

Earth Works and Harvesting Quantities with InRoads V8i:

Lisa Whitson
Transportation and Local Infrastructure Professional
Services, Bentley Systems USA



Topics

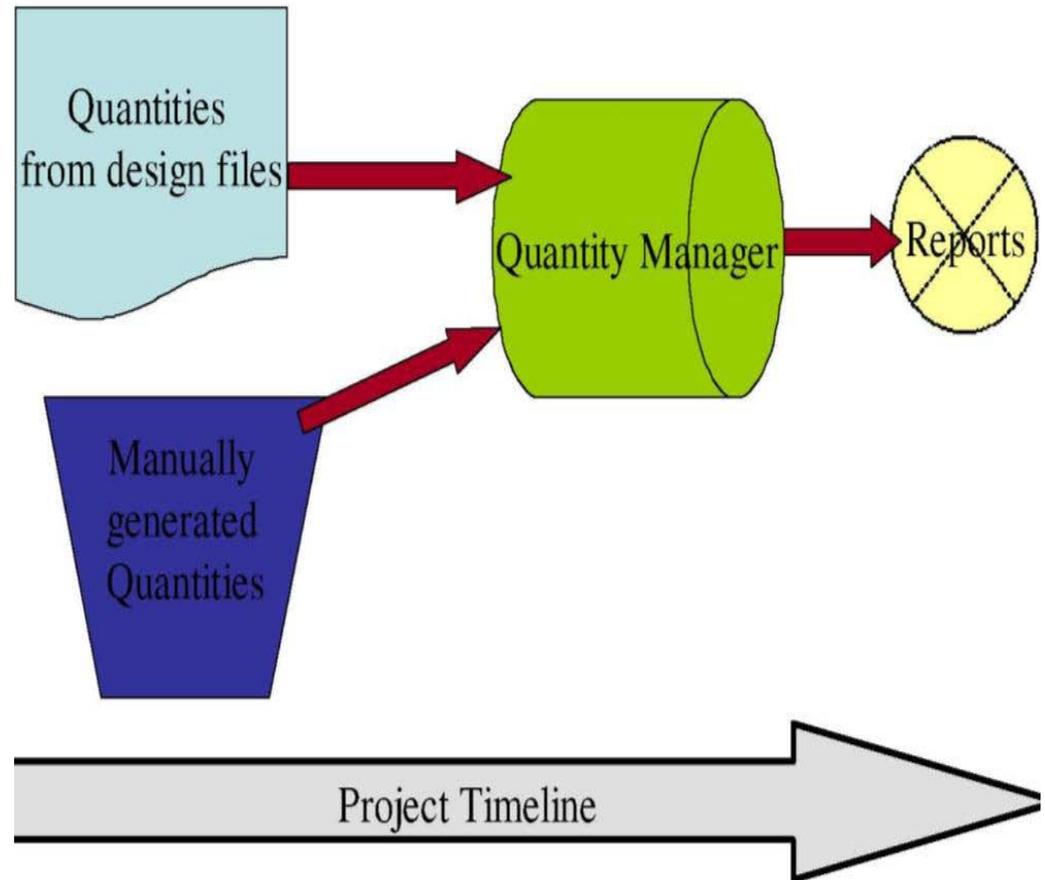
- Generating quantities in Design & Computation Manager (D&C Manager)
- Exporting quantities to Quantity Manager
- Setting project preferences in Quantity Manager
- Importing pay items and funding from AASHTO Trns*port into Quantity Manager
- Adding manual quantities
- Creating reports of quantities
- Exporting quantities to AASHTO Trns*port

Workflow Philosophy

- Design project using elements displayed Pay Item configured in Style Manager.
- Tag those MicroStation elements that are to be quantified with an adhoc attribute defining the chain.
- Check quantities as the project progresses to ensure accuracy.
- Create shapes for odd area quantities.
- Export CAD quantities to Quantity Manager and add manual quantities.
- Generate reports in Quantity Manager and export quantities to Trns*port.

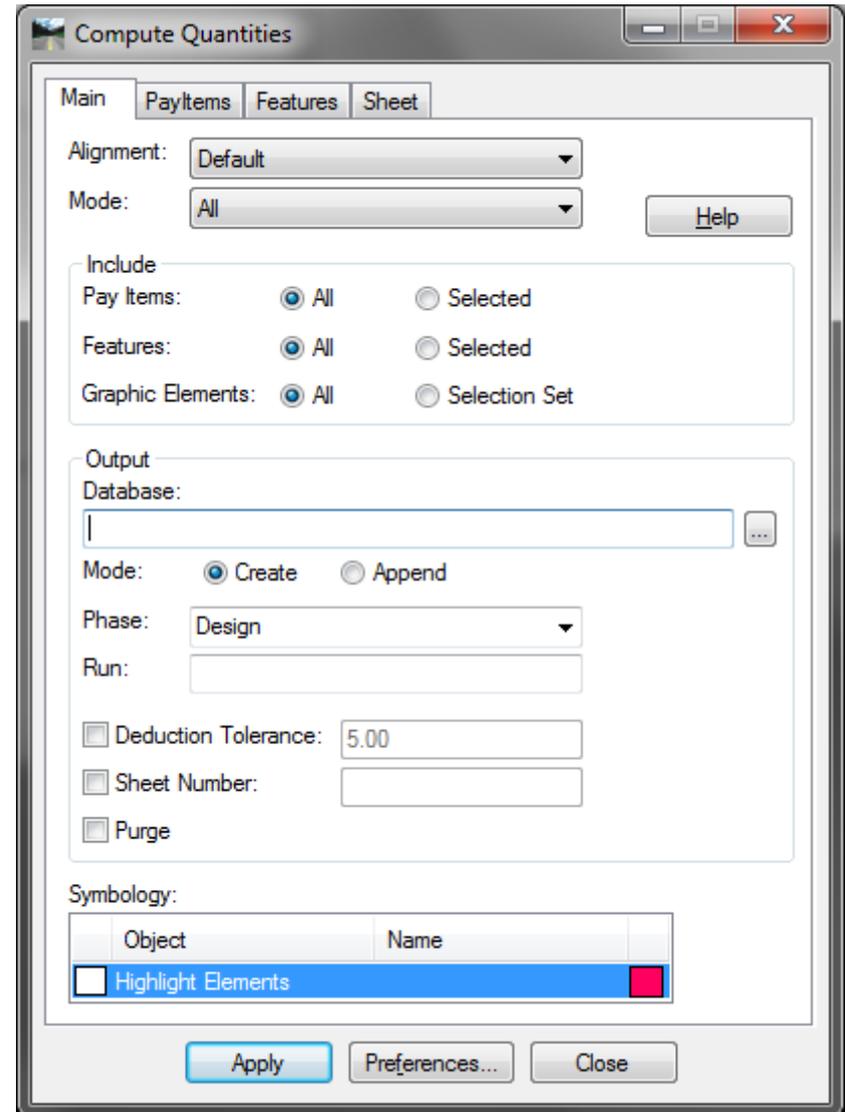
Quantity Manager Workflow

- Quantities from design files
 - Create
 - Update
 - Delete
- Non-graphic quantities (manually calculated)
 - Add adhoc
- Create reports
- Export to Trns*port



Computing Quantities in QM

- Quantities from:
 - Alignment
 - Graphical Element
 - Pay Item
 - Feature
 - Sheet



Overview of Quantity Manager

- Direct interface.
- Application for managing all quantities.
- Organizes quantities by pay items, stations, units of measure, etc.
- Provides for special rounding and lump sum items.
- Supports CAD quantities as well as non-graphic quantities.
- Interfaces with Trns*port.
- Custom report capabilities in PDF, HTML and CSV formats.
- Cost estimates & cost comparisons.

Accessing Quantity Manager

Start InRoads or if in MicroStation select Applications > InRoads Group.

Select Quantity manager from the InRoads Group Menu

If the database was created in Quantity Manager select *Open and choose the previously created database. If not select New, to create a new database.*

Note: The project specific pay items database can be added to the project defaults.

Also QM interfaces with SQL Server and Oracle too!

Quantity Manager Interface

Quantity Manager - C:\Projects\QMW\workshop.mdb

Project Edit View Insert Tools Help

Phase: ALL PHASES

Payitem Tree | Payitem Table

- root
 - Roadway Design
 - Plan Features
 - Curb & Gutter, Curb, Gutter
 - 0520 2 4 Concrete Curb (Type D)
 - 0520 3 Concrete Valley Gutter
 - 0520 1 10 Concrete Curb and Gutter
 - 0520 1 7 Concrete Curb and Gutter
 - Handrail Pipe
 - Concrete Traffic Separators
 - Quantity Features
 - Base
 - Pavt Removal Clearing&Grubbing
 - Grass (Computations Only)
 - Sidewalk
 - Asphaltic Concrete

Category	Payitem	Phase	Chain	Net Value	Remarks	Description	Extended ...	Computati...	Measurem...	W
rootRoadwa...	0520 2 4	DesignEstim...	BL817	97.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	30.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	7.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	7.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	6.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	6.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	403.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	403.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	302.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	302.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	184.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	184.000				[ELEMENT_L...	Linear	
rootRoadwa...	0520 2 4	DesignEstim...	BL817	13.000				[ELEMENT_L...	Linear	

Elements | Adhoc Attributes | Payer Participation | Funding Participation | Funding Rules

Name	Type	Radius	Delta	Length	Direction	Native Id	Document	Extents	Begin X	Begin Y
83721 (Line)						83721	C:\Projects\Q...	Complete		

Customizing the User Interface

The Quantity Manager interface can be customized to show specific quantity information in various display formats. This allows the user to easily review and sort their quantities.

View formats:

- Tree view
- Table view
- Horizontally tiled panes
- Adjustable windows and sashes
- Show/Hide/Adjust/Move columns
- Sort-able columns
- View quantities by phase

Customizing the User Interface

Quantity Manager - C:\Projects\2280791\roadway\2280791.mdb

Project Edit View Insert Tools Help

Phase: DesignEstimate

Payitem	Phase	Chain	Boundary	Net V...	Computed...	Round...	Formatted ...	Forr
0334 1 13	DesignEstimate	BL10ST		20.320	20.323	20.320	26+80.00	28+2
0334 1 13	DesignEstimate	BL10ST		20.320	20.323	20.320	26+80.00	28+2
0334 1 13	DesignEstimate	BL817		19.820	19.817	19.820	85+25.22	85+4
0334 1 13	DesignEstimate	BL817		35.690	35.688	35.690	127+00.00	127+
0334 1 13	DesignEstimate	BL817		142.410	142.406	142.410	110+80.00	116+
0334 1 13	DesignEstimate	BL817		9.650	9.654	9.650	92+19.74	94+3
0334 1 13	DesignEstimate	BL817		11.120	11.120	11.120	128+03.30	130+
0334 1 13	DesignEstimate	BL817		83.380	83.381	83.380	127+00.00	130+
0334 1 13	DesignEstimate	BL817						127+
0334 1 13	DesignEstimate	BL817						123+
0334 1 13	DesignEstimate	BL817						121+
0334 1 13	DesignEstimate	BL817						116+
0334 1 13	DesignEstimate	BL817						110+
0334 1 13	DesignEstimate	BL817						100+

Payitem: 0334 1 13- Computed Quantity: 328.7205

Apply Funding Rule

Customize View

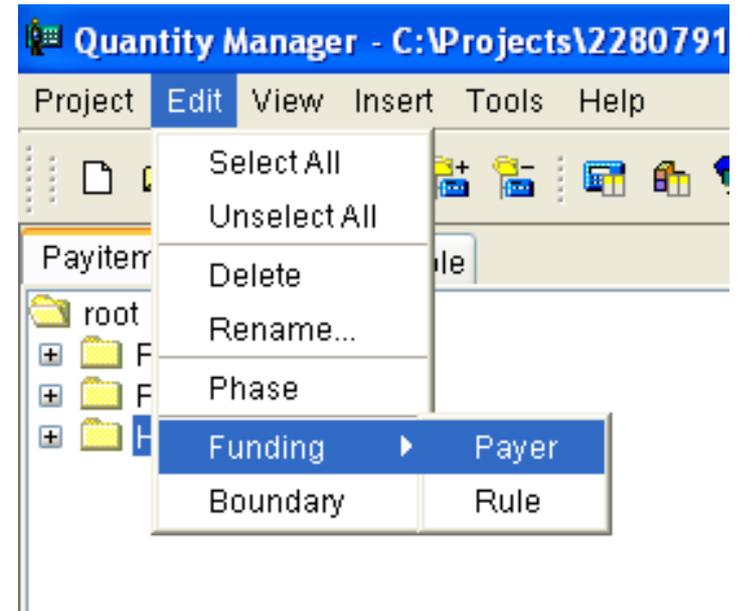
Name	Type	Radius	Delta	Length	Direction	Native Id	Docurr
18974 (Com...	Line String			37.000		18974	C:\Proje
18974 (Com...	Line			85.917	106.598	18974	C:\Proje
18974 (Com...	Arc	3.000	-152.086	7.963	196.598	18974	C:\Proje
18974 (Com...	Arc	80.000	23.854	33.306	221.729	18974	C:\Proje
18974 (Com...	Arc	3.000	-48.719	2.551	65.583	18974	C:\Proje
18974 (Com...	Line			58.780	286.864	18974	C:\Proje
18974 (Com...	Line			36.922	16.398	18974	C:\Proje
18974 (Com...	Line			25.397	106.742	18974	C:\Proje
18974 (Com...	Line			1.960	106.864	18974	C:\Proje

Primary Functions of Quantity Manager

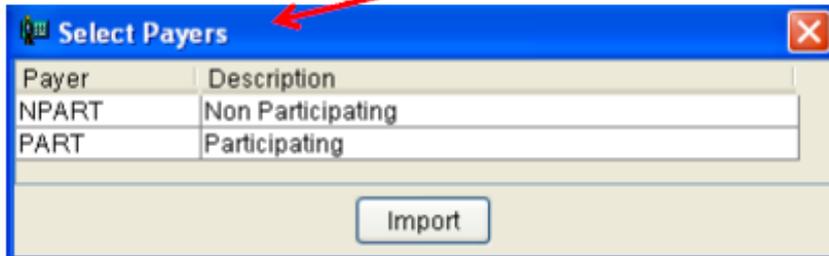
- Develop Cost estimates and cost comparisons
 - Support CAD and non-graphic quantities.
 - Organize quantities by pay item, station, and/or element information.
 - Assign Funding/Payer Parameters
 - Round quantities and designate lump sum items.
 - Allow manual entry of quantities and modifications to quantities.
- Import Trns*port pay items & funding sources.
- Export quantities to Trns*port.
- Create quantity reports

Funding

- Funding is defined by payers (the funding source) and the funding rule (the list of payers and their corresponding participating percentages).
- The Funding dialogs are accessed from *Funding > Payer* and *Funding > Rule*.



Creating Payers



- Funding is defined by payers (the funding source) and the funding rule (the list of payers and their corresponding participating percentages).
- The Funding dialogs are accessed from *Funding > Payer and Funding > Rule*.

Creating a Funding Rule

- Assign percent of participation to existing payers. Note: The total participation for a rule should add up to 100%. If the total participation doesn't add up to 100% it will warn, but allow the definition of the rule.
- Assign station range of influence if applicable, per payer.
- A default funding rule can be applied to each phase.

Creating a Funding Rule

Funding Properties

Name: Default rule Description: funding by city and state

Funding	Payer	Description	%
Default rule	NPART	Non Participating	0
DEFAULT FUNDING	City	Miami	20
	DEFAULT PAY...		0
	PART	Participating	0
	State	Florida	80

Station Range

Limit Funding Rule within Station Range

Chain: [dropdown]

Begin Station: [text] Region: [dropdown]

End Station: [text] Region: [dropdown]

Update

- Click on the new icon and define the name of the rule, then assign the payer participation and any station restrictions.

Note: If the same payer participation is needed outside the station range, an additional funding rule must be created.

Funding Computation by Payer

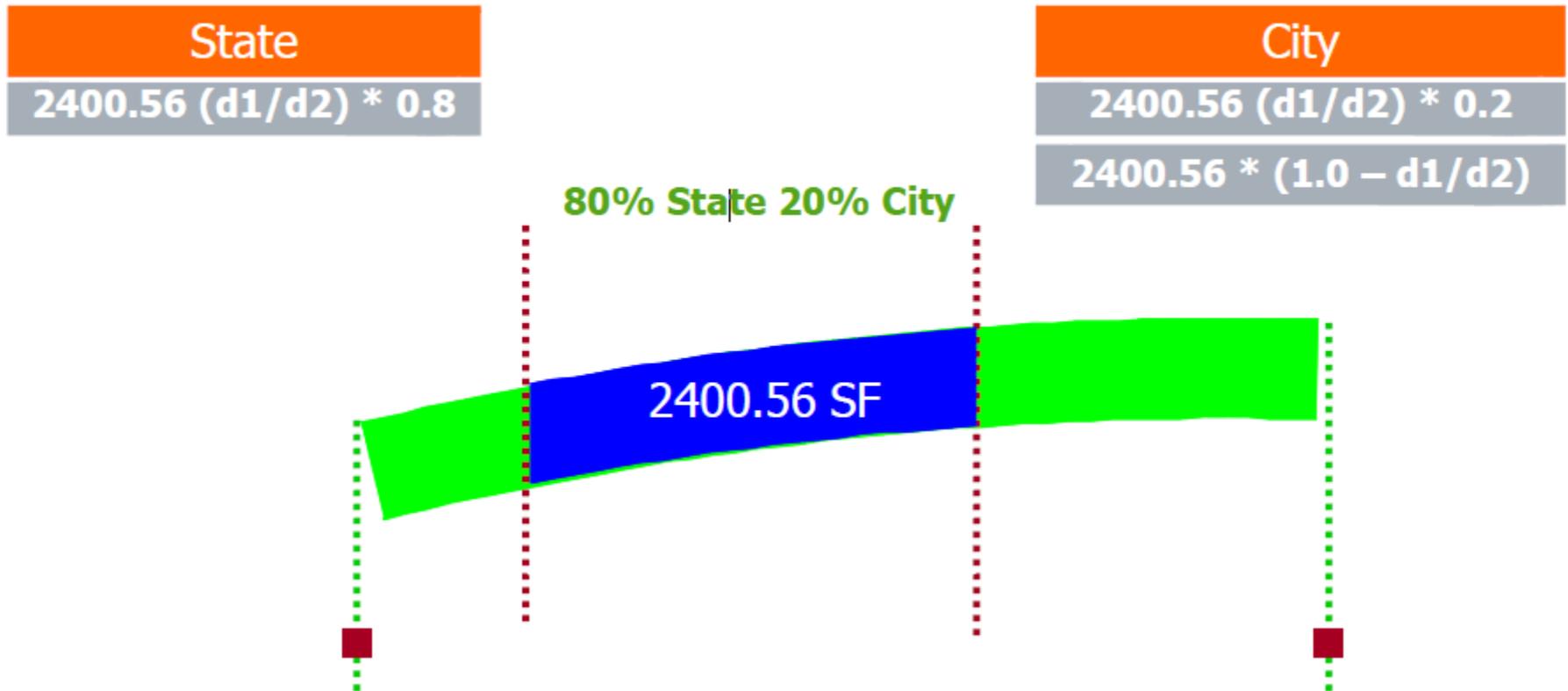
State
 $2400.56 * 0.8 =$
1920.448 SF

80% State
20% City

City
 $2400.56 * 0.2 =$
480.112 SF

2400.56 SF

Funding Computation by Payer Based on a Station Range

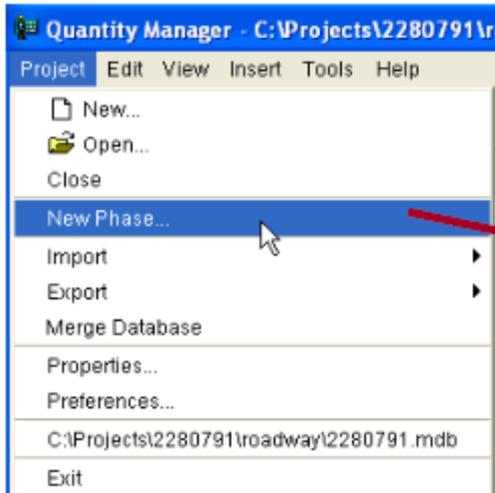


Phases

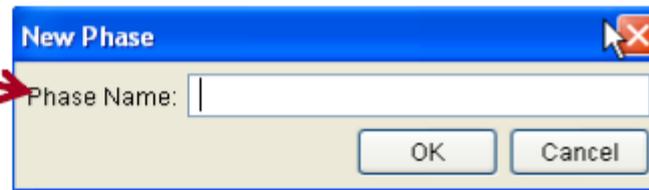
Phase is a way to group quantities. A phase has a default funding rule applied.

- Example phases:
 - DesignEstimate
- When the quantities are imported into Trns*port they must be assigned the phase name DesignEstimate.
 - Preliminary
 - Construction Final
 - Bid Estimate...
- Total quantities of different phases may be compared.
- Reports are generated based on phases.

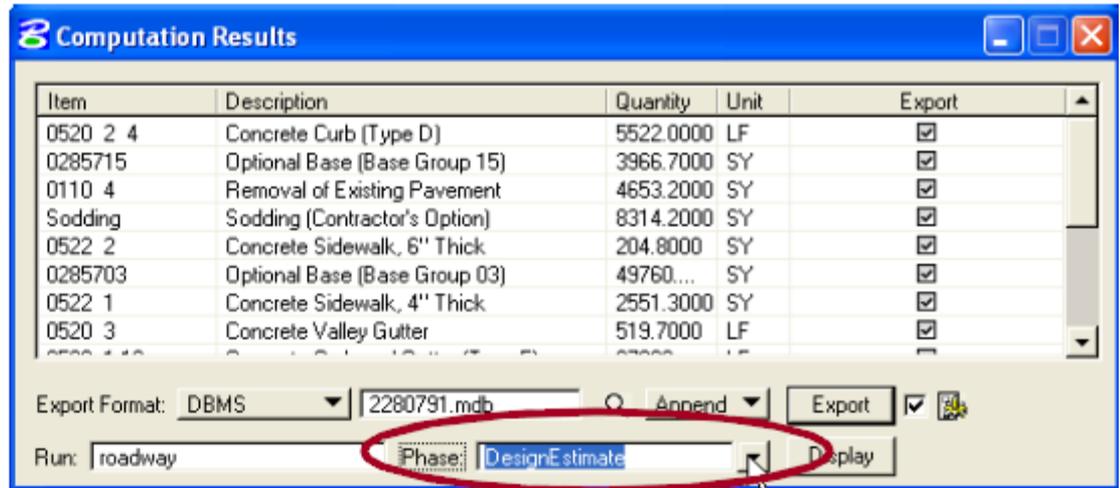
Phases



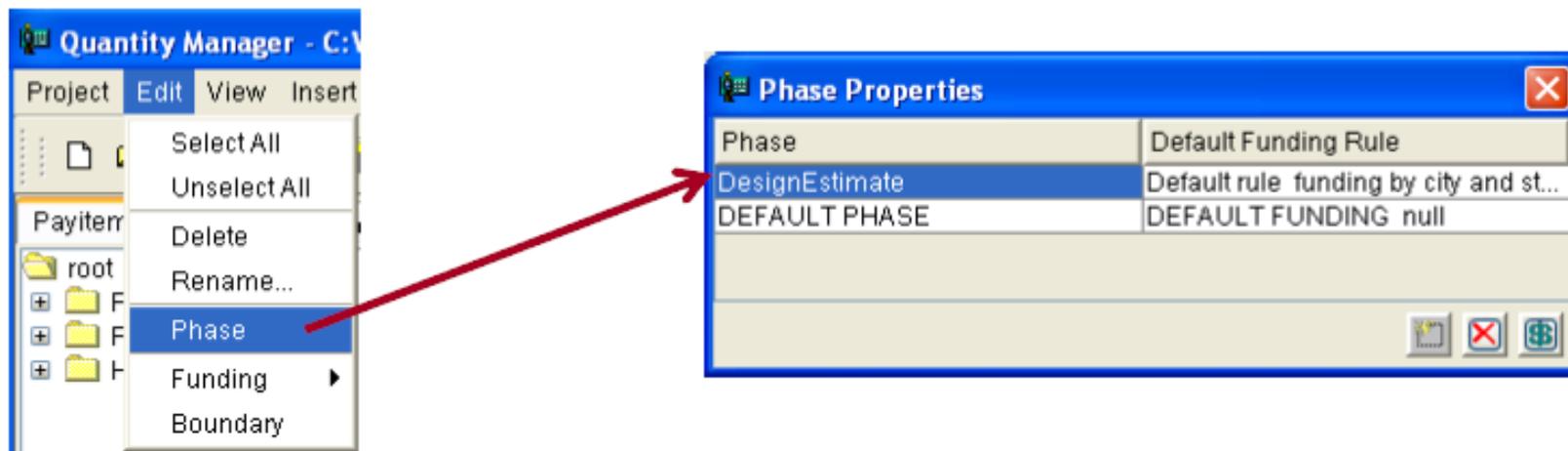
Phases can be defined in QM by selecting *Project > New Phase* or...



The phase used is automatically defined in Quantity Manager.



Phases Properties

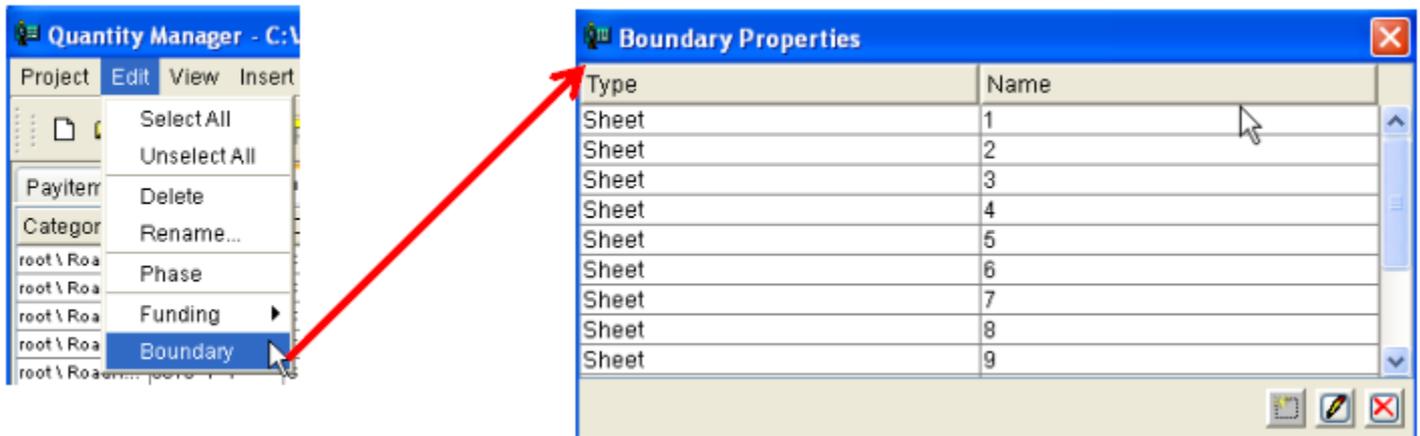


The phase properties defines the funding rule that is automatically applied to the quantities grouped in that particular phase.

Note: The phase assigned to a quantity can be changed later if necessary.

Boundary

- In addition to grouping quantities by phases, quantities can be grouped by a boundary.
- This is normally defined when computing quantities. Whenever sheet, by fence, by station range, by view, or by boundary element is used as the “extents” this boundary information is passed to Quantity Manager.



Boundary

The screenshot displays the Bentley Quantity Manager application window. The 'Tools' menu is circled in red. The 'PayItem Tree' on the left shows a hierarchy of items, with '0334 1 13 Superpave Asphaltic Conc' selected. The 'PayItem Table' on the right shows a table of items with columns for Phase, Category, PayItem, Chain, Net Value, Remarks, and Descr. The 'Graphic Viewer' is active, showing a vertical line representing a boundary.

Phase	Category	PayItem	Chain	Net Value	Remarks	Descr
DesignEstim...	soofRoadwa...	0334 1 13	BL105T	20.320		
DesignEstim...	soofRoadwa...	0334 1 13	BL105T	20.320		
DesignEstim...	soofRoadwa...	0334 1 13	BL817	19.820		
DesignEstim...	soofRoadwa...	0334 1 13	BL817	35.690		

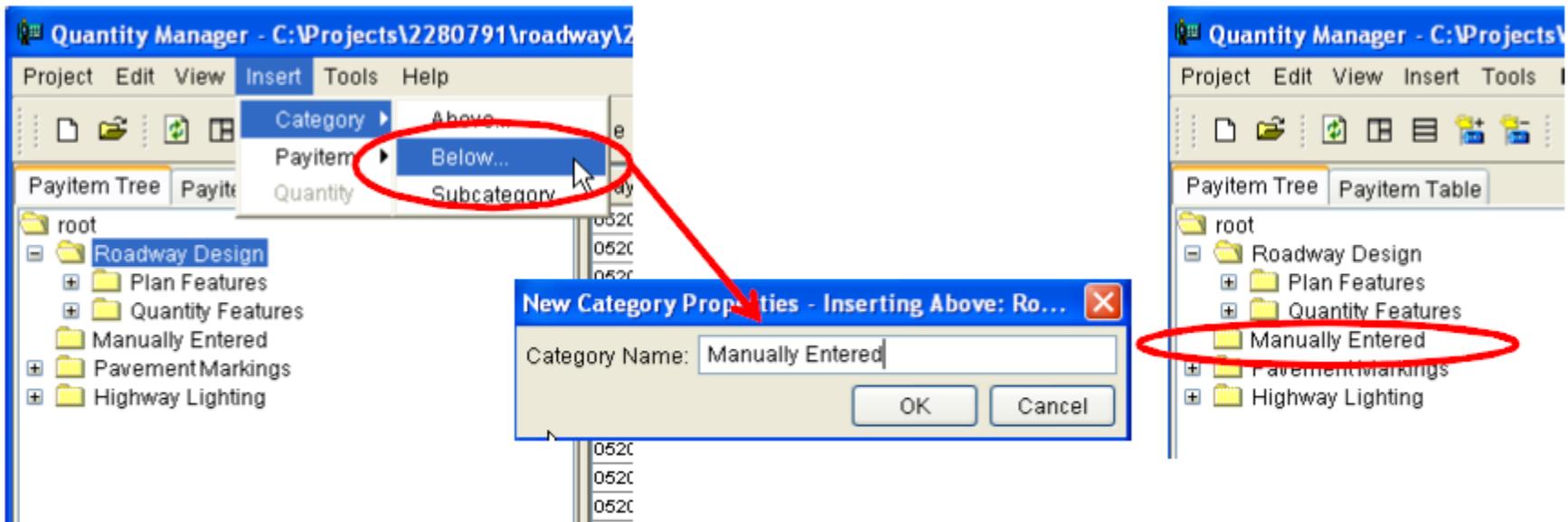
The user can review quantities graphically by activating the Graphic viewer from the tools menu.

Steps to Manually Enter Quantities

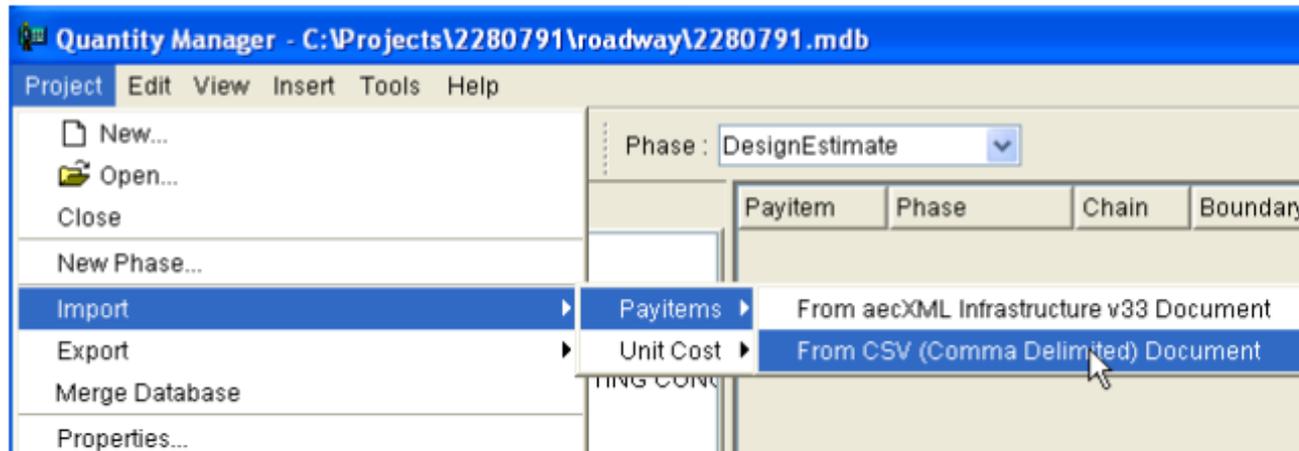
1. Create a category (if needed).
2. Create the pay item (this should be selected from the pay items imported from Trns*port).
3. Add the quantities to the pay item.
 1. Define the general properties.
 2. Define the location properties.
 3. Add adhoc if needed.

Categories Entered Manually

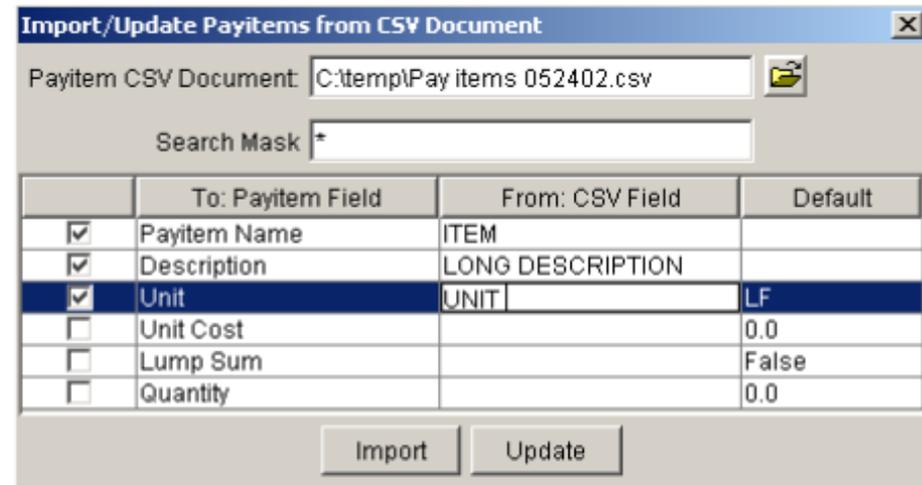
All Pay Items reside under a Category. The user can create a new category by right clicking on a folder in the pay item view or by selecting Category from the Insert menu.



Importing Pay Items from a CSV File



- Select
File > Import
> Pay Items
> From CSV



Adding Quantities to a Pay Item

1. Select Quantities > Pay Item Manager
2. Double click on the Pay Item you want to edit

Edit Pay Item

Pay Item Name:

Pay Item Code:

Description:

Unit Name:

Quantity Calculation
Formula:

Variables:

Name	Value
thck	0.25

Value:

Deduct from Pay Item
Pay Items:

Pay Item	Deduction
----------	-----------

Value:

Measurement
Mode: Planarized Slope

Apply Quantity Factor:

Apply Rounding Factor:

Round Up Round Down

Quantity General Properties

The required information to tell Quantity Manager what type of quantity it is and how it is to be reported must be entered.

Measurement basis	Each/Linear/Area (Linear)
Measurement value	Count/Length/Area (L=23.5)
Computed quantity	$Q = L * w / 9 = 10.44 \text{ SY}$
Rounded quantity	$Q = 11 \text{ SY}$ (if rounding = 1)
Deduction quantity	
Net quantity	net Q = rounded Q – deduction Q

Quantity Properties

- Select the elements to be quantified
- Select the output database

Compute Quantities

Main PayItems Features Sheet

Alignment: Hemfield Road

Mode: All Help

Include

Pay Items: All Selected

Features: All Selected

Graphic Elements: All Selection Set

Output

Database: ...

Mode: Create Append

Phase: Design

Run:

Deduction Tolerance: 5.00

Sheet Number:

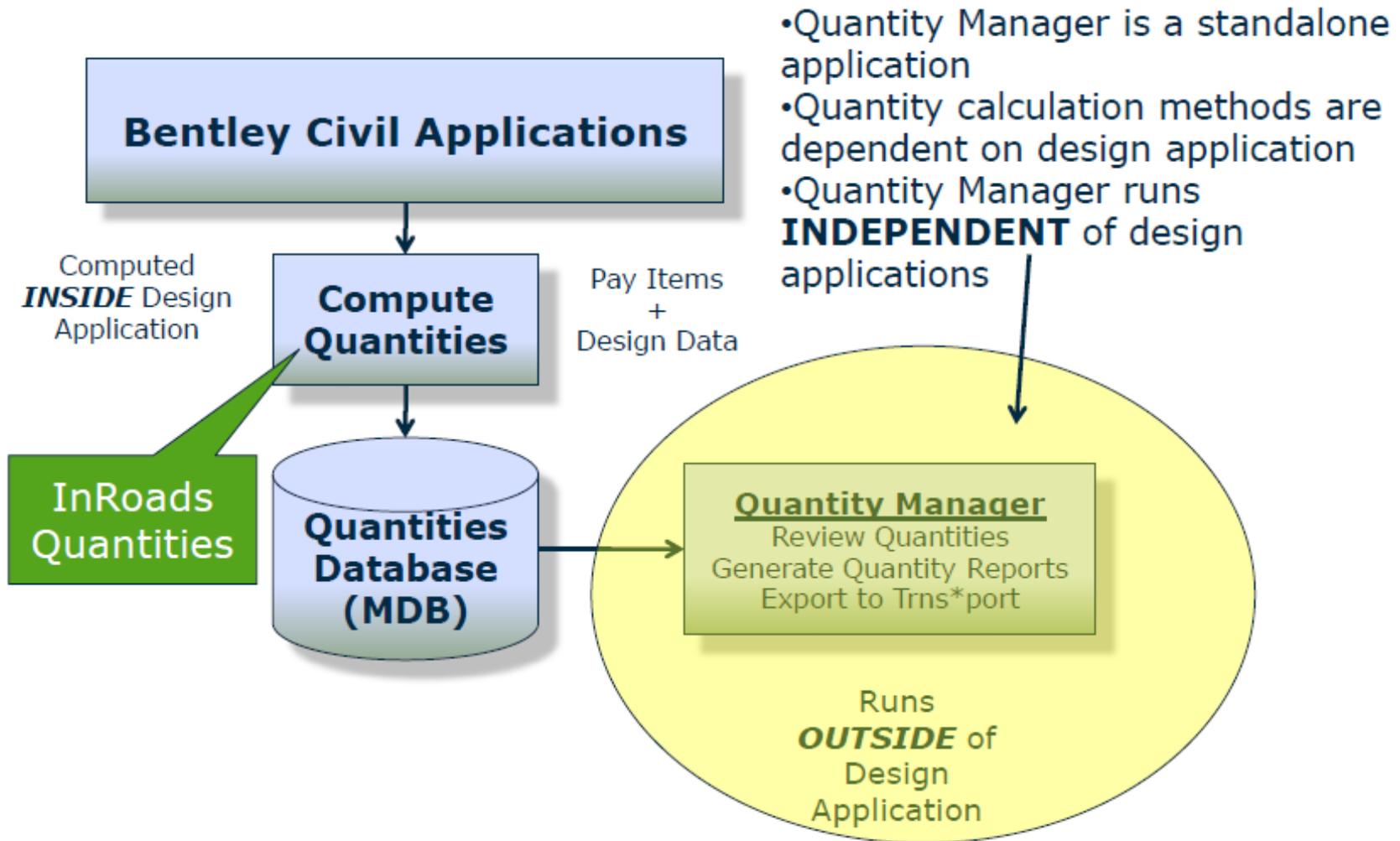
Purge

Symbology:

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

Apply Preferences... Close

Quantity Manager – Summary Overview



Demo

- Lets peek under the hood of quantity manager!