Trends in Highway Material Costs

The cost of construction materials plays an important role in the ability of WSDOT to deliver its highway construction program. Therefore, beginning with the definition of a project and continuing through funding by the legislature to completion of the construction contract an in depth knowledge of the cost of materials is required. Tracking of material costs, at both the state and nationally level, is important if WSDOT is going to deliver projects within their scope, schedule and budget.

Over the past several years material prices have been influenced by national and international demands more than ever. Examples of this include the effects of hurricane Katrina and China's surging need for construction materials. The recent trend in Washington and other states has been an increase in the cost of materials at a pace far exceeding the consumer price index. Two items, steel and Portland cement, have both been in demand and bid prices have increased significantly over just a few years ago.

Tracking bid prices from construction contracts provides key data to monitor highway material cost trends. Seven bid items common to construction projects are currently tracked and the data, beginning in 1990, is graphed with an accompanying trend line. While the bid price for an item is dependant on many factors, the trend line provides insight into the relative changes in cost for a material. The seven items are: crushed surfacing, concrete pavement, structural concrete, hot mix asphalt, roadway excavation, steel reinforcing bar and structural steel.

A construction cost index (CCI) has been developed for Washington State DOT from the bid data collected from construction projects. The CCI is calculated based on historical use of the seven bid items that are tracked and shows the trend in highway material costs. Several other states and the Federal Highway Administration (FHWA) also track bid prices and calculate a construction cost index using a similar formula. The WSDOT CCI and the indexes from other states all show increasing material price trends.

- Highway Construction Cost
  - Cost Index Graph
  - Cost Index Data
  - Unit Bid Prices for Last Quarter
  - Hot Mix Asphalt, Crude Oil & Diesel Fuel Index Graph

- WSDOT Construction Material Unit Price History
  - Concrete Pavement
  - Concrete Structural
  - Crushed Surfacing

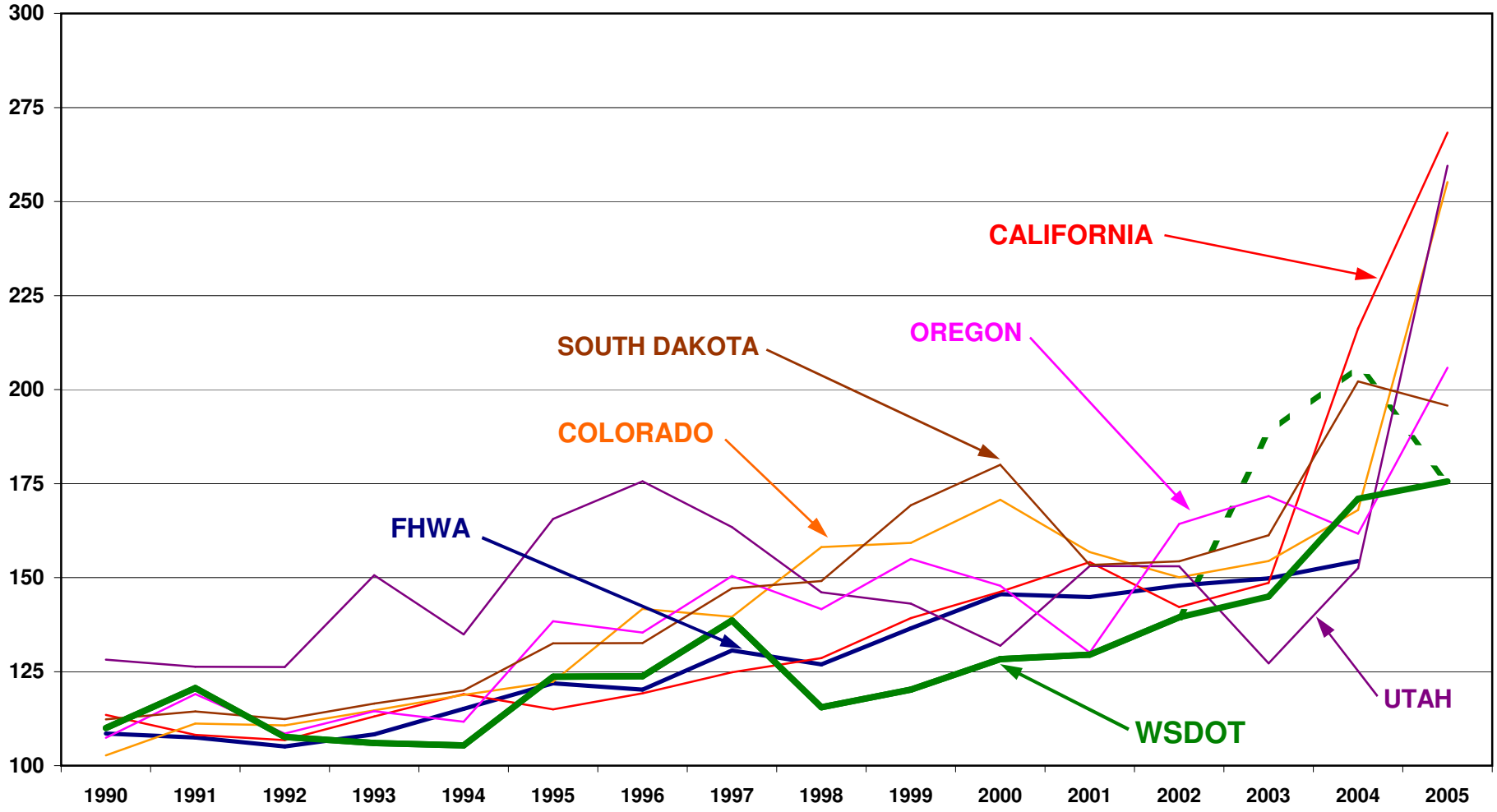
  - Hot Mix Asphalt
  - Roadway Excavation
  - Steel Reinforcing Bar
  - Structural Steel

- WSDOT Market Analysis
  - Market Analysis for March 2006 (Pending)
  - Market Analysis for 3rd Quarter 2005

- Folios
  - Recent Trends in Highway Construction Costs; February 2006
  - Washington Asphalt Paving Association; June 2005

- Gray Notebook Articles
  - Construction Cost Trends; December 2005
  - Construction Industry Costs Advertisement Prices; September 2005
  - Hot Mix Asphalt for Awarded Contracts; September 2005
  - Hot Mix Asphalt for Awarded Contracts; March 2005
  - The Rising Cost of Construction Materials; September 2004
  - Escalation Measure; September 2004

CONSTRUCTION COST INDEXES



WSDOT BASE 1990 = 110
ALL OTHERS BASE 1987 = 100

3/24/2006

CONSTRUCTION COST INDEXES

YEAR	WASHINGTON 1990 = 100	FHWA 1987 = 100	CALIFORNIA 1987 = 100	COLORADO 1987 = 100	OREGON 1987 = 100	SOUTH DAKOTA 1987 = 100	UTAH 1987 = 100
1990	110	109	114	103	107	112	128
1991	121	108	108	111	119	114	126
1992	108	105	107	111	109	112	126
1993	106	108	113	115	115	117	151
1994	105	115	119	119	112	120	135
1995	124	122	115	122	138	133	166
1996	124	120	119	142	135	133	176
1997	139	131	125	140	150	147	163
1998	116	127	129	158	142	149	146
1999	120	137	139	159	155	169	143
2000	128	146	146	171	148	180	132
2001	129	145	154	157	130	153	153
2002	139	148	142	150	164	154	153
2003	188	150	149	154	172	161	127
2004	206	154	216	168	162	202	153
2005	176	*	268	255	206	196	260

* Data not available

WSDOT Highway Construction Costs

4th Quarter 2005

Roadway Excavation: $13.11 per cubic yard

The unit bid price decreased by $0.45 from the average unit price of $13.56 per cubic yard last quarter. The prices ranged from $9.00 to $93.90 per cubic yard.

Crushed Surfacing: $16.03 per ton

The unit bid price decreased by $3.31 from the average unit price of $19.34 per ton last quarter. The prices ranged from $12.00 to $44.50 per ton.

Hot Mix Asphalt: $44.29 per ton

The unit bid price decreased by $2.58 from the average unit price of $46.87 per ton last quarter. The prices ranged from $31.95 to $165.00 per ton.

Concrete Pavement:

There were no bid items for concrete pavement in the 4th quarter of 2005.

Structural Concrete: $793.34 per cubic yard

The unit bid price decreased by $218.75 from the average unit price of $1012.09 per cubic yard last quarter. The prices ranged $500.00 to $2,000.00 per cubic yard.

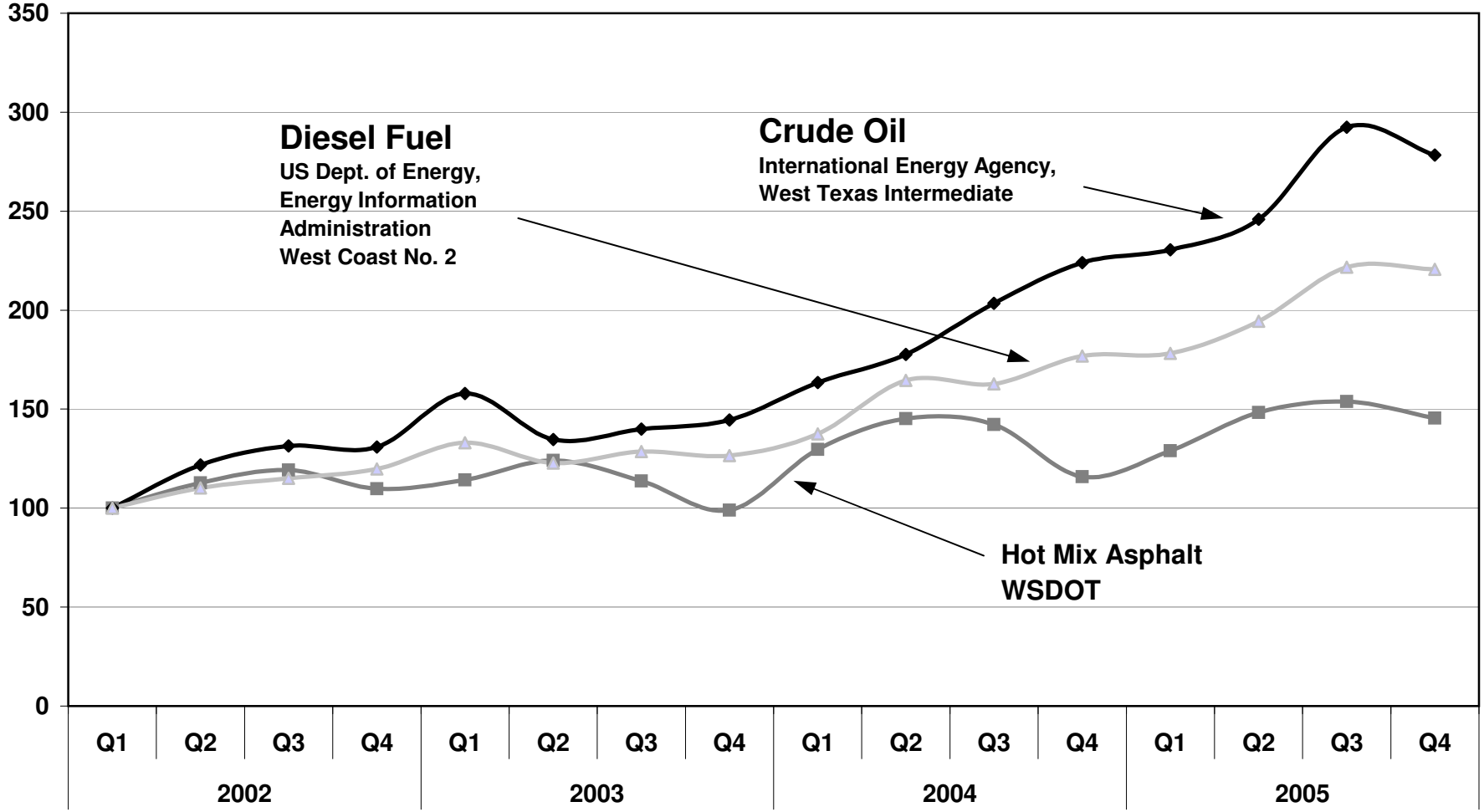
Steel Reinforcing Bar: $0.99 per pound

The unit bid price decreased by $0.16 from the average unit price of $1.15 per pound last quarter. The prices ranged from $0.80 to $2.00 per pound.

Structural Steel: $1.08 per pound

The unit bid price decreased by $0.36 from the average unit price of $1.44 per pound in the second quarter of 2005 (no projects were bid with structural steel in the 3rd quarter). Only one project with structural steel was bid in the 4th quarter of 2005.

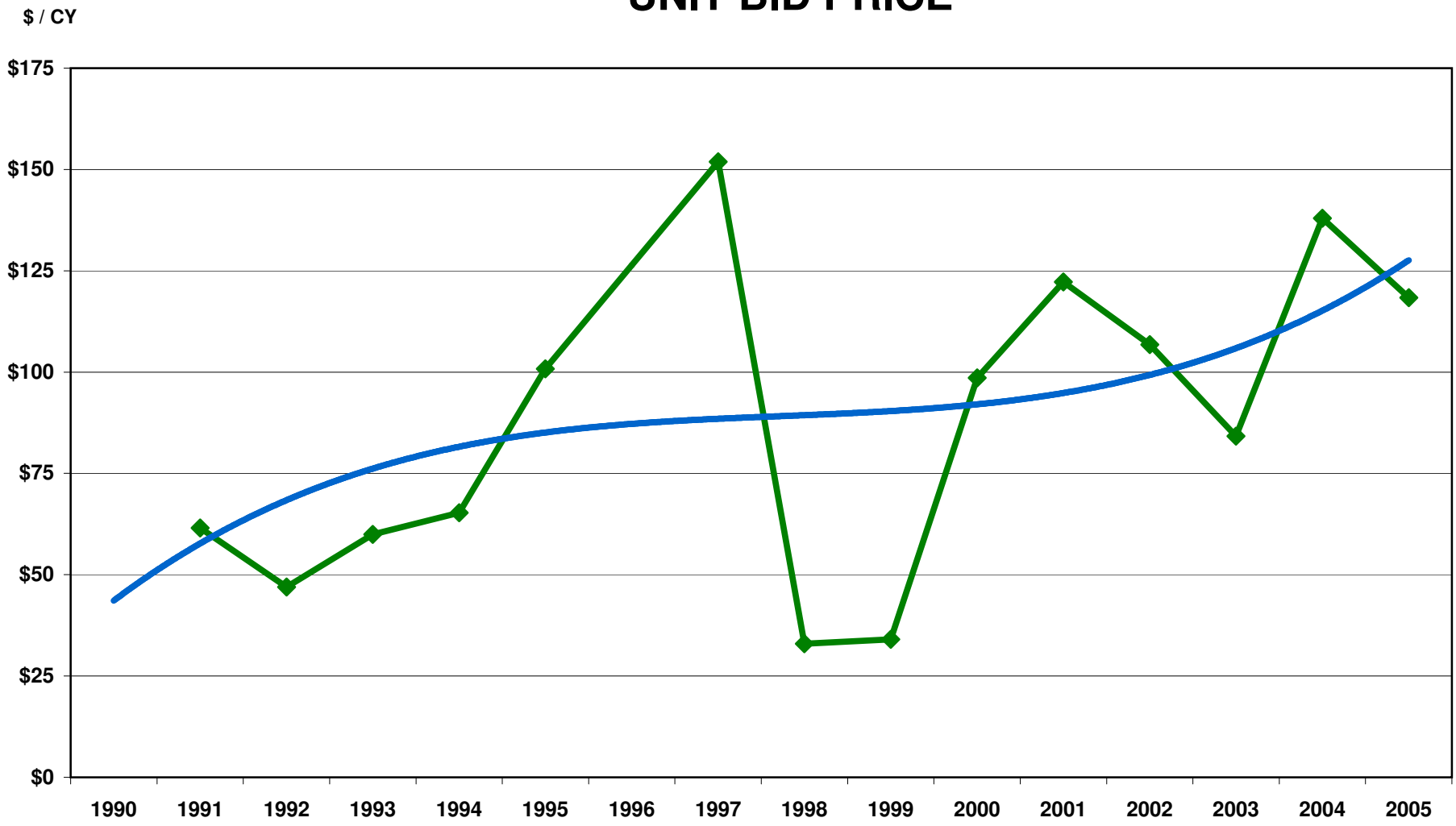
Hot Mix Asphalt, Crude Oil & Diesel Fuel Indexes



BASE 2002 = 100

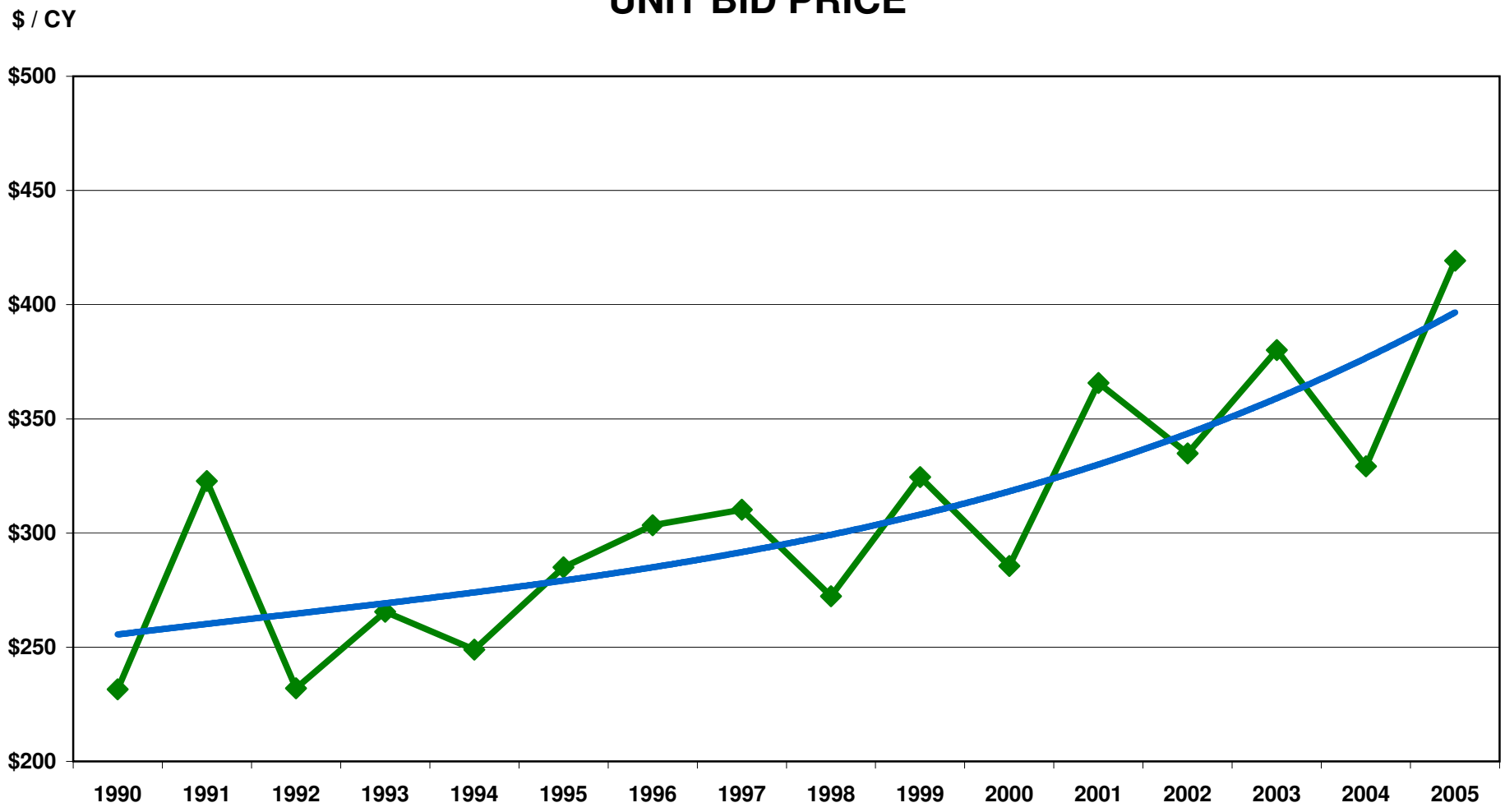
CONCRETE PAVEMENT

UNIT BID PRICE



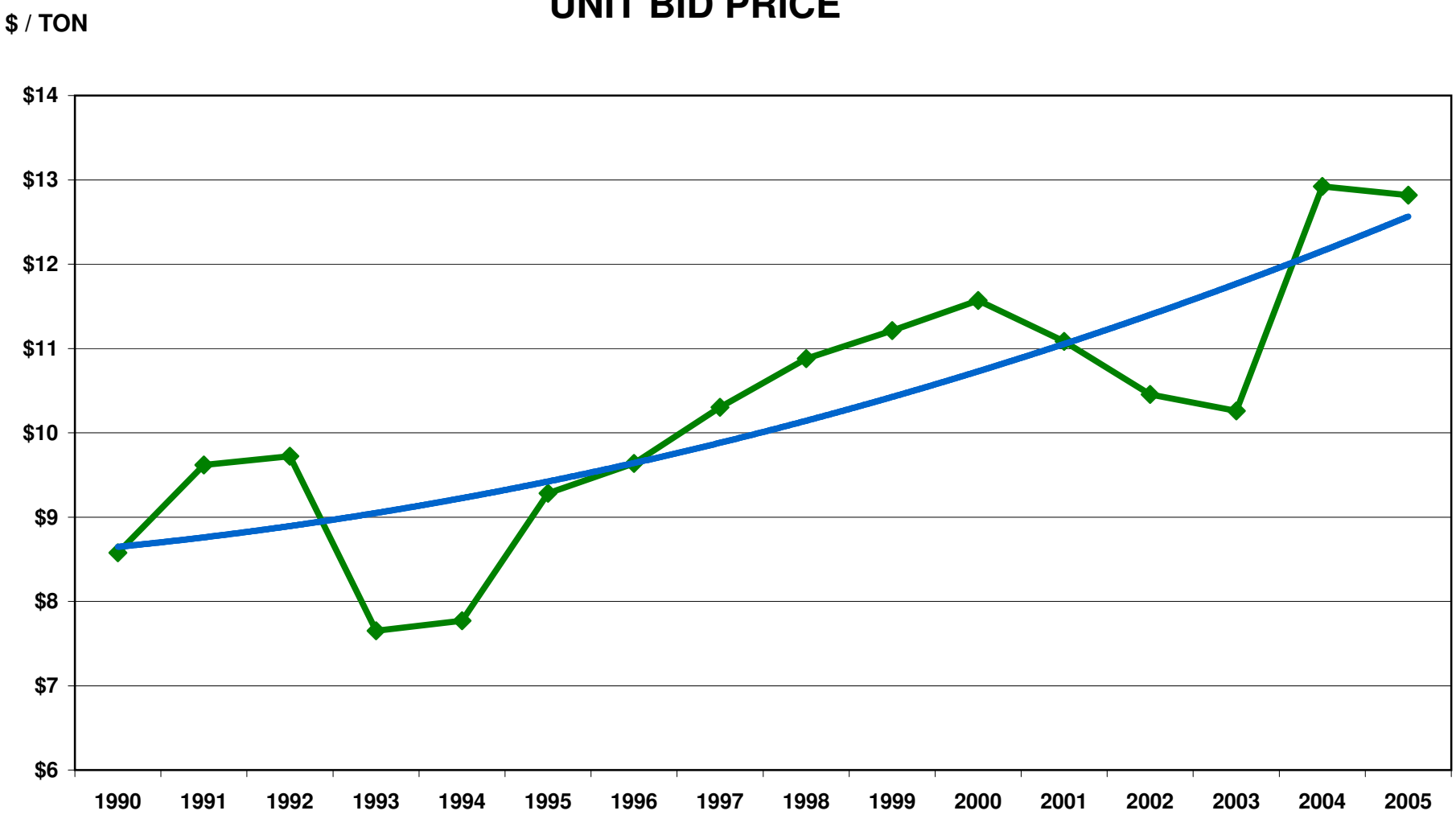
STRUCTURAL CONCRETE

UNIT BID PRICE



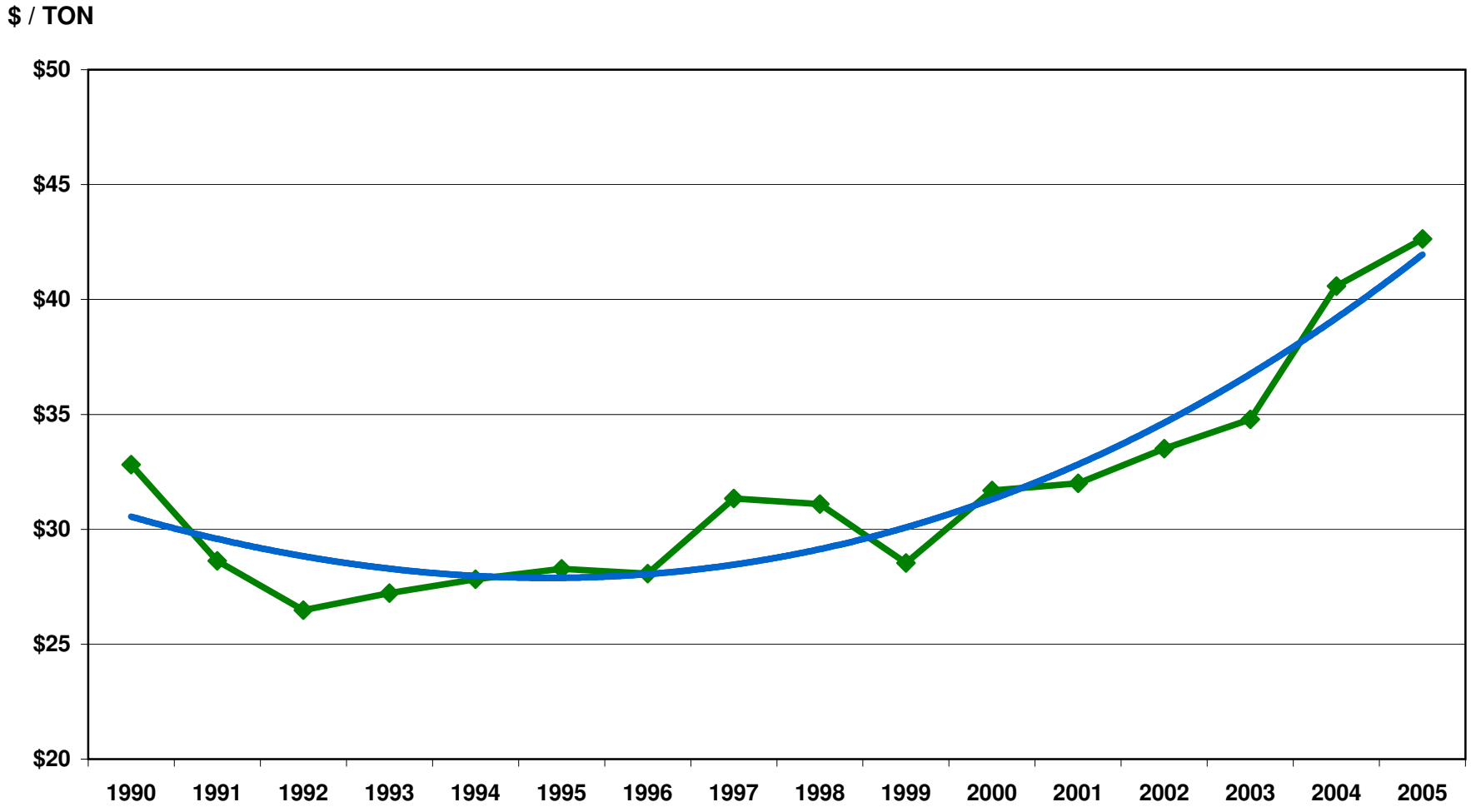
CRUSHED SURFACING

UNIT BID PRICE



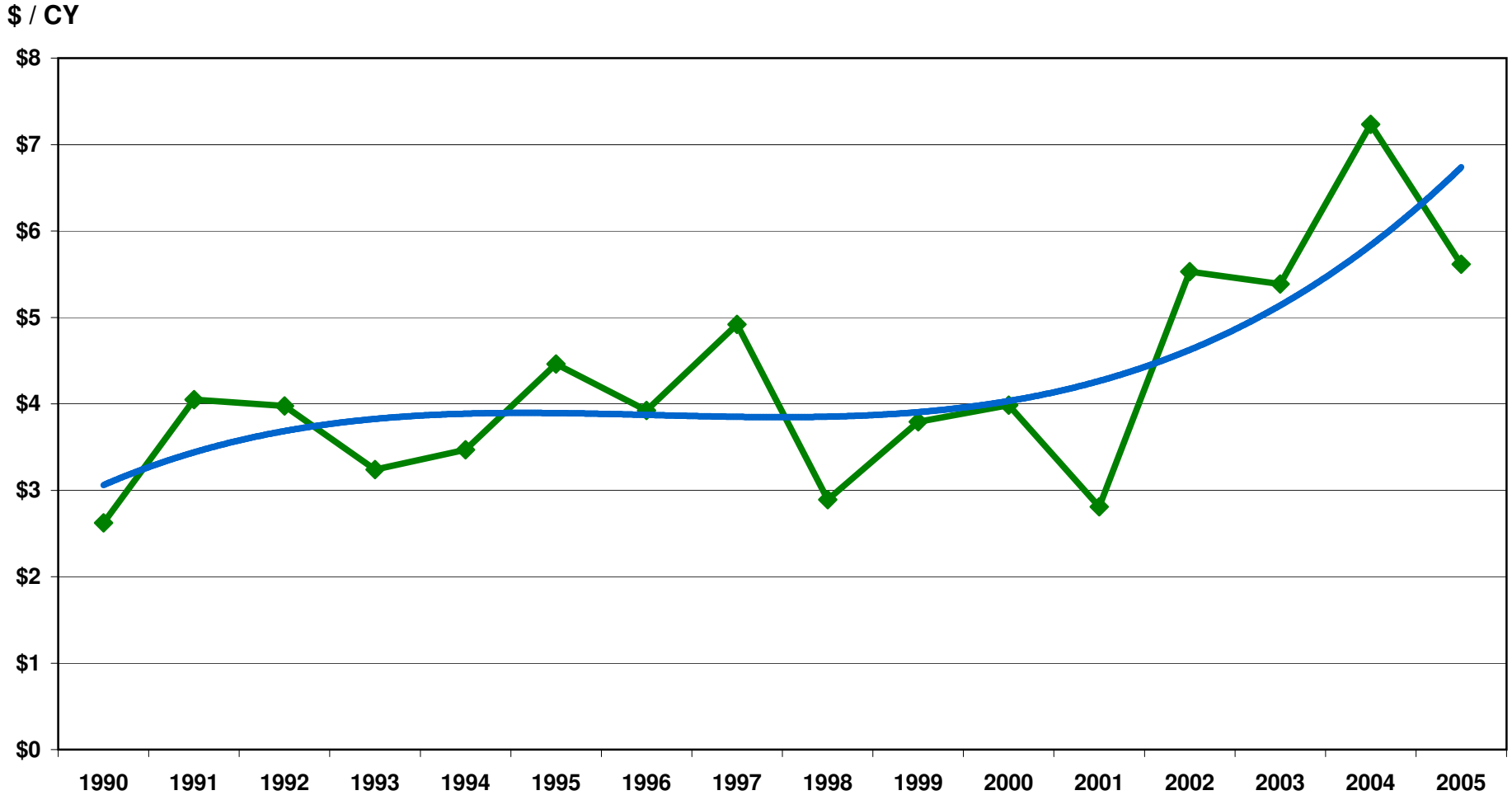
HOT MIX ASPHALT

UNIT BID PRICE



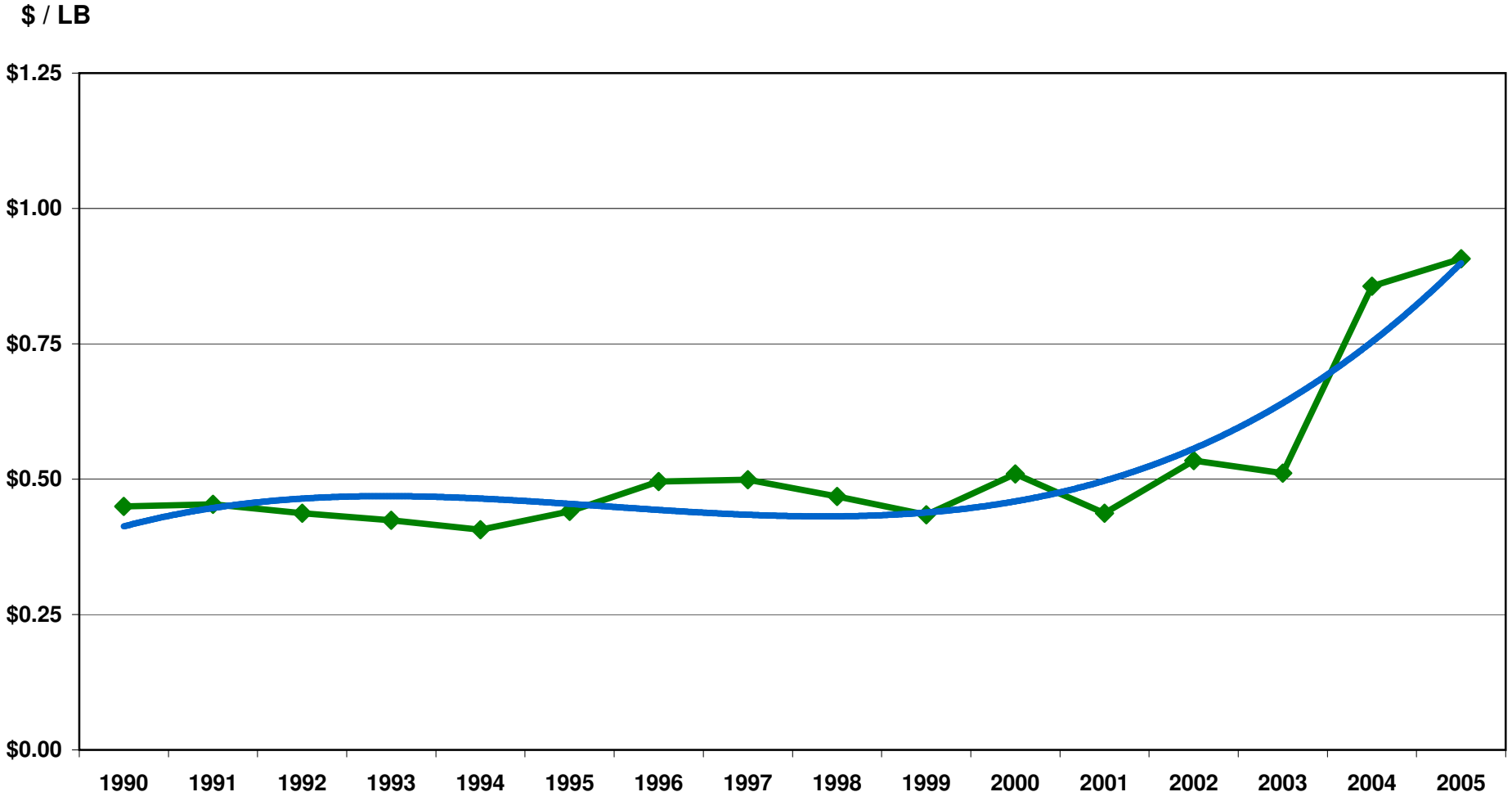
ROADWAY EXCAVATION

UNIT BID PRICE



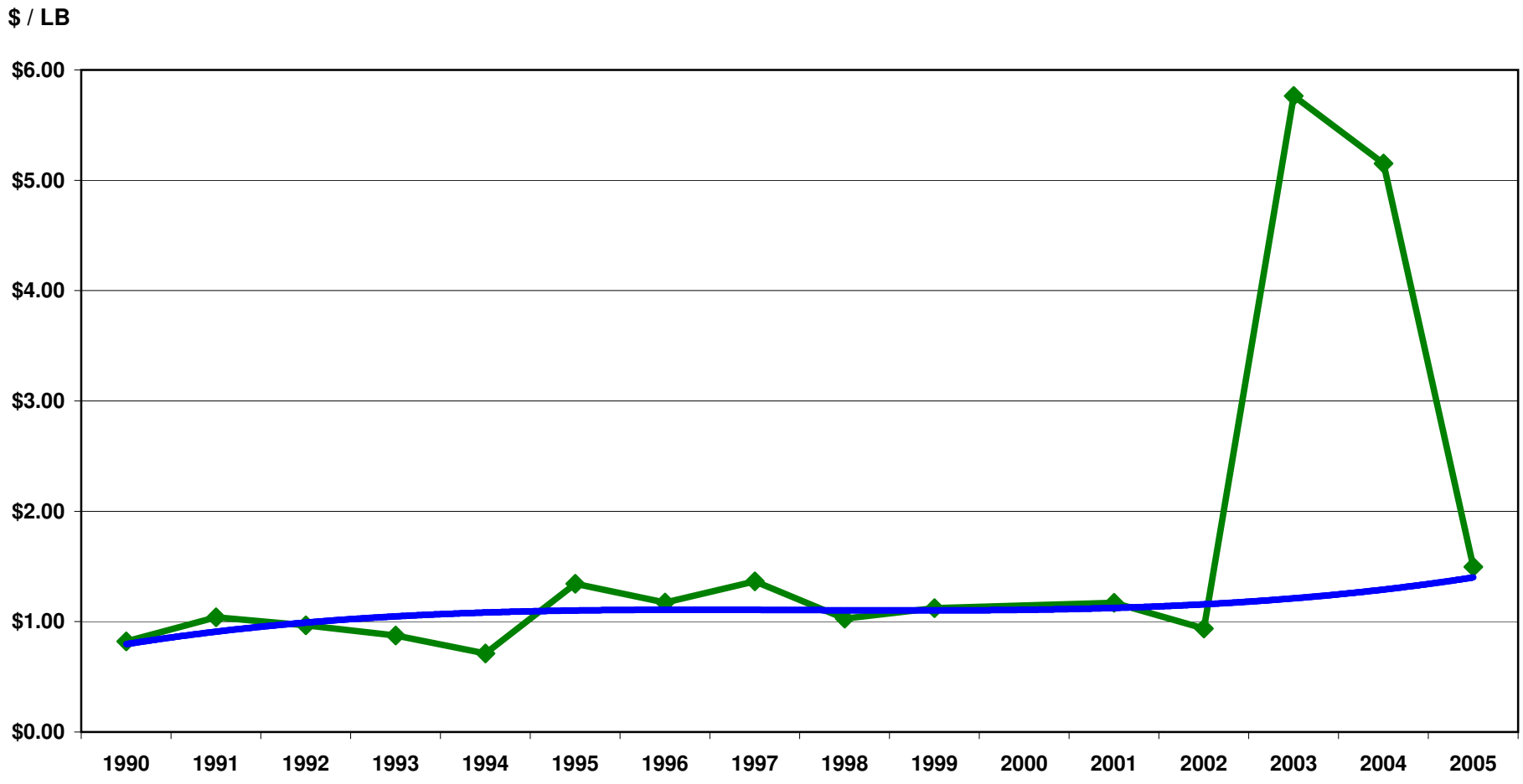
STEEL REINFORCING BAR

UNIT BID PRICE



STRUCTURAL STEEL

UNIT BID PRICE



WSDOT Market Analysis

- The market forecast for the 3rd quarter of 2005 is based on predictions published in graphical format in the September 26th, 2005 edition of ENR Magazine. Data used in ENR is based on the Bureau of Labor Statistics.

  - **Cement** prices that have been rising since early in 2004 are expected to continue rising. The rate of increase is expected to be more moderate through the second quarter of 2006.

    "Before the storm, tight markets and widespread regional shortages had pushed cement prices up 14.5% for the year, according to the Bureau of Labor Statistics' July producer price index." (ENR 9/26/05)

  - **Steel** prices began surging in 2003 and continued surging into 2004. For 2005 the prices have been on a downward trend and the forecast is for prices to be steady or possibly dropping into the second quarter of 2006.

    "Structural steel prices fell from $561 a ton in the third quarter of 2004 to $537 this year. "Before Katrina, we had prices falling to $503," says John Anton, the firm's steel analyst. By the second quarter of 2006, Anton expects structural steel prices to be back down to $500." (ENR 9/26/05)

  - **Lumber and plywood** prices have dropped from the peak in 2004 and remained steady in 2005 and even with the impact of Katrina the prices are only forecast to increase slowly into 2006.

    "Prices for 2x4 western spruce had fallen from $460 per thousand bd. ft. in 2004 to $286 by last August and then jumped back to $321 when the storm hit, according to Resource Information Systems Inc., a Bedford, Mass.-based forecasting firm." (ENR 9/26/05)

  - **Asphalt** prices have been rising consistently since 2003 and will continue to rise through all of 2006.

    "Consequently, costs for derivative products such as liquid fuels, asphalt, PVC pipe, and petrochemical products are rising". (ENR 9/26/05)

  - **Fuel** prices should peak in the fourth quarter of 2005 and then drop during the first two quarters of 2006.

    "In its first post-Katrina forecast, the U.S. Dept. of Energy says that quarterly averages for oil prices will remain above $62 per barrel for the rest of 2005 and all of 2006. While worldwide demand growth is set to slow compared to 2004, it will still be strong enough to sustain high prices. DOE adds that continued tepid production growth through 2006 and "geo-political risks, such as the insurgency in Iraq and potential troubles in Nigeria and Venezuela, have boosted the level of uncertainty in world oil markets." The U.S. imports about 60% of its crude oil." (ENR 9/26/05)

"Diesel prices in the third quarter averaged 50% higher than a year ago, according to the Bureau of Labor Statistics' producer price index. After adjusting for inflation, current prices are the highest in more than 50 years, say DOE". (ENR 9/26/05)

- **Construction** prices in general are expected to continue upwards.

"The major uncertainty relates to the price and availability of building materials, which means in the near-term that the construction industry will continue to adjust to a higher cost structure". (ENR 9/26/05)

"A recent pre-Katrina survey of 167 public owners found that 92% of the owners experienced an average increase in their project cost of 13.2% in 2004, says John Dunkerley, chief estimator for PinnacleOne, Phoenix, which commissioned the survey. "Katrina will only aggravate those conditions," he says. "I had expected industry escalation to slip back to 5% this year. But now I'm expecting Katrina to spike it up over the next 12 to 24 months by 10 to 20% a year." (ENR 9/26/05)

Recent Trends in

Highway Construction Costs

Kevin J. Dayton
State Construction Engineer

Douglas B. MacDonald
Secretary of Transportation

Paula Hammond
Chief of Staff

Washington State
Department of Transportation

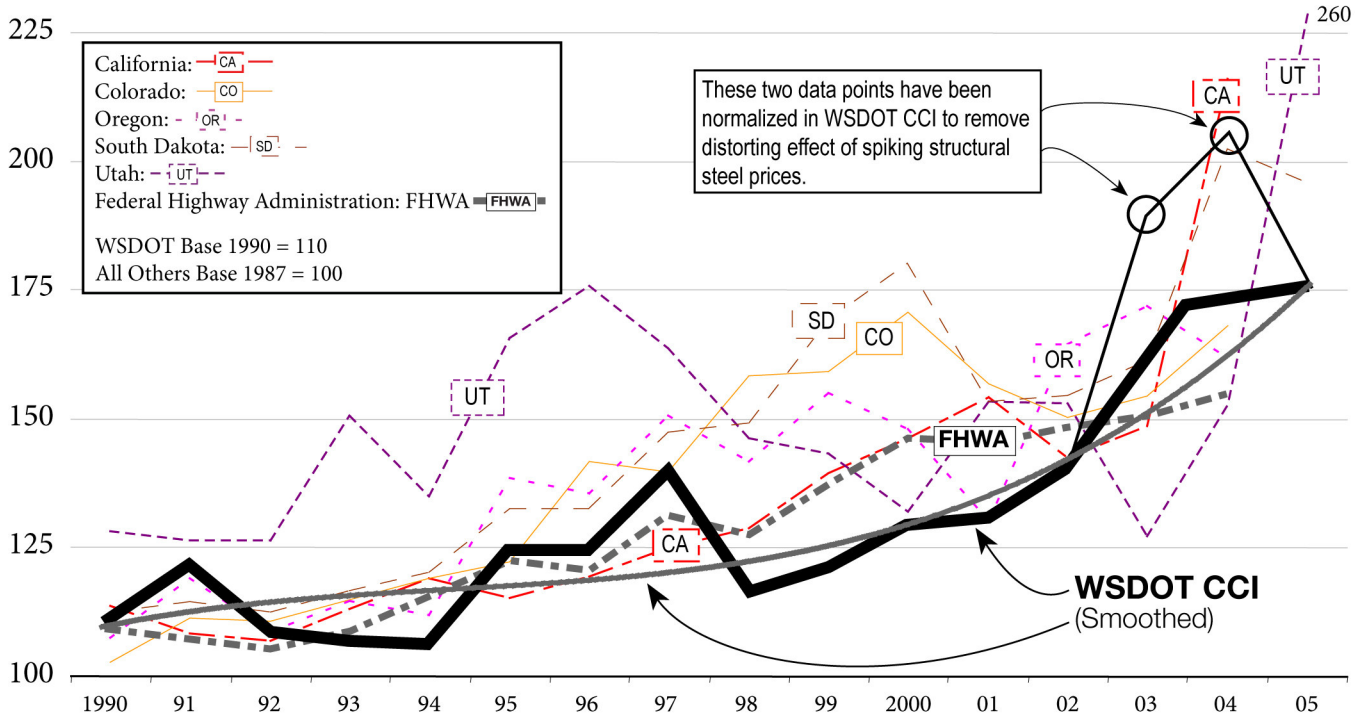
Costs of Construction Materials

The Construction Cost Index (CCI) helps WSDOT track market costs of a "basket" of common highway construction items that are strongly influenced by materials costs.

The following components (weighted as shown) are used to compute the CCI:

- Concrete Pavement 3.2%
- Crushed Surfacing 7.9%
- Roadway Excavation 10.7%
- Structural Concrete 17.4%
- Steel Reinforcing Bar 5.4%
- Structural Steel 6.9%
- Hot Mix Asphalt 48.5%

Data Source: Unit price history from WSDOT bid openings.



The eleven-year average growth rate of the CCI from 1990 through 2001 was 1.5% per year. Since 2001, the average growth rate has been 8.0% per year.

During this period the CCI has been driven up by several factors, among them: the increasing worldwide demand for construction materials such as steel and cement; rising crude oil prices and other energy supply issues that have driven fuel prices up; and recent increases in costs in national and international construction activity, including (most recently) hurricane rebuilding in the South.

What Can WSDOT Do to Mitigate Inflationary Materials Costs Pressures on Project Costs?

WSDOT's Approach

Use the "toolbox" of management options in individual contracts and program wide. These options are scaled-up versions of what any homeowner faces on a remodel or new house project in the same inflationary environment.

- Time the bid to hit materials cost windows. For example, WSDOT tries to bid paving contracts for early season construction to beat the summer season demand rush on asphalt suppliers.
- Give flexibility to contractors to encourage them to shop for the most economical materials values ("performance or end product specifications").
- Provide early payment provisions ("materials on hand") so contractors can "lock in" materials prices near to the time they bid so as to minimize the inflation risk of their bids.
- Cost Reduction Incentive Proposals (CRIPs) give contractors a portion of savings for their creative ideas on construction approach that will save materials costs.
- Adjust a project scope to "buy-less" within in a fixed envelope of expected project cost.
- Cancel a project that inflation in materials costs has made too expensive. [Not preferred]

What are the real life implications for specific projects?

SR 7, SR 507 to SR 512 – Safety (July 27, 2005) The project had three bidders. The low bid was 24% ($2.6 million) over the Engineer's Estimate.

- Most of the excess over the estimate was haul items (fuel costs and a congested work area), and curbs, islands and sidewalks (concrete prices)

SR 3, SR 303 Interchange (October 19, 2005) There were seven bidders. The low bid was 16.8% ($2.4 million) over the Engineer's Estimate

- Most of the excess over the estimate was the large amount of earthwork (fuel prices) and bridges and retaining walls (concrete and steel prices).

SR 202, SR 520 to Sahalee Way (November 29, 2005) The project had eight bidders. The low bid was 8.9% ($3.3 million) over the Engineer's Estimate.

- Most of the excess over the estimate was earthwork items involving haul (fuel prices), bridges, walls and foundations (steel and concrete) and Hot Mix Asphalt

SR 543, I-5 to International Boundary (January 18, 2006) There were two bidders with prices ranging from $27.3 million to $28.6 million. The low bid was 22.3% ($5 million) over the Engineer's Estimate of $22.3 million.

- Most of the excess over the estimate was retaining walls, noise walls, barrier and pavement (Concrete) and Hot Mix Asphalt. The lack of competition is attributed to the geographical location and mix of work.

The project is pending award if the new project cost requirement is funded in the supplemental budget.

Data Note: WSDOT's experience is similar to experiences – some much worse than ours – reported by other states and cities. See the backup slides for more information.

Contractor Competition in Bidding as a Factor in Achieving Good Prices for Project Construction

WSDOT must advertise projects in an aggressive, competitive construction contracting market to obtain good construction prices.

The more bidders – qualified and responsible – the better. Less than 3 is not good.

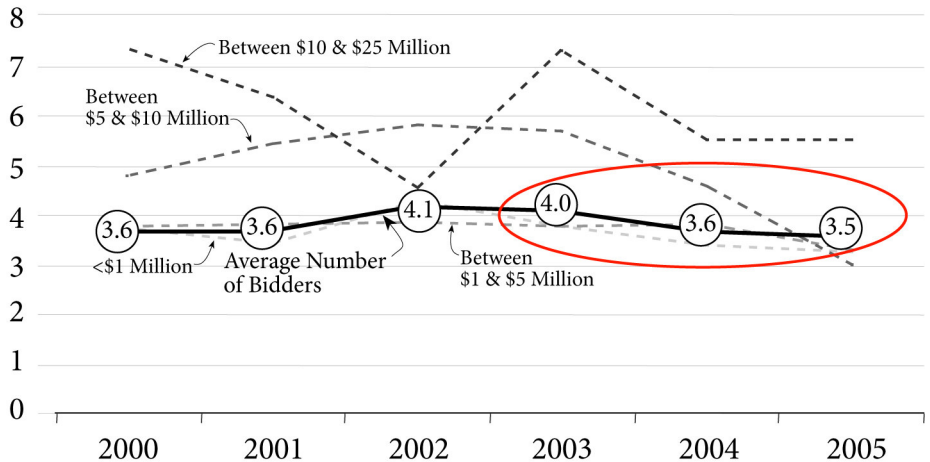
Trends in numbers of bidders on every highway construction project.

Total number of contractors bidding to be a prime contractor on WSDOT highway construction projects from year to year. (In backup slides)

Total number of contractors winning the award of WSDOT highway construction projects from year to year. (In backup slides)

Data Source: WSDOT Construction Office

Average Number of Bidders
By Size of Contract



	2000	2001	2002	2003	2004	2005
3 Bidders	24%	23%	16%	24%	23%	33%
4 or more bidders	42%	41%	50%	50%	44%	35%
3 or more bidders	66%	64%	65%	74%	66%	69%

Analysis

- Percent of WSDOT contracts bid by at least 3 firms has been at 67% +/- for six years.
- Percent of WSDOT contracts bid by at least 4 firms has fallen from about 50% in 2002-03 (work was scarce) to about 33% today.
- Percent of WSDOT contracts bid by one firm has fluctuated from 7.7% (2001) to 13.4% (2004)

Contractor Competition in Bidding as a Factor in Achieving Good Prices for Project Construction

WSDOT influences:

Generally:

- Fair and efficient practices in contract administration
- Fair and efficient risk allocation in the contracting relationship.
- Communication of current and future contract opportunities to the contracting community; special outreach on unusual or difficult projects

Individual contracting opportunities:

- Bid advertisements scheduled to promote competitive appetite. (For example paving contracts early in the summer construction season).
- Specifications on which contractors can confidently prepare bids and a fair process for responding to questions and requests for clarification.

WSDOT does not influence:

- Overall volume of public and private sector work seeking contractors.
- Contractors' access to key subcontractors and sources of construction material.
- Bonding and other capacity constraints affecting contractor's appetite for work.
- Market trends in the construction industry towards consolidation and shrinkage of number of local firms.

Materials Costs, Competitive Environment and Bidding Results – Others' Experience

Alaska. Reports of increasing materials costs exacerbated by higher delivery costs. Ketchikan road job recently came in at 78% over $6 m. estimate (single bidder). Grayling bridge job recently came in at 32% over $2.3 m. estimate.

Arizona. Materials shortages and few bidders. Recent waiver permits import of Mexican cement. ADOT and Commission looking at program expectations with assistance of a consultant. U.S. 60 Junction job recently came in at 22% over $58 million estimate. Seligman Hwy concrete paving job came in at 66% over $3.1 m. estimate.

California. Materials cost escalation and fewer numbers of bidders. Since July 2005, 324 bids on projects with aggregate estimate of $ 1.4 billion have come in at average of 13.9 % over estimate. Average of 3.3 bidders per job. New study to examine current program expectations.

Colorado. State Hwy 7 job opened in November 2005 at 7% over $3.5 m. estimate.

Florida. Florida DOT has rejected more bids in the last month than ever before, and so far this FY have received more single bids than in the past years. Florida DOT is calling a summit of stakeholders to discuss out of the box strategies.

Georgia. Higher costs and shortages of equipment, labor and materials due to demand in Gulf Coast.

New Jersey. Rejected all bids on Rte 52 Causeway Bridge. Three bidders. Low bid was $90 m. over (60% over) the $152 estimate. *ENR, January 2-9, 2006.*

Utah. High bids. US 191 Moab opened in November 35% over $5 m. estimate.

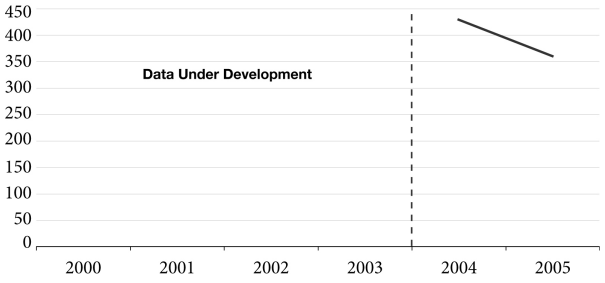
King County, WA. York Bridge Replacement recently opened at 24% over $7.5 million estimate.

City of Shoreline, WA. Aurora Corridor project recently opened at 10% over $20.7 million estimate. Only two bidders.

Transportation Improvement Board. Reports that only half of approximately 50 projects in recent survey had as many as three bidders. Reports of some projects with bids as high as 25% over estimates.

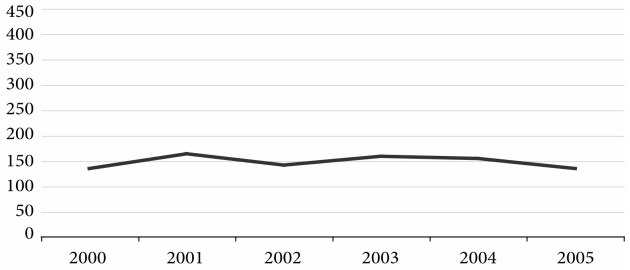
Competitive Market Structure for WSDOT Highway Construction Opportunities

Number of Construction Firms Meeting Prequalification for WSDOT Work



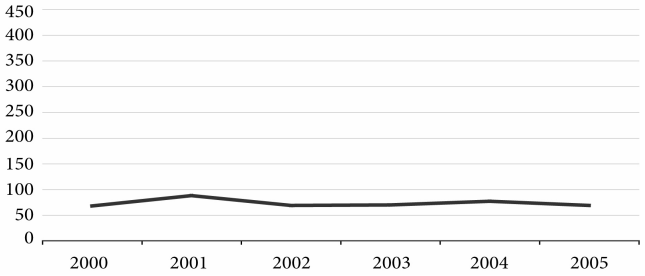
Number of Construction Firms Submitting One or More Bids for Award of a Prime Contract on a WSDOT Highway Project

Number of Bidders



Number of Construction Firms Winning an Award of a Prime Contract on a WSDOT Construction Contract

Number of Successful Contractors



Specialty Areas: Subcontracting and Supply

•**Hot mix asphalt.** Adequate competition in most of Western Washington but only one firm now supplying the majority of the Olympic Peninsula. Much of Eastern Washington sees little or no competition.

•**Roadway striping.** Only three active private firms in Washington.

•**Shaft Drilling.** Six firms now seeking work on WSDOT jobs, but only two have oscillator/rotator capability. WSDOT is encouraging a Utah firm to become active in WA.

•**Concrete pre-stressed structural elements.** Suppliers in Tacoma, Spokane, Yakima and Pasco Oregon and Canadian suppliers would like to play depending on haul costs.

•**Concrete post-tensioned structural elements.** Currently only two firms doing this work. A third is trying to make entry.

•**Steel fabrication.** Now limited to firms in Vancouver and Portland.

Significant Acquisition and Consolidation Trends Affecting Pacific Northwest Market

•1980's Fiorito Brothers no longer bids highway work

•1990's Ledcor Industries no longer bids highway work

•1994 Wilder Construction Co. acquires Construction & Rigging

•1995 Progressive Contractors Inc. close in Washington

•1997 Associated Sand & Gravel acquired by ARC Material Corp. (currently known as Rinker Materials)

•1998 Oldcastle Inc acquires M. A. Segale (currently known as ICON Materials)

•1998 Atkinson Construction becomes a wholly owned subsidiary of Clark Construction Group, LLC.

•1999 Oldcastle Inc acquires Inland Asphalt

•2000 Granite Construction acquires Wilder Construction Co.

•2001 Superior Asphalt acquires Morrill Asphalt

•2001 General Construction Company becomes an affiliate of Kiewit Construction

•2002 American Civil Constructors acquires Hurlen Construction

•2004 Wilder Construction Co. absorbs key One Way Construction personnel

Washington Asphalt Paving Association

Washington State Department of Transportation

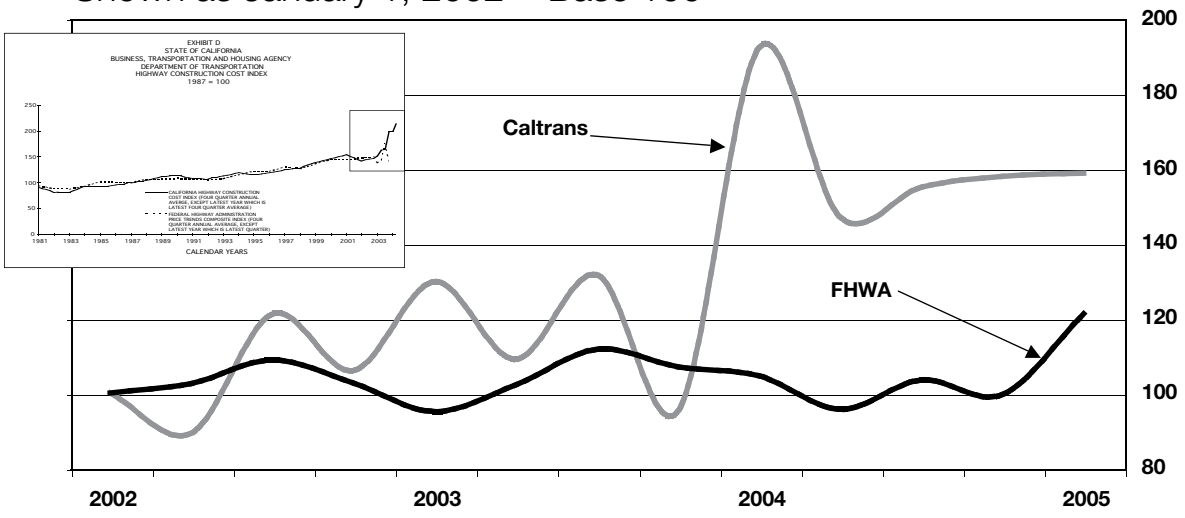
Chelan Washington
June 2-3, 2005

For more information, contact:
Kevin J. Dayton, P.E.
State Construction Engineer
360-705-7821
DaytonK@wsdot.wa.gov

Keeping Informed About Recent Upward Pressures and Trends in Highway Construction Costs

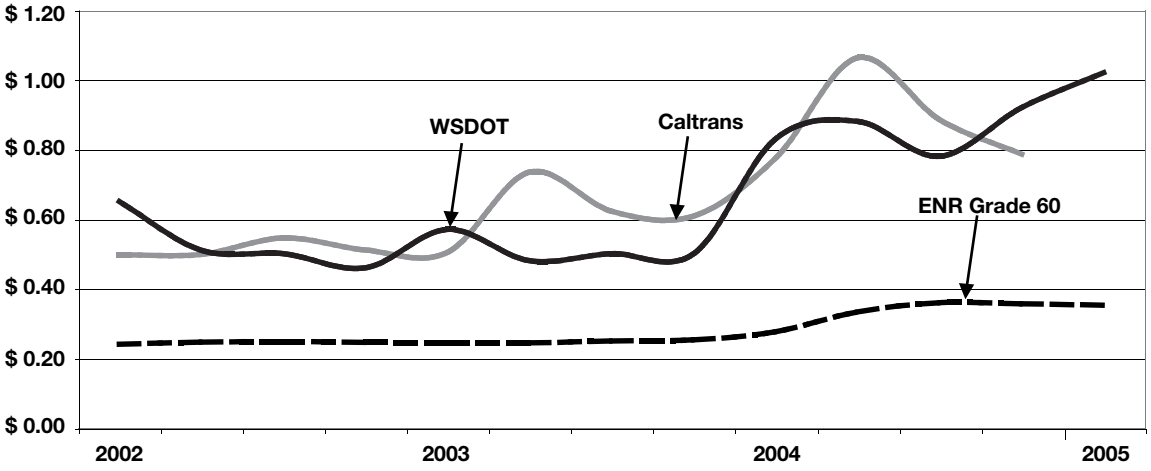
Caltrans and FHWA Highway Construction Cost Index Trends

Shown as January 1, 2002 = Base 100



Steel Reinforcing Bar January 1, 2002 to Present

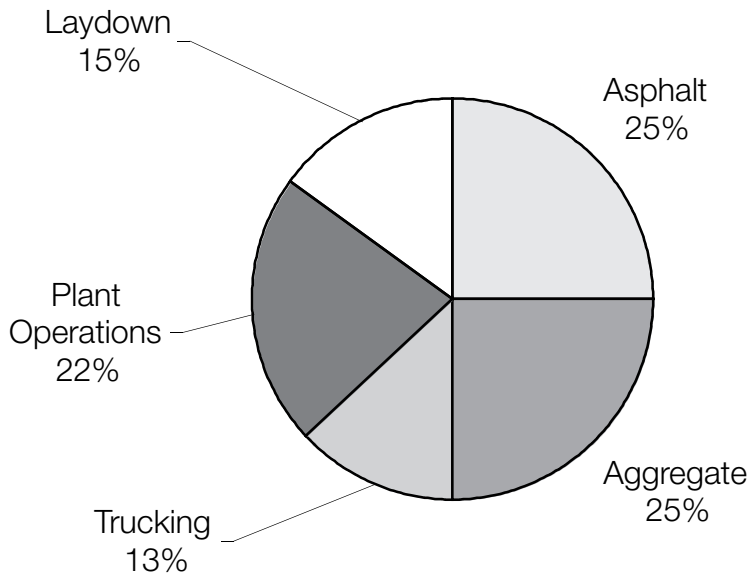
Dollars Per Pound



Washington State
Department of Transportation

Hot Mix Asphalt is Especially Sensitive To Petroleum Prices

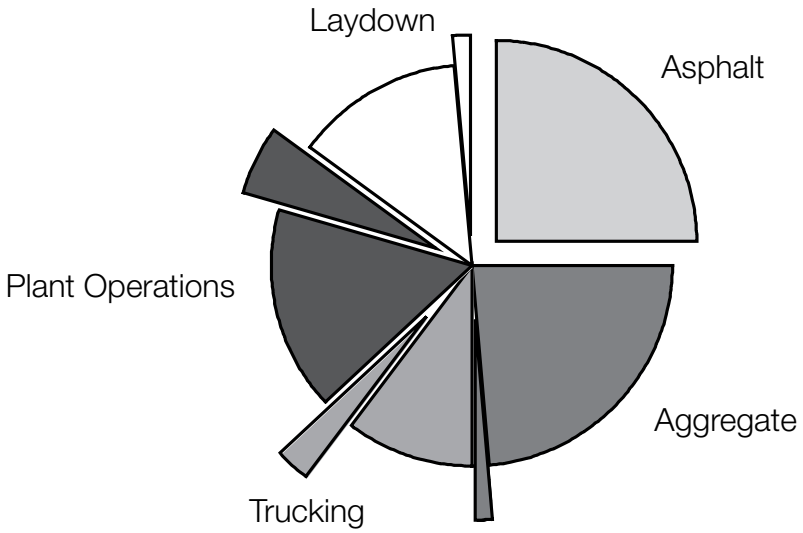
WSDOT Surmise of Typical Cost Components of $40/ton HMA



Asphalt	**$ 10.00**
Aggregate	**$ 10.00**
Trucking	**$ 5.20**
Plant Ops.	**$ 8.80**
Laydown	**$ 6.00**
	$ 40.00

WSDOT Guesstimates That 36% of the Cost of a Ton of HMA is Driven Directly From Petroleum Costs

WSDOT Surmise of Petroleum Share of HMA Cost Components



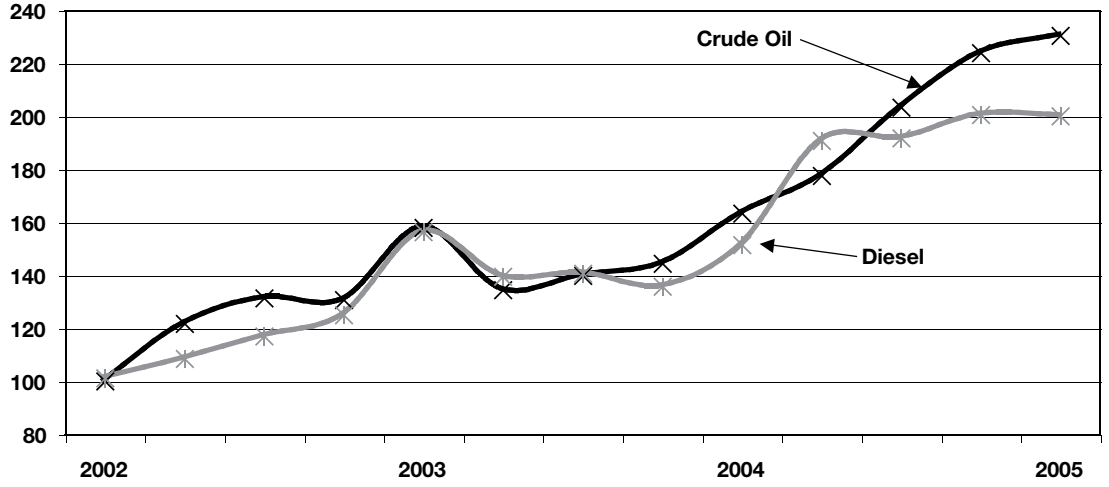
Asphalt	**25%**
Aggregate	**1%**
Trucking	**3%**
Plant Ops.	**5%**
Laydown	**2%**
Total	**36%**

Washington State
Department of Transportation

Petroleum Prices Have More Than Doubled Since January 2002

Crude Oil and Diesel Price Movements

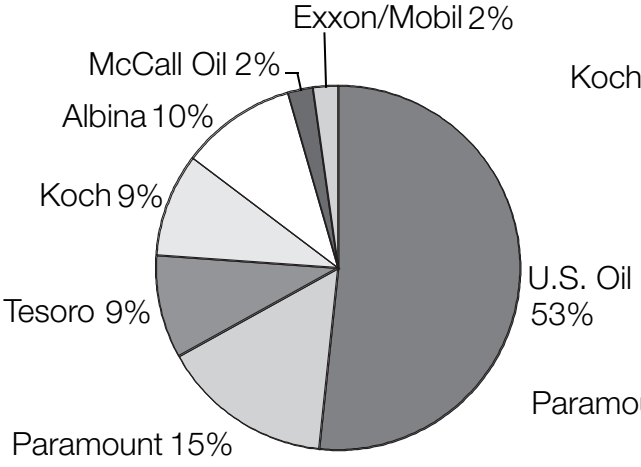
Shown as January 2002 = Base 100



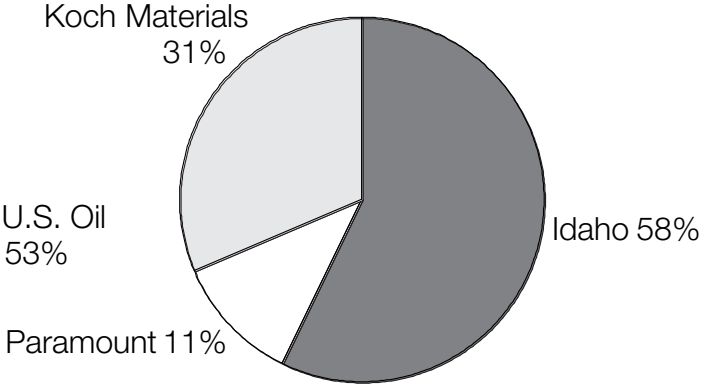
For Asphalt Supply Western WA and Eastern WA Markets Have Very Different Structures

Estimated Market Shares of Asphalt Suppliers

Western Washington Market Share



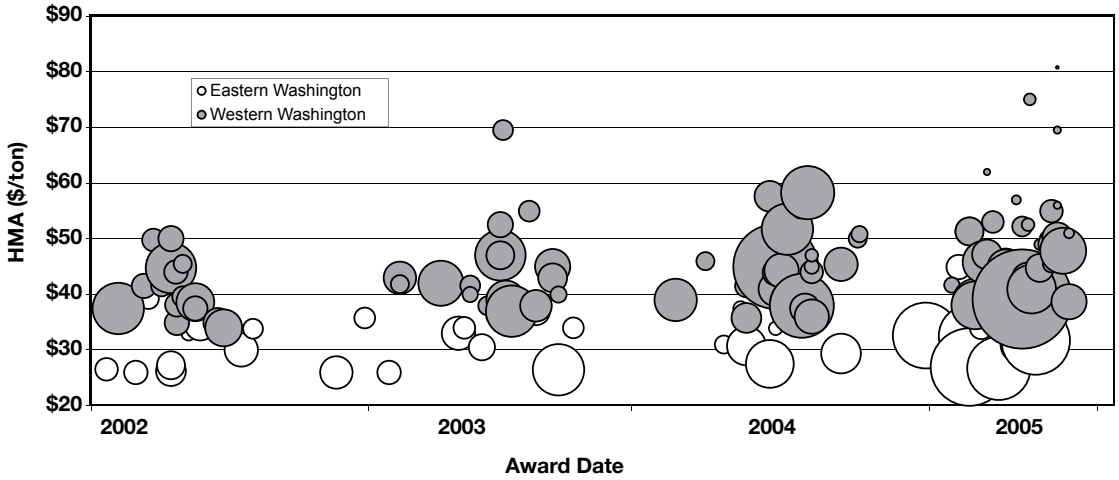
Eastern Washington Market Share



Washington State
Department of Transportation

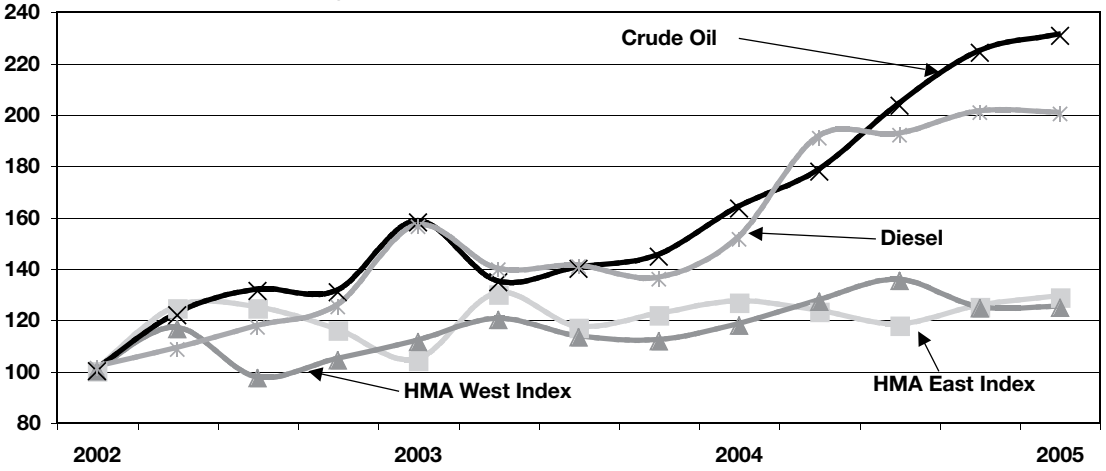
Hot Mix Asphalt Unit Prices in WSDOT Contracts Have Shown Contract-to-Contract Variation

Unit Price and Relative Tonnage of WSDOT Hot Mix Asphalt
January 2002 to Present



Trend Comparisons Between Petroleum Product Prices and Hot Mix Asphalt Unit Prices Are Interesting

Upward Trend of HMA Unit Prices Has Been Less Forceful than for Petroleum Costs - and Not Consistent
Shown as January 2002 = Base 100



Where do we go from here?
How do we establish "No Surprises" trust with the public and officials?

Cross-Cutting Management Issues

Construction Costs Trends

Construction costs have been rising ahead of inflation costs for the past several years. WSDOT's Construction Cost Index (CCI) is prepared by compiling the most recent bid data, which reflects the prevailing market conditions. See the graph at the bottom of the page for WSDOT's CCI and the CCI of other nearby states and the Federal Highway Administration (FHWA). To view some of the most recent costs by quarter, see www.wsdot.wa.gov/biz/construction/constructioncosts.htm.

The eleven-year average growth rate of the CCI from 1990 through 2001 was 1.5% per year, but since 2001, the average growth rate has been 8.0% per year. During this period the CCI has been driven up by several factors, among them: the increasing worldwide demand for construction materials such as steel and cement; rising crude oil prices and other energy supply issues that have driven fuel prices up; and recent increases in costs in national and international construction activity, including (most recently) hurricane rebuilding in the South.

A Competitive Bidding Market is WSDOT's Best Tool in an Inflationary Market

The best way to manage growing construction costs is to nurture a competetive bidding environment: the more qualified and responsible bidders, the better. The goal is to have three or more bidders per contract, when possible. On certain emergency contracts, such as the recent rockslides on I-90 through Snoqualmie Pass, WSDOT selects a prequalified contractor (based on type of work and location) in order to expedite the project. On some regular contracts, the location, type and size of the project reduces the number of interested bidders.

The following components (weighted as shown) are used to compute the CCI:

Concrete Pavement (3.2%)	Steel Reinforcing Bar (5.4%)
Crushed Surfacing (7.9%)	Structural Steel (6.9%)
Roadway Excavation (10.7%)	Hot Mix Asphalt (48.5%)
Structural Concrete (17.4%)	

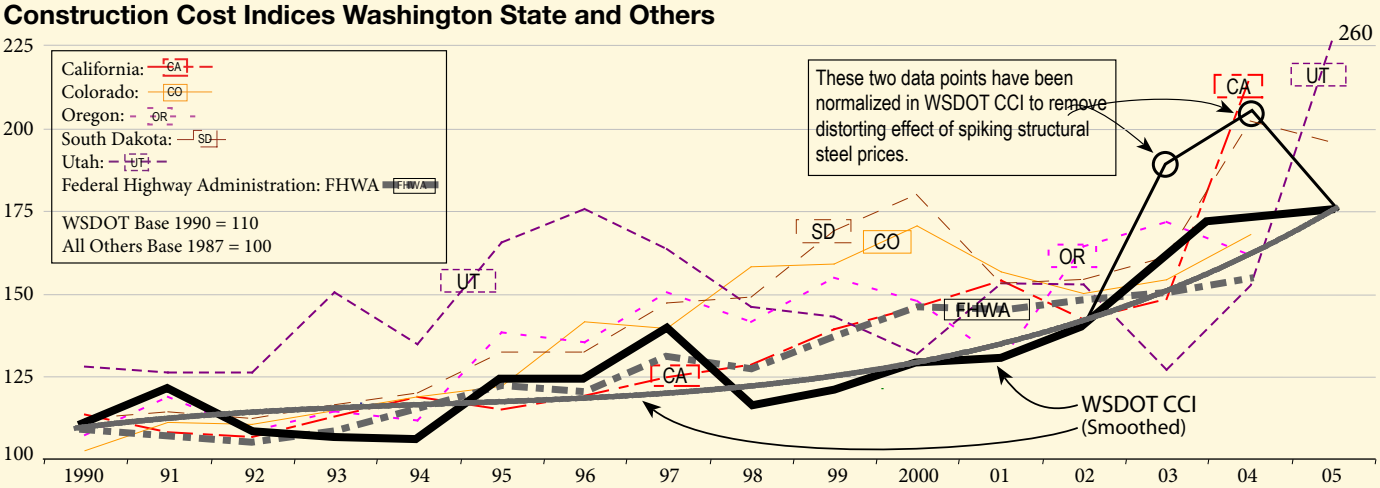
For more information on what these materials are, see page 45 of the September 30, 2005 *Gray Notebook*.

To determine the level of competition for state highway construction contracts, WSDOT follows the trends in the number of bidders on every highway construction project, such as the total number of contractors bidding to be a prime contractor on WSDOT highway construction projects, and the total number of contractors winning the award of WSDOT highway construction projects. See the graphs on the next page.

In 2005, 435 contractors were prequalified to bid on WSDOT construction work. Of these, 137 contractors actually placed a bid to become a prime contractor, and 69 contractors won an award to be the prime contractor on a WSDOT project.

The percent of WSDOT contracts bid by at least three firms has been around 67% for six years, while the percent of WSDOT contracts bid by at least four firms has fallen from about 50% in 2002-03 (when work was scarce) to about 33% today (when work is abundant). The percent of WSDOT contracts bid by one firm has fluctuated from 7.7% (2001) to 13.4% (2004).

Construction Cost Indices Washington State and Others



Source: WSDOT Construction Office

Cross-Cutting Management Issues

What WSDOT Can Influence...

Generally, WSDOT can influence the highway construction market in Washington State by making the agency a customer with whom contractors want to do business.

Fairness and efficiency. WSDOT strives to provide fair and efficient practices in contract administration and in risk allocation in the contracting relationship. Specifications on which contractors can confidently prepare bids, and a fair process for responding to questions and requests for clarification, are also key elements.

Communication with the contracting industry. The agency promotes current and future contract opportunities to the contracting community, and makes special outreach efforts on unusual or difficult projects.

Bid advertisement scheduling. WSDOT tries to schedule bid advertisements to promote competitive appetite. For example, the agency bids paving contracts early in the summer construction season, when few projects are going on.

...and What WSDOT Cannot Influence

There are many factors outside of WSDOT's control. The overall volume of public and private sector work seeking contractors – the demand for contractors' services – is one element of the market that WSDOT cannot exert any control over. Contractors' access to key subcontractors and sources of construction material is another, although WSDOT has been experimenting with early-buy contracts, which allow contractors to purchase construction materials as soon as possible to lock in current prices. Bonding and other capacity constraints are other uncontrollable factors that might affect a contractor's appetite for work.

Recent Sticker Shock Stories from Across the Country

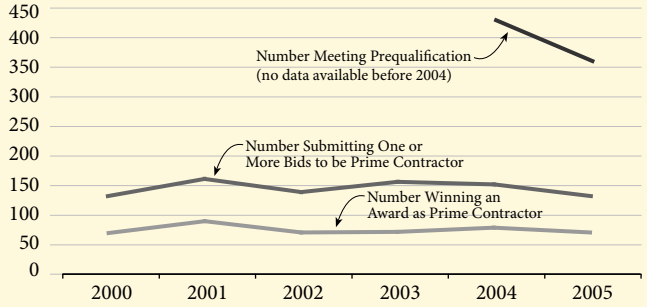
Alaska, November 2005. The Ketchikan road job came in at 78% over the $6 million estimate. This project had only one bidder.

New Jersey, December 2005. The state rejected all three bids on the Rte. 52 Causeway Bridge project. The low bid was $90 million over (60% over) the $152 million estimate.

Florida, December 2005. FDOT has rejected more bids (9 out of 32) in the last month than ever before, and so far this financial year have received more single bids than in the past years. FDOT is calling a summit of stakeholders to discuss out of the box strategies.

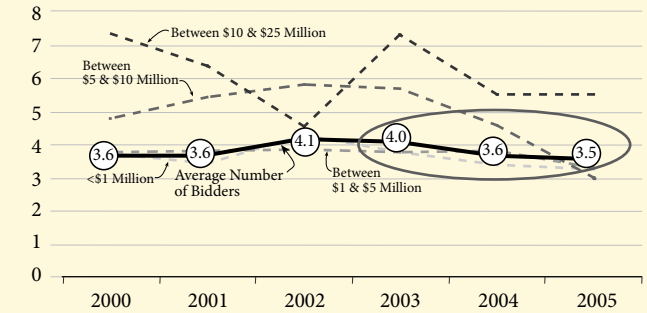
Number of Construction Firms Prequalifying for Bidding On, and Winning WSDOT Construction Contracts

Number of Bidders



Average Number of Bidders

By Size of Contract



	2000	2001	2002	2003	2004	2005
3 Bidders	24%	23%	16%	24%	23%	33%
4 or more bidders	42%	41%	50%	50%	44%	35%
3 or more bidders	66%	64%	65%	74%	66%	69%

Source: WSDOT Construction Office

Limited Number of Contractors

Market trends in the construction industry towards consolidation and shrinkage of the number of local firms is another factor in construction costs. Acquisitions and mergers as far back as the early 1980's have reduced the number of contractors available to provide the work. Additionally, specialty areas in construction have a limited number of contractors. Such specialties include hot mix asphalt paving, roadway striping, shaft drilling, concrete pre-stressed structural elements, concrete post-tensioned structural elements, and steel fabrication.

Highway Construction: Quarterly Update

Construction Industry Costs Advertisement Prices

The construction industry across the country has been buzzing with discussion of price run-ups for construction inputs including materials, fuel, equipment, and labor. Adverse trends had been apparent throughout the last year, especially for steel (heavy overseas demand, although a price surge seemed to begin to level off somewhat during mid-2005), cement (supply shortages) and energy (upward trends for fuel for construction equipment and energy inputs into materials).

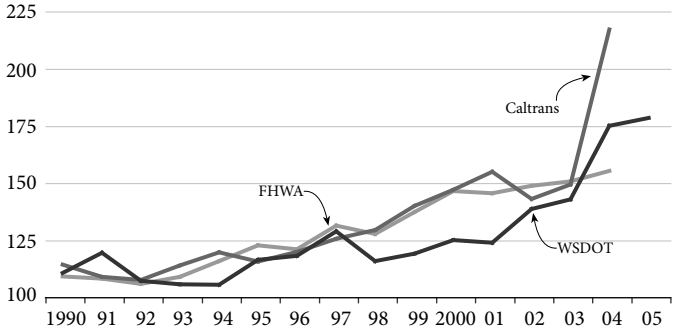
In the aftermath of Hurricane Katrina (and then, to a lesser extent, Wilma), concerns heightened especially at the prospects of still higher energy prices as well as new demand-side pressure on industry resources from Gulf area re-building. The Gulf States situation also raises concerns for shortages of skilled labor and experienced construction engineers and project managers, as well as overall construction industry capacity. Conversations with construction industry experts also touch on potential difficulties for contractors' access to surety bonding. Discussions also address the adverse implications for the true competitiveness of pricing in the industry from the on-going trends toward industry concentration, i.e., fewer and fewer big contractors taking more and more of the overall industry pie.

In recent weeks, news has been spreading among state and local transportation departments of "sticker shock" as bid openings have shown contractors' pricings appreciably above project estimates.

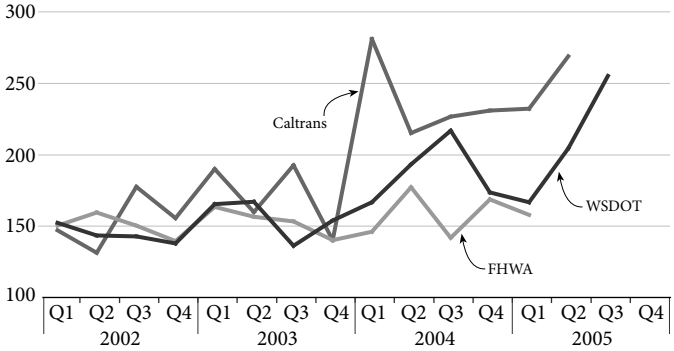
Some of WSDOT's recent bid openings have not been reassuring. For example, WSDOT recently opened bids on *SR 3 – SR 303 Interchange*, and despite the agency's efforts to incorporate the impact of cost escalation into the estimate, WSDOT still missed the low bid by almost 17%. The second and third low bids were in the same general range. WSDOT's estimate was $14.33 million, while the low bid was $16.74 million. WSDOT is currently analyzing the bid tabs to understand the differences, but the initial impression is that the cost of fuel in equipment and trucking, as well as the steel cost in the bridge superstructure and sign structures, are the major areas contributing to this difference.

On a positive note, WSDOT opened bids on *I-5 48th to Pacific* in late June and was pleased to find the low bid to be under the engineer's estimate by 4.7%. This project was awarded to

Annual Construction Cost Index
WSDOT Base 1990 = 110
FHWA and Caltrans Base 1987 = 100



Quarterly Construction Cost Index
WSDOT Base 1990 = 110
FHWA and Caltrans Base 1987 = 100



"Sticker shock" is exactly what the Arizona DOT experienced when it recently opened bids for a project providing improvements at the junction of Red Mountain, Satan Highway, and U.S. 60. The engineer's estimate for this project was $58 million; the low bid came in at $71 million, and the second lowest bid at $84 million.

the low bidder Kiewit Pacific for a contract amount of $72.87 million. The second bidder on this project submitted a price of $78.42 million, which was 2.6% over the engineer's estimate.

WSDOT's experience of a volatile bidding environment is similar to what is happening in other states (see gray box on page 43). One significant difference between Washington and other states is that WSDOT is still seeing strong competition by bidders for its projects. Other states such as Florida, California, and Arizona are reporting a decrease in the number of bidders on large projects. Some states are even experiencing an increase in the occurrence of single-bidder bid openings.

Trailing Indicators

WSDOT prepares its construction cost estimates from the information about market conditions drawn from recent bids, not from a crystal ball of future market conditions. WSDOT accumulates construction cost information into a construction cost index and compares that information against the experience of other states. WSDOT's Construction Cost Index is a composite of unit price information from low bids on seven of the most commonly used construction materials. These items reflect a composite cost for a completed item of work and include the cost of labor, equipment and materials.

The first of the graphs on page 43 shows WSDOT's experience since 1990, plotted against similar types of cost indices maintained by the Federal Highway Administration (FHWA) for the country as a whole and by the California Department of Transportation (CalTrans) for California. The second looks in greater detail at the most recent 15 quarters. FHWA has not yet released data on the two most recent quarters. WSDOT will be including Construction Cost Indices for other states in future editions.

Making information available to the public

This quarter, WSDOT began publishing its materials costs on its website. In line with the agency's "No Surprises" philosophy, details on costs trends are now available to the public with updates occurring at the end of every quarter. To view some of the most recent costs by quarter, see the graphs on page 46. These graphs, as well as costs on an annual basis from 1990 to 2004, are available at www.wsdot.wa.gov/biz/construction/constructioncosts.htm.

Fuel Cost Escalation Pilot Project

WSDOT is currently evaluating the use of an escalation clause on a pilot basis to try to buffer the impacts of fuel escalation to the contractors. This clause would shift the risk of price increases during the life of the contract from the contractor, who includes it in the bid, to the state, which would pay the increased or decreased cost of fuel during the life of the project. This clause does not eliminate the financial impact of escalation to the project, but rather shifts its risk from the contractor to the owner, to fund as it materialized throughout the project.

The Crystal Ball

In the world of markets, everyone knows by heart the disclaimer in the advertisements for mutual funds. "Past results are not a guarantee of future performance." This is precisely the case when looking ahead to national and local construction industry pricing, especially when price volatility seems inevitable from the many trends the industry now faces.

WSDOT's construction cost estimates are necessarily based completely on available trailing indicators and there is neither data nor methodology from which engineers can estimate projects based on crystal ball forecasts of changing future prices. In the Cost Estimate Validation Process (CEVP)™, which WSDOT is applying to large projects, some account is given to baseline future inflation.

For future project costs, WSDOT applies industry standard inflation rates to base estimates in order to project year of construction costs. Recent trends indicate that tables detailing inflation rates were in need of update. The rates used on these tables were evaluated against updated industry forecasts and updated. The changes to the tables include a higher than previously forecasted inflation rate for 2004 and 2005 and an updated forecast for future years. Updating the inflation rates used to forecast future costs attempts to reflect some of the recent price trends.

Recent coverage of construction industry inflation in *The Engineering News Record*, the leading industry periodical, contained the following statements, none of which can be regarded at this time as more than the weathervanes of industry sentiment:

Highway Construction: Quarterly Update

The major uncertainty relates to the price and availability of building materials, which means in the near-term that the construction industry will continue to adjust to a higher cost structure.

A recent pre-Katrina survey of 167 public owners found that 92% of the owners experienced an average increase in their project cost of 13.2% in 2004, says John Dunkerley, chief estimator for PinnacleOne, Phoenix, which commissioned the survey. "Katrina will only aggravate those conditions," he says. "I had expected industry escalation to slip back to 5% this year. But now I'm expecting Katrina to spike it up over the next 12 to 24 months by 10 to 20% a year." (from *The Engineering News Record*, September 26, 2005)

What can WSDOT do?

In volatile markets, contractors must place their own contingencies against inflation into fixed price bids. If their contingencies are larger than turn out to be required, windfall profits result. The opposite is also true, and can lead contrctors to significant losses on jobs. WSDOT and many other states across the country are now examining whether these risk elements can be removed from contracts in a volatile pricing environment by making bids subject to unit price adjustments from time-of-bid base bid costs. WSDOT has also worked with industry to allow contractors to expedite purchase of materials in order to be able to lock in key materials requirements for the jobs they win.

The Seven Common Construction Items That Make Up the WSDOT Construction Cost Index

The costs of these seven materials are calculated on a quarterly basis to determine WSDOT's construction cost index (CCI). Four of them are included in graphs on page 46 which show trends lines for increasing costs over the past 15 quarters.

Crushed Surfacing:
Crushed surfacing is used in construction of highways to establish a drainable base or platform underneath concrete pavement or Hot Mix Asphalt for the final roadway surface. Prices have held constant since 2004 based on the annual trendline.

Hot Mix Asphalt:
Hot Mix Asphalt is one of the common driving surfaces constructed for state roadways. Prices have increased 14.6% since the first quarter of this year based on the quarterly trendline.

Concrete Pavement:
Concrete pavement is another of the common driving surfaces constructed for state roadways. Prices have increased 13% since 2004 based on the annual trendline.

Structural Concrete:
Structural concrete is used to construct bridges and retaining walls. Prices have increased 27% since the first quarter of this year based on the quarterly trendline.

Steel Reinforcing Bar:
Steel reinforcing bars are used in bridges and retaining walls to reinforce the concrete. Prices have edged up roughly 1% since the first quarter of this year based on the quarterly trendline.

Structural Steel:
Structural steel is used to construct bridges and certain types of retaining walls. Prices have increased 9.7% since 2004 based on the annual trendline.

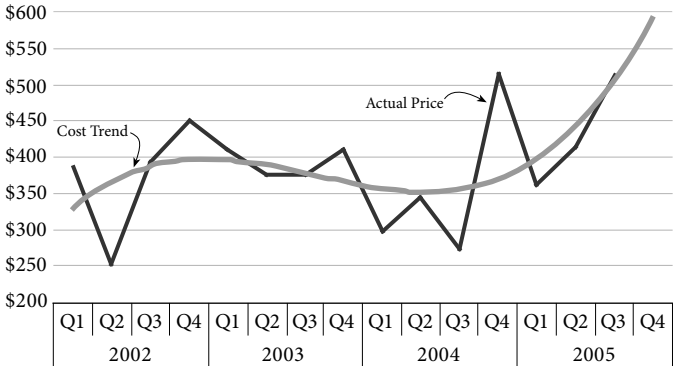
Roadway excavation:
Roadway excavation is the activity of moving the native material (soil) on a construction site from one area to another, or off site for disposal. Prices have increased 22% since the first quarter of this year based on the quarterly trendline.

Highway Construction: Quarterly Update

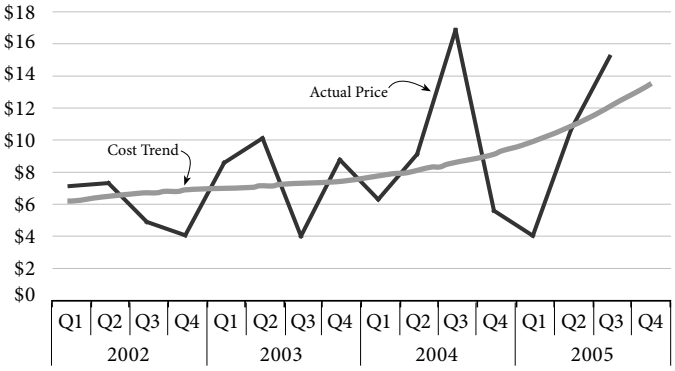
Bid History Graphs

The graphs below reflect the unit bid price for four major construction materials, and exemplify the increasing cost trend. "Unit bid price" means the amount the contractor bid per unit of material (e.g., dollars per cubic yard of structural concrete). Unit bid prices include labor costs, which is standard for the highway construction industry. Exact details are difficult to derive from the graphs shown but they are very useful in describing trends. It is difficult to derive exact details because project quantities vary substantially from project to project based on the size and geographical setting of the project. Rural projects generally tend to have unit bid prices on the lower end. Projects with larger quantities generally have lower unit prices, as the contractor is able to distribute its fixed costs over a broader base of units. With this said, the individual data points represent the trailing indicators, and the extension of the trend line is the crystal ball projection.

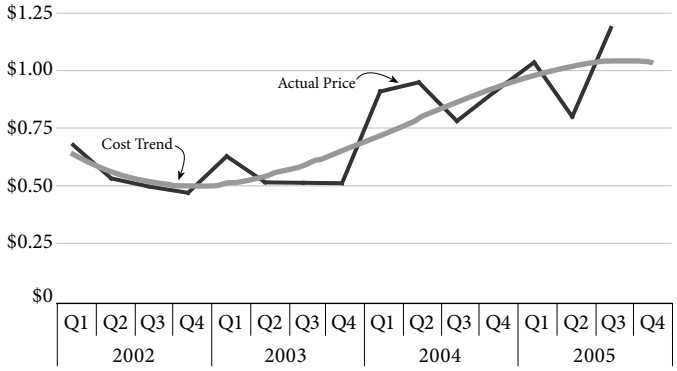
Structural Concrete
Quarterly Unit Bid Price
Dollars per Cubic Yard



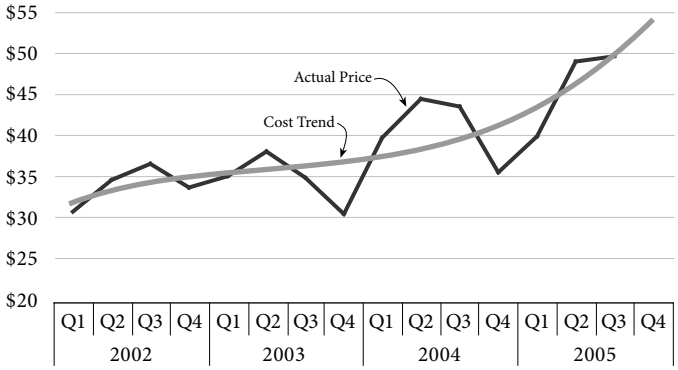
Roadway Excavation
Quarterly Unit Bid Price
Dollars per Cubic Yard



Steel Reinforcing Bar
Quarterly Unit Bid Price
Dollars per Pound



Hot Mix Asphalt
Quarterly Unit Bid Price
Dollars per Ton



Highway Construction: Quarterly Update

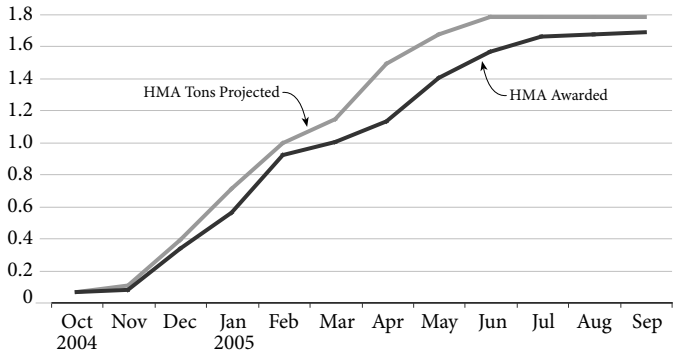
Hot Mix Asphalt for Awarded Contracts

In October 2004, WSDOT forecasted that contracts for 1,779,826 tons of Hot Mix Asphalt (HMA) would be awarded throughout the State by September 2005. The final amount was 1,685,394 tons awarded, which was 95% of the original forecast.

The award of HMA closely matched the forecast amount for the first few months, beginning in October 2004 through March 2005. In April 2005 the tons of HMA awarded lagged behind the original forecast, primarily the result of a couple of planned projects not being awarded due to higher than estimated bids. By September 2005 the tons awarded had closed some but not all of the gap.

2005 Hot Mix Asphalt Tons Awarded

Millions of Tons



Hot Mix Asphalt Pavement - Projected vs. Actual, 2002-2005

In Tons, Through September of each year

Year	Projected	Actual	% Difference
2002	1,373,465[1]	1,364,021	-1%
2003	1,417,126	1,825,442	+29%[2]
2004	1,324,218	1,299,377	-2%
2005	1,779,826	1,685,394	-5%

[1] The projection for 2002 was revised in March 2002 by the Transportation Commission following budget cuts.
[2] The 2003 "Nickel" Transportation Funding Package was passed after the projection was made for 2003. WSDOT subsequently awarded five projects from the Nickel funding package with a combined total of 315,285 tons of HMA.

These pictures tell the story of a Hot Mix Asphalt paving job on SR 2 near Orondo. To the left, trucks haul in the Hot Mix Asphalt (HMA) to the road site.

A truck, transfer vehicle, and paving machine place the HMA.

A roller compacts the HMA, and the road is repaved. A quality check and some restriping come next, then the road is open for business.

Highway Construction Program

Hot Mix Asphalt for Awarded Contracts

In October of 2004, WSDOT forecasted that 1,779,826 tons of Hot Mix Asphalt (HMA) would be awarded in construction contracts through September 2005. This is a 34% increase in HMA tons forecasted compared to the previous year. This increase is caused, in part, by the passage of the 2003 Transportation Funding Package.

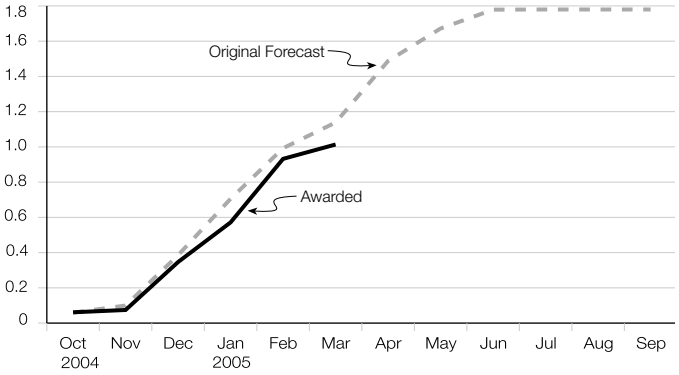
WSDOT forecasted that during the six months from October to March 63 projects would be awarded with a combined total of 1,138,613 tons of HMA (see project awarded on pages 4-5). At the end of March 2005 the total is 58 projects awarded with 1,013,610 tons of HMA. Of this amount, 11 are Nickel projects amounting to 436,585 tons. For more information on Nickel projects see pages 3-17.

A tack truck used for spraying oil on asphalt before paving.

Hot Mix Asphalt Pavement* - Tons Awarded

October 2004 through September 2005

Tons of Asphalt in Millions



** Graph indicates which month projects were awarded, not when HMA was placed.*
Source: WSDOT Construction Office.

Early paving project on South Tacoma Way.

MOVING WASHINGTON 100 YEARS 1905-2005
Washington State Department of Transportation

The Rising Cost of Construction Materials

Wrestling with the Issues

WSDOT, along with other states, has observed the rapid rise in steel prices, primarily due to an unprecedented demand for steel overseas. States have been wrestling with the issue of whether or not to include an "escalation clause" into construction contracts to help insulate or share the risk with the contractors. Similar concerns focus on cement shortages and price escalation, as well as increased prices for crude oil, which drives up the market price for fuel and asphalt.

The direct effect of steel, fuel and cement escalation on the cost of work is difficult to measure. WSDOT uses unit price contracting, where the contractor is requested to provide "bid prices" for completed items of work, as opposed to prices for individual components that make up a complete item of work. For instance, the contractor provides a complete price to furnish, install and test a storm sewer pipe. Integrated in this price, are all material cost, labor cost, equipment cost and any additional cost that may be associated with the risk of doing the work. It is generally not possible from the bid to isolate the cost of the pipe itself. However, all other things remaining constant, an increase in the cost of pipe would ultimately raise the price the contractor bids.

WSDOT collected data on select items that would serve a possible measure for the effect that price escalation has had on contracts. This was done under the assumption that "all other things remained constant". In the end analysis, the items for "Steel Reinforcing Bar" and "Hot Mix Asphalt" revealed upward price trends that illustrate WSDOT's concern with price escalations. A consistent trend for cement was not present. The trend of increased prices for steel reinforcing bars (rebar) and hot mix asphalt on WSDOT projects is similar to what is being reported on a national scale. Engineering News-Record (ENR) magazine tracks material price indexes for rebar and PG 58, the asphalt binder in Hot Mix Asphalt, in twenty cities around the country. The ENR price index is based on the material cost and does not include the other costs that are reflected in the WSDOT bid prices. To compare WSDOT and ENR trends, the ENR price indexes have been adjusted to a baseline that is equivalent to the WSDOT bid price for the first quarter of 2002.

Steel rebar used to build the Methow River Bridge deck.

Asphalt paving on I-90 at Moses Lake.

Escalation Measure

Steel Reinforcing Bar Analysis Indicates a 100 Percent Increase

Steel is used in WSDOT projects primarily in two major areas – structural steel, and steel reinforcing bar. The design and construction of structures using structural steel is not the most common of WSDOT bridge materials, and therefore does not have a clear and consistent bid history in which to track escalation. Steel reinforcing bar (rebar) on the other hand is used in virtually all projects with structural work. The difficulty with rebar is that it is typically embedded in other lump sum items of work such as "superstructure". A separate item is used for rebar that is placed in walls, footings and abutments. While this item may not accurately reflect the total quantity of rebar used in WSDOT projects and does include labor and equipment costs as well as materials, it should reflect the effects of cost escalation. Since January 2002 there seems to have been over a 100 percent increase in the price bid for steel reinforcing bar. During the same period the ENR rebar index increased by 36 percent.

Hot Mix Asphalt Analysis Indicates a 20 Percent Increase

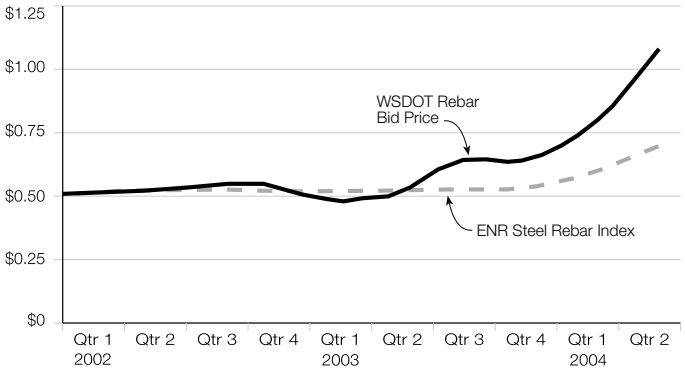
Hot Mix Asphalt prices were selected to help identify cost escalation in petroleum products. The unit cost of HMA involves the manufacturing, placement and compaction of asphalt pavement. The cost of this item is very dependent on the petroleum market, not only in the form of the liquid asphalt used in the mix, but also for the fuel cost of the plant, placement equipment, hauling vehicles and compaction train. Since January 2002 there has been a 20 percent increase in the price bid for Hot Mix Asphalt (36 percent since January 2000).

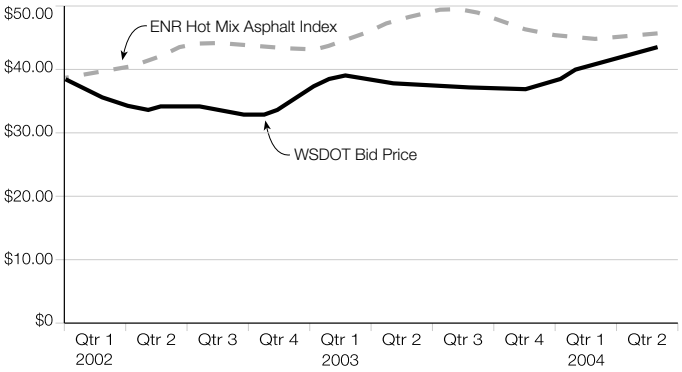
Continued Efforts to Track Cost Escalation

While it is difficult, if not impossible, to extrapolate data to predict the total cost impact from each of WSDOT's projects, it is clear from the highlighted trend that these items and perhaps others, are having an effect on bid prices. While this has not been a significant issue to date, WSDOT will continue to monitor the situation.

Steel Reinforcing Bar - Cost Trend

Unit Bid Price (per lb.), January 2002 - June 2004



Hot Mix Asphalt - Cost Trend

Unit Bid Price (per ton), January 2002 - June 2004