

CDOT Calculating Quantities With InRoads and Quantity Manager



This document guides you through the use of InRoads and Quantity Manager to calculate and extract quantities from InRoads data. The processes included in this document cover:

Editing the Pay Item database to calculate quantities for materials that use the same pay item code but use different variables or formulas to compute the quantity.

Importing MicroStation graphic elements into a surface (DTM) so that they can be quantified.

Using the Shapes Tool to create surface features from closed areas.

Using the Compute Quantities tool to calculate quantities and store the output to a database.

Working with Quantity Manager to input quantities that were not calculated and create various reports on the quantity data.

CDOT Customizing the Pay Items Database

When figuring quantities, it is possible that two or more features will use the same pay item code but require different values for some formula variables. For example, the same paving material may be used for both the roadway and driveways but the thickness of that material can vary. Pay Item Manager will be used to copy a pay item and edit that copy for use with different variables or formulas.

Copying The CDOT Pay-Items.mdb:

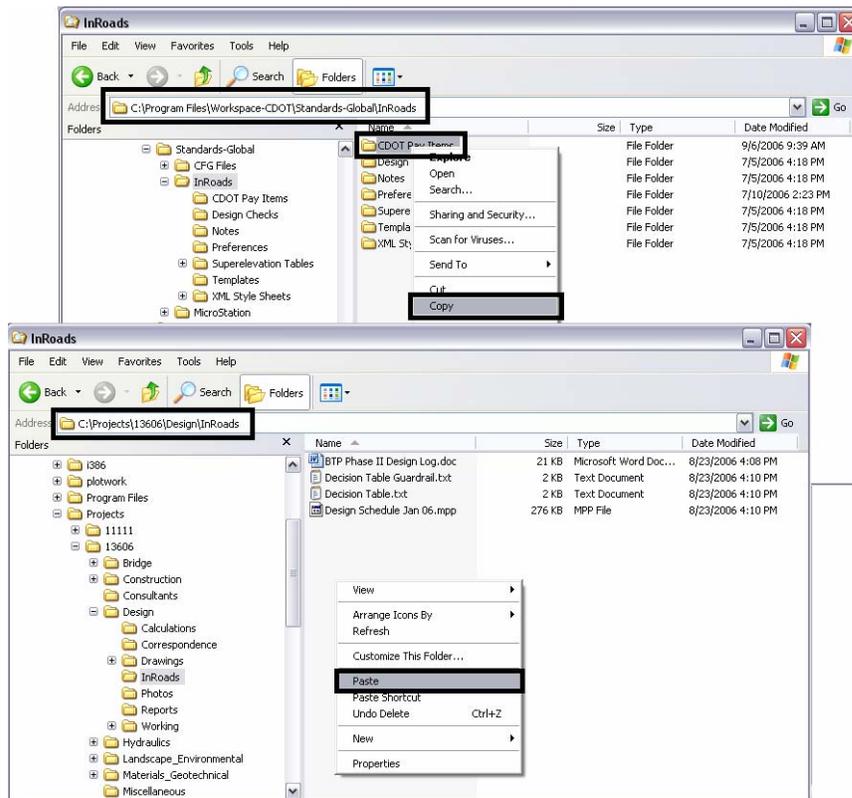
Because the changes made to the pay items database will be unique to the project, a copy of the CDOT Pay-Items.mdb should be placed in the project directory.

Making The Copy

1. Open an Explore window to the C:\Program Files\Workspace-CDOT\Standards-Global\InRoads directory and copy the entire **CDOT Pay Items** folder.

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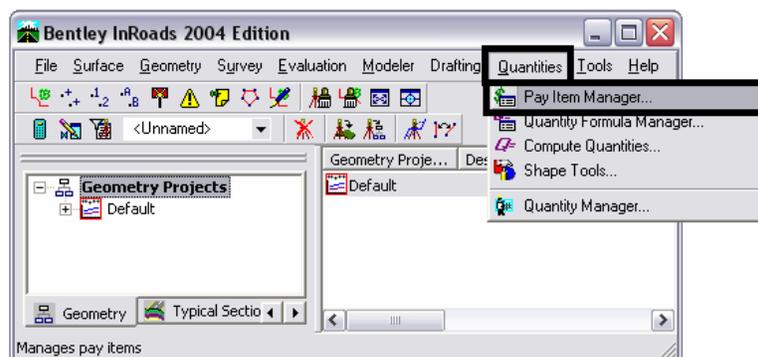
2. Change the directory to **C:\Projects\JPC#\Design\InRoads** and paste.



Copying A Pay Item

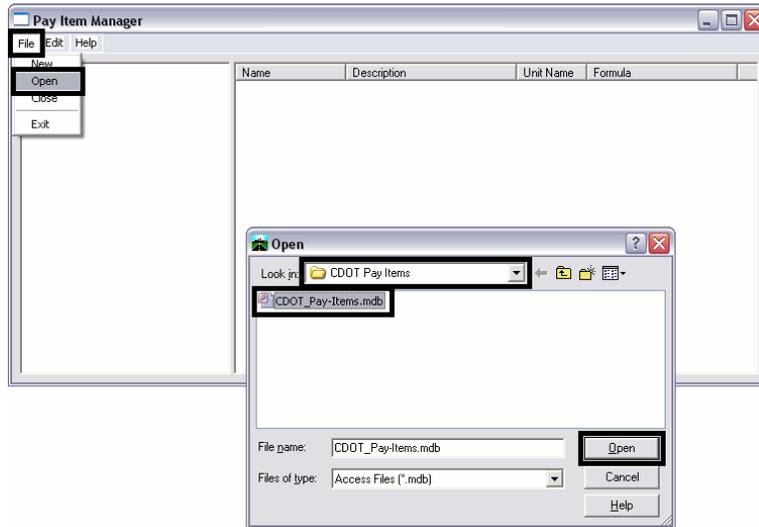
Now that a copy of the master database has been made, customizing the copy for the particular project can be accomplished.

3. Start InRoads (and MicroStation), opening the;
C:\Projects\JPC#\Design\Working\XXXJPC#QuantityModel##.dgn file.
4. From the InRoads menu, select **Quantities > Pay Item Manager**. This displays the Pay Item Manager dialog box.



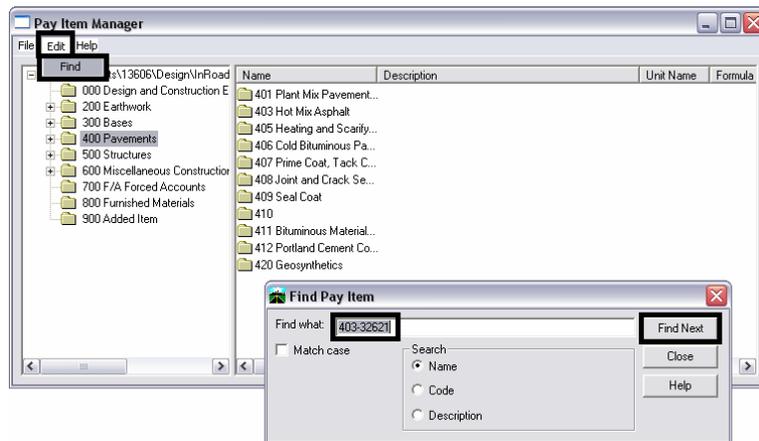
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5. From the Pay Item Manager dialog box, select **File > Open**.
6. In the Open dialog box, Set the directory path to:
C:\Projects\JPC#\Design\InRoads\CDOT Pay Items\.
7. Select **CDOT Pay-Items.mdb** and **Open**.



Locate The Pay Item To Be Copied

8. Select **Edit > Find** from the Pay Item Manager dialog box. This displays the Find dialog box.
9. In the **Find What** field of the Find dialog box, key in the desired **Pay Item Code**. And select **Find Next**. The desired pay item will be displayed, highlighted in the right pane of the Pay Item Manager dialog box.

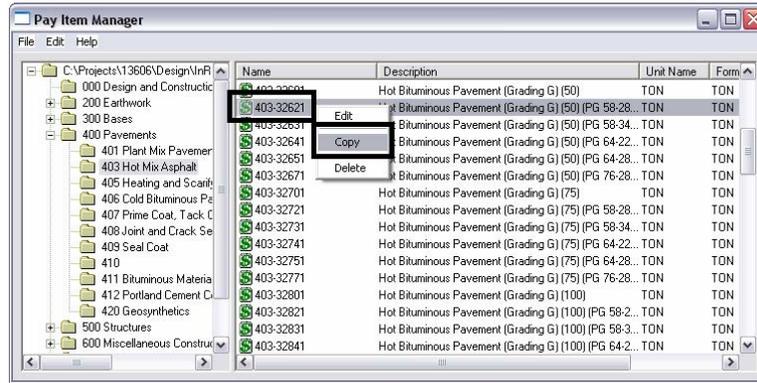


10. Select **Close** from the Find dialog box.

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Making The Copy

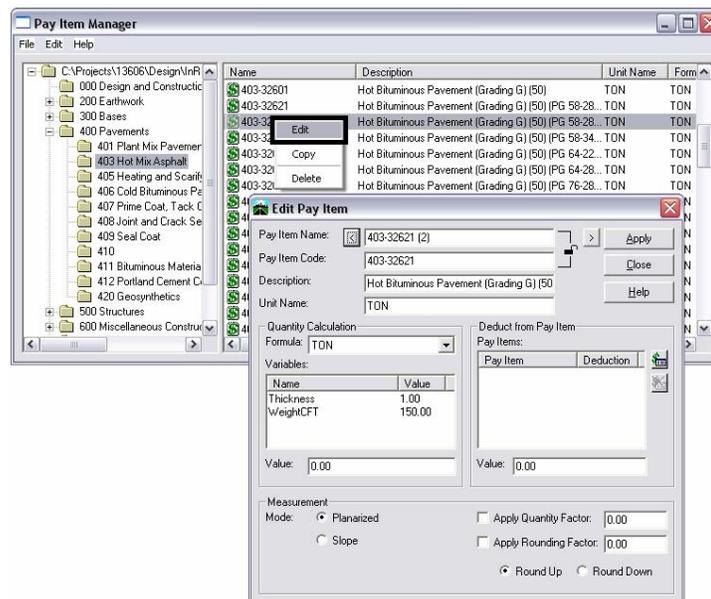
10. In the right pane of the Pay Item Manager window, <R> on the desired Pay Item Name. **Note:** be sure that the cursor is in the Name column. Select **Copy** from the menu that is displayed.



Move the cursor to the Description column, <R> and select Paste. A copy of the pay item (with (2) appended to the name) is placed under the original.

Editing The Pay Item:

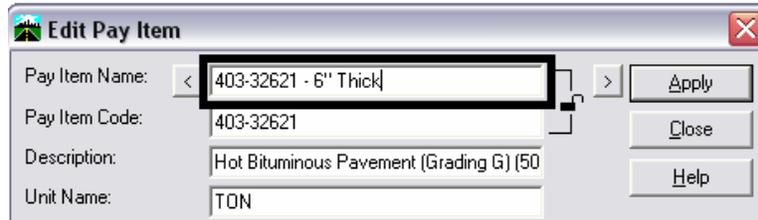
13. In the right pane of the Pay Item Manager window, <D> on the copied Pay Item Name. **Note:** be sure that the cursor is in the Name column. This will highlight the copied Pay Item.
14. <R> on the Pay Item Name and select **Edit**. This displays the Edit Pay Item dialog box.



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15. <D> just to the left of the '(2)' in the Pay Item Name field. Key in a brief, descriptive addition to the name. Delete the '(2)'.

For Example, if pay item 403-32621 is to be laid down 6" thick, the name could read, "403-32621 – 6" Thick".



403-32621 - 6" Thick

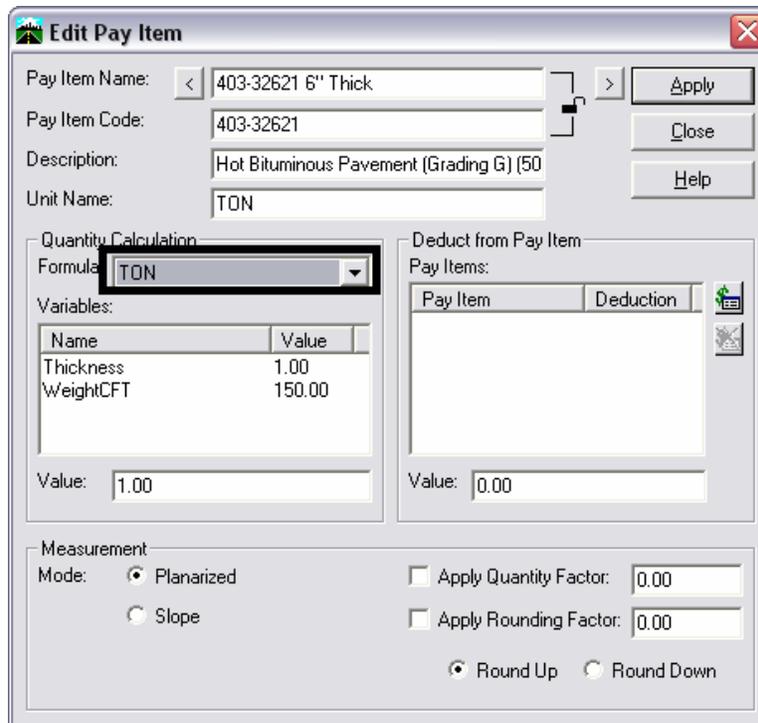
403-32621

Hot Bituminous Pavement (Grading G) (50)

TON

16. Do not change the Pay Item Code, Description, or Unit Name. Doing so will result in errors in the pay quantity calculations.
17. A different formula may be selected from the **Formula** pull-down in the Quantity Calculation area.

For example, there are two formulas for computing tons; 'Ton' and 'Ton – L'. 'Ton' uses the area of a feature and the variables Thickness and WeightCFT. 'Ton – L' uses the length of the feature and the variables Width, Thickness, and WeightCFT.



403-32621 6" Thick

403-32621

Hot Bituminous Pavement (Grading G) (50)

TON

Quantity Calculation

Formula: TON

Name	Value
Thickness	1.00
WeightCFT	150.00

Value: 1.00

Deduct from Pay Item

Pay Item	Deduction
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Value: 0.00

Measurement

Mode: Planarized Slope

Apply Quantity Factor: 0.00

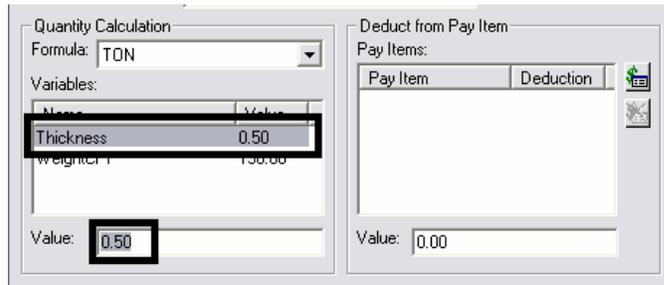
Apply Rounding Factor: 0.00

Round Up Round Down

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Editing Formula Variables

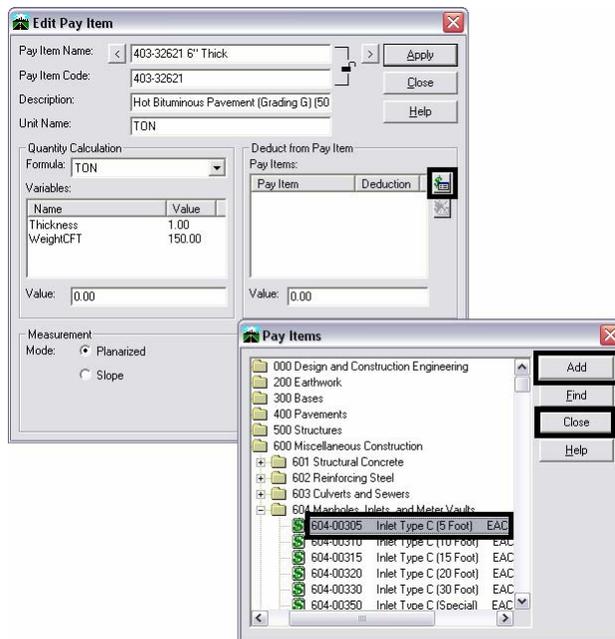
18. <D> on the desired variable from the Variables list in the Quantity Calculation area.
19. Highlight the data in the Value field directly below the Variables list and *key in* the desired value. Press the Tab key to accept the value.



Deduction From Pay Items

This option is used when two features occupy the same location (are coincident) and one of those features can reduce the quantity of the other. For example, suppose a curb feature is stored as a continuous Breakline and inlet features are stored as random points on the curb Breakline. For each occurrence of an inlet on the curb, the quantity of the curb can be reduced by a defined value.

20. To add a pay item for deduction <D> on the **Pay Item Browser** button. This displays the Pay Item browser dialog box.
21. <D> on the desired pay item and select **Add**. The Pay Item is add to the Deduct From Pay Items list. <D> on the **Close** button to dismiss the Pay Item browser dialog box.



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22. <D> on the desired pay item from the list in the Deduct From Pay Items area.
23. Highlight the data in the Value field directly below the Pay Items list and key in the desired value. Press the Tab key to accept the value.

The image shows two side-by-side dialog boxes. The left box is titled "Quantity Calculation" and contains a "Formula:" dropdown set to "TON", a "Variables:" table, and a "Value:" field set to "0.00". The right box is titled "Deduct from Pay Item" and contains a "Pay Items:" table with one row highlighted, and a "Value:" field set to "5.00".

Name	Value
Thickness	1.00
WeightCFT	150.00

Pay Item	Deduction
604-00305	5.00

The Measurement Area

The options in this area are used to determine how areas and lines are measured. It is also used to specify quantity factors and rounding.

There are two mode of measurement; Planarized and Slope. Planarized projects the shape to a flat (2D) plane for measurement. Slope measures the actual (3D) shape.

24. <D> on the desired radio button to select the measurement **Mode**.

The image shows the "Edit Pay Item" dialog box. It contains fields for "Pay Item Name", "Pay Item Code", "Description", and "Unit Name". Below these are the "Quantity Calculation" and "Deduct from Pay Item" sections. At the bottom, the "Measurement" section has two radio buttons: "Planarized" (selected) and "Slope". There are also checkboxes for "Apply Quantity Factor" and "Apply Rounding Factor", and radio buttons for "Round Up" and "Round Down".

Name	Value
Thickness	1.00
WeightCFT	150.00

Pay Item	Deduction
604-00305	5.00

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A Quantity Factor is a multiplier applied to the calculated quantity.

25. If a Quantity Factor is to be used, <D> the check box to the left of **Apply Quantity Factor**.
26. Highlight the data in the field to the right of **Apply Quantity Factor** and *key in* the desired value. Press the Tab key to exit the field.

Measurement
Mode: Planarized Apply Quantity Factor: 0.00
 Slope Apply Rounding Factor: 0.00
 Round Up Round Down

A Rounding Factor is used to modify the computed value to the nearest specified increment. There is also the option to round up or down.

27. If a Rounding Factor is to be used, <D> the check box to the left of **Apply Rounding Factor**.
28. Highlight the data in the field to the right of **Apply Rounding Factor** and *key in* the desired value. Press the Tab key to exit the field.
29. Select the desired rounding option from the two radio buttons below **Apply Rounding Factor**.

Measurement
Mode: Planarized Apply Quantity Factor: 0.00
 Slope Apply Rounding Factor: 1.00
 Round Up Round Down

30. <D> the **Apply** button to accept all of the changes made to the pay item.
31. <D> the **Close** button to dismiss the Edit Pay Item dialog box.

Edit Pay Item

Pay Item Name: 403-32621 6" Thick
Pay Item Code: 403-32621
Description: Hot Bituminous Pavement (Grading G) (50
Unit Name: TON

Quantity Calculation
Formula: TON
Variables:

Name	Value
Thickness	1.00
WeightCFT	150.00

Value: 0.00

Deduct from Pay Item
Pay Items:

Pay Item	Deduction
604-00305	5.00

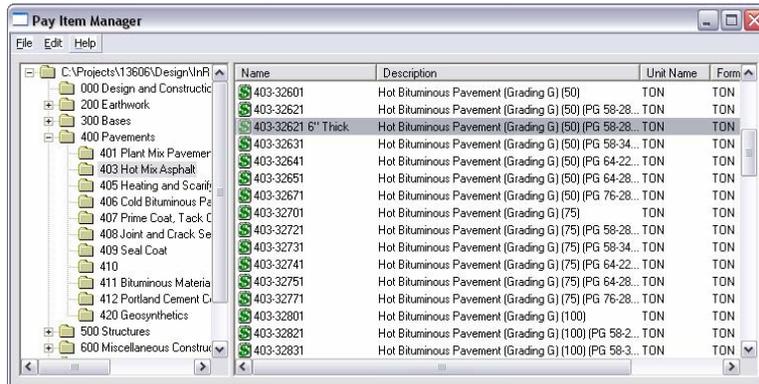
Value: 5.00

Measurement
Mode: Planarized Apply Quantity Factor: 0.00
 Slope Apply Rounding Factor: 1.00
 Round Up Round Down

Buttons: Apply, Close, Help

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32. This completes the edit.



Importing Graphics To surface

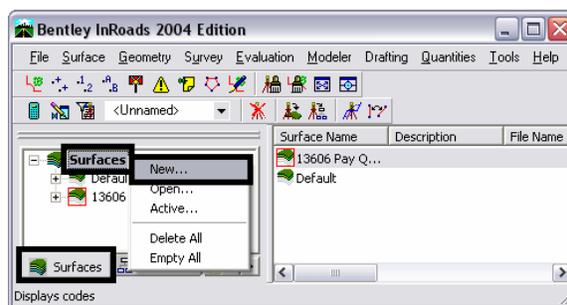
This command takes the X, Y, and Z coordinate information from a MicroStation element and stores it in a DTM file. This command will be primarily used for creating pay quantity data. Because of the high level of data control required, the Load From Fence option is inappropriate and will not be described.

Creating Or Opening The Surface

Data imported from graphics can be either loaded into a new or existing surface.

Creating A Surface

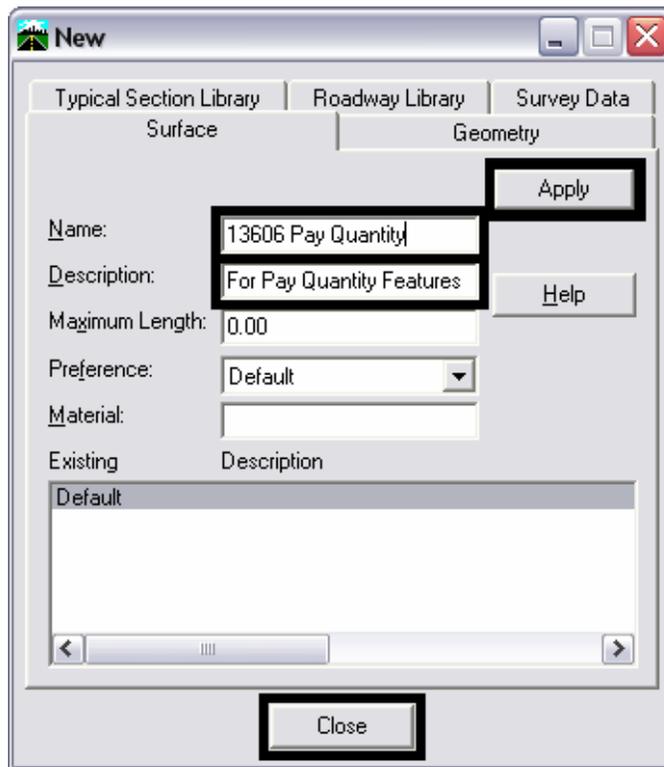
1. In the InRoads menu, <D> on the bottom **Surfaces** tab. <R> on the word 'Surfaces' at the top of the left pane then select **New** from the menu.



2. In the **Name** field of the **New** window, key in the desired name.
3. In the **Description** field, key in the desired description.

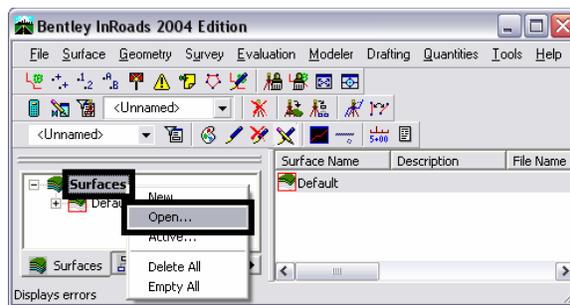
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4. <D> the **Apply** button then <D> **Close**.



Opening An Existing Surface

5. In the InRoads menu, <D> on the bottom **Surfaces** tab. <R> on the word 'Surfaces' at the top of the left pane then select **Open** from the menu.



6. In the Open dialog box, use the **Look In** pull down menu to select the desired directory path.
7. <D> on the desired file name.

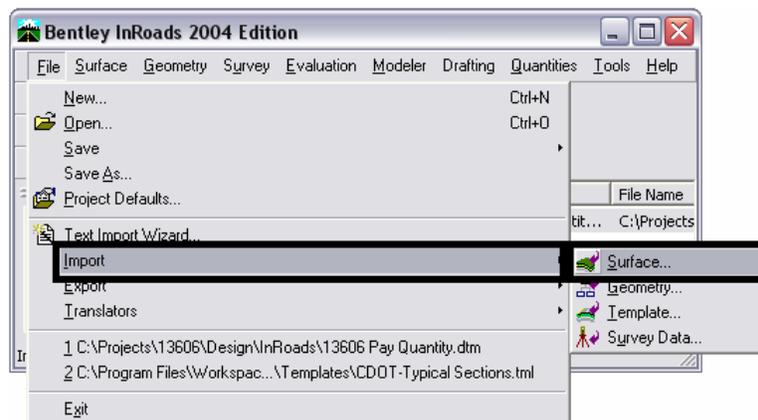
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8. <D> on the **Open** button, then <D> on the **Cancel** button to dismiss the Open dialog box.



Importing Graphic Data

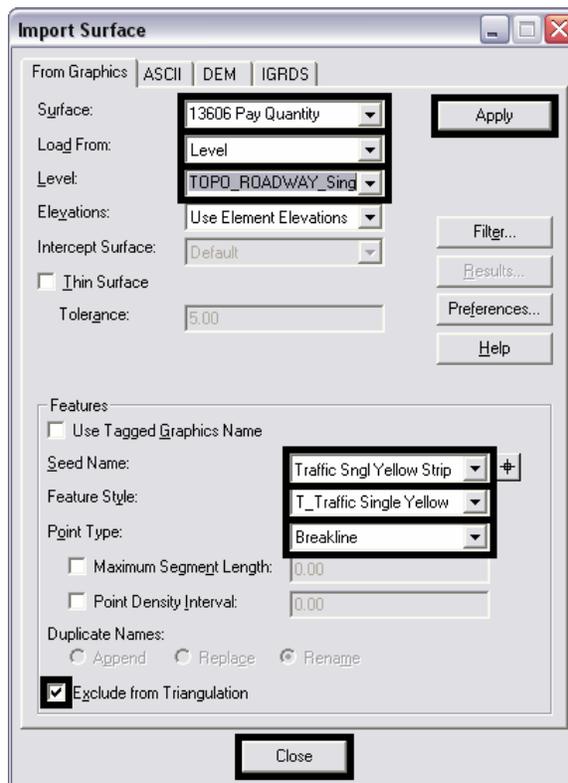
9. In the InRoads menu, select **File > Import > Surface**. The Import Surface dialog box will be displayed.



10. Using the **Surface** pull down menu, select the desired surface.
11. With the **Load From** pull down menu, select the desired method.
 - a. If all of the elements on a particular level are to be imported, select **Level**.
 - b. If some elements on a level are to be imported and others are not, then select **Single Element**.
12. If **Load From** is set to **Level**, then with the **Level** Pull down menu select the desired level. If **Load From** is set to **Single Element** this field is inactive.
13. In the **Seed Name** field, key in the desired name. This will be used to name the features imported from the graphic elements. **Note:** this field may be populated if an existing surface is being used.

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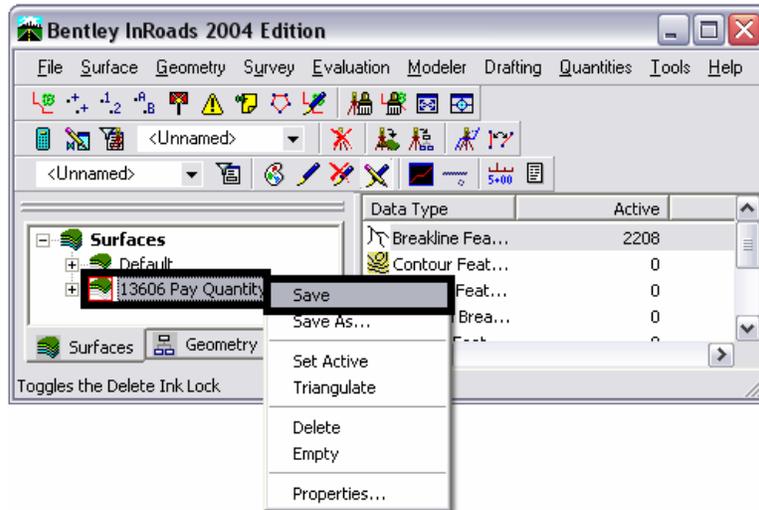
14. Use the **Feature Style** pull down menu to select the desired feature style.
15. Select the desired **Point Type** from the pull down menu. **Note:** when importing graphics for pay quantities, **Random** should be used for items paid for as each. **Breakline** is used for items whose quantity is figured from a linear measurement.
16. <D> the **Apply** button.
 - a. If the **Load From** is set to **Level**, all elements on the selected level are imported.
 - b. If **Load From** is set to **Single Element**, then <D> on the desired element. <D> a second time to Accept the selection.



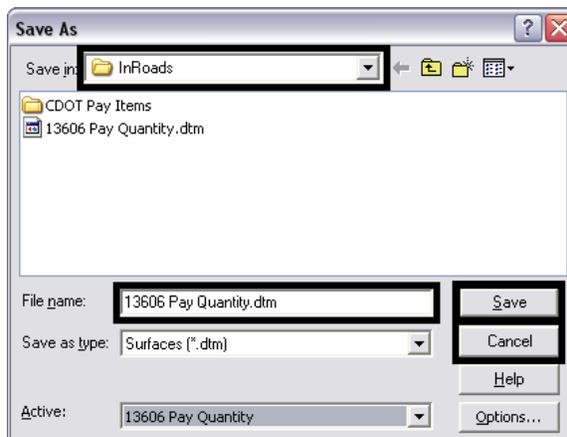
17. After all Levels and Elements are imported, <D> the **Close** button.

Saving The Surface

18. In the InRoads menu, <R> on the surface name in the left pane then select **Save** from the menu. If the file existed prior to importing data then the data is saved to that file and no further action is required.



19. If the file was new then the **Save As** dialog box will appear. Select the directory path using the **Save In** pull down menu.
20. In the **File Name** field, *key in* the desired name.
21. <D> on the **Save** button, then <D> on the **Close** button.



Using The Shapes Tool

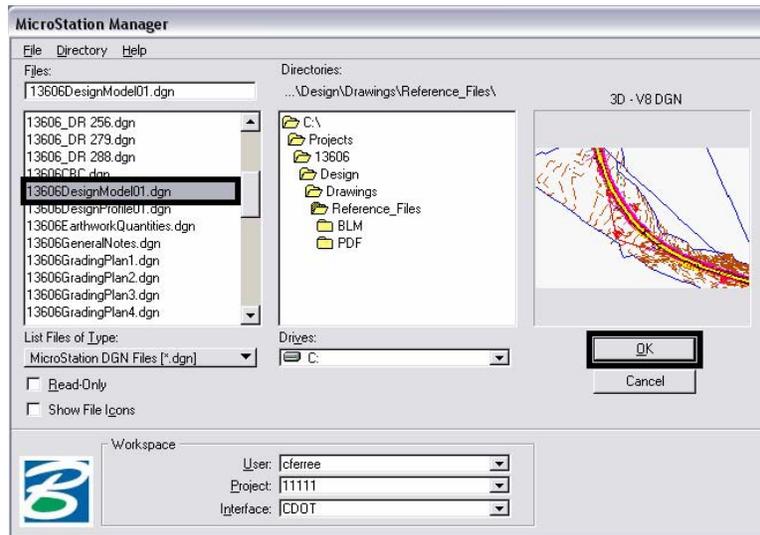
The Shapes Tool is used to create dtm features that define an area. The advantage of this tool is that it does not affect the graphic elements used to create the features. So, some of the same elements used to define an area feature can also be used to define linear features as well.

Creating A Working DGN file:

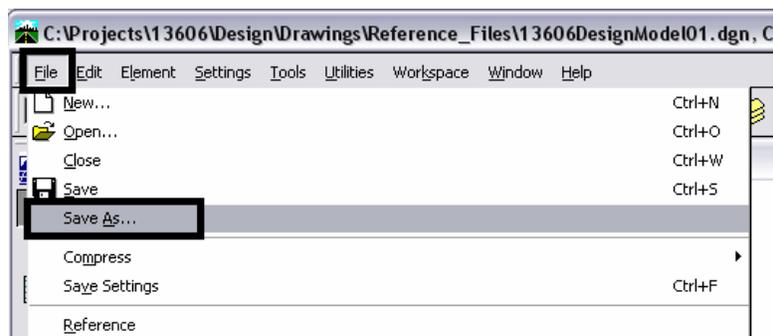
Because the Shapes Tool may require additional graphic elements to be added to the model file, or existing elements to be modified, a copy of this file should be used.

Creating A Copy of the DGN File

1. Start InRoads (and MicroStation). Set the directory path and highlight the desired file. Select **OK**.



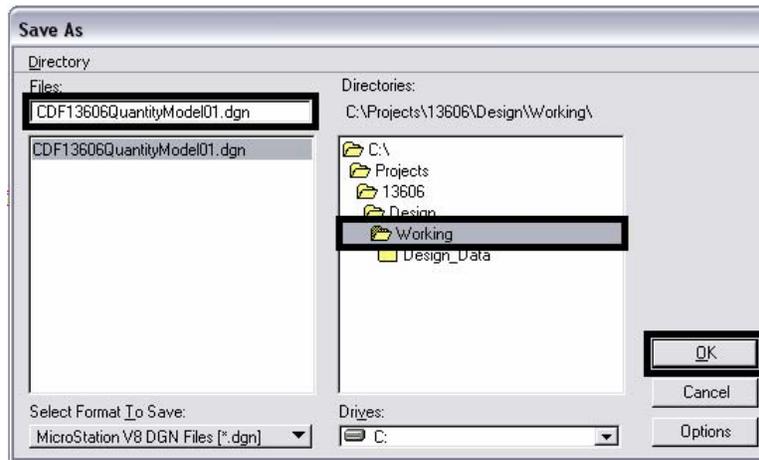
2. Select **File > Save As** from the MicroStation Menu.



3. In the **Save As** dialog box, set the directory to the **Working** directory.

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4. Key in the new name for the copied file and select **OK**. The copied file is now open in MicroStation.

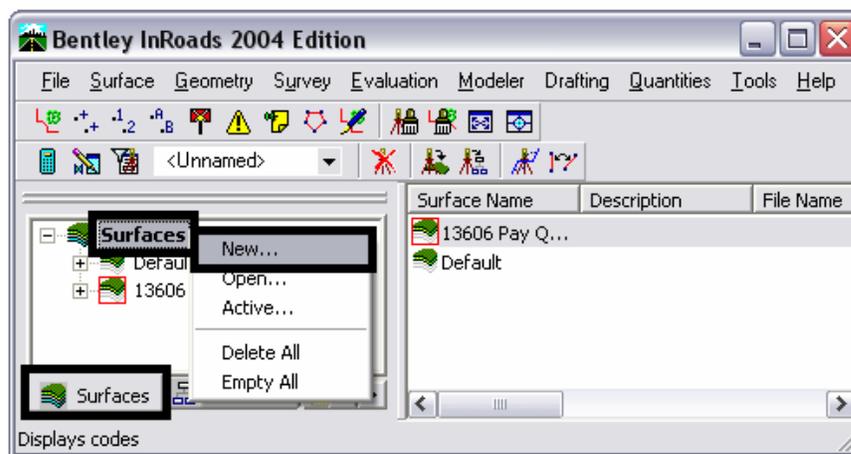


Preparations For Using The Shapes Tool:

Creating A surface For Quantity Data

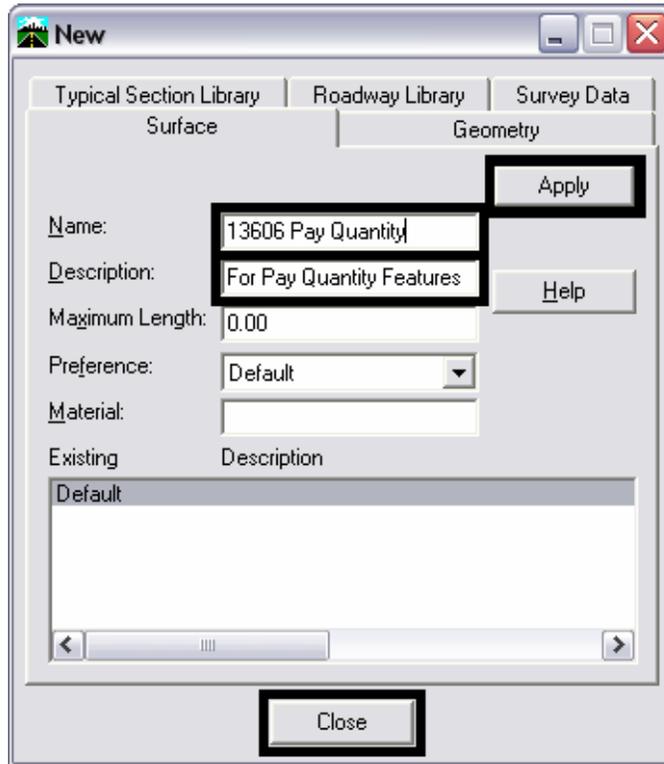
The design DTM will contain a large number of features that will not be used for quantity calculation. Using this surface could produce unwanted or erroneous quantity data. To avoid this problem a surface will be created to contain only pay quantity data.

5. In the InRoads menu, <D> on the bottom **Surfaces** tab. <R> on the word 'Surfaces' at the top of the left pane then select **New** from the menu.



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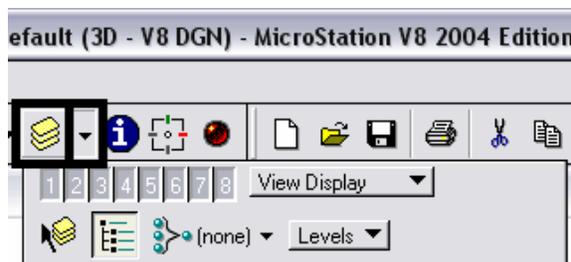
6. In the **Name** field of the **New** window, key in the desired name.
7. In the **Description** field, key in the desired description.
8. <D> the **Apply** button then <D> **Close**.



Setting The Level Display

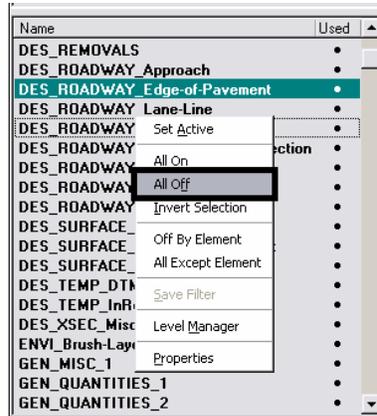
The Shapes Tool works with all of the visible graphic elements. Therefore, it is necessary to turn off those levels that do not contain elements that will be used define the area feature.

9. Select the Level Display. **Note:** if the down arrow next to the Level Display button is selected, the Level Display menu will be automatically dismissed when the cursor is moved off the menu.



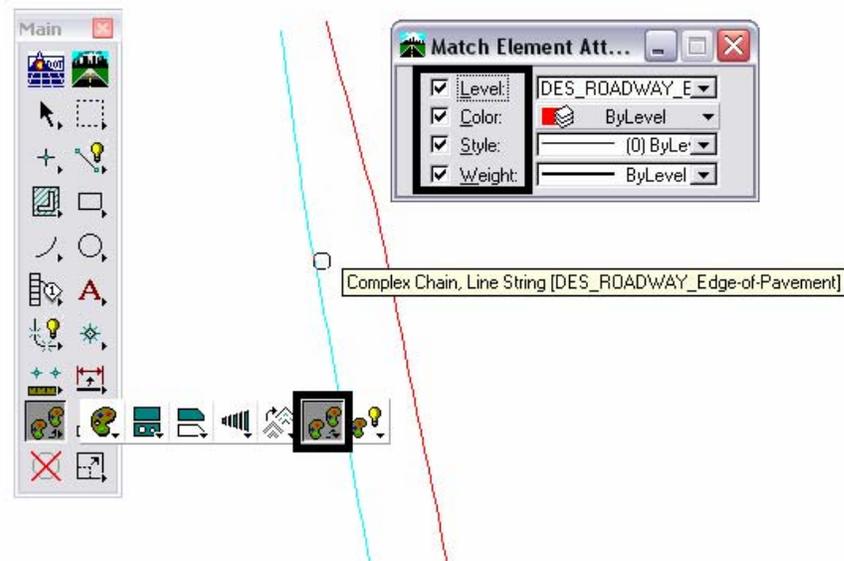
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10. <R> on the desired level and select **Set Active** from the menu.
11. <R> on the Level Display and select **All Off** from the menu. This will leave only the desired elements displayed.



Closing The Area

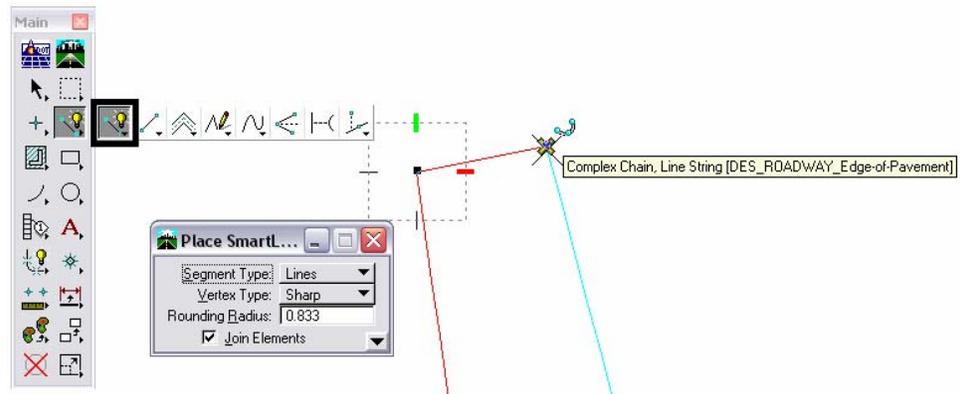
12. Use the Match Element Attributes command. Turn on all of the check boxes. <D> on the desired element to match its attributes.



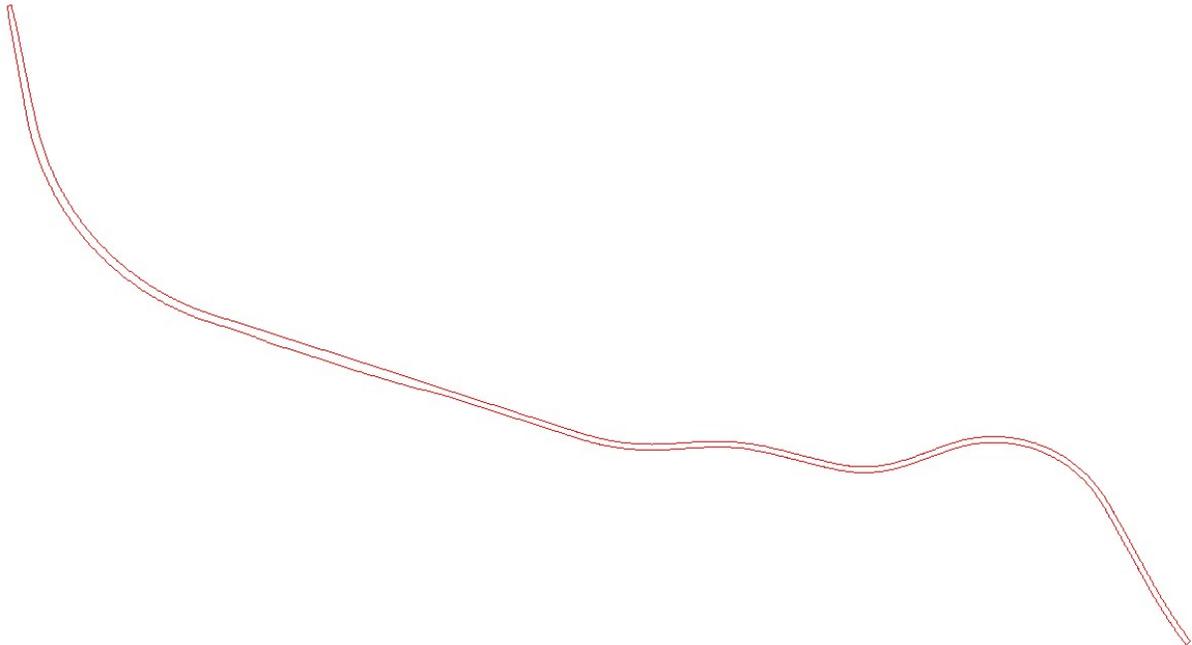
13. Select the **Place Smartline** (or Place Line) command. <T> to the end of one of the elements that will form the area then <D>.

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14. <T> to the end of the next element that will form the area then <D>.

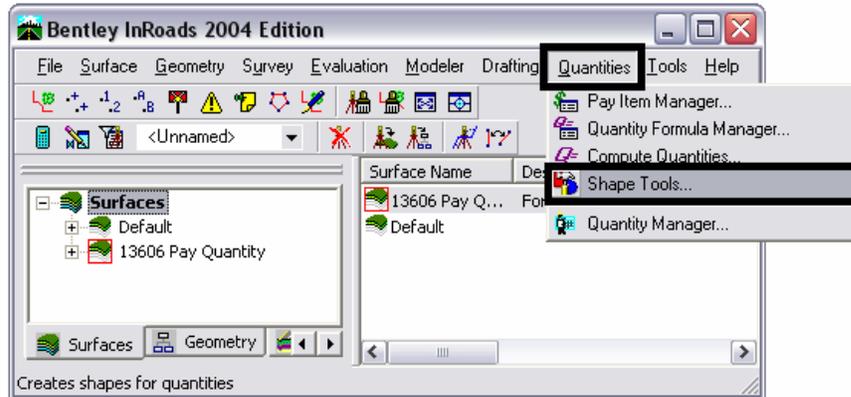


15. Repeat this process until all of the gaps in the area are filled. Below is an example of a closed area.

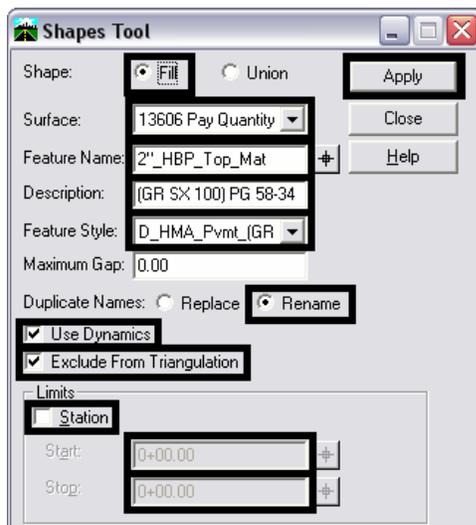


Creating The Area Feature

- From the InRoads menu, select **Quantities > Shapes Tool**. The Shapes Tool dialog box will be displayed.

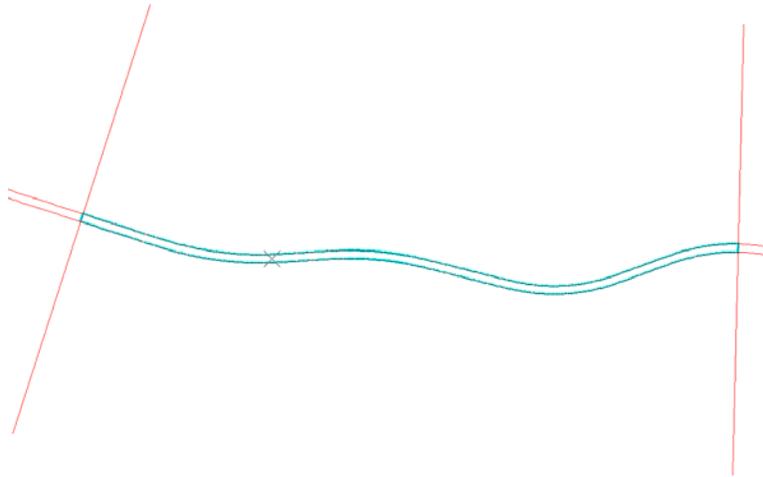


- On the Shapes Tool dialog box, select **Fill** for the **Shape** entry.
- Using the **Surface** pull down menu, select the surface created above.
- In the **Feature Name** field, *key in* the desired feature name.
- In the **Description** field, *key in* the desired text.
- Using the **Feature Style** pull down menu, select the desired feature style.
- Select **Rename** for the **Duplicate Names** setting.
- Toggle on **Use Dynamics** and **Exclude From Triangulation**.

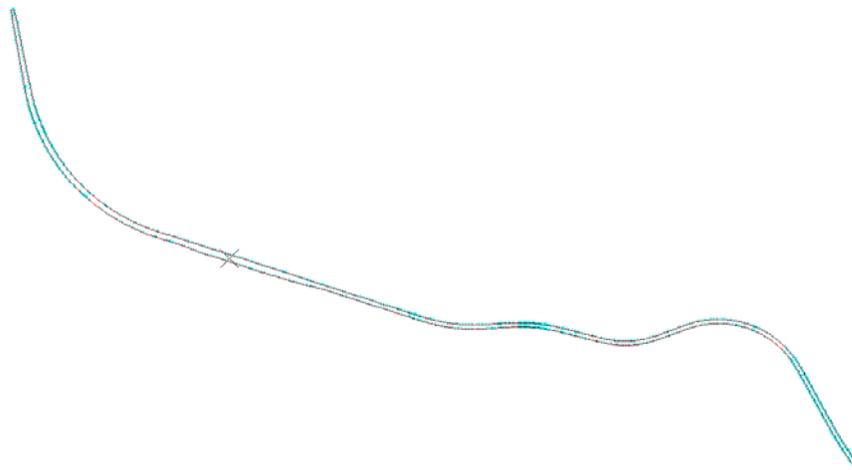


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24. In the Limits area, toggle **Station** on if desired. If used, *key in* the **Start** and **Stop** stations in their respective fields. **Note:** If station limits are used, temporary lines extending perpendicular to the active alignment 1,000 feet in either direction will be placed at the Start and Stop stations. These will be used to define areas both inside and outside the station limits.



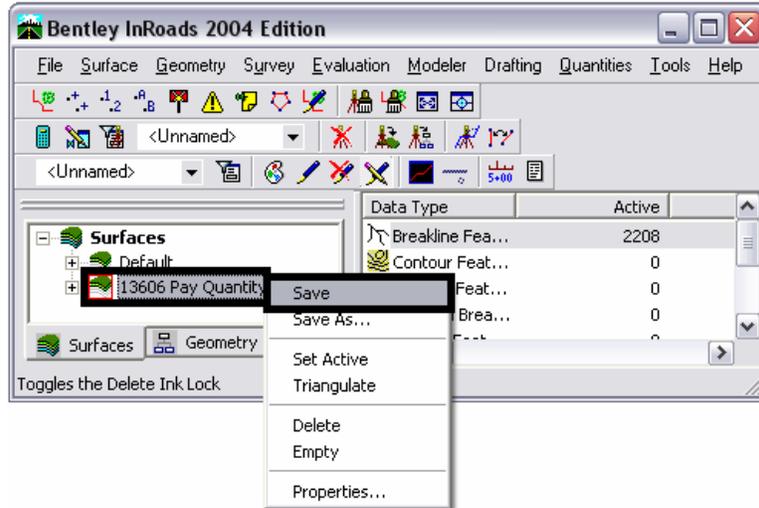
25. Select the **Apply** button.
26. Move the cursor inside the desired area. Closed areas will highlight as the cursor is moved through them.
27. **<D>** inside the area to create the feature. **<D>** a second time to accept. If additional features are to be created using the same settings, these can be selected at this time. The first additional feature will have a '1' appended to its name. This will be incremented by 1 for each additional feature thereafter.



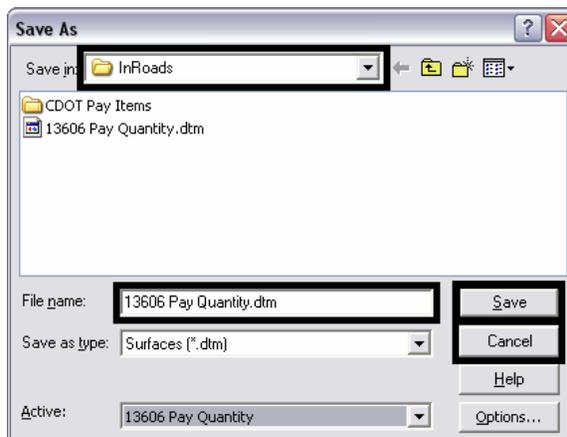
28. After the desired areas have been selected, **<R>** to redisplay the Shapes Tool dialog box and then select **Close**.

Saving The Surface

29. In the InRoads menu, <R> on the surface name in the left pane then select **Save** from the menu. If the file existed prior to importing data then the data is saved to that file and no further action is required.



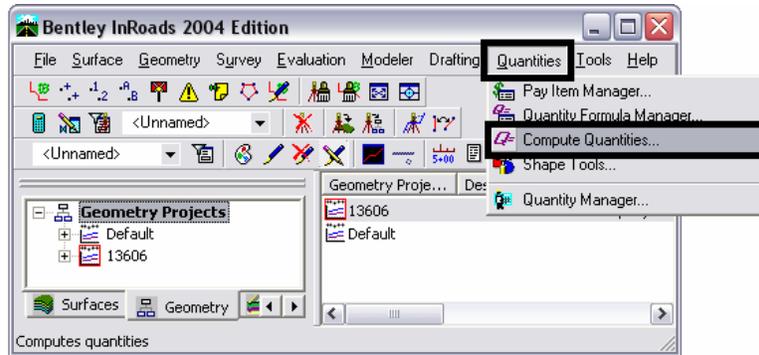
30. If the file was new then the **Save As** dialog box will appear. Select the directory path using the **Save In** pull down menu.
31. In the **File Name** field, *key in* the desired name.
32. <D> on the **Save** button, then <D> on the **Close** button.



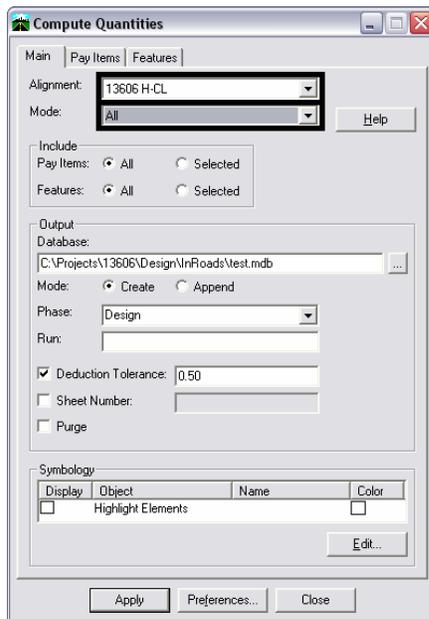
InRoads Compute Quantities

The compute Quantities command collects pay quantity data from a DTM and stores it in a database to be used with Quantity Manager. This command requires a surface with pay items assigned to the features and a geometry project with a horizontal alignment.

1. From the InRoads menu, select **Quantities > Compute Quantities**. This will display the Compute Quantities dialog box.

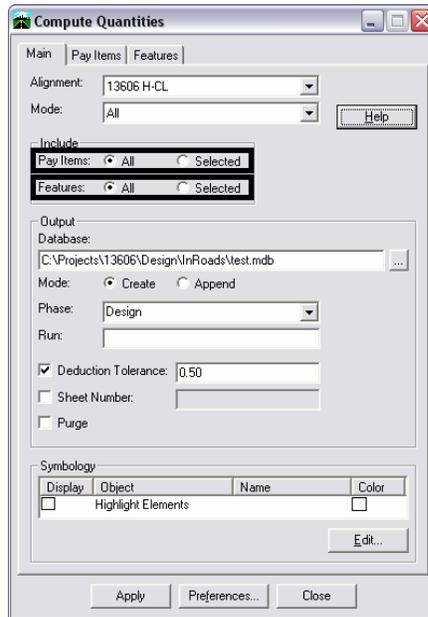


2. Select the desired alignment using the **Alignment** pull down menu. Quantities will only be calculated for features within the station range of the specified alignment.
3. Using the **Mode** pull down menu, select either **All** or **Fence**. The **All** mode uses all features within the alignment, the **Fence** mode uses only those features that are within a defined fence.



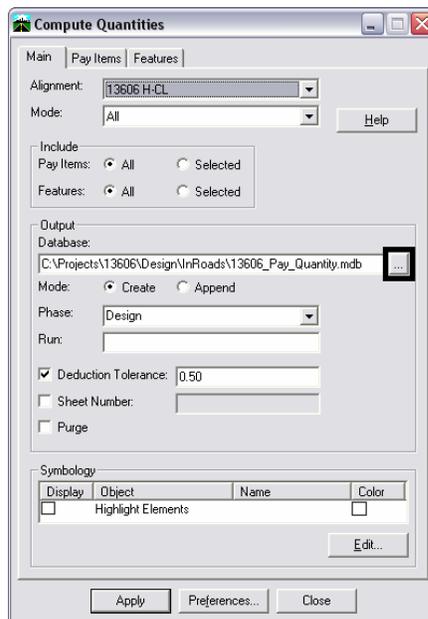
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4. In the **Include** area, <D> either the **All** or **Selected** radio button for **Pay Items**.
5. <D> either the **All** or **Selected** radio button for **Features**.



Note: If the **Selected** radio button is chosen, then the items to be processed must be identified on their respective tab. If the **All** radio button is selected all data of that type is processed and its tab is not used.

6. In the **Output** area, <D> on the browser button next to the **Database** field. This will display the Browse window.

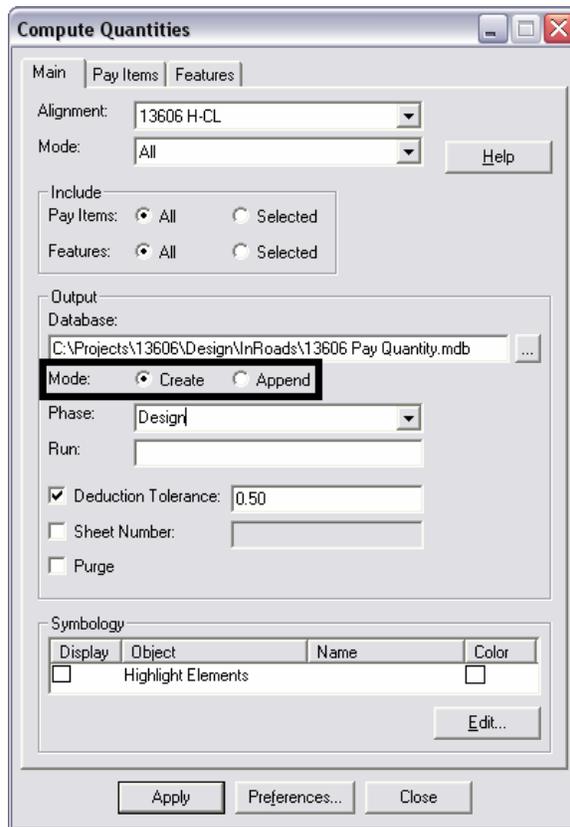


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7. Select the desired directory path from the **Save In** pull down menu.
8. In the **File Name** field, *key in* the desired filename or select an available one from those listed.
9. **<D>** on the **Save** button. This will dismiss the Browse window and fill in the Database field.



10. Select a **Mode**. Choose **Create** to make new file or to overwrite an existing file. Choose **Append** if adding additional data to an existing file.



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11. Select a **Phase** from the combo box to the right. A new **Phase** can be created by *keying in* a name in the combo box. Phases are used to group quantities.
12. The **Run** field is another method of grouping quantities. If desired, *key in* a **Run** name in the field to the right.
13. **<D>** in the **Deduction Tolerance** check box to turn it on or off. The field to the right is used to define the distance at which features are considered coincident. *Key in* the desired value. For more information on pay item deductions see the “Customizing The Pay Items Database” workflow.
14. **<D>** in the **Sheet Number** check box to turn it on or off. When on, the field to the right is made active and a **Sheet Number** can be *keyed in*. This field is for informational purposes when quantities are tabulated on a per sheet basis.
15. **<D>** in the **Purge** check box to turn it on or off. When on, this option deletes pay quantities from the database if the feature used to calculate the quantity has been deleted from the DTM.

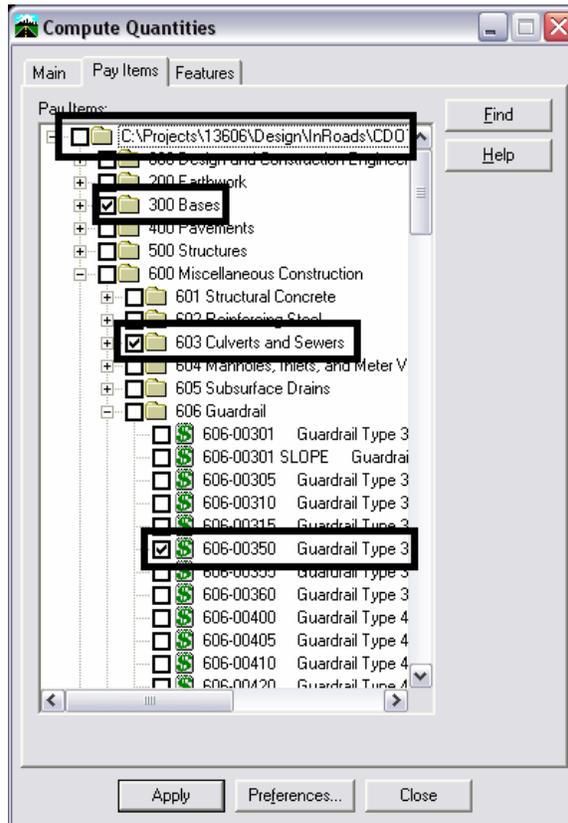
Display	Object	Name	Color
<input type="checkbox"/>	Highlight Elements		<input type="checkbox"/>

16. The **Symbology** area is used to set the parameters for highlighting elements that quantities were computed for. **<D>** on the check box in the Display column to turn the highlight on or off.

The Pay Items Tab

This tab is used if **Pay Items** in the **Include** area is set to **Selected**.

17. <D> on the **Pay Items** tab to bring it to the front.
18. Select the Pay Items to be computed by clicking in the check box to its left.



Note: All of the pay items in the list can be selected by selecting the 'Root' directory at the top of the list. If a Category is selected ('300 Bases' in the example above) then all of the items in that category and its sub-categories are selected. If a Sub-Category is selected ('603 Culverts and Sewers' above) then all of the items in that sub-category are selected. Finally, individual pay items can be selected ('606-00350 Guardrail Type 3 above).

The Features Tab

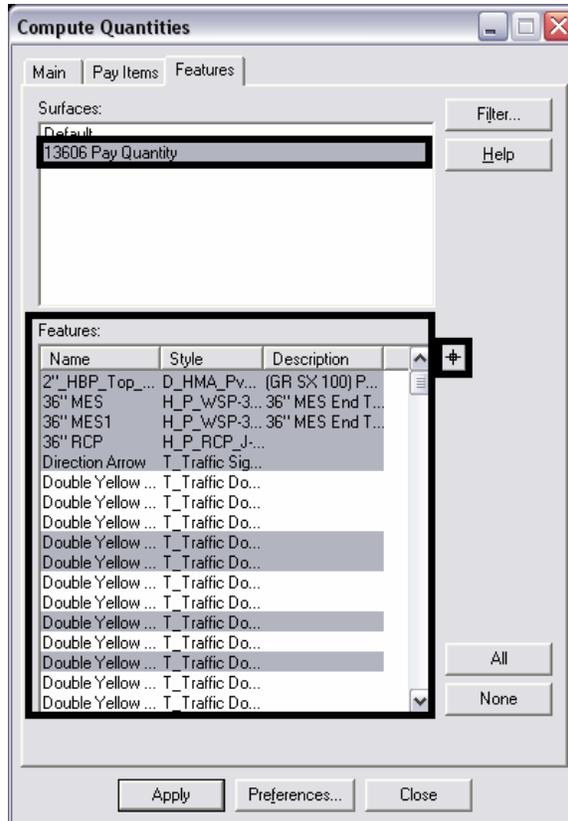
This tab is used if **Features** in the **Include** area is set to **Selected**.

19. <D> on the **Features** tab to bring it to the front.
20. In The **Surface** area, <D> on the desired surface. Multiple surfaces can be selected by holding the **Shift** or **Ctrl** key and then clicking on the desired surfaces.

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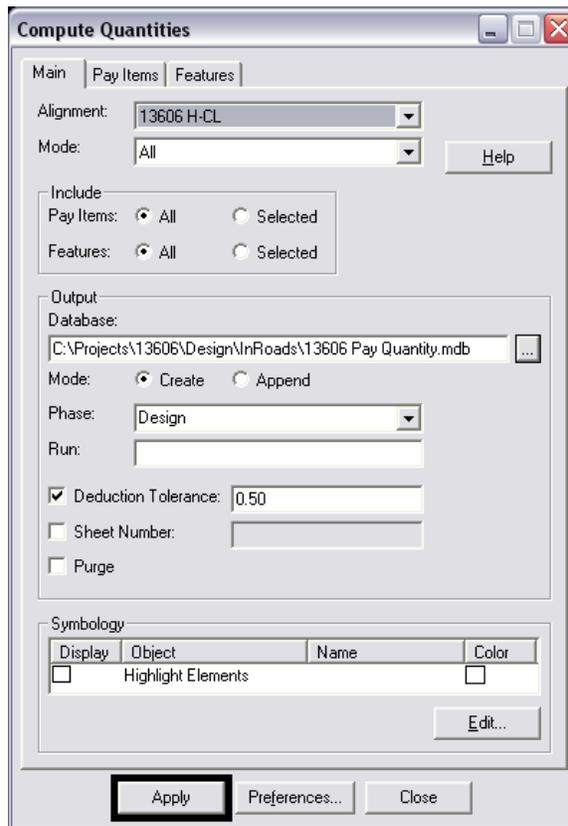
21. In the **Features** area, <D> on the desired Feature. A consecutive range of features can be selected by holding the Shift key then clicking on the first and last feature in the range. A number of individual features can be selected by holding the Ctrl key then clicking on the desired features.

The **Locator** button can be used to identify features from the graphic elements displayed. The **Ctrl** key can be used with this option, however, the **Shift** key can not. To use it, <D> on the **Locator** button then <D> on the desired graphic element.

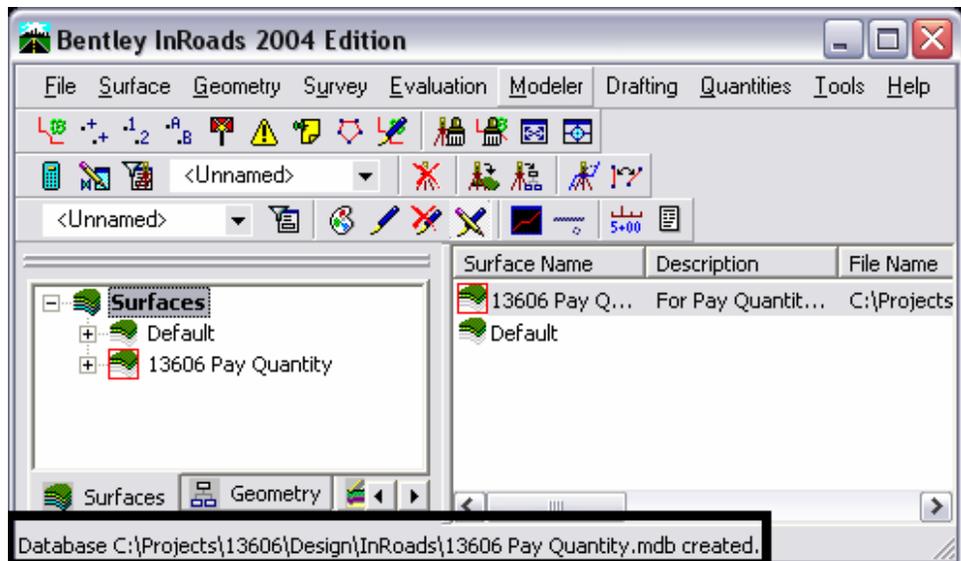


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22. <D> the **Apply** button to calculate the quantities.



23. When processing is completed, a message stating that the *.mdb file has been created will appear in the lower left corner of the InRoads interface.



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24. <D> the **C**lose button to dismiss the **C**ompute **Q**uantities dialog box..

Compute Quantities

Main | Pay Items | Features

Alignment: 13606 H-CL

Mode: All Help

Include

Pay Items: All Selected

Features: All Selected

Output

Database: C:\Projects\13606\Design\InRoads\13606 Pay Quantity.mdb ...

Mode: Create Append

Phase: Design

Run:

Deduction Tolerance: 0.50

Sheet Number:

Purge

Symbology

Display	Object	Name	Color
<input type="checkbox"/>	Highlight Elements		<input type="checkbox"/>

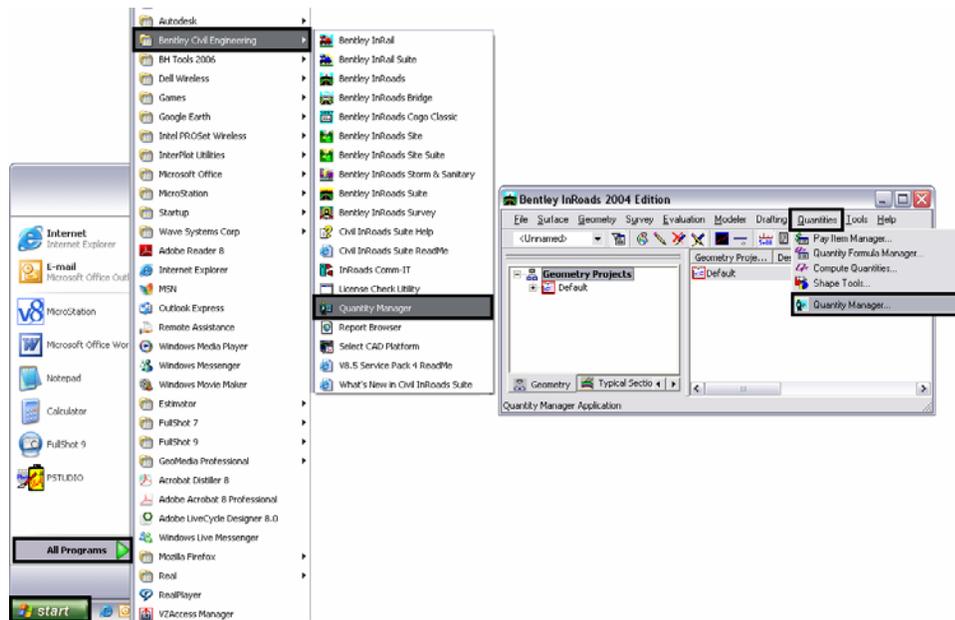
Apply Preferences... **Close** Edit...

Working With Quantity Manager

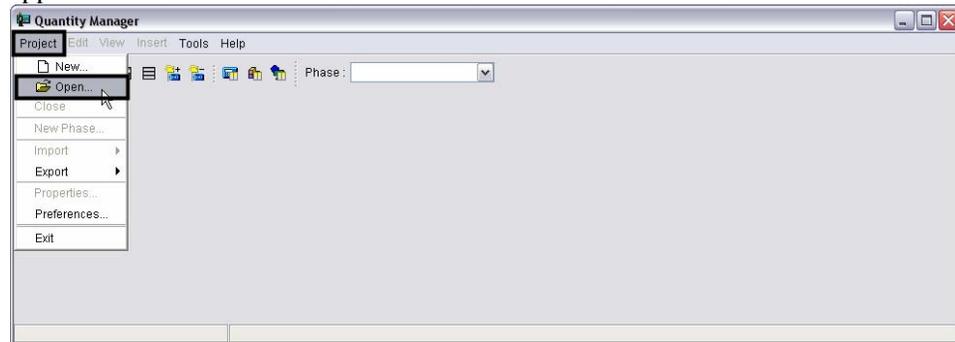
Quantity Manager is a “Stand Alone” interface with the pay quantity database created by the InRoads Compute Quantities command. It is used to update the database with quantities not computed by InRoads and to create reports on the quantity data.

Opening Quantity Manager

1. Quantity Manager can be started from the InRoads menu by selecting **Quantities > Quantity Manager**. It can also be started from the Start menu by selecting **Start > All Programs > Bentley Civil Engineering > Quantity Manager**. MicroStation and InRoads do not have to be running for Quantity Manager to work.



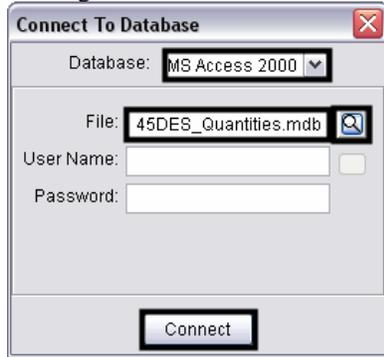
2. Select **Project > Open**. This option is used to load the database created by the InRoads Compute Quantities command. The ‘Connect to Database’ window will appear.



3. Set the **Database** pull down to: **MS Access 2000**. This is the format used by the Compute Quantities command (SQL Server 2000 and Oracle formats can also be used by Quantity Manager)

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- In the 'File' box, type in the directory path and file name of the desired file. The 'Browse' button to the right of the field can be used to locate and select the desired file.
- <D> the **Connect** button. (unless otherwise noted, the 'User Name' and 'Password' fields are left blank.) The database is now loaded into Quantity Manager and editing can begin.

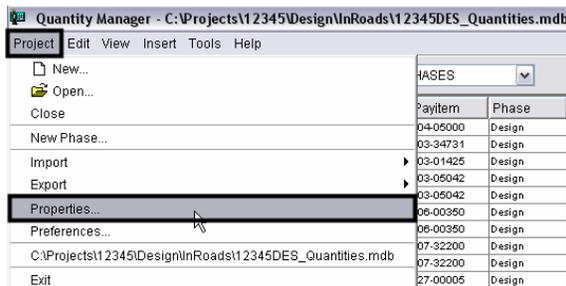


Properties And Preferences

Information about the project that is used by Trns*port is stored in the Project Properties. A data file that facilitates the manual entry of quantities is attached to through the Project Preferences. This information should be filled in after the project is opened the first time.

Properties Data

- Select **Project > Properties** from the menu bar.



- In the Project Properties dialog box, fill in the desired information for: **Project Number** (JPC Code), **Description** (optional), **Unit System**, and **Spec. Year**. This information is used when creating a data file to be used with Trns*port. After the data is entered, <D> the **OK** button.

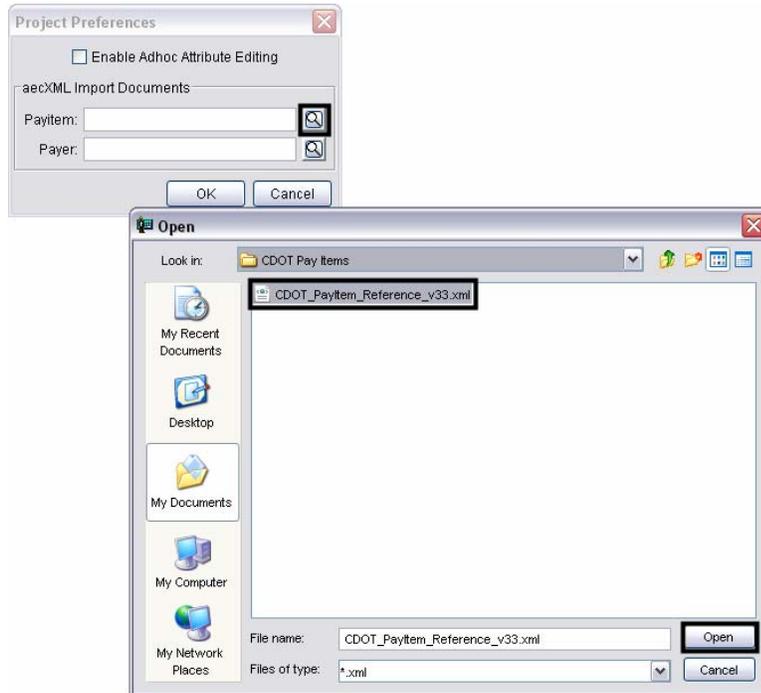


Preference Data

8. Select **Project > Preferences** from the menu bar.

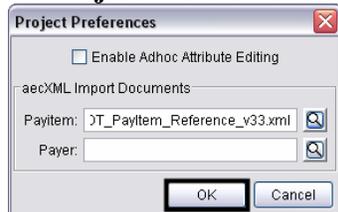


9. From the **Project Preferences** dialog box, <D> the Browse icon for the Payitem field. Navigate to the **C:\Projects\JPC#\Design\InRoads\CDOT Pay Items** directory and select the **CDOOT_Payitem_Reference_v33.xml** file. <D> the **Open** button.



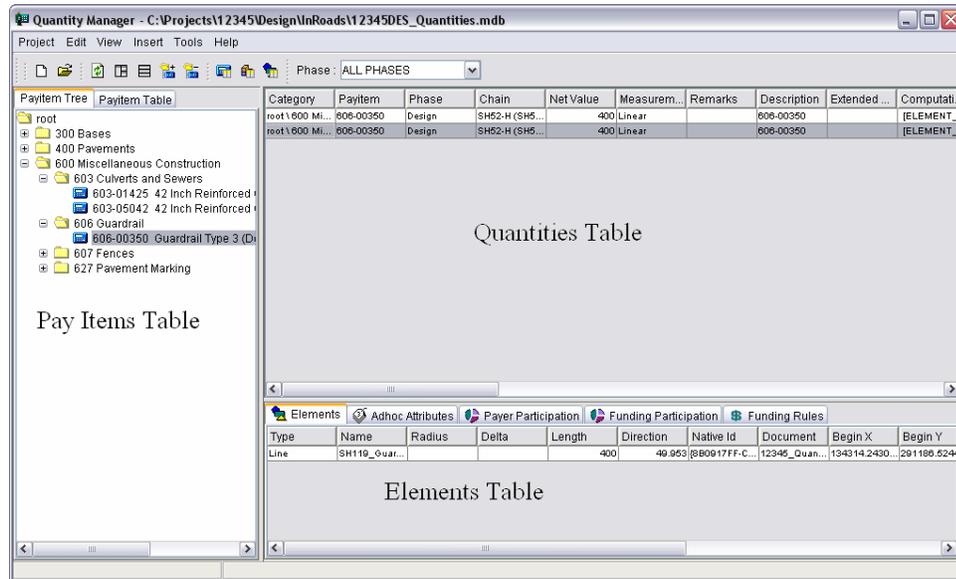
This file contains a searchable pay item code list that will allow users to select pay item data from the file instead of manually keying in the information.

10. <D> the **OK** button from the **Project Preferences** dialog box. This will dismiss the **Project Preferences** dialog box.



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The data stored in the pay quantity database is now displayed in the Quantity Manager window. The window is divided into three parts; the Pay Items Table, the Quantities Table, and the Elements Table. The Pay Items table is used to add, edit, and delete Pay Items and Categories within the database. It is also used to add additional quantities. The Quantities Table is used to add, edit, and delete specific quantities within the database. The Elements Table is for informational purposes only.



The Pay Item Table

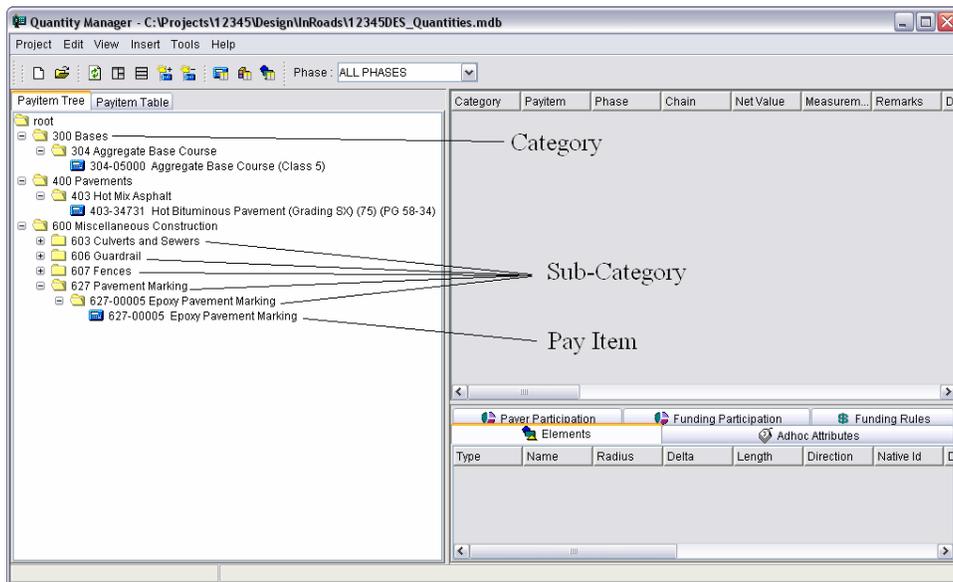
The majority of the work done in Quantity Manager will be accomplished through the Pay Item Table. It is used to add or delete categories and pay items and can also be used to add quantity data to new or existing pay items within the pay quantity database.

The Pay Item Table is broken down into two basic types of data; Categories and Pay Items. Categories (and Sub-Categories) are used to divide the pay item data up into manageable pieces. They work much like the folders in the project directory structure, with the pay items organized by the first three digits of the pay item code. Sub-Categories are used to further divide pay items.

The pay item contains data on each element that had a quantity calculated for it using its pay item code. It also contains quantity data that was added manually to the database.

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The illustration below identifies categories, sub-categories, and pay items within the Pay Item Table's tree view.



Information can be displayed within the Pay Item Table in two ways; the Payitem Tree and the Payitem Table. The Payitem Tree (illustrated above) shows only the Category and Pay Item names. The Payitem Table displays data specific to each pay item code used in the database. Below is an illustration of a sample Payitem Table:

Category	Total Cost	Total Net...	Payitem	Description	Unit	Unit Cost	Total Rounding	Lump Sum	Document	DEFAULT PAYER	DEFAULT FUNDING
root\300 Bases\304 Aggregate Base Course	0.0	12,085.161	304-05000	Aggregate B...	TON	0	0	<input type="checkbox"/>		0	0
root\400 Pavements\403 Hot Mix Asphalt	0.0	12,085.161	403-34731	Hot Bitumine...	TON	0	0	<input type="checkbox"/>		0	0
root\600 Miscellaneous Construction\603 Culverts and Sewers	0.0	120	603-01425	42 Inch Rein...	LF	0	0	<input type="checkbox"/>		0	0
root\600 Miscellaneous Construction\603 Culverts and Sewers	0.0	2	603-05042	42 Inch Rein...	EACH	0	0	<input type="checkbox"/>		0	0
root\600 Miscellaneous Construction\606 Guardrail	0.0	900	606-00350	Guardrail Ty...	LF	0	0	<input type="checkbox"/>		0	0
root\600 Miscellaneous Construction\607 Fences	0.0	6,159.461	607-32200	Fence Wood ...	LF	0	0	<input type="checkbox"/>		0	0
root\600 Miscellaneous Construction\627 Pavement Marking	0.0	41.107	627-00005	Epoxy Pave...	GAL	0	0	<input type="checkbox"/>		0	0

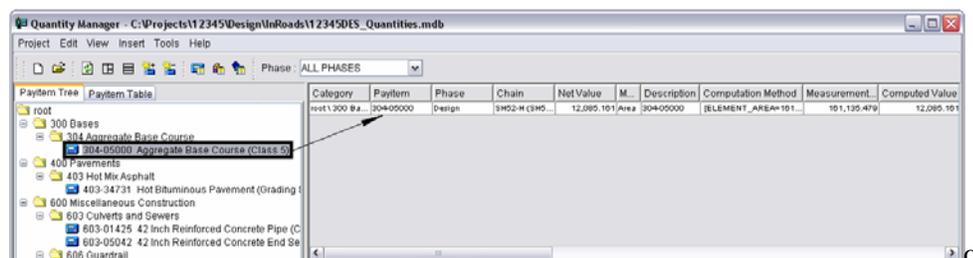
Because the Payitem Tree is generally easier to work with, it will be used throughout this workflow.

Displaying Information In The Quantity And Element Tables

Information is displayed in the quantity and element tables based on items selected in the pay items table.

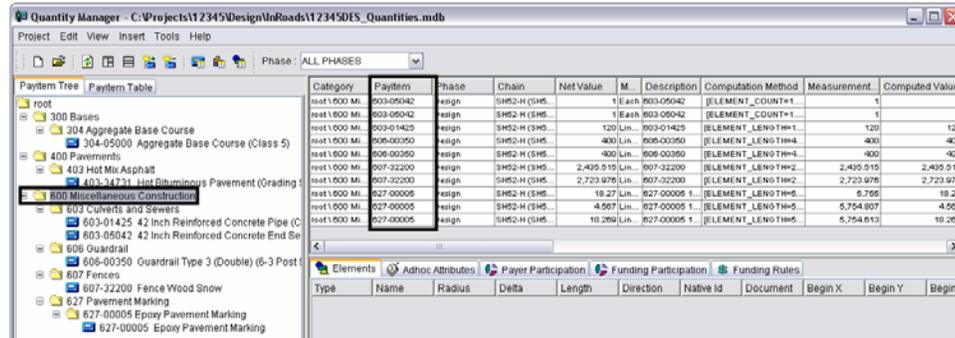
Displaying Pay Item Information

- Expand the Pay Item Tree to show the desired pay item. <D> on the desired pay item. The data for that pay item is displayed in the quantity table



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12. To show all of the items within a category or sub-category, <D> on the category in the pay item tree. All items within the category are displayed. In the example below, by selecting category 600, the pay items in subcategories 603,606,607,and 627 are displayed.



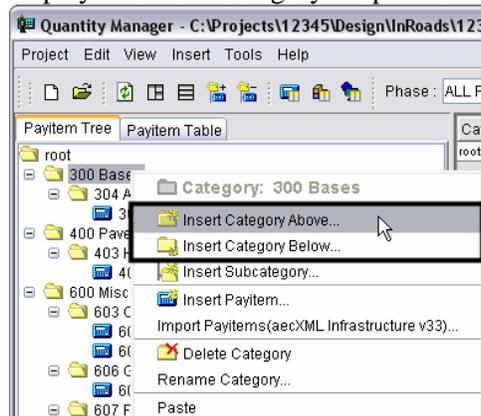
13. Items from multiple categories can be displayed by holding the Shift or Ctrl key and selecting the desired categories or items.



Adding Data To The Database

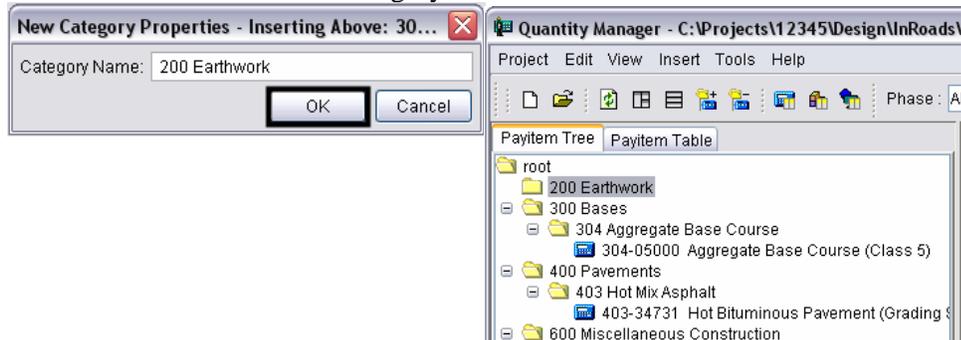
Quantities for earthwork and many lump sum items will not be included in the dtm and, therefore, not incorporated into the database by the Compute Quantities command. To include these additional categories, sub-categories, and pay items may need to be added to the database.

14. To add a new category <D> on the category next in sequence to the one to be added.
 15. Right Click and select **Insert Category Above...** or **Insert Category Below...** This displays the New Category Properties dialog box.



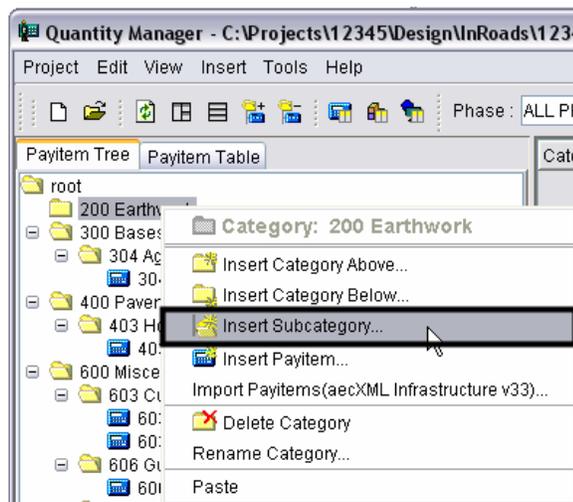
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16. In the **New Category Properties** dialog box, key in the desired category name. Select **OK** to create the new category.

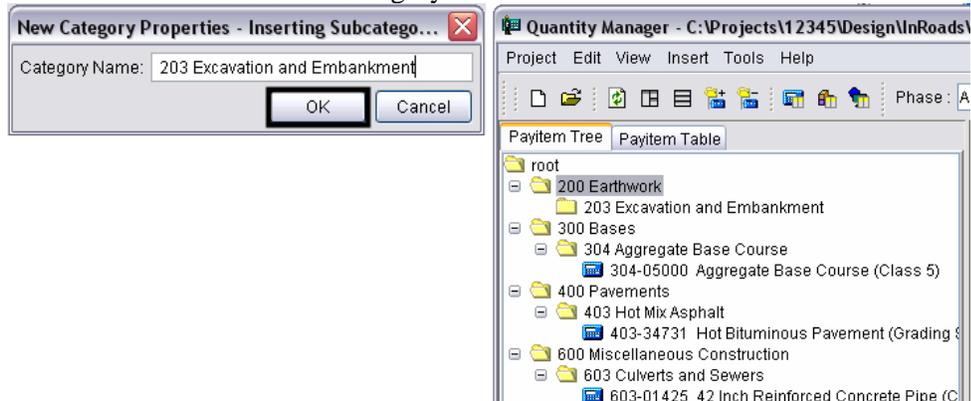


Note: A new category can not be placed above or below the Root category they must be placed as sub-categories.

17. To add a new sub-category <D> on the category that will contain the new sub-category.
18. Right Click and select **Insert Subcategory...** This displays the New Category Properties dialog box.

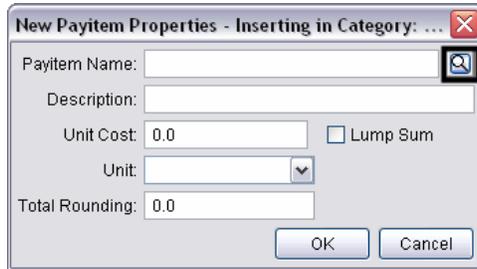


19. In the **New Category Properties** dialog box, key in the desired category name. Select **OK** to create the new category.



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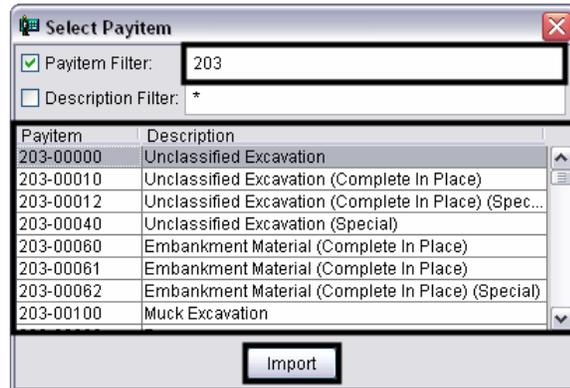
20. To add a new pay item <D> on the pay item next in sequence to the one to be added (or <D> on the category the pay item is to be added to).
21. Right Click and select **Insert Payitem Above...** or **Insert Payitem Below...** (or **Insert Payitem...** if a category was selected above). The New Payitem Properties dialog box appears.
22. Select the Search  icon next to the **Payitem Name** field. This displays the Select Payitem dialog box.



The dialog box is titled "New Payitem Properties - Inserting in Category: ...". It contains the following fields and controls:

- Payitem Name: [Text Field] 
- Description: [Text Field]
- Unit Cost: 0.0 [Text Field] Lump Sum
- Unit: [Dropdown Menu]
- Total Rounding: 0.0 [Text Field]
- Buttons: OK, Cancel

23. Key in the desired value in the **Payitem Filter**. This will greatly reduce the number of items that will have to be scrolled through.
24. <D> on the pay item to be used, then select the **Import** icon.

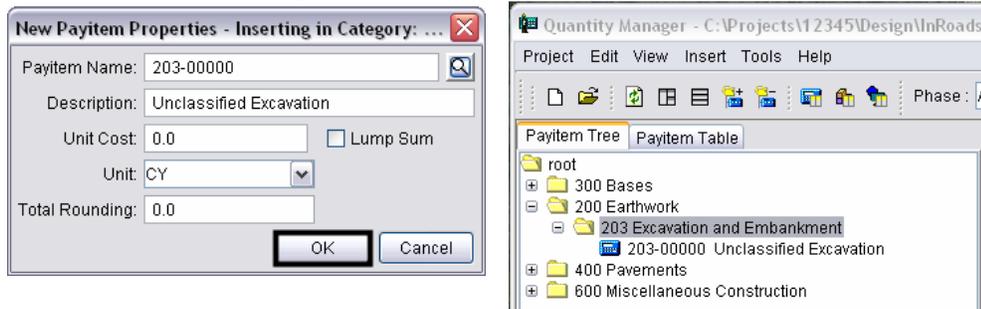


The dialog box is titled "Select Payitem". It contains the following fields and controls:

- Payitem Filter: 203
- Description Filter: *
- Table with columns: Payitem, Description
- Buttons: Import

Payitem	Description
203-00000	Unclassified Excavation
203-00010	Unclassified Excavation (Complete In Place)
203-00012	Unclassified Excavation (Complete In Place) (Spec...
203-00040	Unclassified Excavation (Special)
203-00060	Embankment Material (Complete In Place)
203-00061	Embankment Material (Complete In Place)
203-00062	Embankment Material (Complete In Place) (Special)
203-00100	Muck Excavation

25. The Select Payitem dialog box is dismissed and the New Payitems Properties dialog is populated with the selected data. Select the **OK** icon and the pay item is added to the Pay Item Tree,



The image shows two windows side-by-side. The left window is the "New Payitem Properties" dialog box, now populated with data:

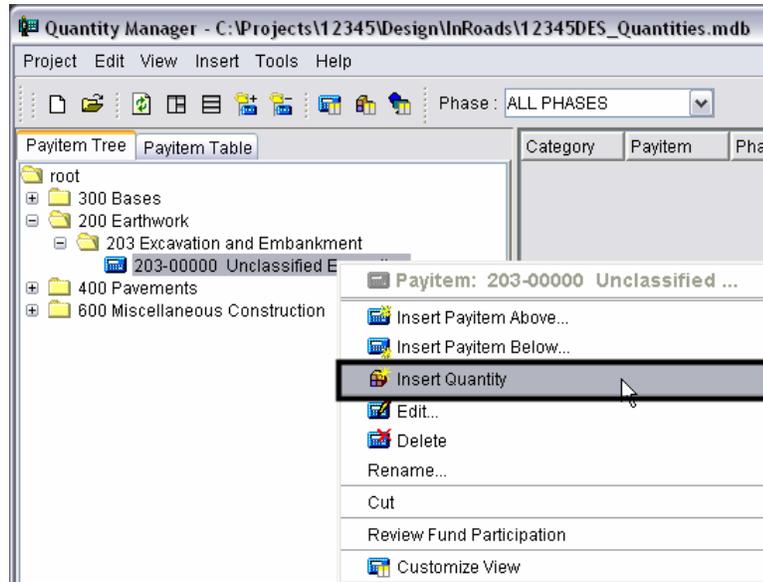
- Payitem Name: 203-00000
- Description: Unclassified Excavation
- Unit Cost: 0.0 Lump Sum
- Unit: CY
- Total Rounding: 0.0
- Buttons: OK, Cancel

The right window is the "Quantity Manager" application. The "Payitem Tree" is visible, showing a hierarchy:

- root
 - 300 Bases
 - 200 Earthwork
 - 203 Excavation and Embankment
 - 203-00000 Unclassified Excavation
 - 400 Pavements
 - 600 Miscellaneous Construction

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26. To add a Quantity to a pay item <D> on the pay item then Right Click.
27. From the Right Click menu select Insert Quantity... The New Quantity Properties dialog box is displayed.



Note: only the Measurement Basis, Computed Quantity, and Phase are required fields. The others may be filled in as desired so that the data included with the manually entered quantity will match those of the ones imported from InRoads.

28. Select the desired Measurement Basis. This is how the feature would have been measured if there was one. There are three options; Area, Linear, and Each. Items measured by volume (Tons, Gallons, Cubic Yards, etc.) or area (Square Feet or Square Yards) should be set to 'Area'. Those measured in Linear Feet or Linear Yards should be set to 'Linear'. Items listed as Each or Lump Sum should use 'Each'. Use the pull down menu to select the desired entry.
29. Select the desired Measurement Value. This equates to the area of a shape feature, the length of a line feature, and the number of points in a random feature. For a Lump Sum payitem this should be 1. This number is not used for any calculation. It is here to make this payitem record consistent with those imported from the DTM. Key in the desired value.
30. Key in the desired Computed Quantity. If a formula was utilized, this field is the result of the computation. Using a pavement quantity example, a formula computing tons from square feet could be utilized. In this case, the tonnage is the Computed Quantity. Entering data into this field auto-fills the Rounded Quantity with the same value. Key in the desired value.
31. Key in the desired Rounded Quantity. Some payitems use a Rounding Factor which is applied to the Computed Quantity. If the quantity being entered uses

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a rounding factor, change the number in this field to the rounded computed quantity. For example, concrete pipe is rounded to 2 foot increments. An 83 foot long pipe would be rounded to 84 feet. Key in the desired value.

32. Select the desired Deduction Quantity. The quantity of some payitems may be reduced by the presence of another payitem. While the payitem causing the reduction is not listed here, the amount of the reduction is. Key in the desired value.
33. Key in the desired Sheet Number. This is the name of the sheet upon which the quantities are located. This can be useful when computations are tabulated for individual sheets.
34. Key in the desired Run Name. This is a user-defined name. The run name is a grouping mechanism to permit segregation of quantities under the same payitem. It could be used to represent quantities of different stages or different alternatives.
35. Select the desired Phase. To assign the quantity to a particular phase. **Note:** if this data is to be exported to Trns*port the Phase must be set to Design.
36. Key in the desired Remarks. Key-in field for remarks. Limited to 256 characters.
37. Key in the desired Description. Key-in field for the Description. Limited to 256 characters.
38. Key in the desired Extended Description. Key-in field for the Extended Description. Limited to 256 characters.

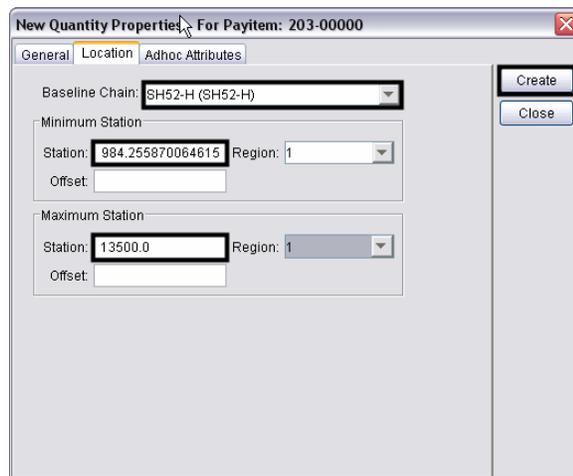
The screenshot shows a software dialog box titled "New Quantity Properties - For Payitem: 203-00000". It has three tabs: "General", "Location", and "Adhoc Attributes". The "General" tab is selected. The fields and their values are: Measurement Basis (Area), Measurement Value (12431.56), Computed Quantity (12431.56), Rounded Quantity (12432), Deduction Quantity (0.0), Net Quantity (12432.0), Sheet Number (empty), Sheet Name (empty), Run Name (empty), Phase (Design), Date / Time (2008-01-16 07:50:01), Remarks (empty), Description (empty), and Extended Description (empty). There are buttons for "Create", "Close", "Phase", and "Set Current". A callout box labeled "Required fields" points to the Measurement Basis, Computed Quantity, and Phase fields.

Note: it is not required to enter location data. However, this information may be used when generating some reports.

39. Select the Location Tab. This tab is used to identify the location of the quantity in relation to an alignment.

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40. Select the desired Baseline Chain from the pull down menu. This is the alignment to be measured from.
Note: Minimum and Maximum Stations are used to set a boundary around the quantity. The station numbers do not represent the beginning or end of a feature, but the lowest and highest station at which the quantity would occur. The same can be said about the offsets, they represent denote the furthest distance to the left and right of the alignment that the quantity occurs.
41. key in the desired **Minimum Station** number. Note: station numbers should be computed as if there is no station equation.
42. key in the desired **Minimum Offset**. Left of the alignment is negative, right of the alignment is positive.
43. Select the desired **Region**. This is used if the alignment has a station equation. This option is usually selected automatically when the station number is entered.
44. key in the desired **Maximum Station** number.
45. key in the desired **Maximum Offset**.

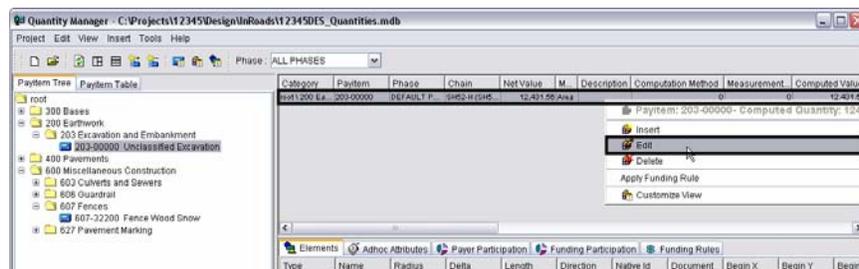


46. Select the **Create** icon to complete the quantity.

Editing Quantites

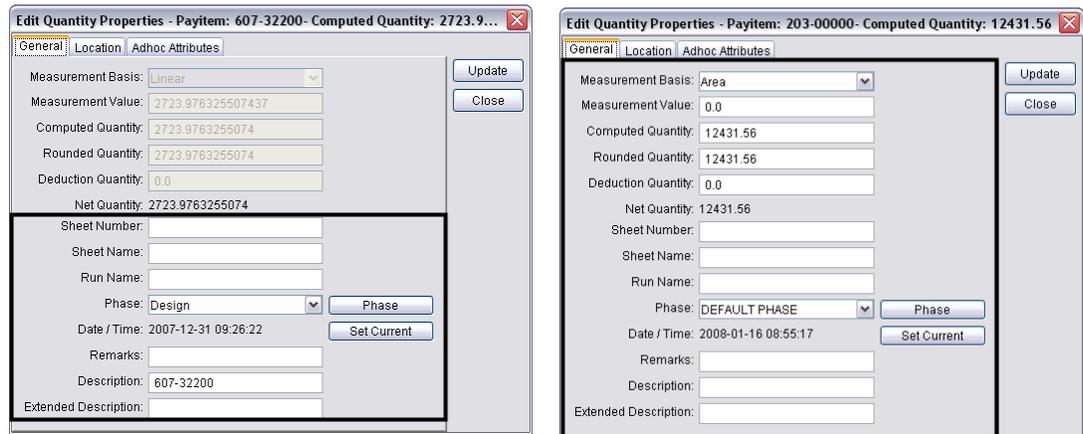
Note: The quantity value of pay items imported from InRoads can not be changed in Quantity Manager only those entered manually can.

47. To edit a quantity, <D> on the quantity in the Quantities Table, then right click and select edit from the menu.



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48. This displays the Edit Quantity Properties dialog box. This dialog box is the same as the New Quantity Properties dialog box. The illustration on the left shows the fields that can be edited for a quantity imported from InRoads. The illustration on the right shows fields that can be edited for a quantity that is manually entered.



Creating A Report

Reports are used to display the quantity data in a meaningful way.

49. Display the Quantities to be reported on in the Quantities Table. This can be done by Selecting Pay items from the Pay Item Table (hold the Shift or Ctrl to select multiple pay items) or **Select Edit > Select All**.
50. Highlight the desired quantities in the Quantities Table.

Category	Payitem	Phase	Chain	Net Value	M	Description	Computation Method	Measurement	Computed Value
root	203-00000	Design	SHE2-H (SHS)	12,085.101	Area	203-00000	ELEMENT_AREA	12,085.101	12,085.101
root	203-00000	DEFAULT P.	SHE2-H (SHS)	12,431.56	Area		ELEMENT_AREA	12,431.56	12,431.56
root	403-34731	Design	SHE2-H (SHS)	12,085.101	Area	403-34731	ELEMENT_AREA-101	12,085.101	12,085.101
root	803-01425	Design	SHE2-H (SHS)	120	Lin	803-01425	ELEMENT_LENGTH1	120	120
root	603-08042	Design	SHE2-H (SHS)	1	Each	603-08042	ELEMENT_COUNT-1	1	1
root	603-05042	Design	SHE2-H (SHS)	1	Each	603-05042	ELEMENT_COUNT-1	1	1
root	606-00360	Design	SHE2-H (SHS)	400	Lin	606-00360	ELEMENT_LENGTH-1	400	400
root	600-00350	Design	SHE2-H (SHS)	400	Lin	600-00350	ELEMENT_LENGTH-1	400	400
root	607-32200	Design	SHE2-H (SHS)	2,723.976	Lin	607-32200	ELEMENT_LENGTH2	2,723.976	2,723.976
root	607-32200	Design	SHE2-H (SHS)	2,723.976	Lin	607-32200	ELEMENT_LENGTH2	2,723.976	2,723.976
root	627-00005	Design	SHE2-H (SHS)	6,756	Lin	627-00005	ELEMENT_LENGTH3	6,756	6,756

51. Select Tools > Reports > Create to open the 'Create Report' window.
52. Select the desired **Report Style** from the pull down menu. The Style name describes the type of information to be contained in the report.
53. Key in the directory path and filename for the **Report File Name**. The 'search' button can be used to select the directory path and filename if desired.
54. Some report styles use the **Starting Page Number** to automatically number the pages of the report. If this field is active, the desired page number can be keyed in.

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55. The three buttons at the bottom of the window determine how the information will be stored. Select **Append** to add the data to an existing file. Note: this button is not available if the report type is PDF. Select **Create** to create a new file or overwrite an existing file. **Cancel** closes the Create Report window without processing any data. No report is created.

