2008 CONFERENCE: CREATING VALUE

ESTIMATING AND MANAGING ESCALATION

Strategies to Model & Manage Cost Escalation

October 28, 2008

Agenda

- Defining Escalation
- Project Level Escalation Forecasting Approach
- Program Level Escalation Forecasting Approach
- Key Drivers Behind Escalation
- Escalation Forecast Within Risk Analysis

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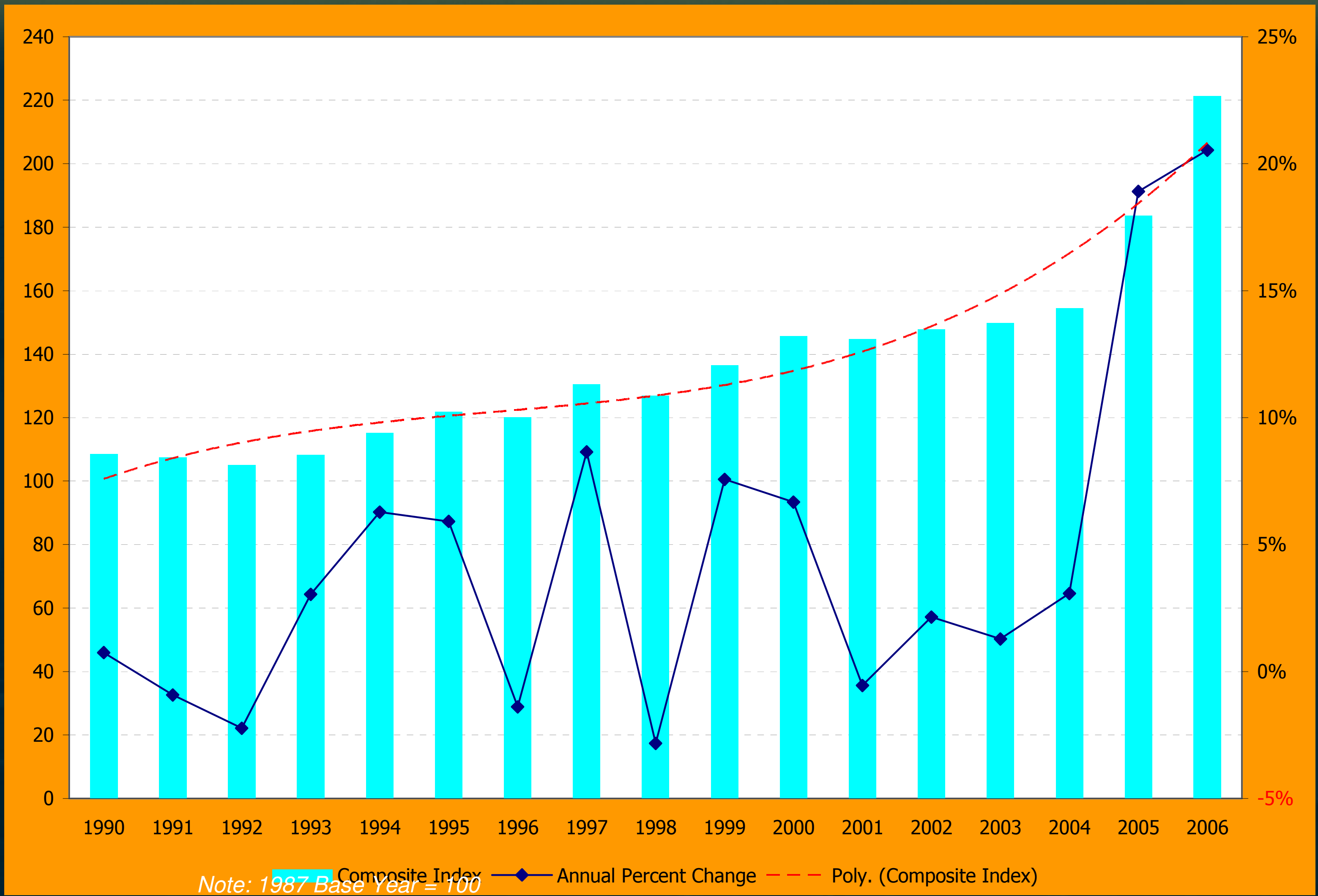
Inflation Vs. Escalation

- Inflation: The rise in price levels caused by an increase in available currency and credit without a proportionate increase in available goods and services of equal quality. Inflation does not include real escalation.

- Real Escalation Rate: The annual rate of increase of an expenditure that is due to factors such as resource depletion, increased demand, and improvements in design or manufacturing (negative rate). The real escalation rate does not include inflation.

- Escalation Rate: The total annual rate of increase in cost. The escalation rate includes the effects of inflation, which is the same for all cost items, and real escalation, which is cost item specific.

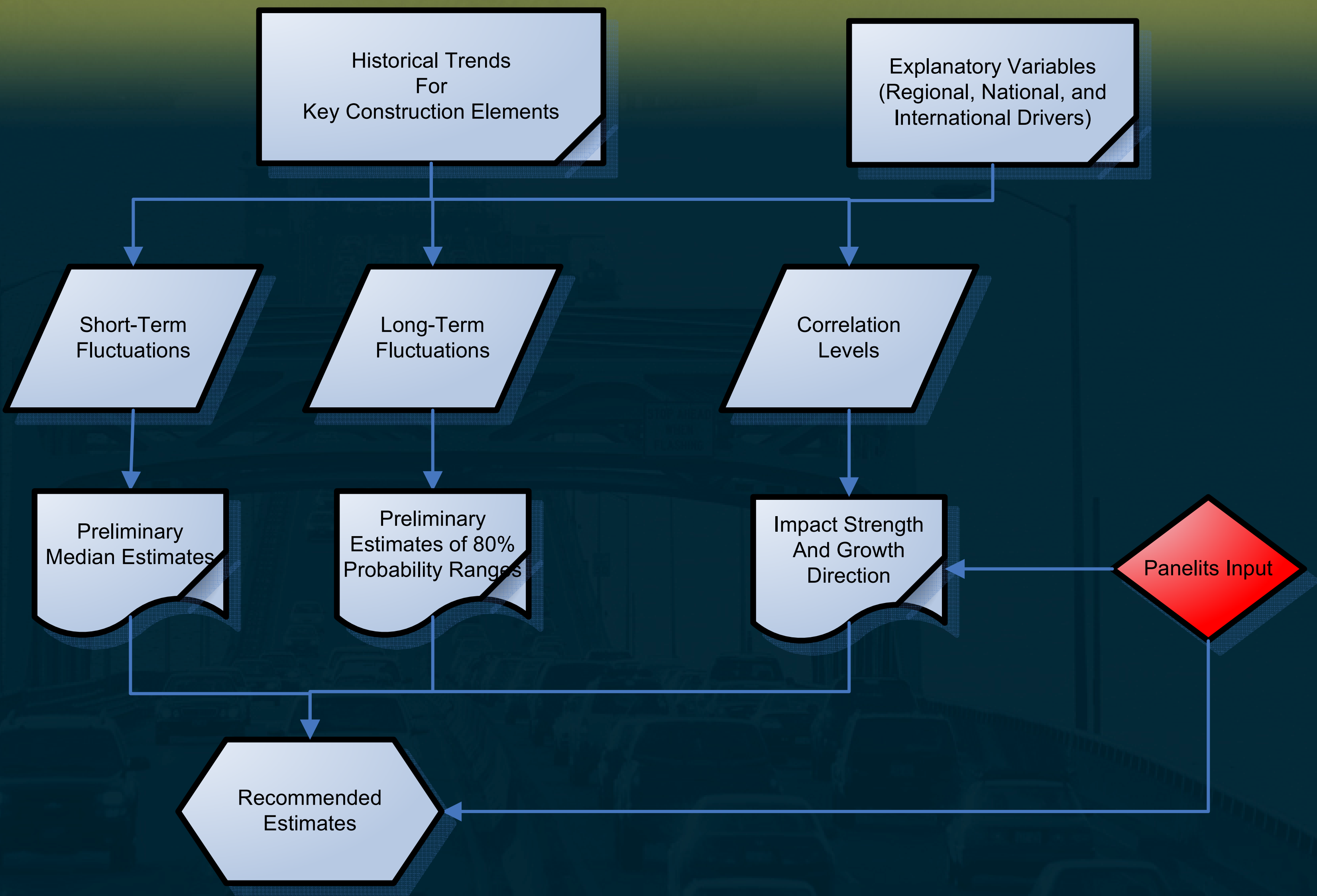
Construction Cost Composite



Note: 1987 Base Year = 100

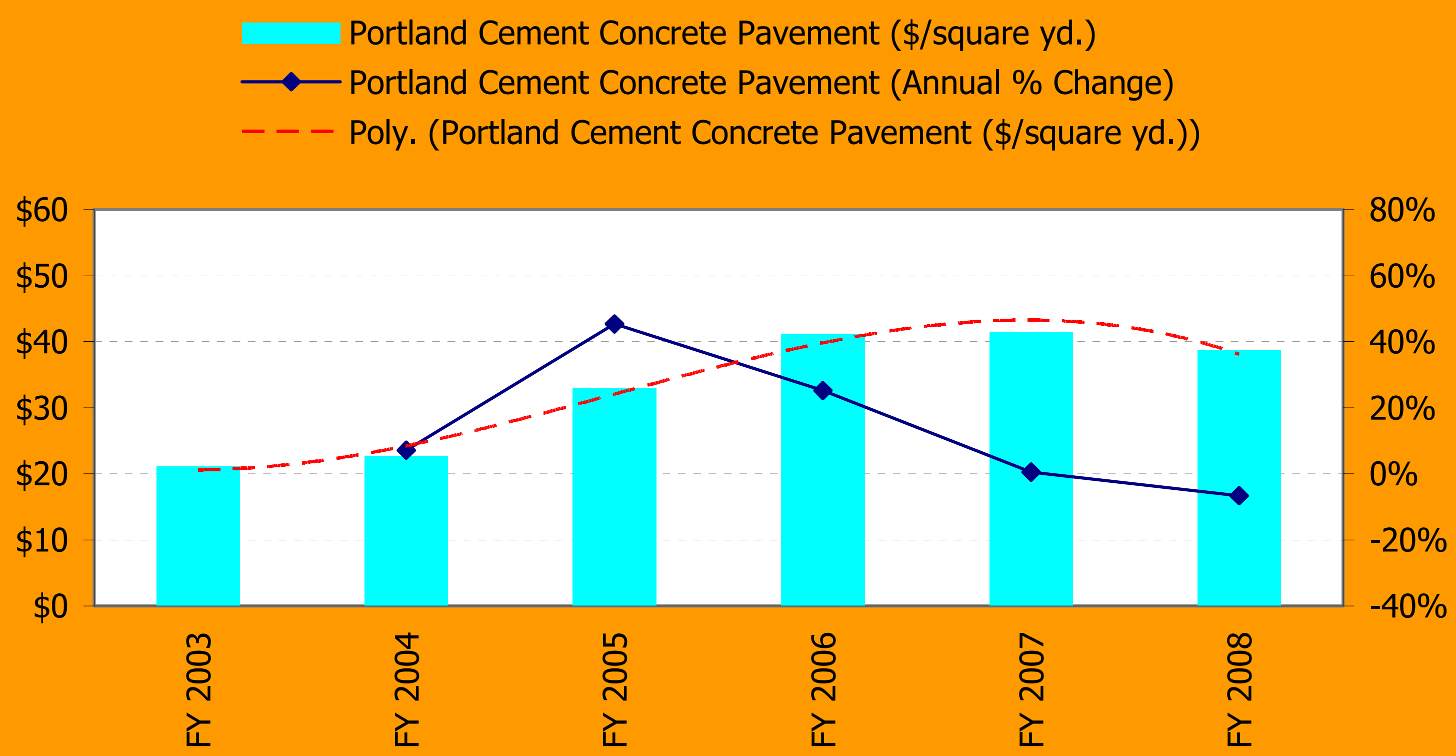
Source: FHWA, "Price Trends for Federal-Aid Highway Construction," July 2007.

Project Level Approach



Program Level Escalation Forecasting Approach

Concrete Cost Trend



Period	Average Annual Compound Growth	Mean	Minimum	Maximum	80% Confidence Interval	
					Lower 10%	Upper 10%
Full Period	12.8%	14.3%	-6.6%	45.3%	-3.8%	37.2%

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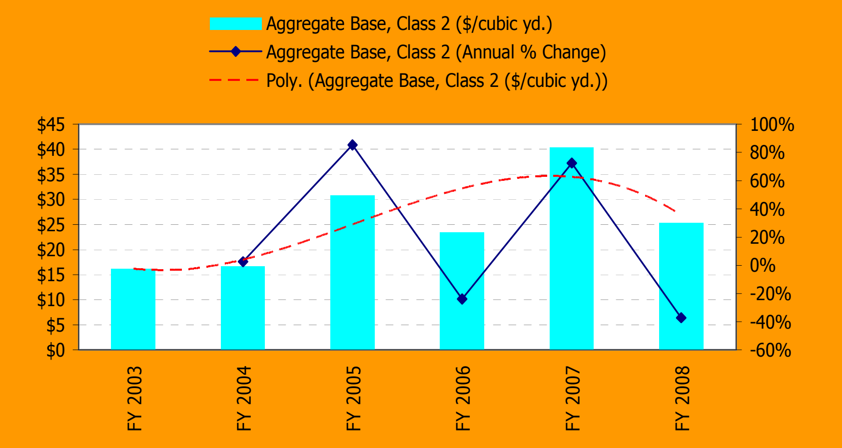
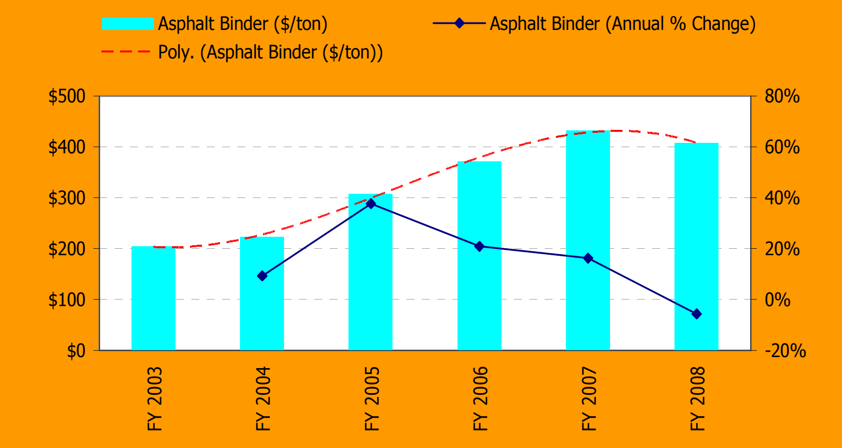
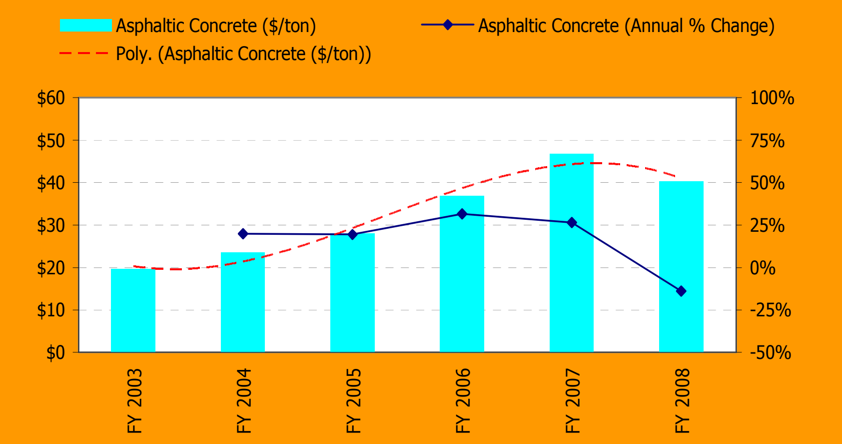
Asphalt Cost Trends



Period	Average Annual Compound Growth	Mean	Minimum	Maximum	80% Confidence Interval Lower 10%	80% Confidence Interval Upper 10%
Full Period	9.4%	19.8%	-37.2%	85.2%	-31.9%	80.1%

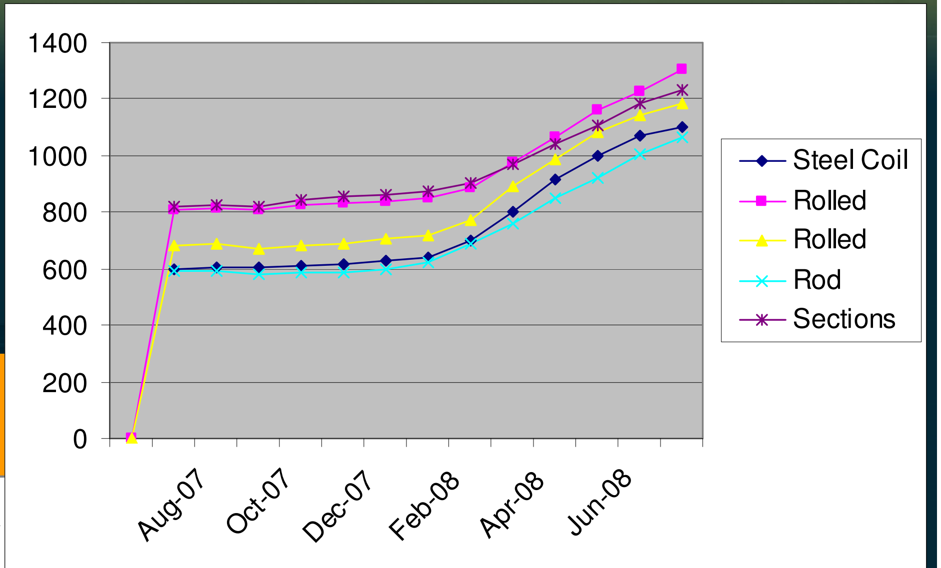


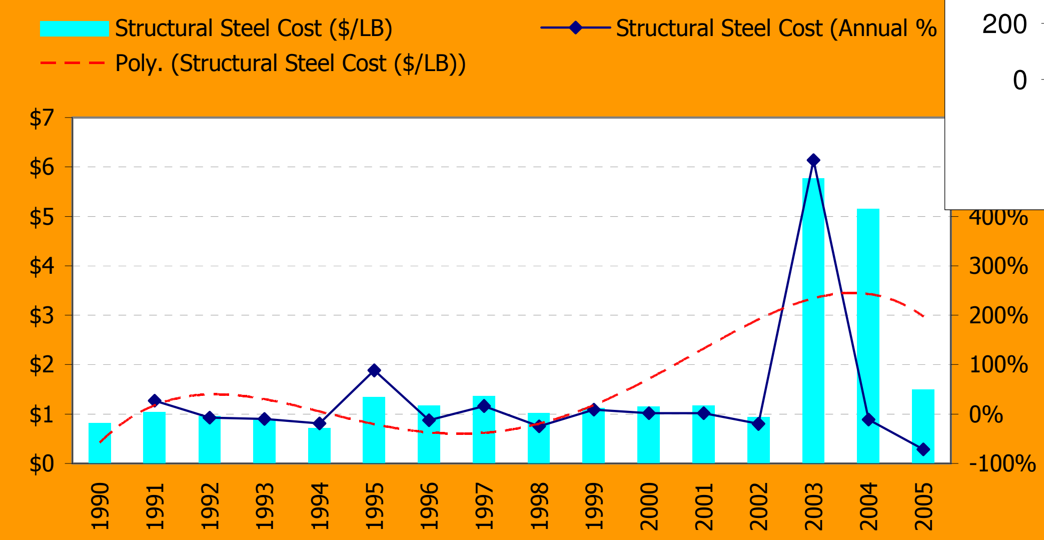
Period	Average Annual Compound Growth	Mean	Minimum	Maximum	80% Confidence Interval Lower 10%	80% Confidence Interval Upper 10%
Full Period	14.8%	15.7%	-5.7%	37.7%	0.3%	30.9%



Period	Average Annual Compound Growth	Mean	Minimum	Maximum	80% Confidence Interval Lower 10%	80% Confidence Interval Upper 10%
Full Period	15.5%	16.7%	-13.8%	31.5%	-0.5%	29.5%

Long-Term and Short Term Trends





Period	Average Annual Compound Growth	Mean	Minimum	Maximum	80% Confidence Interval Lower 10%	80% Confidence Interval Upper 10%
Last 5 Years	5.5%	83.0%	-70.9%	514.2%	-50.5%	309.3%
Last 10 Years	1.1%	40.5%	-70.9%	514.2%	-29.3%	66.2%
Full Period	4.1%	32.4%	-70.9%	514.2%	-22.8%	63.9%

Candidate Explanatory Variables

1) Regional highway spending: Total disbursements (capital and O&M) for highways by all units of government (federal, state, local) in Arizona, California, New Mexico, Nevada and Utah.
2) Regional Gross State Product: Sum of gross outputs of industries minus intermediate goods and services purchased from other industries or imported in Arizona, California, New Mexico, Nevada and Utah.
3) Wages in construction sector: Average weekly wages in private companies of the highway, street and bridge construction sector in Arizona.
4) National construction spending: Total value of construction put in place in the United States.
5) Iron and steel scrap price: The producer price index for iron and steel scrap measures the average change in selling prices received by domestic producers for their output.
6) Iron ore price: The producer price index for iron ore measures the average change in selling pricings received by domestic producers for their output.
7) Cement price: The producer price index for Portland cement measures the average change in selling prices received by domestic producers for their output.
8) Aggregate price: The producer price index for aggregate materials (crushed stones, gravel and sand) measures the average change in selling prices received by domestic producers for their output.
9) Construction equipment and machinery cost: The producer price index for construction machinery manufacturing measures the average change in selling prices received by domestic manufacturers for their output.
10) Severe weather conditions: Measure of historical seasonal hurricane activity captured by the "Accumulated Cyclone Energy (ACE)" index.
11) Consumer Price Index (CPI): The Consumer Price Index is a measure of the average change over time in prices paid by urban consumers for a market basket of consumer goods and services.
12) Crude oil price: Spot prices of a barrel of West Texas Intermediate (WTI) crude oil at Cushing, Oklahoma.
13) Steel imports to China: The value in dollars of total imports of steel products into China.
14) Exchange Rate: The national Broad Index is a weighted average of the foreign exchange rates of the U.S. dollars against the currencies of a large group of major U.S. trading partners.

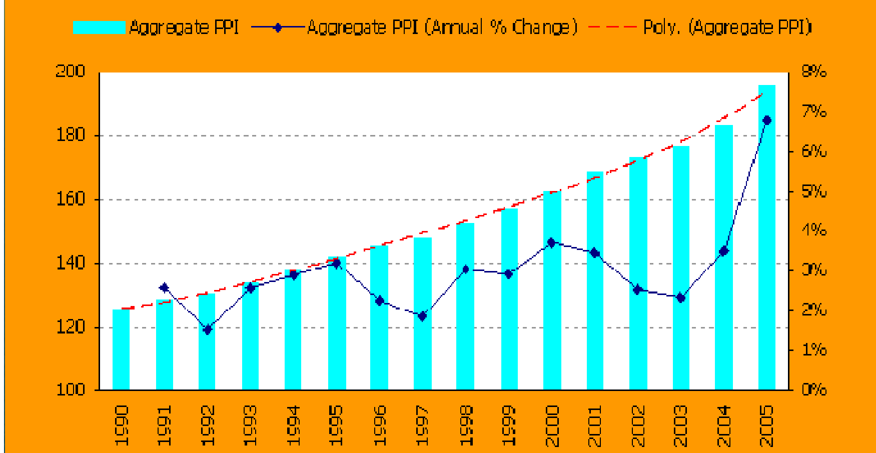
Candidate Explanatory Variables, Cont'

Potential Explanatory Variable	Area of Impact	Cost Categories					
		Asphalt	Drainage	Earthwork	Concrete	Traffic Engineering	Incidentals
Regional highway spending	Regional	√	√	√	√	√	√
Regional Gross State Product	Regional	√	√	√	√	√	√
Wages in construction sector	Regional	√	√	√	√	√	√
National construction spending	National	√	√	√	√	√	√
Iron and steel scrap prices	National		√				√
Iron ore prices	National		√				√
Cement prices	National				√	√	
Aggregate prices	National				√	√	
Construction equipment and machinery costs	National	√	√	√	√	√	√
Crude oil prices	International	√	√	√	√	√	√
Steel exports to China	International		√				√
Consumer price index (Inflation)	National	√	√	√	√	√	√
Exchange rate (USD wrt currencies of major trading partners)	International	√	√		√	√	√
Natural disasters (e.g., hurricanes)	National	√	√	√	√	√	√

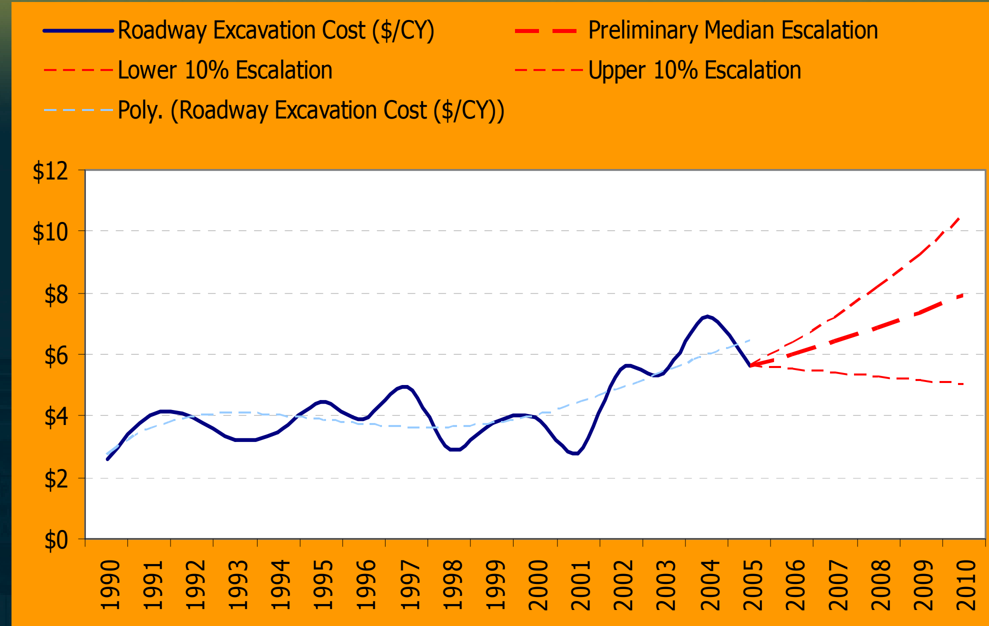
Correlation between Cost Components and Key Drivers

Construction Cost Component	Key Drivers	Coefficient of Correlation
Roadway Excavation Prices	Regional highway spending	0.51
	Regional Gross State Product	0.61
	Wages in construction sector	0.72
	Construction equipment and machinery costs	0.62
	Severe weather conditions	0.4
	Crude oil price	0.65
	Inflation	0.65
Hot Mixed Asphalt	Regional highway spending	0.63
	Regional Gross State Product	0.77
	Wages in construction sector	0.89
	Construction equipment and machinery costs	0.74
	Severe weather conditions	0.53
	Crude oil prices	0.91
	Inflation	0.76
Structural Concrete	Regional highway spending	0.72
	Regional construction spending	0.35
	Regional Gross State Product	0.68
	Wages in construction sector	0.7
	National total construction spending	0.82
	Cement prices	0.74
	Construction equipment and machinery costs	0.73
	Severe weather conditions	0.46
	Crude oil price	0.76
	Inflation	0.76

Estimating Escalation Rate



Period	Average Annual Compound Growth	Mean	Minimum	Maximum	80% Confidence Interval Lower 10%	80% Confidence Interval Upper 10%
Last 5 Years	3.7%	3.7%	2.3%	6.8%	2.4%	5.5%
Last 10 Years	3.2%	3.2%	1.9%	6.8%	2.2%	4.0%
Full Period	3.0%	3.0%	1.5%	6.8%	2.0%	3.6%



Construction Material	Median	Lower 10% Limit (a)	Upper 10% Limit (a)
Roadway Excavation	**5.5%**	**2.5%**	**8.5%**
Crushed Surfacing	**3.5%**	**2.0%**	**6.5%**
Hot Mix Asphalt	**5.3%**	**2.5%**	**8.5%**
Concrete Pavement	**4.5%**	**2.5%**	**6.5%**
Structural Concrete	**4.5%**	**3.5%**	**8.5%**
Steel Reinforcing Bar	**5.0%**	**3.5%**	**8.5%**
Structural Steel	**6.0%**	**3.5%**	**9.5%**

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Consistency Across Cost Elements, Not projects

	Alaskan Way (Tunnel)			Alaskan Way (Rebuild)			SR 519			Existing CCI Weight		
Year	Median	Lower 10% Limit	Upper 10% Limit	Median	Lower 10% Limit	Upper 10% Limit	Median	Lower 10% Limit	Upper 10% Limit	Median	Lower 10% Limit	Upper 10% Limit
2006	5.70%	3.50%	9.20%	5.60%	3.40%	9.00%	5.40%	3.40%	8.80%	5.20%	2.80%	8.50%
2007	5.70%	3.50%	9.20%	5.60%	3.40%	9.00%	5.40%	3.40%	8.80%	5.20%	2.80%	8.50%
2008	5.70%	3.50%	9.20%	5.60%	3.40%	9.00%	5.40%	3.40%	8.80%	5.20%	2.80%	8.50%
2009	5.30%	2.80%	9.20%	5.20%	2.70%	9.00%	5.00%	2.70%	8.80%	4.90%	2.20%	8.60%
2010	4.90%	2.10%	9.20%	4.80%	2.10%	9.00%	4.70%	2.10%	8.90%	4.50%	1.60%	8.60%
2011	4.50%	1.40%	9.10%	4.40%	1.40%	9.00%	4.30%	1.40%	8.90%	4.20%	1.00%	8.70%
2012	4.10%	0.80%	9.10%	4.10%	0.70%	9.00%	4.00%	0.70%	8.90%	3.90%	0.40%	8.80%
2013	3.70%	0.10%	9.10%	3.70%	0.00%	9.00%	3.60%	0.00%	8.90%	3.50%	-0.20%	8.80%
2014	3.30%	-0.60%	9.10%	3.30%	-0.70%	9.00%	3.20%	-0.70%	9.00%	3.20%	-0.80%	8.90%
2015	2.90%	-1.30%	9.00%	2.90%	-1.30%	9.00%	2.90%	-1.30%	9.00%	2.80%	-1.40%	8.90%
2016	2.50%	-2.00%	9.00%	2.50%	-2.00%	9.00%	2.50%	-2.00%	9.00%	2.50%	-2.00%	9.00%