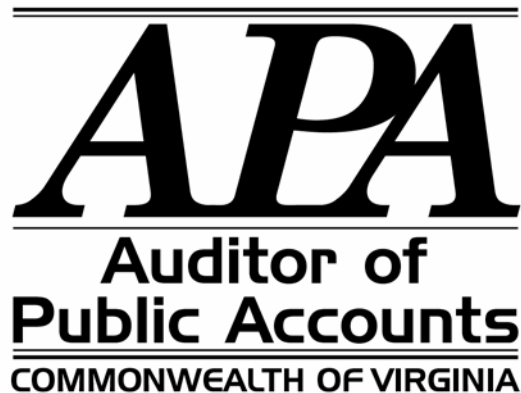


**FOLLOW-UP OF THE SPECIAL REVIEW OF
CASH MANAGEMENT AND
CAPITAL BUDGETING PRACTICES**

**VIRGINIA DEPARTMENT OF TRANSPORTATION
RICHMOND, VIRGINIA**



EXECUTIVE SUMMARY

Our review has found that Transportation has made significant progress or completed most of the recommendations made in our 2002 special report. Complete implementation of these changes will take at least four to five years.

Over the last two years, Transportation's management has started not only implementing recommendations, but more importantly begun implementing a change in the corporate and cultural structure of the organization. The success of change with Transportation will depend on whether a true structural change in organization takes place. The measure of success will require a substantial long-term commitment by management to not only making the change, but to prevent backsliding into Transportation's old approaches.

In some ways, the accomplishments to date are the easy part of change. The harder part lays ahead in funding and implementing new systems, continuing to make the changes to get closer to capital budgeting process, and overcoming Transportation's corporate and cultural structure to improve project management. The success of this effort is highly dependent on management guidance and direction, and current management has demonstrated their dedication towards this effort. If any management change occurs, it is essential that they have the same commitment; otherwise, progress may be negatively impacted.

Transportation is restoring fiscal accountability by implementing several budgetary and financial changes, including adopting a debt management policy and model. Additionally, they are establishing a methodology to identify statewide transportation priorities and developing project management policies.

Transportation has completed several budgetary and financial changes, including attempts to make the Six-Year Improvement Program a realistic management tool and reduce the projects with a deficit status. However, to ensure accurate matching on cash inflows and outflows, Transportation must begin estimating the cost of projects by fiscal year. Transportation does not currently have sufficient controls and processes in place to manage the rate at which they spend funds.

For major projects, Transportation has begun assigning a project management team that follows a project from its inception to its completion. However, it is still too early in the process to determine if the policies put into place will provide Transportation with better project management. However, the actions to date are those considered best practices in both the private and public for large organizations.

Maintenance is still an area of concern at Transportation. The growing maintenance requirements and the limited ability to budget on a needs-based approach increases the risk of inappropriately applied funding. Once the asset management system is fully implemented a needs-based approach will be possible and Transportation will be able identify and prioritize maintenance projects.

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Governor of Virginia
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The Honorable Lacey E. Putney
Chairman, Joint Legislative Audit
and Review Commission
General Assembly Building
Richmond, Virginia

We have completed our review of the Department of Transportation as required by Item 484 G. of Chapter 4 of the 2004 Acts of Assembly and submit our report entitled, **"Follow-Up on the Special Review of the Cash Management and Capital Budgeting Practices for the Department of Transportation."** We conducted our review in accordance with the standards for performance audits set forth in Government Auditing Standards, issued by the Comptroller General of the United States.

Objectives

We had three objectives for our review of Transportation. These objectives were:

1. to provide an update on Transportation's, the Commonwealth Transportation Board's, the General Assembly's, and the Governor's progress on implementation of the recommendations made during the "Special Review of the Cash Management and Capital Budgeting Practices;"
2. to document any new legislation resulting from the special review and to determine whether Transportation has developed plans to address such legislation; and
3. to ensure that Transportation is committed to implementing the recommendations and properly monitoring the implementation process.

Scope

Our review procedures included requesting and reviewing various documents related to this project including the following: strategic plans, policy and procedures manuals for project management, revenue forecasting reports, and various technical reports obtained from the agency and used for management decisions, including reports issued by the Department of Transportation discussing the status of prior recommendations. We conducted interviews with Transportation personnel to document various processes related to funding and financing sources, allocations, development of the Six Year Program, cash flow and

forecasting, construction and maintenance operations, and automated information systems. We researched the Code of Virginia and federal regulations for statutes that govern these processes.

We would like to thank Transportation's management and staff for their cooperation and professionalism throughout this review. Without their knowledge and contributions, this report would not be possible.

We discussed this report with Transportation's management and included their response in Appendix C.

AUDITOR OF PUBLIC ACCOUNTS

CHAPTER 1

INTRODUCTION

In February 2002, the Governor requested that the Auditor of Public Accounts conduct an operational and performance review of the Department of Transportation (Transportation). We issued and presented a report entitled: “**Special Review of the Cash Management and Capital Budgeting Practices**” to the Commonwealth Transportation Board (Board) in July 2002. The report included 62 recommendations addressing Transportation, the Board, the Governor, and the General Assembly. Transportation and the Board began developing plans to implement the recommendations addressed in the report. The Secretary of Transportation designated a Board committee to address the recommendations addressed to the Board, the Governor, and the General Assembly. Transportation was specifically responsible for implementing the remaining recommendations. Transportation has developed a work plan with ‘deliverables’ needed to fully implement the recommendations.

During the 2003 General Assembly session, the Governor proposed changes for Transportation. In summary, the Governor’s legislative package required Transportation to do the following:

- adopt a detailed financial plan for all construction projects in excess of \$100 million;
- report to the public and General Assembly on a quarterly basis on the status of every state highway construction project;
- take a more proactive approach in working with local governments; and
- develop an innovative congestion relief program in conjunction with the Department of Rail and Public Transportation for the most heavily traveled areas of the Commonwealth.

As a result, the General Assembly passed House Bill 2259 and Senate Bill 869 to address these changes. This legislation included the following general provisions:

- a financial plan with minimum specified content for projects valued at more than \$100 million;
- a periodic report with specific information for every project in the Six-Year Improvement Plan;
- the Board to coordinate with local governments in developing comprehensive transportation plans; and
- the Board to adopt the Six-Year Improvement Plan by July 1 of each year.

During the 2004 session, the General Assembly directed the Auditor of Public Accounts to conduct a follow-up status review of the July 2002 special review. Additionally, budget language requires the Auditor to “review Transportation’s implementation of the cash and expenditure forecasting model, project cost estimating system, and the development of the Six-Year Improvement Program as a financially-constrained budget.” The purpose of this report is to include Transportation’s progress towards implementing all the recommendations made in the cash management and capital budgeting practices report.

Status Of Recommendations

In performing our follow-up review, we found that the Board committee and Transportation have made progress on the recommendations. We reviewed Transportation’s quarterly reports to the Joint Legislative Audit and Review Commission (JLARC), which discuss Transportation’s progress towards

implementation of the recommendations. According to the September 2004 update, the responsible parties have implemented the majority of recommendations and the remaining issues are under development.

Many of these recommendations require the development of policies or methodologies to increase accountability and fiscal integrity. We do not argue that Transportation has developed many of these policies and methodologies; however, the long-term success of these efforts is dependent upon continuous monitoring and measuring of performance.

Transportation's preparation of the Six Year Improvement Program (SYIP) is an integral part of improving cash management. The SYIP will need to include needs determination, cash management, monitoring, and communication and have the support of accurate and reliable automated information systems. This change will need to consider using statewide priorities rather than the current district allocation.

This report provides a status update on Transportation's effort to implement the recommendations. A detailed discussion of Transportation's processes and the agency's relationship to other transportation agencies was included in the Commonwealth Transportation Report dated October 15, 2004. We will not be repeating that information in this report.

Chapters 2 through 5 discuss changes in the six-year plan and management. Chapter 2, "Resources," discusses recommendations involving resource allocation, including changes to the federal revenue forecast and debt management processes.

Chapter 3, "Prioritization," discusses how the Commonwealth's transportation construction project priorities are developed. In this chapter, we address the progress of several recommendations including establishing and implementing objective criteria for project selection and prioritization of project lists for the SYIP.

A discussion on how Transportation is now approaching long-range planning including project cost and budget oversight is included in Chapter 4, "Construction Project Management and Capital-Based Budgeting." Here we address the recommendations to improve accountability of the SYIP and general management of the process.

The development and implementation of policies and procedures are important; however, there must also be systems in place to provide appropriate monitoring and control of information. Chapter 5, "Monitoring," discusses the need to actively monitor the state of Transportation's policies and improve their systems to ensure the changes discussed in this and other chapters are successful.

Chapter 6, "Maintenance and Asset Management," reports on the progress Transportation has made on several of the maintenance recommendations including efforts to develop financial policies and a needs-based asset management system. Transportation must continue its efforts to ensure that there are systems and policies in place to identify and prioritize maintenance and funding requirements.

Chapter 7, "Systems Environment and Development," discusses the changes made to the systems at Transportation that gather and keep the information necessary to manage projects and plan and monitor cash flow. Properly operating systems that provide timely and accurate data are part of Transportation's long-term solution.

A complete list of the 2002 special review recommendations and their current status is included in this report as Appendix B. Though Transportation and the Board have made progress on each of these recommendations, we rarely consider the status complete. As noted in Chapter 5, "Monitoring," the

implementation of policies and procedures is a beginning; however, it will take long-term monitoring and management oversight to ensure Transportation continues progressing with these changes.

Observations

Our review found that Transportation has made significant progress or completed most of the recommendations made in our 2002 special review. Transportation has been undergoing a major reorganization and is working to restore fiscal accountability. The agency is implementing several budgetary and financial changes including adopting a debt management policy and model. Additionally, they are establishing a methodology to identify statewide transportation priorities and developing project management policies.

While Transportation is making progress in their ability to forecast resources, they face several challenges in the process, which include refining the forecast with uncertain federal funding and public pressures to increase construction projects with near stagnant resources. The ultimate goal is to match prioritized project and maintenance budgets to available resources. Transportation can only accomplish this goal with accurate and reliable revenue forecasts, realistic project budgets, and sound project management. The success of this goal is also dependent on developing systems that support these activities and can provide accurate project cost estimates and payment forecasting.

This approach makes the SYIP sensitive to changes in cash flow. Therefore, policy makers need to consider a way to mitigate the impact of economic changes and project timing issues that could affect both revenues and payments. As Transportation continues to fine tune their planning, having a cash reserve becomes a more critical component of the process.

Transportation is also developing statewide transportation priorities in the 20-year plan known as VTrans2025. However, unless legislative changes occur, this process will have no direct effect on the allocation of construction resources throughout the Commonwealth. The Code of Virginia will continue to direct the allocation of resources and the statewide transportation priorities will only continue to serve as a tool to begin projects within districts by road system.

While Transportation has the mechanism to provide the information to prioritize projects both statewide and by district, they do not have the authority to adjust the funding to meet these priorities. The Governor and the General Assembly will need to determine how Transportation uses this information.

Transportation is making progress towards capital-based budgeting; however, it will take several years to fully implement this policy. Transportation has completed several budgetary and financial changes, including attempts to make the SYIP a realistic management tool and reduce the projects with a deficit status. However, to ensure accurate matching on cash inflows and outflows, Transportation must begin estimating the cost of projects by fiscal year. Transportation does not currently have sufficient controls and processes in place to manage the rate at which they spend funds.

For major projects, Transportation has begun assigning a project management team that follows a project from its inception to its completion. It is still too early in the process to determine if the policies put into place will provide Transportation with better project management. However, the actions to date are those considered best practices in both the private and public for large organizations.

Maintenance is still an area of concern at Transportation. The growing maintenance requirements and the limited inability to budget on a needs-based approach increases the risk of inappropriately applied funding. Once the asset management system is fully implemented, a needs-based approach will be possible and Transportation will be able identify and prioritize maintenance projects.

Transportation should continue to make the implementation of the asset management system a priority. There is no way to appropriately fund maintenance needs without an asset management system that provides sound data and decision-making tools. Transportation should then perform analyses to identify its true maintenance needs on a statewide level.

Transportation should also work to enhance the make-versus-buy analysis when determining whether to use state forces or contract out, taking into consideration the costs and benefits associated with each option. Transportation should develop policies and procedures to standardize this decision-making process.

Transportation has developed IT policies and procedures; however, success of these initiatives to meet enterprise-wide needs is dependent on Transportation's commitment to enforcing and monitoring their IT policies and data standards requirements. Failure to comply with or enforce these IT policies and standards will result in systems that do not meet enterprise-wide needs or support the agency's mission.

All of the changes and actions taken by Transportation have begun to improve communication, increase the sense of accountability, and enhance monitoring and oversight. These actions require adoption of a long-term commitment to changing and enforcing these changes. However, like many of the changes in this and other areas, to make these changes permanent will take time and commitment of several years to effect. More importantly, there will need to be constant attention to making sure Transportation staff follows these changes.

Monitoring provides information, which clearly shows Transportation's performance and therefore, is one the first areas to suffer if the news is not good. This makes having management's long-term commitment to overseeing the changes critical.

Implementing these changes has been a significant and continuous endeavor that we expect will take Transportation at least four to five years to complete. The success of this effort is highly dependent on management guidance and direction, and current management has demonstrated their dedication towards this effort. If any change in management occurs, it is essential that new management has the same commitment; otherwise progress may be negatively impacted.

Future Challenges

When we conducted the 2002 review, Transportation's management relied heavily on a compartmentalized approach for all projects and tasks. Cross-functional responsibilities and authorities did not exist and the flexibility to do something different required extensive approval. There existed a further disconnect between financial accountability and project management. While "on time and budget" existed as an idea, management did not hold anyone accountable for this objective.

In addition to our report, by 2002, Transportation had received a series of reports from the Joint Legislative Audit and Review Commission (JLARC) and other internal and external study groups recommending changes. In addition to implementing the recommendations from our review, Transportation has also implemented many changes identified in these other reports.

Over the last two years, Transportation's management has started not only implementing recommendations, but more importantly has begun implementing a change in the corporate and cultural structure of the organization. The success of change within Transportation will depend on whether a true structural change in the organizational culture takes place.

While Transportation has completed or has underway a number of our recommendations and those from other reports, the measure of successful change will require a substantial long-term commitment by

management to not only making the change, but also prevent backsliding into Transportation's old approaches. In viewing this or any report on the changes at Transportation, the reader needs to focus not only on the accomplishments, but on the processes to continue the improvement.

In some ways, the accomplishments to date are the easy part of change. The more difficult challenges lay ahead in funding and implementing new systems, continuing to make the changes to get closer to a capital budgeting process, and overcoming Transportation's corporate and cultural structure to improve project management.

Finally, both Transportation and policy makers need to create an organizational structure that adapts to changes. With questions of future federal funding, increased emphasis of public-private partnerships, and more reliance on local governments, these and other changes indicate that Transportation management needs an organizational structure that can deal with change.

CHAPTER 2

RESOURCES

Transportation receives both state and federal revenues that support the Commonwealth's transportation system. State revenues consist of various taxes and fees that support the two primary Transportation funds; the Highway Maintenance and Operating Fund and the Transportation Trust Fund. The sources dedicated to highway funding are specific transportation user fees and taxes such as fuels tax, motor carrier fees, vehicle titling fees, and a half-cent state sales-and-use tax. Our Commonwealth Transportation Fund Report, issued October 2004, includes a detailed discussion of Transportation revenue sources and uses.

This chapter discusses the status of recommendations from our 2002 special review involving resource allocation includes changes to the federal revenue forecast and debt management processes. Chapter 4, Construction Project Management and Capital-Based Budgeting, details the development of a cash flow model, which will align projected cash payouts to revenues received. The following are the specific recommendations discussed in this chapter:

- Budget federal revenues based on obligation authority;
- Establish a policy on how to decide if and when to issue future Federal Reimbursement Anticipation Notes (FRANs);
- The General Assembly should consider involving the Debt Capacity Advisory Committee (DCAC) to develop debt guidelines;
- The General Assembly may wish to provide guidance on how Transportation should pay debt service in relation to the allocation of resources within the SYIP; and
- Determine a minimum cash balance and consider creating a revenue reserve fund.

Our review has found that Transportation has completed or made significant progress on several budgetary and financial changes, including adopting a debt management policy and model and basing federal revenue estimates on obligation authority rather than apportionments. However, the success of these changes depends on Transportation's compliance with the newly established policies and procedures and the funding forecasts remaining stable.

Transportation faces two critical funding issues. First, Transportation must forecast federal revenues under the TEA 21 guidelines. Though 14 months have passed since the federal legislation, TEA 21, expired, Congress has extended its provisions six times. The latest extension will expire in May 2005. A major change in this federal legislation could change the current Transportation revenue forecasts for the Commonwealth. Second, neither the Governor nor the General Assembly should initiate or approve transferring transportation revenues to the general or other funds.

Federal Transportation Funding

Transportation, in addition to the biennial budget submissions, issues a yearly budget in June before the beginning of the new fiscal year. It details federal and state revenue forecasts by fiscal year. Our Commonwealth Transportation Fund Report includes a detailed discussion on the Commonwealth's revenue forecasting processes. Basically, the Department of Taxation (Taxation) develops the state portion of the estimates, while Transportation's Office of Financial Planning develops the federal portion.

Federal revenue is a large portion of Transportation's annual budget. Transportation receives federal revenue mainly from the Federal Highway Administration (FHWA) under the Federal-Aid Highway Program and TEA-21 federal funds assist in providing for construction, reconstruction, and improvement of highways, eligible federal highway routes, and other specific uses. In fiscal year 2004, federal transportation revenues were 29 percent of the total revenues allocated for Commonwealth transportation funding.

The largest variance between forecasted and actual revenues has been primarily due to the disconnection between federal apportionment and reimbursement. Before projects begin and Transportation receives reimbursements, the federal government assigns funds to the states through apportionments. Apportionments are amounts of projected federal funds that are available to the states based on formulas prescribed by law. The annual apportionment amounts are provided by FHWA in a series of tables, organized by federal fiscal year, providing the amount of federal transportation apportionments each state can expect. Once the states receive these tables, they are used to identify the federal funds available for planning future projects.

Federal-aid highway funds are available for use for more than one year and most categories are available for four years. Therefore, unused (unobligated) balances carry forward to the next fiscal year. After they expire, the federal government redistributes the funds among other qualifying states. This gives the states more freedom in planning projects as well as project scheduling. Congress controls spending by establishing an annual obligation authority, which indirectly limits the future disbursement of federal funds. In addition, a federal budgeting mechanism, called RABA (revenue-aligned budget authority), compares current estimates of highway account receipts with the estimated apportionments released in TEA-21. This mechanism combines a look back at the prior fiscal year and a look ahead at the current estimate of receipts for the coming budget year. Based on that comparison, FHWA adjusts both obligation limitation and authorizations to the Federal-Aid Highway Program and the budget caps for the highway categories. Therefore, TEA-21 could have originally set higher estimated apportionments, but after adjustments, these could fall below the forecasted amounts.

To commit federal funds to a specific project, Transportation and FHWA execute a federal project agreement to obligate specific federal funds. The project agreement and obligation process is done before initiation of the project. It also utilizes a portion of the state's annual obligation authority (OA). OA locks the federal apportionment for a specific use and must have a reimbursement request submitted to it within one year of the designation. This helps to manage the OA funds and minimize the amount of expired apportionments. Additionally, to control spending, TEA-21 includes a ceiling that limits the total amount of apportionments eligible to be committed or obligated for reimbursement in a given year.

Prior to fiscal year 2003, Transportation, not taking into account the ceiling, assumed and budgeted for the full, carried-forward apportionment amount. This affected Transportation's ability to estimate federal apportionments accurately. This practice overstated Transportation's budgeted resources and increased the risk Transportation would over commit the Commonwealth on construction and maintenance contracts. Therefore the Commonwealth's practice to budget based on apportionments often caused large differences in budget-to-actual revenue forecasts.

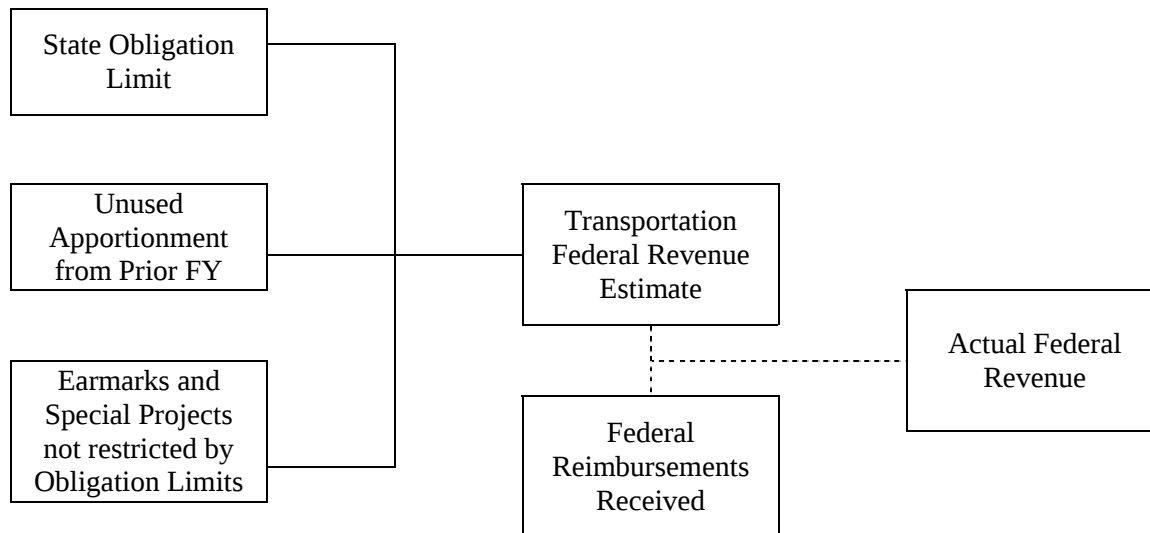
Our 2002 review recommended that Transportation continue to take into account apportionment changes and obligation authority in developing its federal revenue estimates. This recommendation also stressed the importance of taking into consideration projected reimbursement requests to better align budget revenues with actual reimbursements. Transportation has worked to improve its project estimation with major changes to the SYIP. Chapter 4, "Construction Project Management and Capital-Based Budgeting," presents a discussion of these changes. In addition, in order for the Board to make decisions about how to assign new annual federal apportionments to projects, the SYIP must allocate those apportionments. This

assignment of apportionments will become federal reimbursement in future years. Transportation plans to also develop a companion document to the SYIP that documents each project's anticipated cash flow.

Beginning with the 2004 forecast, Transportation considered the TEA-21 ceiling in its budget process. This process, illustrated in Table 1, estimates revenues by taking into consideration the published obligation limit for Virginia's unobligated apportionments from fiscal year 2003, plus earmarks and other special projects not restricted by obligation authority.

Table 1

Federal Revenue Process



FRAN Debt

Transportation debt includes bonds issued for roads and bridges in addition to Federal Revenue Anticipation Notes (FRANs). However, most of the non-FRAN debt relates to a specific project having a dedicated revenue stream such as tolls. FRANs are short-term debt instruments, which commit the Commonwealth's future reimbursements from the Federal Government to debt service and can restrict which projects are undertaken.

Before 1995, states could only obligate their Federal highway apportionments to repay the principal component of debt service of a highway project or for federal project reimbursement. However, due to many states' demands to accelerate completion dates of projects and to defray the initial impact of debt service, Congress agreed to a new approach.

The Grant Anticipation Revenue Vehicles (GARVEEs) is the Congressional answer to this demand. GARVEEs allow states to issue state originated debt based on future apportionments. The states may use the revenues from these bonds as they see fit for transportation projects. Based on this GARVEE authority, the Commonwealth issued its own FRANs. The Virginia Transportation Act of 2000 (VTA) authorized the issuance of FRANs to fund specific transportation projects in the Commonwealth. Repayment of these FRANs comes through reimbursements received from the federal government, the Transportation Trust Fund (TTF), the Priority Transportation Fund (PTF), or through an appropriation by the General Assembly. The structure of Virginia's anticipation notes allows use of their revenues for any construction or maintenance

project in the state and as a revolving line of credit. By the end of fiscal 2004, nearly \$790 million remained outstanding of a total \$900 million FRAN debt issued.

Table 2

FRAN Debt Service/Repayment Schedule

<u>Fiscal Year</u>	<u>Total Outstanding Principal</u>	<u>Interest</u>	<u>Total Debt Service (principal + interest)</u>
2003	\$ 898,320,000	\$ 31,453,341	\$ 65,058,341
2004	864,715,000	40,452,170	118,522,170
2005	786,645,000	36,829,020	118,764,020
2006	704,710,000	33,100,497	118,680,497
2007	619,130,000	28,908,865	118,298,865
2008	529,740,000	24,268,432	118,228,432
2009	435,780,000	19,389,084	118,059,084
2010	337,110,000	14,250,972	117,970,972
2011	233,390,000	8,881,969	117,831,969
2012	124,440,000	4,656,108	65,386,108
2013	<u>63,710,000</u>	<u>1,557,356</u>	<u>65,267,356</u>
Total	<u>\$5,597,690,000</u>	<u>\$243,747,814</u>	<u>\$1,142,067,814</u>

Interest as a Percentage of Total Debt Service: 21.34%

Source: FRANs Debt Capacity Model

The SYIP assumes the sale of \$532.6 million in FRANs by fiscal year 2008. The Board has not issued any FRANs since the fall of 2002; however, there are plans to issue a portion of this \$532.6 million during the spring of 2005.

FRAN Debt Guidelines

The 2002 review recommended that Transportation establish a debt capacity model similar to the Commonwealth's model for determining the level of debt to incur. This recommendation included using the Debt Capacity Advisory Committee (DCAC) to recommend guidelines for issuing transportation debt.

This policy is important because FRANs require a commitment of future federal transportation apportionments, which means federal dollars originally designed for future projects are not available. Second, the original bond sale structure in 2001 required that actual federal apportionments remain as high or higher than original projections.

The Board adopted a debt management policy for transportation debt in consultation with the DCAC and Department of Treasury. In November 2003, the Board presented the model developed by Transportation to the DCAC.

This model reflects several key elements, including:

- limiting debt service to not exceed 25 percent of federal reimbursements;
- measuring federal revenue as the average of the prior six-year federal fiscal year reimbursements;
- establishing an interest rate measure based on a municipal index; and
- establishing the model with a maximum of ten-year maturity.

The DCAC endorsed this policy. The policy takes a conservative approach by determining how much federal funding can be committed to debt service and measuring federal revenues based on past reimbursements rather than future apportionments.

Transportation Revenues Used for General Funds

For budgetary reasons, Governors and the General Assembly have periodically initiated or approved transfers of transportation revenue to the general fund for purposes other than transportation. For example, the 2002 Appropriation Act included a transfer of \$317 million and a commitment that the General Fund would make future appropriations transfers back to Transportation for debt service. To date, the General Assembly has appropriated \$114.8 million from the general fund.

This type of action is a one-time fix for long-term problems. The conversion of Transportation funds to debt not only affects the current year's Transportation projects but also significantly affects the SYIP and other long-term transportation plans.

Minimum Cash Balance for Transportation Construction

The 2002 review recommended that Transportation determine an appropriate minimum cash balance to maintain as a reserve. The cash reserve is necessary to meet revenue receipt fluctuations and timing differences between receipts and construction payments. Under the best forecasting model, seasonal cash fluctuation can and do occur.

Transportation is currently working to develop a minimum cash balance for construction. The main obstacles to establishing this balance are continued project deficits and unanticipated events. These project deficits include borrowing allocations from new construction projects to complete those in progress. Transportation's aim is to develop a cash balance of up to \$500 million to ensure a positive cash flow and minimize the need to incur project deficits and further FRAN debt. We find their actions, to date, are reasonable, but Transportation needs to continue to develop this cash balance.

Transportation Construction and Revenue Reserve Fund

Our 2002 review also recommended that the General Assembly may wish to create a Transportation Revenue Reserve Fund that would act like a Rainy Day Fund for the Transportation Trust Fund. Additionally, the General Assembly may wish to restrict availability of these funds from other uses. This fund would cushion the effects of economic downturns where revenues are less than anticipated.

Chapter 4 of the 2004 Acts of Assembly empowers the Secretary of Transportation to establish a minimum cash balance or reserve from the Highway Maintenance and Operating Fund to act in part as a reserve fund for economic downturns. However, as discussed in Chapter 6, maintenance expenses currently exceed allotments to the fund so it will be difficult for Transportation to justify creating a cash balance when needs exceed available resources.

Matching Receipt of Revenues with Construction Payment Schedules

Revenue forecasts drive the construction project planning and therefore, the accuracy of these forecasts is critical to maximizing the projects in the SYIP. Further, it is important to integrate cash flow information into the SYIP to forecast, monitor, and manage cash throughout a fiscal year. This includes the agency's ability to match expected revenue receipts with construction payments.

To address this concern, Transportation is developing an internally-integrated SYIP (iSYIP) which consolidates project level estimates, expenses, and schedules from other Transportation systems and takes this information to predict individual project needs for the next six-year period. These project needs come out of revenue line items from various federal and state revenue sources. The Programming Division, when developing the SYIP and the Secondary Six-Year Plan (SSYP) allocates the funding amounts to the various projects throughout the iSYIP. Transportation has policies that require a project to have an estimate before it adds it to the iSYIP. Therefore, when fully implemented, the iSYIP tool will serve as a control to ensure that Transportation does not schedule projects that cannot possibly have allocations to match them.

iSYIP is a new planning tool for construction and currently, Transportation does not have the ability to match revenues and projected expenditures as part of their annual operating budget or biennial budget submissions. Many projects currently under construction did not originate in the iSYIP and did not necessarily have all pre-planning scoping completed as is now required.

Overall Status of Resource Recommendations

While Transportation has made progress in their ability to forecast resources, they face several challenges in improving the process, which include refining the forecast in a period of uncertain Federal funding and pressures to increase construction projects with limited resources. The ultimate goal is to do as many projects as possible with available resources. This goal envisions a near perfect matching and timing of payments with the receipt of revenue. Many factors affect meeting this goal, which depends heavily on having systems to support these activities, accurate construction budgeting, and payment forecasting.

Finally, this approach makes the SYIP highly sensitive to changes in cash flow. Therefore, while Transportation makes the changes, all policy makers need to consider a way to cushion the impact of outside economic changes that could affect both revenues and payments. As Transportation continues to fine tune their planning, having a cash reserve becomes a more critical component of the process.

CHAPTER 3

PRIORITIZATION

The transportation needs and demands of the Commonwealth have historically always exceeded available resources. This situation has created the need for the Board, Transportation management, and the General Assembly to find ways to invest the limited funds that are available for transportation construction projects.

The General Assembly has clearly shown its intent, through legislation, that Transportation should prioritize projects by focusing on the needs of the state as a whole and has placed this responsibility for the development of the priority criteria with the Board. This chapter discusses how the Commonwealth's transportation construction project priorities are developed. We also address the progress of several previous recommendations including:

- establishing and implementing objective criteria for project selection and prioritization; and
- prioritizing project lists for the Six-Year Improvement Program (SYIP).

Six-Year Improvement Program

The Six-Year Improvement Program (SYIP) is the mechanism the Board uses to schedule and program projects. It outlines the Board's plan to distribute available funds for ports, airports, public transit, rail, and prioritized highway construction projects in the current fiscal year and for the next five fiscal years. Currently, Transportation is operating under the 2005-2010 SYIP.

In the past, many of the decisions to start or add projects to the SYIP appear to have been motivated more by a project's popularity or the desire to begin as many projects as possible rather than develop a realistic, deliverable project plan. Transportation staff and the Board did not follow established, objective criteria to determine project selection and authorization. They also did not consider available resources for long-term project funding. Policy makers encouraged this environment and the construction program expanded dramatically.

Eventually, Transportation experienced cash shortages resulting from the lack of cash and project management and by not matching construction projects in the SYIP to available resources. In an effort to correct the plan, Transportation removed 166 projects in the fiscal year 2003 SYIP. To address the long-term need for objective criteria to determine project selection based on available resources, Transportation has developed a project prioritization process, which incorporates the goals of the 20-year plan (VTrans2025) and performance objectives.

VTrans2025

Both our 2002 report and legislation adopted by the 2002 session of the General Assembly directed the Board to develop a statewide multimodal long-range transportation plan with a statewide focus that should minimize the impact of regional and local influence over the transportation planning process. The legislation calls for the development of the plan in three phases and identifies specific deliverables for each phase. This plan, titled VTrans2025, is a combined effort of the four state transportation agencies. VTrans2025 is a formal planning effort that analyzes the future trends and needs of highway motorists, rail and transit passengers, freight shippers, airline travelers, cyclists, and pedestrians.

Each of the four state transportation agencies develops a needs assessment, which feeds into the statewide intermodal plan. These plans begin the process for prioritizing projects for inclusion in the SYIP. The needs assessment is a statewide analysis of highway deficiencies and potential highway solutions. This needs assessment is the foundation for identifying problem areas and incorporating these projects into a State Highway Plan.

Taking into consideration existing local and regional transportation plans, the State Highway Plan contains a list of recommendations for the Interstate and Primary highway systems. The development of transportation project priorities includes making a long-term assessment of transportation needs in the Commonwealth and then converting these needs into projects. This long-term plan, referred to as VTrans2025, identifies the Commonwealth's long-term transportation priorities. The following is a discussion of both of these planning and project prioritization processes.

VTrans2025 and Transportation Project Prioritization

Transportation is currently developing a three-step tool to analyze highway construction needs in the Commonwealth. The steps include identifying highway construction needs and deficiencies and then using this information to create a prioritized project list. Once Transportation completes its development, the Board will formally introduce the assessment tool in the VTrans2025 Phase 3 report.

For prioritization purposes, Transportation divides the Commonwealth's road system into two distinct categories. The first category is Interstate Highways, which include all roads in the Interstate Highway System. The second category is Primary Systems, which include all federal and state roads not part of the interstate system, but still maintained by Transportation. Secondary and Urban Systems are roads managed by localities, and are not included in the assessment tool. In developing the 2006-2011 SYIP, Transportation will prioritize Interstate projects on a statewide basis, and Primary projects by Transportation District, resulting in two recommendation lists.

To perform the first step, beginning this fiscal year, Transportation will use the 2025 Highway Needs Assessment Model to establish a technical and objective method of identifying system-wide highway needs, purposefully not taking into consideration physical and financial constraints. Transportation examines highway needs using Levels of Service (LOS) and other transportation related criteria. LOS refers to roadway traffic volume, either actual or potential, and its relationship to total roadway capacity. Transportation measures LOS for road systems, individual roads, and even sections of roads.

To run the 2025 Highway Needs Assessment Model, Transportation developed the Statewide Planning System (SPS). The SPS is a database that compiles LOS data and other variables to develop capacity projections for a given highway, segment of highway, or interchange. These projections are available up to thirty years in the future. Using this information, the SPS system can estimate critical points or dates for highway construction needs. Not only does this system provide capacity projections, but it can also provide rough construction cost estimates adjusted for inflation. Information obtained at this step allows Transportation to compare relative highway needs statewide and between the individual Transportation construction districts.

The second step of the process is the development of the 2025 Statewide Highway Plan. This plan identifies current and future deficiencies that may require more immediate attention as well as a longer-term approach. It also takes into account the needs identified by the needs assessment program and compares them with the needs of localities and planning commissions, constructability issues, and potential alternative solutions. The final product is a comprehensive list of all possible construction projects in the state.

The third step in the process is the creation of the Highway Prioritization list. This list takes the product of the 2025 Statewide Highway Plan and applies a set of criteria to prioritize these projects. Transportation based these criteria on a set of goals and objectives derived from the VTrans2025 effort. Table 3 is a draft list of these goals.

Table 3

2025 Highway Prioritization Draft Goals

Goal 1: Provide a transportation system that facilitates the efficient movement of people and goods.

Goal 2: Provide a safe and secure transportation system.

Goal 3: Retain and increase business and employment opportunities.

Goal 4: Improve quality of life and minimize potential impacts to the environment.

Goal 5: Preserve the existing transportation system and promote efficient system management.

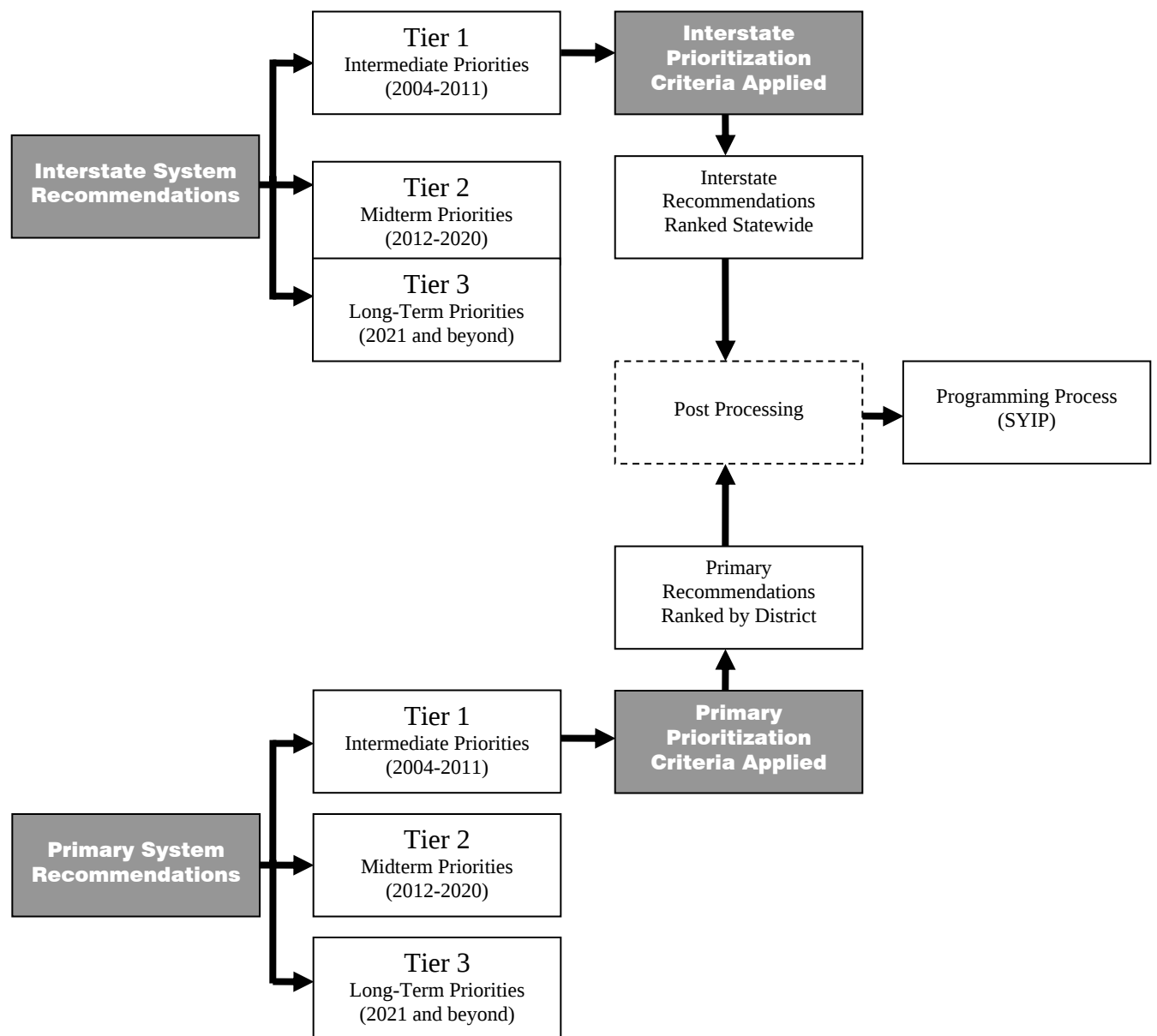
(Source: Transportation Planning Division)

To incorporate these goals into the process, Transportation assigns a series of objectives and performance measures to establish a quantitative assessment for projects statewide. With LOS as a main driver, Transportation applies the measures to segments of a highway, a specific highway, or a complete highway system, providing a ranking for each measure. Transportation then uses this ranking to establish a prioritization schedule for projects.

In order to comply with the Code of Virginia, the State Highway Plan covers a 20-year timeframe of Commonwealth road construction. Therefore, the plan includes projects for both present and future needs. In consideration of this, Transportation developed another project ranking stage based on project priority, completion time, and timing of the project need.

As illustrated in Chart 1, Transportation applies these tiers to Interstate and Primary highways separately. Transportation then applies prioritization criteria to Tier 1 projects and develops two project recommendation lists. At this point, post processing of priorities occurs. In post processing, Transportation obtains public feedback from fall planning and program meetings, determines funding availability, reviews leveraging options to maximize federal share, and considers project timeframe. Using this information, Transportation determines which projects are included in the SYIP. Transportation expects the tentative 2006-2011 SYIP to be available May 2005.

Chart 1



Issues Facing Primary Project Prioritization

The Code of Virginia instructs the Board to plan on a statewide basis by assessing transportation needs and prioritizing projects. However, to distribute estimated highway revenues, the Code of Virginia also prescribes the allocation formula and the specific order in which Transportation must use the allocation. Due to these constraints, Transportation cannot prioritize Primary System projects on a statewide basis. The current allocation and the distribution formulas of funds within the Primary, Secondary, and Urban Systems became part of the Code of Virginia in 1985, and there has been no change to these formulas since.

Secondary Six-Year Plan

The Secondary Six-Year Plan (SSYP) is a document that guides construction projects for localities. Section 33.1-70.01 of the Code of Virginia requires the development and publication of separate plans for the

Secondary system of state highways. The localities' Comprehensive Plan governs the projects that make it onto the SSYP. The localities' planning staff, planning commissions, and Boards of Supervisors generally develop the Comprehensive Plan. These plans, though sometimes updated annually, are often only updated every two years. Though Transportation's residency engineers play a large role in the development of the SSYP, the addition of projects and prioritization of projects are the ultimate decision of the Boards of Supervisors.

A primary concern of the SSYP noted in our 2002 report was the timing of updates of the plan. The federal government requires the Commonwealth to develop an annual Statewide Transportation Improvement Program (STIP). The STIP is a report that is comprised of a shorter-term listing of projects planned for implementation throughout the state over a three-year period. When Transportation issues its STIP to the federal government, it combines the SYIP and SSYP. The STIP is due to the federal government before December 1 of a given year.

Prior to our recommendation, SSYP updates were generally compiled each year in November and December. However, the Commonwealth Transportation Fund (CTF) budget approval did not occur until the following spring. Therefore, SSYP plans included in the STIP were often out of date or inaccurate due to changes at the local level. We suggested that the Board and Transportation modify the development of the SSYP. They made the changes and aligned them with the implementation and STIP reporting of the SYIP.

Transportation is in the process of satisfying the prioritization and selection of projects by incorporating a need based planning approach through the efforts of the Planning Division to implement the goals of VTrans2025 into construction planning. Like communication, Transportation needs to adopt this long-term commitment into their strategic approach to service delivery.

Transportation's prioritization process based on "need" is a first step in gaining a handle to the future of transportation in the Commonwealth. However, given this is a strategic approach, no model can ever consider all variables, especially in its infant stages. Therefore, Transportation must continue to develop this model by continuously identifying its strengths and weaknesses, and altering the 20-year plan and SYIP accordingly.

Overall Status of Prioritization Recommendations

While Transportation is developing statewide transportation priorities in VTrans2025, this process without legislative changes will have no direct effect on the allocation of construction resources throughout the Commonwealth. The allocation as set forth in the Code of Virginia will continue to direct the allocation of resources and the statewide transportation priorities will only continue to serve as a tool to begin projects within districts by road system.

Transportation has the mechanism to prioritize projects both statewide and by district, however, they do not have the authority to adjust funding to meet these priorities. The Governor and the General Assembly will need to determine how Transportation needs to use this information.

CHAPTER 4

CONSTRUCTION PROJECT MANAGEMENT AND CAPITAL-BASED BUDGETING

The goal of good cash management is to have enough resources to meet expenses as an organization incurs them, maximize the uses of available cash on as many projects as possible, and maintain a sound financial footing. Cash flow planning must be a continuous activity. Keeping track of outflows and inflows of resources and comparing the actual outcomes to the long-term plan will improve the ability to forecast and budget.

After management identifies all available resources and sets priorities, the next phase of cash management is the projection and estimation of project costs. The SYIP and the SSYP are Transportation's commitment to start, continue, or complete projects during a six-year period. Transportation originally created the SYIP as a project list and a revenue distribution plan. However, in order to manage resources and track costs the SYIP must become a program and project management tool.

The 2002 review included several recommendations related to developing and applying a reasonable, realistic, and consistent cost estimation process re-evaluating and budgeting for indirect cost charges and coordinating the decision making process over contract budget additions. This chapter discusses how Transportation is now approaching long-range planning including project cost and budget oversight. We address the recommendations to improve accountability of the SYIP and general management of the process. These recommendations include:

- creating a mechanism for funding scoping and other pre-construction activities on projects before approval of the Board for inclusion in the Six-Year Improvement Program;
- estimating monthly project expenditures and provide matching project allocations to improve cash management and budgetary processes; and
- developing and employing an effective cost estimation process.

Both the VTrans2025 and the SYIP are heavily dependent on Transportation's ability to provide reliable, consistent, and accurate project cost estimates. The planning and the allocation of scarce resources depend on having information that allows the Board to project the Commonwealth's ability to meet its transportation needs. Historically, project cost estimation has led the Board to approve projects that later proved much more costly than originally intended and grew beyond their original scope.

Transportation funded projects in the past by allocating a portion of their estimated revenues to them each year. The amounts allocated had no relation to a project's expected payout and resulted in an undeliverable SYIP. As discussed in the 2002 review, managing and monitoring cash flow through a cash forecasting process is an essential element for keeping the budget and projects on track. Though there are several planned changes, Transportation does not currently have sufficient controls and processes in place to control the pace they spend cash.

Budgeting and the Six-Year Improvement Program

The SYIP is an annual plan approved by the Board setting forth the expected financing of statewide vehicular transportation needs in the Commonwealth. According to Section 33.1-12.9(b) of the Code of Virginia, the financing of the SYIP relies on the most recent official Transportation revenue forecast and is consistent with the policies of the Debt Capacity Advisory Committee.

Currently, Transportation updates the SYIP annually. The Board allocates funds to the interstate, primary, and urban highway systems, public transit, ports, and airports for the immediate fiscal year and identifies the planned program funding for the next five years in the SYIP. The SYIP also identifies the secondary system statutory distribution of funds to the counties, the distribution of funds to items earmarked by the General Assembly, and bond-funded projects. Accurately estimating project costs is critical to budget development and monitoring.

The Code of Virginia also requires the SYIP to include certain elements such as a project description, a total cost estimate, a total of funds expended to date, a project timeline and completion date, a statement if the project is on or off schedule, and the name of the main contractor. The SYIP presents these elements in a summary form and is active until the end of the project.

Transportation had developed a process that required a project to receive at least 70 percent of its allocations before it could go to advertisement. Transportation discontinued this 70 percent allocation. The removal of this control resulted in the under funding of projects. Abandonment of this method for the primary and interstate systems was one of the major causes for the cash shortages Transportation experienced. In addition, Transportation had added more projects to the SYIP than it could afford. Transportation did not attempt to determine if there was sufficient funding for completion of the projects before placement in the SYIP. Further, the Board approved the process of funding projects that commits a district's future allocations beyond a project's completion date.

Allocation deficits represent the borrowing of revenue allocations between districts or projects. In order to fund large construction projects, the Board would allocate funding to all the districts and then have a district do the equivalent of borrowing an allocation between districts to pay for a project. In some cases, a district could have multi-year allocations, and therefore, give up new construction projects until there is a settlement of the allocation borrowing.

Allocation deficits continue to be the first priority for funding in the SYIP. Cash payout schedules are complete on all the projects in the program. Because the Board continues to clean up older project deficits that resulted from allocation deficits, it will take several years before the cash-forecasting model results will be the only instrument used in developing the SYIP.

Because there were not enough resources for all the projects in the SYIP, in 2002, Transportation removed many projects from the plan. Since then, the Board has adopted policies to ensure that new projects included in the SYIP have sufficient funds to be completed.

Changes to the Development of the Six-Year Improvement Plan

The SYIP must serve as a capital budget for operations rather than a revenue distribution plan. Capital budgeting for Transportation is a plan to finance multi-year transportation projects. This includes the development of finalized, realistic project estimates before their addition to the plan. In a capital-based project budget, expected revenues are matched with expenses and changes made accordingly.

The VTrans2025 initiative as discussed in chapter 3, "Prioritization," includes the Board's and Transportation's development of a soon to be released prioritized State Highway Plan. When finalized, this plan will serve as an objective tool for determining which projects the SYIP should include. It will also be able to provide management with the ability to adjust the SYIP according to changes in revenues as well as an established list of projects throughout Virginia. The SYIP can then serve as a capital-based budgeting plan.

However, as mentioned in Chapter 3, VTrans2025 provides the information to prioritize projects both statewide and by district. The Board does not have the authority to adjust funding to meet these priorities.

The Code of Virginia establishes allocations. The Governor and the General Assembly will need to determine how Transportation needs to use this information.

Two primary factors affect the ability of the SYIP to successfully transfer to a capital-based approach. First is the ability to accurately forecast cash flows from revenues, which is critical in determining when and what cash is available for projects. Second, Transportation's development of accurate project scoping and cost estimates affects the amount of revenues available for all projects in the SYIP. This includes not only the ability to foresee all of the components of a construction project, like bridges, drainage, sidewalks, and right of way costs, but also requires valid and reliable data to make those estimates.

Transportation has implemented certain elements of a cash based program by creating and utilizing tools during development of the 2004 SYIP. These tools, though some require further refinements, work to eliminate project deficits; utilizing the cash flow model to match project allocations with project expenditures, where feasible, and evaluate projects against the availability of cash.

To ensure accurate matching on cash inflows and outflows, Transportation must begin estimating the cost of projects by fiscal year. Currently there is no formal relationship between the allocation of revenues, the timing of cash inflows, and the budgeting of construction payouts. This disconnect must be addressed in order for Transportation to function effectively.

Due to the constraints surrounding the allocation of funds to construction projects, efforts towards a capital-based budget will probably result in a capital-based program based on allocations, and a companion document of expenditures based on forecasted expenditure patterns. Complete conversion may require a change in legislation.

Cost Estimation for Projects in the Six-Year Improvement Program

The second feature of developing a capital-budgeting process at Transportation includes the accurate cost estimate of projects included in the SYIP. At the time of our 2002 report, it was standard practice for Transportation not to conduct these pre-construction activities on specific projects before adding them to the SYIP. Placement of the project in the SYIP and Transportation management's approval provided the only authorization to begin preliminary engineering, and the budget allocations for projects. Basing these allocations on rough and initial cost estimates and project scoping that was often inaccurate, inconsistent, and incomplete impacted the allocations.

"Cradle To Grave" Project Management

Our earlier report found a need to improve the overall process by establishing project management accountability. Each department and section within Transportation performed its duties and functions without coordination and oversight on a project. Project problems would go uncommunicated or result in confusing delays and project reworks. The need for a clear project management leader or team that would follow a project from its inception to completion with ownership and accountability would address issues in our report as well as several other reports issued on Transportation. We proposed this recommendation in the concept of "Cradle to Grave" project management.

Focused project management is necessary to achieve accountability with the cash management and budgeting process for both Transportation and the Board especially within the SYIP. This project team would have the responsibility for the project's development, construction, and progress. The team would also report the project's progress to management and the Board and includes both the engineering and financial management of the project.

In addition to the implementation of this cradle to grave project management plan, other 2002 recommendations included Transportation's need to:

- implement a policy requires that all right of way be acquired and utilities relocated prior to advertisement;
- assign utility inspectors to work more closely with utility companies;
- clearly articulate the vision of a quality assurance program and staff roles in construction quality; and
- issue and ensure compliance with policy detailing the frequency and timing for updating ESTIMATOR system data.

A cradle to grave project management approach will establish accountability for and improve the quality of the entire construction process. The Concurrent Engineering Process (CEP), discussed later in this section, has been adopted by Transportation and includes the implementation of cradle to grave project management.

Project management has been migrated to the district level. The district constructing the project is responsible for the project management. On projects without a dedicated "cradle to grave" project manager, the district will use the project coordination approach. This phased approach assigns one project manager for preliminary engineering activities up to the award of the construction contract and another project manager for the construction phase. A residency Project Engineer is responsible for the day-to-day management of the contract. The Department will continue to use this phased approach for a majority of the projects developed. By decentralizing project management, Transportation can more closely monitor the project and will be able to progress much faster than in the past. On-site project management will enable the process to proceed faster and catch potential errors before they occur.

Transportation needed to increase efforts to implement the CEP, develop ways to measure the impact of the process, and identify the responsible parties. Additionally, Transportation needed to create a formal constructability process to help reduce design errors and omissions. In response to this recommendation, Transportation issued a memorandum to all Location and Design (L&D) Managers detailing a number of issues, including the use of the CEP. This memorandum also detailed the duties of the project managers as discussed in the Construction section of this report.

Transportation completed implementation of this recommendation in December 2003. The agency updated its CEP instructions in March 2004 and has decentralized project management to the district level, as explained above. The L&D Team has also held CEP instructional sessions at each of the nine districts and the Central Office for those project managers and resident engineers who will be involved in the process.

Construction Project Management

Transportation has created a Project Management Policy and Procedures Manual as a guide to delivering projects on time, within budget, and according to the scope requirements. Currently, there are two approaches to project management used at Transportation, "phased" and "cradle to grave." Prior to the 2002 report, Transportation almost exclusively used the "phased" approach. Since the 2002 report, Transportation has begun to use the "cradle to grave" approach for the larger construction projects. The decision on which approach to use is made by the Chief Engineer for Program Development on a project-by-project basis, using the criteria illustrated in Table 4.

The Policy and Procedure Manual outlines four factors for the Chief Engineer to consider when choosing a project management approach:

- Project Size – Statewide, Regional, or Local Significance
- Project Complexity – Low, Moderate, High, or Extreme Complexity
- Project Impact – Effect on Economics, Effect on Quality of Life, Visibility
- Project Cost

The major parties involved in a project include the project sponsor, project manager, project team, project stakeholder, and the functional manager. Each of these parties has defined roles and responsibilities. Transportation considers a role as “who does what” and a responsibility as “who decides what.” The Project Management Policy and Procedure Manual provides a listing of roles and responsibilities for each of the major parties.

The manual lays out a project life cycle for all Transportation construction projects. The life cycle is comprised of four phases: Feasibility/Initiation, Planning/Design, Construction, and Maintenance. The Manual goes on to define deliverables for each phase in the project life cycle.

Table 4

Construction Project Life Cycle

Phase	Deliverables
Feasibility/Initiation	Long Range Planning Project Programming Funding Allocation
Planning/Design	Project Location Environmental Documentation and Permitting Plans, Specification, and Estimates Right of Way Acquisition
Construction	Utility Relocation Construction
Maintenance	Operational Preservation

Transportation has established a project management “toolbox” as part of the manual to aid the project manager. This toolbox includes a detailed description of nine documents that the project team may need to create during stages of project development. These tools include Project Purpose and Need Statement, Project Charter, Project Narrative, Project Requirements Document, Scope Definition Document, Change Control Documents, Project Plan, and Risk Management Plan.

Project managers use the following table to determine what is required of each project.

Table 5

Complexity	Low	Moderate		High	Extreme
Cost	<\$5 Million	\$5 - \$30 Million	\$30 - \$50 Million	\$50 - \$100 Million	>\$100 Million
Project Purpose & Need Statement	Required	Required	Required	Required	Required
Project Charter	Required	Required	Required	Required	Required
Project Narrative	Required	Required	Required	Required	Required
Project Scope Document	Required	Required	Required	Required	Required
Formal Project Plan	N/A	Suggested	Suggested	Required	Required
Project Requirements Document	N/A	N/A	Suggested	Required	Required
Risk Management Plan	N/A	N/A	Suggested	Required	Required
Project Management Approach	Phased	Phased	Cradle to Grave	Cradle to Grave	Cradle to Grave

Source: VDOT Project Management Policy and Procedures Manual

A Purpose and Need Statement is required for all Transportation projects. It is the responsibility of the project sponsor to provide the Purpose and Need Statement to the project manager. This document consists of goals, objectives, and justification for project authorization. Another document required for all Transportation projects is the Project Charter, which is a contract between Transportation management and the project manager. This charter includes a description of the work the team will perform, a description of expected results, and budgetary and time constraints. The final two documents required for all Transportation projects are a narrative and a scope document. The project manager develops the narrative after acceptance of the charter by the project sponsor. The narrative is a background description and summary of the project including location, project limits, funding types, and initial identified risks. The project manager works with the team in the development of the scope definition document. The scope should include the activities and deliverables required to complete the technical and functional requirements of the project.

A formal project plan is required for all projects with a total construction cost exceeding \$50 million, and suggested for most others. Transportation defines a project plan as a formal, approved document used to guide both project execution and project control. A project requirement document and risk management plan is required for all projects exceeding \$50 million and suggested for those over \$30 million. The project manager should prepare the project requirement document prior to scope approval. The team uses this document as a comprehensive listing of the primary requirements of the project. The team should prepare the risk management plan after each milestone to identify risks (both positive and negative) that may affect costs, use of resources, and scheduling.

Another issue Transportation has addressed in the policy and procedure manual is change control. To be able to determine how to deal with a project change, the project manager must first determine if the change is within the approved project scope. If the change is still within the scope of the project the project manager makes the decision to approve the change. If the change is outside the project scope, the project sponsor should make the final decision.

Transportation has created a seven-step process for dealing with project changes:

1	A project team member identifies the change.
2	Project team evaluates the change for impact to project budget, deadline, or scope.
3	If change does not affect budget, deadline, or scope, project manager accepts or rejects the project change and communicates the results to the rest of the project team.
4	If change does affect budget, deadline, or scope the project team member is required to complete a Transportation Project Change Control Form.
5	If change does affect budget, deadline, or scope the project manager reviews the Transportation Project Change Control Form submitted by the initiating team member.
6	If change affects budget or deadline within established tolerances, the project manager accepts or rejects the project change and communicates the results to the project team through the issuance of the accepted Transportation Project Change Control Form.
7	If change affects project scope or affects the project budget or deadline outside of established thresholds, the project sponsor makes the acceptance or rejection of the project change and communicates to the project manager for distribution to the project team through the issuance of an approved Transportation Project Change Control Form.

The policies and procedures outlined above create a solid framework for construction project management. We were not able to conclude to Transportation's compliance with this framework because these policies and procedures are in different stages of implementation. However, we find the procedures to be reasonable.

Transportation should consider implementing the Cradle to Grave project management approach for all Transportation construction projects. This will help provide accountability for project successes and failures, as well as shift some responsibility for project management from the central office to the districts.

Construction Life Cycle

The construction life cycle of a project consists of three phases: Preliminary Engineering, Right of Way, and Construction. These phases involve project design, right of way acquisition and utility relocation, and physical construction, respectively. Though there are technically three phases, the term "preliminary engineering" generally refers to all activities that occur between project inception and advertisement for a construction contract, including the Right of Way phase activities.

Transportation has established several initiatives to track a project from inception to completion. Below is a discussion of changes through the three major phases of construction. These program and policy changes are a movement in the direction of total project management. However, most of these initiatives are in the development and implementation stages. The long-term effectiveness of these changes will not be assessable until the majority of initiatives are completed and implemented.

Preliminary Engineering Phase

Transportation has established a pre-construction interdisciplinary committee, which seeks ways to reduce plan errors and omissions; these are the primary reasons why construction costs exceed budgets. The committee also has the responsibility to organize a Quality Assurance/Quality Control (QA/QC) unit within

the Location and Design (L&D) Division. Finally, the committee will begin migrating project management to the districts and provide increased emphasis and ad-hoc training on concurrent engineering.

The concurrent engineering process (CEP) promotes performing multiple activities at the same time, with design disciplines beginning their work as soon as input information is available. If functioning correctly, this process should increase the efficiency in which projects are developed by improving the on-time performance, establishing regularly scheduled communication and coordination points throughout the project development process, enabling a “team” approach to project development, and improving the quality of the project. Implementation is in the early stages, with the most progressed projects at the 30 to 40 percent design complete stage, entering public hearings. Concurrent engineering encompasses only the preliminary engineering activities of a project. As such, L&D still manages the preliminary engineering phase, and Construction manages the construction phase.

Transportation has also created an Errors and Omissions Committee to aid in creating a formal constructability process to help reduce plan errors and omissions. This committee will also assist in moving forward with the full implementation of the CEP and project management. The committee is comprised of members from Transportation Engineering, Program Management, Land Acquisition and Property Management, L&D Engineering, Innovative Project Delivery, and Division Administration. The Errors and Omission Committee met and produced objectives which include:

1. Assign trained and competent project managers to each Construction and Maintenance project in the fiscal year 2004 SYIP. All major projects now fall in these categories and each project now has a designated project manager from start to finish.

However, the Committee added that it is not feasible in some districts; due to lack of adequately trained staff, to have a dedicated project manager for every project in the Commonwealth due to lack of adequately trained staff. In these instances, a project manager from the central office may work with the resident engineer in managing the smaller projects.

2. Continue to expand Transportation’s implementation of the CEP and Project Management. The CEP must be a living process that continually improves; therefore, it will never have a final version.
3. Institute constructability reviews at all project milestones beginning with scoping. Conduct bid-ability reviews of the plans, contract documents, and regulatory commitments at the pre-advertisement stage. These review teams will include representatives of all disciplines participating in the project. Transportation will replace the Design Quality Index process with a formal post-construction review that will be included in the modified CEP.
4. Each preliminary engineering discipline will review and modify its internal QA/QC policies and procedures and will apply them to plans prepared both in-house and by consultants. Each discipline submitted a copy of its policies and procedures to the Chief Engineer for Program Development and individuals from each discipline were designated as being held accountable for their respective QA/QC procedures.

Right of Way Phase

Although Transportation has a policy requiring the movement of utilities and acquisition of rights of way before the advertisement for bid on a contract, the 2002 review found there were added costs and construction delays resulting from utility relocation. In response to the recommendation that Transportation continue to work toward implementing the policy, the Chief Engineer for Program Development issued a statement to Transportation management reinforcing the policy that all right of way access will be acquired and all utilities moved prior to advertisement except in very unusual circumstances.

Before Transportation can advertise a contract for bid, the Director of Right of Way and Utilities must certify that the right of way is clear and utilities relocated. This certification, prepared and submitted by the Project Scheduling and Certification Section, addresses one of the following four situations.

1. The project has all right of ways and utilities relocated. This would result in immediate approval.
2. Projects on which utility work is very nearly complete. The clearance letter should state that utility work will be complete prior to the awarding of contract. A letter of explanation from the State Utility Engineer is required.
3. Projects on which coordination with the contractor's work is necessary. The clearance letter should state that the project has executed all necessary utility agreements, coordination between utility company and contractors is necessary for the remainder of utility work and a letter stating all special provisions providing for the coordination included in the project is required.
4. The Chief Engineer must approve those projects with incomplete acquisition of right of way, relocations, and/or clearing of improvements. His certification states the project will have completed all outstanding issues by the award date.

It is Transportation's current policy that the clearance letter and supporting documentation are submitted to the Director of Right of Way and Utilities for certification. The Director bases his certification on the review of the supporting documentation. No project will go to bid until the Director certifies the project and all utility relocation and right of way acquisitions are complete.

In response to the Final Report of the Governor's Commission on Transportation Policy, Transportation began to implement policies and procedures for statewide utility inspection in 2003. The Chief Engineer for Program Development issued these policies and procedures to all District Administrators and District Construction Engineers. The policy states that each Transportation District will assign inspectors to verify the construction and location of all utilities requiring relocation by a project prior to the advertisement of a project. The inspectors will work with the District Utilities Engineer to determine the inspection needs on each Transportation project. Since instituting these policies and procedures, Transportation has seen a decrease in projects advertised before acquiring right of way and relocating utilities.

Construction Phase

Transportation's management has clearly articulated its vision of a quality assurance program and the roles that staff play in ensuring quality over construction. Transportation has held statewide meetings with L&D Managers and Hydraulic engineers that made personnel aware of their responsibilities for error-free plans.

The Instructional and Informational Memorandum for Preliminary Engineering Project Development Process, issued in 2003, reiterated the duties of the project managers to L&D Managers. The memorandum emphasized the project coordination approach. This approach involves having one project manager for preliminary engineering activities up to the award of the contract and having another project manager for the construction phase. The district where the project is constructed will perform the management of the project. In cases where the manager is a remote project manager, that manager will report for that project to the District Project Engineer or Construction Engineer of the district constructing the project. The duties of the Project Manager include managing the flow of communication across disciplines, project scope, budget, and communication to project team and management.

Project Estimation and Budget Monitoring

An integral reason for revising the project management process was also to achieve accountability in developing project cost estimates. This section covers two of the tools Transportation uses in this process and the changes made to make them more effective, which are the Project Cost Estimating System (PCES) and the ESTIMATOR system.

Project Cost Estimating System

Transportation, in an effort to develop and apply a reasonable, realistic, and consistent cost estimation method, began its search for a new project estimation tool. The Fredericksburg District was using a tool that met Transportation's basic specifications, known as the Project Cost Estimating System (PCES). This application is an attribute based planning tool designed to decrease the amount of estimates and variability before projects begin.

Transportation decided to implement an enhanced version of this system statewide. PCES integrates with the SYIP. PCES allows users to find details surrounding cost estimates.

PCES also includes the ability to adjust for inflation. Since the planning horizon of the SYIP is six years, economic forces can significantly influence the price of goods, including construction materials and land. Therefore, PCES designers included the ability to add an inflation factor that will adjust cost estimates, by year, to allow for increases or decreases in the rate of inflation.

PCES provides an accurate cost estimate for the development of a project. An estimated project budget uses the information gathered from PCES for the SYIP until a detailed estimate can be created based on specific Trns*port unit prices and quantities when the project begins. The advantage of PCES is its ability to incorporate project and cost estimates of project components into one application.

For new projects, PCES provides project planners a choice of project components and design features, without having to determine unit costs for materials and other needs. The costs of these elements are taken from other systems owned by Transportation, PPMS, RUMS and Trns*port. This approach helps ensure the full scoping of a project before it is included in the SYIP. The result is a project cost estimate that should provide a reliable estimate for managers and planners to base their budgets.

The identification of component parts drives the creation of accurate project cost estimates in PCES. The design of this system allows the user to take into consideration all possible impacts and design features before finalization. PCES divides these components into five major types: Construction, Bridges, Utilities, Right of Way, and Manual. For planning purposes, Transportation developed a standard project scoping methodology. The organization of PCES considers these five major components and provides a running summary cost estimate of the project.

Construction: The construction worksheet collects data to determine the budget of the non-bridge, construction phase of the project. The project manager enters the information. Examples of data include number of lanes, length of lanes, engineering difficulty, and expected advertisement date. Once all of the worksheet's data fields are completed, a construction total is calculated and added to the total cost estimate of the project scoping.

Bridges: Bridges are a major financial component of any construction project and are a separate worksheet in PCES. The worksheet allows a project manager to enter data on up to 24 bridges for a project. The worksheet allows for planning of reconstruction/rehabilitation of an existing bridge, expansion of an existing bridge, and the construction of a new bridge. It takes into consideration the number of lanes, length, width, and engineering complexity. It includes expected costs such as the demolition of existing structures, consultant costs, and other incidentals. The system provides two bridge cost totals: a "to-date" total and an inflation-adjusted total based on bid advertisement date.

Right of Way: Acquiring the land necessary to build a project has the potential to significantly affect the cost of a project. Given the varying values of land within a district, even between residencies, estimating right of way costs is as much an art as it is a science. To help mitigate these impacts, PCES allows the user to enter two types of data for determining right of way costs, either pre-set computed costs or user-defined costs. The computer costs utilize average land, building, and appreciation values in a district. However, estimates to date are user defined. The user enters specific land, building, and real estate appreciation values to receive a more accurate estimate. This worksheet also takes into consideration land and building values, value appreciation factors, land use type, value of improvements, hazardous material removal, relocation assistance, condemnation costs, administrative/incidental costs, and Transportation's projected responsibility. The worksheet provides a summary of expected utilities costs added to the project estimate total.

Utilities: The relocation of utilities is often a factor in underestimating project costs. PCES enables the user to create a budget for the utilities impacted. For example, PCES considers the unit costs of replacing water, electrical, telephone, cable, sewer, cellular, gas service, and other, undefined utilities. PCES also allows the user to enter the unit cost and total number of replacement units, as well as Transportation's source funding, and the percentage of costs for which Transportation is responsible. Once this data is entered, an estimated utilities cost is provided for the project.

"Manual" Worksheet: This form captures project components not captured in the other four worksheets. For example, this may include rail related costs, and even costs for infrastructure like rest areas. This section is user defined, and requires not only general project information that ties it into PCES, and FMSII, but detailed information like architectural and engineering designs, estimated project costs, and inflation factors. This is a new addition to PCES implemented in the latter half of 2004.

Once all of these sections are completed, project managers have a summary sheet that breaks down the costs of a project based on these five elements. Transportation indicates that the accuracy of PCES estimates has been about +/- 22 percent of final construction costs, though this will take several years to verify. According to Estimating Systems International, a transportation cost estimating consulting firm, acceptable preplanning variances should range from 5 percent to 25 percent of the final cost of a project.

Our review of PCES indicates the system can provide Transportation the ability to develop accurate, reliable, pre-planning estimates of projects to go into the SYIP. However, information provided by any system is only as reliable as the data input, particularly any manual adjustments, or estimates. It will be the responsibility of Transportation's management to educate and ensure compliance by project managers and the Districts. When fully implemented, PCES will serve as a critical component of a capital-based budget. Since

this is a new system, with many variables, Transportation must work to ensure the acceptance of this system as a management tool and stress to project developers the importance of innovation to ensure an optimal product is developed.

“ESTIMATOR”

Our review recommended that the Scheduling and Contract Division develop a policy detailing the frequency and timing for updating ESTIMATOR data. ESTIMATOR is the software program that Transportation uses to produce average price estimates for each item in the construction plan. Estimators are personnel that enter actual prices into an ESTIMATOR catalog on their individual computers, which the software then uses to calculate the price estimates on.

In January 2004, Transportation issued guidelines that assign the responsibility to each estimator to maintain current cost evaluation information for evaluating work orders, claims, and competitive bids submitted for construction contracts. The guidelines point out estimating procedures to guide how estimators should gather their data, where it should come from, and a deadline for estimators to update their catalogs.

The guidelines also detail how the updated ESTIMATOR data may be used in congruence with Trns*Port software to determine a fair and reasonable cost of highway construction projects. This section of the guidelines also gives the estimator a list of considerations and guidance toward coming up with a fair construction estimate as well as required documentation needed with the final submission of every engineer's estimate. The required documentation includes the Trns*Port estimate, the ESTIMATOR summary of items, and the Site Review Form including a project narrative. Other supporting documentation may include a consultant's estimate or written approval for use of statistical prices from the State Estimates and Bid Engineer.

The State Estimates and Bid Engineer is in charge of tracking compliance with this procedure. It is his responsibility to ensure that on September 30th of each year the eight estimators that Transportation currently employs have updated ESTIMATOR with current prices.

It is too early to determine the full impact of the guidelines and procedures for estimating. Transportation feels that the guidelines will have a positive impact simply due to the standardization of the procedure and the mandated requirements for each phase.

Status of Planning Recommendations to the Board

The Board is responsible for approving Transportation's construction projects and maintenance budget. As such, they are responsible for offering guidance on how management should develop these plans as well as their controls. The Commonwealth accepts a certain level of business risk in delegating the responsibility of committing a considerable amount of Commonwealth resources for transportation programs to the Board. However, the Board does not agree there should be any personal liability for unauthorized deficits, as they are a policy board not a supervisory board. Therefore, we again recommend the General Assembly may wish to extend the provisions of the Appropriations Act to the Commonwealth Transportation Board.

The Board had assumed responsibility to review and approve all project designs. The Code of Virginia did not require this review, which added 30-60 days to each project. The 2002 report recommended the Board discontinue these practices since the Board does not have the technical expertise to review designs, and this practice caused unnecessary project delays. The Board agreed to this recommendation and has stopped this practice.

Overall Status of Project Management Recommendations

Although Transportation is making progress towards capital-based budgeting, it will take several years to fully implement this policy. Transportation has completed several budgetary and financial changes, including attempts to implement the SYIP as a realistic management tool and reducing the projects with a deficit status. However, to ensure accurate matching on cash inflows and outflows, Transportation must begin matching the cost of projects with allocations by fiscal year. Transportation does not currently have sufficient controls and processes in place to control the pace they spend cash.

For major projects, Transportation has begun assigning a project management team that follows a project from its inception to its completion. It is still early in the process, to determine if the policies put into place will provide Transportation with better project management. However, the actions to date are those considered best practices in both the private and public for large organizations, such as Transportation.

CHAPTER 5

MONITORING

Monitoring is an essential aspect of project management. It must be a continuing function that provides managers and stakeholders with regular feedback and early indicators of progress or lack thereof in the achievement of project goals. The purpose is to track all major project variables; cost, time, scope, and quality of deliverables. Several of our 2002 report recommendations involved implementing or improving monitoring functions over cash and project management. These include:

- requiring progress reports on the SYIP;
- improving communication process between Transportation organizational units;
- requiring reporting on the progress and success or failure of the SYIP to the Transportation and Finance committees annually;
- using a common identification number and definition for project; and
- developing policies to evaluate the impact of contract budget additions on allocations and cash.

Our review also noted that communication of information during the development of the SYIP and later during its implementation is a key factor in ensuring that the SYIP is deliverable and stays on track. However, the Transportation divisions do not effectively communicate information between and among themselves. Transportation's culture is very compartmentalized and hierarchical. Without communication among the various divisions, Transportation cannot produce a reliable SYIP and alleviate cash shortages.

Transportation has recognized that communication is an essential tool in having an effective monitoring system. Through the development of new systems to provide improved monitoring, management has started the flow of information within the organization. Supplementing these efforts are a re-examination and re-thinking of many of Transportation's policies and procedures.

The development and implementation of policies and procedures are important, however, there must also be systems in place to provide appropriate monitoring and control information. Transportation must actively monitor the state of its policies and improve its systems to ensure the changes discussed in this and other chapters are successful.

Transportation has developed several monitoring tools and processes. These include new project management reporting tools, including the online SYIP and Dashboard. Transportation has also developed a new process to monitor project overruns and improvements to the common project identification number policy. These changes and several other practices Transportation has implemented improve the communication of information throughout the agency and to the decision makers.

Required SYIP Reporting

Chapter 560 of the 2003 Acts of the Assembly requires the Commissioner of Transportation to report the status of all construction projects four times per year. Transportation has complied with this requirement with two new tools: Dashboard and online SYIP.

Dashboard, established in 2003, tracks Transportation administered SYIP projects under construction or in the planning stages. It provides general information on a project including a project's district, road system, and contact information. As discussed below, there are two versions of Dashboard, an internal project management tool and a public version available through the Internet.

Online SYIP is also available through the Internet and is a tool that provides access to project information included in the SYIP, but not the information in the SSYP. The online SYIP organizes project information by plan year providing various search options for the user.

We reviewed these applications and determined they fulfill the reporting requirements developed by the General Assembly. In addition, both applications are relatively new, and will undergo continuing refinement to integrate with the Transportation's changing systems environment. Though the information is currently accurate, the long-term reliability of these tools will need to be monitored and re-assessed frequently.

Dashboard

Transportation has created a website application that provides information to users about road-construction projects throughout the Commonwealth. The website tracks all projects that are under construction or ready to advertise for construction, with daily updates. It displays project status in one of four phases: advertisement, construction contract deadlines, construction contract award amount, and construction contract work orders. Each phase shows status via a stoplight-style system of green, yellow, and red lights. Green stands for on time and on budget, yellow for in risk of falling behind in one or both, and red for seriously behind schedule or over budget.

Transportation created Dashboard in Spring 2003 as a way for highway department officials to monitor projects. There are two versions of the Dashboard, the Project Dashboard, which is internal to Transportation and the Public Dashboard, which is available to the public. The two versions are basically identical to each other; however, the Project Dashboard includes more detail regarding the project history, including changes made to the project during its lifetime. The website provides a significant amount of information concerning each project for both internal and external users. It even provides an e-mail address for the project manager in charge of a certain project for comments, questions, and complaints.

Dashboard receives its information from the Data Warehouse, most of which comes from PPMS and Trns*Port. Dashboard also receives information from the Construction Expenditure Report, such as the Inspector's Estimated Amount to Complete a Project.

This application serves as a communications tool for Transportation. Transportation has implemented online Project Dashboard monthly video conferences with districts to discuss the status of individual construction projects and work information.

In October 2004, Transportation's internal audit staff conducted a review of Dashboard. Their audit found control weaknesses in the lack of disclosure for the basis of project cost accumulation, security of an operational password, and access rights of an operating database. Many of these control weaknesses originate from the data Dashboard pulls from the Data Warehouse. Transportation has responded to the recommendations and they are currently making, or have already made, progress towards completing these recommendations.

Online SYIP

In 2003, Transportation switched from a printed to an online version of the SYIP. The online SYIP integrates pre-planning, scoping, and costs estimates as well as current project management tools. There are two versions, one for public access, and one for internal access. Both versions allow the user to view the SYIP in many different ways, including a sort by plan year, district, and road system. The primary difference between the public and internal versions is the ability for Transportation's project managers and management to access and alter information.

Before the SYIP was online, a project's status was dependent upon timely and complete reports from the Districts. The online SYIP now provides real-time access to project information at a user's request. Additionally, the internal version contains tools for managing projects, such as cost estimation and project scoping applications, project status statistics, and certain budget planning applications. Transportation's data warehouse, discussed in Chapter 7, "Systems Environment and Development," populates the online SYIP.

This online application has changed the way the Central Office and Districts communicate and manage construction projects. For the Central Office, it has the potential to provide up-to-date information on project progress, determine if a project will be over or under budget, and measure the accuracy of cost estimates and scoping activities. Over time with refinement, the system has the potential to serve as an integral part of strategic and operational planning at Transportation.

Given the scope of the SYIP, the benefits of the online system will take at least six to eight years to assess fully, after a complete series of projects has cycled through the plan. Currently, all projects are included in the online SYIP, though not all information is complete. The current project management system, PPMS, does not yet provide all of the details required by the online SYIP. However, Transportation should use the online SYIP as the primary planning and scheduling tool for projects, while using PPMS and other systems to supplement needs when required.

Controlling Project Overruns

Transportation and the Board approved a revised SYIP for fiscal year 2003. The new program reduced total projects from \$10.1 billion to \$7.2 billion in the six-year allocation plan, or about 29 percent. According to the Board, this cutback was the result of major reductions in expected state and federal revenues, historically underestimated costs for statewide maintenance needs, and significantly low project construction costs and scoping estimates. This SYIP also sought to remove projects that were not, or could not, receive a funding allocation.

To ensure success of the new SYIP, Transportation implemented a strict policy regarding project overruns. If a district is expecting to exceed a project's budget, existing project budgets must cover the funds to bridge the shortfall. Additionally, the districts must provide a justification of the budget change to central office management. Transportation monitors this through two methods, a quarterly project estimate/project status update that the districts provide to the Programming Division as well as an ad hoc project change request submitted to the Programming Division as well.

In either case, the districts must submit a request to adjust the advertisement date or estimated cost for a project. Required information for the request includes the impact if not approved, a proposal by the district on which project(s) allocations to shift, and the impact, an allocation shift will have on the funds moved from that particular project. The request requires the approval of the project manager, the district construction engineer, a member of Programming Division management, Transportation's Chief Financial Officer, and Transportation's Chief Engineer.

This process, as developed, can be an effective management tool to control project overruns. However, Transportation management and the Board must consistently monitor and enforce these procedures to ensure the process is effective.

Transportation implemented this strict policy to monitor project payouts as no systems controls exist to actively monitor the progress of project budgets. Budget monitoring responsibility and reporting continue to rest on project managers and the districts. Therefore, the only way to currently identify project overruns is when there is a request for additional allocations.

In an effort to track cost overruns Transportation should develop an application that monitors, on an ongoing basis, the cash payout of projects. A previous version of FMS monitored budget progress and triggered a notification to management when a project reached 90 percent of its total allocation, however, Transportation did not implement this application.

In an effort to achieve capital-based budgeting, this trigger should use payouts by project year, not total project costs. An automatic trigger of this nature would allow district administrators as well as Central Office management greater oversight of a project budgets' status. It is important that districts maintain flexibility when managing their construction projects; however, the Central Office must have an effective tool for monitoring of projects and their status. When the FMS Upgrade and the iSYIP applications, discussed in Chapter7, "Systems Environment and Development," occur they will allow the Central Office to have this ability.

Common Identification Number

Transportation has historically not had a statewide uniform mechanism for identifying and monitoring individual projects. The same project could have had a different identifier in each system tracking some aspect of the project. In addition, if a project involved more than one district or type of road system, there was no common identification.

The agency adopted the concept of each system having the FMSII Universal Project Code (UPC) as part of the system data structure to facilitate financial accounting of projects. Some systems will use the State Project Number in the format Route/County/Section in addition to the UPC project number. The agency requires the use of UPC in each new system containing project data in order to integrate the system with other Transportation systems.

A UPC can have different county and route numbers associated with it, and staff uses them as such in the day-to-day operations out in the field. However, when looking at the costs of the overall project, staff only needs the FMSII UPC to distinguish what costs are associated with that project. All enterprise systems associated with construction or maintenance must include a common UPC for integration of data.

Overall Status of Resource Recommendations

All of the changes and actions taken by Transportation have begun to improve communication, increase a sense of accountability, and enhance monitoring and oversight. These actions require adoption of a long-term commitment to changing and enforcing these changes. However, like many of the changes in this and other areas, to make these changes permanent will take time and commitment over several years to effect. More importantly, there will need to be constant attention to making sure Transportation staff follows these changes.

Monitoring provides information which clearly shows Transportation's performance, and therefore is one the first areas to suffer if the news is not good. This makes having management's long-term commitment to overseeing the changes critical.

CHAPTER 6

MAINTENANCE AND ASSET MANAGEMENT

The Code of Virginia sets maintenance of Transportation's existing infrastructure as the first funding priority. The Board allocates, from all funds available for highway purposes, an amount deemed reasonable and necessary for the maintenance of roads within the interstate, primary, and secondary system of highways as well as city and town street maintenance payments and payments made to counties which have withdrawn or elect to withdraw from the secondary system of highways. The Code of Virginia then allocates the remaining funds for administration and general expenses and the construction program. Although maintenance is a priority over other activities, there are no specific guidelines established to determine the funding amount.

Maintenance costs were \$455.8 million in 1986, \$1.1 billion in fiscal year 2004 with projections reaching \$1.5 billion by 2010. Of the \$19.9 billion in the current six-year program, 40 percent will fund maintenance programs. Maintenance costs continue to increase due to traffic on state roads, an aging infrastructure, and the number of miles accepted into the state's secondary system continues to rise each year. The 2002 report and the 2004 CTF report include a detailed discussion of maintenance and construction costs.

Our 2002 review included the following recommendations related to controlling and improving the maintenance budgeting and prioritization processes. These include:

- reviewing the MCI formula to ensure that it is reflective of current maintenance practices;
- using objective criteria to prioritize maintenance need; establish performance targets and develop maintenance budget; use automated system for data; make implementation of asset management a priority;
- recognizing changing spending patterns and consider incoming revenue when planning maintenance work; consider cash flows when scheduling maintenance work and entering into contracts;
- developing policies and procedures; implement the use of a make-versus-buy model; and
- developing a formal project management plan for maintenance activities, including cash management.

Transportation has made progress on several of these maintenance recommendations including efforts to develop financial policies and a needs-based asset management system. Transportation should continue its efforts to ensure that there are systems and policies in place to identify and prioritize maintenance and funding requirements.

MCI Formula

Transportation reviewed the MCI formula to determine if it could be reflective of current maintenance practices and associated changes in costs. Transportation determined that the resources necessary to correct and maintain the MCI formula would be better spent on developing the Asset Management System. Transportation presented a proposal to the Board that it would adjust maintenance payments to localities at the same rate as Transportation's maintenance budget. The Board adopted this proposal.

Therefore, Transportation no longer uses the MCI formula, rather payments to localities increase 4 percent each year across the board. This is now the calculation used in the Six-Year Financial Plan to determine maintenance program funding.

Crossover

“Crossover” is the point at which Transportation transfers money from the Transportation Trust Fund, typically used for construction, into the Highway Maintenance and Operating (HMO) fund. This occurs when operating expenses of the HMO fund exceed the revenues in the HMO fund. This shift of funds is a transfer, not a loan, thus there is no future repayment of these funds to construction.

As reported previously, Transportation currently calculates the maintenance budget by increasing the previous year’s budget by 4 percent. The forecasted revenues for the HMO Fund in the Six-Year Financial Plan will not be enough to support the current maintenance budget. Therefore, Transportation will experience crossover each year. Transportation has estimated the level of crossover for fiscal year 2005 to be \$245 million. This will decrease the funds available for construction by the same amount. Transportation does consider crossover when allocating money for construction projects. This reduces the likelihood that construction projects will experience delays due to crossover.

Transportation is developing an Asset Management System (AMS) to help determine whether crossover actually exists and to what extent. This system, discussed in the next section, will allow the agency to more accurately estimate maintenance costs. Based on preliminary information from AMS, Transportation has been under-budgeting maintenance. As Transportation moves toward a needs-based budgeting approach for maintenance the agency will more accurately estimate maintenance costs and determine the amount of anticipated crossover each fiscal year.

Asset Management

Transportation is undertaking the development of an asset management system that provides analytical information for determining maintenance needs. An objective asset management system and methodology is essential to Transportation’s ability for planning, assessing, and controlling maintenance costs. Our 2002 report included four recommendations for the development of an asset management system. These include the need to:

- implement an asset management approach; an objective method of identifying and prioritizing maintenance needs. This includes an automated system to record data and should prioritize needs based on an objective set of criteria;
- implement an asset management system to determine the true maintenance needs of the Commonwealth’s roads and the relative cost and to determine whether crossover actually exists and to what extent. Then determine how to handle crossover in the future, whether it be by obtaining additional funding or maintaining assets at a lower service level;
- make the implementation of asset management a priority. There must be continuous efforts towards this goal, including that all maintenance staff understand the changes that will come with a need based asset management system; and
- establish performance targets for all maintenance asset groups as soon as possible and use those targets to identify needs and develop the budget.

Transportation has begun developing AMS. This system has six planned modules, the random condition assessment, needs based budgeting, planning and scheduling, work accomplishment, inventory, and analysis tools modules.

Transportation has completed at least one version of each of the first four modules. These modules allow Transportation to collect and load inventory into a database, identify maintenance needs based on asset inventory, and compare alternative maintenance allocation strategies and the effect of performance targets for the initial set of assets.

Maintenance Budget Monitoring and Cash Management

The Asset Management Division (AMD) has begun preparing a monthly budget and expenditure report detailing expenditures, budget, and asset analysis. Transportation's Internal Audit Division conducts periodic audits of AMD's financial functions, including these financial reports. These reports allow Transportation to consider cash flows when scheduling maintenance work and entering into maintenance contracts.

The Financial Planning Division staff also receives and reviews a copy of this monthly report to assist the AMD and district management teams in managing the maintenance and operations program budget. In comparing monthly expenditures to spend plans, management can tell if the AMD needs to adjust the maintenance budgets. This monthly review also helps monitor the impact of major emergencies expenditures on the overall maintenance and operations program budget and the necessity to readjust priorities and financial resources.

Transportation has also created a set of financial management procedures for the asset management program. This report details procedures for the budget program, spending plan, budget unit responsibilities, major asset management financial reports, changes in budget spending patterns, and the carry forward policy. Each district submits a detailed spending plan which includes quarterly spending benchmarks for financial monitoring purposes. The Asset Management, the Financial Planning, and Debt Management Divisions create the statewide spending plan through collaborative efforts.

Maintenance Projects and Contracts

Make vs. Buy

Transportation has begun the implementation of a "Make-Versus-Buy" module in AMS. This module is in two districts for use as a pilot version. A review of the results and feedback from users will begin in December 2004 to identify any anomalies or glitches. Once refined, all districts will use the software when deciding to contract or use state forces.

The Make-Versus-Buy module is to be an analysis tool used by district managers in making business decisions as to when to use state forces or contract forces in the delivery of maintenance services and projects.

Transportation still needs to improve the make-versus-buy analysis module. For example, the system does not currently include a cost estimator which is the most critical component of any make-versus-buy decision. In its current state, the system relies on its user to substantiate their position by calculating costs themselves and entering data into a comment box next to their ranking.

Maintenance Project Management

As with the Construction process, Transportation needs project management to establish accountability for contract and project management in the maintenance program. Project managers should understand that they have budgets and must understand cash flows and reporting on the status of their work. While many of the projects are smaller and less costly, the volume of activity in this area makes project management just as important.

Transportation has implemented a formal project management plan over maintenance activities. Transportation assembled a team to develop a cash management process. In late 2002, the team investigated the project management work plan in the construction division. The team conducted the investigation to determine if there are any similarities between asset management and construction, as well as identifying the differences between project management in these two areas.

The final output of this team was the Project Management Plan in the asset management program. This is a policy, vision, and guideline for the administration, implementation, and monitoring of maintenance projects. According to the project management plan, the purpose of the plan is to document business practices for contract and project administrators, managers, and engineers to help them more successfully manage their contract needs.

One issue addressed in the Project Management Plan is funding carry forward from one fiscal year to the next. In the past, any funds remaining in maintenance at the end of the fiscal year did not automatically carry-forward. An asset management program often has an unspent balance at the end of the fiscal year as a result of ongoing contracts and uncompleted work plans. Transportation has established a new policy regarding funding carry-forward, which is a policy that allows maintenance allocations to carry forward into the next fiscal year. The Chief Financial Officer will establish controls over annual spending to ensure effective cash management, and control the spending of the carry forward.

The remaining sections of the Project Management Plan address topics such as the decision process, general procurement, project types and guidelines, and training. Transportation intends for this document to serve as a formal project management plan over maintenance activities.

Overall Status of Maintenance Recommendations

Maintenance is still an area of concern at Transportation. The growing maintenance requirements and the limited inability to budget on a needs-based approach increases the risk of inappropriately applied funding. Transportation is implementing a needs-based budget approach for the fiscal year 2006 maintenance budget request. When the AMS is fully implemented Transportation should be able to implement this approach and develop a prioritized maintenance program.

Transportation should continue to make the implementation of asset management a priority. There is no way to appropriately fund maintenance needs without an asset management system that provides sound data and decision-making tools. Transportation should then perform analyses to identify its true maintenance needs on a statewide level.

Transportation should also work to enhance the make-versus-buy analysis when determining whether to use state forces or contract out, taking into consideration the costs and benefits associated with each option. Transportation should develop policies and procedures to standardize this decision-making process.

CHAPTER 7

SYSTEMS ENVIRONMENT AND DEVELOPMENT

This chapter discusses the changes to Transportation's systems that gather and keep information necessary to both manage projects and plan and monitor cash flow. Properly operating systems that provide timely and accurate data are part of Transportation long-term solution.

Our 2002 review included the following recommendations related to identifying and ensuring the integrity of critical data elements necessary for project and cash management: developing a common project identifier; improving data exchange processes between systems and developing a department-wide information technology plan and a systematic approach to the enterprise information and systems needs:

- establishing accountability for information contained in systems;
- identifying critical data elements for project and cash management, and establish data integrity;
- reducing data exchange errors;
- establishing policies for data usage and update to ensure accuracy in critical systems;
- establishing data standards;
- developing department-wide information system technology plan that incorporates new development and a maintenance plan;
- developing systematic approach to addressing enterprise information and system needs;
- developing Common data exchange standards and cash management information for Asset Management Systems; and
- considering electronic exchange of information between Site Manager and Trns*Port application.

Transportation must use information technology to meet its critical business needs, and improve agency responsiveness, effectiveness, and efficiency. Effective management of projects and cash flow requires timely, accurate, and consistent information about budgets, time schedules, accounting information, and commitments. Without the proper level of detailed information from all sources, there exists the risk that projects will exceed budget and cash will not be available to meet commitments or that opportunities to use cash more effectively will be lost.

Transportation has developed processes or policies addressing many of the systems environment and development recommendations from the 2002 report. The following is a discussion of the agency's progress. It is important to remember that the success of these improvements is dependent upon continued compliance with and review of these new policies.

System Structure Overview

Transportation has numerous and diverse systems, which run on many different operating platforms, program configurations, and networks. Transportation finds itself in this environment for a number of reasons; the primary reason is that the agency has developed its system over time to meet specific needs with specific and available technologies. This system environment does create problems with the exchange of information between systems because there is no common understanding of what basic information is necessary to operate the entire department, and who has responsibility to gather and maintain this information. Modern system development techniques approach this situation differently through an enterprise approach.

Transportation recognized that its ultimate goal is the use of an enterprise-wide system. An enterprise approach will provide a long-term plan to address and consolidate data gathering, information exchange, storage, and usage. The creation of a data warehouse was part of Transportation's interim solution to have information available from the various divisions. This warehouse provides a common and uniform database to store information from various sources and allows users to create reports and programs to extract information.

The Data Warehouse And Source Systems

Transportation created its data warehouse to provide a collection of critical data from its major systems. The warehouse captures important data from major systems which will enable management to base decisions on integrated information. Transportation's project management, cash forecasts, dashboards, and other reports assemble project information from the data warehouse.

Currently, the data warehouse extracts data nightly from three main systems: the Program and Project Management System (PPMS), the Right of Way and Utilities Management System (RUMS), and Trns*Port. PPMS also interfaces with the Financial Management System (FMSII), RUMS, the Highway and Traffic Records Information System (HTRIS), and Trns*Port. The 2002 Special Review contains detailed descriptions of these systems and their functions.

The data warehouse plays a major role in Transportation's decision support systems (Dashboard, iSYIP, etc.) and, therefore, it is essential that it provides the most complete and accurate data possible. If the data warehouse provides incomplete or inaccurate data, the usefulness of the decision support systems is questionable. Transportation must strengthen controls over the information flow into the data warehouse to ensure accuracy and completeness of the information that the system provides.

As an example, a June 2004 report by Transportation's internal audit staff on the operation of the data warehouse and the flow of information from operational systems to the warehouse found significant control weaknesses in the handling of information rejected or identified as suspect when it flows into the data warehouse. Some information identified in exception reports has remained unresolved for a year or more. There are also no written procedures for handling the RUMS to PPMS and Trns*Port to PPMS interface errors, and no clear lines of responsibility, accountability, manageability, or upstream resolution.

A small number of FMSII tables are now available in the data warehouse. The data warehouse stores this limited FMSII data for the sole use of the Transportation iSYIP program. There are concerns, based on the complexity of the FMSII information, that the risk of extracting incorrect information through the ad-hoc process would be high. Therefore, users can not directly access the FMSII data in the warehouse. This rule prevents the data warehouse staff from substituting the FMSII information in PPMS with the direct data source.

In general, the data warehouse is providing the anticipated interim solution that Transportation expected. Transportation is aware of the data limitations and expectations, but they have compensated for these problems. Further, Transportation is developing some long-term solutions, which we discuss later in this chapter.

Information Accountability

The creation of a data warehouse was Transportation's interim solution to have information available from the various divisions. However, inaccurate, untimely, and inconsistent information can quickly compromise the usefulness of such data. If the data warehouse is to provide sound interim solution, Transportation management must, for each system, assign and hold accountable the division responsible for

gathering and monitoring the information. To accomplish this, Transportation has named Data Stewards for all Directorates and established a Data Administration Steering Committee. These groups are responsible for maintaining their respective system's data. This structure, if properly managed, should ensure that Transportation has accountability for the information contained in their systems.

Critical Data Elements

Transportation has identified critical data elements for cash, project, and asset management. Asset Management project teams were included in this effort to identify all critical data elements within their area. Transportation creates critical data elements according to the following criteria:

- the data is created/maintained within a system and is considered mission-critical information by the system owner organization;
- the data affects the quality of planning and budgeting activities or management reporting; and
- integration of the data with information from other systems would contribute to more-informed operating decisions.

A Data Integrity Program has also been established which identifies performance goals. Data integrity is the strict adherence to data standards, and the completeness, validity, and accuracy of data. The purpose of the Data Integrity Program is to respond to the Department's need for better data integrity. The Program will:

- determine and document the program components;
- establish and document performance criteria for data integrity;
- establish and document measurable goals for data integrity of critical data elements;
- establish and document measurable goals for deliverables required during the three major areas of systems development (pre-development, development, and post-development); and
- seek review and approval of goals by Data Stewards and Senior Management.

To provide information required by the data warehouse, Transportation has added metadata to the Metadata Repository. The Metadata Repository is a resource used to provide data definitions, semantics, business rules, transformations, and data models. The repository is inclusive of all the information held in a typical data dictionary. Adding metadata is an ongoing function and will continue to improve the data warehouse, and will help maintain a high level of data quality.

Data Exchange Errors

Our review found Transportation has made significant improvement towards reducing data exchange errors. Transportation plans on implementing iSYIP, discussed below, by June 2005. The first part of this project included an assessment of data exchange errors and reprogramming efforts to address and eliminate these errors. Short-term modifications to correct data exchange errors are complete, long-term modifications will not occur until the implementation of iSYIP is complete.

Data Usage and Accuracy

Enterprise data is a strategic asset that Transportation decision-makers use to operate the agency. Since no single entity owns enterprise data, the agency must provide the resources necessary to collect and

maintain data at an appropriate level. Transportation has established policies regarding utilization of critical systems to ensure accuracy and completeness of source system data including usage and update requirements. Management has approved the Data Management Policy and the Data Administration Steering Committee is responsible for monitoring implementation.

Data Standards

In order to establish better transfer information between systems, Transportation established new data standards. These standards are for information system designers, developers, and business subject matter experts. Consistent use of naming standards facilitates maintenance, upgrades, and integration of systems. These naming standards assist in the assumptions about the nature of the object, and can reduce the likelihood of synonyms and homonyms. Developer efforts can focus on designing and building systems and not on finding new ways of naming things.

Many database object names will continue to exist that do not conform to these standards simply because the guidelines had not been established in the past. Over time, these objects will disappear as Transportation progresses towards data element standardization. ITAD staff updated these data standards and is currently incorporating them into project guidelines for future system development.

Department-wide IT Plan

Transportation has completed a prioritization of IT projects for both the short-term and long-term IT governance needs. Transportation also designed a system to track agency and project data using the IT Strategic Planning Guidelines. In June 2003, Transportation developed an Agency Technology Strategic Plan, which prioritizes all major and non-major projects. Our review of the strategic plan found it to be a department-wide information system technology plan that incorporates new development and a maintenance plan.

Enterprise and Systems Needs

To address the problem of having too many systems that cannot communicate, Transportation has developed a plan to develop systems and continue with changes to existing systems only as they can provide the most return on investment and that are the most relevant to departmental needs. The eventual goal is to move to an enterprise system that will provide communication from one system to another, improving communication between divisions.

Transportation has implemented multiple levels of oversight and approval to ensure that information technology projects meet both enterprise and system needs. Included in these initiatives are the required approval of the oversight committee, adherence to the information technology strategic plan, and documentation requirements. These initiatives should ensure that Transportation evaluates its current and proposed investments in system development and maintenance to determine the best fit to strategic needs and business improvement priorities.

The Transportation Oversight Committee, chaired by the Deputy Secretary of Transportation and includes members from VITA, DPB, and representatives from the business/functional owners of the Transportation directorate. They provide the enterprise perspective on information technology projects within Transportation by reviewing, approving, and recommending to VITA's CIO major projects proposed for development. The Transportation Information Technology Strategic Plan documents the agency's major and non-major development projects while the procedures for update and approval of this Plan document the enterprise approach. Before the start of any development work, a project must be included in the Strategic Plan. There must be a documented project plan that identifies how the project addresses enterprise needs for a

project to be included in the Strategic Plan. Transportation management must review and agree upon the projects in the plan. Every project must also have a Steering Committee documented in the project's Charter, and approved by VITA. This Committee provides oversight and monitoring throughout a project's entire development life cycle.

In July, 2003, VITA implemented standards and policies that outline the systematic approach. Transportation's IT policies comply with the direction of the Secretary of Technology on the enterprise approach. VITA oversees and authorizes Transportation's approach to ensure that it is systematic and that it addresses enterprise and system needs.

This enterprise approach will provide a long-term plan to address and consolidate data gathering, information exchange, storage, and usage. However, in the interim, Transportation needs to continue addressing minimum system requirements and data standards to have accurate information to operate and manage its resources.

Overall Status of Resource Recommendations

Transportation has developed policies and procedures to address the recommendations in our 2002 report. However, success of these IT initiatives to meet enterprise-wide needs is dependent on Transportation's commitment to enforcing and monitoring their IT policies and data standards requirements. Failure to comply with or enforce these IT policies and standards will result in systems that do not meet enterprise-wide needs or support the agency's mission.

Systems Development Projects

Transportation is developing new systems and upgrading existing systems. These systems should help manage cash, plan projects, estimate costs, decrease times to complete projects, and identify construction and maintenance needs. While there are many other current projects, the following are some of the more critical systems that are under development and not discussed in other chapters of this report.

Program & Project Management System Upgrade

PPMS is a project tracking system that Transportation uses to manage projects from preliminary engineering authorization to project completion and records fund allocations and authorizations. PPMS tracks project activities and key events or target dates in order to meet the proposed advertisement date. Transportation now uses this system to schedule and monitor the project's progress including right-of way authorization, preliminary engineering authorization, and advertisement dates.

PPMS is almost 20 years old and Transportation never designed it to be an integrated project management system. Over time, Transportation has built several components outside the system because of PPMS' inability to provide modern functionality. The proposed upgrade will provide a new web-based system that will replace the existing system. It will also use a central repository for information and have integration with other systems as much as possible. The overall objectives of the redesign is to provide management and project teams with better, more reliable information with which to manage Transportation's projects, construction program, and the necessary reporting and monitoring requirements needed in today's environment.

PPMS Upgrade staff will replace PPMS with an Integrated Project Manager (iPM) that includes, among others, an Enterprise Project Manager (EPM). EPM is a web-access version of Microsoft Project 2003, which will allow project managers and staff to track the status of projects. EPM tracks the status of each individual task associated with a project and the amount of time that project staff has used and the

amount of budgeted time that is still available for each. This portion of the PPMS Upgrade is still under development and is likely to be complete sometime during the first quarter of calendar year 2005.

Currently, Transportation is using components of the iPM web-based integrated system. iPM allows any Transportation employee to search or browse through the list of construction projects to view its status. Project managers for each individual project keep iPM data current. Much like PCES, iPM is only as useful and beneficial as project managers allow it to be. iPM is currently under user-acceptance testing and staff will begin training project managers at the district offices. Transportation should have this module of the PPMS Upgrade implemented during the first quarter of calendar year 2005.

Financial Management System Upgrade

The vendor no longer supports Transportation's PeopleSoft Financials system, FMSII. Transportation has requested and received approval from VITA to upgrade the system. The project objectives are to upgrade the application software and replace system hardware with current vendor supported versions, and migrate to Web-based technology. Transportation has recently hired an FMSII Upgrade Project Director and so the first phase system requirements should take 12 months. After the completion of Phase I, Transportation should have an estimated completion date for the upgrade.

Inventory Management System Upgrade

The Inventory Management System (IMS) provides a department-wide standardized, computerized perpetual inventory system linking all inventory locations and includes the Inventory and Sign Shop. The system resides on a DEC microcomputer running VAX and ADABAS, which is an outdated database system. Transportation is working on a new web-based inventory system, WebIMS. This new system will replace the existing system with a Microsoft web-based application using a centralized Oracle database.

Transportation started the WebIMS project development in January 2001; Transportation should complete this implementation by January 2005. Transportation is currently in User Acceptance Testing.

Systems Project Development Issues

Transportation's Information Technology Applications Division (ITAD) develops and administers policies and procedures to achieve Transportation's business goals with regard to information systems. ITAD has recently issued revised project management guidelines for major systems development to incorporate VITA's new project management guidelines. Both ITAD and VITA's project management guidelines and standards are similar industry standard in project management. ITAD guidelines also consider additional Transportation requirements.

Project planning is not just a listing of tasks necessary to complete a project; it is detailed tasks, resource assignments, budget estimates, and a detailed sequence of events, among many more. Project planning is crucial to achieving success in three important aspects: completing the project on time, within budget, and in scope. Without a detailed plan, it is very difficult to consistently achieve these three aspects concurrently.

We reviewed project planning documents for three current ITAD systems development projects, representing a sample of the \$47 million in current ITAD projects. ITAD began two of the projects before VITA implemented guidelines across the Commonwealth and before ITAD revised their internal project management guidelines. One of the projects is currently in the planning phase and is following ITAD's new guidelines.

The two pre-VITA projects we reviewed had weaknesses in three major areas; budgeting, tracking, and resources and were primarily the result of ITAD using a traditional systems development life cycle approach rather than a project management approach. Using a project management approach improves projects oversight, budget controls, and the effective use of resources among others.

For the post-VITA project, we determined that it does provide a detailed work breakdown structure, assigns resources to tasks, and budgets at the task level. It also has a communication plan, risk management plan, among other requirements. Since the project is only in the planning phase we cannot determine the frequency of project plan updates, a process that is important to maintain control of project deadlines and milestones. However, generally we found considerable progress in implementing a project management approach to systems development since VITA issued their project management guidelines. ITAD has taken an in-depth look at their practices along with the required items from VITA and made many improvements to their methodologies.

A VITA standard that became effective November 2004 stated that earned value is a requirement for IT projects. Before this requirement, ITAD did not assign project costs at a task level nor calculate earned value. We reviewed a project plan after November 1st, and found that ITAD is taking steps to calculate earned value and other financial project related numbers. They are also currently tracking their projects in more detail which allows a more accurate and up to date status of the project. They are also beginning to track resources with more detail; however, there is still some room for improvement in this area.

We recommend that ITAD continue to work diligently to stay informed and in compliance with VITA standards and also to continue to follow the internal guidelines they have created. Along with that, continuing to improve on tracking and managing their resources will benefit their projects and their success.

ACRONYMS AND TERMS

2002 Special Review	Auditor of Public Accounts “Special Review of the Cash Management and Capital Budgeting Practices in the Virginia Department of Transportation” July 2002
2004 CTF Report	Auditor of Public Accounts “Commonwealth Transportation Fund, Agencies of the Secretary of Transportation Special Review” October 2004
AMS	Asset Management System
CARS	Commonwealth Accounting and Reporting System
CAS	Trns*Port’s Construction Administration System
CEP	Concurrent Engineering Process
CTF	Commonwealth Transportation Fund
CWB	Construction Workbook
DCAC	Debt Capacity Advisory Committee
EPM	Enterprise Project Manager
FHWA	Federal Highway Administration
FMSII	Financial Management System
FRANs	Federal Revenue Anticipation Notes
GARVEEs	Grant Anticipation Revenue Vehicles
HTF	Highway Trust Funds
IMS	Inventory Management System
iPM	Integrated Project Manager
iSYIP	Integrated Six-Year Program
ITAD	Information Technology Applications Division
ITOD	Information Technology Operations Division
JLARC	Joint Legislative Audit and Review Commission (organization)
L&D	Location and Design
LAS	Trns*Port’s Letting and Award System

LOS	Level of Service (vehicle count)
MCI	Maintenance Cost Index
OA	Obligation Authority
PCES	Project Cost Estimation System
PETS	Preliminary Engineering Tracking System
PPES	Preliminary Planning Estimating System
PPMS	Program & Property Management System
QA/QC	Quality Assurance/Quality Control
RABA	Revenue Aligned Budget Authority
ROW	Right of Way
RUMS	Right of Way and Utilities Management System
SPS	Statewide Planning System
SYIP	Six-Year Improvement Program
SSYP	Secondary Six-Year Plan
STIP	Statewide Transportation Improvement Program
TEA-21	Transportation Equity Act for the 21 st Century
The Board	Commonwealth Transportation Board
Transportation	Virginia Department of Transportation
UPC	Universal Project Code
VITA	Virginia Information Technologies Agency
VTA	Virginia Transportation Act of 2000
VTrans2025	Commonwealth Transportation Planning Initiative
WebIMS	Web-based Inventory Management System

STATUS OF RECOMMENDATIONS**CASH MANAGEMENT**

***Recommendation #1:** Transportation should continue to budget federal revenues based on obligation authority, RABA, and the growth rate of motor fuels consumption, but should also include projected reimbursements to help bring the projection more in line with actual reimbursements. Transportation should document this process and adopt the policy.*

- **In-Progress – Federal revenue estimates for fiscal year 2004 Six-Year Improvement Program is based on obligation authority.**

Transportation does not take into account projected federal reimbursements for construction projects, only projected obligation authority. Budgeting based on projected reimbursements would provide budget planners and the Board a more reliable picture of federal revenues.

***Recommendation #2:** Transportation should establish a policy on how to decide when and if to issue future FRANs. This policy should consider the amount of any proceeds remaining from previous FRAN issues, the readiness of projects to use the funds, and the impact the issuance has on current and future revenue streams.*

- **In Progress – Transportation developed a debt management policy that includes management of FRAN debt.**

Per Chapters 533, 560, and 1042 of the 2003 Acts of Assembly the Board developed a debt management model for transportation. Transportation, though, did not develop specific guidelines that define under what circumstances it will use FRAN debt. This includes a decision whether to use FRAN revenues for construction only, or to fund maintenance and non-road capital construction projects.

***Recommendation #3 (General Assembly and Governor):** The General Assembly and the Governor may wish to consider having the Debt Capacity Advisory Committee review and recommend guidelines for Transportation to follow when issuing debt.*

- **Completed – the DCAC analyzed the Board's debt management policy.**

In December 2003, the DCAC acknowledged this policy as required by Chapter 1042 of the 2003 Acts of Assembly. The DCAC did not opine on this policy, nor did they issue any additional guidelines.

***Recommendation #4 (General Assembly and Governor):** The General Assembly may wish to provide guidance on how Transportation should pay debt service in relation to the allocation of resources within the Six Year Program.*

- **Completed**

In Chapter 1042 of the 2003 Acts of Assembly and Chapter 4 of the 2004 Acts of Assembly (Session II) the General Assembly provides appropriations to the Board for debt service payments

SIX YEAR IMPROVEMENT PROGRAM AND PLANNING

***Recommendation #5:** Transportation's programming divisions should incorporate estimated monthly project payouts and estimated monthly cash flow information into the project allocation process. This would allow Programming and Scheduling to match project allocations to a project's cash needs and would mitigate the cash drain that the mismatch of cash and allocations has on Transportation's cash account.*

***Recommendation #10:** Transportation must develop and follow a policy to forecast, monitor, and manage cash continuously throughout the year. Transportation must establish lines of communication between Financial Planning and all of the other divisions to ensure that the divisions share and use the information.*

- **In-Progress – Transportation is moving towards implementing a capital-based operations budget.**

Transportation is beginning to track monthly project expenditures via internal iSYP applications. However, the iSYP planning processes has not yet matched estimated revenues with estimated expenses at the project level. Currently, the Programming Division uses revenue estimates provided by Financial Planning to create road system estimates for the Interstate, Primary, Secondary and Urban systems. Financial Management must continue to work to promote the importance of cash management at the project level.

***Recommendation #6:** Transportation should re-evaluate the necessity for the pre-allocation hearing. If the Six Year Program is truly to be a budgetary document, the Board should draft the program using the official revenue estimate and available cash, and add the statewide priority projects that funding can support for the year. Transportation could provide this list to the public for input at the final allocation hearings. The Board could, at that point, substitute other projects ready to proceed based on public input as long the projects were within the budget established.*

- **No change implemented.**

The Board and Transportation feel that public input is still necessary and Transportation needs to conduct hearings to comply with federal regulations. Transportation has consolidated and reformatted the hearings.

***Recommendation #7:** Transportation should establish and adopt a new timeline for the addition of projects to the Secondary Six-Year Plan to align more closely with the SYP cycle.*

- **Policy completed – Requires long-term monitoring and compliance.**

The SSYP receives Board approval in conjunction with the SYIP. Transportation should continue to monitor the utility of aligning the timing of the SYIP and SSYP to aid collaboration with localities as well as to realize efficiencies in effort.

***Recommendation #8:** Transportation should open the lines of communication and establish procedures to ensure that necessary information flows between divisions. Transportation should institutionalize this communication process throughout the department.*

- **In-Progress**

Tools such as the iSYP, PCES, and AMS are facilitating collaboration at Transportation between Central Office divisions and between the Central Office and Districts. As Transportation integrates these systems into its operations, communication lines will require further development.

***Recommendation #9:** Transportation should continue to use cash forecasting to develop the Six Year Program and to balance expected cash inflows against anticipated project payout schedules.*

***Recommendation #19:** We concur with the Research Council recommendation that Transportation should develop and employ a more rigorous cost estimation process, and allocate more resources (front loading) to the development of cost estimates during the planning process, thereby yielding more refined and more accurate project concepts. We believe Transportation has taken a step in the right direction with the formation of the group to study cost estimates. We strongly urge Transportation to closely monitor their progress and ensure the development and application of a reasonable, realistic, and consistent cost estimation method.*

***Recommendation #45:** We concur with JLARC's recommendation that Transportation should consistently include contingency rates in their project estimates. Transportation should enforce a written policy and provide training to all individuals estimating project costs to ensure consistent application of the rates used at all milestones for the construction estimates.*

***Recommendation #47:** Transportation should ensure that contingency and inflation factors are consistently included in the SYP estimates.*

***Recommendation #49:** Transportation should establish a set of criteria by which to evaluate projects in order to determine a reasonable contingency rate for each project basis and apply rates in that manner.*

- **In-Progress – Budget management systems are being developed to link scheduled payouts with cash inflows.**

Transportation is beginning to use the iSYP as a budget management tool. The Financial Planning Division provides total estimated revenue amounts to the Programming Division. However, until all projects are fully scoped using PCES and other iSYP applications Programming Division cannot accurately project expected project payouts by fiscal year.

***Recommendation #11:** Transportation must carefully monitor and link the timing of cash receipts and expenses to all projects currently authorized. This may result in increased cash balances as Transportation matches their current and anticipated road construction expenses to forecasted cash. To accomplish this, Transportation will need to budget for construction payouts.*

***Recommendation #12:** Transportation should begin the systematic process of budgeting for the Construction Program. The budget should consider anticipated contract payout against anticipated cash flow. Transportation's Six Year Program should be a six-year capital budget. Currently, it is a revenue distribution document. This process will be central to Transportation's success in developing a deliverable, financially constrained construction program based on statewide needs and priorities.*

- **In-Progress – Budget management systems are being developed to link scheduled payouts with cash inflows.**

Transportation is moving towards a capital-based budget system for road construction projects. This includes the ability to develop yearly budgets detailing anticipated expenditures for multi-year projects.

Recommendation #13 (Commonwealth Transportation Board): The Board should prioritize project lists for inclusion in the Plan. This would alleviate outside pressure to add more projects in the plan than for which there is adequate funding. Transportation would apply available funding in the project's priority order until no further funding was available. The Board should determine the priorities, and the Programming Divisions should apply the funding.

Recommendation #20 (Commonwealth Transportation Board): The Commonwealth Transportation Board should immediately establish and implement objective criteria for construction project selection and prioritization. Both the Transportation Research Council and the Governor's Commission on Transportation Policy have recommended project selection and prioritization criteria.

Recommendation #21 (Commonwealth Transportation Board): The focus of the Six Year Program should remain on the statewide needs of the Commonwealth as a whole; it should not focus on districts. The current process of presenting individual district's tentative plan to the Board members from those districts distracts from the statewide focus and instead encourages the district focus. Transportation and the Board should focus on statewide needs, as is statutorily required of the Board, when reviewing and approving the Six Year Program. Transportation and Board should change their presentation and review process.

- **In-Progress – Prioritization of Interstate and Primary road projects is in the process of being completed.**

Based the goals of VTrans2025, the Board and Transportation are developing a prioritization list for Interstate and Primary road systems in Virginia. They are taking into consideration objective factors like current and projected levels of service as well as subjective factors like public input.

Recommendation #14: Transportation must develop a financially constrained Six Year Program based on anticipated project payouts. To do this, Transportation should develop a method to ensure that the projects added to the Six Year Program have sufficient allocations to complete planned work each year and that the full cost of the project has been allocated to it by the year of project completion. The method should allocate revenues to projects based on expected project payout each year, and should be reconciled to anticipated cash flow. Transportation should only add new projects to the extent that there is sufficient cash to pay for them. When developing the Six Year Program, Transportation should begin with a district's, county's, or municipality's allocation, remove any outstanding debt service, and subtract anticipated existing project payouts. Transportation can use the remaining funds, if any, to add new projects as long as project payouts equal cash inflows.

Once developed, Transportation should adopt this method as a written policy and institutionalize it throughout Transportation. This will require accurate project estimates, addressed below, and tight controls over cash flow. The budgeting, programming, and operational (construction) areas will need to develop open lines of communication and work closely toward delivering a financially constrained achievable program for this to occur.

- **In-Progress – Budget management systems are being developed to link scheduled payouts with cash inflows.**

Transportation is moving towards a capital-based budget system for road construction projects. This includes the ability to develop yearly budgets detailing anticipated expenditures for multi-year projects.

***Recommendation #15:** During development and implementation of the new process, Transportation should determine an appropriate minimum cash balance to maintain as a reserve. The cash reserve is necessary for economic downturns where revenues are less than anticipated as well as to provide a cushion for Transportation while they work to develop and refine new processes.*

➤ **In-Progress – Transportation is working to build a minimum cash balance of \$500 million.**

As a matter of practice, the Board and Transportation would shift allocations from one project to another to accelerate or complete an under-funded project. As a result, many projects in the SYIP show “deficit funded” – where Transportation must omit projects from the SYIP or not include new ones in order to pay off these projects deficits. Once these “internal IOUs” are repaid, Transportation will be able to build and maintain its minimum cash balance.

***Recommendation #16 (General Assembly and Governor):** The General Assembly may wish to create a Transportation Revenue Reserve Fund that would act like a Rainy Day Fund for the Transportation Trust Fund. Additionally, the General Assembly may wish to restrict availability of these funds from other uses.*

➤ **In-Progress – 2004-2006 biennial budget details a maintenance reserve fund for transportation.**

The budget empowers the Secretary of Transportation to develop a maintenance reserve fund for the HMO fund. There is no formal reserve fund dedicated for construction only.

***Recommendations #17 (General Assembly and Governor):** The Governor and the General Assembly may wish to consider amending the Code of Virginia to require Transportation to report on the progress and success or failure of the SYP to the Transportation and Finance committees annually.*

➤ **Completed – Code of Virginia amended to include reporting requirements.**

Chapter 560 of the 2003 Acts of Assembly requires Transportation to make progress updates to the SYIP at least four times per year and requires daily information on individual projects and their progress. There is no requirement that Transportation make formal, periodic presentations or reports to the General Assembly. Transportation publishes this information on the Internet.

***Recommendation #18:** We recommend that Transportation complete basic preliminary engineering work, such as scoping, soil tests, environmental permitting, and surveys, prior to approving projects and placing projects in the SYP. We concur with the Governor’s Commission on Transportation Policy’s recommendation that Transportation should create a mechanism for funding scoping work on projects before Board approval for inclusion in the program. However, we do not recommend the creation of a separate fund receiving separate appropriations. We believe the creation of a cost center or a budgetary “pool” of funds would be the most practical choice. Preliminary work before project approval would allow for more realistic initial project estimates and the Board would benefit by having more information available for decision-making purposes. Prior to authorization, Transportation could eliminate projects that are not feasible or whose estimated costs are too high to be practical.*

➤ **In Progress – Funding is complete and Pre-planning systems are under development by Transportation staff.**

The 2004-2006 biennium Appropriations Act (Chapter 4) includes \$4 million in each year to support pre-planning activities. Transportation has developed PCES and other early planning activities and should continue to commit and resources to support these activities.

Recommendation #22 (General Assembly and Governor): Since the actions of the Commonwealth Transportation Board significantly commit the resources of the Commonwealth, the General Assembly may wish to extend the provisions of this Section to the Commonwealth Transportation Board.

➤ **No Change Implemented**

The General Assembly, Governor, nor the Board extended the provisions of §4-3.01 b of Chapter 4 of the 2004 Acts of Assembly (Special Session II) to include the members of the Board.

Recommendation #23 (Commonwealth Transportation Board): We concur with the Governor's Commission on Transportation Policy recommendation that the Board should discontinue the practice of reviewing and approving design plans.

Recommendation #24 (Commonwealth Transportation Board): The Board should discontinue the practice of reviewing and approving professional service contracts.

➤ **Completed – The Board stopped the practice of reviewing and approving road construction plans and professional service contracts.**

Recommendation #27 (General Assembly and Governor): The General Assembly may wish to re-examine the use of allocations for setting construction project priorities and funding. While the General Assembly has established that the Commonwealth Transportation Board must establish a method for setting statewide priorities, the General Assembly may wish to provide them some guidance on factors that the Board should consider in establishing this process.

Recommendation #28 (General Assembly and Governor): Transportation may not be able to achieve a program based on statewide needs and priorities using the current method for project allocation to districts, counties, and cities and towns. The General Assembly may wish to amend the Code of Virginia to change the current allocation system so that Transportation can truly base their priorities and criteria on statewide needs rather than by district, county, and city.

➤ **No Change Implemented – The General Assembly nor Governor changed allocation procedures or provisions.**

Currently, the “HJR 211 Committee,” comprised of legislative members and staff, gubernatorial representatives, and Transportation are researching alternatives for transportation allocations.

Recommendation #33: Transportation should review the manual processes such as transferring information from the Six Year Improvement Plan database and consider developing an automated interface to update and exchange this information with other systems.

➤ **In-Progress – The iSYP is an integrated approach for SYIP and SSYP management.**

The internal iSYP is developing into a powerful tool for project management as well a user-friendly interface for the various IT systems at Transportation. This recommendation is considered to still be “in progress” since the system is still being developed and is not fully utilized due to controllable and uncontrollable constraints.

Recommendation #25: Transportation should develop a clear definition of “need” for assessing statewide transportation deficiencies. Once defined, Transportation should establish criteria for evaluating highway needs for the quinquennial needs assessments. As part of the needs assessment, Transportation should attempt to estimate costs for total highway needs identified.

➤ **In-Progress – Transportation and the Board developed a definition of need.**

Highway needs assessment and project prioritization process have been developed. Application of the process is being tested. A 20-year long-range highway vision plan has been completed. Financial constraints of the long-range highway vision plan will be accomplished via the programming process, using the prioritization process that is currently being tested.

THE 20 YEAR PLAN

Recommendation #26: Transportation should use the 20 Year Plan as the foundation for statewide Transportation planning. The 20 Year Plan should use the results of the statewide needs assessment, should contain prioritized projects, and should be financially constrained. The 20 Year Plan should contain all projects eligible for placement in the SYP, and Transportation should base their SYP project selection decisions on the priorities outlined in the 20 Year Plan.

➤ **In-Progress – VTrans2025 is integrated, in part, with a new 20-year planning process.**

The Code of Virginia requires the Board and Transportation develop a long range 20-year plan for Transportation in the Commonwealth. The three phases of the VTrans2025 embody these long range goals. Currently, Transportation is developing lists of potential Interstate and Primary road projects to be included in the iSYP, along a 30-year horizon. These lists are expected to provide a 20-year plan of prioritized projects based, in part, on the goals established by VTrans2025.

SYSTEMS ENVIRONMENT AND DEVELOPMENT

Recommendation #29: If the Data Warehouse is to provide a sound interim solution, management must, for each of these systems, assign and hold accountable each division responsible for gathering and maintaining this information. Without this accountability, inaccurate, untimely, and inconsistent information will very quickly compromise the usefulness of the Data Warehouse.

➤ **Policy completed – Requires long-term monitoring and compliance.**

Each System has a designated Data Steward. Management has approved a Data Management Policy and the newly formed Data Administration Steering Committee is responsible for implementation. The Chief of Technology Research and Innovation must ensure the monitoring of policy implementation and compliance to the standards.

Recommendation #30: Transportation should identify all of the critical data elements in the systems necessary for project and cash management. After identification, Transportation should implement a program of data integrity to ensure that the critical elements undergo update in all systems as needed. This program of data integrity should especially address those individuals that extract information from a system and use the data independently of the system such as users of PPMS.

➤ **Policy completed – Requires long-term monitoring and compliance.**

Critical data elements have been identified and a Data Integrity Program has been established which identifies performance goals. Data integrity is the strict adherence to data standards, and the completeness, validity, and accuracy of data. Management must now monitor of program implementation and ensure compliance to the standards.

***Recommendation #31:** Transportation should examine the reasons for data exchange errors and determine if reconciliation or some re-programming could reduce the errors that occur during data exchanges.*

➤ **In-Progress – Scheduled for completion when iSYP is implemented.**

Short-term modifications to reduce data exchange errors has been completed the long-term modifications will not be complete until the implementation of iSYP in June 2005.

***Recommendation #32:** Transportation needs to develop a common identification number and definition for projects so that systems and users have a method to match information with the project. Effective cash management cannot occur if budget, expenses, and oversight data does not agree and have common standards of information to review.*

➤ **In-Progress – Complete once systems in development are implemented.**

A Common Universal Project Code (UPC) number has been defined and is being used in all current and future systems development.

***Recommendation #34:** Transportation needs to establish policies regarding utilization of critical systems to ensure accuracy and completeness of source system data. The policies should address usage and update requirements.*

➤ **Policy completed – Requires long-term monitoring and compliance to ensure that the plan is properly implemented and developed.**

Enterprise Data Management Policy has been developed and implemented by the Data Administration Steering Committee.

***Recommendation #35:** Transportation should establish data standards and use these standards as the basis for future systems development. This will facilitate the transfer of information between systems.*

➤ **In-Progress – Complete once all database objects conform to standards.**

Transportation has established new data standards, the non-conforming data objects will be phased-out over time.

***Recommendation #36:** Transportation should develop a department-wide information technology plan that focuses on what Transportation needs to accomplish its mission. Transportation should evaluate all system development requests against this plan. Transportation should only approve and fund systems and system changes that support Transportation's mission.*

***Recommendation #37:** Transportation should implement a Development and Maintenance Plan that addresses how Transportation will handle system and information needs before implementing an enterprise system. Management should strictly enforce this policy by defining system development versus system maintenance projects and the procedures for each area.*

- **Policy completed – Requires long-term monitoring and compliance to ensure that the plan is properly implemented and followed.**

Systems development and maintenance coincides with the prioritization of IT governance needs.

***Recommendation #38:** Transportation, after addressing its interim need, should complete its work on developing a systematic approach to addressing its enterprise information and systems needs.*

- **Policy completed – Requires long-term monitoring and compliance to ensure that the plan is properly implemented and followed.**

Transportation is working towards a systematic approach for enterprise information and systems needs. Proper oversight and approval is implemented at both the enterprise and system needs.

***Recommendation #39:** Management should have the Asset Management project teams work as a group to ensure that the asset management systems have common data exchange standards and incorporate the same types of information necessary to provide the same cash management information as that coming from the Data Warehouse.*

- **Completed**

Asset Management project teams were included in creation of common data exchange standards.

***Recommendation #40:** Transportation should consider developing an electronic exchange of information between Site Manager and the Trns*Port application.*

- **In-Progress – Complete once all projects use SiteManager.**

Transportation will not continue to use the mainframe application and, therefore, will not develop an electronic exchange. Old projects will run their course rather than convert over. Only projects that end by July 2005 will continue on the mainframe applications.

CONSTRUCTION

***Recommendation #41:** Transportation should continue its efforts towards improving the quality control process to ensure accuracy of design plans, including improvement of the field inspection process. Transportation should consider using Construction personnel to review design plans before advertisement as part of that process.*

- **Committees established – Requires long-term monitoring and compliance.**

Transportation established a pre-construction interdisciplinary committee, a Quality Assurance/Quality Control unit within the L&D Division, and an Errors and Omissions Committee.

***Recommendation #42:** Transportation should continue to work toward implementing the policy that all right of way be acquired and all utilities relocated prior to advertisement. This will save project costs due to utility relocation delays.*

➤ **Policy reinforced – Requires long-term monitoring and compliance.**

Transportation management issued a memorandum reinforcing the policy on utility relocation issue

***Recommendation #43:** We concur with the Final Report of the Governor's Commission on Transportation Policy that Transportation should work more closely with utility companies by assigning utility inspectors.*

➤ **Policy completed – Requires long-term monitoring and compliance.**

Transportation established policies and procedures for statewide utilities inspection and issued them to all districts.

***Recommendation #44:** In developing an aggressive project management plan, Transportation needs to clearly articulate its vision of a quality assurance program and the roles that staff play in ensuring quality over construction.*

➤ **Policy completed – Requires long-term monitoring and compliance.**

Transportation communicated to L&D managers regarding their duties and responsibilities, emphasizing the project coordination approach.

***Recommendation #46:** The Construction Division should develop a policy detailing the frequency and timing for updating ESTIMATOR data and ensuring that staff are following the policy.*

➤ **Policy completed – Requires long-term monitoring and compliance to ensure that the plan is properly implemented and followed.**

Transportation established guidelines and procedures to follow, but it is too early to determine the adequacy of these guidelines.

***Recommendation #51:** Transportation should increase its efforts to implement the concurrent engineering process, develop ways in which to measure the impact of the process, and identify accountable parties. Transportation should also create a formal constructability process to help reduce design errors and omissions.*

***Recommendation #52:** Transportation should develop an aggressive plan to implement cradle to grave project management in an effort to establish accountability for and improve the quality of the entire construction process. This plan could involve single individuals as project managers, project management teams, or a combination of the two. Transportation should clearly define responsibilities and give the appropriate authority to the responsible individuals.*

***Recommendation #53:** Transportation should develop best practices for project management both as a training tool and performance measure for its managers.*

- **Policy completed – Requires long-term monitoring and compliance to ensure that the plan is properly implemented and followed.**

Transportation issued a memorandum to all L&D managers detailing the concurrent engineering process and the duties of the project managers.

MAINTENANCE AND ASSET MANAGEMENT

***Recommendation #54:** Transportation should periodically review the MCI formula to ensure that it is reflective of current maintenance practices and associated changes in costs.*

- **Not addressed – A new system is being developed.**

Transportation determined that the resources necessary to correct and maintain the MCI formula would be better spent on developing the Asset Management System. Transportation presented a proposal to the Board that it would adjust maintenance payments to localities at the same rate as the Transportation's maintenance budget and the Board adopted this proposal.

***Recommendation #55:** Transportation should implement an objective means of identifying and prioritizing maintenance needs, namely an asset management approach. See the section entitled "Asset Management" for more details. Transportation should use an automated system to record data and should prioritize needs based on an objective set of criteria.*

***Recommendation #58:** Transportation should implement asset management as recommended in Recommendation #55 to determine the true maintenance needs of the Commonwealth's roads and the relative cost and to determine whether crossover actually exists and to what extent. Then, Transportation should determine how to handle crossover in the future, whether it be by obtaining additional funding or maintaining assets at a lower service level.*

***Recommendation #60:** Transportation should make the implementation of asset management a priority, with or without the automated systems fully in place to support it. Transportation should make continuous efforts towards this goal and ensure that all maintenance staff, including those from the area headquarters level and up, understand the changes that will come with asset management. Transportation should recognize that there is no way to appropriately fund the maintenance program without an asset management system to provide sound data and decision-making tools.*

***Recommendation #61:** Transportation should establish performance targets for all maintenance asset groups as soon as possible and use those targets to identify needs and develop the budget. Performance targets are critical to an asset management system.*

- **In-Progress – At least one version has been completed for four of the six proposed AMS modules.**

Transportation has completed a portion of the Asset Management System. The final two modules are still under development. Transportation expects that there will be multiple versions of AMS as it becomes more developed and management and users determine additional needs.

Recommendation #56: Transportation should recognize the changing spending patterns of the maintenance program and continue to take the pattern of incoming revenue into consideration when planning maintenance work, thus helping prevent cash shortfalls in the maintenance program.

Recommendation #57: The Maintenance Division needs to consider cash flows when scheduling maintenance work and entering into maintenance contracts. The Maintenance Division should work with Financial Planning to monitor cash and expenditure cycles.

- **Policy completed – Requires long-term monitoring and compliance to ensure that the plan is properly implemented and followed.**

Transportation has updated its budget process and implemented a monthly review of spending to attempt to alleviate the cash shortfall in asset management.

Recommendation #59: Transportation should develop policies and procedures to standardize the decision making process of whether to contract out or use state forces. Transportation should implement the use of a make-versus-buy model. Transportation should consider another interim solution specifically for make/buy decisions rather than depending on the Business Decision Making Model. Transportation should consider this solution as soon as possible and should not wait for the implementation of IMMS, which has an uncertain time frame for implementation.

- **In-Progress – Complete upon implementation of a Make vs. Buy module.**

Transportation has begun implementation of a “pilot” version of the Make vs. Buy module. However we have the following recommendations to consider:

- Transportation should include a cost estimator as part of the Make-Versus-Buy module in AMS;
- Transportation should not rely on user rankings of priorities. Relying on user rankings can lead to skewed or biased results; and
- Transportation should include staffing considerations as part of the Make-Versus-Buy module. Outsourcing costs should include a portion of Transportation employee’s wages that the agency will still pay if the project is outsourced.

Recommendation #62: Transportation should implement a formal project management plan over maintenance activities, which would include cash management techniques. This could help alleviate the maintenance program’s cash shortfalls.

- **Policy completed – Requires long-term monitoring and compliance to ensure that the plan is properly implemented and followed.**

Transportation completed a Project Management Plan for Asset Management Projects and implemented the policy in April 2004.

BUDGET MONITORING

Recommendation #48: Transportation should re-evaluate the methodology used to distribute prorated charges. In addition, Transportation should annually budget for prorated charges and develop an estimating factor for estimators to use in determining pro-rate costs for a project.

- **Completed**

Effective July 2004, prorated charges were eliminated. These costs are now included in the administrative budget.

Recommendation #50: Transportation should establish and enforce policies to include Programming and Scheduling, Secondary Roads, Urban Roads, and Financial Planning Divisions in the decision making process over contract budget additions. They should consider the effect the changes would have on allocations and cash management. This process should be formalized and documented for all changes that exceed a threshold determined by Transportation.

➤ **Policy completed – Requires long-term monitoring and compliance.**

Transportation has revised the policy for changes to construction contract work orders. Transportation performed a Work Order Process Review, developed recommendations and revised and issued policies and procedures via a Construction Directive Memorandum.



COMMONWEALTH of VIRGINIA

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

PHILIP A. SHUCET
COMMISSIONER

December 13, 2004

Mr. Walter J. Kucharski
Auditor of Public Accounts
P.O. Box 1295
Richmond, Virginia 23218

Dear Mr. Kucharski,

On behalf of the Department of Transportation, I want to express my deep appreciation for the follow-up work your staff completed on the 2002 "Special Review of the Cash Management and Capital Budgeting Practices." Your recognition of the many accomplishments we have made in the last 18 months gives all of us great satisfaction.

Your report highlights the focus the Department has on developing sustainable processes that will allow us to be financially strong and accountable no matter the circumstances. Certainly the 2003 and 2004 legislative actions to endorse these concepts are a significant step in this sustainability. Your recognition of the need to continue this focus endorses the deliberate and methodical approaches we are taking in our actions.

Please share with your staff my appreciation for their work and diligence.

Sincerely,

A handwritten signature in black ink, appearing to be "P. Shucet", written over a horizontal line.

Philip A. Shucet

DEPARTMENT OF TRANSPORTATION

Richmond, Virginia

Whittington W. Clement, Secretary of Transportation

Philip Shucet, Commissioner

Barbara Reese, Chief Financial Officer

Stacy D. McCracken, Controller

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