GROWTH IN HIGHWAY CONSTRUCTION AND MAINTENANCE COSTS

Federal Highway Administration

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Memorandum

U.S. Department of Transportation
Office of the Secretary of Transportation
Office of Inspector General

Subject: INFORMATION: Report on the Growth in Highway Construction and Maintenance Costs
Report Number CR-2007-079

Date: September 26, 2007

From: David Tornquist
Assistant Inspector General
for Competition and Economic Analysis

Reply to Attn. of: JA-50

To: Federal Highway Administrator

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), enacted in August 2005, provides $244.1 billion for highway and transit projects for fiscal year (FY) 2005 through FY 2009. Within a year of its enactment, dramatic cost increases led some state planners to cancel or delay highway projects due to insufficient funds. An April 2006 survey by the American Association of State Highway and Transportation Officials (AASHTO) confirmed this trend, with 42 states and the District of Columbia indicating that they were witnessing significant growth in the costs of their highway projects. This rapid cost escalation has significant implications for the funding levels needed in the next highway bill to maintain or expand highway construction nationwide.

In September 2006, the House Committee on Transportation and Infrastructure requested that the Office of Inspector General analyze the growth in highway project costs. Our objectives were to determine: (1) the extent of recent cost increases for highway construction and maintenance projects, (2) whether the cost increases are the product of transitory factors or indicative of longer term structural changes that need to be incorporated into future transportation funding plans, and (3) the degree to which the cost increases are subject to regional variations.

In conducting this performance audit, we examined both national and state data on highway construction and maintenance costs. In addition, we analyzed a range of supporting information, such as data on the number of bidders per project, industry profit margins, and wages. Further, we interviewed experts on each of the major categories of commodity inputs used in highway construction and maintenance, as well as on the highway construction industry. We performed this audit in accordance with Generally Accepted Government Auditing Standards prescribed by the Comptroller General of the United States with the exception of the data quality standards. We did not systematically audit or validate the data used for this report. However we conducted checks of the data to assess reasonableness and comprehensiveness and concluded that the data, despite shortcomings, was sufficient to support our findings. Exhibit A more fully describes our scope and methodology.

RESULTS IN BRIEF

We found that highway construction and maintenance costs nationwide grew approximately three times faster from 2003 through 2006 than their fastest rate during any 3-year period between 1990 and 2003, substantially reducing the purchasing power of highway funds. These increases are largely the result of escalation in the costs of commodities used in highway projects, such as steel and asphalt, and reflect structural,[1] not transitory, economic changes. Consequently, we expect these commodity costs to remain elevated, and possibly continue expanding, in the near term. Finally, we found that highway project cost growth varied across states due primarily to differences in costs of transporting commodity inputs.

Continuing elevated highway construction costs will create a significant challenge for both Congress and the Administration as they consider, in the next highway bill, how best to maintain and improve the nation’s aging highway infrastructure. Higher construction costs have significantly reduced the purchasing power of current highway funding. The next highway bill may need to provide a significant increase in funding just to maintain, let alone exceed, the volumes of highway construction and maintenance undertaken prior to 2003.

Highway construction and maintenance costs have soared in recent years. Figure 1 shows the escalation in the two major national indices[2] of highway construction and maintenance costs: the Federal Highway Administration Bid Price Index (FHWA BPI), and the Bureau of Labor Statistics bridge and highway construction producer price index (BHWY PPI).[3] The FHWA BPI increased 47.7

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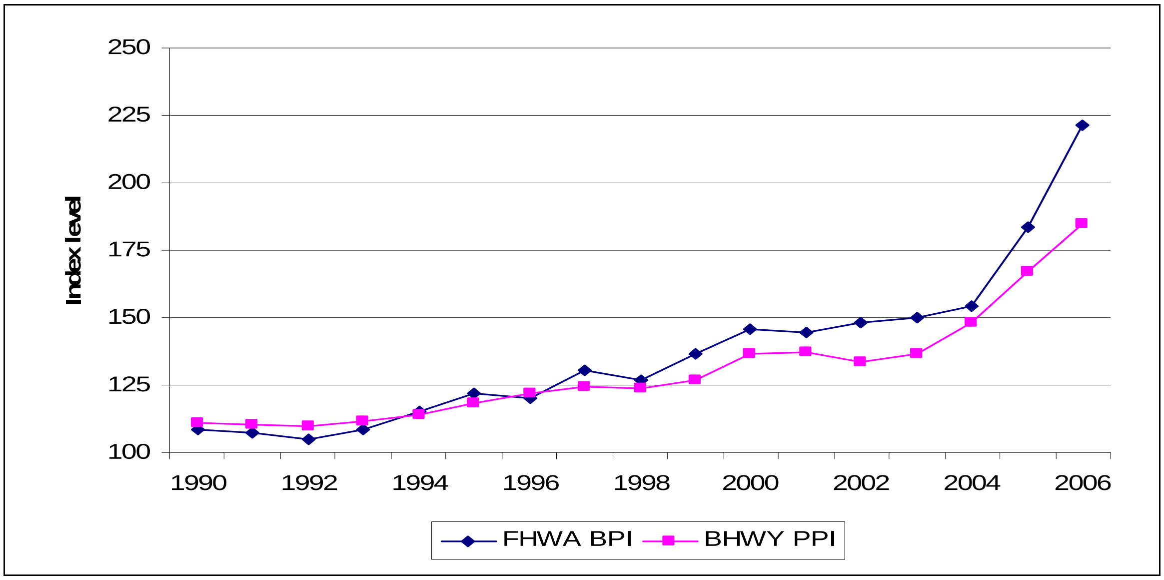
1 In this setting, structural economic changes are either lasting modifications in the demand for these commodities, or long-term reductions in their supply.

2 Indices are a common means of measuring inflation. Most indices discussed in this report track the cost of purchasing fixed quantities of inputs to highway projects over time. The costs in an index are scaled to have a value of 100 in a base year. This facilitates calculation of the percentage inflation in the costs tracked since the base year. For example, an index level of 120 indicates that costs have risen 20 percent since the base year.

3 The FHWA BPI tracks the installed prices of several components to highway construction (that is, it includes other costs such as labor and overhead as well as materials costs). The BHWY PPI only tracks the costs of materials used in highway construction. For more information on these indices, see the Data Reliability section in exhibit A.

percent from 2003 through 2006, 3 times greater than its largest growth in any 3-year period between 1990 and 2003 (16 percent). The BHWY PPI's 35.3 percent growth from 2003 through 2006 was 3.2 times greater than its largest increase, 10.9 percent, over a 3-year span between 1990 and 2003. We found similarly dramatic cost increases in state-level data. See exhibit A for a discussion of the shortcomings of the FHWA BPI, which the Federal Highway Administration (FHWA) has announced that it would be discontinuing.

Figure 1. National Highway Construction and Maintenance Cost Indices*



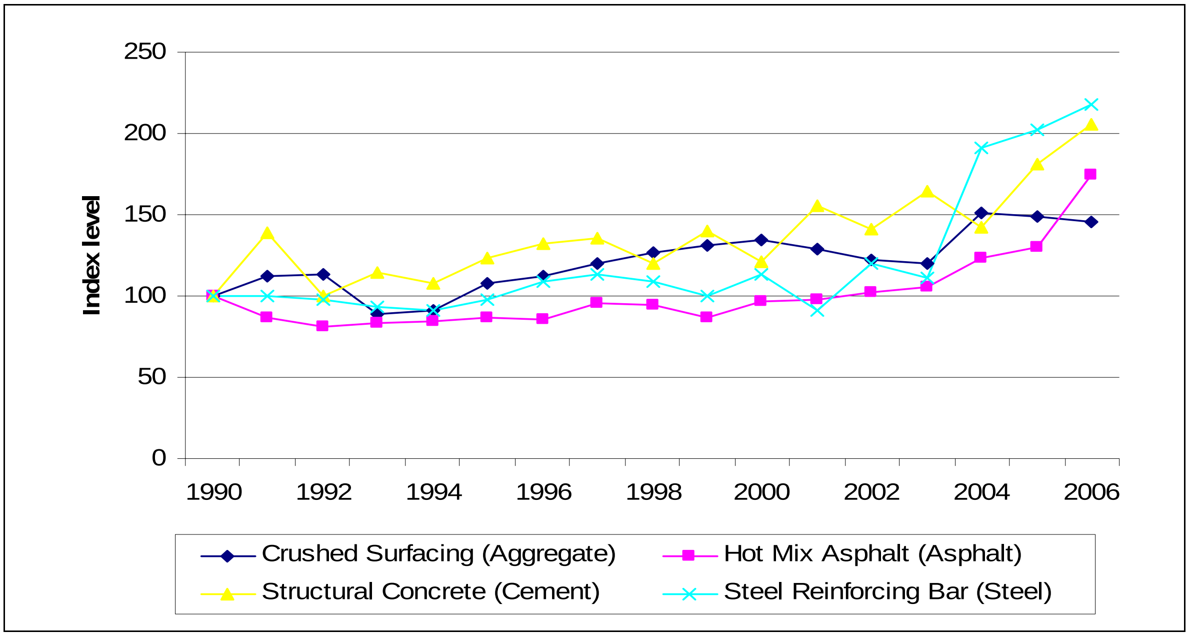
**These indices have been scaled to equal 100 in 1987.*

Highway project cost growth has substantially reduced the purchasing power of highway funds provided in SAFETEA-LU. A dollar will have lost between 37 and 60 percent of its value between 2005 and 2009, if highway project inflation continues at its 2006 pace. Under these circumstances, the $42 billion provided in SAFETEA-LU for 2009 Federal-aid to highways will only be equivalent to between $16.8 billion and $26.6 billion in 2005 dollars.

Growth in the costs of commodity inputs has been the primary driver of the recent increases in highway construction and maintenance costs. Nationally, prices have risen dramatically since 2003 for each of the major commodity groupings used as inputs in highway projects. These include aggregate (any of various loose particulate materials, such as crushed stone or gravel), asphalt, cement, and steel. Excavation and embankment costs have also risen dramatically during this time, but have contributed less to recent highway cost growth as they constitute a smaller share of project costs than commodity inputs.

The state data we examined support the national trends. For example, figure 2 shows the unusually large growth in commodity input costs in the state of Washington since 2003. In this instance, the costs of hot mix asphalt grew by 64.2 percent from 2003 through 2006, as opposed to 9.8 percent from 2000 through 2003. The results were largely the same for the other states in our sample, which was designed to include representation from as many regions of the country as possible. (See exhibit B for information on the states included in our sample.)

Figure 2. Growth in Commodity Input Costs for Highway Construction in Washington State*



**All indices were scaled to equal 100 in 1990.*

We found no evidence that other elements of highway construction and maintenance costs exhibited comparable growth during this time. For example, wages for workers engaged in heavy and highway construction have increased gradually. Likewise, insurance and engineering costs have increased only to a limited extent. Further, we found no evidence to indicate that highway construction firm profit margins were an underlying cause of the recent surge in overall highway project costs. However, the information available on them was limited.

According to industry analysts, structural economic changes have been the driving force behind the escalation in commodity input costs. The industry analysts we interviewed noted that the following structural economic changes are occurring in the markets for the commodities used in highway projects:

- The per capita supply of steel scrap, the primary input to the production of steel used in highway projects, is falling. At the same time, international demand for scrap is growing.

- Higher prices for higher grade fuel products are inducing refineries to increase the efficiency of their production processes, resulting in less production of by-products, such as asphalt.

- The price of cement is following the shift to higher oil prices, as its production is a highly fuel-intensive process.

- Aggregate is becoming increasingly unavailable as a result of spreading urban and suburban development reducing opportunities for its extraction.

Consequently, the costs of these commodities can be expected to remain elevated, and possibly continue to escalate, in the near term.

The extent of the increases in commodity input costs differed significantly across states. For example, the increases in the costs of structural concrete were much higher in some states than in others. According to industry experts, these variations in costs resulted primarily from differences in transportation costs. Each of the commodity inputs to highway projects either requires special handling to be transported or is very heavy or cumbersome. As a result, transportation costs tend to comprise a substantial share of total commodity input costs.

ACTION REQUIRED

This report does not include recommendations. Accordingly, our findings are not subject to follow-up review. However, we intend to raise with FHWA, under separate cover, the need for accurate highway construction cost data and the challenges FHWA and states face in developing such data.

We appreciate the courtesies and cooperation of the government and private sector representatives that provided assistance during this audit (see exhibit C). If you have any questions concerning this report, please call me at (202) 366-9970 or Betty Krier, the Project Manager, at (202) 366-1422

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cc: Audit Liaison, OST, M-1
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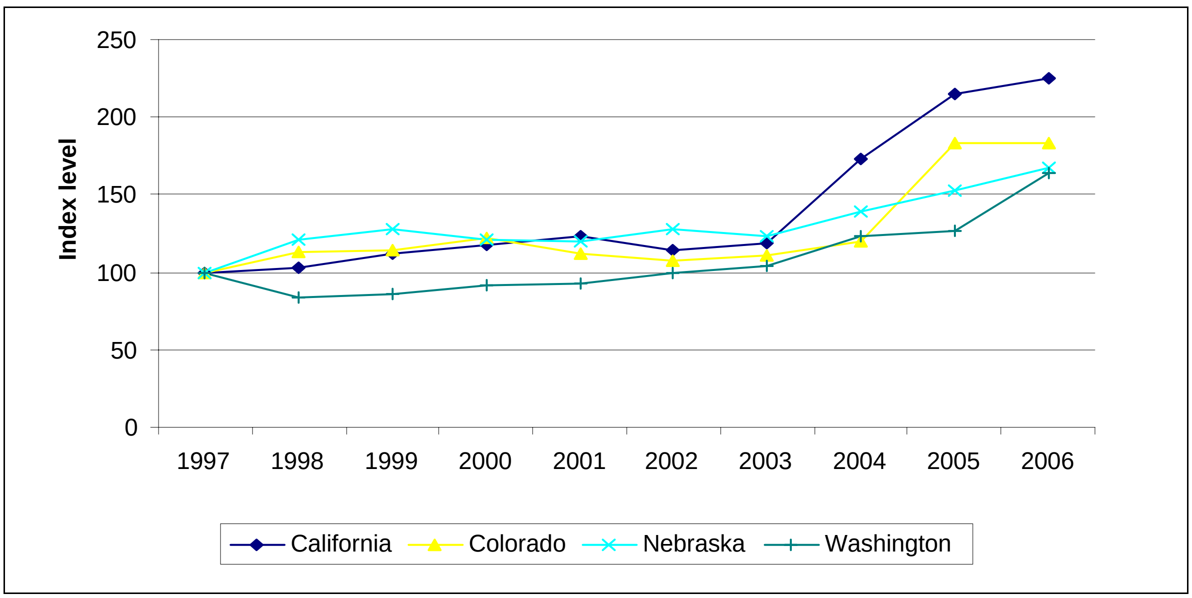
TABLE OF CONTENTS

FINDINGS

Highway Construction and Maintenance Costs Have Grown Dramatically in Recent Years

Both national and state data show that the growth in highway construction and maintenance costs has accelerated notably in recent years. Figure 1 on page iii shows the cost growth measured by two national indices of highway construction and maintenance costs. We also examined data from nine states representing seven regions of the country.[4] Figures 3 and 4 show the highway construction cost indices (CCI) for seven states, each representing one of the seven regions.[5]

Figure 3. State Construction Cost Indices*



**All indices were scaled to equal 100 in 1997.*

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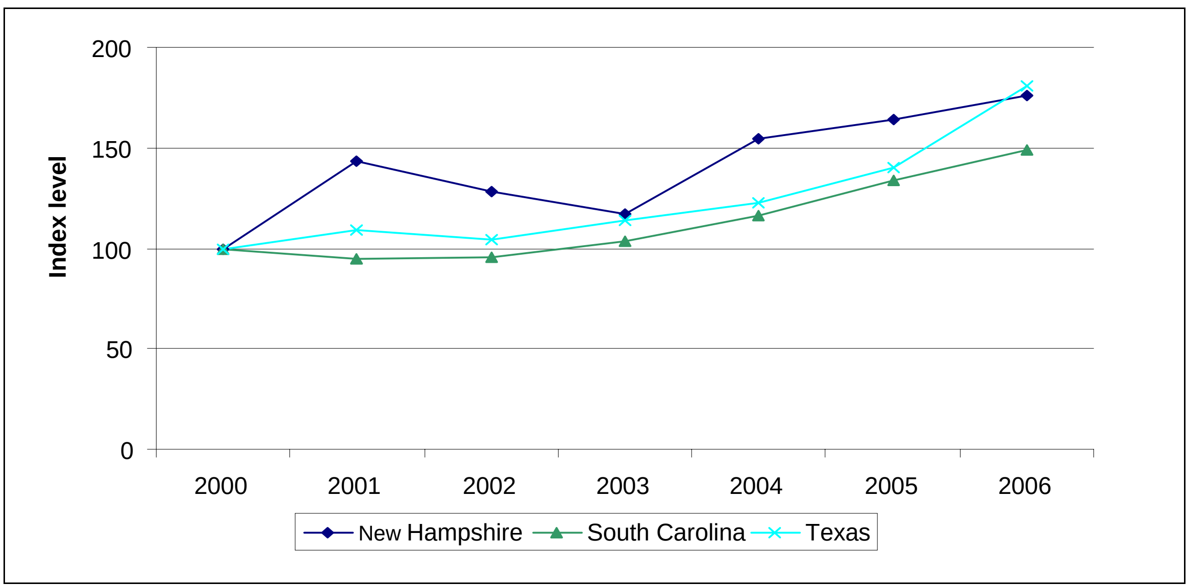
4 Those states were New Hampshire, South Carolina, Georgia, Texas, Nebraska, Utah, Colorado, California, and Washington. The regional definitions were those delineated by FHWA. South Carolina and Georgia are in the same region, as are Utah and Colorado. Our sample did not include regions 3 and 5, the mid-Atlantic and eastern upper Midwest regions, respectively, because no states in region 3 and only one in region 5, Wisconsin, had construction cost indices with sufficient historical data that we could use in our analyses. The Wisconsin data was received at too late a date to be included in our analysis. See Exhibit B for a list of the states contacted in performing our review and the data collected.

5 Figures 3 and 4 cannot be used to compare growth rates across states because the composite indices shown do not track the costs of the same highway construction and maintenance activities. Specifically, different states apply radically different weights to the various commodity component price series, and often price different products within each commodity group in constructing their composite indices.

The four states represented in figure 3 had CCI data available at least as far back as 1997. For these states, the cost growth since 2003 contrasted strongly with any other experienced from 1997 through 2003, with the contrast being the most marked for California and the least striking for Nebraska. In California, the cost growth of 88.8 percent from 2003 through 2006 was 4.5 times the 19.1 percent occurring over the previous seven years, a time period more than twice as long. In Nebraska, the 36.2 percent growth rate from 2003 through 2006 was still 1.6 times higher than the 23.1 percent occurring from 1997 through 2003.

Although less historical data exists for the three states tracked in Figure 4, the available data showed the same pattern. Their CCIs increased significantly more from 2003 through 2006 than from 2000 through 2003. For example, the cost growth for South Carolina from 2003 through 2006 was 44.0 percent, almost 13 times the 3.5 percent growth for the earlier period.

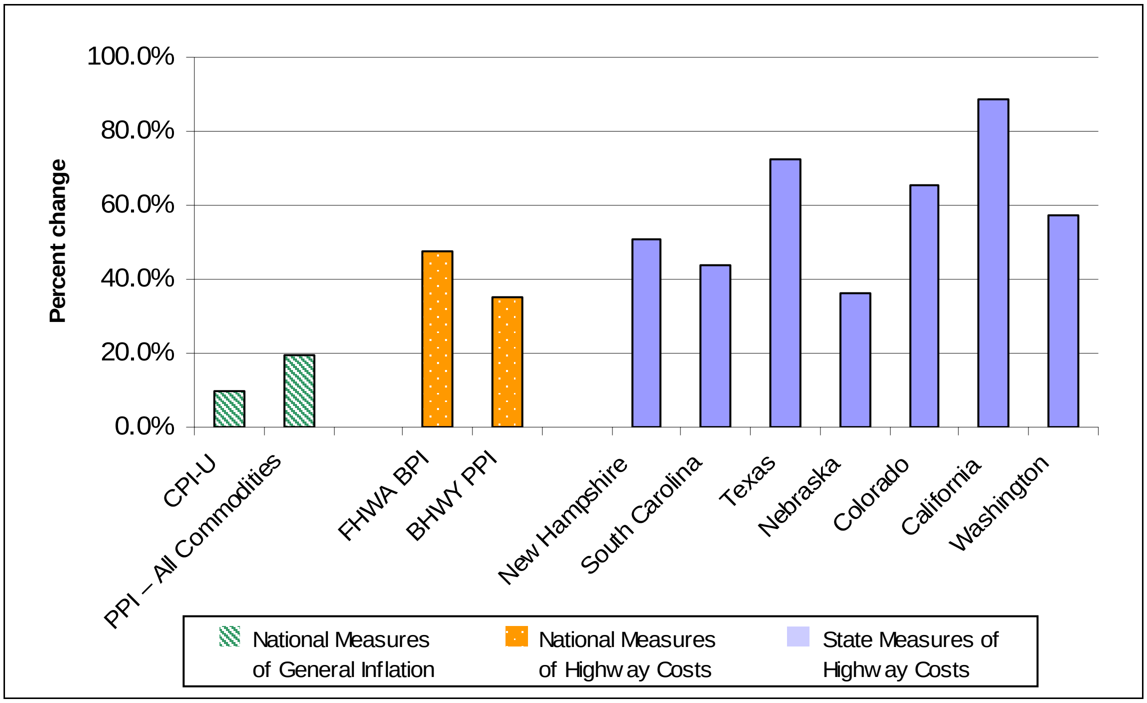
Figure 4. State Construction Cost Indices*



**All indices were scaled to equal 100 in 2000.*

The rapid growth in highway construction and maintenance costs substantially outpaced the inflation in the rest of the economy over the last three years. Figure 5 compares the growth in general inflation indices with the growth in highway cost indices, both nationally and for our sample of states representing seven of the nine FHWA regions from 2003 through 2006. The measures of general inflation shown are: the consumer price index for urban consumers (CPI-U), the most commonly used measure of inflation, and the overall producer price index (PPI). The national indices of highway construction and maintenance costs used are the FHWA BPI and the BHWY PPI. As indicated, most of the highway cost measures exhibit growth that was at least twice that of the PPI, and more than four times that of the CPI-U.

Figure 5. Percent Changes in Measures of General Inflation and Highway Costs Between 2003 and 2006

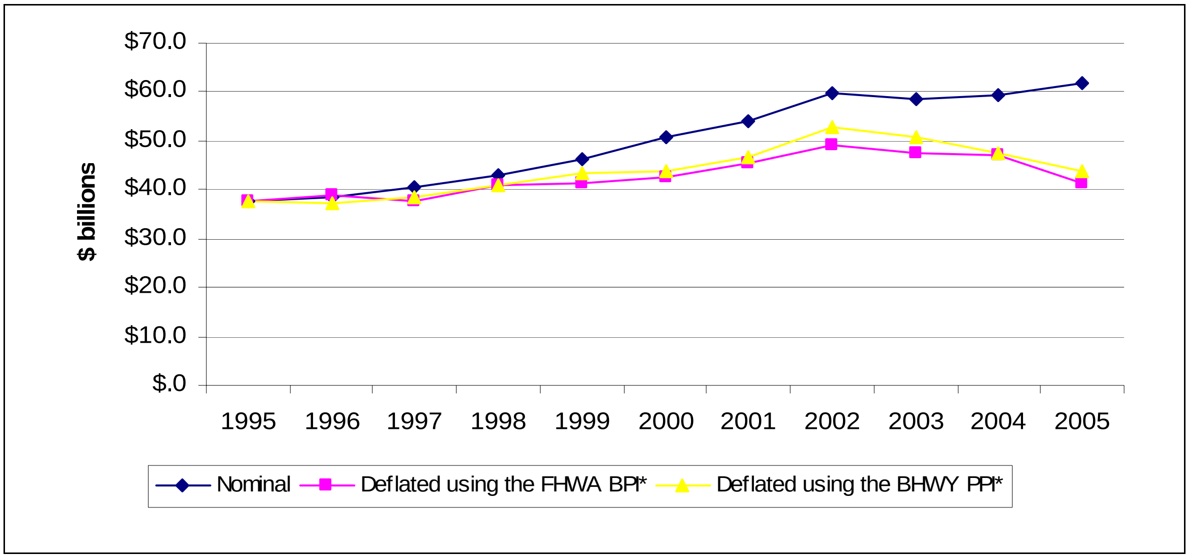


Highway Construction and Maintenance Cost Growth Has Substantially Reduced the Purchasing Power of Highway Funds

The impact of this cost growth is illustrated in figure 6, which shows the path of Government expenditures on highway construction in nominal and real terms,[6] using the two major indices of national highway costs. Between 1995 and 2002, both nominal and real expenditures increased. Between 2003 and 2005, nominal expenditures increased moderately, but real expenditures declined significantly.

[6] Nominal expenditures are equal to the face value of the money spent. Real expenditures are adjusted for inflation so that each real dollar of expenditure has the same purchasing power. Consequently, real expenditures in figure 6 increased only when the increase in expenditures exceeded the rate of inflation, and the total funds spent could buy more highway construction.

Figure 6. Federal, State, and Local Government Highway Construction Expenditures



**The base year for this index is 1995.*

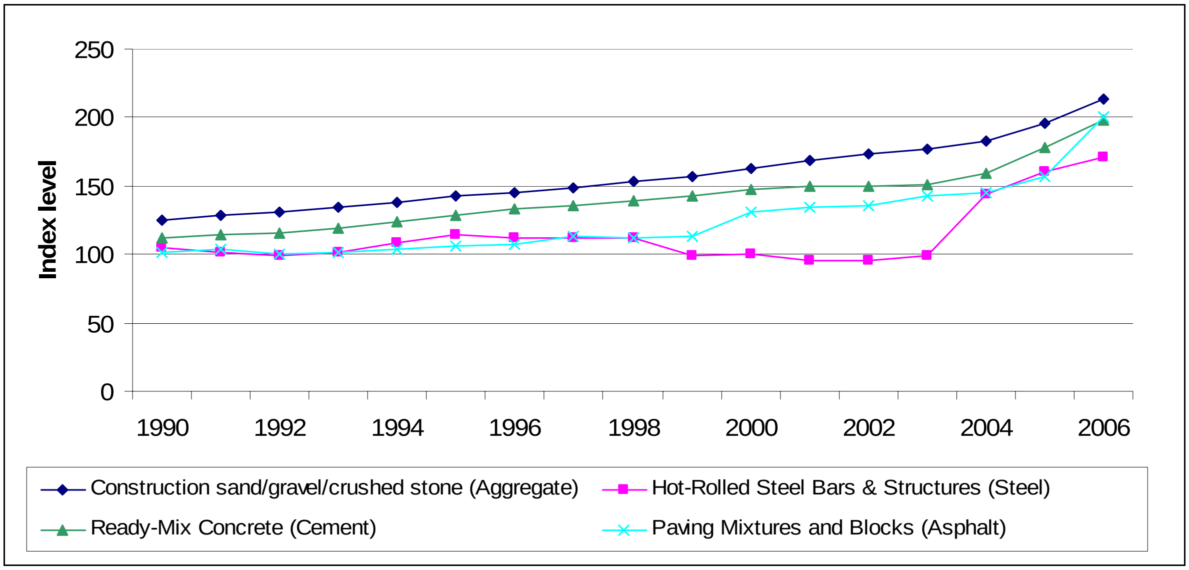
When enacted in 2005, SAFETEA-LU authorized $42 billion for 2009 Federal-aid to highways. Should highway project inflation continue at its 2006 pace, as tracked by the two national indices, this $42 billion will have lost between 37 percent and 60 percent of its value by 2009. In other words, it will be equivalent to between $26.6 billion and $16.8 billion in 2005 dollars when it becomes available to be spent.

Growth in the Costs of Commodity Inputs Has Been the Primary Driver of the Recent Escalation in Highway Construction and Maintenance Costs

Nationally, commodity prices have risen dramatically for each of the major commodity groupings used as inputs in highway projects—aggregate, asphalt, cement and steel. In addition to rising prices for commodity inputs, excavation and earthwork costs have also risen dramatically. However, they have contributed less to construction and maintenance cost growth because they comprise a smaller share of project costs.

Figure 7 shows the growth over time in producer price indices for inputs drawn from each commodity grouping. The most dramatic growth occurred in the costs of hot-rolled steel bars and structures. After remaining virtually unchanged from 2000 through 2003, they jumped 71.9 percent from 2003 through 2006. The cost growth for construction sand/gravel/crushed stone was the lowest of those shown from 2003 through 2006, but at 20.8 percent was 2.4 times its 8.6 percent growth rate from 2000 through 2003.

Figure 7. Commodity Input Cost Inflation Nationally*

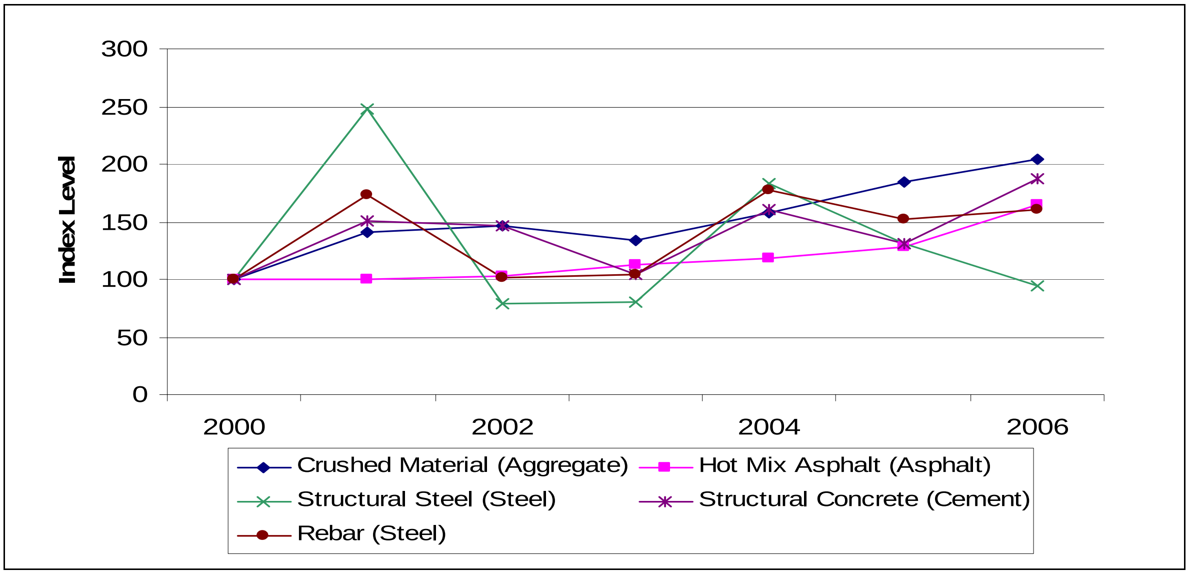


**All indices were scaled to equal 100 in 1987.*

Figures 8 through 10 show the growth in costs for inputs in the major commodity groupings experienced by three states in different parts of the country—New Hampshire, South Carolina, and California. The component costs depicted all increased substantially from 2003 through 2006. The costs of the major commodity inputs included in the CCIs of the other states in our sample exhibited similarly large growth over the last three years.[7]

[7] The exceptions were as follows. The costs of Portland cement concrete pavement in Georgia and the costs of structural concrete in Nebraska increased only moderately. Utah experienced a decline in the costs of structural steel.

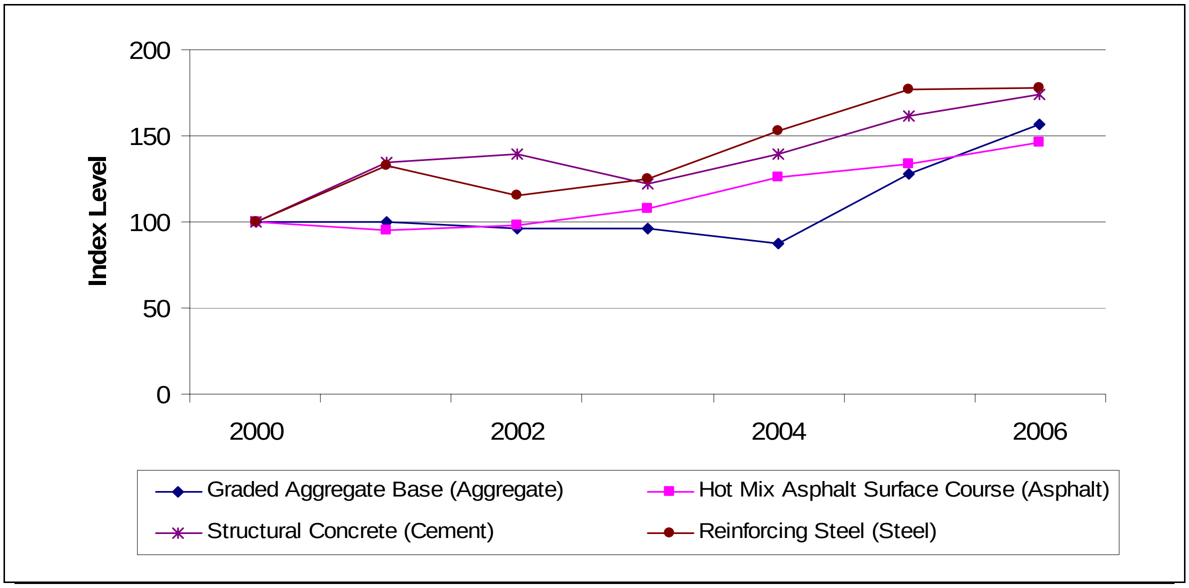
Figure 8. Commodity Input Cost Inflation in New Hampshire*



**All indices were scaled to equal 100 in 2000.*

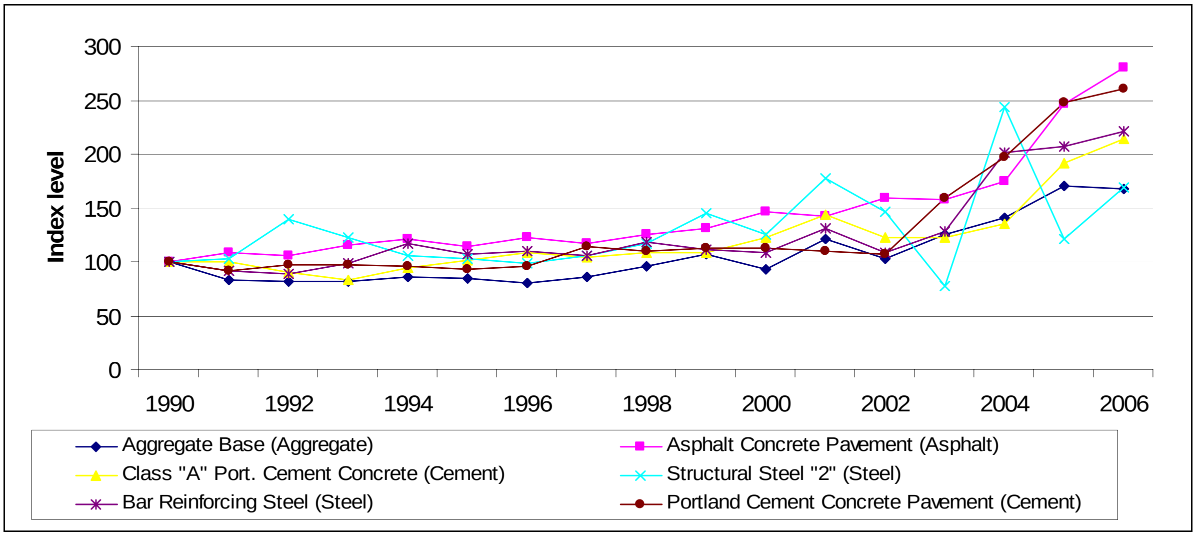
In New Hampshire, from 2003 through 2006, hot mix asphalt costs increased 46.8 percent, while costs for structural concrete increased 79.0 percent. By comparison, from 2000 through 2003 those costs increased by 12.3 percent and 4.8 percent, respectively. In South Carolina, the increases in the commodity input costs from 2003 through 2006 ranged from 36.3 percent for asphalt to 64.1 percent for aggregate base. The comparable figures for 2000 through 2003 were 7.3 percent and -4.3 percent, respectively. The range of commodity input cost increases in California from 2003 through 2006 extended from 34.6 percent for aggregate base to 118.0 percent for structural steel. While the comparable increase for aggregate base from 2000 through 2003 was about the same, the change for structural steel was -37.9 percent.

Figure 9. Commodity Input Cost Inflation in South Carolina*



All indices were scaled to equal 100 in 2000.

Figure 10. Commodity Input Cost Inflation in California*



All indices were scaled to equal 100 in 1990.

Increases in the costs of excavation and earthwork have also been dramatic since 2003 (see table 1).[8] Consequently, they have also contributed to the recent escalation in highway construction costs. However, they account for a much

[8] Some states include more activities than others when tracking the costs of excavation or earthwork. For example, some include embankment work while others do not. In addition, excavation costs vary significantly with the particular projects undertaken and environmental considerations. Therefore, these cost growth figures are not directly comparable across states.

smaller share of total cost growth than the various commodity inputs because they account for a smaller amount of total costs. For example, in South Carolina in 1999 cost increases for excavation accounted for 16 percent of the costs measured by the South Carolina CCI and installed commodity inputs accounted for the remaining 84 percent.[9] Other highway construction and maintenance costs have not exhibited growth comparable to that of commodity inputs and excavation and earthwork. However, the number of bidders on projects has declined, which may have implications for future highway project cost growth.

Table 1. Excavation Cost Growth

State	Type of Excavation	Percent Change in Cost (2003 - 2006)
New Hampshire	Roadway Excavation	56.5
South Carolina	Combined Excavation	26.1
Texas	Earthwork	47.2
Nebraska	Roadway Excavation	56.3
Colorado	Earthwork	70.6
California	Roadway Excavation	153.5
Washington	Roadway	13.1

Other Highway Construction and Maintenance Costs Have Not Shown Comparable Growth

Although commodity inputs have shown considerable growth over the last three years, other elements of highway project costs did not. We investigated the growth in wages, insurance and engineering costs, and highway construction companies' profit margins. We found that wages for workers engaged in heavy and highway construction have increased only gradually from 2003 through 2005,[10] well below the increase in the highway cost indices both at the national level and for the states in our sample (see table 2).

9 Installed commodity input costs include labor, overhead, and transportation costs and a profit margin.
10 At the time of our audit, wage data were not available for all of 2006.

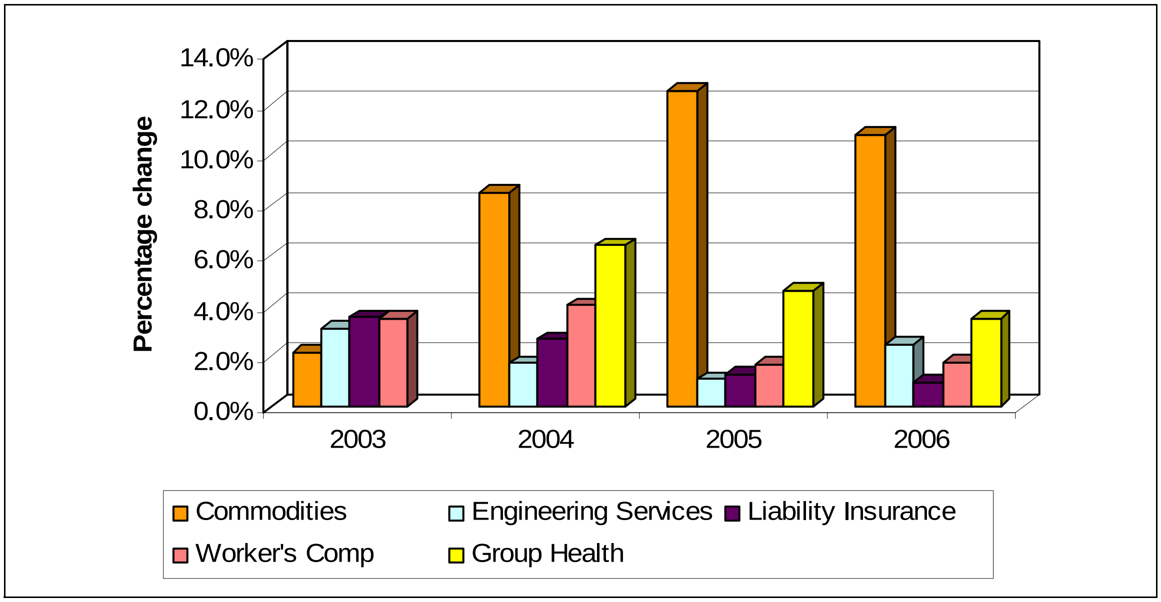
Table 2. Wages for Heavy and Highway Construction Versus Highway Cost Indices Percent Changes for 2003 through 2005

	Wages	Highway Cost Indices
National:	6.5	
FHWA-BPI		22.6
BHWY PPI		26.4
State:		
California	7.7	80.6
Colorado	3.0	65.3
Nebraska	7.2	39.0
New Hampshire	2.6	40.6
South Carolina	8.1	48.2
Texas	7.8	47.2
Washington	9.1	21.4

Insurance and engineering costs also showed limited increases. As illustrated in figure 11, the growth in commodity input costs was far greater than that of these other costs.[11]

[11] The cost increases in figure 11 were calculated using the relevant producer price indices. The BHWY PPI was used to derive the growth in commodities.

Figure 11. Comparison of Growth in Commodities and Other Major Costs



We found no evidence that highway construction firm profit margins were an underlying reason for the recent surge in overall highway project costs. Based on consultation with industry experts and our review of the available data, we determined that profits in the heavy and highway construction industry have not been unusually high in recent years. However, both provided information on a limited sample of the industry.[12]

The Number of Bidders on Highway Projects Has Declined in Recent Years

A 2006 AASHTO survey found that 34 of 45 state respondents had experienced a decrease in the number of bids received on highway projects since 2003. In the State of Washington, for example, the average number of bidders per contract declined from 4.0 in 2003 to 3.0 in 2006. Historically, fewer bidders for highway projects has been associated with an increase in costs, due to decreased competition. The absence of clear evidence of an increase in the profitability of firms engaged in highway construction since 2003 indicates that the decline in bidders has not yet contributed to the growth in highway costs. However, the decrease in the number of bidders is a development that bears further monitoring.

[12] The primary available data on heavy and highway construction industry profits for the period since 2003 was collected by the Construction Financial Management Association through a voluntary survey of its members. The construction industry analysts we interviewed could only comment on the profitability of publicly traded heavy and highway construction firms.

Structural Economic Changes Have Been the Driving Force Behind the Escalation in Commodity Input Costs

Industry analysts for each of the major commodity groupings indicated that structural economic changes have largely been responsible for the recent escalation in commodity input costs. Consequently, the costs of commodity inputs to highway projects can be expected to remain elevated, and possibly continue their rise in the near term. The effect of this is to reduce the purchasing power of each dollar of Federal highway construction and maintenance funding below its value in 2003. Therefore, if Congress and the Administration want to provide for the same amount of highway construction as was undertaken prior to 2003, significantly more funding may be required in the next highway bill. The following paragraphs summarize industry analysts' views of the structural changes affecting the markets for each of the major commodity groups used in highway projects.

Steel

Steel scrap, the primary input to the production of steel used in highway projects, is becoming harder to acquire.[13] Less steel scrap is produced per capita in the United States than in the past because less manufacturing occurs in this country, and recycled manufactured products, such as motor vehicles, contain less steel. At the same time, international demand for steel scrap is growing. As a result, prices for common scrap have more than doubled in recent years.

Further, since 2000 significant consolidation has occurred in the steel industry. Before this consolidation, the top 10 steel manufacturers held 30 percent of the world steel market, whereas they now hold 50 percent. One company created through a 2003 merger, Arcelor-Mittal, supplies 10 percent of the world steel market. Consolidation has increased the market power of the remaining firms, and their ability to maintain prices.

Asphalt

Higher gasoline prices and growing international demand for middle distillates, such as diesel fuels, has resulted in a decrease in the production and an increase in the price of asphalt. Until recently, asphalt had been produced largely as a by-product of other refinery processes, rather than as a source of profits in its own right. Now, refineries are upgrading their processes to produce larger amounts of higher grade, profitable output from each unit of crude oil input, resulting in a

[13] Most of the steel used in highway projects is produced in mini-mills. Mini-mills rely on electric arc furnaces to melt scrap steel, which is the largest component of their costs. This is in contrast to integrated steel mills, which use blast furnaces to process iron ore and coke.

decrease in the production of by-products, including asphalt. This is causing the price of asphalt to increase to justify its production by refineries instead of other profitable output.

Additionally, asphalt customers increasingly demand specialized products, such as asphalt meeting Superpave requirements.[14] The demand for specialized products makes it more difficult for asphalt customers to obtain supplies meeting their needs. Combined with the changes in refinery processes, it is becoming less likely that available by-products can adequately provide the asphalt required to meet customer demand.

Cement

The price of cement tracks the growth in oil prices, as the production of cement is a highly fuel-intensive process. Not only must the kilns used to produce the intermediate outputs be heated to extreme temperatures, but considerable power is required to grind those intermediate outputs into powder. The near-term forecast of the Energy Information Administration and major energy forecasters we interviewed is for the price of oil to remain elevated, keeping the price of cement high.

Aggregate

Aggregate deposits are becoming increasingly unavailable as a result of spreading urban and suburban development. New residents often object to aggregate operations because of truck traffic, noise, or dust. Encroachment has already prevented the development of substantial aggregate deposits.

Further, aggregate quarries are increasingly deciding not to supply Superpave projects, because they are finding that supplying those projects causes their output of other products to decline. Consequently, the number of quarries available to supply certain projects is decreasing.

The Extent and Timing of Commodity Input Cost Increases Varies Across States

States from across the country have seen the costs of commodities used in highway projects rise dramatically in recent years. However, we found that the timing and extent of the increase in the cost for any given commodity input differed significantly across states.

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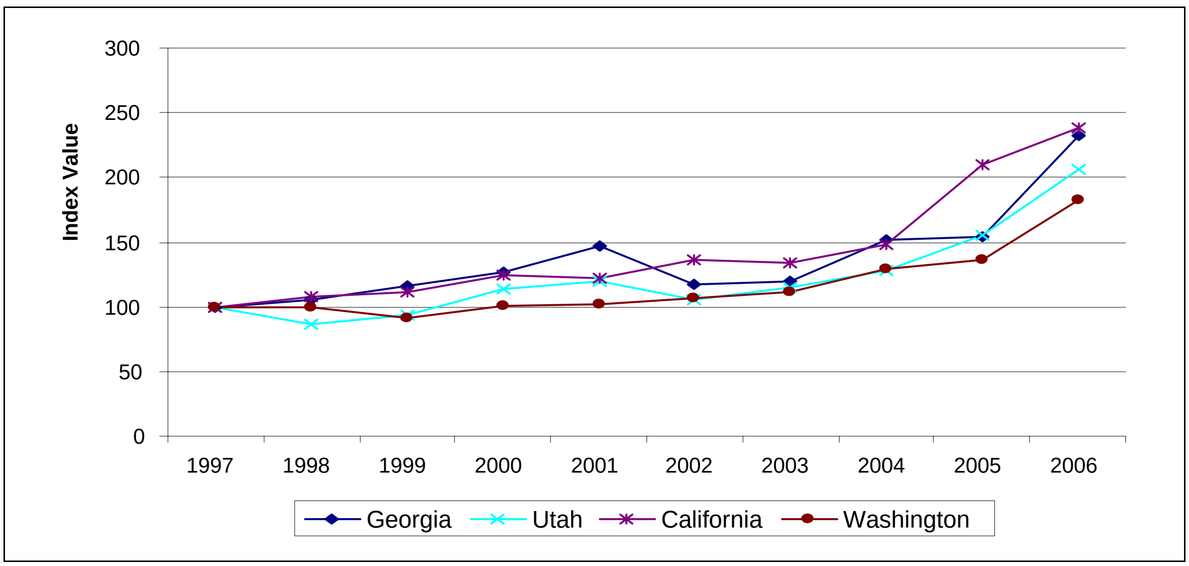
[14] Superpave, a principal product of the Strategic Highway Research Program, is a system of standard specifications, test methods, and engineering practices that enable the appropriate materials selection and mixture design of hot mix asphalt to meet the climatic and traffic conditions of specific roadway paving projects.

To investigate this issue, we identified instances where the states in our sample tracked the costs of the same commodity inputs over time.[15] We made cross-state comparisons of the cost growth of inputs in each of the major commodity groupings across subsets of our sample of states. Specifically, we performed comparisons of costs across certain states for bituminous concrete pavement, reinforcing steel, structural steel, portland cement concrete (PCC) pavement, and structural concrete. The extent and timing of the cost increases for each of the inputs examined varied by state (see figures 12 through 14).

The cost increases for the states in our comparison did not occur in step with each other nor were they of the same magnitude for any of the commodities. For example, from 2003 through 2006, Georgia experienced growth of 93.7 percent in the cost of bituminous concrete, while the comparable figure for Washington State was 64.2 percent. Also, between 2004 and 2005, the cost of bituminous concrete increased by 41 percent in California, but remained relatively flat in Georgia and Washington state.

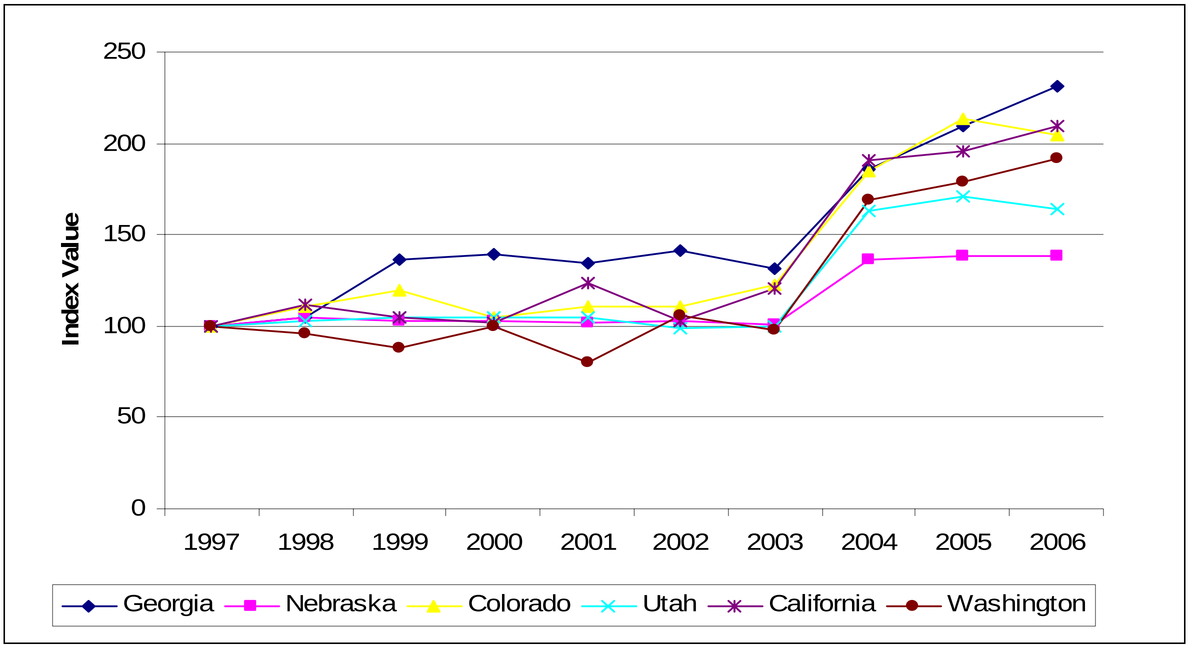
Figure 12. Bituminous Concrete Pavement Costs*



**All indices have been scaled to equal 100 in 1997.*

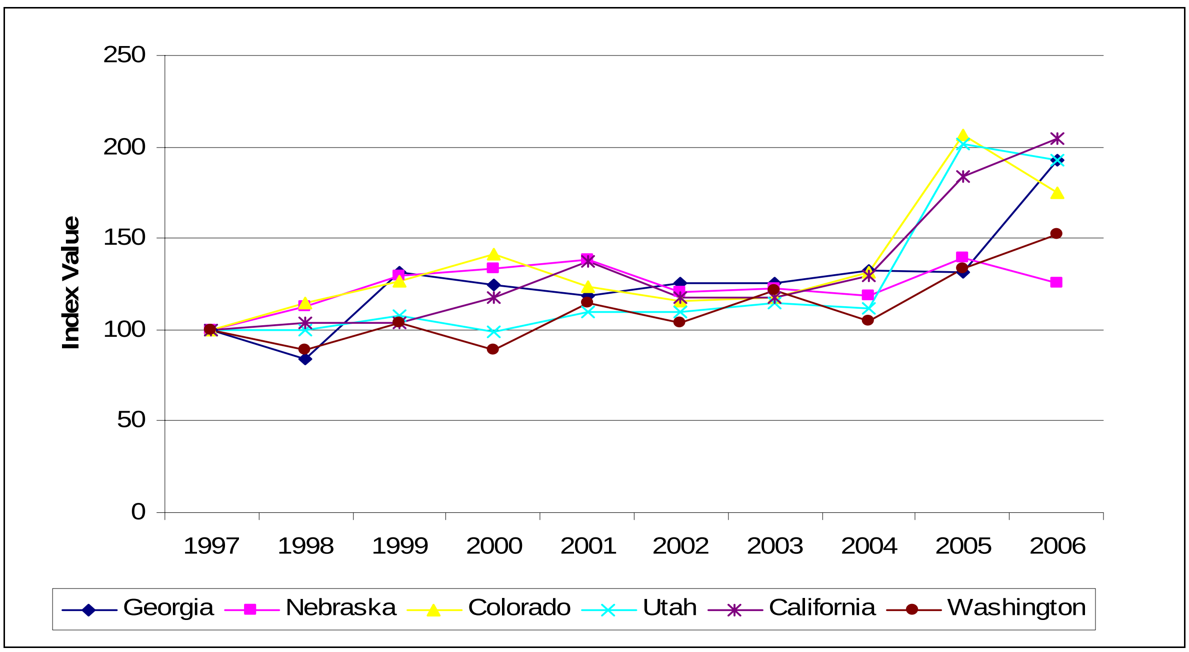
[15] This required the collection of detailed technical data on the commodity inputs included in various CCIs and consultation with our engineering group.

*Figure 13. Reinforcing Steel Costs**



**All indices have been scaled to equal 100 in 1997.*

*Figure 14. Structural Concrete Costs**



**All indices have been scaled to equal 100 in 1997.*

Findings

While some timing differences may result from differences in ongoing contracts, the industry experts we interviewed stated that these variations in costs resulted primarily from differences in transportation costs. The commodity inputs to highway projects require special handling in transportation, or are simply very heavy or cumbersome. For example, asphalt products must be heated in order to become soft enough to pour into and out of the containers in which they are transported. Consequently, transportation costs tend to comprise a substantial share of total commodity input costs.

CONCLUSION

Highway construction and maintenance costs nationwide grew dramatically from 2003 through 2006, substantially reducing the purchasing power of highway funds. Increases in the costs of the commodities used in highway projects, such as cement and steel, have largely driven this growth. Since these increases are the result of structural economic changes, the costs of these commodities can be expected to remain elevated, and possibly continue to increase in the near term. Finally, the extent of highway project cost growth has varied across states primarily due to differences in transportation costs

The challenge of rebuilding our nation's highway and bridge infrastructure is likely to be compounded by rising construction costs driven by increasing prices for construction materials. Given these cost increases, the next highway bill may need to provide a significant increase in funding to maintain, let alone exceed, the volumes of highway construction and maintenance undertaken prior to 2003.

EXHIBIT A. SCOPE AND METHODOLOGY

Scope

In September 2006, the House Committee on Transportation and Infrastructure requested that our office analyze the growth in highway construction and maintenance costs. Our objectives were to determine: (1) the extent of recent cost increases for highway construction and maintenance projects, (2) whether the cost increases are the product of transitory factors or indicative of longer term structural changes that need to be incorporated into future transportation funding plans, and (3) the degree to which the cost increases are subject to regional variations.

In conducting this performance audit, we examined both national and state data on highway construction and maintenance costs. In addition, we analyzed a range of supporting information, such as data on the number of bidders per project, industry profit margins, and wages. Further, we interviewed experts on each of the major categories of commodity inputs used in highway construction and maintenance, as well as on the highway construction industry. We performed this audit in accordance with Generally Accepted Government Auditing Standards prescribed by the Comptroller General of the United States with the exception of the data quality standards. We did not systematically audit or validate the data used for this report. However we conducted checks of the data to assess reasonableness and comprehensiveness and concluded that the data, despite shortcomings, was sufficient to support our findings.

The methodology section below describes the steps we took to answer the objectives of this audit. In the data reliability section, we describe the quality of the data collected for this report and its limitations.

Methodology

Gauging Highway Construction and Maintenance Cost Increases

We examined both national and state measures of highway costs to determine the extent of recent increases. For national highway construction and maintenance costs, we examined all available indices—the FHWA BPI, the BHWY PPI, and the Engineering News Record's Construction Cost Index (ENR CCI). We later excluded the ENR CCI from our analysis because we determined it was a poor measure of highway construction costs.[16]

We conducted a survey, with the help of AASHTO, to determine which states maintained construction cost indices.[17] From the states that replied to the survey, we selected a judgmental sample, including one state from each FHWA region.[18] Exhibit B lists the survey respondents and states in our sample.

Effects of Cost Increases on Highway Construction Expenditures

We used data from the United States Census Bureau and FHWA to estimate total Federal, state, and local expenditures between 1995 and 2005. We measured the effects of the increase of highway construction costs on expenditures by comparing nominal expenditures to real expenditures calculated using both the FHWA BPI and the BHWY PPI to measure inflation.

Drivers of Highway Construction Costs

We identified the drivers of highway construction costs by first examining the components included in the indices mentioned above. The national FHWA BPI and the state indices are based on bid data and track the installed price of the commodity inputs. This not only includes the costs of raw materials, but also the costs of labor, transportation, overhead, and a margin for profit. We identified additional elements of highway construction costs by consulting experts from the Federal Highway Administration, the American Road and Transportation Builders Association (ARTBA), the Associated General Contractors of America, and state departments of transportation. We investigated the growth in raw material prices, wages, insurance and engineering costs, and highway construction companies' profit margins. We compared the non-commodity inputs' price fluctuations to the BHWY PPI, which tracks the price level of highway construction commodity inputs from the producer's perspective and does not include any costs related to the installation of raw materials. The specific measures used for each component of highway construction we investigated can be found below.

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[16] The ENR CCI was created to monitor the costs of general construction in the economy by tracking the price of a fixed set of inputs chosen in 1921. The CCI weights labor at 81 percent and includes lumber, which is not a major input to highway construction.

[17] FHWA also maintains individual state bid price indices (BPIs) to monitor regional price variations in highway construction costs. However, given the data quality weaknesses discussed in the data reliability section below, we were not confident of the BPIs accuracy at the state-level and instead relied on construction cost indices maintained by states.

[18] In regions 3 and 5, none of the respondents to our survey that were provided in time to be included in our analysis maintained a construction cost index. Therefore, region 3, the mid-Atlantic region, and region 5, the eastern upper Midwest region, were not represented in our sample. We selected two states in two other regions to compare intraregional commodity input price movements.

We collected national and state wage data for highway and street construction workers from the Bureau of Labor Statistics. To measure profits of the highway construction industry we collected gross and net profit margins, return-on-equity, and return-on-assets data from the Certified Financial Managers Association and the Internal Revenue Service. We supplemented the profit data with interviews with financial analysts that cover publicly traded heavy and highway construction and engineering firms. In addition to comparing the national wage data and profit data to the BHWY PPI, we compared state wage data to the composite state construction cost indices.

We also gathered data on the other components tracked implicitly by the FHWA BPI and state CCIs. These components were equipment and elements of overhead; that is, group health insurance, worker's compensation insurance, and liability insurance. We used producer price indices for each of these items as proxies to measure price fluctuations.[19]

Following our analysis of inputs tracked by the indices in our review, we needed to determine whether other costs of highway construction not tracked by the indices may have contributed to the recent cost increases. We attempted to conduct a trend analysis of the percentage of highway construction costs not accounted for by state CCIs. However, we did not have data from a sufficient sample of states to draw a conclusion and the data we did have did not show any discernable pattern. Based on the information obtained from our interviews of experts discussed above, we identified two main cost items for highway construction not tracked by the indices, engineering and right-of-way acquisition costs. We used the PPI for non-building related engineering services to measure engineering price fluctuations. We compared the price levels of the engineering PPI to commodity price levels using the BHWY PPI. Data on right-of-way costs were not readily available. Consequently, we were not able to estimate the extent to which right-of-way costs contributed to the increase in highway construction costs.

Structural Versus Transitory Change

Once we identified commodity cost growth as the main driver of highway project costs over the past few years, we set out to determine whether the price increases for highway commodity inputs were a result of transitory factors or indicative of structural change. Since the rapid acceleration of prices for highway commodity inputs had only begun in 2003, there was insufficient data to support a statistical analysis. Instead, we selected and interviewed a group of experts for each major

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[19] The producer price indices used as proxies for the other non-commodity components of highway construction were not specific to the highway construction industry. Where possible, we used PPIs for industry that may be similar to highway construction such as general construction.

grouping of commodity inputs to highway construction. These groupings were: cement, steel, aggregate, and asphalt. We also interviewed petroleum industry experts, as the price of petroleum heavily affects the costs of the commodity inputs. We selected at least three groups of experts for each commodity grouping based on recommendations from government sources or industry associations and our own research. For instance, for petroleum we interviewed analysts at the Energy Information Administration of the U.S. Department of Energy, who then recommended a diverse group of experts from reputable research firms and a forecasting firm. Exhibit C provides a complete list of interviewees.

Highway Construction Cost Variation Across States

We found that the make-up of composite state CCIs varied too substantially to allow for meaningful cross-state comparisons. We also found, however, that some individual commodity components of state indices (for example, asphalt, structural steel, etc.) were comparable across some states. We determined this by collecting detailed technical information from states on the specific items tracked for each component and having our in-house engineer examine their comparability. This was necessary because the specific items tracked under any given commodity label, such as structural steel, varied. We compared the cost growth for components that were determined to be comparable to examine the extent of price variation across states for highway input commodities.

Data Reliability

This section discusses the data series we used for this report, as well as the limitations of some major data series we decided not to use. We did not systematically audit or validate the data used for this report. However, we conducted checks of the data to assess reasonableness and comprehensiveness. Moreover, we did not rely on any one series to draw our conclusions; instead, we looked for patterns across the various data series and supplemented those with information gathered through interviews with various industry experts. We concluded that any shortcomings with the data did not materially affect the type of analyses we conducted or our ability to draw conclusions based on the data.

Federal Highway Administration

Bid Price Index

Data for the FHWA indices on highway construction costs came from state reports of statistics on all Federal-aid primary, urban, and interstate highway projects. Respondents were required to report the quantities and the costs for six highway construction items—common roadway excavation, Portland cement concrete pavement, bituminous concrete pavement, reinforcing steel, structural steel, and structural concrete. Based on this data, FHWA calculated national and state level Bid Price Indices (BPI) and indices for each of the highway construction items. It published these indices in the quarterly publication *Price Trends for Federal-Aid Highway Construction*.

The quality of the data underlying these indices was criticized in a 2003 Government Accountability Office (GAO) report.[20] GAO found that FHWA had no systematic error-checking of reported data, data were substantially underreported by some states, and FHWA reported some data in a year subsequent to that which it applied. GAO also noted that FHWA had not disclosed the limitations of the data of which it was aware. FHWA had not made any changes to the FHWA BPI or its data collection methodology to address the recommendations outlined in the 2003 GAO report before discontinuing it on May 22, 2007.

Bidders Data

Data on the number of bidders on Federal-aid highway construction contracts of more than one million dollars used to be required to be reported to FHWA within two weeks of the awarding of each highway contract. That requirement was recently discontinued by FHWA. Our analysis of this bidders data indicated that there may be a degree of underreporting. Consequently, we did not rely on FHWA bid tab data in our analyses.

Expenditure Data

Federal Expenditures

The figures we used for Federal expenditures on highway construction were obtained from FHWA's Highway Statistics series. FHWA collects data on direct expenditures by Federal agencies for highway construction. The bulk of these Federal direct expenditures are expended by FHWA.

State and Local Expenditures

FHWA collects data from states and local governments on highway construction expenditures; however, we did not use this data because we do not consider it to be as reliable as similar information provided by the Census Bureau. FHWA relies on state transportation departments to abide by FHWA guidelines for reporting highway-related expenditures and does not formally test whether states are complying with those guidelines. In some instances, state transportation departments are required to sample local governments to estimate highway expenditures. The sampling methodology varies from state to state and FHWA

[20] *Comparison of States' Highway Construction Costs,* U.S. Government Accountability Office, GAO-04-113R, Washington, DC, November 3, 2003.

does not review these sampling procedures. FHWA depends on its staff to recognize errors and anomalies and to follow-up with state transportation departments to investigate the errors.

Bureau of Labor Statistics

Producer Price Indices (PPIs)

The Bureau of Labor Statistics (BLS) constructs producer price indices to track the change over time in the prices quoted by producers of goods and services in the United States. The data for these indices are collected through voluntary surveys submitted by thousands of reporters in establishments across the United States. The data is obtained by sampling virtually every industry in the mining and manufacturing sectors of the U.S. economy. The indices published by the BLS are a popular and widely trusted source of price data.

The PPIs used in our analysis were the PPI for the highway and street construction sector and individual PPIs for commodities used in highway and street construction, and for engineering and various types of insurance. We selected the individual producer price indices based on research by ARTBA and the American General Contractors Association and interviews with other experts.

Wage Data

We used data from the BLS Quarterly Census of Employment and Wages (QCEW) to determine wages for highway and street construction workers at both national and state levels. The QCEW is a cooperative program between BLS and state employment agencies to assemble employment and wage information for all workers covered by state and Federal unemployment laws.[21] Because of the ubiquitous nature of the unemployment insurance laws, the QCEW program serves as a near census of monthly employment and quarterly wages and is considered to be a reliable source for wage data.

State Data

State Construction Cost Indices (CCIs)

Generally, the states in our sample did not have a formal process to review the data on which their CCIs were based. Personnel responsible for maintaining state CCIs collect data directly from the database that houses bid data. These databases

[21] In 1994, the most recent year data were available, over 96 percent of the total wage and salary civilian workforce was covered under either state or Federal unemployment insurance. Workers not covered by unemployment compensation laws consist mostly of agricultural workers, self-employed farmers, some domestic workers, and unpaid family workers.

generally have mechanisms to filter out erroneous data, such as negative dollar figures or quantities, that exceed a predetermined range. In all states, personnel review the index data with each update and flag any anomalous data. In addition, some states publish construction cost index data publicly, which may increase the level of scrutiny of data quality.

State Bidders Data

Not all of the states in our sample had sufficient historical data on the number of bidders on highway projects readily available. Instead, we were able to collect bidders data from Iowa, Nebraska, New Hampshire, North Carolina, South Dakota, Texas, Utah, Virginia, Washington, and Wisconsin.

The Census Bureau

Expenditure Data

We used data from the United States Census Bureau for estimates of highway construction expenditures by state and local governments. The Census Bureau obtains the data through annual surveys of state and local government entities, where local government entities include counties, municipalities, townships, special districts, and school districts. The data for states represent actual annual expenditures of all 50 state governments. For non-school local governments, a sample survey of 13,000 non-school governments is conducted annually except for census years when data from all 87,000 local governments are obtained. The Census Bureau collects annual financial reports electronically from states. Further, Census Bureau staff code the expenditure items according to Census Bureau rules and guidance.

Other Data Sources

Highway Construction Industry Profit

We collected data from three sources on the profitability of the highway construction industry. The first source was the Construction Financial Management Association (CFMA), which is a nonprofit organization geared towards accountants and other financial professionals working in the construction industry. The CFMA conducts an annual "Construction Industry Financial Survey" that provides comprehensive financial data for construction companies, including highway construction firms. In these survey reports, CFMA provides breakdowns of financial data by construction sector and region. We collected its national and regional data for the heavy and highway construction sector.[22]

CFMA's 2006 Annual Financial Survey states that the survey is not intended to be statistically representative and only about 60 to 70 percent of survey respondents overlap from year to year. Despite these limitations, CFMA survey data are the only source of data that we are aware of that provide detailed financial information for the highway construction sector for recent years.

The second set of data we collected on the profitability of the highway construction industry was compiled from tax filings by the heavy construction industry, which we obtained from the Internal Revenue Service's website. At the time of our analysis, the most recent data available covered 2003. This limited the data's usefulness for the purposes of our analysis.

The third source of profitability data that we collected was ARTBA, which assembles a measure of industry profitability based on a voluntary survey of its members. However, the survey only asks respondents if their profits have increased, stayed the same, or decreased relative to the previous quarter. The measure ARTBA publishes indicates whether more respondents experienced an increase than a decrease in their profits, or vice versa, when compared with the previous quarter. We found it difficult to draw any implications from this series.

[22] The heavy and highway construction sector includes companies not directly involved in the construction of highways. Since only the overall number of survey respondents for the heavy and highway construction is reported, the number of highway construction companies that complete CFMA's survey is unknown. As a result, the financial data may be skewed by data from other heavy construction firms.

EXHIBIT B. STATES CONTACTED AND DATA OBTAINED

FHWA Region	State	Contacted by OIG	Has an Overall CCI	Has Component Price Data	Length of Data Series
1	Connecticut	No			
	Maine	No			
	Massachusetts	Yes	No		
	New Hampshire*	Yes	Yes	Yes	2000 – 2007
	New Jersey	No			
	New York	Yes	No		
	Rhode Island	No			
	Vermont	Yes	No		
	Puerto Rico	No			
3	Delaware	No			
	District of Columbia	No			
	Maryland	Yes	No		
	Pennsylvania	Yes	No		
	Virginia	Yes	No		
	West Virginia	No			
4	Alabama	No			
	Florida	Yes	No		
	Georgia*	Yes	No	Yes	1996 – 2006
	Kentucky	No			
	Mississippi	Yes	Yes	Yes	1988 – 2006
	North Carolina	Yes	Yes	Yes	1995 – 2006
	South Carolina*	Yes	Yes	Yes	1999 – 2006
	Tennessee	No			
5	Illinois	Yes	Yes	Yes	N/A
	Indiana	No			
	Michigan	No			
	Minnesota	No			
	Ohio	Yes	Yes	Yes	2005 – 2006
	Wisconsin	Yes	Yes	Yes	1982 – 2006
6	Arkansas	No			
	Louisiana	No			
	New Mexico	No			
	Oklahoma	No			
	Texas*	Yes	Yes	Yes	1999 – 2006
7	Iowa	Yes	Yes	Yes	1986 – 2006
	Kansas	No			
	Missouri	No			
	Nebraska*	Yes	Yes	Yes	1998 – 2006
8	Colorado*	Yes	Yes	Yes	1987 – 2006
	Montana	No			
	North Dakota	No			
	South Dakota	Yes	Yes	Yes	1987 – 2006
	Utah*	Yes	Yes	Yes	1990 – 2006
	Wyoming	No			

FHWA Region	State	Contacted by OIG	Overall CCI	Component Price Data	Length of Data Series
9	Arizona	No			
	California*	Yes	Yes	Yes	1987 – 2006
	Hawaii	No			
	Nevada	No			
10	Alaska	No			
	Idaho	No			
	Oregon	Yes	Yes	Yes	1987 - 2006
	Washington*	Yes	Yes	Yes	1990 - 2006

*States in our sample.

Exhibit B. States Contacted and Data Obtained

EXHIBIT C. AGENCIES VISITED OR CONTACTED

Federal Government

Department of Transportation	
Federal Highway Administration	
Office of Asset Management	Washington, DC
Office of Chief Financial Officer	Washington, DC
Office of Policy Information	Washington, DC
Office of Transportation Policy Studies	Washington, DC
Office of Program Administration	Washington, DC
Department of Labor	
Bureau of Labor Statistics	Washington, DC
Department of Commerce	
Census Bureau	
Governments Division	Suitland, MD
Manufacturing Construction Division	Suitland, MD
Department of Energy	
Energy Information Administration	Washington, DC
Department of the Interior	
Geological Survey	Reston, VA

State Departments of Transportation

California
Colorado
Florida
Georgia
Illinois
Iowa
Maryland
Massachusetts
Mississippi
New York
Nebraska
North Carolina
South Carolina
South Dakota
Ohio
Oregon
Pennsylvania
Texas
Utah
Vermont
Virginia
Washington
Wisconsin

Industry Associations

American Road and Transportation Builders Association, Washington, DC
Association of State and Highway Transportation Officials, Washington, DC
Associated General Contractors of America, Rosslyn, VA
Construction Financial Management Association, Princeton, NJ
National Stone, Sand and Gravel Association, Alexandria, VA
Portland Cement Association, Skokie, IL
Steel Manufacturers Association, Washington, DC
The Asphalt Institute, Lexington, KY

Research Firms and Other Organizations (Grouped by Subject)

Aggregate
Vulcan Materials Company, Birmingham, AL

Asphalt
Argus Media Group, Houston, TX
Poten & Partners, New York, NY

Construction Industry
Credit Suisse, New York, NY
Goldman Sachs, New York, NY
Morgan Joseph, New York, NY

Energy
Deutsche Bank, Washington, DC
Global Insight, Washington, DC

Steel
Bradford Research, New York, NY
Metal Strategies, West Chester, PA

EXHIBIT D. MAJOR CONTRIBUTORS TO THIS REPORT

THE FOLLOWING INDIVIDUALS CONTRIBUTED TO THIS REPORT.

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The following pages contain textual versions of the graphs and charts found in this document. These pages were not in the original document but have been added here to accommodate assistive technology.

Figure 1. National Highway Construction and Maintenance Cost Indices

	FHWA BPI	BHWY PPI
1990	108.5	110.7
1991	107.5	110.6
1992	105.1	110.0
1993	108.3	111.7
1994	115.1	114.3
1995	121.9	118.4
1996	120.2	122.1
1997	130.6	124.6
1998	126.9	123.5
1999	136.5	126.6
2000	145.6	136.5
2001	144.8	137.0
2002	147.9	133.7
2003	149.8	136.6
2004	154.4	148.2
2005	183.6	166.8
2006	221.3	184.8

Figure 2. Growth in Commodity Input Costs for Highway Construction in Washington State

	Crushed Surfacing (Aggregate)	Structural Concrete (Cement)	Hot Mix Asphalt (Asphalt)	Steel Reinforcing Bar (Steel)
1990	100.0	100.0	100.0	100.0
1991	112.1	139.4	87.2	100.0
1992	113.3	100.2	80.7	97.8
1993	89.2	114.7	83.0	93.3
1994	90.6	107.5	84.8	91.1
1995	108.2	123.1	86.2	97.8
1996	112.4	131.8	85.5	108.9
1997	120.0	135.3	95.5	113.3
1998	126.8	119.8	94.8	108.9
1999	130.7	139.9	87.0	100.0
2000	134.8	120.9	96.6	113.3
2001	129.1	155.2	97.5	91.1
2002	121.8	141.0	102.1	120.0
2003	119.6	164.5	106.0	111.1
2004	150.6	141.7	123.7	191.1
2005	149.4	181.1	129.9	202.2
2006	145.6	205.6	174.0	217.8

Figure 3. State Construction Cost Indices

	California	Colorado	Nebraska	Washington
1997	100.0	100.0	100.0	100.0
1998	103.0	113.3	121.3	83.5
1999	111.5	114.0	128.2	86.3
2000	117.2	122.3	120.9	92.1
2001	123.5	112.3	119.9	92.8
2002	113.9	107.5	127.3	100.0
2003	119.1	110.6	123.1	104.3
2004	173.2	120.3	139.3	123.0
2005	214.9	182.8	152.3	126.6
2006	224.8	183.0	167.7	164.0

Figure 4. State Construction Cost Indices

	New Hampshire	South Carolina	Texas
2000	100.0	100.0	100.0
2001	143.4	94.6	109.4
2002	128.3	95.6	104.3
2003	117.0	103.5	113.9
2004	154.2	116.2	122.4
2005	164.5	133.7	140.4
2006	176.4	149.0	180.9

Figure 5. Percent Changes in Measures of General Inflation and Highway Costs Between 2003 and 2006

	2003 - 2006
National Measures of General Inflation	
CPI-U	9.6%
PPI – All Commodities	19.3%
National Measures of Highway Construction Costs	
FHWA BPI	47.7%
BHWY PPI	35.3%
State Measures of Highway Construction Costs	
New Hampshire	50.8%
South Carolina	44.0%
Texas	72.4%
Nebraska	36.2%
Colorado	65.5%
California	88.8%
Washington	57.2%

Figure 6. Federal, State, and Local Government Highway Construction Expenditures ($ millions)

	Nominal	Deflated using the FHWA BPI	Deflated using the BHWY PPI
1995	$ 37,465	$ 37,465	$ 37,465
1996	$ 38,427	$ 38,970	$ 37,262
1997	$ 40,351	$ 37,663	$ 38,343
1998	$ 42,789	$ 41,103	$ 41,022
1999	$ 46,231	$ 41,286	$ 43,236
2000	$ 50,619	$ 42,379	$ 43,907
2001	$ 54,177	$ 45,609	$ 46,822
2002	$ 59,579	$ 49,105	$ 52,761
2003	$ 58,603	$ 47,689	$ 50,795
2004	$ 59,548	$ 47,014	$ 47,574
2005	$ 61,969	$ 41,144	$ 43,987

Figure 7. Commodity Input Cost Inflation Nationally

	Construction sand, gravel, & crushed stone	Ready-mixed concrete	Hot rolled bars, plates, & structural shape	Paving mixtures and blocks
1990	125.4	111.9	105.1	101.2
1991	128.6	114.7	101.5	103.2
1992	130.6	115.3	98.6	100.2
1993	134.0	118.8	101.9	102.0
1994	137.9	123.8	108.1	103.2
1995	142.3	129.0	114.4	105.8
1996	145.6	133.1	112.5	107.6
1997	148.2	135.6	112.1	113.2
1998	152.8	139.7	111.8	112.5
1999	157.2	143.2	99.1	112.9
2000	163.1	147.1	100.5	130.4
2001	168.8	150.3	95.1	134.6
2002	173.0	150.2	95.1	136.2
2003	177.1	150.8	99.3	142.6
2004	183.3	158.7	143.8	144.9
2005	195.8	177.7	159.8	156.9
2006	213.9	198.6	170.7	200.5

Figure 8. Commodity Input Cost Inflation in New Hampshire

	Crushed Material (Aggregate)	Structural Steel (Steel)	Rebar (Steel)	Hot Mix Asphalt (Asphalt)	Structural Concrete (Cement)
2000	100.0	100.0	100.0	100.0	100.0
2001	140.7	247.9	173.3	100.5	150.1
2002	146.6	79.5	101.4	103.2	147.2
2003	133.6	80.8	104.6	112.3	104.8
2004	157.9	183.3	177.2	118.7	161.1
2005	184.1	131.4	151.6	128.0	131.4
2006	203.8	94.7	160.8	164.8	187.6

Figure 9. Commodity Input Cost Inflation in South Carolina

	Graded Aggregate Base (Aggregate)	Structural Concrete (Cement)	Hot Mix Asphalt Surface Course (Asphalt)	Reinforcing Steel (Steel)
2000	100.0	100.0	100.0	100.0
2001	99.7	134.2	95.6	133.1
2002	96.0	139.1	98.1	115.0
2003	95.7	122.3	107.3	124.8
2004	87.6	139.1	126.4	153.2
2005	128.3	161.4	133.6	177.0
2006	157.1	174.4	146.3	177.8

Figure 10 - Commodity Input Cost Inflation in California

	Aggregate Base (Aggregate)	Class "A" Portland Cement Concrete (Cement)	Bar Reinforcing Steel (Steel)	Asphalt Concrete Pavement (Asphalt)	Structural Steel "2" (Steel)	Portland Cement Concrete Pavement (Cement)
1990	100.0	100.0	100.0	100.0	100.0	100.0
1991	83.6	100.0	91.9	108.6	103.4	90.9
1992	81.0	89.9	89.3	105.5	139.1	96.9
1993	82.1	82.6	98.9	115.1	122.5	96.9
1994	86.2	94.1	116.6	120.7	105.7	96.4
1995	84.5	101.2	106.4	114.7	102.6	92.6
1996	80.8	109.0	109.2	122.4	98.3	95.6
1997	85.4	104.5	105.8	117.2	105.8	113.9
1998	95.9	108.4	117.9	126.0	117.5	110.1
1999	106.7	108.8	111.1	130.5	145.5	113.1
2000	92.4	123.2	108.1	146.6	124.7	113.4
2001	121.0	144.0	130.5	142.6	176.8	109.9

Figure 10 - Commodity Input Cost Inflation in California (cont'd)

2002	103.1	123.1	108.3	159.2	147.0	107.6
2003	124.9	122.9	127.9	157.1	77.4	159.5
2004	140.8	135.4	201.9	174.0	244.0	197.2
2005	171.0	192.2	206.4	246.1	120.7	248.4
2006	168.1	213.4	221.5	279.6	169.0	260.7

Table 2 – Wages for Heavy and Highway Construction Versus Highway Cost Indices Percent Changes from 2003 through 2005

	Wages	Highway Cost Indices
National:	6.5	N/A
FHWA-BPI	N/A	22.6
BHWY PPI	N/A	26.4
State:	N/A	N/A
California	7.7	80.6
Colorado	3.0	65.3
Nebraska	7.2	39.0
New Hampshire	2.6	40.6
South Carolina	8.1	48.2
Texas	7.8	47.2
Washington	9.1	21.4

Figure 11 - Comparison of Growth in Commodities and Other Major Costs

	Commodities	Engineering	Liability Insurance	Worker's Comp	Group Health
2003	2.17%	3.09%	3.54%	3.49%	N/A
2004	8.49%	1.74%	2.68%	4.03%	6.40%
2005	12.55%	1.09%	1.26%	1.71%	4.62%
2006	10.79%	2.45%	0.98%	1.77%	3.50%

Growth in Highway Construction and Maintenance Costs
508 Compliant Presentation

Figure 12 - Bituminous Concrete Pavement Costs

	Georgia	Utah	California	Washington
1997	100.0	100.0	100.0	100.0
1998	105.3	86.5	107.5	99.2
1999	116.0	94.0	111.3	91.0
2000	127.4	113.3	125.1	101.1
2001	146.6	120.2	121.7	102.1
2002	117.7	105.2	135.8	106.9
2003	120.1	115.2	134.0	110.9
2004	152.2	128.5	148.5	129.5
2005	154.0	155.5	209.9	136.0
2006	232.6	206.0	238.5	182.2

Figure 13 - Reinforcing Steel Costs

	Georgia	Nebraska	Colorado	Utah	California	Washington
1997	100.0	100.0	100.0	100.0	100.0	100.0
1998	104.9	104.4	111.1	103.2	111.5	96.1
1999	136.6	102.7	120.0	104.8	105.0	88.2
2000	139.0	102.5	104.4	104.8	102.2	100.0
2001	134.1	101.5	111.1	104.8	123.4	80.4
2002	141.5	102.9	111.1	98.4	102.4	105.9
2003	131.7	101.2	122.2	100.0	121.0	98.0
2004	185.4	136.7	184.4	162.9	190.9	168.6
2005	209.8	138.4	213.3	171.0	195.2	178.4
2006	231.7	138.2	204.4	164.5	209.5	192.2

Figure 14 - Structural Concrete Costs

	Georgia	Nebraska	Colorado	Utah	California	Washington
1997	100.0	100.0	100.0	100.0	100.0	100.0
1998	83.7	112.4	114.9	99.7	103.7	88.5
1999	131.5	129.9	126.1	107.3	104.1	103.4
2000	124.9	133.7	140.8	98.5	117.8	89.4
2001	118.3	138.6	123.1	110.0	137.8	114.7
2002	125.3	120.5	115.9	109.5	117.8	104.2
2003	125.8	122.7	117.5	114.4	117.6	121.6
2004	132.2	118.3	131.3	112.0	129.5	104.7
2005	131.0	139.0	206.6	201.2	183.9	133.8
2006	192.6	125.5	174.7	192.2	204.2	151.9

Exhibit B. States Contacted and Data Obtained

FHWA Region	State	Contacted by OIG	Has an Overall CCI	Has Component Price Data	Length of Data Series
1	Connecticut	No	N/A	N/A	N/A
	Maine	No	N/A	N/A	N/A
	Massachusetts	Yes	No	N/A	N/A
	New Hampshire*	Yes	Yes	Yes	2000 – 2007
	New Jersey	No	N/A	N/A	N/A
	New York	Yes	No	N/A	N/A
	Rhode Island	No	N/A	N/A	N/A
	Vermont	Yes	No	N/A	N/A
	Puerto Rico	No	N/A	N/A	N/A
3	Delaware	No	N/A	N/A	N/A
	District of Columbia	No	N/A	N/A	N/A
	Maryland	Yes	No	N/A	N/A
	Pennsylvania	Yes	No	N/A	N/A
	Virginia	Yes	No	N/A	N/A
	West Virginia	No	N/A	N/A	N/A
4	Alabama	No	N/A	N/A	N/A
	Florida	Yes	No	N/A	N/A
	Georgia*	Yes	No	Yes	1996 – 2006
	Kentucky	No	N/A	N/A	N/A
	Mississippi	Yes	Yes	Yes	1988 – 2006
	North Carolina	Yes	Yes	Yes	1995 – 2006
	South Carolina*	Yes	Yes	Yes	1999 – 2006
	Tennessee	No	N/A	N/A	N/A
5	Illinois	Yes	Yes	Yes	N/A
	Indiana	No	N/A	N/A	N/A
	Michigan	No	N/A	N/A	N/A
	Minnesota	No	N/A	N/A	N/A
	Ohio	Yes	Yes	Yes	2005 – 2006
	Wisconsin	Yes	Yes	Yes	1982 – 2006
6	Arkansas	No	N/A	N/A	N/A
	Louisiana	No	N/A	N/A	N/A
	New Mexico	No	N/A	N/A	N/A
	Oklahoma	No	N/A	N/A	N/A
	Texas*	Yes	Yes	Yes	1999 – 2006
7	Iowa	Yes	Yes	Yes	1986 – 2006
	Kansas	No	N/A	N/A	N/A
	Missouri	No	N/A	N/A	N/A
	Nebraska*	Yes	Yes	Yes	1998 – 2006
8	Colorado*	Yes	Yes	Yes	1987 – 2006
	Montana	No	N/A	N/A	N/A
	North Dakota	No	N/A	N/A	N/A
	South Dakota	Yes	Yes	Yes	1987 – 2006
	Utah*	Yes	Yes	Yes	1990 – 2006
	Wyoming	No	N/A	N/A	N/A

Exhibit B. States Contacted and Data Obtained (cont'd)

FHWA Region	State	Contacted by OIG	Overall CCI	Component Price Data	Length of Data Series
9	Arizona	No	N/A	N/A	N/A
	California*	Yes	Yes	Yes	1987 – 2006
	Hawaii	No	N/A	N/A	N/A
	Nevada	No	N/A	N/A	N/A
10	Alaska	No	N/A	N/A	N/A
	Idaho	No	N/A	N/A	N/A
	Oregon	Yes	Yes	Yes	1987 - 2006
	Washington*	Yes	Yes	Yes	1990 - 2006

*States in our sample.