

AUDIT OF THE SPRINGFIELD INTERCHANGE PROJECT

Federal Highway Administration

*Report Number: IN-2003-003
Date Issued: November 22, 2002*



Memorandum

**U.S. Department of
Transportation**

Office of the Secretary
of Transportation
Office of Inspector General

Subject: **ACTION:** Report on Audit of the Springfield
Interchange Project
IN-2003-003

Date: November 22, 2002

From: Alexis M. Stefani 
Principal Assistant Inspector General
for Auditing and Evaluation

Reply to
Attn. of: JA-30

To: Federal Highway Administrator

This report presents the results of our audit of the Virginia Department of Transportation's (VDOT) Springfield Interchange project (Springfield project). The Springfield project, when completed, will improve traffic flow at the junction of Interstates (I)-95, 395, and 495 in Fairfax County, Virginia, which is one of the busiest and most congested interchanges in the country. As originally planned, the project would be constructed in eight phases and involve building or reconfiguring two major junctions along the I-95 corridor.

We reviewed the Federal Highway Administration's (FHWA) oversight of the Springfield project. Our objectives were to determine (1) factors contributing to increased cost estimates and the reasonableness of the current cost estimate, (2) reasonableness of the current schedule, and (3) adequacy of project funding. In addition, we evaluated how deficiencies in VDOT's project cost estimating process affected Virginia's ability to implement its 3-year Statewide Transportation Improvement Program (3-year Transportation Plan).¹ Exhibit A describes our objectives, scope, and methodology.

This audit was done as part of a series of major project reviews. Congressman James P. Moran also requested a review. During the course of the audit, and as recently as August and September 2002, we shared the results of our work with FHWA and VDOT officials who have taken a number of actions to address the issues we raised. We also adjusted our audit plan on several occasions so that we

¹ States are required to prepare and submit for FHWA approval a 3-year Statewide Transportation Improvement Program (STIP). The STIP provides a list of projects that will be undertaken in the next 3 years. The STIP must be financially constrained, i.e., the State must show that it has enough money to complete those projects. In this report we refer to the STIP as the "3-year Transportation Plan."

could respond to an unusually dynamic environment of rapidly changing costs and newly emerging funding concerns and schedule delays. For example, in January 2002, Virginia's Governor acknowledged that Virginia's 3-year Transportation Plan had "unrealistic assumptions, overly optimistic revenue estimates and greatly understated costs" and directed that VDOT's Interim Transportation Commission develop "a realistic and achievable transportation program." This resulted in VDOT making significant revisions to its program, including its cost-estimates and revenue assumptions for the Springfield project. At the same time, the State projected major reductions in revenues due to the events of September 11, 2001 and subsequent economic downturn. Finally, construction problems, occurring in late 2001, threatened to delay project completion and add significant additional costs. As a result of these events and other changes, we extended our audit so that our review would include consideration of these events.

RESULTS IN BRIEF

Our audit found that the Springfield project cost estimates have increased by 180 percent since June 1994, construction problems have increased costs and could delay project completion, and funding to pay for cost increases has come at the expense of other State highway projects. We made six recommendations to improve planning, cost-estimating, project management, and oversight. Responding to a draft of this report, FHWA agreed to implement all six recommendations. VDOT also agreed with all of the recommendations and committed to work with FHWA to implement them.

Springfield project cost estimates have increased by \$435.5 million, from \$241 million in June 1994 to at least \$676.5 million in June 2002. This 180 percent cost increase occurred due to (1) the addition of new features after the initial estimates were prepared, (2) consistent exclusion of certain reasonably anticipated and known costs from earlier estimates, and (3) unanticipated cost increases. VDOT also moved a key project segment, High Occupancy Vehicle (HOV) ramps to the Capital Beltway. The ramps were intended to reduce congestion and improve safety, and were considered a key design feature when the project was approved. The ramps were moved to a future project, which is currently unfunded. Had the HOV ramps not been moved, we estimate that project costs would have increased another \$84 million, for a total project cost of \$760.5 million.

In late 2001, project management officials began reporting significant construction problems. If not mitigated, those problems could delay project completion until 2008 or later. Ongoing construction problems and the complexity of later project phases create significant risks of further cost increases.

VDOT officials agreed that the cost of the Springfield project would be at least \$676.5 million and they have identified sufficient funds to cover that estimate. Nonetheless, these funds have come at the expense of other State transportation projects. Virginia has eliminated many planned projects because the costs of Springfield and other projects were consistently underestimated. In June 2002, Virginia allocated \$7.3 billion for transportation projects over the next 6 fiscal years. This is \$2.8 billion, or 28 percent, less than the amount approved 6 months earlier in December 2001. This funding cut resulted in the elimination of 166 projects that had been previously approved.

FHWA is required to ensure that projects planned during the first 3 years of the program can be implemented using reasonably anticipated funding sources. However, FHWA routinely approved the 3-year Transportation Plans submitted by VDOT, even though the plans were not achievable because project costs were consistently underestimated. Our review of 152 construction projects planned for the Northern Virginia District from 1994 to 2000 revealed that 106 projects (70 percent) were either delayed or no longer scheduled. Of those 106 projects, 57 percent were delayed, some over 4 years, and 13 percent were no longer scheduled, many due to inadequate funding.

Given current construction problems and delays, stronger Federal and State oversight is needed to ensure this project and the State's 3-year Transportation Plan are managed effectively. This report contains six recommendations to improve oversight. Two key recommendations are to:

- Strengthen oversight of the project by requiring VDOT to prepare a finance plan for the Springfield project that includes reasonable cost estimates, adequate funding, and reliable schedules. Normally, finance plans are required only for projects costing more than \$1 billion. However, because the project has encountered significant cost growth, faces risks of future cost growth from ongoing construction problems, and is approaching the \$1 billion threshold, we believe the need for a finance plan is compelling.
- Validate that Virginia's revised 3-year Transportation Plan (1) represents a realistically achievable Plan that can be completed with available funds and (2) fully considers how deferring the HOV connector ramps will affect VDOT's goals for relieving congestion and improving safety.

Springfield Interchange Project

Cost Increases

Springfield project cost estimates have increased by \$435.5 million, from \$241 million in June 1994² to \$676.5 million in June 2002. Costs increased because additional features were added to the project (\$140 million), VDOT officials consistently excluded certain reasonably anticipated and known costs (\$236.5 million), and the project encountered unanticipated cost overruns and construction delays (\$59 million). Specifically:

- As the project was defined and input was received from stakeholders, the project's scope was expanded to encompass \$140 million of secondary road improvements and design enhancements. These improvements included connections to Route 644 (Franconia and Old Keene Mill Roads), and widening Loisdale Road and Commerce Street.
- VDOT understated project cost estimates by \$236.5 million because it did not include estimates for known and planned costs, such as \$43 million for preliminary engineering and design and \$44 million for inflation. Also, some incurred costs, such as those for a preliminary engineering and design contract that had already been awarded, were not included. Of the \$236.5 million, \$110.9 million were costs that VDOT identified between June 1994 and June 2002. The remaining \$125.6 million were costs we identified during this audit.
- Project officials identified \$59 million in unanticipated cost increases related to contractor overruns (\$10 million) on the completed first junction, for phases 2 and 3 work, and ongoing construction delays on the second junction (at least \$49 million), for phases 4 and 5 work.

On August 17, 2000, a Commonwealth Transportation Board resolution directed VDOT to remove the construction of HOV connector ramps from the Springfield project and move them to an as yet unfunded Capital Beltway project. The HOV connector ramps were a key design feature of the Springfield project when it was approved. Had the HOV ramps not been moved, we estimate project costs would have increased another \$84 million, for a total project cost of \$760.5 million.

In May 2002, VDOT officials agreed to increase the Springfield project cost estimate to reflect the additional costs we identified, and in June 2002, the State identified Springfield project costs as \$676.5 million. The project, however, could

² VDOT officials said the June 1994 estimate was Virginia's original estimate for the Springfield project because it was based on the project's first approved scope and design.

experience significant future cost increases due to uncertainties about the costs of ongoing construction problems and the complexity of the latter phases of the project.

Schedule Delays

Until late 2001, project status reports indicated that the Springfield project was on schedule to be completed in spring 2007, 4 years earlier than the original 2011 completion date. However, construction problems have since placed the project at substantial risk of not meeting its spring 2007 completion date. Delays have already added \$49 million to project costs and, if not mitigated, will extend the project into 2008 and add further costs.

A 1-year delay in constructing a critical bridge over rail lines has impacted the construction of another bridge. The year-long delay will postpone the start of the next phases of construction by at least 1 year. Work on the next phases cannot start until the bridge is completed because multiple contractors would have to share the same work site, but they cannot do that and work safely and efficiently. VDOT officials acknowledge that ongoing construction problems on the bridge and other unresolved work conflicts could further postpone the start of construction on future project phases to spring 2004. If the start of future phases is postponed until 2004, the overall project completion would be delayed.

Although VDOT is working to mitigate the problems, its ability to succeed is uncertain because it has neither (1) required contractors to provide resource-loaded schedules for each contract nor (2) prepared an integrated master schedule that merges the schedules of all contractors into a single schedule. Resource-loaded schedules identify the labor and other resources needed to complete each task and would allow VDOT to evaluate recovery plans, mitigate schedule delays, and more accurately track construction completion. The integrated master schedule can be used to more accurately forecast potential delays and better measure project progress. These tools are especially important to use on the Springfield project because it is complex, with multiple contractors performing work in the same areas. If the schedules are not managed in an integrated fashion, delays by one contractor can have cascading effects on other contractors. Responding to our draft report, FHWA concurred with our recommendations and VDOT agreed to develop an integrated master schedule and require that new construction contracts specify development of resource-loaded schedules.

Our past work on projects such as the Tren Urbano Rail Transit Project in Puerto Rico and the Central Artery/Tunnel Project in Massachusetts has shown that these tools are essential for managing large projects. Given the Springfield project's complexity and use of multiple contracts with overlapping schedules, resource-loaded schedules and an integrated master schedule are essential for this

project as well. Without them, VDOT cannot accurately forecast project completion or appropriately monitor the adjustment of critical activities to mitigate delays.

Funding

VDOT has allocated sufficient funding to cover current project costs. In June 2002, VDOT agreed that the Springfield project will cost at least \$676.5 million and identified funding to cover that amount. However, because the project faces substantial risks of future cost increases, current funding may not be sufficient to complete the project. In addition, funding to pay for past cost increases for the Springfield project has come at the expense of other Statewide projects. VDOT has had to cancel or postpone many other planned projects to provide funds to complete the Springfield project. Also, funding has not been identified to complete the \$84 million HOV connector ramps, which originally were a critical component of the Springfield project.

Need For A Finance Plan For This Project Is Compelling

Finance plans are required for projects that exceed a billion dollars and for those designated as “high risk” or “troubled.” They are useful tools that should provide executives and oversight officials with reliable information about project costs, schedules, funding sources, cash flows, and risks. We have found the use of finance plans to be an effective oversight technique on other large projects, including the Tren Urbano Rail Transit and the Central Artery/Tunnel. The need for a finance plan for this project is compelling because the project: (1) has encountered significant cost growth and costs are approaching \$1 billion, (2) faces risks of future cost growth, (3) is experiencing ongoing construction problems, and (4) is not using the full capability of schedule management tools.

3-year Transportation Plans

Three-year Transportation Plans are important documents because they are legally required plans. They also provide useful information for the State Legislature and the taxpayers about how transportation funds will be used to improve mobility, reduce congestion, and improve safety. VDOT's past 3-year Transportation Plans were not realistic or achievable because VDOT underestimated costs for Springfield and many other projects. As a result, funding was not adequate to complete all the projects in the 3-year Transportation Plan. Cost increases, especially on large, high priority projects such as Springfield, have resulted in the State canceling or delaying many smaller planned projects.

The Transportation Equity Act for the 21st Century (TEA-21) requires 3-year state transportation plans to be realistic and achievable. Transportation plans must include sufficient financial information to show that projects planned in the first 3 years can be implemented using reasonably anticipated funding sources.

Virginia's 3-year Transportation Plans, however, were not achievable because project costs were consistently underestimated. Our review of 152 construction projects planned for the Northern Virginia District from 1994 to 2000 revealed that 13 percent of the projects were no longer scheduled for construction. In addition, 57 percent were delayed, some by over 4 years, largely because funding was not adequate to cover actual project costs that proved higher than anticipated.

These problems were compounded when Virginia faced declining revenues to pay for transportation projects this year. To deal with declining revenues and cost increases on the Springfield and other high priority projects this year, VDOT revised its planning process in 2002 to reflect more realistic cost and funding assumptions. In June 2002, VDOT allocated \$7.3 billion for transportation projects over the next 6 fiscal years. This is \$2.8 billion, or 28 percent, less than the amount approved 6 months earlier in December 2001. VDOT also eliminated 166 construction projects that had been previously approved.

FHWA Oversight of 3-year Transportation Plans

TEA-21 makes FHWA responsible for reviewing and approving each state's 3-year Transportation Plan. However, FHWA's reviews did not detect that Virginia's projects were underfunded and that the overall Plan was not realistic or achievable. FHWA has established few requirements to ensure that reasonable cost estimation is an integral part of any state's highway project management or planning processes. For example, FHWA has not set minimum standards for states to follow when estimating costs for projects valued at less than \$1 billion.

Consequently, VDOT officials determined which cost elements to include in project cost estimates and which to exclude. In the case of Springfield, they consistently excluded certain known and reasonably anticipated costs.

While VDOT had no minimum Federal standards to follow when developing project cost estimates, FHWA approved the State's 3-year Transportation Plans without determining the reasonableness of project-level cost estimates for projects included in the plans. It appears that FHWA's review of costs was limited to ensuring that stated funding matched stated costs. However, information was available that should have alerted FHWA officials that problems existed. For example, FHWA officials approved VDOT's 2001 3-year Transportation Plan in August 2001, even though two State reports had previously identified problems. A September 2000 report issued by the Governor's Commission on Transportation Policy concluded that cost estimates in the 3-year Transportation Plan were generally inaccurate. A January 2001 report by the Joint Legislative Audit and Review Commission also found that VDOT had consistently underestimated project costs and predicted that funds would not be adequate to cover the cost of all projects in the Plan.

Projects in Virginia's 3-year Transportation Plan are also interrelated. For example, to improve traffic flow along the I-95 corridor in Northern Virginia, HOV lanes were originally included in the Springfield, Capital Beltway, and Woodrow Wilson Bridge projects. However, HOV connector ramps were moved from the Springfield project to the Capital Beltway project, which has been postponed. The Woodrow Wilson Bridge project has also encountered significant cost increases. Because HOV lanes are an important element of all three projects, State and FHWA planners need to consider how moving the HOV connector ramps from the Springfield project to the planned Capital Beltway project will affect goals to improve traffic flow and safety.

RECOMMENDATIONS

We recommend that FHWA:

1. Require VDOT to prepare resource-loaded schedules for the contract phases under construction and an integrated master schedule for the entire project.
2. Require VDOT to prepare a finance plan for the Springfield project that includes reasonable cost estimates, adequate funding, and reliable schedules to meet the financing requirements of the Springfield project.
3. Validate that the information contained in the schedules and finance plan is reliable.

4. Establish minimum standards for Virginia and other states to follow when preparing cost estimates for major projects valued at less than \$1 billion.
5. Complete its planned review of VDOT's cost estimating process to ensure that it is sufficiently rigorous to generate reasonable estimates of project costs.
6. Validate that Virginia's revised 3-year Transportation Plan is financially achievable and that it fully considers how deferring the Springfield Interchange HOV connector ramps will affect the Capital Beltway and Woodrow Wilson Bridge projects.

FHWA AND VDOT COMMENTS AND OIG RESPONSE

A draft of this report was provided to FHWA on August 16, 2002. In FHWA's September 4, 2002 response to the draft report, which was coordinated with VDOT, FHWA concurred with all recommendations. VDOT also concurred with all recommendations and agreed to work with FHWA to implement them.

FHWA provided plans of action and time frames for accomplishing five of the recommendations. Specifically, FHWA agreed to require VDOT to prepare resource-loaded schedules for the contract phases under construction, an integrated master schedule for the entire project, and a project finance plan. FHWA also agreed to validate the reliability of information contained in VDOT's schedules and finance plan, complete its planned review of VDOT's cost-estimating process, and validate that Virginia's revised 3-year Transportation Plan is financially achievable and fully considers the impact of deferring the HOV connector ramps. FHWA's proposed actions and completion dates for implementing these five recommendations are acceptable.

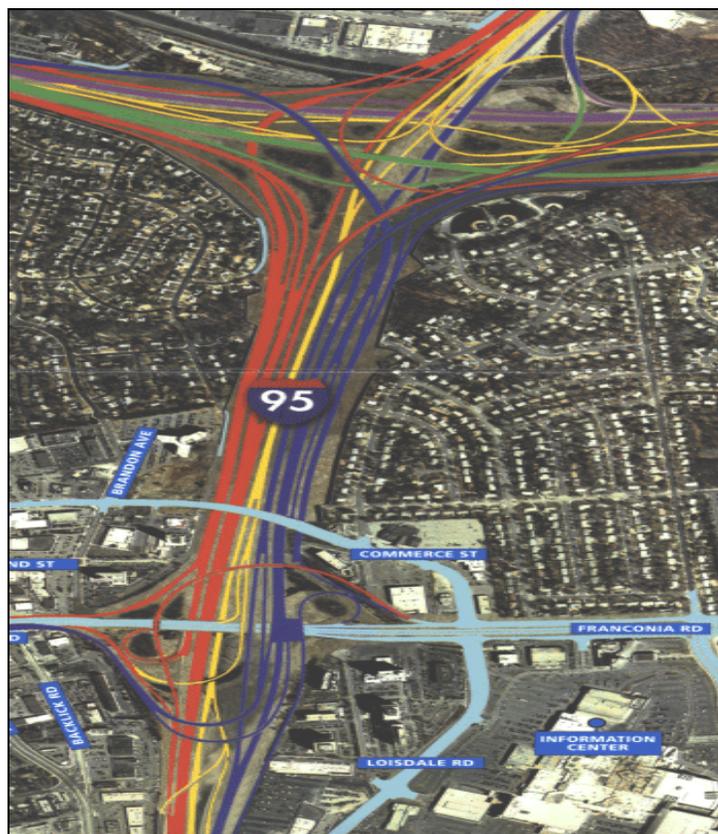
FHWA concurred with our recommendation to establish minimum standards for preparing cost estimates for major projects valued at less than \$1 billion. FHWA stated that, after a national study on best practices for cost-estimating is completed in February 2003, it will review the study results and use the information to develop a national perspective. However, FHWA did not provide a commitment date for issuing standards. FHWA further stated that Title 23 Code of Federal Regulations (CFR) provides for estimates of construction costs on projects and what such estimates must reflect. We found that Title 23 CFR provides only a general statement about cost estimates. It does not provide clear direction or standards for developing realistic cost estimates. Consequently, it is unclear whether FHWA will further define and strengthen cost estimating standards; and if so, when. As a result, we are requesting further clarification from FHWA on its proposed course of action on the recommendation and target date for completion.

In other comments, FHWA and VDOT suggested changes in the report, which we made as appropriate. FHWA and VDOT's comments are in the Appendix. Our responses to those comments are at the end of the Results section of this report.

BACKGROUND

As shown in Figure 1, the Springfield project is a major interstate construction project at the junction of I-95, I-395, and I-495 in Fairfax County, from the Franconia-Springfield Parkway through the Capital Beltway. The primary purpose of this project is to relieve bottlenecks by building highway improvements

Figure 1
Springfield Interchange Project – Including Phase 8



that will reduce congestion, enhance traffic operations, and improve safety in the project area. These improvements include the elimination of objectionable merging and weaving movements, a reconfiguration of interchange ramps, and the physical separation of local and through traffic. When completed, the Springfield project will include 24 lanes at its widest point, have 50 bridges, and consist of more than 41 miles of roadway.

As originally planned, the project would be constructed in eight phases and involve the building or reconfiguring of two major junctions along the

I-95 corridor. Work on the first junction (under phases 1 through 3) was completed this year and, as shown in Figure 2, involved the addition of travel lanes on southbound I-95, reconstruction of the I-95 and Route 644 interchange, and improvements to the local road network throughout the Springfield area.

Figure 2
First Junction – I-95/Route 644



Before Construction

After Phases 1 through 3

As shown in Figure 3, the second junction (under phases 4 through 8) involves major improvements to the interchange of I-95, I-395, I-495 and, as originally planned, the addition of HOV connector ramps to the Capital Beltway (I-495). The project is dubbed “the mixing bowl” because of the shape of the second junction and the mixing of traffic from various directions.

Figure 3
Second Junction I-95/I-395/I-495



Before Construction

After Phases 4 through 8

VDOT originally planned to complete the project by 2011. VDOT has since accelerated the construction schedule to complete the project by 2007. The work on the second junction was to be completed under four separate contracts. The first and second contracts are underway, and a third is planned for award next

year. VDOT decided not to award the fourth contract for the HOV connector ramps to the Capital Beltway (I-495), which is shown in yellow in Figure 4.

Figure 4

HOV Connector Ramps to the Capital Beltway (Phase 8)



VDOT's latest 3-year Transportation Plan, approved by the Virginia Commonwealth Transportation Board in June 2002, estimates that project costs will total \$676.5 million. As of October 11, 2002, total expenditures on the project were \$399.7 million.

RESULTS

Springfield Project

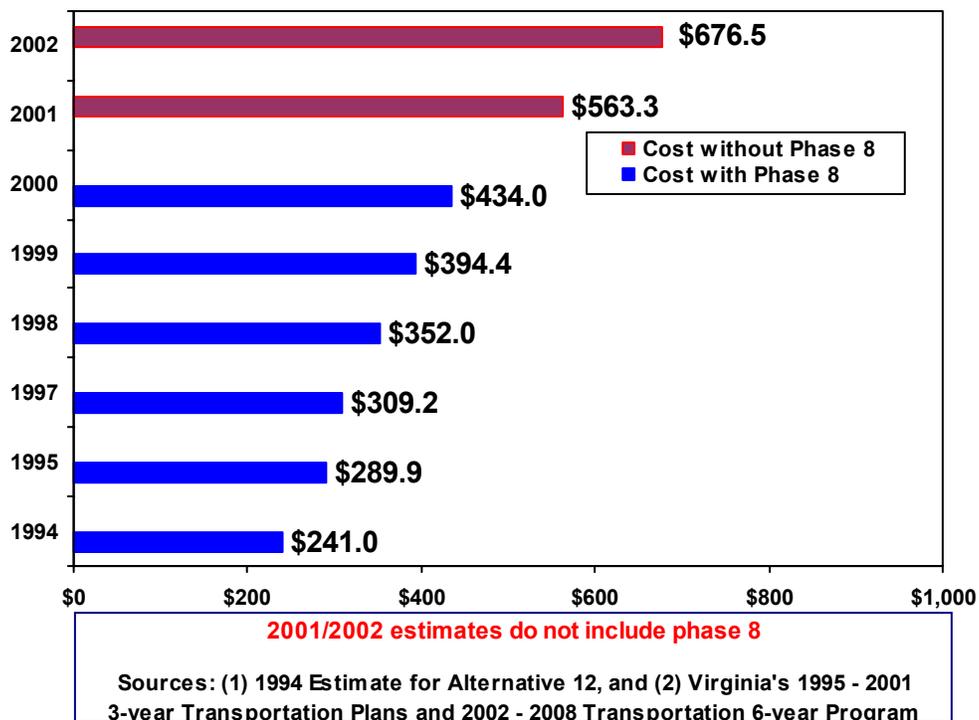
Springfield project cost estimates have increased by \$435.5 million because additional features were added to the project (\$140 million), VDOT officials consistently excluded certain reasonably anticipated and known costs (\$236.5 million), and the project encountered unanticipated cost overruns and construction delays (\$59 million). Project officials have also encountered construction problems that, if not mitigated, could delay project completion until 2008 or later. These ongoing construction problems and the complexity of the later phases of construction create significant risks that costs will increase further. VDOT has allocated sufficient funding to cover current project costs, but cost increases would require additional funds. Also, given the risks of further cost

growth, ongoing construction problems, and the fact that project officials are not using the full capability of schedule management tools, the need for project officials to prepare a finance plan is compelling.

Cost: Increases Due to Scope Changes, Poor Cost Estimating, and Construction Overruns and Delays

As shown in Figure 5, Springfield project cost estimates have increased by \$435.5 million, from \$241 million in June 1994 to at least \$676.5 million in June 2002. The June 2002 estimate does not include the cost of phase 8, the HOV connector ramps to the Capital Beltway, which we estimate will cost at least \$84 million.

Figure 5
Springfield Interchange Cost Estimates
(\$ in millions)



Scope and design changes added \$140 million to project costs. As the project was defined and input was received from stakeholders, the project's scope was expanded to encompass \$140 million of secondary road improvements and design enhancements listed in Table 1. The costs shown in Table 1 for the congestion management plan, information center, and right-of-way resulted from the State's decision to construct the project so as not to preclude future access to the Franconia/Springfield Parkway.

Table 1	
Cost of Scope and Design Changes¹	
Between 1994 and 2002	
(\$ in millions)	
Construction	Additional Costs
Roadways	\$30.0
Lee High School	.5
Bridge replacements	20.5
Sound walls	14.9
Retaining walls	13.6
Utility relocations	5.3
Subtotal Construction Costs (rounded)	\$85.0
Nonconstruction	
Congestion management	\$28.0
Information Center ²	3.2
Right-of-way	22.8
Fire support	.9
Subtotal Nonconstruction Costs (rounded)	\$ 55.0
Total (rounded)	\$140.0

¹The design consultant, HTNB, estimated the cost of scope and design changes based on current costs. See Exhibit A for a discussion of methodology.

²The total estimated cost for the Information Center is \$6 million, of which \$2.8 million was identified by the Office of Inspector General and discussed in the following section.

The Springfield project started primarily as an interstate construction project. However, the scope of the project has grown to encompass \$30 million in connections to several secondary roads in the Springfield area, at Fairfax County's request. Included in these secondary improvements are connections to Route 644 (Franconia and Old Keene Mill Roads) and the widening of Loisdale Road and Commerce Street.

In addition to the local road network, the Fairfax County Public School Board requested replacement of several facilities at schools affected by the project. For example, widening Franconia Road required additional right-of-way purchases that affected several public schools along the corridor. VDOT agreed to replace athletic fields, tennis courts, and a stadium press box for Lee High School, which added \$0.5 million to the cost of the Springfield project.

Since 1994, a number of significant design enhancements have also been made at the request of Fairfax County, the public, and FHWA that have raised the project's cost. These design enhancements included the replacement of several bridges and the replacement and installation of sound walls throughout the project area. One assumption in the initial design work was that existing bridges included in the

project area could simply be redecked. However, as design work progressed, VDOT's design consultant determined that existing bridges for the last four phases of the project would have to be replaced, increasing project costs by \$20.5 million.

Additionally, VDOT spent \$14.9 million replacing existing sound walls and constructing new sound walls for residential areas affected by the redesigned interchange. The need for sound walls was identified in the initial environmental assessment in 1994, but VDOT did not include this cost in the project estimate until 2000. According to the project manager, the cost of sound walls was excluded in previous estimates because the cost had not been approved by FHWA and the number of walls needed remained uncertain. VDOT also spent \$18.9 million to build retaining walls and to do additional utility work that was not part of the original scope of the project.

Another item that has increased the cost of the project is the congestion management program required by Federal regulation. The purpose of this program is to inform the public of planned construction, manage congestion in the project area, and encourage the use of alternate means of transportation. The establishment of a congestion management program was approved in June 1994, but the estimates for the program increased significantly, from \$1 million to \$28 million, as congestion management strategies were developed. Because Federal guidelines for the congestion management program are broad, the size and content of the program are subject to the State's discretion. As a result, items provided under the Springfield project include expanded bus and transit services, additional State Police coverage, and improvements to local road networks.

Further, although not funded through the congestion management program, VDOT operates the Springfield Information Center in the Springfield Mall to assist with congestion management. When the audit began, VDOT estimated that the operating costs of the Information Center would be only \$3.2 million. As discussed in the following section, we identified additional costs that resulted in VDOT raising its estimate of operating costs to a total of \$6 million.

Additionally, \$22.8 million in right-of-way was added to the cost of the project to allow for various road improvements, including designing single occupancy vehicle access from I-95 to the Franconia-Springfield Parkway. Finally, \$0.9 million was added for fire support. While scope and design changes have added significantly to project costs, VDOT's project estimates have also grown due to the inclusion of certain known or planned costs that were consistently omitted in past estimates.

VDOT's poor cost-estimating practices led to a \$236.5 million cost increase. VDOT officials agreed that the June 1994 estimate was Virginia's original

estimate for the Springfield project, and an appropriate baseline, because it was based on the project's first approved scope and design. However, that \$236.5 million estimate severely understated project costs because it excluded known, planned, and easily predictable costs that are standard cost elements in major highway construction projects (see Table 2). We found that VDOT's subsequent estimates also contained many of the same deficiencies.

Between 1994 and 2001, VDOT identified and added \$110.9 million of those costs to its estimate. We identified approximately \$125.6 million during this audit. VDOT agreed to add \$98.1 million of the costs we identified to its December 2001 estimate and approximately \$27.5 million to its June 2002 estimate.

Table 2 Previously Omitted Costs Added to VDOT's 1994 Estimate for the Springfield Project (\$ in millions)	
Additional Costs Identified by VDOT	Cost
Inflation of 1994 costs to year of expenditure ¹	\$ 44.0
Increased right-of-way costs	14.3
Preliminary engineering and design	42.6
Contractor incentives on phases 2 and 3	10.0
Subtotal	\$ 110.9
Adjustments recommended by Office of Inspector General	
Additional construction management	\$ 47.0
Additional contingency reserve	36.7
Design revisions and inflation	7.8
Railroad flagmen	1.5
Additional preliminary engineering and design	2.3
Additional costs for Information Center ²	2.8
Contractor incentives on phases 4 and 5	13.0
Accounting adjustments (staging area and phase 1)	14.5
Subtotal	\$125.6
Total	\$236.5

¹ Inflation was estimated at approximately 3 percent per year.

² This amount is in addition to the \$3.2 million estimated by VDOT in its 3-year Transportation Plan for 2000-2001.

VDOT's June 1994 cost estimate was limited to rough estimates of the cost of construction (\$220 million) and right-of-way (\$21 million). Moreover, VDOT's construction estimate included only the costs of major structural components such as pavement, bridges, earthwork, and drainage. The 1994 estimate did not include costs for items such as inflation over the life of the project (estimated at \$44 million) or the costs of preliminary engineering and design work (\$42.6 million), which are standard costs for construction projects. VDOT originally awarded contracts for these services in 1992, but did not include the cost of the original contract or two subsequent supplements, which by 1994 totaled \$19.6 million.

Over the years, VDOT periodically revised its estimates and made changes to its cost estimating practices. As a result, VDOT added \$110.9 million in previously omitted costs to project cost estimates between 1994 and 2001. Because records describing the detailed methodologies used to prepare cost estimates between 1995 and 1999 were not available, it is unclear when various items were added to the estimates. However, those changes included adding costs associated with inflation, increased right-of-way, preliminary engineering, and design work. VDOT also revised its estimate to add allowances for contractor incentives for completing phases 2 and 3 ahead of schedule.

VDOT's December 2001 and June 2002 estimates added a total of \$125.6 million in cost adjustments that we identified during this audit. For example, we found that before 2001, VDOT did not include the cost of construction management and contingencies in project estimates until the designs for each phase were 80 to 90 percent complete. VDOT agreed to include estimates of those costs in its 2001 cost estimate and to increase the factors used to project these costs to more closely reflect actual expenditures. VDOT's estimate also did not include an allowance for potential design revisions and railroad flagmen needed on contracts for phases 4, 5, and 6 and 7. Additionally, VDOT underestimated the cost of preliminary engineering and design, the impact of inflation, and the cost of operating the Information Center for congestion management.

In 1997, VDOT acquired two parcels of land for use as temporary construction staging areas for the Springfield project, among other projects. In May 2001, VDOT officials informed FHWA that they planned to sell this property and would be reporting the expected \$14.3 million sales price as a recovered expense. As a result, VDOT removed \$14.3 million from the cost of the project. Because the staging areas are needed for other projects, FHWA stated it would not approve the sale of the staging area properties and that the \$14.3 million should be reflected as a right-of-way expenditure for the Springfield project. FHWA officials told us that while this amount cannot be claimed now as a recovered expense, it would be recovered eventually when the property is sold. We also identified approximately

\$0.2 million in phase 1 expenditures that were not included in VDOT's estimate. These costs were omitted because of recordkeeping errors in reconciling expenditures to financial records.

Another omission was an allowance for contractor incentives for completing the work ahead of schedule. The phase 4 and 5 contracts allow contractors to earn a maximum incentive payment of \$6.5 million on each contract for early completion. Although delays have been reported in both phases, they resulted from factors outside the contractors' control, and the contractors are accelerating construction to help VDOT recover from the delays. Therefore, according to VDOT, both contractors are likely to receive incentive payments based on revised completion dates for each phase. As a result, approximately \$13 million, the maximum amount for both contracts, should be incorporated into the project estimate.

In May 2002, VDOT agreed to make all of the cost adjustments we identified and to increase its project estimate to \$676.5 million.

Contractor overruns and construction delays add \$59 million in unanticipated cost increases. In 2002, project officials identified unanticipated cost increases of \$59 million related to contractor overruns on phases 2 and 3 and construction delays on phases 4 and 5, as shown in Table 3.

Table 3	
2002 Unanticipated Cost Increases Due to Overruns and Delays	
(\$ in millions)	
Overruns on phases 2 and 3	\$10.0
Schedule delays on phases 4 and 5	49.0
Total	\$59.0

In February 2002, VDOT officials determined that cost overruns on phases 2 and 3 could range from \$2 million to \$10 million. A final figure will not be available until VDOT completes an audit of the contract later this year. We concluded, and VDOT officials agreed, that the project cost estimate should reflect an increase of \$10 million.

In March 2002, VDOT officials reported a projected 1-year delay in the construction of a critical bridge over CSX Transportation Railroad and Washington Metropolitan Area Transit Authority rail lines in phase 4 and a 1-year delay in phase 5 construction. The phase 4 delay has resulted in a 1-year delay in the start of construction on phases 6 and 7. VDOT officials are working to mitigate the potential impact of the delays on the project's schedule and hope to recover some costs. Until this is done, VDOT has identified an additional cost of

\$49 million due to construction delays. The \$49 million is in excess of planned contingencies and should be included in the project estimate.

VDOT moved HOV connector ramps from the project. We estimate that project costs would be \$84 million higher, or a total of \$760.5 million, had VDOT not moved construction of a key element of the original design from the Springfield project. Phase 8 of the Springfield project was designed to include the construction of HOV connector ramps from I-95 to the Capital Beltway. VDOT planned another project for widening the Capital Beltway, which included HOV lanes. VDOT considered the ramps essential to relieve congestion in the junction by carrying HOV traffic from I-95, through and beyond the main interchange, and onto the Capital Beltway. In fact, during the Springfield design selection process, VDOT rejected any proposed design that did not include the HOV connector ramps to the Capital Beltway.

In August 2000, VDOT moved the construction of the HOV connector ramps to the Capital Beltway project and deducted the cost of the HOV ramps from the Springfield project. In February 2002, FHWA granted VDOT a temporary deferral of the construction of the HOV connector ramps only until VDOT could ensure the compatibility of the designs for the HOV connector ramps and the Capital Beltway HOV lanes. However, on April 26, 2002, a Virginia official stated that neither the HOV connector ramps nor the Capital Beltway project will be built in the near future because funding is not available to complete the projects. The official stated that VDOT is committed to completing ongoing major projects, including the Springfield Interchange and the Woodrow Wilson Bridge. VDOT's decision was based primarily on financial considerations. VDOT has not conducted studies to determine the impact this decision will have on congestion, the environment, or public safety.

The project could experience significant future cost increases due to uncertainties about the costs of ongoing construction problems and the complexity of the latter phases of the project. These risks are discussed below.

Schedule: Construction Problems Could Delay Project Completion and Increase Costs

Until late 2001, the Springfield project was on schedule to be completed in the spring of 2007, 4 years earlier than the original 2011 completion date. VDOT moved the completion date to 2007 to minimize travel disruptions and to reduce project costs. However, construction problems have placed the project at substantial risk of not meeting its spring 2007 completion date. In 2002, project officials reported a 1-year delay in the construction of phases 4, 5, and 6 and 7. The delays have already added \$49 million to project costs and, if not mitigated,

will extend the project into 2008 and add further costs. VDOT officials believe they can mitigate the delays and complete the project on schedule. However, because VDOT officials are not using important project management tools, such as resource-loaded schedules and an integrated master schedule, to manage the project; the likelihood that delays will be mitigated is reduced.

VDOT originally planned to build the Springfield Interchange in eight phases, with the contract for the first phase being advertised in 1994, and the last phase being advertised in 2011. To accelerate project completion, VDOT combined the contracts for phases 2 and 3 and for phases 6 and 7. VDOT also moved phase 8, full HOV connector ramps, from the Springfield project to the planned Capital Beltway project. Work on phases 4 and 5 are underway. Phases 6 and 7 are scheduled to start in June of 2003 and be completed no later than the spring of 2007 (see Table 4).

Table 4 Milestones for the Springfield Project September 4, 2002		
Interchange Project Segment	Construction Start	Construction End
<i>Phase 1:</i> I-95 southbound 4th lane	January 1995	August 1996
<i>Phase 1A:</i> Ramp connecting I-95 northbound to Spring Mall Drive	April 1997	June 1998
<i>Phase 1B:</i> Beltway ramps	October 1998	October 1999
<i>Phases 2 and 3:</i> Route 644 interchange, Commerce Street, parts of local northbound and southbound roads, and Franconia/Old Keene Mill Roads	March 1999	June 2002
<i>Phase 4:</i> I-95 southbound, part of Capital Beltway at railroad, part of HOV roadway, and ramp I-495 to I-95 southbound	November 2000	Summer 2004
<i>Phase 5:</i> Part of eastbound Capital Beltway and ramp N-W	September 2001	Fall 2003
<i>Phases 6 and 7:</i> I-95 northbound; Ramps N-E, S-W, W-N, and local ramps; I-395 southbound; the HOV roadway; and ramps W-S	June 2003	Spring 2007
<i>Phase 8:</i> Full HOV connections between I-95, I-395, and I-495	Moved	Moved

Construction problems and work conflicts are delaying work on final phases. In 2002, project officials reported a 1-year delay on phases 4 through 7. VDOT

officials said the 1-year delay in the completion of a critical bridge, over railroad and transit rail lines, in phase 4 resulted in a 1-year delay in the start of construction on phases 6 and 7, which is now scheduled to begin in June 2003 and be completed in spring 2007. The delay occurred because the Washington Metropolitan Area Transit Authority reduced the number of hours the contractor could work over train tracks due to changes in security regulations imposed since September 11, 2001. In addition, CSX Transportation Railroad provided insufficient numbers of railroad flagmen to do signal work near railroad utilities where the contractor was working. This caused work stoppages because flagmen were not available to provide coverage as required by the construction schedule. While the first stage of work on the bridge is finished, subsequent stages of work on the bridge have also been affected. As a result, VDOT projects a 1-year delay in finishing work under the phase 4 contract.

According to VDOT officials, the problems on phase 4 will also delay the start of construction work under the contract for phases 6 and 7 by at least a year. By postponing the start of construction for phases 6 and 7, VDOT hopes to avoid conflicts from having multiple contractors sharing the same worksite. For example, if delays on phase 4 result in contractors sharing the worksite, it could create difficulties by limiting overhead space for construction of the ramps in phases 6 and 7.

VDOT performed a technical review of the schedule for phases 6 and 7 to determine whether a 2007 completion date is still feasible if the start of construction on phases 6 and 7 is delayed by a year. VDOT's report recommended changes to the sequence of construction to resolve anticipated conflicts and achieve the 2007 completion date. Project officials told us that, if these conflicts are not resolved or if the start of construction on phases 6 and 7 is delayed beyond a year, the project's completion schedule could slip beyond spring 2007.

VDOT officials also reported a 1-year delay on phase 5, which they attributed to interruptions caused by conflicts with the installation of a major sewer line in phase 4. According to VDOT officials, these conflicts were not foreseen because phases 4 and 5 were originally combined as one contract. However, the work is now being performed by two separate contractors. Although the sewer line is part of phase 4, it is in a location that affects the progress of phase 5. VDOT had to temporarily redirect the efforts of the phase 5 contractor, which resulted in lost time. VDOT officials expect this delay to be successfully mitigated, with no impact on the project schedule.

VDOT is not using the full capability of schedule management tools. We found that the Springfield project is at substantial risk of not being completed by

spring 2007 because VDOT is not using the full capability of its schedule management tools. VDOT officials have not required contractors to resource-load the construction schedules for each contract and the project office has not developed an integrated master schedule of all phases of ongoing construction. Although VDOT believes it can mitigate current schedule delays, its ability to succeed is uncertain because VDOT is not using these important management tools.

Because the Springfield project is being constructed under multiple contracts, an integrated master schedule is needed to accurately track construction progress and reliably estimate project completion. Currently, VDOT measures construction progress by comparing the current rate of expenditures over the original contract value to the approved expenditure plan, which is derived from the baseline schedule at the start of construction. However, this method assumes that contract activities proceed in the same sequence as planned in the baseline schedule. Because the sequence of construction activities changes with the pace of construction and because delays have been experienced, the method chosen by VDOT for measuring progress has overstated actual progress.

Resource-loaded schedules identify the labor and other resources needed to complete each task and would allow VDOT to evaluate the efficacy of recovery plans, mitigate schedule delays, and more accurately track construction completion. In addition, VDOT had not prepared an integrated master schedule for the project. An integrated project master schedule would merge the schedules of multiple contracts into a single project schedule, allowing conflicts to be identified and resolved.

Our work on other major construction projects, such as Tren Urbano Rail Transit in Puerto Rico, has shown that an integrated master schedule is a fundamental component for managing complex projects constructed under multiple contracts. Given the Springfield project's complexity and the use of multiple contracts with overlapping schedules, an integrated schedule is essential. Without it, VDOT and FHWA cannot accurately forecast project completion or appropriately monitor the adjustment of critical activities to successfully mitigate delays.

Delays add \$49 million to project costs. VDOT added \$49 million to project costs due to construction delays. These costs are in excess of previously planned contingency reserves. If not mitigated, the delays will extend the project into 2008 and add further costs. The project is also at significant risk of further cost increases. Given the history of large cost increases, current construction problems and delays, and the likelihood of further cost increases, it is important for VDOT to use the full capability of its schedule management tools.

Funding: Project at Risk for Future Cost Increases

VDOT has allocated sufficient funding to cover current project costs. In June 2002, VDOT estimated that the Springfield project will cost \$676.5 million and identified funding to cover the full amount. However, because the project faces substantial risks of future cost increases, current funding may not be sufficient to complete the project. Also, VDOT has not identified funding to complete the \$84 million HOV connector ramps.

Several factors place the project at risk of significant cost increases in the future. These include uncertainty about the full impact of schedule delays and the complexity of the latter phases of the project. As construction moves into multiple phases, work on the project is also becoming more complex. Phases 6 and 7 have intrinsic delay risks in addition to the risks posed by the delays in phases 4 and 5. These include the construction of piers and ramps at locations with limited overhead space for installation of steel girders, constraints imposed by coordinating construction with active rail lines, and conflicts with unmarked utilities. Extended overtime, contractor incentives, and other actions to recover from delays would add to the cost of the project.

Need for a Finance Plan for This Project is Compelling

Finance plans are required for projects that exceed a billion dollars. We have also found them useful for projects designated as “high risk” or “troubled” and for those costing much less than \$1 billion. They are useful tools that should provide executives and oversight officials with reliable information about project costs, schedules, funding sources, cash flows, and risks. We have found the use of finance plans to be an effective oversight technique on other large projects, including the Tren Urbano Rail Transit Project in Puerto Rico and the Central Artery/Tunnel Project in Massachusetts. The need for a finance plan for this project is compelling because the project: (1) has encountered significant cost growth and costs are approaching \$1 billion, (2) faces risks of future cost growth, (3) is experiencing ongoing construction problems, and (4) is not using the full capability of schedule management tools. The analysis required to develop a finance plan may result in a project cost estimate that is greater than the June 2002 estimate of \$676.5 million.

The main purpose of a finance plan is to provide senior program and oversight officials with the comprehensive information needed to make appropriate financial decisions. Finance plans include information about costs, funding and revenue sources, schedules, cash flows, and other relevant factors, including risks. The history of the Springfield project and its cost growth in excess of \$435.5 million make a compelling case for developing a finance plan.

The cost of the Springfield project is approaching \$1 billion, there is significant congressional interest in the project, and the project is critical to relieving congestion and improving the safety of the Interstate Highway System. Therefore, VDOT officials need resource-loaded schedules and an integrated master schedule to better manage their delay mitigation efforts. They also need a finance plan for the Springfield project so they can more effectively control future cost growth and ensure adequate funding.

3-year Transportation Plan

State 3-year Transportation Plans are legally required documents. They provide useful information for the State Legislature, the taxpayers, and FHWA about how transportation funds will be used to improve mobility, reduce congestion, and improve safety. However, VDOT's 3-year Transportation Plans were not realistic or achievable because VDOT underestimated costs for Springfield and many other projects. As a result, funding was not adequate to complete all the projects in the 3-year Transportation Plans. Cost increases, especially on large, high priority projects such as Springfield, have repeatedly resulted in the State canceling or delaying many smaller planned projects. Further, FHWA routinely approved the State's 3-year Transportation Plans without detecting that project cost estimates were understated and that Plans were underfunded.

VDOT's 3-year Transportation Plans Were Not Realistic

TEA-21 requires state 3-year Transportation Plans to be financially achievable. Transportation Plans must include sufficient financial information to show that projects planned in the first 3 years can be implemented using reasonably anticipated funding sources.

Virginia's 3-year Transportation Plans, however, were not achievable because project costs were consistently underestimated. Our review of 152 construction projects planned for the Northern Virginia District from 1994 to 2000 revealed that 106 projects (70 percent) were either delayed or no longer scheduled. Of those projects, 57 percent were delayed, some over 4 years, and 13 percent were no longer scheduled, many due to inadequate funding.

For example, Virginia's 1994 3-year Transportation Plan scheduled the modification of an interchange at Route 234 in Prince William County for July 1996. Subsequent 3-year Transportation Plans rescheduled the \$12 million construction project to begin in July 1997, October 1998, and October 1999. Actual construction did not begin until 2000. In another example, a project in Virginia's 1994-1995 3-year Transportation Plan to construct parallel lanes in Loudon County was scheduled to begin in July 1998 and rescheduled in subsequent Plans to start July 1999, July 2000, and July 2001. In the 1999-2000

and 2000-2001 Plans, the project was listed but not scheduled for construction. This project is not listed in VDOT's new transportation program.

This year, the problems were compounded because Virginia faced a decline in revenues that were needed to pay for transportation projects. In February 2002, Virginia's newly elected Governor and the Acting Commissioner of VDOT raised concerns about VDOT's transportation planning. To deal with declining revenues and cost increases on Springfield and other high priority projects, VDOT revised its planning process to reflect more realistic cost and funding assumptions. As a result, Virginia has eliminated many planned projects and reduced its funding allocations. In June 2002, Virginia allocated \$7.3 billion for transportation projects over the next 6 fiscal years. This is \$2.8 billion, or 28 percent, less than the amount approved 6 months earlier in December 2001. This funding cut resulted in the elimination of 166 projects that had been previously approved.

FHWA Did Not Detect 3-year Transportation Plan Deficiencies

TEA-21 makes FHWA responsible for reviewing and approving each state's transportation plan. FHWA's review is to ensure that a state followed Federal transportation planning requirements, including requirements that the plan be realistic and achievable. However, FHWA's reviews did not detect that Virginia's projects were underfunded and that Virginia's 3-year Transportation Plans were not realistic or achievable.

In large part, FHWA's reviews did not detect the problems because FHWA has not established minimum requirements for states to follow when preparing project cost estimates. FHWA has established few requirements to ensure that reasonable cost estimation is an integral part of any state's highway project management or planning process. Specifically, FHWA has not set minimum standards for states to follow when estimating costs for projects valued at less than \$1 billion. Consequently, VDOT officials determined which cost elements to include in project cost estimates and which to exclude; and, in the case of Springfield, they consistently excluded known and reasonably anticipated costs. FHWA also approved Virginia's 3-year Transportation Plans without determining the reasonableness of project-level cost estimates for projects included in the Plans.

FHWA did not review the reasonableness of estimates included in the 3-year Transportation Plan. It appears that FHWA's review of costs was limited to ensuring that stated funding matched stated costs. FHWA officials told us they review the cost of individual contracts prior to award. However, that review can occur years after a project included in the 3-year Transportation Plan is approved.

Information was also available that should have alerted FHWA officials that problems existed. For instance, FHWA officials approved VDOT's 2001 3-year Transportation Plan in August 2001 even though two State reports had previously identified problems. A September 2000 report, issued by the Governor's Commission on Transportation Policy, concluded that cost estimates in the 3-year Transportation Plan were generally inaccurate. A January 2001 report, by the Joint Legislative Audit and Review Commission, found that VDOT had consistently underestimated project costs and predicted that funds would not be adequate to cover the cost of all projects in the Plan.

Deficiencies in Virginia's 3-year Transportation Plan could adversely affect several large and interconnected projects. For example, to improve traffic flow along the I-95 corridor in Northern Virginia, HOV lanes were originally included in the Springfield, Capital Beltway, and Woodrow Wilson Bridge projects. However, HOV connector ramps were moved from the Springfield project to the Capital Beltway project, the Capital Beltway widening project has been postponed, and the Woodrow Wilson Bridge project has encountered significant cost increases. Because HOV lanes are an important element of all three projects, State and FHWA planners need to consider how eliminating HOV connector ramps from the Springfield project and deferring the Capital Beltway project will affect goals to improve traffic flow and safety.

Recognizing that VDOT's cost estimation process is deficient, in June 2001, FHWA designated it as "high risk" and a priority for review in 2002. While the review is not yet initiated, FHWA plans to complete its review of VDOT's cost estimation process in conjunction with its review of VDOT's revised cost estimate for the Springfield project.

RECOMMENDATIONS

We recommend that FHWA:

1. Require VDOT to prepare resource-loaded schedules for the contract phases under construction and an integrated master schedule for the entire project.
2. Require VDOT to prepare a finance plan for the Springfield project that includes reasonable cost estimates, adequate funding, and reliable schedules to meet the financing requirements of the Springfield project.
3. Validate that the information contained in the schedules and finance plan is reliable.

4. Establish minimum standards for Virginia and other states to follow when preparing cost estimates for major projects valued at less than \$1 billion.
5. Complete its planned review of VDOT's cost estimating process to ensure that it is sufficiently rigorous to generate reasonable estimates of project costs.
6. Validate that Virginia's revised 3-year Transportation Plan is financially achievable and that it fully considers how deferring the Springfield Interchange HOV connector ramps will affect the Capital Beltway and Woodrow Wilson Bridge projects.

FHWA AND VDOT COMMENTS AND OIG RESPONSE

A draft of this report was provided to FHWA on August 16, 2002. FHWA provided a response to our draft report on September 4, 2002, which was coordinated with VDOT (see the Appendix for FHWA's comments). FHWA and VDOT agreed with all recommendations and VDOT committed to work with FHWA to implement them (see attachment to Appendix for VDOT's comments). FHWA provided plans of action and time frames for accomplishing five of the recommendations.

Specifically, FHWA will require that all existing and new construction contracts include the development of resource-loaded schedules. The schedules for existing contracts and the integrated master schedule will be completed by December 2002. VDOT has accepted this recommendation and response. FHWA has asked VDOT to develop a finance plan for the project. VDOT expects to submit the draft finance plan to FHWA by the end of November 2002. FHWA will review and approve both the schedules and the finance plan and anticipates approving the initial finance plan by the end of 2002. FHWA and VDOT have also initiated a process review to evaluate VDOT's cost-estimating process for all stages of project development. This review will result in a report and recommended criteria for VDOT's use in developing future cost estimates. FHWA anticipates completing its report and making its recommendations by the end of 2002. Finally, FHWA will confirm that Virginia's new 3-year Transportation Plan meets the intent of the fiscal constraint regulation. FHWA stated that VDOT is expected to issue its new 3-year Transportation Plan on December 6, 2002.

Although FHWA concurred with our recommendation to establish minimum standards for preparing cost estimates for major projects valued at less than

³ We did not include VDOT's response to the draft report in the Appendix because VDOT officials declined to provide an electronic version that was compliant with the Workforce Investment Act of 1998, Section 508. Compliance with this law ensures that visually disabled individuals are able to read documents with the aid of screen readers. Hard copies of VDOT's response may be requested from the Virginia Department of Transportation, 1401 East Broad Street, Room 1410, Richmond, VA, 23219.

\$1 billion, it did not provide a target date for establishing the standards. FHWA stated that after a national study on best practices for cost-estimating is completed in February 2003, it will review the study results and use the information to develop a national perspective. However, FHWA did not provide a commitment date for issuing standards. FHWA further stated that Title 23 CFR provides for estimates of construction costs on projects and what such estimates must reflect. We found that Title 23 CFR provides only a general statement about cost estimates. It does not provide clear direction or standards for developing realistic cost estimates. Consequently, it is unclear whether FHWA will further define and strengthen cost estimating standards; and if so, when. As a result, recommendation 4 remains unresolved.

In other comments, FHWA and VDOT suggested changes in the report, which we made as appropriate. Two of those comments are discussed below.

FHWA commented on our use of the term “Transportation Plan” to refer to the Statewide Transportation Improvement Program. FHWA stated that our use confuses terms because there is also a requirement to develop a State Transportation Plan that does not have to be financially constrained. We have revised the text to read “3-year Transportation Plan” when we refer to the plan that must be financially constrained.

Finally, FHWA commented that, even though it is responsible for reviewing and approving VDOT’s 3-year Transportation Plan, FHWA does not review the reasonableness of the Plan’s cost estimates. FHWA commented that it “has traditionally focused, as required by law, on the construction cost estimate at the time of Federal authorization because that is the time of the obligation of Federal funds...” As stated in the report, that review can occur years after a project is included in the 3-year Transportation Plan and too late for long-range financial planning and decision-making. FHWA is responsible for ensuring that the 3-year Transportation Plan is achievable and, to do that, FHWA needs to review the reasonableness of the cost estimates of projects included in the Plan.

ACTION REQUIRED

Actions taken and planned by FHWA are reasonable and satisfy the intent of five of our recommendations, subject to the follow-up requirements in Department of Transportation Order 8000.1C. In accordance with Order 8000.1C, we request that, within 30 days, FHWA clarify its proposed course of action and target date for establishing minimum cost-estimating standards for states to use when estimating the costs of major projects valued at less than \$1 billion.

We appreciate the courtesies and cooperation of FHWA and VDOT personnel during this audit. If you have any questions concerning this report, please call me at (202) 366-1992 or Theodore Alves, Assistant Inspector General for Highway Infrastructure and Safety Programs, at (202) 366-0687.

EXHIBIT A. OBJECTIVES, SCOPE, AND METHODOLOGY

We conducted an audit of FHWA's oversight of the Springfield project. Specifically, we evaluated the:

- factors contributing to increased cost estimates,
- reasonableness of the current cost estimate,
- reasonableness of the current schedule, and
- adequacy of project funding.

In addition, we evaluated how deficiencies in VDOT's project cost estimating process affected Virginia's ability to implement its 3-year Transportation Plan. We did not review contracting and billing practices, which were outside the scope of our audit. This audit was done as part of a series of major project reviews; it was also requested by Congressman James P. Moran.

We conducted the audit from July 2000 through September 2002 in accordance with Government Auditing Standards prescribed by the Comptroller General of the United States. During the audit, we conducted interviews with VDOT and FHWA officials in Richmond, Virginia, and Washington, D.C., and VDOT officials and management consultants at the project office in Springfield, Virginia. We also met with VDOT's engineering and design consultant in Alexandria, Virginia.

To assess the reasonableness of the project schedule, we reviewed VDOT's Primavera (P3) schedules for phases 4 and 5, showing the project's critical path and current schedule delays. We compared the P3 schedules to construction status reports and information provided by VDOT engineers and project managers. From the data we were able to reach conclusions concerning VDOT's consistency in reporting the progress of construction, identify the activities that created delays, and assess the reasonableness of the forecasted project completion date. By reviewing the schedules, we were also able to determine whether VDOT can appropriately evaluate the feasibility and efficacy of proposed mitigation measures.

We also attended VDOT's March 2002 technical review of phases 6 and 7 to gain an understanding of anticipated construction difficulties, their impact on the schedule, and the sequence of construction and preventive engineering measures to mitigate delays. We met with headquarters and division FHWA officials and VDOT project management officials to discuss issues impacting the project's schedule.

To assess the growth in cost estimates, reasonableness of the current estimate, and adequacy of project funding, we interviewed officials from FHWA, VDOT, and members of the Virginia Legislature. We also reviewed Virginia's 3-year Transportation Plans, Transportation 6-year Program, contract expenditure reports and invoices for the Springfield project, and construction and other financial records for the period January 1994 through September 2002. Additionally, we reviewed the January 2001 Review of Construction Costs and Time Schedules for Virginia Highway Projects issued by the Joint Legislative Audit and Review Commission of the Virginia General Assembly, and the September 2000 Second Interim Report by the Governor's Commission on Transportation Policy.

Our review of cost information was limited, in certain aspects, by incomplete or missing data. Specifically, VDOT officials could not provide supporting data from early cost estimates prior to 1994. These cost estimates were developed before any preliminary engineering and design work and did not include forecasts of major cost elements. Design officials stated that they lost much of the data when their office was relocated. This limitation prevented us from assessing the reasons for growth in cost estimates between 1991 and 1994.

VDOT officials agreed that the June 1994 estimate was Virginia's original estimate for the Springfield Interchange project and could serve as a baseline for analyzing cost increases. In June 1994, the Commonwealth Transportation Board approved the project's basic design concept, known as Alternative 12, and authorized VDOT officials to begin work on a detailed design.

Alternative 12 represents the original scope of the Springfield project. Therefore, we used VDOT's June 1994 estimate as the basis for analyzing subsequent changes in design, scope, cost, and schedule. We compared the 1994 baseline to the estimates in Virginia's Transportation 6-year Program, which was approved by the Commonwealth Transportation Board on June 20, 2002. Documentation was not available detailing all of the factors contributing to cost growth between 1994 and 2002. However, the design consultant reconstructed estimates of design and scope changes and construction enhancements that have occurred since 1994. In addition, we were able to identify actual and likely reasons for overall increases and the cost categories where major increases occurred. We did this by reviewing expenditures on all completed and active contracts, and trends in cost growth on other highway construction projects in the Northern Virginia District from January 1998 to January 2001.

We also evaluated construction change orders and modifications, quantity changes, asphalt and fuel price adjustments, and construction management to determine the rate of expenditures for each category as a percentage of construction costs. We reviewed construction contracts to identify the potential costs of early completion allowances and contractor claims. Further, we analyzed VDOT's experience with contractor claims in the Northern Virginia District. We also reviewed VDOT's expenditures on right-of-way, preliminary engineering and

design, congestion management, and the Information Center. We used the data to forecast future costs on active and unawarded contracts.

To determine the adequacy of funding for the project, we reviewed VDOT's 3-year Transportation Plans for Fiscal Years 1994 through 2001, as well as Virginia's Transportation 6-year Program for Fiscal Years 2002 through 2008. We identified and assessed VDOT's funding history for the project. We also reviewed applicable Federal laws, regulations, and strategies governing Virginia's statewide transportation planning process as well as FHWA's review and approval of VDOT's Transportation Plans. In addition, we reviewed VDOT's TEA-21 apportionments and budget proposals. We met with FHWA officials and VDOT's financial officers to discuss actual and forecasted revenues.

EXHIBIT B. MAJOR CONTRIBUTORS TO THIS REPORT

THE FOLLOWING INDIVIDUALS CONTRIBUTED TO THIS REPORT.

<u>Name</u>	<u>Title</u>
Theodore Alves	Assistant Inspector General for Highway Infrastructure and Safety Programs
Michael Gulledge	Program Director
Loretta F. Swanson	Project Manager
Tom Sachs	Project Manager
Frank Schutz	Senior Auditor
Rodolfo Pérez	Engineer Advisor

Appendix. Management Comments



MEMORANDUM

Subject: **INFORMATION:** Federal Highway Administration
Response to OIG Draft Report, "Audit of the
Springfield Interchange Project"

Date: September 4, 2002

/s/ Frederick G. Wright for:

From: Mary E. Peters
Federal Highway Administrator

Refer to: HOA-1

To: Alexis M. Stefani
Assistant Inspector General for Auditing (JA-30)

Thank you for the opportunity to review the subject draft report. We have coordinated this response within the Federal Highway Administration (FHWA) and with the Virginia Department of Transportation (VDOT), as authorized by your office. We have concluded that all of the recommendations that apply to VDOT and our Virginia Division Office are worthy of implementation. The Division and VDOT have already begun implementing most of the recommendations. In fact, in the summer of 2001, the Division Office identified both fiscal constraint of the Statewide Transportation Improvement Program (STIP) and project cost estimates as areas of concentration for process reviews in our Stewardship and Oversight Program. The VDOT also agrees that all of the recommendations should be implemented. A copy of VDOT's comments on the report is attached.

The following is the FHWA implementation strategy:

Recommendation #1: Require VDOT to prepare resource-loaded schedules for the contract phases under construction and an integrated master schedule for the entire project.

Response: Concur. The FHWA will require that all existing and new contracts have resource-loaded schedules. We have already requested an integrated



schedule that looks at all of the projects together. The schedules for the existing contracts and the integrated schedule will be completed by December 2002. The VDOT has accepted this recommendation and response.

Recommendation #2: Require VDOT to prepare a finance plan for the entire Springfield project that includes reasonable cost estimates, adequate funding, and reliable schedules to meet the financing requirements of the Springfield project.

Response: Concur. A finance plan will be developed for the project, and work has already started for its preparation. The VDOT expects to submit the draft finance plan to FHWA by the end of September 2002. The VDOT has accepted this recommendation and response.

Recommendation #3: Validate that the information contained in the schedules and finance plan is reliable.

Response: Concur. The FHWA will review and approve both the schedules and the finance plan. The Division will work concurrently with VDOT to expedite the preparation and approval of a finance plan consistent with FHWA guidelines. We anticipate that the initial finance plan will be approved by November 2002.

Recommendation #4: Establish minimum standards for Virginia and other states to follow when preparing cost estimates for major projects valued at less than \$1 billion.

Response: Concur. In Virginia, VDOT and the Division Office have undertaken a process review to evaluate the cost estimating process for all stages of a project's life (i.e., planning, environmental, design, right-of-way, and construction). This will establish criteria for VDOT on developing future estimates. The completion of the resulting report and recommendations is anticipated by the end of September 2002. The VDOT has accepted this recommendation and response. From a national standpoint, FHWA is fully supporting an ongoing National Cooperative Highway Research Program (NCHRP) study entitled, "Best Practices and Development Guidelines for Cost Estimating," which is expected to be completed in February 2003. The study will specifically address the expressed concern of national guidelines in this area of project development. We will review the study results and utilize that information to develop a national perspective on this issue. Currently, Title 23 CFR 630.205, does provide for estimates of construction costs on projects and what such estimates must reflect.

Recommendation #5: Complete its planned review of VDOT's cost estimating process to ensure that it is sufficiently rigorous to generate reasonable estimates of project costs.

Response: Concur. The same response as #4.

Recommendation #6: Validate that Virginia’s revised Transportation Plan is financially achievable and that it fully considers how deferring the Springfield Interchange High Occupancy Vehicle (HOV) connector ramps will affect the Capital Beltway and Woodrow Wilson Bridge.

Response (Part 1): Concur. The Virginia Division will confirm that the new STIP meets the intent of the fiscal constraint regulation. The new STIP is due December 6, 2002. The FHWA and VDOT are performing a process review that is addressing financial constraint development, which we expect to complete in October 2002. The outcome of this review will provide VDOT and FHWA information as to how we will assure financial constraint in future TIPs and STIPs.

Response (Part 2): Concur. The second part of the recommendation asked that we consider the effect deferring the HOV ramps would have on the Capital Beltway and Woodrow Wilson Bridge projects. Since the HOV ramps will connect to the HOV lanes on the proposed Capital Beltway project, they will not be effective until the Beltway project is complete. The Woodrow Wilson Bridge project has yet to determine if HOV lanes or Transit will cross the bridge. The bridge is being designed so as not to preclude the development of either option.

While FHWA accepts and will implement the recommendations of the report, we wish to clarify some sections of the report that we feel may be misleading. The relevance and merit of the recommendations are independent of our comments related to some of the text of the report. The following are several examples of statements that are either misleading or incorrect:

1. The report focuses on the fact that the project may be completed past the current 2007 estimated date. It fails to focus on the fact that the original completion estimate was for 2011, and that any completion date before 2011 should be considered a time savings and an illustration of the efforts to deliver the project as soon as possible. Currently, VDOT plans to advertise Phase VI/VII in December 2002 and Notice to Proceed with construction would be given in June 2003. Based on the amount of work in these phases, it is now estimated to be complete in spring or summer 2007. In addition, if Phases IV and V delay the project, the contractors would not earn an incentive payment, which is currently included in the estimate at \$13 million. This would offset increased costs due to late completion.
2. Throughout the document, it is stated that the HOV ramps were “eliminated” or “dropped.” They were not eliminated or dropped; they were deferred until the Capital Beltway project was brought forward. The Capital Beltway project will provide the HOV lanes that connect to the HOV ramps. Construction of the HOV ramps is included in VDOT’s Six-year Program for 2002-2008 under I-495. The estimate of needed funding is shown as \$71 million compared to \$84 million estimated by OIG. The Capitol Beltway project has been moved into the Development Phase with no new funding

programmed beyond the previously allocated \$4 million. Since actual construction of both the HOV ramps and the Beltway will begin some time after 2008, no construction costs are allocated.

3. The draft report indicates that delays on Phases IV and V will cause a \$49 million increase in the cost of the project. The \$49 million estimate was based on the results of a project briefing in February 2002. Since that time, the delay on Phase IV has been reduced from 470 days to 323 days with corresponding cost reductions and estimated costs for overhead, inefficiencies, and acceleration having been reduced from \$11 million to \$3 million, and construction inspection costs should similarly be reduced. The Phase V delay is now estimated at 358 days and estimated costs for overhead, inefficiencies, and acceleration have been reduced from \$7 million to \$3 million. Further refinement of delay should result in an estimate much closer to actual than the rough, undocumented estimate done for the February briefing.
4. The document continually states that the reason several projects were dropped from the VDOT's program was the overruns on projects. There were numerous factors that caused VDOT to postpone or drop projects, not the least of which was a reduction in estimated revenues in future years.
5. The audit indicates that the project's scope has been expanded by \$140 million for secondary improvements and design enhancements. As noted in the chart on page 12, \$54 million of this cost is for the congestion management plan, the information center, and the right-of-way costs added because of building the project so as not to preclude future ramps for single occupancy vehicles to and from the Franconia/Springfield Parkway.
6. Throughout the report, it implies that FHWA approved VDOT's 2002 Transportation Program. Page 2 specifically states that FHWA routinely approved plans submitted by VDOT. FHWA did not approve the Commonwealth Transportation Board program dated December 2001. It was never submitted to FHWA by VDOT for approval, and VDOT has no intention of submitting it.
7. The report repeatedly states that delays in completing the long bridge may cause delays in the start of future phases. The long I-95 southbound bridge on Phase IV is not being delayed. B-635, the bridge over the CSX Railroad and WMATA, is the bridge that has been delayed.
8. Page 13 – In reference to the statement that the cost of sound walls had not been approved by FHWA, it should be revised to read: "Costs for sound walls were not included in the estimate since they had not yet been found to be justified by the sound wall committee."
9. Page 13 – We are unaware of a \$1 million estimate for the congestion management plan. A Steering Committee was formed in 1995 to study

congestion management strategies. No costs were set at the beginning of the study. The committee recommended \$56 million for the program, which was later limited to \$28 million by the Chief Engineer.

10. Page 14, last line – The Division is not aware of the June 2002 estimate that is referred to in the sentence.
11. Page 18, last paragraph – The first sentence incorrectly indicates that the last phase was to be awarded in 2011. The target date for completion of the last phase is 2011.
12. Page 24, third paragraph – The Division has traditionally focused, as required by law, on the construction cost estimate at the time of Federal authorization because that is the time of the obligation of Federal funds. It is important to remember that at this time the State actually requests the funding for a particular project.
13. The draft report reveals confusion regarding transportation plans and programs. At the State level, there are State Transportation Plans and Statewide Transportation Improvement Programs (STIP). The STIPs must be financially constrained, but not the plans. Most State plans are policy documents and are usually not project specific. In developing State plans, finances should be considered but the term considered is much less demanding than the term constrained. Many State plans only project how much money they anticipate spending for various programs such as new construction or reconstruction, preservation, safety etc.

The STIP is a list of projects that will be undertaken in the next three years and the State must show that it has enough funds to complete those projects. At the metropolitan level, there are metropolitan plans and Transportation Improvement Programs (TIPs). Metropolitan plans are usually more specific than State plans and they do include a list of projects expected to be completed in the next 20 years. Metropolitan plans also have a financial plan associated with them. The TIP contains the projects expected to be undertaken in the next three years. The TIPs are subsets of STIPs. Since the STIPs and TIPs only cover the next three years, the information available is much more accurate than what one would expect in the long term metropolitan plan. Some of the projects listed in the metropolitan plan may be at the pre-design stage and therefore have not yet been subject to a rigorous cost analysis.

Some States have transportation improvement programs that cover more than three years. If so, the out years (those beyond three years) are not required by Federal law.

It appears to us that where the term State Plan is used, it should be either the STIP or the State's short-range program or the metropolitan plan. By

confusing these terms, the implication is given that the State plan requires much more rigorous financial analysis than current law demands.

Attachment



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, VIRGINIA 23219-2000

Philip A. Shucet
Commissioner

August 21, 2002

Roberto Fonseca-Martinez
Federal Highway Administration
400 North 8th Street
Room 750
Richmond, Virginia 23240

Dear Roberto,

Thank you for sharing with me the draft report on the Audit of The Springfield Interchange Project prepared by the Office of the Inspector General, Department of Transportation. I plan to use this report and the recommendation to bring positive change to VDOT's management of construction projects. My goal is to have excellent planning processes, good financial practices, and deliver projects on time and on budget. While some recommendations require clarification, VDOT will work with FHWA in implementing the six proposed recommendations applicable to VDOT.

A review of the draft report revealed several major themes that I believe need to be addressed to better reflect the cooperative spirit demonstrated by all agencies during the audit. Those are:

- An acknowledgment of the collaborative work of VDOT and OIG in the development of the final \$676M project estimate. In effect, VDOT accepted the cost analysis and conclusions of the OIG.
- An acknowledgment of the fact that the Springfield project is on schedule to be completed by 2007 at a final cost of \$676 million. Potential problems in Spring 2002 that could have delayed the project have been mitigated and the project is now on schedule.
- An acknowledgment of the collaborative work of OIG and VDOT in the understanding of the deferral of the Capital Beltway HOV ramps. These ramps were not arbitrarily eliminated from the Springfield project in the FY 01-06 Six Year Program; they were deferred until funding could be identified for the entire

Capital Beltway HOV lane project. You should be aware that that the Department has received at least one private proposal to build and operate HOV/HOT lanes on the Capital Beltway and that the upcoming Northern Virginia referendum contains funding Capital Beltway improvements.

- An acknowledgment of the fact that, while there were errors and omissions in the project cost estimates, there is no evidence that these were intentional or purposeful errors.

Attached is a schedule with detailed comments or proposed changes.
Again, thank you for an opportunity to review the report.

Sincerely

A handwritten signature in black ink, appearing to read "Philip A. Shucet". The signature is fluid and cursive, with a long horizontal stroke extending to the left.

Philip A. Shucet
Commissioner

Suggested Changes Audit of the Springfield Interchange Project

VDOT plans to fully implement all applicable recommendations contained in the report. However, the following comments are intended to correct either misleading or incorrect statements identified during our review.

(The strike throughs are for deleted text and the underlined words present text to be inserted. The text in parentheses represents comments to be considered in revising the report.)

- **Results In Brief, page 1, line four** - (2) ~~consistent~~ exclusion of certain reasonably anticipated and known costs from early estimates, (The language used should make it clear that, while there were errors and omission in the project cost estimates, there is no evidence that these were intentional or purposeful errors.)
- **Results In Brief, page 1, line six** - also ~~recently eliminated~~ deferred a key project segment. High Occupancy Vehicle (HOV) ramps to the Capital Beltway by a Commonwealth Transportation Board resolution dated August 17, 2000. The ramps were intended to reduce congestion and improve safety, and were considered a key design feature when this project was approved. (The Capital Beltway project will connect the HOV ramps and lanes. VDOT's 2002 through 2008 six-year program provides for construction under the I-495 project. Actual construction is not slated until after 2008, therefore, no allocations are included in the program.)
- **Results In Brief, page 2, second paragraph** - The ~~project~~ project's recently phase IV and V began to encounter construction problems beginning in late 2001 that, if not mitigated could delay project completion until 2008 or later. Recognizing these events, in May 2002 VDOT and OIG agreed that estimated project cost should be \$676 million. Subsequent to our fieldwork, we understand that VDOT has resolved these issues and have a firm contract schedule in place with an expected completion of summer 2007. ~~0ft going construction problems and the complexity of later project phases create significant risks of Further cost increases.~~ (We believe the report should acknowledge that the original completion date was 2011 and continues on track for an early completion. VDOT has made great strides in delivering the project early.)
- **Results In Brief, page 2, third paragraph, starting line three** - Virginia has eliminated many planned projects from its recent Transportation Plan because the cost of Springfield and other projects included in the plan were consistently underestimated and there were significant reductions in revenue estimates.
- **Results In Brief, page 2, third paragraph, last sentence** - delete sentence that reads, "Transportation Plans submitted... that were understated." (FHWA approves the PS&E documents. The estimates in the PS&E were usually more than the contract bid amount.)
- **Results In Brief, page 2, fourth paragraph** - When we discussed these issues with VDOT official in May 2002, they committed to raising their cost projection to the \$676 million computed by the OIG ~~correcting the problems~~, including resolving the contract

- issues on phases IV and V ~~increasing the project's cost estimate to \$676 million.~~
 However, given the history ...Transportation Plans are managed effectively. (This text does not acknowledge the collaborative work of VDOT and OIG in development of the final \$676 project estimate. In effect, VDOT accepted the cost analysis and conclusions of the OIG.)
- **Results In Brief, page 3, first paragraph** - Springfield project cost estimates have increased by \$435 million, from \$241 million in June 1994 to \$676 million in June 2002. The earlier estimate of 1994 was without benefit of the complete design plans for all the phases. For example, phases 6 and 7 were only recently completed with phases 4 and 5 completed in 2001. This accounts for some of the gap between early and current estimates.
 - **Results In Brief, page 3, second bullet** - VDOT understated early project estimates costs by \$236 million because ... for inflation. An analysis of the \$236.5 million is shown on Table 2. Need to strike "Of the \$236.5 million, \$110.9 million were cost that ~~VDOT identified between June 1994 and June 2002. The remaining \$135.6 million were cost we identified during this audit.~~ (While the OIG identified additional cost, it is not clear that the amount identified is \$125.5 million. This comment serves no real purpose. We recommend that all reference to dollars found by VDOT versus the OIG be deleted from this report. It leaves the impression that VDOT did not know about these costs.)
 - **Results In Brief, page 3, third bullet, fourth sentence** - delays on the second junction (\$20 to \$49 million), on phases 4 and 5 work. (The \$49 million was a very early cost estimate of the potential delays. The delays and corresponding projected cost have been mitigated through negotiations and planning sessions with the contractors.)
 - **Results In Brief, page 3, second paragraph, line one** - VDOT also ~~recently eliminated on August 17, 2000 by way of a Commonwealth Transportation Board resolution~~ deferred plans to complete HOV ramps to the Capital Beltway...was approved.
 - **Results In Brief, page 3, last paragraph** - In May 2002, VDOT officials and OIG agreed to increase the Springfield project cost estimate to reflect...Springfield costs as \$676.5 million. This estimate was based on recent construction issues identified, but not resolved at that time. Therefore, the cost estimate of \$676 million was a worst case scenario.
 - **Results In Brief, page 4, first paragraph, schedule delays** - In May 2002 we reviewed with VDOT the potential schedule delays. Until late 2001, the Springfield ... spring 2007 completion date. Delays have already added \$49 million to the estimated project cost and ...further costs. Subsequent to the May 2002 meeting, VDOT has resolved these issues and have a firm contract schedule in place with an expected completion for summer 2007. The project cost estimate is expected to increase by approximately \$20. The project will be delivered on time (summer 2007) and on budget (\$676million).
 - **Results In Brief, page 4, second paragraph, and line one - Insert** "There was a 1 year delay in constructing bridge 635 which impacted the construction of bridge 610. The year long delay will postpone the start of the next phase of construction by at least one year." Delete " A 1 1/2 year delay in constructing ... by at least 1 year.
 - **Results In Brief, page 4, third paragraph, line one** - VDOT has been using working schedules for each phase of work to evaluate and mitigate the delays. These schedules are required in the special provision, copy notes on all construction contracts. Although VDOT...

- **Results In Brief, page 5, Need For a Finance Plan For This Project is Compelling** - insert "and" before, (3) delete "(4) it is not using available schedule management tools." (VDOT does use tools to manage the projects. In fact, please refer to Exhibit A where the auditor indicated that they reviewed VDOT's primavera schedules and other data to draw conclusions regarding the critical path and current schedule delays. This demonstrates that VDOT does have the tools to manage the projects.)
- **Results In Brief, page 5, Need For a Finance Plan For This Project is Compelling, line 8** - encounter significant cost growth and costs are ~~approaching~~ two thirds of \$1 billion,
- **Results In Brief, page 7, Statewide Transportation Plans, third paragraph, line 5 and 9** - line 5 change the word **eliminated** to **deferred**, line 9 change the word **eliminating** to **deferring**
- **Results, Springfield Project, first paragraph, line 3** - delete the word "consistently"
- **Results, Springfield Project, first paragraph, line 11** - Delete "and the fact that project official are not using available schedules tools, (The department is using schedules provided by the contractors to manage and evaluate the project's progress.)"
- **Page 15, Table 2** - Do not show a distinction between the amounts VDOT found versus OIG.
- **Page 17, line 12** - concluded, and VDOT officials agreed, that project estimated cost...
- **Page 17, line 14** - change 1 1/2 year to 1 year.
- **Page 17, line 15** - delete the word "long"
- **Page 18, fourth paragraph, line 6** - change 1 1/2 year to 1 year.
- **Page 18, fourth paragraph, line 7** - insert "to run concurrently" after "on phase 5"
- **Page 18, fourth paragraph, line 7** - The delay have already added between \$20 and \$49 million to the estimated project cost and, ~~if not mitigated, will extend the project into 2008 and add further costs.~~
- **Page 18, fourth paragraph, line 10**-Delete " However, because ...will be mitigated."
- **Page 18, last paragraph, line 2** - Change 1994 to 1998. Also the last phase was to be completed in 2011.
- **Page 19, first line** - Change fall to June
- **Page 19, table 4** - Change phase 4 construction end to **Summer 04.**, Change phase 6 and 7 Construction start to **June 2003** from Fall 2003, Change phase 5 Construction end to **Fall 2003** from late 2003.
- **Page 19, line 4 and 16** - change 1 1/2 to 1 year.
- **Page 20, fourth paragraph** - Delete the entire paragraph. (VDOT does use tools to manage the projects. In fact, please refer to Exhibit A where the auditor indicated that they reviewed VDOT's primavera schedules and other data to draw conclusions regarding the critical path and current schedule delays. This demonstrates that VDOT does have the tools to manage the projects.)
- **Page 21,** - Delays add \$20 to \$49 million to project estimated costs.
- **Page 21, third paragraph, line 3** - delete "If not mitigated... add further costs."
- **Page 22, first paragraph,** - delete and (4) it is not.. management tools." Insert "and" before (3).
 - Page 24, 5th **paragraph, line 5** - delete word: "eliminated" and insert "deferred"