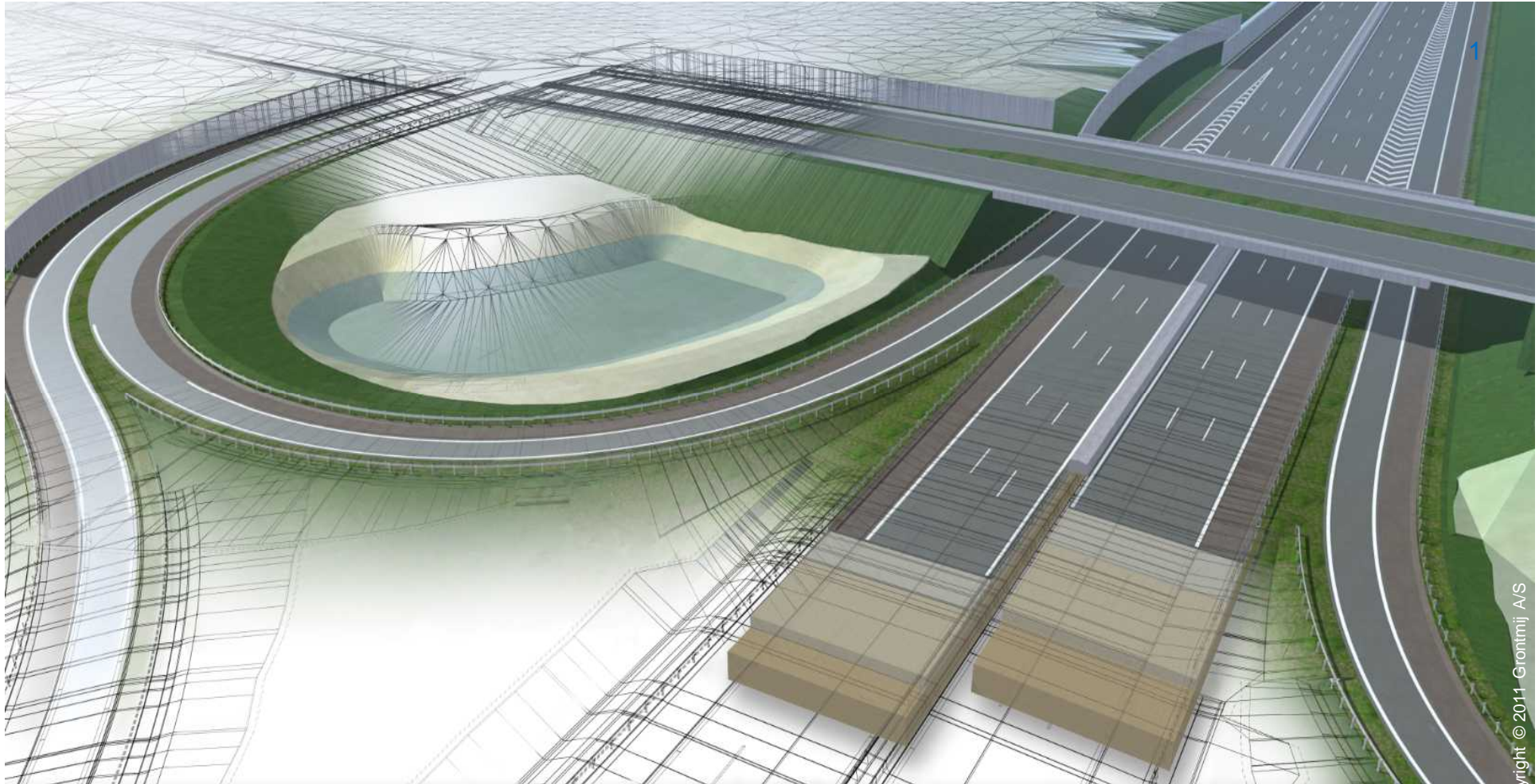


# Extracting Project Quantities with InRoads



Bentleyuser.dk Civil SIG møde September 2015  
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planning connecting  
respecting  
the future

# Extracting Project Quantities with InRoads

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## Two Major Components:

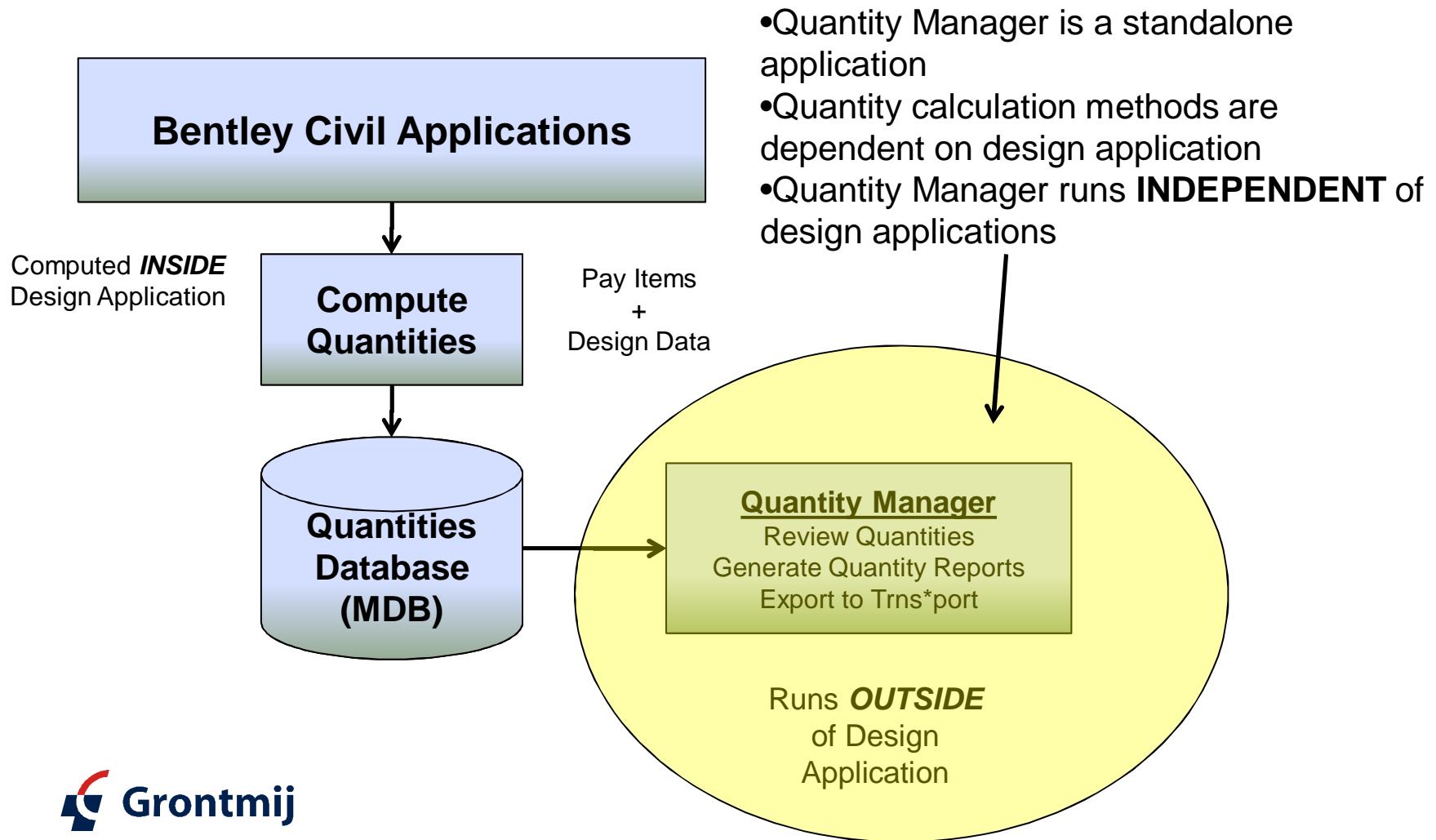
### InRoads Quantity Extractor

- Computes quantities from DTM data
- Exports those quantities to Quantity Manager

### Quantity Manager

- Manages quantities (reporting, estimating, etc.)
- Standalone
- Database application

# Extracting Project Quantities with InRoads



# Extracting Project Quantities with InRoads

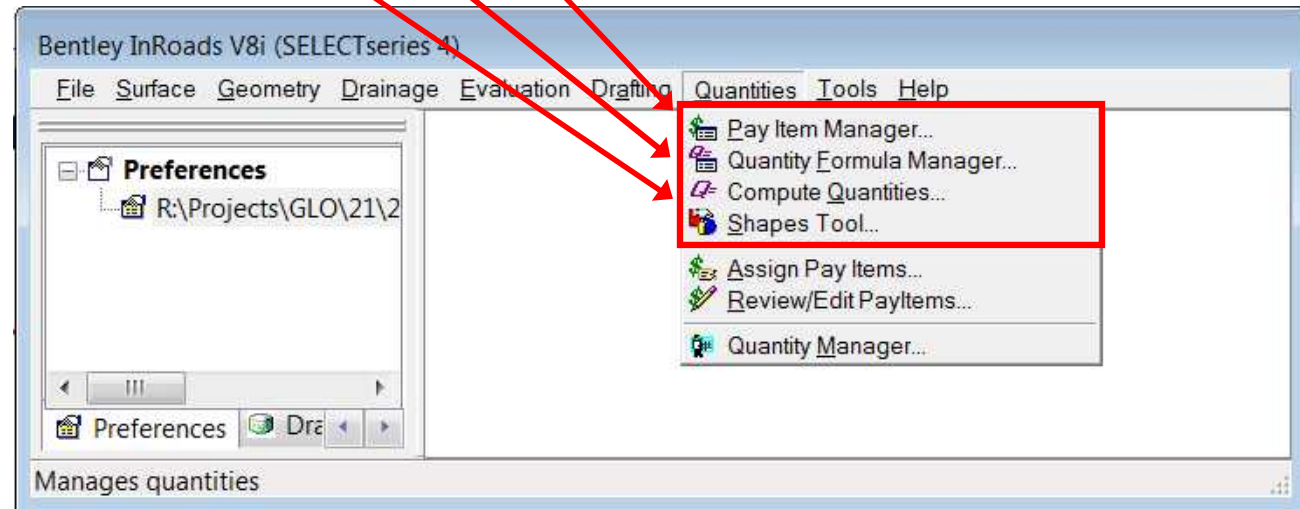
## InRoads Quantity Extractor

Pay Item Database

Pay Item Manager

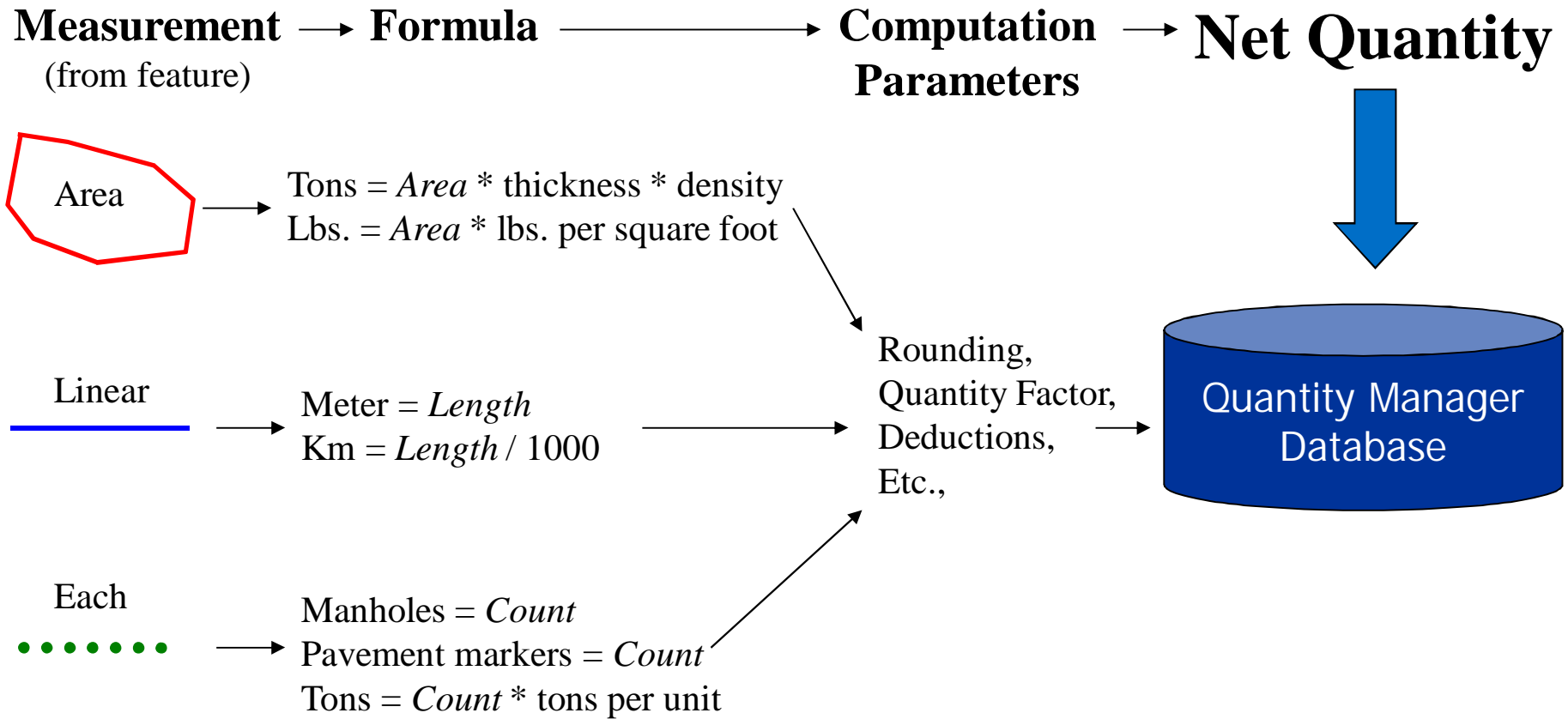
Quantity Formula Manager

Compute Quantities



# Extracting Project Quantities with InRoads

## InRoads Quantity Extractor



# Extracting Project Quantities with InRoads

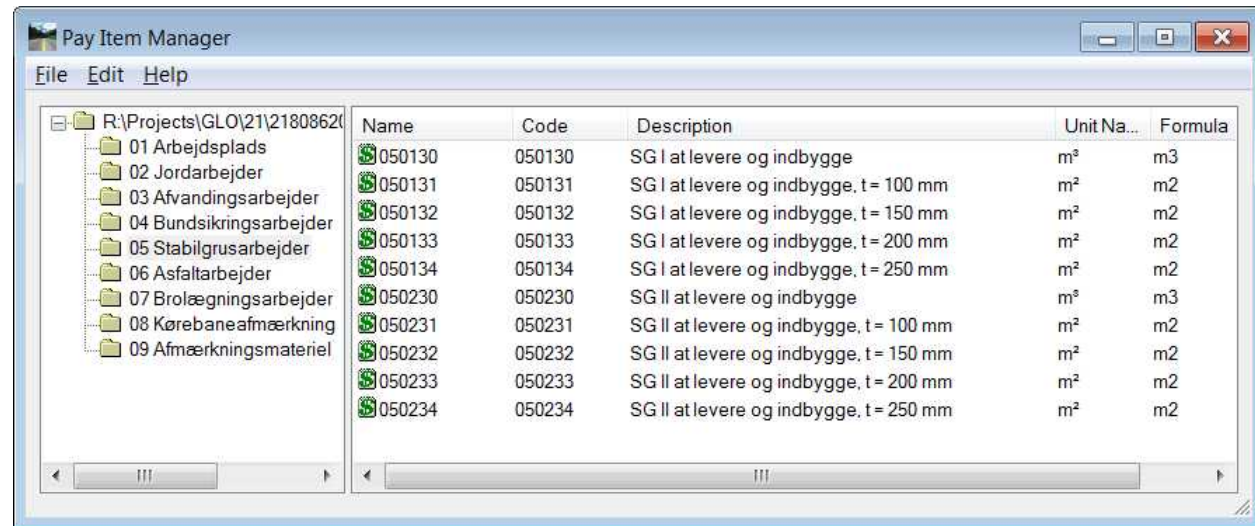
## Pay Item Manager

### 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



# Extracting Project Quantities with InRoads

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## Pay Item

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

- Assigned to features
  - Feature style
  - Feature properties
  - Assigns pay items to graphic elements and surface features
- Defines computation of pay items
  - Formula, rounding, deductions, etc.
- Stored in the InRoads Pay Item database

# Extracting Project Quantities with InRoads

## 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

**Edit Pay Item**

Pay Item Name: 071016

Pay Item Code: 071016

Description: Levering og sætning af granitkantsten, R >= 2

Unit Name: m

Quantity Calculation

Formula: m

Name	Value
------	-------

Value: 0,0000

Deduct from Pay Item

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

Value: 0,0000

Measurement

Mode:  Planarized  Slope

Apply Quantity Factor: 0,0000

Apply Rounding Factor: 0,0000

Round Up  Round Down



# Extracting Project Quantities with InRoads

## Pay Item

### Deductions

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

### Measurement

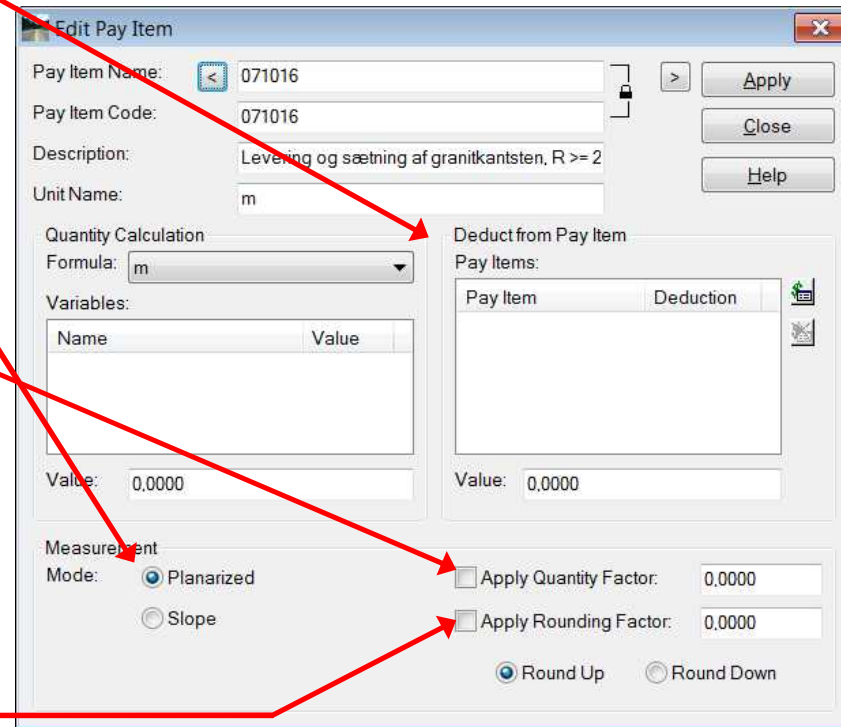
- Planar
- Slope

### 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



# Extracting Project Quantities with InRoads

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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

# Extracting Project Quantities with InRoads

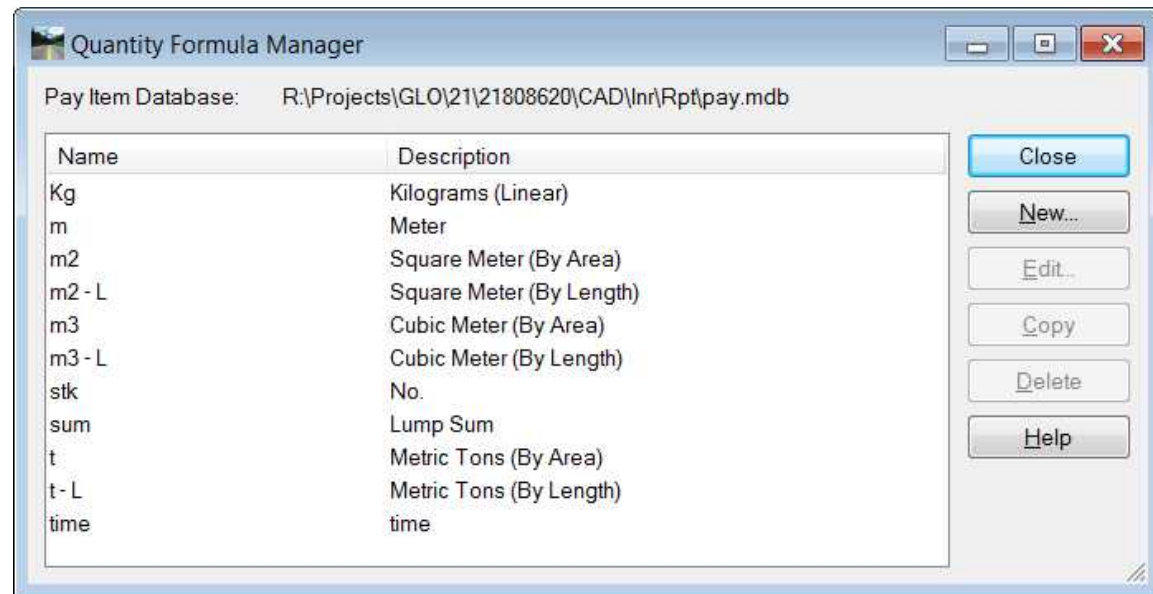
## Quantity Formula Manager

Manages Formulas

- Create
- Edit
- Delete

Default set delivered

Customizable



# Extracting Project Quantities with InRoads

## Quantity Formula

### Measurement Basis

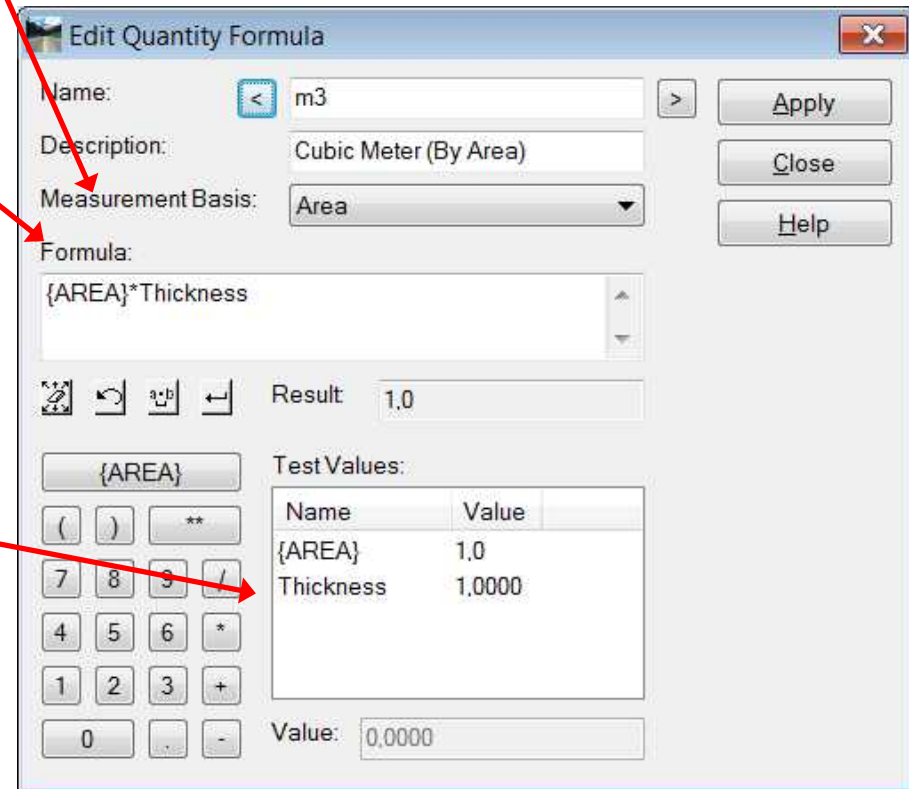
- Each – count feature or points
- Linear – length of feature
- Area – area of closed feature

### 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



# Extracting Project Quantities with InRoads

## Associating Pay Items with InRoads Features

### Methods

1. Assign pay items to feature styles
2. Assign pay items to features
3. Assigns pay items to graphic elements and surface features

### Multiple pay items per feature

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

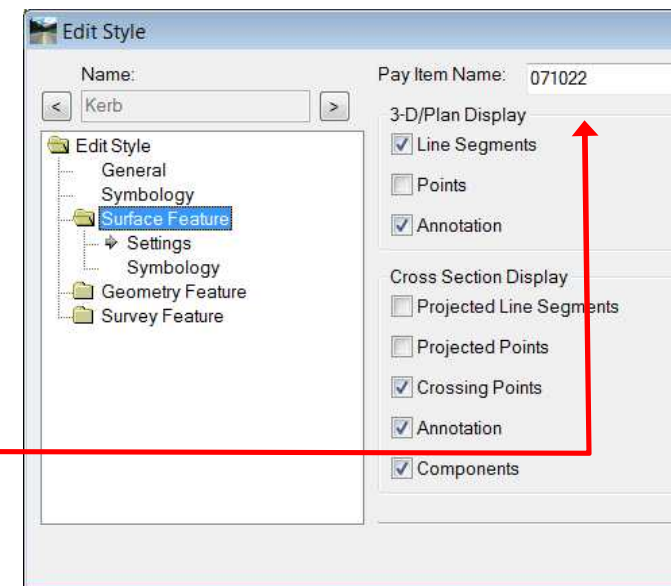
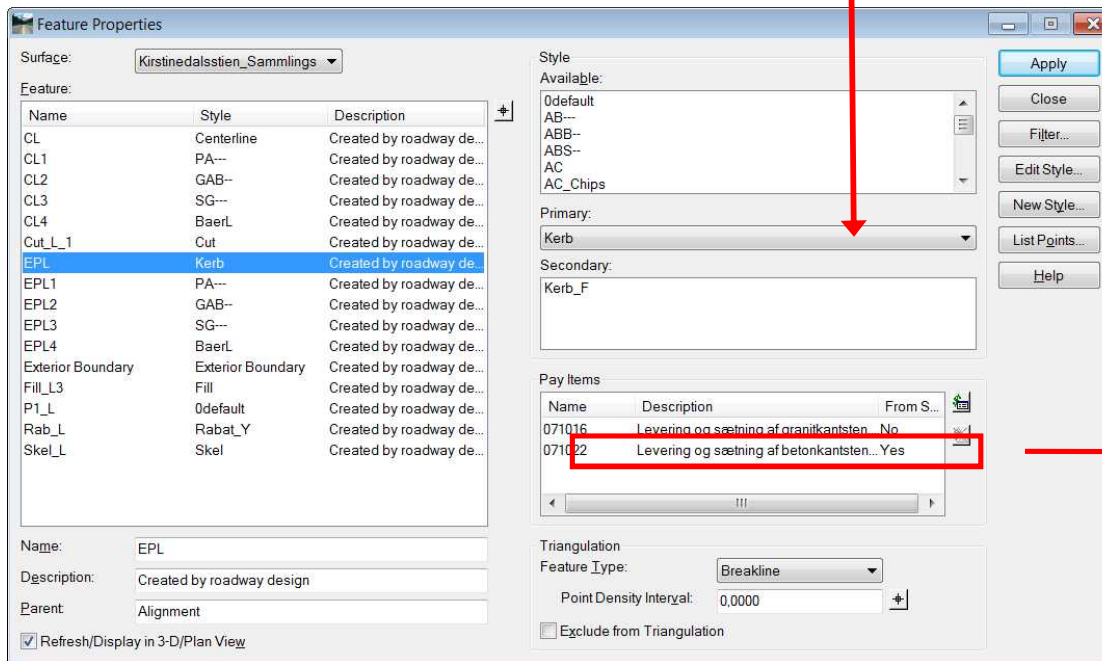


# Extracting Project Quantities with InRoads

## Associating Pay Items with InRoads Features

Feature Properties

Feature Style



# Extracting Project Quantities with InRoads

## Compute Quantities

### Control Alignment

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

### Mode

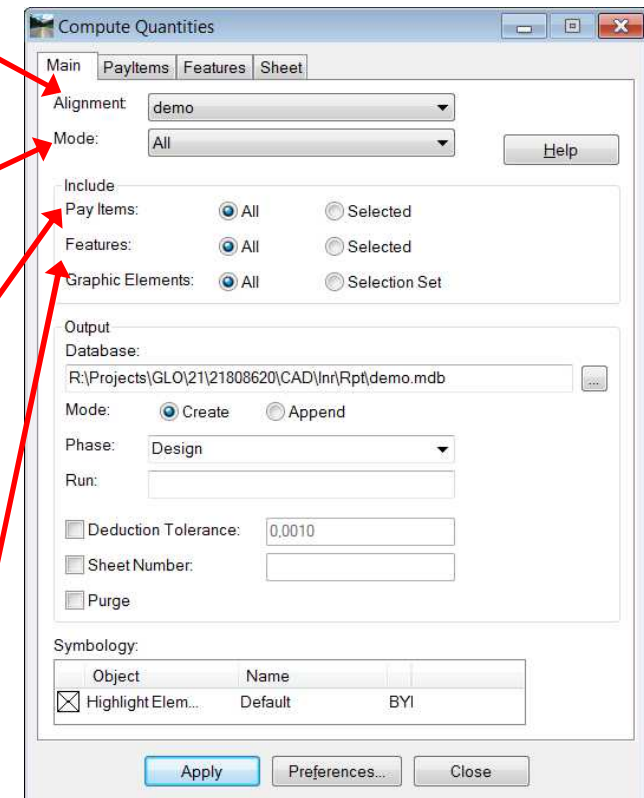
- All – everything within the station range.
- Fence - inside, clip, void, etc.

### 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 and Graphic elements

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





# Extracting Project Quantities with InRoads

## Compute Quantities

### Output

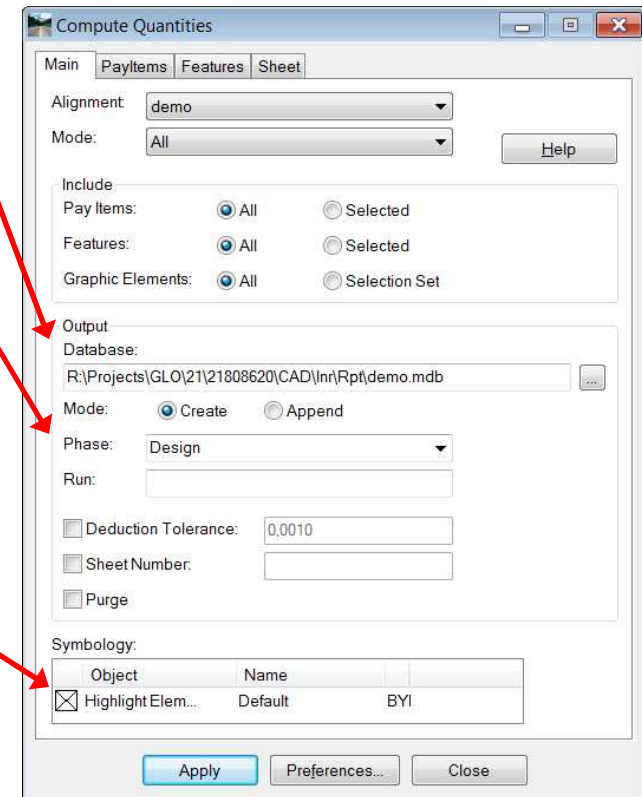
- Quantities Database
- Create new, or append to existing

### Phase

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

### Highlight Elements

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



# Extracting Project Quantities with InRoads

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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

# Extracting Project Quantities with InRoads

## Quantity Manager Interface

### Pay Items

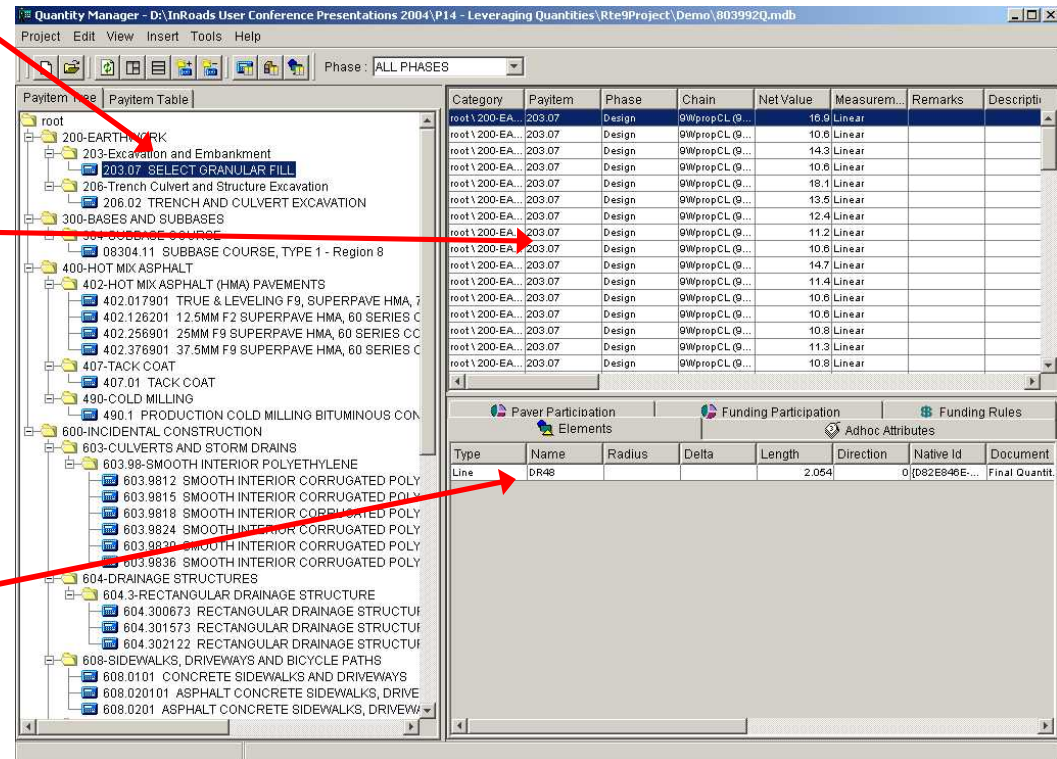
- Unit Name
- Unit Cost

### Quantities

- Quantity
- Measurement basis
- Station location
- Etc.

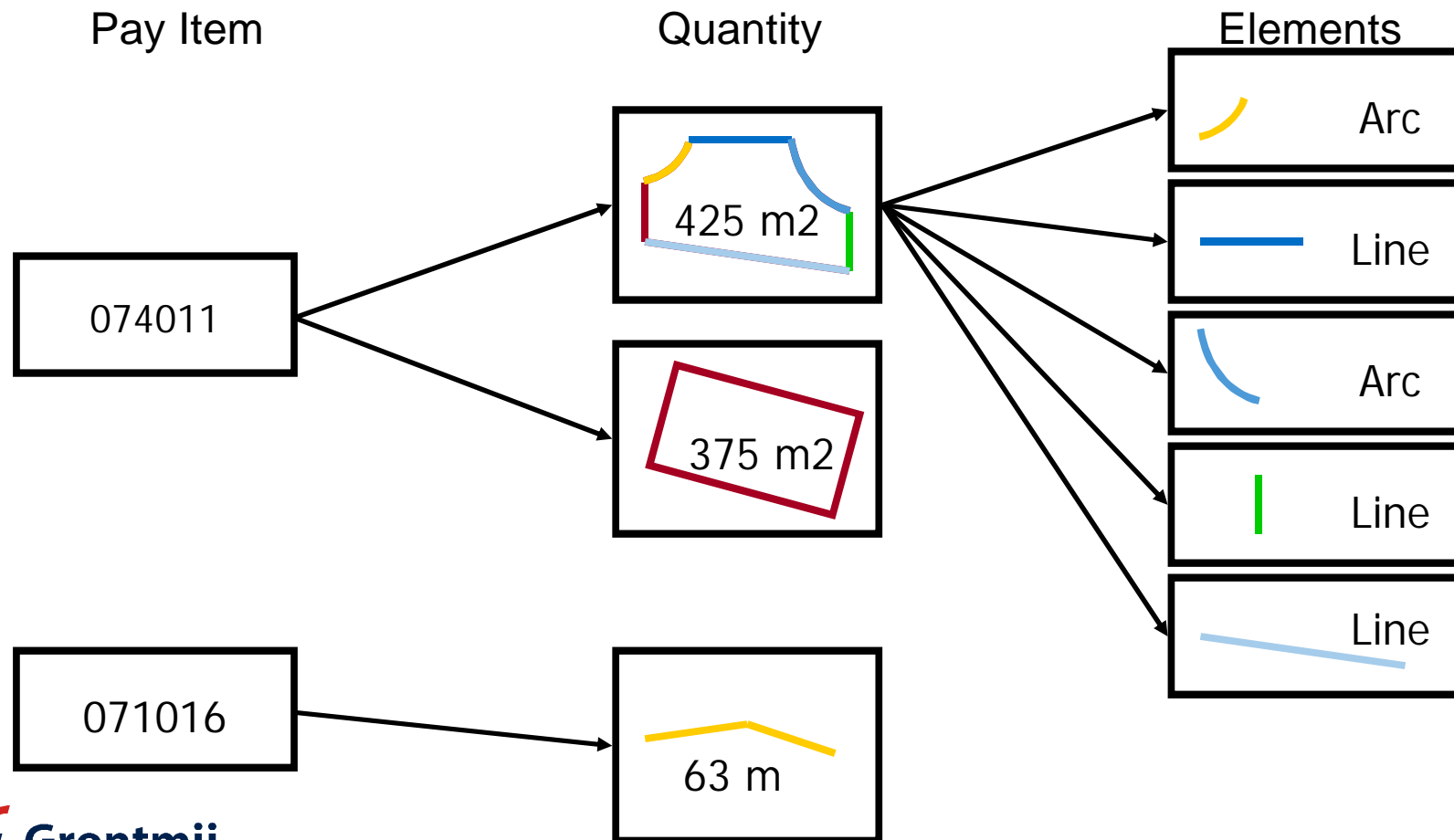
### Elements

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



# Extracting Project Quantities with InRoads

## Database Table Relationships



# Extracting Project Quantities with InRoads

## Quantity Contents

“Itemized” quantity list

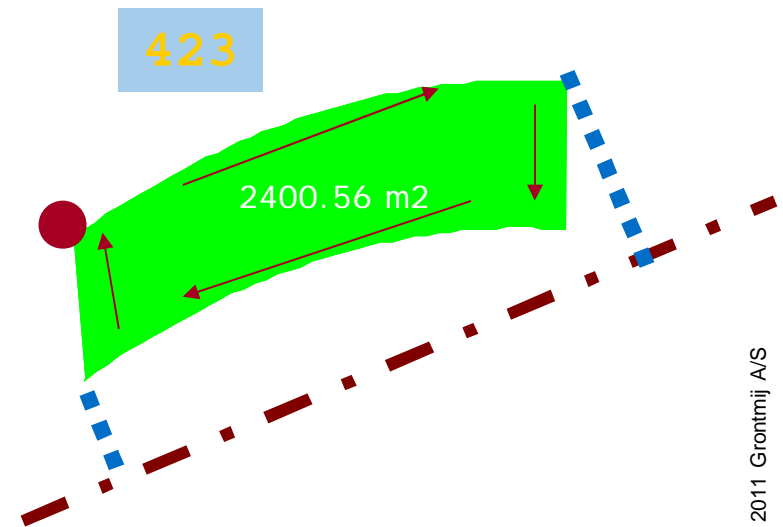
- Measurement
- Parameters
- Quantity (unrounded & rounded)

Element location information

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

Feature information

- Surface Name
- Feature Name



# Extracting Project Quantities with InRoads

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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

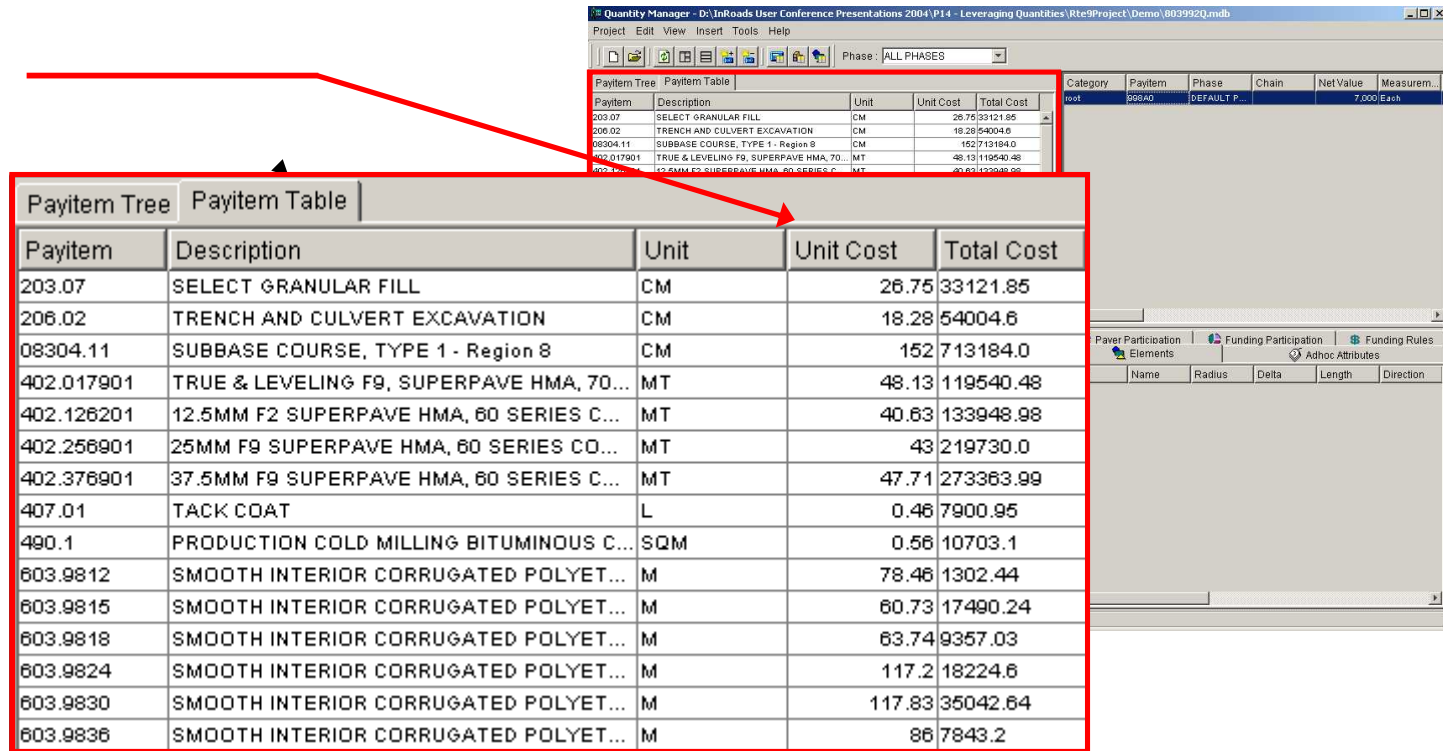
### Import from CSV

- Pay item data
- Quantity data

# Extracting Project Quantities with InRoads

## Cost Estimating

Unit Cost



Payitem	Description	Unit	Unit Cost	Total Cost
203.07	SELECT GRANULAR FILL	CM	26.75	33121.85
206.02	TRENCH AND CULVERT EXCAVATION	CM	18.28	54004.6
08304.11	SUBBASE COURSE, TYPE 1 - Region 8	CM	152	713184.0
402.017901	TRUE & LEVELING F9, SUPERPAVE HMA, 70...	MT	48.13	119540.48
402.126201	12.5MM F2 SUPERPAVE HMA, 60 SERIES C...	MT	40.63	133948.98
402.256901	25MM F9 SUPERPAVE HMA, 60 SERIES CO...	MT	43	219730.0
402.376901	37.5MM F9 SUPERPAVE HMA, 60 SERIES C...	MT	47.71	273363.99
407.01	TACK COAT	L	0.46	7900.95
490.1	PRODUCTION COLD MILLING BITUMINOUS C...	SQM	0.56	10703.1
603.9812	SMOOTH INTERIOR CORRUGATED POLYET...	M	78.46	1302.44
603.9815	SMOOTH INTERIOR CORRUGATED POLYET...	M	60.73	17490.24
603.9818	SMOOTH INTERIOR CORRUGATED POLYET...	M	63.74	9357.03
603.9824	SMOOTH INTERIOR CORRUGATED POLYET...	M	117.2	18224.6
603.9830	SMOOTH INTERIOR CORRUGATED POLYET...	M	117.83	35042.64
603.9836	SMOOTH INTERIOR CORRUGATED POLYET...	M	86	7843.2



# Extracting Project Quantities with InRoads

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## Funding Partitions

### Multiple payers

- Federal
- State
- County
- City

### Apply funding rules to quantities

- By selection
- By station range

# Extracting Project Quantities with InRoads

## Funding Rules

Station Range

Contribution %

Payers

**Funding Properties**

Name: After Intersection    Description: Funding Split after Intersection

Funding	Payer	Description	%
After Intersection	FHWA	Federal Highway Administration	30
Before Intersection	NYSDOT	New York State Department of Tran...	70
Intersection	DEFAULT PAYER		0
DEFAULT FUNDING			

Station Range

Limit Funding Rule within Station Range

Chain: 9WpropCL (9WpropCL)

Begin Station: 3805.0    Region: 1

End Station: 4550.0    Region: 1

Update

# Extracting Project Quantities with InRoads

## 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

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

# Extracting Project Quantities with InRoads

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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

# Extracting Project Quantities with InRoads

## Custom Reports

DEPARTMENT OF TRANSPORTATION  
CURB AND/OR GUTTER COMPUTATION

STATION TO STATION	SIDE	PAY ITEM DESCRIPTION COMBINATION CURB & GUTTER, TYPE C			
		DESIGN ORIGINAL			
		GROSS LENGTH ( LIN FT )	TYPE	LENGTH	NET
50+86 - 15+13.79 (Centerline)	LT	1531		80	
50+86 - 15+87.27 (Centerline)	RT	1543		142	
14+54.00 - 15+07.47 (Centerline)	LT	129		0	
14+70.95 - 15+86.18 (Centerline)	LT	214		0	
16+86.18 - 32+00.77 (Centerline)	LT	1621		112	
16+87.27 - 16+80.25 (Centerline)	RT	484		0	
16+32.25 - 32+00.77 (Centerline)	RT	1611		74	
16+33.02 - 17+07.80 (Centerline)	RT	459		0	

HTML

Name	Description	Unit	Unit Cost	Total Quantity	Total Cost
201A000	CLEARING & GRUBBING (APPROXIMATELY ____ACRES)	LUMP SUM	1500.0	5.71	8568.79
206C009	REMOVING BITUMINOUS PAVEMENT	SQ YD	5.0	11011.00	55055.00
623C000	COMBINATION CURB & GUTTER, TYPE C	LIN FT	14.0	7204.00	100856.00
530A001	18" ROADWAY PIPE (CLASS 3 R.C.)	LIN FT	50.0	2591.00	129550.00
530A002	24" ROADWAY PIPE (CLASS 3 R.C.)	LIN FT	65.0	83.00	5395.00
530A003	30" ROADWAY PIPE (CLASS 3 R.C.)	LIN FT	90.0	330.00	29700.00
		CU YD	100.0	226.00	22600.00
		EACH	500.0	8.00	4000.00
		EACH	650.0	2.00	1300.00
		EACH	800.0	1.00	800.00
		EACH	2800.0	20.00	56000.00
		EACH	3500.0	4.00	14000.00
		EACH	2000.0	3.00	6000.00

PDF

	A	C	G	K	L	M	N
1	Chain	Minimum Station	Maximum Station	201A000	206C009	623C000	530A001
2	Centerline	50.84	1534.35	1.24			
3	Centerline	50.85	1684.52	1.55			
4	Centerline	1475.44	3200.77	1.47			
5	Centerline	1619.27	3200.77	1.46			
6	Centerline	49.64	3200.77		11011		
7	Centerline	50.85	1513.8			1471	
8	Centerline	50.85	1587.27			1401	
9	Centerline	1454	1507.48			129	

Excel