Extracting Project Quantities with InRoads

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The presentation is based on a
presentation from the InRoads User
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Herrera, Bentley

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InRoads Quantity Solution

Two Major Components:

InRoads Quantity Extractor

- Computes quantities from DTM data

- Exports those quantities to Quantity Manager

Quantity Manager

- Manages quantities (reporting, estimating, etc.)

- Standalone

- Database application

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InRoads Quantity Extractor

Pay Item Database

Pay Item Manager

Quantity Formula Manager

Compute Quantities
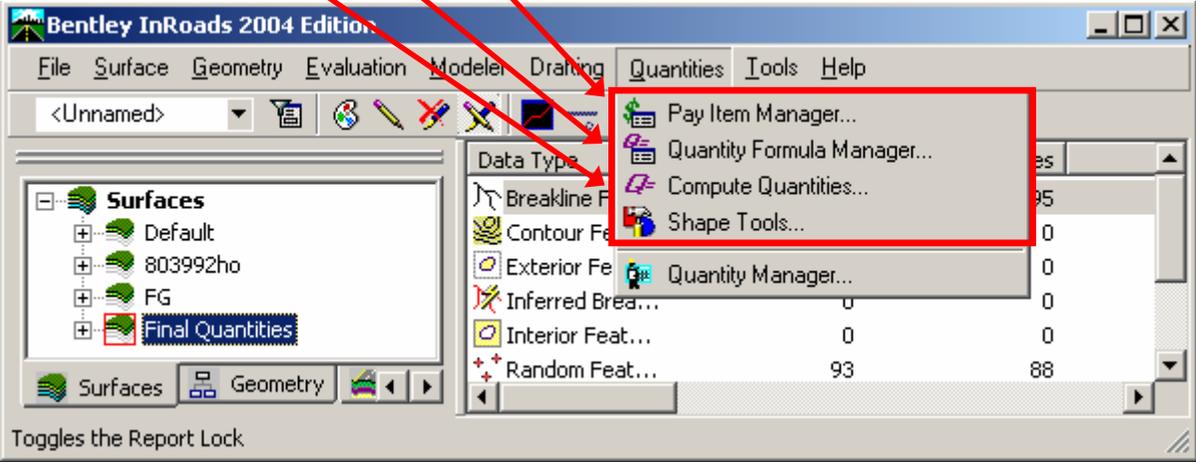
Pay Item Database

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InRoads Quantity Extractor

Measurement → **Formula** ————————→ **Computation Parameters** → **Net Quantity**
(from feature)

Area → Tons = *Area* * thickness * density
Lbs. = *Area* * lbs. per square foot

Linear → Meter = *Length*
Km = *Length* / 1000

Rounding, Quantity Factor, Deductions, Etc.,

Quantity Manager Database

Each → Manholes = *Count*
Pavement markers = *Count*
Tons = *Count* * tons per unit

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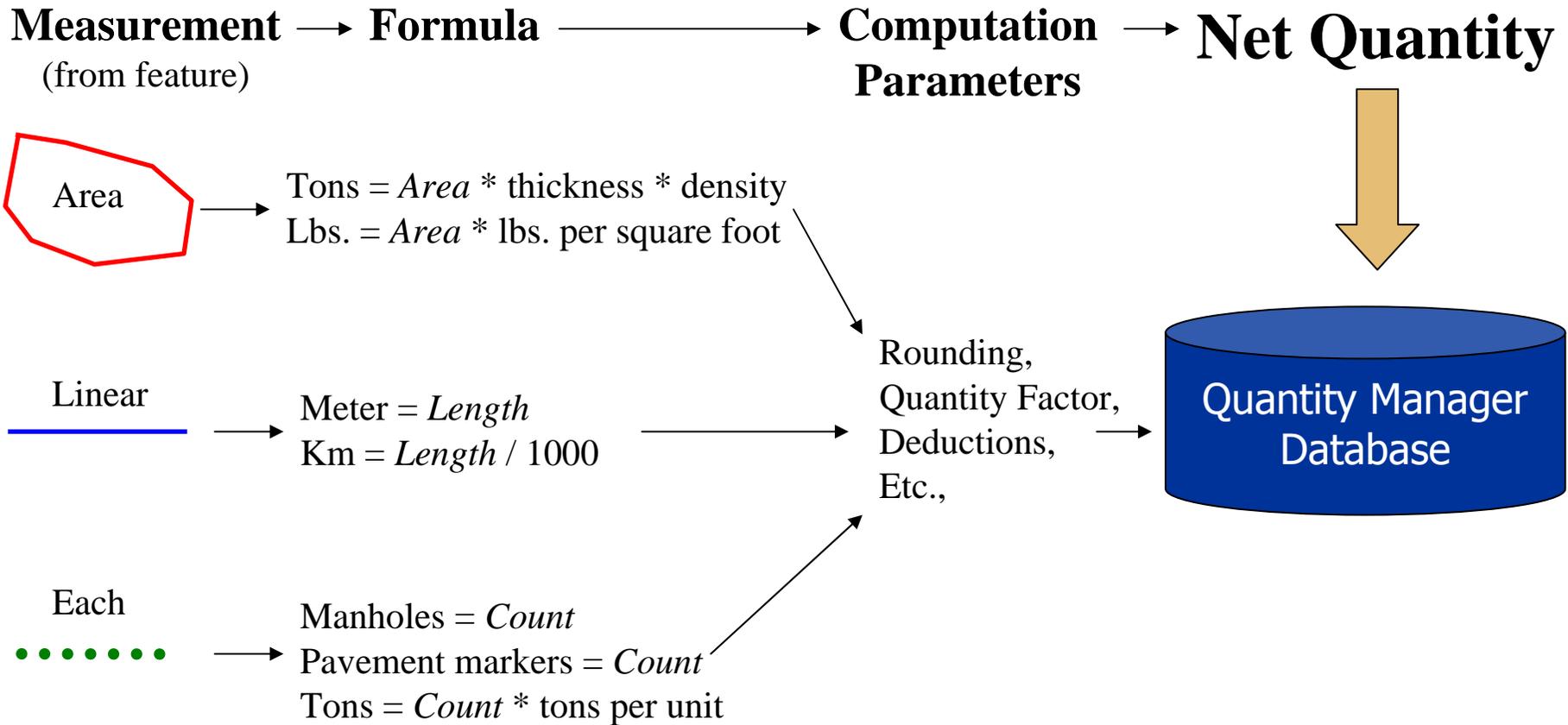
Pay Item Manager

Manages Pay Item databases

- Open
- Create
- Close

Manages Pay Items

- Organizes pay items by category
- Create
- Edit
- Copy
- Delete

Windows Look and Feel

- Drag and drop
- Right click
- Popup menus

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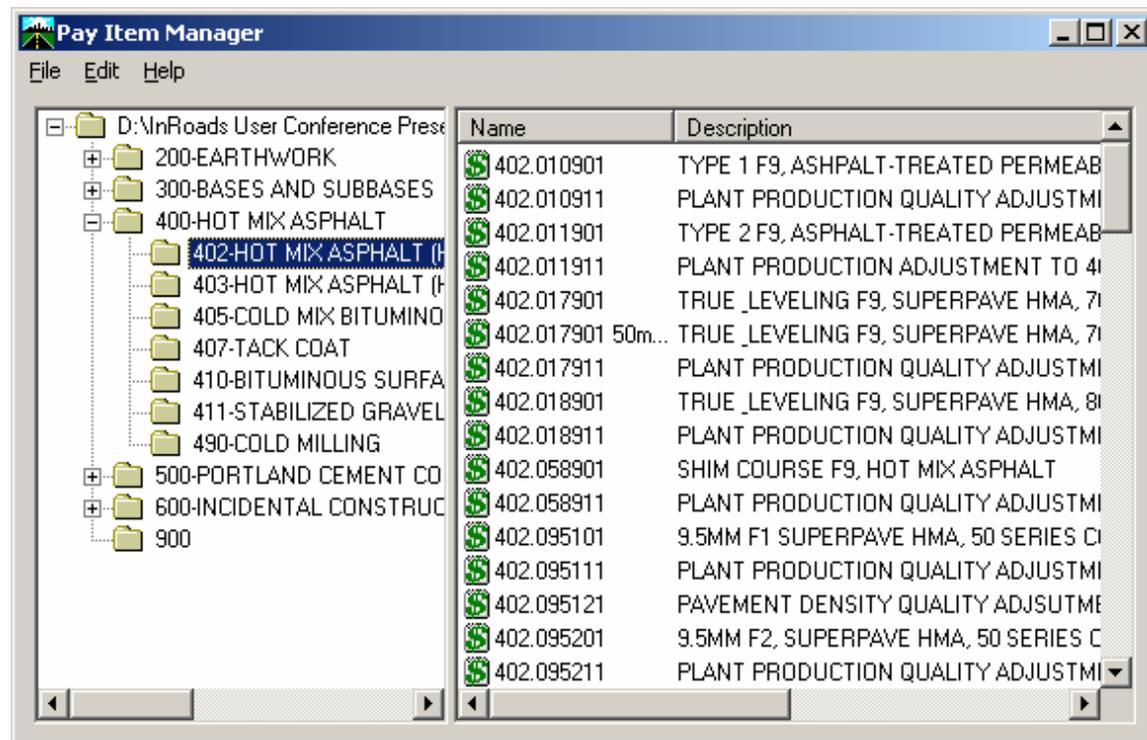
Pay Item

We know what it is, but what is it in InRoads?

- Assigned to features
  - Feature style
  - Feature properties

- Defines computation of pay items
  - Formula, rounding, deductions, etc.

- Stored in the InRoads Pay Item database

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Pay Item

Pay Item Name
- Assigned to Style or Feature

Pay Item Code
- Locked to name by default
- Sent to QM database
- Appears on reports

Unit Name
- TN, SY, FT, etc.
- Sent to QM database
- Appears on reports

Formula
- From Quantity Formulas
- Assign variable substitutions

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Pay Item

Deductions

- Corrects for coincident items
- Ex. Inlets / Curb & Gutter
- Enter pay items to be deducted

Measurement

- Planar
- Slope

Quantity Factor

- Applied to computed value
- Ex. 1 Margin of error
- Ex. 2 Paint stripe/skip

Rounding Factor

- Round to any decimal place
- Round up or down

Edit Pay Item

Pay Item Name: 402.256901 65mm
Pay Item Code: 402.256901
Description: 25MM F9 SUPERPAVE HMA, 60 SERIE
Unit Name: MT

Apply
Close
Help

Quantity Calculation
Formula: Metric Tons

Variables:

Name	Value
mm	65.0000
UnitWgt	2.4040

Value: 0.0000

Deduct from Pay Item
Pay Items:

Pay Item	Deduction

Value: 0.0000

Measurement
Mode: ○ Planarized
       ○ Slope

☐ Apply Quantity Factor: 0.0000
☑ Apply Rounding Factor: 0.1000
   ○ Round Up   ○ Round Down

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Quantity Formula

What is it?

- Converts the geometric measurement of a feature to a quantity.

Examples

- Metric Tons = {AREA} x thickness x weight
- Liters = {LENGTH} x width x liters per square meter
- Cubic Meters = {EACH} x cubic meters per unit

Associated with features via pay items

Stored in the InRoads Pay Item database

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Quantity Formula Manager

Manages Formulas

- Create
- Edit
- Delete

Default set delivered

Customizable

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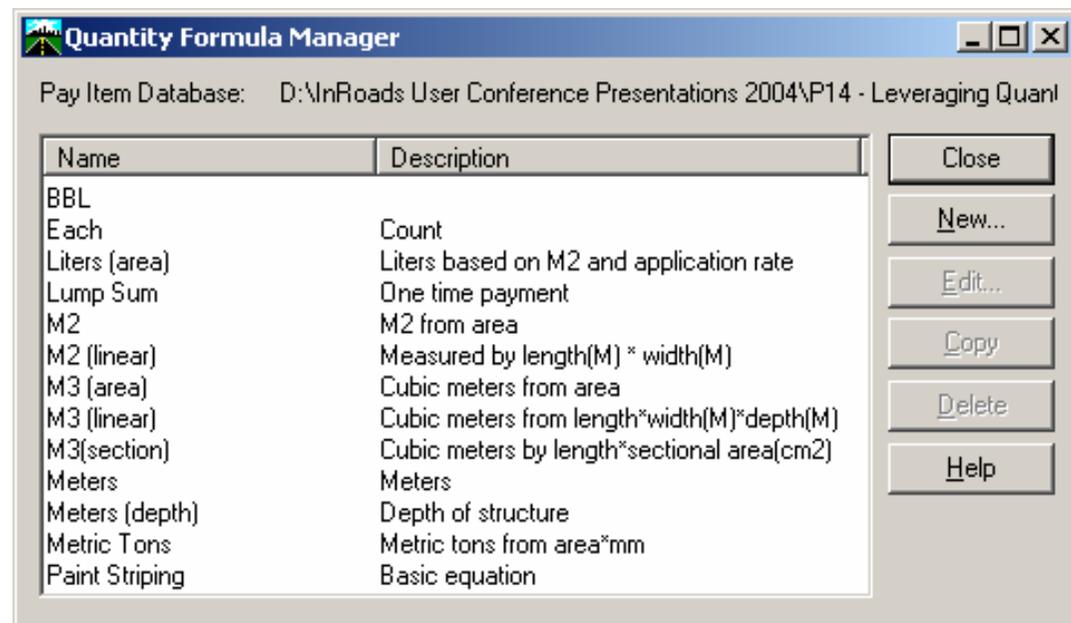
Quantity Formula

Measurement Basis

- Each – count feature or points
- Linear – length of feature
- Area – area of closed feature

Formula

- Measurement Tag
  - {EACH}, {LINEAR}, {AREA}
- Unlimited Variables
- Unlimited Constants
- Math operators

Test Values

- Variable substitutions for testing formula
- Tag and variables are parsed out automatically

Edit Quantity Formula

Name: [<] Metric Tons [>]   Apply

Description: Metric tons from area*mm   Close

Measurement Basis: Area [▼]   Help

Formula:
({AREA}*(mm/1000)*UnitWgt)

Result: 2.4040

{AREA}

Test Values:

Name	Value
{AREA}	1.0000
mm	1000.00...
UnitWgt	2.4040

Value: 0.0000

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Associating Pay Items with InRoads Features

Two Methods

1. Assign pay items to feature styles
2. Assign pay items to features

Multiple pay items per feature

- Assign multiple pay items to the feature
- Feature styles can contain only one pay item

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Associating Pay Items with InRoads Features

Feature Properties

Feature Style

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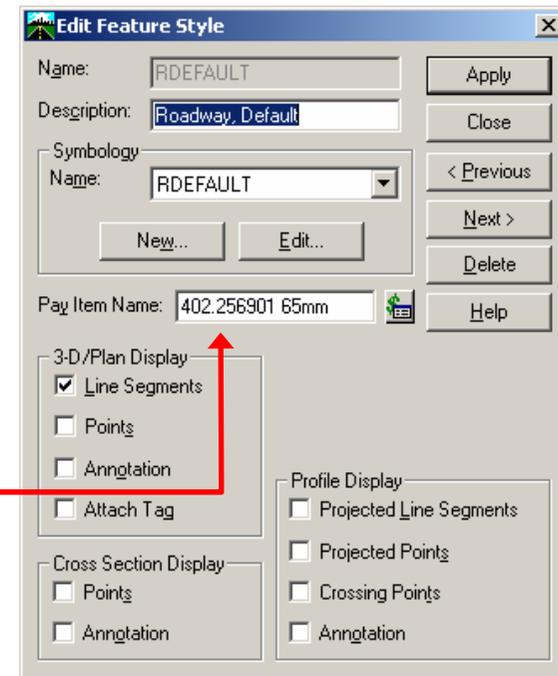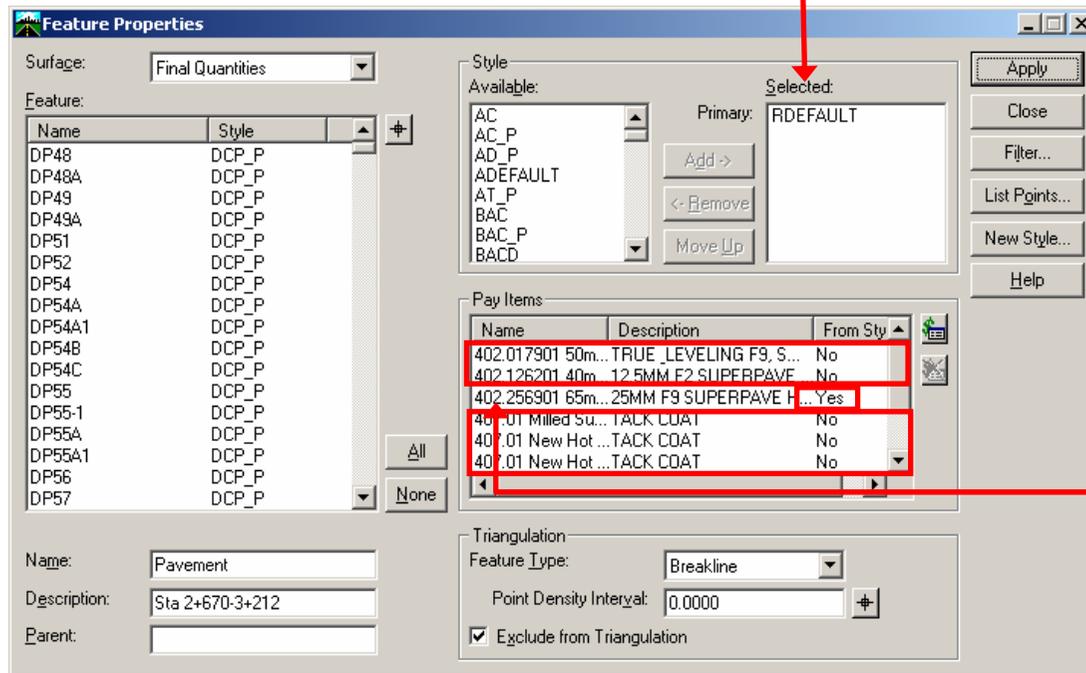
Compute Quantities

Control Alignment

- Controls the range
- Used to compute station/offset locations

Mode

- All – everything within the station range.
- Fence - inside, clip, void, etc.

Include Pay Items

- All – process all pay items in the pay item manager
- Selected – ignore pay items not selected on the
  pay items tab

Include Features

- All – process all features in all loaded DTMs
- Selected – ignore features not selected
  on the features tab

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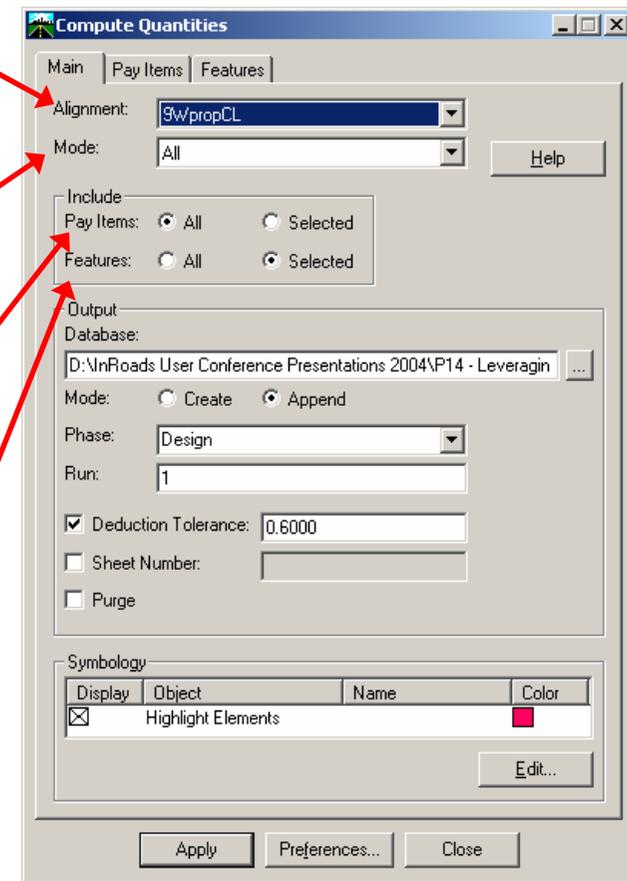
Compute Quantities

Output

- Quantities Database
- Create new, or append to existing

Phase

- Preliminary
- Design
- Final
- Other – editable combo box accepts key-ins

Highlight Elements

- Features are displayed with the selected symbology as they are quantified.

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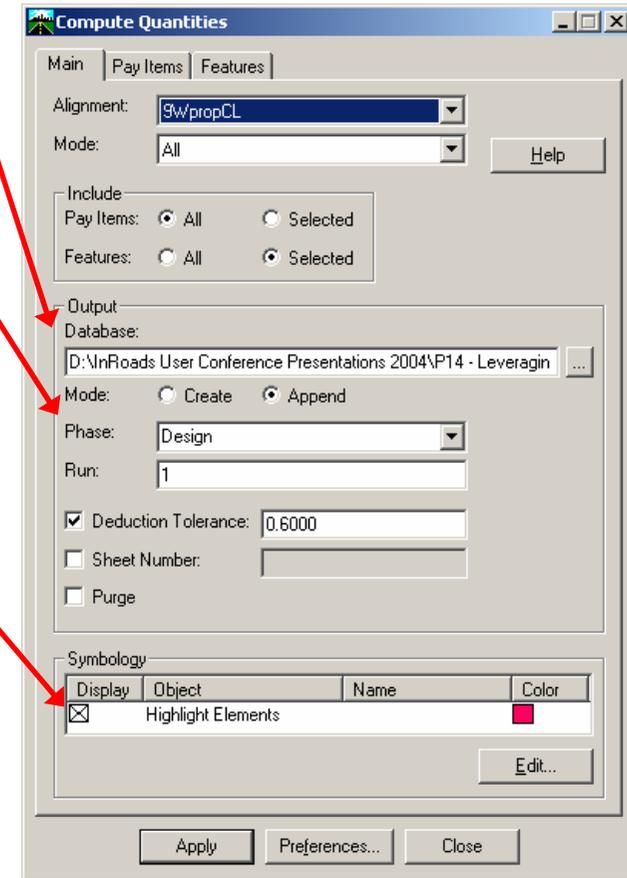
Quantity Manager

Database application for managing quantities

Plan quantities

Earthwork

Non-graphic quantities

Funding Partitions

XML based, customized reports

Cost estimating

Cost comparisons

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Quantity Manager Interface

Pay Items
- Unit Name
- Unit Cost

Quantities
- Quantity
- Measurement basis
- Station location
- Etc.

Elements
- Begin/End X,Y
- Station Location
- Etc.

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Database Table Relationships

Pay Item

Quantity

Elements

339-1

425 SF

375 SF

Arc

Line

Arc

Line

Line

425-767-12

63 LF

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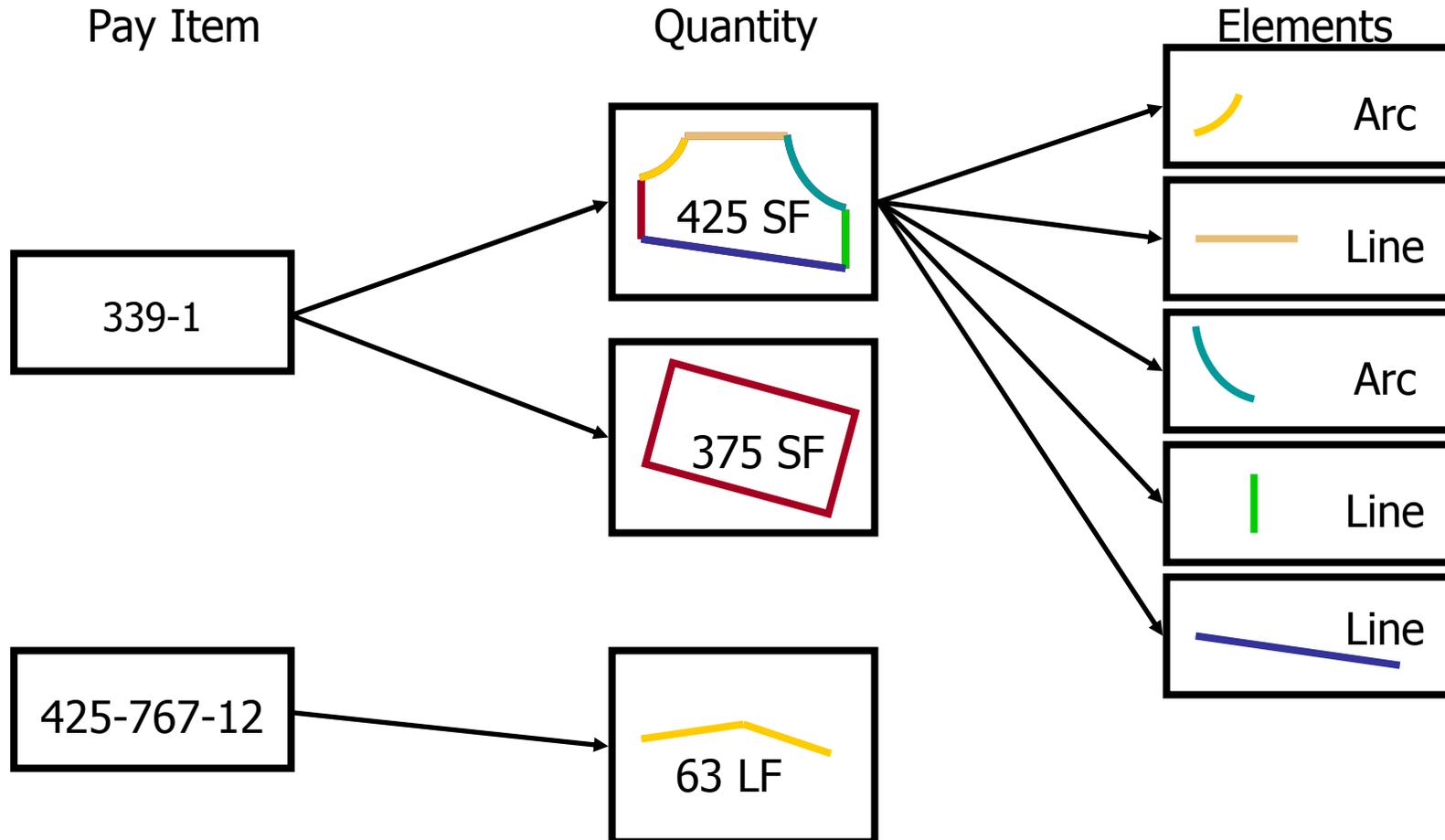
Quantity Contents

"Itemized" quantity list

- Measurement
- Parameters
- Quantity (unrounded & rounded)

Element location information

- Begin / End x, y, station, offset
- Minimum / Maximum x, y, station, offset

Feature information

- Surface Name
- Feature Name

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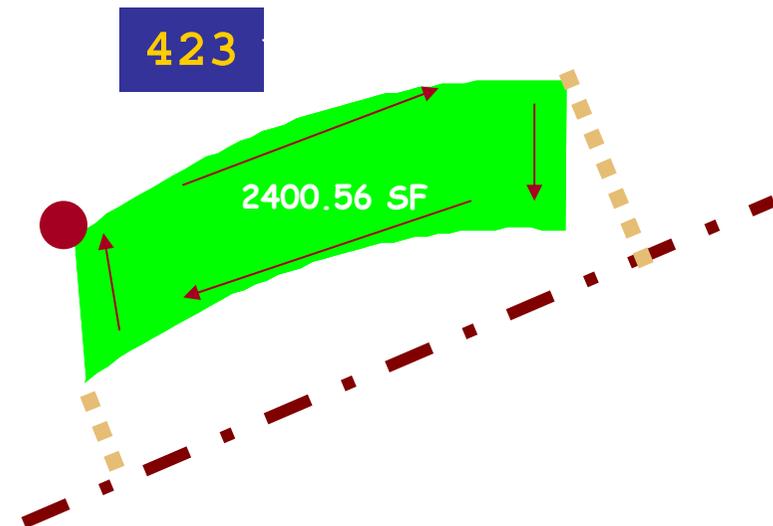
How to get data into Quantity Manager

Run InRoads quantity extractor

- Plan view quantities
- Clearing & grubbing, asphalt, guard rail, seeding, etc

Enter manually through the interface

- Mobilization, Human Resources, Equipment, etc

Import from CSV

- Pay item data
- Quantity data

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Cost Estimating

Unit Cost

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Funding Partitions

Multiple payers

- Federal
- State
- County
- City

Apply funding rules to quantities

- By selection
- By station range

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Funding Rules

Station Range

Contribution %

Payers

Funding Review

Cost per rule

Cost per payer

Payitem	Description	Unit	Unit Cost	Total Cost	FHWA	NYSDOT	Before Intersection	Intersection	After Intersection
203.07	SELECT GR...	CM	26.75	33121.85	905.7	2,716.4	1,222.242	1,206.202	1,193.656
206.02	TRENCH AN...	CM	18.28	54004.6	2,152.21	6,427.89	2,919.667	2,812.132	2,848.302
08304.11	SUBBASE C...	CM	152	713184.0	1,558.159	4,487.411	2,993.68	1,703.414	1,348.476
402.017901	TRUE & LEV...	MT	48.13	119540.48	1,862.775	5,588.325	2,483.7	2,483.7	2,483.7
402.126201	12.5MM F2 ...	MT	40.63	133948.98	1,847.934	5,487.066	2,759.491	2,350.439	2,225.071
402.256901	25MM F9 SU...	MT	43	219730.0	2,817.4	8,360	4,236.857	3,572.135	3,368.408
402.376901	37.5MM F9 ...	MT	47.71	273363.99	1,564.429	4,445.071	3,379.03	1,589.471	1,040.999
407.01	TACK COAT	L	0.46	7900.95	10,543.455	31,417.963	15,164.486	13,633.134	13,163.798
490.1	PRODUCTIO...	SQM	0.56	10703.1	14,334.503	43,003.51	19,112.671	19,112.671	19,112.671
603.9812	SMOOTH IN...	M	78.46	1302.44	12.45	37.35	16.6	16.6	16.6
603.9815	SMOOTH IN...	M	60.73	17490.24	216	648	288	288	288
603.9818	SMOOTH IN...	M	63.74	9357.03	110.1	330.3	146.8	146.8	146.8
603.9824	SMOOTH IN...	M	117.2	18224.6	116.625	349.875	155.5	155.5	155.5
603.9830	SMOOTH IN	M	117.83	35042.64	198.834	595.766	280.549	263.637	250.414

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Custom Reports

User defined Report styles offer robust reporting capability

Quantity data is streamed in XML format through style sheets

The user defines the following:

- Granularity of data
  - By pay item
  - By quantity
  - By funding rules
  - Etc.
- Output format
  - PDF (Adobe)
  - HTML (web page)
  - CSV (comma separated values)
  - TXT
- XSL file used to process the report

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Custom Reports

HTML

PDF

Excel

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