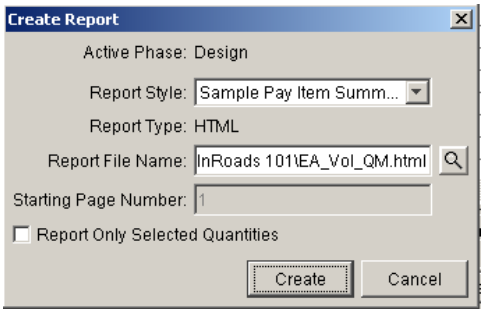
Scroll the report to the right and note the Mass Ordinate value is a positive number, this indicates a value should be populated in the Waste field.

6. Close the InRoads Report Browser and the End Area Volumes dialog and open Quantity Manager.
7. Specify the previously created Quantities Database and connect.

8. The following items will be displayed

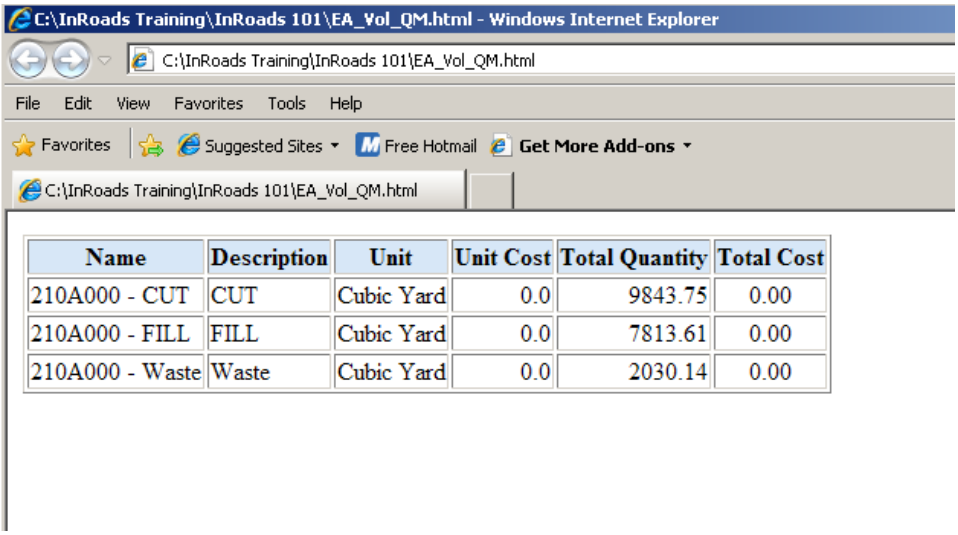


9. Make sure Phase is set to Design, navigate through the Pay Items listed (note the station, etc.).
10. Select “root” at the top of the Pay Item Tree, the select Tools>Reports>Create and choose the Sample Pay Item Summary (HTML)



Specify an output file and click the Create button.

11. The following HTML file will be displayed



Name	Description	Unit	Unit Cost	Total Quantity	Total Cost
210A000 - CUT	CUT	Cubic Yard	0.0	9843.75	0.00
210A000 - FILL	FILL	Cubic Yard	0.0	7813.61	0.00
210A000 - Waste	Waste	Cubic Yard	0.0	2030.14	0.00

10. Close all browser, report, and Quantity Manager windows and return to InRoads.
11. Re-Run the same End Area Volumes, but this time append to the database “QM-all” created in the earlier lesson.
12. Open Quantity Manager again, connect to QM-all, and review.
13. Generate Summary Reports as previous, notice the inclusion of End Area Volumes.