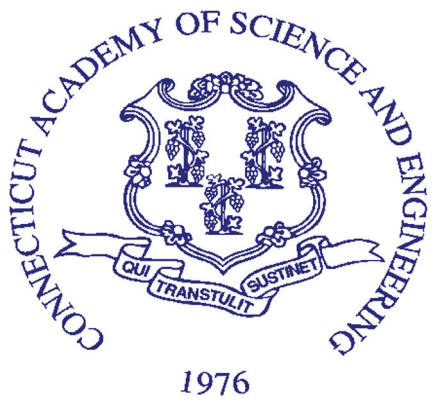
# Benchmarking Connecticut's Transportation Infrastructure Capital Program with Other States

September 2012

A Report By

The Connecticut Academy of Science and Engineering




For

The Connecticut Department of Transportation

# Benchmarking Connecticut's Transportation Infrastructure Capital Program with Other States

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## The Connecticut Academy of Science and Engineering

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| Origin of Inquiry: | The Connecticut Department of Transportation |
| Date Inquiry Established: | July 1, 2011 |
| Date Response Released: | September 5, 2012 |

This study was initiated at the request of the Connecticut Department of Transportation on July 1, 2011. The project was conducted by an Academy Study Committee with the support of Study Manager Nicholas Lownes, PhD, PE and Study Advisor, Eric Jackson, PhD. The content of this report lies within the province of the Academy's Transportation Systems Technical Board. The report has been reviewed by Academy Member Peter G. Cable, PhD. Martha Sherman, the Academy's Managing Editor, edited the report. The report is hereby released with the approval of the Academy Council.

Richard H. Strauss
Executive Director

Disclaimer

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**Technical Report Documentation Page**

| | | |
|---|---|---|
| **1. Report No.**<br>CT-2276-F-12-6 | **2. Government Accession No.** | **3. Recipients Catalog No.** |
| **4. Title and Subtitle**<br>**Benchmarking Connecticut's Transportation Infrastructure Capital Program with Other States** | | **5. Report Date**<br>September 2012<br>**6. Performing Organization Code**<br>SPR-2272 |
| **7. Author(s)**<br>Nicholas Lownes, Study Manager<br>Eric Jackson, Study Advisor<br>Kelly Bertolaccini, Research Assistant | | **8. Performing Organization Report No.**<br>CT-2276-F-12-6 |
| **9. Performing Organization Name and Address**<br>Connecticut Academy of Science & Engineering<br>805 Brook Street, Building 4-CERC<br>Rocky Hill, CT 06067-3405 | | **10. Work Unit No. (TRIS)**<br>**11. Contract or Grant No.**<br>CT Study No. SPR-2276<br>**13. Type of Report and Period Covered**<br>Final Report<br>July 2011 – September 2012 |
| **12. Sponsoring Agency Name and Address**<br>Connecticut Department of Transportation<br>2800 Berlin Turnpike<br>Newington, CT 06131-7546 | | **14. Sponsoring Agency Code**<br>SPR-2276 |

**15. Supplementary Notes**
Partners: Connecticut Department of Transportation, Bureau of Engineering and Construction, Division of Design Services, AEC Applications and Research Section; Connecticut Academy of Science and Engineering; and the Connecticut Transportation Institute, University of Connecticut. Prepared in cooperation with USDOT, Federal Highway Administration.

**16. Abstract**
This study was conducted to benchmark Connecticut's performance in capital programming against other state DOTs, identify ways to improve the performance and efficiency of the capital programming process and create a tool, a "Transportation Investment Dashboard," to communicate the performance of Connecticut's capital program to the state's transportation leadership.

Current data suggest that Connecticut's capital program may be more reliant on federal sources than the selected benchmark and best practice states reviewed in this study. This finding may indicate that expanded state investment and/or alternative sources of revenue will be needed to keep pace with the state's capital investment needs. ConnDOT is currently involved in many initiatives that are intended to improve the efficiency of the state's capital programming process and linkage to long-term transportation goals. These initiatives should be continued and progress should be tracked in a transportation investment dashboard using relevant financial data and performance measures. These performance measures should also be used in formalizing the linkage between long-term planning and capital programming, and to ensure that resources are adequate to meet future travel demand.

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|---|---|---|---|
| **17. Key Words**<br>Capital program benchmarking, planning and performance; transportation infrastructure funding/investment. | **18. Distribution Statement**<br>No restrictions. This document is available to the public through the National Technical Information Service, Springfield, VA 22161 | | |
| **19. Security Classif. (Of this report)**<br>Unclassified | **20. Security Classif.(Of this page)**<br>Unclassified | **21. No. of Pages**<br>**78** | **20. Price**<br>N/A |

**Form DOT F 1700.7 (8-72)** **Reproduction of completed page authorized**

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# GLOSSARY OF TERMS

| | |
|---|---|
| **AASHTO** | American Association of State Highway Transportation Officials |
| **ARRA** | American Recovery and Reinvestment Act |
| **CASE** | Connecticut Academy of Science and Engineering |
| **ConnDOT** | Connecticut Department of Transportation |
| **FHWA** | Federal Highway Administration |
| **FFY** | Federal Fiscal Year |
| **FY** | Fiscal Year (State) |
| **GRTA** | Georgia Regional Transportation Authority |
| **LRTP** | Long Range Transportation Plan |
| **MassDOT** | Massachusetts Department of Transportation |
| **MDOT** | Maryland Department of Transportation |
| **MoDOT** | Missouri Department of Transportation |
| **MPO** | Metropolitan Planning Organization |
| **NCHRP** | National Cooperative Highway Research Program |
| **NEPA** | National Environmental Policy Act |
| **NJDOT** | New Jersey Department of Transportation |
| **NYSDOT** | New York State Department of Transportation |
| **ROW** | Rights of Way |
| **RPA** | Regional Planning Agency |
| **STIP** | State Transportation Improvement Program |
| **TICP** | Transportation Infrastructure Capital Plan |
| **VTrans** | Vermont Transportation Agency |
| **WSDOT** | Washington State Department of Transportation |

# EXECUTIVE SUMMARY

The Connecticut Department of Transportation (ConnDOT), like most state transportation agencies, is operating with an increasingly constrained budget. Decreasing state revenues from traditional funding sources (such as the gas tax), uncertainty in federal funding to states, and the increasing need to invest in aging infrastructure, has led ConnDOT and other state transportation agencies to reevaluate or adjust their planning and programming processes. As ConnDOT aims to meet the state's long-term transportation goals in this constrained fiscal environment, they need to ensure that available funds are invested as effectively and efficiently as possible.

## STUDY PURPOSE

This study was conducted to benchmark Connecticut's performance in capital programming against other state DOTs, identify ways to improve the performance and efficiency of the capital programming process and create a tool—a "Transportation Investment Dashboard"—to communicate the performance of Connecticut's capital program to the state's transportation leadership.

## BRIEF STATEMENT OF PRIMARY CONCLUSION

Current data suggests that Connecticut's capital program may be more reliant on federal sources than the selected benchmark and best practice states reviewed in this study. This finding may indicate that expanded state investment and/or alternative sources of revenue will be needed to keep pace with the state's capital investment needs. ConnDOT is currently involved in many initiatives that are intended to improve the efficiency of the state's capital programming process and linkage to long-term transportation goals. These initiatives should be continued and progress should be tracked in a transportation investment dashboard using relevant financial data and performance measures. These performance measures should also be used to formalize the linkage between long-term planning and capital programming, and to ensure that resources are adequate to meet future travel demand.

## SUMMARY OF BACKGROUND

The study's literature scan revealed that several states maintain a capital plan, and unlike federally mandated documents, such as the State Transportation Improvement Plan (STIP), the information provided in these capital plans varied considerably. In particular, the sources of "state" funding varied in both the reliability and the diversity of sources. Therefore, the funding of planned capital expenditures provided from state sources should be considered an approximation. Interestingly, Connecticut has a percentage of revenues from federal sources (Figure 3(a)) consistently among the highest of the referenced benchmark states over the period 1992-2009.

## STUDY DESCRIPTION

A three-phase approach was taken to the study, consisting of a literature scan; a series of focus group sessions with ConnDOT personnel; and a detailed survey, interviews and data collection and analysis of selected benchmark and best practice states.

## SUMMARY OF FOCUS GROUPS

Focus groups sessions were held to investigate the current ConnDOT capital programming practices. These sessions identified several common issues in the capital program design and planning process that either can be, or are being changed, to improve efficiency. Changes included better communication throughout the process, further integration of project deliverability into the programming process, and the use of a bin of completed projects as a tool to manage uncertainty in the federal and state funding process. No formal linkage between the Long Range Transportation Plan (LRTP) and capital programming exists, though in practice, the five-year capital plan, along with the performance measures currently reported quarterly by ConnDOT, are being used to provide this linkage.

## SUMMARY OF STATE SURVEY RESULTS

Six states—three benchmarking and three best practice states—were selected for study and analysis.

- Best practice states (Missouri, Vermont, and Washington) were identified through an examination of the literature on strengthening the planning/programming linkage, asset management, and performance measurement; and
- Benchmark states (Maryland, Massachusetts, and New Jersey) were identified through a small-scale quantitative comparison of the similarities between Connecticut and the selected states with regard to funding sources, transportation infrastructure, demographics and climate.

The survey findings revealed no evidence that a dependency on federal funds over state funds, with the associated lack of flexibility, limited a state transportation agency's ability to link funding decisions to its long-term transportation goals. However, it is important to note that nearly all of the selected states reported interest in decreasing their reliance on federal funds due to federal funding uncertainty.

Another common concern identified in the survey process was the importance of better incorporating customer input into the planning process by measuring the level of customer satisfaction and reporting it regularly along with other performance measures.

All of the states surveyed are currently looking for ways to utilize their limited funding resources more efficiently. Most states are approaching this challenge by looking for new revenue sources, as well as implementing innovative contracting techniques to promote more efficient use of existing funds. Some of the proposed revenue sources include raising the gas tax,

implementing a mileage tax, and adding more toll roads. Additionally, some states include the number of projects completed through innovative contracting techniques in their performance metrics.

## RECOMMENDATIONS

Based on the study findings, the CASE study committee offers the following recommendations.

- **Establish performance measures to track project deliverability and innovative contracting methods.** Project deliverability performance should be measured by monitoring the percentage of capital projects that are completed on time and on budget. Connecticut currently measures the percentage of construction contracts completed within budget and the percentage of construction contracts completed on time. While these are useful measures, they do not necessarily reflect the experience of transportation users. Therefore, an additional performance measure should be used that identifies whether a project is fully functional and open for public use on time. Enhanced tracking capabilities and linkage to performance metrics may require additional information technology (IT) resources, as was the case for most case study states. ConnDOT should consider contracting with a third party to develop a capital projects management system, customized to the department's needs and organizational structure. Additional performance measures to consider for measuring project deliverability include:
    - Cause(s) of delay for project delivery
    - Variance between project budget and actual cost
    - Measures for projects undertaken using alternative innovative contracting methodologies, such as design-build, should include: number of projects, estimated time and cost savings, number of change orders, and number of contractor claims filed. Data measured for alternative contracting methodologies should be analyzed and compared with traditional design-bid-build methodology to assess the value achieved, if any.
- **Under-program (under-commit) the capital project plan while maintaining a bin of fully-designed, non-programmed projects.** For most of the states surveyed, the inclusion of a project in the state's capital program is a guarantee that it will be delivered. All of the selected benchmark and best practice states interviewed in the study's survey chose to under-program their capital budgets, though the methods used to under-program varied from state to state. Some of the states, such as Washington, make conservative project cost estimates. Other states, such as Maryland, simply do not program to the full amount of expected funding. However, these conservative programming methods often lead to unused funding becoming available at the end of a fiscal year. Therefore, to fully utilize available funding it is crucial to have a "bin" of projects that have been designed and have completed the permitting process that are not included in the capital plan. It should be noted that because ConnDOT has depleted their project bin through use of American Recovery and Reinvestment Act Act (ARRA) funding, in the short term it may be necessary to over-program to replenish the bin to achieve balance for under-programming over the long term.

- **Develop and maintain a "Transportation Investment Dashboard" to monitor Connecticut's transportation investment performance as compared to that of selected states.** The dashboard is intended to communicate data and information clearly and visually to ConnDOT and state's leadership for their use is assessing Connecticut's capital planning/programming and project deliverability performance. Preferably the dashboard would be issued annually. Annual issuance will provide data and information at a frequency well suited for analysis of performance and program review. The dashboard should be web-based for easy access by decision-makers, policymakers and the general public. The performance metrics chosen for inclusion should be consistent with LRTP and TICP priorities.

  It is suggested that ConnDOT consider using the dashboard to compare Connecticut with other selected states with respect to the level of state funding versus federal funding provided for capital projects. This will be a useful tool for determining the level of state funding appropriate to support Connecticut's LRTP and investment in the state's transportation infrastructure.

  However, this effort would require ConnDOT staff resources to develop and maintain the dashboard system for ongoing reporting and analysis, as well as collaboration and communication with other states for the comparative analysis. Therefore, the implementation and frequency of issuance of the dashboard system should be considered in the context of the commitment of resources along with potential value of analysis to ConnDOT.

### *Selection of Comparative States*

Options for the selection of states include:

- The benchmark states (Maryland, Massachusetts, New Jersey) and best practice states (Missouri, Vermont, and Washington) selected and surveyed for this study.
- New England Transportation Consortium states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)
- Northeast Association of State Transportation Officials states (includes the New England states, as well as Delaware, Maryland, New Jersey, New York, and Pennsylvania) as well as the District of Columbia, and the Province of Ontario, Canada, or a subset of these states.

### *Dashboard Data Considerations*

Most of the statistical and financial data used for the sample and proposed dashboards are submitted by each state annually to the Federal Highway Administration (FHWA). See Appendix B for data source information for the sample dashboards.

However, there is a two-year time lag from submittal of data by the states to public release of the data by FHWA on its website. This time lag in reporting unfortunately makes the suggested dashboard data outdated and less useful for analysis to assess capital planning/programming and project deliverability performance. This reporting time lag could be reduced by having ConnDOT take the lead in establishing a collaborative network of selected states willing for

mutual benefit to make state-level data available in a timelier manner. The dashboard concept could also be extended to provide a comparison of other aspects of state highway, public transportation, and other modes of transportation performance.

The purpose of the multi-state collaborative would be to:

- Determine data and information to include in the individual state and summary dashboards
- Report the commonly defined data
- Meet periodically to review the findings from the dashboard update, identify best practices to address capital planning/programming and project deliverability challenges.

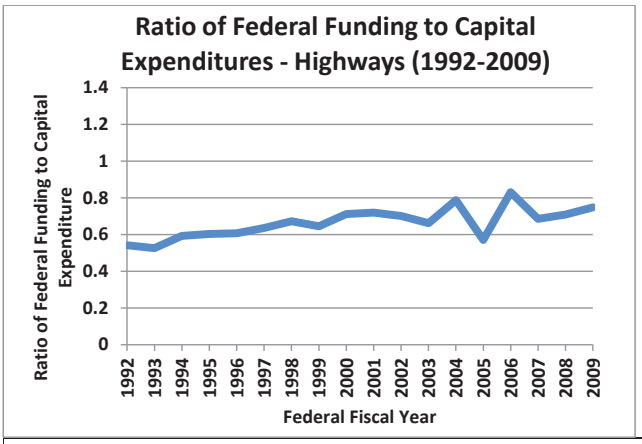
## *Sample Dashboards*

Two types of dashboards are conceptualized: an individual state dashboard and a summary dashboard that provides an overview of the comparative states.

Individual state dashboards could include key statistics on demographics, infrastructure, and finance in conjunction with a select group of performance measures that provide a linkage between LRTPs and TICPs.

An example of a state dashboard for Connecticut is shown in Figure ES-1. The proposed state dashboard also would include a table similar to Table 3 of this report (see page 20) that provides data on key demographic and infrastructure factors for each state.

## Capital Program Investment Dashboard: Connecticut




| | |
|---|---|
| Population (2010) | 3,405,565 |
| Rural to Urban Ratio (2010) | 0.14 |
| Miles of State Owned Roads (2010) | 3,717 |
| Number of State Owned Bridges (2010) | 2,800 |
| Total Expenditures ($M) (2009) | 1,370 |
| Capital Expenditures ($M) (2009) | 554 |
| Approx. Capital Exp. from State (%) (2012) | 40.7 |
| Approx. Capital Exp. on Transit (%) (2012) | 45.8 |

| Performance Measure | Latest Reporting Period | Performance |
|---|---|---|
| Fatalities per 100 M VMT | 0.71 (CY 2009) | Improving |
| Fatalities per 100,000 population | 6.34 (CY 2009) | Improving |
| Pavements with Good Ride Quality (% with IRI < 95) | 20 (CY 2010) | No Change |
| State Roadway Bridges in Good Condition (%) | 32 (CY 2010) | Improving |
| Road Network with Traffic Volumes > Capacity (%) | 8.67 (CY 2010) | Improving |
| Rail Passenger Trips | 9,847,219 (CY 2011-Q3) | Declining |
| Bus Passenger Trips | 6,856,175 (CY 2011-Q3) | Improving |

FIGURE ES-1: CAPITAL PROGRAM INVESTMENT DASHBOARD (STATE EXAMPLE: CONNECTICUT)

The summary dashboard compares each state's transportation revenues, disbursements, and ratios of federal funds to capital expenditures over time. A sample summary dashboard using the benchmark and best practice states included in this study is shown in Figure ES-2. The State Transportation Revenues Sources and State DOT Disbursement tables at the top of the dashboard are the same as Figures 2(a) and 2(b) from the state survey section of this report. Also, the Ratio of Federal Funding to Capital Expenditures graph shown at the bottom of the dashboard is a composite of Figures 4(a) and 4(b) from the state survey section of this report. Analysis of the information provided in the summary dashboard could lead to follow-up analysis to gain a more detailed understanding of commonalities or differences between the states.

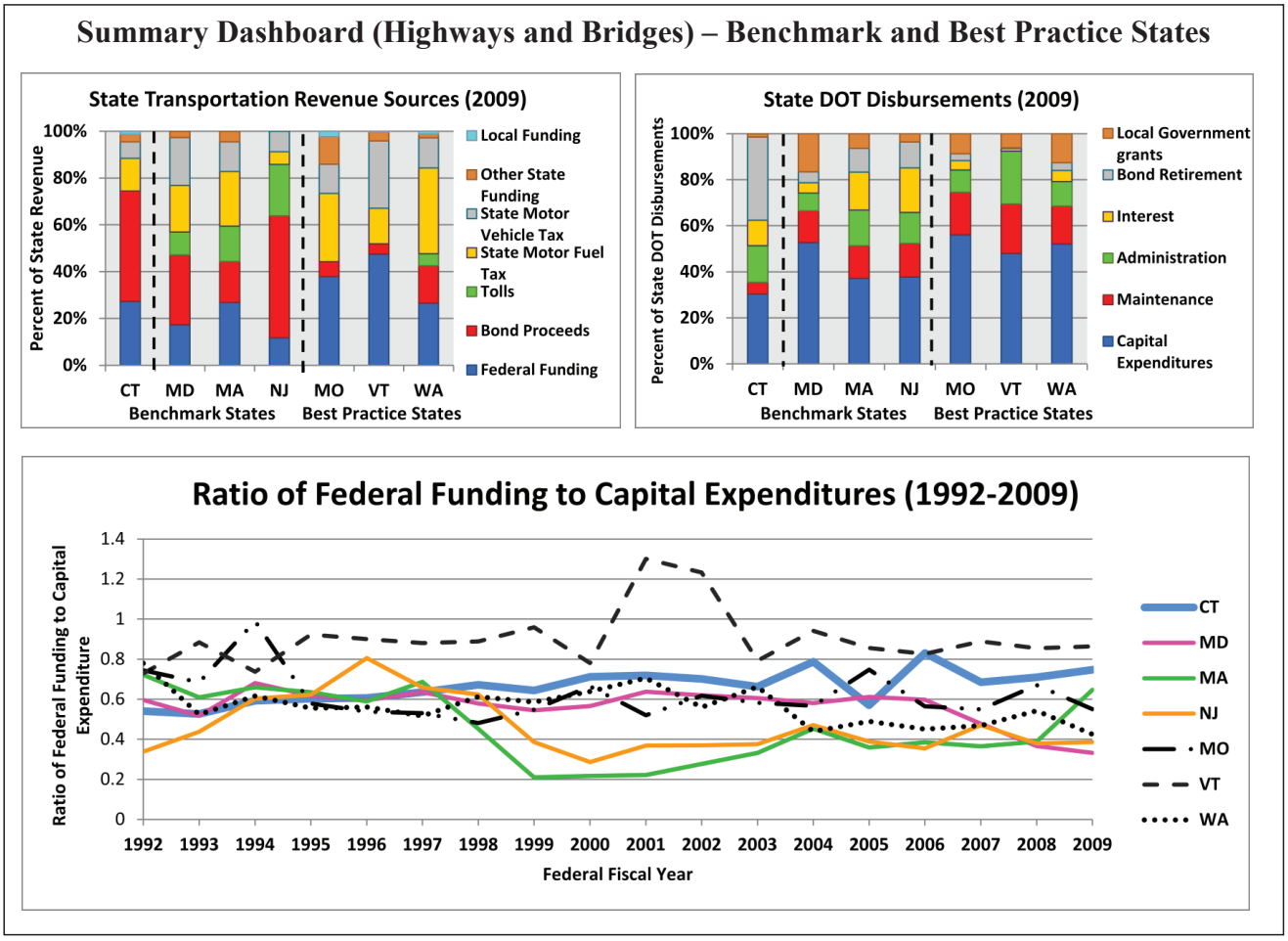



FIGURE ES-2: SUMMARY DASHBOARD (HIGHWAYS AND BRIDGES) – BENCHMARK AND BEST PRACTICE STATES

- **Administer periodically a customer survey to provide insight into user preferences and to gauge customer satisfaction.** ConnDOT should consider conducting an annual customer survey to best assess timely trends in customer satisfaction. Survey results would be used to report customer satisfaction with ConnDOT's performance and to serve as a guide for setting priorities. The survey should be used by ConnDOT in conjunction with other performance measures to determine actions for improving work systems, project deliverability and overall public satisfaction with the state's transportation system over time.

  As noted in the study findings, most of the benchmark and best practice states included in this study have significant experience in using customer surveys to provide an independent assessment of customer satisfaction that can serve as models for ConnDOT. Consideration should be given to contracting with a company/organization experienced in developing, conducting, analyzing, and reporting through the use of surveys. Also, ConnDOT should engage in a public awareness effort to make available and inform the public of its LRTP goals and its capital planning/programming process using its web presence and opportunities available through public project meetings and other events.

## CONCLUDING REMARKS

The study recommendations provide a framework for continually reviewing and assessing ConnDOT's capital planning/programming process and project deliverability performance, as well as linkage with the goals of the state's LRTP.

Providing transparent data and information to the state's leadership and the general public through the use of visible dashboards could help increase accountability and serve as a basis for establishing a better understanding of ConnDOT's capital program, the condition of the state's transportation infrastructure, and the need for resources to support the goals of the LRTP. Involving the public in this process requires increasing public awareness and measuring customer satisfaction.

The development of a multi-state collaborative of benchmark and best practice states should be considered by ConnDOT to provide the department with opportunities to share its experience with other states and to learn about innovative solutions to improve the efficiency and effectiveness of its capital program investments.

# INTRODUCTION

The Connecticut Department of Transportation (ConnDOT), like most state transportation agencies, is operating under an increasingly constrained budget. Decreasing state revenues from traditional funding sources, such as the gas tax, and uncertainty in federal funding combined with the increasing need to invest in maintaining the state's aging transportation infrastructure, has led ConnDOT, as well as other state transportation agencies, to reevaluate or adapt their capital project planning and programming processes to ensure that capital project funding is being utilized as effectively and efficiently as possible.

The objectives of this study include the following:

1. Identify comparative measures for understanding Connecticut's performance regarding implementation of its capital investment plan in the state's transportation infrastructure and services as compared to other states.
2. Develop a template for a "Transportation Investment Dashboard" that will be useful for communicating information involved in transportation capital allocation clearly and visually to the state's leadership. This dashboard will include funding sources and alignment of allocation with strategic goals.
3. Make recommendations for project deliverability performance measures regarding ConnDOT's implementation of its capital plan.

Additionally, research was conducted on methods and processes for strengthening the linkage between the state's long-range transportation goals, as outlined in the state's long-range transportation plan, and shorter-term capital planning, as outlined in the state's capital plan.

The study included a literature review, focus group sessions with ConnDOT staff, and a survey and interviews with transportation agency staff of benchmark and best practice states, which provided the basis for the study's findings and recommendations.

# BACKGROUND

The Connecticut Department of Transportation (ConnDOT) is divided into six bureaus: Highway Operation, Public Transportation, Aviation & Ports, Finance & Administration, Policy & Planning, and Engineering & Construction. Each of the bureaus reports to the governor-appointed commissioner, who is responsible for unifying the separate bureaus under a common mission, vision, and set of values. One of the core values of the agency is measurable results. ConnDOT has developed a comprehensive list of performance measures to monitor progress towards the state's long-term transportation goals. The state also maintains an annually updated, five-year capital plan that outlines all capital projects and funding sources for a five-year horizon. Figure 1 outlines the process of implementing a project, from planning to delivery, and shows the role of the capital plan in that process. One of the purposes of this research is to develop a more direct way for ConnDOT to incorporate performance measures into the development of the five-year capital plan.

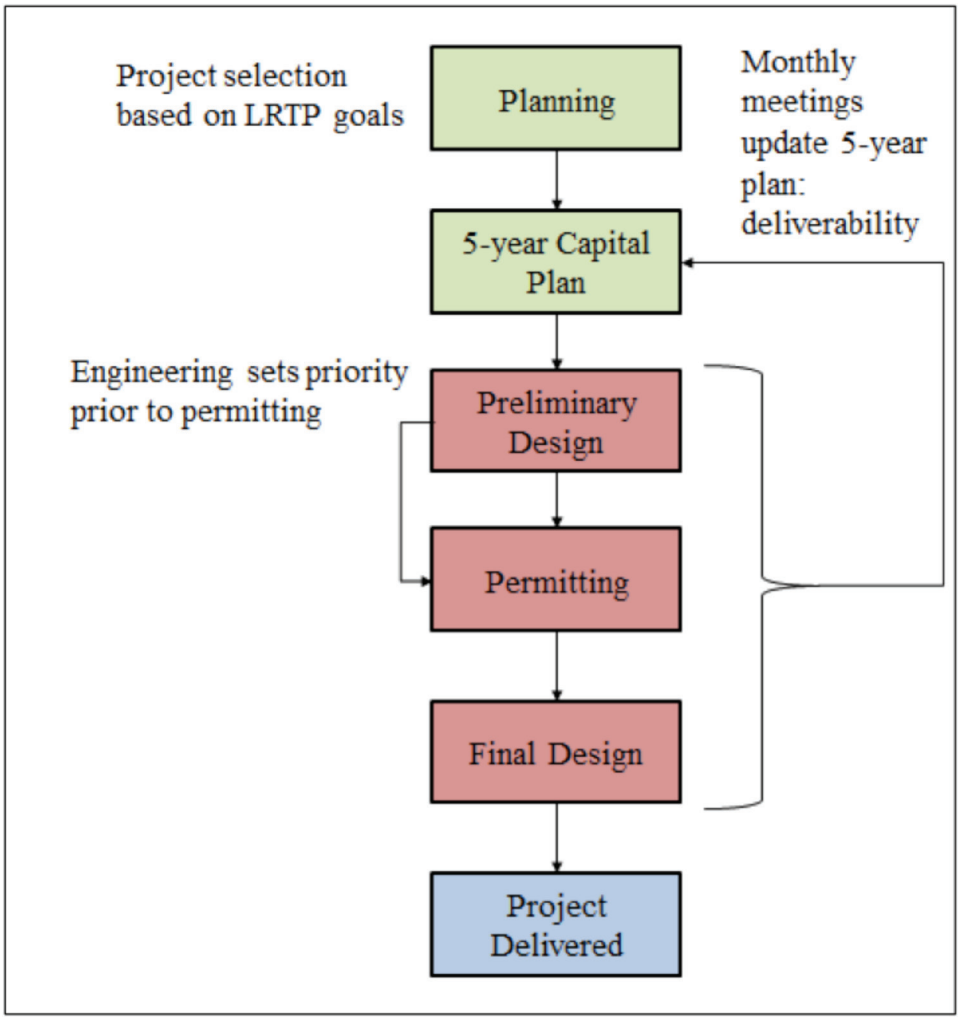



FIGURE 1: PROJECT IMPLEMENTATION FROM PLANNING TO DELIVERY

Connecticut maintains a federally mandated Long-Range Transportation Plan (LRTP) as a high-level plan useful in directing project-specific plans. The LRTP is updated every 3 – 5 years and covers a planning horizon of at least 20 years. The LRTP provides a framework for planning, engineering, and construction activities, with priorities identified for the first three to five years of the plan that take into consideration need and fiscal capability. The LRTP also identifies funding sources and commitments associated with the priorities. The following five points have been identified as goals of Connecticut's LRTP strategy:

- Preservation - State of Good Repair
- Safety and Modernization
- Efficiency
- Quality of Life
- Strategic Capacity Improvements

ConnDOT developed a five-year Transportation Infrastructure Capital Plan (TICP) in 2009 that is updated annually. The TICP identifies projects with funding source(s), federal and/or state, that are projected to be funded in the next five years. The capital plan serves as a management tool for ensuring that project allocations align with the strategic vision of the LRTP.

This study examines the following questions related to Connecticut's capital plan:

- Which other states are developing similar plans?
- How are other states structuring their expected funding sources given the fiscal constraint requirements put forth by FHWA?
- What percentage of planned capital expenditures is dedicated to preservation, capacity improvement, quality of life, or other strategic long-range goals?
- What methods or tools do other states use to target and program their capital funds?

# LITERATURE REVIEW

## STRENGTHENING THE PLANNING/PROGRAMMING LINKAGE

### *Introduction*

The federal government requires each state transportation agency to develop a long-range transportation plan (LRTP). LRTPs are generally policy documents intended to guide transportation professionals, regional planners, elected officials, and citizens towards common long-range goals. Most LRTPs, including Connecticut's, have a planning horizon of twenty years. Because most LRTPs do not include specific projects or set performance targets, monitoring progress towards LRTP goals can be extremely difficult. Agencies typically rely on their State Transportation Improvement Plan (STIP) to identify and allocate funding for specific projects. However, STIPs only have a planning horizon of about five years and are not explicitly linked to LRTPs. Successfully bridging the fifteen-year gap between these planning horizons requires the intentional development of practices which link long-range goals to short-term capital project programming. This linkage is defined in NCHRP Report 591, "Factors that Support the Planning-Programming Linkage," as "the degree to which current funding commitments reflect the stated policies, goals, and objectives of the long-range plan" or "the degree to which progress toward long-range policies and objectives is being made with funds committed to current projects and improvements" *(Reference 1)*. Strengthening the planning/programming linkage is necessary to achieve the goals outlined in a state's LRTP.

Originally, LRTPs were simply presented as lists of transportation projects and investments necessary to meet forecasted need, making it very easy to determine how well short-term investments lined up with long-term goals. However, steadily increasing needs and limited funding caused project backlogs to grow. Projects intended to be built in the later years of the LRTP planning horizon were frequently deferred to create space in the budget for unanticipated and immediate needs. In response to the growing backlog of projects and the inability of long-range plans to predict all future needs, state transportation agencies shifted away from creating LRTPs as lists of specific projects and towards creating more general policy documents. Shifting the LRTP towards a policy document allowed politicians and policymakers to discuss and reach an agreement on broad goals for a state's transportation system without forcing them to agree to specific projects. It also provided the opportunity to explicitly incorporate statewide economic, environmental, and social goals into the state's transportation plan. Though the effects of switching the LRTP to a policy document have been largely positive, it created the need to develop techniques and processes for connecting LRTP goals to shorter-term programming *(Reference 1)*.

Some states, such as Florida, Pennsylvania and Washington, have attempted to address this gap by developing intermediate-range financial plans with planning horizons between 8 and 12 years *(Reference 1)*. This strategy is also suggested in the Australian Infrastructure Financial Management Guidelines *(Reference 2)*. However, developing a separate plan is not necessarily required to strengthen the planning/programming linkage. According to NCHRP Report 591,

states and regions with strong planning/programming linkages display certain "intermediate characteristics" that can be expressed in either an LRTP or a separate intermediate plan. State transportation agencies need to establish clear goals and desired outcomes. A set of performance measures, as well as a data system for gathering those measures, must be developed to determine progress towards desired outcomes. Performance measures need to be considered in project selection, prioritization, and funding allocation. It is also important for these measures to be analyzed and reported to stakeholders. Performance analysis and stakeholder feedback should be considered in future planning to programming cycles *(Reference 1)*.

NCHRP Report 591 provides a comprehensive overview of successful strategies used by transportation agencies to strengthen the connection between planning and programming. The report suggests focusing on four major categories when working to improve the planning/programming linkage:

- Leadership
- Communication
- Organizational structure and culture
- Performance measurement and application

Special efforts are required to ensure that those in leadership positions, such as policymakers, planners, and politicians, understand the state's long-range plans and the process for integrating these plans into shorter-term project selection decisions. Communication is vital, not only between divisions within state transportation agencies, but also between state agencies and regional planning agencies (RPAs) and metropolitan planning organizations (MPOs). The organizational structure of state transportation agencies needs to provide a clear link between divisions responsible for planning and programming. Perhaps the most important way to strengthen the planning/programming linkage is to emphasize performance-driven planning. This requires state transportation agencies to broaden their focus from specific projects to overall performance within regions or corridors. The following discussion suggests specific actions that can be taken to strengthen the planning/programming linkage.

## *Leadership*

Before any changes can be made, an agency's leadership needs to be invested in strengthening the planning/programming linkage. If leaders fail to provide support and commitment for strengthening this link, business as usual is likely to continue. Prioritizing this linkage begins with ensuring that all policymakers and leaders in the transportation profession have a thorough understanding of and commitment to the goals outlined in the LRTP. Agency leadership from all stages of the planning process should be involved in setting LRTP goals and outlining programming processes. This may be especially difficult for agencies where short terms of office result in a high turnover rate of appointed and elected political leaders *(Reference 1)*. Frequent communication between state transportation agencies and political leaders is necessary to ensure that politicians understand the goals and benefits of transportation investments and the systematic approach used to plan and prioritize projects. In recent years there has been a move to lessen the role of elected officials in making investment decisions, as they tend to prioritize the needs of their own districts over those of the state. State transportation professionals need to have a thorough knowledge of the planning/programming

process and maintain the skills necessary to adequately perform these functions. Recent staffing reductions to planning and programming divisions of state transportation agencies are one of the most significant barriers they face in achieving the necessary level of skill and leadership for effective capital project planning/programming *(Reference 1)*. As the resources provided to capacity planning and programming divisions are reduced, the expertise, communication and administrative responsibilities demanded from them are increasing. While this is not an easy issue to resolve, it should be considered as state agencies make efforts to strengthen the planning/programming linkage *(Reference 1)*.

## *Communication*

Unsurprisingly, the results of the NCHRP Report 591 suggest that frequent and clear communication is vitally important to strengthening the planning/programming link. However it is not only an agency's planning and programming divisions that require clear lines of communication; planners and programmers also need to maintain frequent dialogue with MPOs, RPAs, external stakeholders, and agency finance and budgeting divisions responsible for implementing and delivering projects *(Reference 1)*. State transportation agencies, MPOs and RPAs need to ensure that they are working towards common outcomes and that their projects do not have conflicting goals. Many transportation agencies, MPOs and RPAs have incorporated external stakeholders into the process through their decentralized planning practices. Enhancing communication between an agency's planners, programmers and the divisions responsible for budgeting and finance is crucial to strengthening the planning/programming link. Too frequently, planners and programmers fail to consult those responsible for financing projects until after they have already reached project selection decisions *(Reference 1)*. Funding sources often have significant legal and financial management implications that can put severe restraints on projects. To prevent unexpected obstacles from restricting or delaying projects, finance and budgeting divisions should be included in the planning/programming process. Divisions responsible for implementing and delivering projects should also be consulted throughout the planning process. If they do not appreciate or fully understand the planning and programming decisions, they may not implement the projects as intended. Communication with staff responsible for implementing and maintaining projects is increasingly important today given the recent shift towards a "Context Sensitive Design" approach *(Reference 1)*.

## *Organizational Structure and Culture*

Ideally, planning and programming functions should be near each other in organizational structure, falling under the supervision of the same manager. The interviews conducted for NCHRP Report 591 suggest that sharing a senior level manager can help bridge the planning/programming gap. However, the report also emphasizes that good communication can overcome structural gaps between planning and programming divisions. Differences in organizational cultures seem to cause greater dissonance than any structural issues. In the past, state transportation agencies focused almost exclusively on designing and building transportation infrastructure, creating a culture that emphasized project outputs and delivery.

The emphasis has remained on outputs even as the focus has shifted from building new facilities to operating and maintaining existing infrastructure. Some divisions of state transportation agencies, particular those involved in business and finance, have maintained

this point of view *(Reference 1)*. Most planners, however, are interested in the broader range of economic, social, and environmental outcomes resulting from transportation investments. These different perspectives can create friction between the planning and business divisions that needs to be resolved to improve the effectiveness of the planning to programming process. The report also mentioned that very few surveys reported significant culture clashes between state agencies and local stakeholders. Though disagreements between the groups arise frequently, state agencies claim that high levels of communication and local involvement allow the groups to achieve a unified vision. However, before interpreting these results as proof that no culture clash exists between states agencies and local stakeholders, it is important to note that local stakeholders were not surveyed as part of this research *(Reference 1)*.

## *Performance-Driven Planning*

NCHRP Report 591 found performance measurement to be the single most important factor in understanding the state of current transportation systems, as well as the most important element in strengthening planning/programming linkages. The goals outlined in a state's LRTP are used to define categories for measurement and investment. States must then develop a list of specific measures to gauge performance within each category *(Reference 1)*. For example, the number of fatalities per vehicle miles traveled can be used to measure progress within the safety category. Most states have either established or are currently developing a set of relevant performance measures. Performance measurement has also become a part of the national agenda. A report by the National Transportation Policy Center, part of the Bipartisan Policy Center, proposed national performance measures for economic growth, energy and environment, and safety *(Reference 3)*.

Each measure should be paired with a specific target so that progress can be measured as objectively as possible. Regularly publishing performance reports can help state agencies cultivate a sense of ownership of policy goals among their staff and establish a reliable image with politicians and the public *(Reference 4)*. As previously mentioned, it is very important for agency staff, political leaders, and other stakeholders to be committed to achieving the state's long-range goals and strengthening the planning/programming link. Some agencies have further cultivated a sense of commitment by decentralizing performance assessment data collection and analysis. Relying on the staff closest to the data to report their progress links the staff responsible for project implementation to broader policy goals, again creating a sense of ownership. However, self-reported performance measures may lead to questionable data quality. Virginia addressed this issue by posting all of the data as received on its online dashboard, even if the data were incomplete or obviously inaccurate. Knowing that the data were going to be made public gave agency divisions the incentive to improve data quality *(Reference 4)*. Ultimately, performance reporting not only provides valuable information on the current state of the transportation system but also generates more commitment towards an agency's policy goals.

To strengthen the planning/programming linkage, performance measures should be incorporated into programming and funding allocation procedures. Some states, such as Minnesota, require regional offices to analyze and document the expected outcomes of any new projects *(Reference 1)*. Predicting the effects of proposed projects on performance measures can

be difficult and requires significant effort. However, as more performance data are collected over time, causal relationships should begin to emerge, reducing the effort required to predict the amount of progress specific transportation investments can achieve. There are several other obstacles that prevent state transportation agencies from using performance-driven planning to make programming and funding allocation decisions. These include the need to:

1. move ahead with committed projects
2. invest in projects earmarked for a specific funding source, and
3. address equity issues in prioritization and funding allocation *(Reference 1)*.

Though incorporating performance measures into programming decisions may be challenging, the literature suggests it is one of the most important steps that transportation agencies can take to strengthen the planning/programming linkage.

## *Summary of Strategies for Strengthening Planning/Programming Linkage*

Strengthening the planning/programming linkage requires focusing on leadership, communication, organizational structure and culture, and performance-driven planning. Table 1 outlines some of steps that can be used to promote planning/programming linkage. All of the suggestions can be aggregated into two major strategies:

- Everyone involved in the planning to programming process, from transportation agency leaders and politicians to regional planning agencies and agency financial division staff, needs to be kept informed and working to achieve common goals.
- Transportation agencies need to develop performance measures to gauge progress towards LRTP goals and incorporate these measures into the capital project programming process.

While not all of the ideas identified in this review will be appropriate for every state transportation agency, these two major strategies are important considerations for agencies interested in strengthening their planning/programming linkage.

TABLE 1: STRATEGIES FOR STRENGTHENING THE PLANNING/PROGRAMMING LINKAGE

| | Strategies |
|---|---|
| **Leadership** | • Ensure that all leaders understand and are fully committed to the goals outlined in the LRTP<br>• Provide political leaders with knowledge of the planning to programming process<br>• Focus role of elected officials on policy development and accountability rather than making specific project selection decisions<br>• Maintain the professional skills necessary to make planning/ programming decision |
| **Communication** | • Include MPOs and RPAs in the planning/programming process<br>• Communicate with divisions responsible for budgeting and finance when making planning/programming decisions<br>• Consult divisions responsible for implementing and delivering projects throughout planning process |
| **Organizational Structure and Culture** | • If possible, move planning and programming functions close to each other within organizational structure<br>• If restructuring is not possible, strengthen communications between planning and programming functions to overcome structural weaknesses.<br>• Shift organizational focus from project "outputs" to project "outcomes" |
| **Performance-Driven Planning** | • Develop categories of investment that match LRTP goals<br>• Develop specific measures and targets to gauge progress in achieving goals<br>• Regularly publish performance reports<br>• Consider decentralizing data collection to agency staff in the field<br>• Develop analyses to predict the effect of potential projects on performance<br>• Incorporate predicted performance measure values into the programming process |

## COMPARISON OF TRANSPORTATION INFRASTRUCTURE CAPITAL PLANS

Every state is required by federal mandate (23 CFR 450.216) to develop and update a STIP. However, there is no federal mandate for a state to maintain a Transportation Infrastructure

Capital Plan (TICP). Several states, including Connecticut, have developed documents that provide detail focused solely on capital programming beyond that which is included in the STIP. A search of DOT websites and discussions with several states identified six states that maintained TICPs: New York, New Jersey, Maine, New Hampshire, Massachusetts and Connecticut. The content and time frame varied for each of these states' plans. For example:

- Connecticut maintains a five-year plan, whereas Maine has a two-year plan.
- Connecticut's plan provides a detailed list of capital projects with anticipated funding sources, whereas Massachusetts focuses its plan on needs and linkages to strategic goals.

Table 2 summarizes available information on a per-year basis for comparison purposes from the TICPs of six of the seven referenced states. Massachusetts is not included in the table as their TICP does not provide data in sufficient detail for analysis. Maryland is included in the table, but the data presented are from the state's budget, as Maryland does not have a TICP. For some states that have multi-year plans, such as New York, if annual data were not available in sufficient detail, plan totals were used to calculate per-year information shown on the table. Further, the focus of the table is on highway and bridge capital programs, as not every state referenced has a TICP transit component. The information provided in the table is based on the assumptions and qualifications noted. Population estimates are from the 2010 census data. The source for route-mile and lane-mile information is the 2008 *AASHTO Transportation Finance* website data, which is based on the FHWA Highway statistics series maintained by FHWA. Observations from analysis of the data and information available for the referenced states include:

- Connecticut and Maine clearly identify anticipated funding sources by federal versus state.
- Maryland's data are taken from its Statewide Capital Budget plan, which provides a clear breakdown of federal versus state funding, but does not provide detail on a project-by-project basis.
- The level of detail and state funding sources available (i.e., tolls) varies from state to state.
- New York considers funds not yet identified as part of their state funding percentage.
- New Hampshire includes credits from the operation of toll facilities for the state's federal funding match.
- Rural states tend to have higher capital funding per capita than urban states, though their funding per route or lane mile tends to be lower than that of the urban states.
- Lane miles and route miles are presented using all public roadways, not just those administered by the state. This comparison is included to provide a comparison of network size.
- Connecticut's total funding per capita is 3rd highest among the referenced states.
- Connecticut's total funding per route and per lane mile funding is highest of the referenced states.
- Connecticut's percentage of state funds to support its capital program is 3rd lowest of the referenced states at 40.7%, with the range being 61.6% to 30.1%.

TABLE 2: COMPARISON OF ANNUAL CAPITAL PROGRAM (HIGHWAYS & BRIDGES) FUNDING FOR SELECTED STATES

| | CT (Note 1) | VT (Note 2) | MD (Note 3) | ME (Note 4) | NJ (Note 5) | NH (Note 6) | NY (Note 7) |
|---|---|---|---|---|---|---|---|
| **Estimated Total Capital Funding in Capital Plan ($ millions)** | $823.4 | $524.8 | $712.6 | $688.7 | $1,486 | $266 | $18,711 |
| **Estimated Annual Capital Funding in capital plan ($ millions)** | $823.4 | $524.8 | $712.6 | $344.4 | $1,486 | $266 | $3,742.2 |
| **Fiscal Years Included in Estimate** | 1 | 1 | 1 | 2 | 1 | 2 | 5 |
| **Total Funding/per Year/per Capita** | $230 | $838 | $122 | $259 | $168 | $202 | $192 |
| **Total Funding/per Year/ per Route-Mile State Roadway System*** | $38,543 | $36,391 | $22,704 | $15,085 | $38,345 | $16,620 | $32,691 |
| **Total Funding/per Year/per Lane-Mile State Roadway system**** | $18,076 | $17,705 | $10,344 | $7,366 | $17,631 | $8,060 | $15,415 |
| **% State Funds***** | 40.7% | 30.1% | 40.1% | 43.4% | 44.2% | 50.5% | 61.6% |

* Route miles as of 2008 from www.transportation-finance.org

** Lane miles as of 2008 from www.transportation-finance.org

*** State funding sources vary significantly state-by-state and funding percentages should be interpreted accordingly. For example, NYSDOT includes "significant additional funds yet to be identified" in their state total. NH includes toll credits.

Note 1 (CT): http://www.ct.gov/dot/lib/dot/documents/dcommunications/press_release/5-year_Cap_Plan_-_Oct11_Update_11-17.pdf

Note 2 (VT): http://www.aot.state.vt.us/CapProg/documents/FY13/FY13TransportationBudgetReports.pdf

Note 3 (MD): http://www.dbm.maryland.gov/agencies/capbudget/Documents/2013CapImprovPlan.pdf

Note 4 (ME): http://www.maine.gov/mdot/planningdocs/bcwp2012-2013/documents/pdf/completereport.pdf

Note 5 (NJ): http://www.state.nj.us/transportation/capital/tcp13/

Note 6 (NH): http://www.nh.gov/dot/org/projectdevelopment/planning/typ/documents/MASTER_13-22_Gov_2_Leg_1-13-12_print_2-8-12.pdf

Note 7 (NY): https://www.dot.ny.gov/programs/repository/NYSDOT-Capital-Plan-March2008.pdf

## RELATED TOPICS

Several topics are closely related to the capital programming process and its linkage to long-range transportation goals. These topics are briefly discussed below—for detailed information, refer to the reference section of this report.

### *Asset Management in the Planning to Programming Process*

The Federal Highway Administration (FHWA) defines asset management as the "systematic process of maintaining, upgrading and operating of physical assets cost effectively. It includes preservation, upgrading and timely replacement of assets, through cost effective management, programming, and resource allocation" *(Reference 5).* By combining standard engineering practices with business techniques and economic theory, the asset management framework creates a rational, organized approach to decision making (*Reference 5).* Most state transportation agencies have incorporated asset management principles into their planning to programming procedures to at least some extent.

Many of the strategic focus areas, or long-term goals, set by state transportation agencies involve asset management components *(Reference 6)*. These long-term goals, such as prioritizing maintenance, focusing on customers, increasing mobility, and improving quality of life and economic competitiveness, are shared by most, if not all, state transportation agencies. Legislation or other formal mandates are used by many states to institutionalize the implementation of asset management principles and link the principles to funding. Asset management goals need to be linked to budgets and financial plans to ensure the availability of future revenue for the maintenance and preservation of infrastructure *(Reference 6).* Research also indicates that each goal, or strategic objective, should be monitored by a separate manager *(Reference 6)* and that asset management functions should not be the responsibility of a single, isolated group *(Reference 8).*The actions suggested to improve an agency's asset management framework are very similar to those suggested to strengthen an agency's planning/ programming linkage.

The asset management literature emphasizes the importance of using performance measures in the planning to programming process *(References 6, 7, 8, 9).* Asset management explicitly links policy goals to performance measures *(Reference 7).* Similar to the process described previously, policy goals are formulated into more specific asset management objectives which are then used to develop a set of relevant performance measures. These measures should align with the planning performance measures being used to gauge progress towards non-asset management related goals *(Reference 6).* Frequently cataloging the value and condition of a state's transportation assets can help to develop a baseline for evaluating candidate projects. State transportation agencies should share this information across departmental boundaries to strengthen the planning asset management linkage and promote collaboration. Also, sharing asset management performance measures with the public cultivates a sense of trust and a culture of accountability, an important step towards improving customer satisfaction *(Reference 6)*.

Allocating funds to the maintenance and repair of infrastructure can be complicated because candidate projects involve different types of infrastructure for various modes and require different treatments *(Reference 9)*. Asset management uses performance measures to make objective comparisons between dissimilar projects, making it a particularly useful framework

for the project selection process (*Reference 7)*. This framework also allows transportation agencies to make decisions across agency divisions and modes, as well as tradeoffs between capital project and maintenance funding. Before implementing any program, agencies should conduct analyses to predict potential project outcomes, accounting for revenue projections, available staffing and resources, and other investment needs *(Reference 7)*. To improve the accuracy of these analyses, decision-makers should consider economic and time factors *(Reference 9)*. Without implementing an asset management framework, state agencies tend to adopt "worst first" policies, allocating funds towards the infrastructure in greatest need of repair while leaving little funding for preventative maintenance. Such policies fail to consider long-term costs and do not yield the most economically efficient results *(Reference 8)*. Asset management is a valuable framework for decision making and complements efforts to strengthen the planning/programming linkage.

### *Program Implementation and Project Delivery*

In addition to project costs and outcomes, programming processes should also consider any risks associated with the implementation of a specific project. Recently, the Georgia Regional Transportation Authority (GRTA) conducted a thorough evaluation of project delivery risk *(Reference 10)*. The report develops a methodology for quantifying the amount of risk associated with candidate projects. Combining quantitative and qualitative factors, the proposed score measures risk along two axes: likelihood of delivery risk and severity of delivery risk. Likelihood of delivery risk is a primarily quantitative score while the severity of delivery risk considers qualitative components. The GRTA relies on panels of experienced professional staff to assign values for severity of risk. The document analyzes 37 types of risk factors, as well as several related sub-factors, and the types of delays these factors may cause. Considering project risk in the programming process may help transportation agencies spend their time and resources more efficiently. GRTA study risk categories relevant for use by other states include the following:

- Project crosses jurisdictional boundaries
- Project is part of a larger program
- Does the project have a service/operation plan?
- Project schedule
- Use of federal funds
- Project delivery method
- Project cost estimates
- Vehicle procurement strategy
- Identification of early action contracts
- Contract packaging determined
- NEPA documents in process
- NEPA finding/decision received
- Supporting environmental documents
- Project coordination issues and studies
- Permitting
- Right of way
- Design standards
- Inter-operability standards
- Significant facilities/construction
- Permits/agreements (Environmental, relocation, ROW, Construction/Relocation, remediation)
- Other features (Park and Ride, Layover yards, stations)
- Traffic engineering
- Plan reviews
- Railroad right of way
- Highway right of way
- Utility right of way
- Environmental issues
- Schedule issues
- Permitting/Agreements (Construction permits, reimbursement agreements)
- Quality/Management
- Operations
- Third Party Responsibilities

# FOCUS GROUPS

The study research team led focus group sessions with ConnDOT staff as part of this study's review and analysis of the linkage between planning and capital programming. Each of the four focus groups included approximately ten staff members representing various ConnDOT offices and bureaus. The moderator used broad questions to start a dialogue on issues related to the LRTP, capital programming, deliverability, and project selection. After the conversation was initiated, the moderator provided focus group participants an opportunity to guide the discussion with minimal interruption.

The sessions were designed to focus on three primary topics:

1. Existing linkage between LRTP and capital programming
2. Funding uncertainty and capital programming impacts
3. Metrics and measures for efficient capital programming

A summary of the most significant and relevant findings from the focus group sessions are outlined below.

- **ConnDOT's current capital plan and recently developed performance measures are not perfectly aligned with the department's current LRTP.** The capital plan and performance measures are well aligned with each other and seem to play a more significant role in ConnDOT's decision making process for capital project selection than the strategic goals outlined in the LRTP. While the performance measures do not directly contradict the LRTP's strategic goals, they do seem to give new priority to certain goals, such as preservation, and redefine others, such as quality of life. In general, participants viewed the capital plan and performance measurements as useful tools while few were familiar with the LRTP. As ConnDOT considers updating its LRTP, the department may want to take the opportunity to revise its long-term goals to better align with its capital plan and leverage existing performance measures.
- **The goals of the LRTP are not given equal priority.** Most focus group participants agreed that the department gives preservation and maintenance the highest priority. Participants indicated that this is necessary due to the current condition of the state's transportation infrastructure. Safety was also cited as a major priority. At the same time, there are very few projects that emphasize quality of life, one of the state's strategic LRTP policy goals. However, it was noted that this does not necessarily imply that quality of life is being ignored in project planning and design. Rather, quality of life improvements are often incorporated into projects during the project scoping phase. For example, a sidewalk expansion project might not be selected as a high priority project, but sidewalk expansion may be included as part of another, larger project. Participants expressed the need to find ways to fund projects falling outside of the preservation and safety categories.

- **Uncertainties in funding and constrained budgets are changing ConnDOT's planning process.** In the absence of a federal transportation bill, long-term financial planning has been challenging for ConnDOT, which is heavily reliant on federal funding. Some participants indicated that state funding is even less predictable than federal funding, increasing the department's challenges with longer-term financial planning. Also, a significant proportion of state funding is committed to matching federal dollars, thus providing ConnDOT with less flexibility in the allocation of state funds. In an effort to manage uncertainty in funding, ConnDOT has started to delay design of major projects until project funding has been secured. Several participants also expressed the importance of maintaining a bin of "shovel-ready" projects in case project bids come in lower than budgeted and unanticipated funding becomes available. Participants indicated that in an effort to use American Reinvestment and Recovery Act (ARRA – 2009) funding, ConnDOT nearly emptied its bin of shovel-ready projects and it was suggested that the bin needs to be replenished.
- **Deliverability concerns play a major role in project selection and capital programming.** As part of ConnDOT's recent shift to a constrained programming approach, the department has chosen to focus its limited resources on projects identified as highly deliverable. Scheduling and deliverability play a major role in selecting projects if unanticipated funding becomes available. Environmental assessment and attaining rights of way are the most common barriers to delivering projects in a timely manner and are now considered in the scheduling process. ConnDOT's engineering staff conducts a monthly meeting to discuss projects funding, programming, and scheduling. The general consensus among participants was that ConnDOT has improved its ability to select deliverable projects.

# STATE SURVEY

The study research team conducted an in-depth analysis of the planning and programming processes of selected state transportation agencies through a detailed survey process. The CASE study committee selected two sets of states for analysis:

1. Best practice states (Missouri, Vermont, and Washington) were identified through an examination of the literature on strengthening the planning/programming linkage, asset management, and performance measurement; and
2. Benchmark states (Maryland, Massachusetts, and New Jersey) were identified through a small-scale quantitative comparison of the similarities between Connecticut and the selected states with regard to funding sources, transportation infrastructure, demographics and climate.

Key demographic and infrastructure factors were used to select the benchmark and best practice states. This analysis was combined with the study committee's knowledge of and connection to other state transportation agencies for final benchmark state selection. Table 3 shows this information for Connecticut and the selected states. Before conducting the survey, the research team gathered background information on the budgets and revenue sources of the selected state transportation agencies. This provided better context and foundation for conducting and analyzing the results of the survey.

Investigating the best practice states provided insight into the innovative strategies used by leading organizations to promote effective and efficient planning and programming. Analyzing benchmark states also provided an assessment of how Connecticut's process compares to its peer states.

Figures 2(a) and 2(b) compare total transportation revenue sources and disbursements, including non-capital spending and spending on non-highway modes, respectively. These figures also provide a general context for benchmarking Connecticut's capital program. While the information presented in these figures does not provide details on the use of federal versus state funds, two observations are noted based on the 2009 data:

- Connecticut is second only to New Jersey in using bonding as a revenue source and accordingly, Connecticut has a higher percentage of its disbursements tied to bond retirement and interest than any of the benchmark or best practice states.
- Connecticut spent the smallest percentage of disbursements on capital expenditures of any of the referenced states.

TABLE 3: KEY DEMOGRAPHIC AND INFRASTRUCTURE FACTORS USED FOR SELECTION OF BENCHMARK AND BEST PRACTICE STATES

| Key Factors | | CT MD | Benchmark States | | | Best Practice States | | |
|---|---|---|---|---|---|---|---|---|
| | | | MA | NJ | MO | VT | WA | |
| Demographic (Note 1) | **Total Population (in 1000s)** | 3,406 | 5,296 | 6,349 | 8,414 | 5,595 | 609 | 5,894 |
| | **Population Density (per sq. mi.)** | 703 | 542 | 810 | 1,134 | 81 | 66 | 89 |
| | **Rural/Urban Population Ratio** | 0.14 | 0.16 | 0.09 | 0.06 | 0.44 | 1.62 | 0.22 |
| | **% Population Below Poverty Line** | 9 | 8 | 10 | 9 | 14 | 11 | 12 |
| Infrastructure (Note 2) | **Miles of Road (State owned)** | 3,717 | 5,148 | 2,834 | 2,324 | 33,677 | 2,630 | 7,042 |
| | **Number of Bridges (State owned)** | 2,800 | 2,846 | 3,464 | 3,719 | 10,210 | 1,077 | 3,175 |
| | **% Roads in Poor Condition** | 4 | 19 | 4 | 28 | 10 | 17 | 4 |
| | **% Bridges Structurally Deficient** | 9 | 7 | 12 | 11 | 18 | 16 | 5 |
| | **Bus Route Mileage** | 3,436 | 6,131 | 6,196 | 9,641 | 577 | 378 | 8,438 |

Note 1: Demographic Data Source: User generated tables from the US Census Bureau's American Factfinder Website, http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Note 2: Infrastructure Data Source: http://www.bts.gov/publications/state_transportation_statistics/state_transportation_statistics_2010/index.html

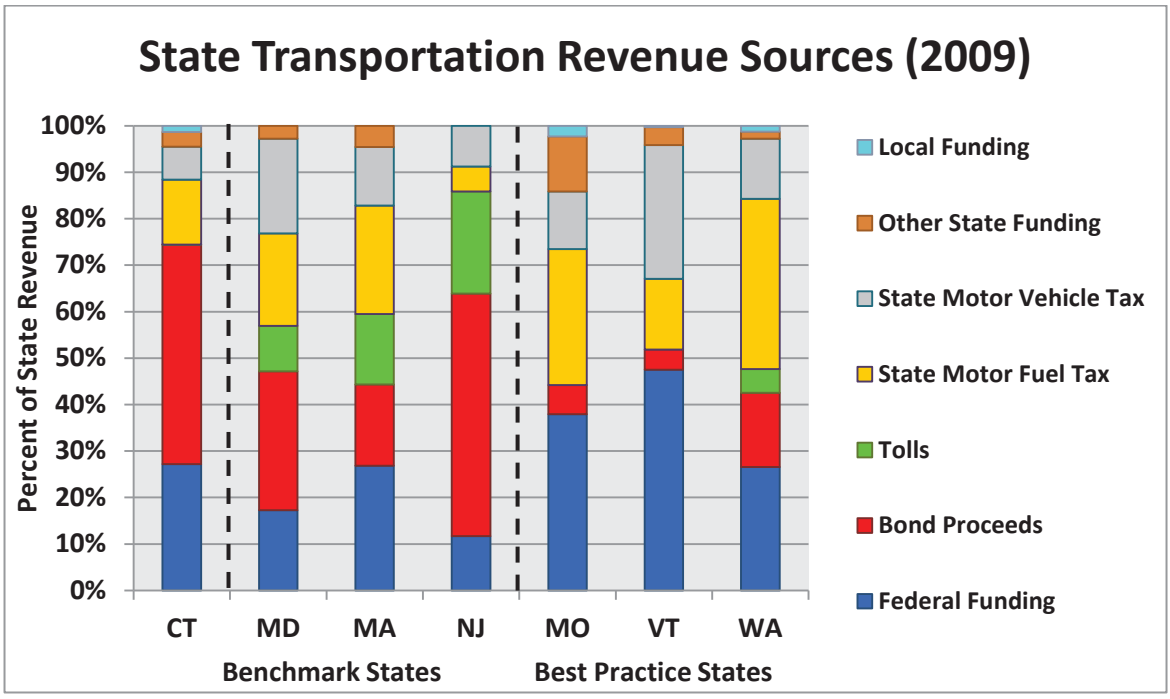



FIGURE 2(A): STATE TRANSPORTATION REVENUE SOURCES - BENCHMARK AND BEST PRACTICE STATES (2009)
(SOURCE: HTTP://WWW.FHWA.DOT.GOV/POLICYINFORMATION/STATISTICS/2009/; TABLE SF-1)

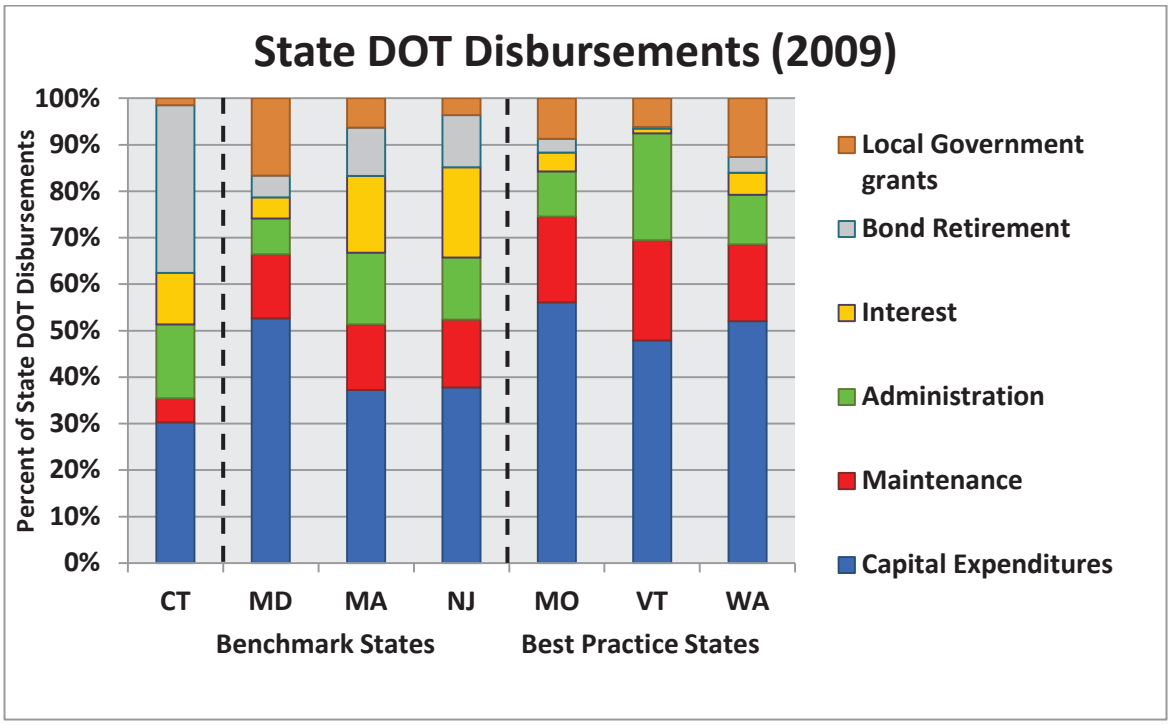



FIGURE 2(B): STATE DOT DISBURSEMENTS – BENCHMARK AND BEST PRACTICE STATES (2009)
(SOURCE: HTTP://WWW.FHWA.DOT.GOV/POLICYINFORMATION/STATISTICS/2009/; TABLE SF-2)

Figures 3(a) and 3b) show how the percentage of each state's revenues from federal sources has changed over time for the benchmark and best practice states, respectively. Almost all of the remaining funding comes from a variety of state funding sources (see Figure 2a), as no state received a significant percentage of its funding from local sources. Therefore, for the states selected for analysis in this study, it is reasonable to estimate that the percentage of revenues from state sources should be considered to be those not provided from federal sources.

Interestingly, Connecticut appears to have a percentage of revenues from federal funds (Figure 3(a)) that is consistently higher than its benchmark peers over the period 1992-2009. When compared to best practice states, however, Connecticut falls right in the middle. No statistical inference can be made from these qualitative observations, though they do suggest that Connecticut tends in general to be more reliant on federal funding than the benchmark states.

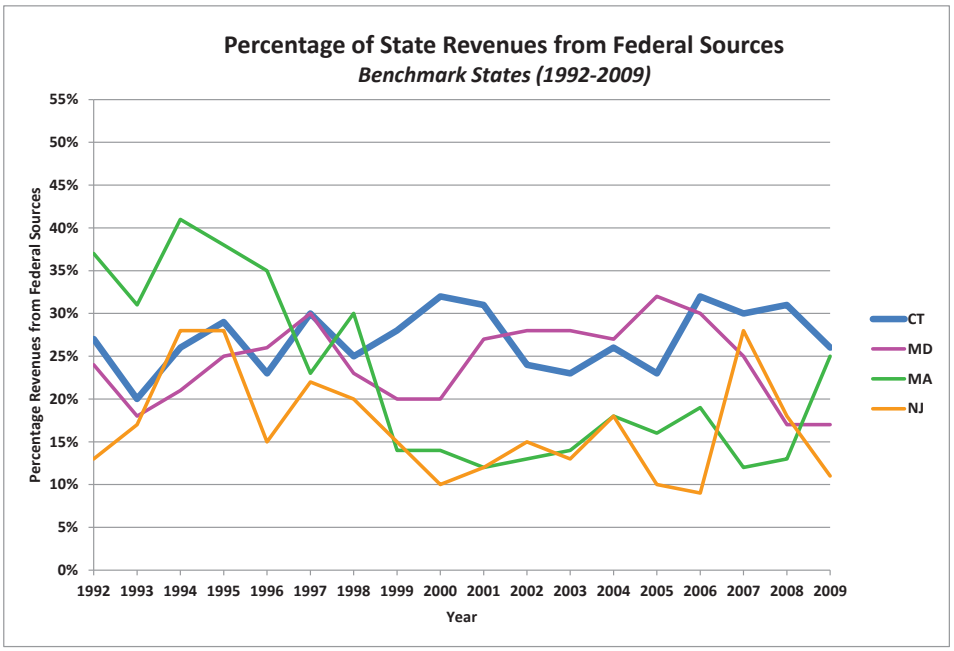



FIGURE 3(A): PERCENTAGE OF STATE REVENUES FROM FEDERAL SOURCES (1992 – 2009): BENCHMARK STATES
(SOURCE: HTTP://WWW.FHWA.DOT.GOV/POLICYINFORMATION/STATISTICS; TABLE SF-1)

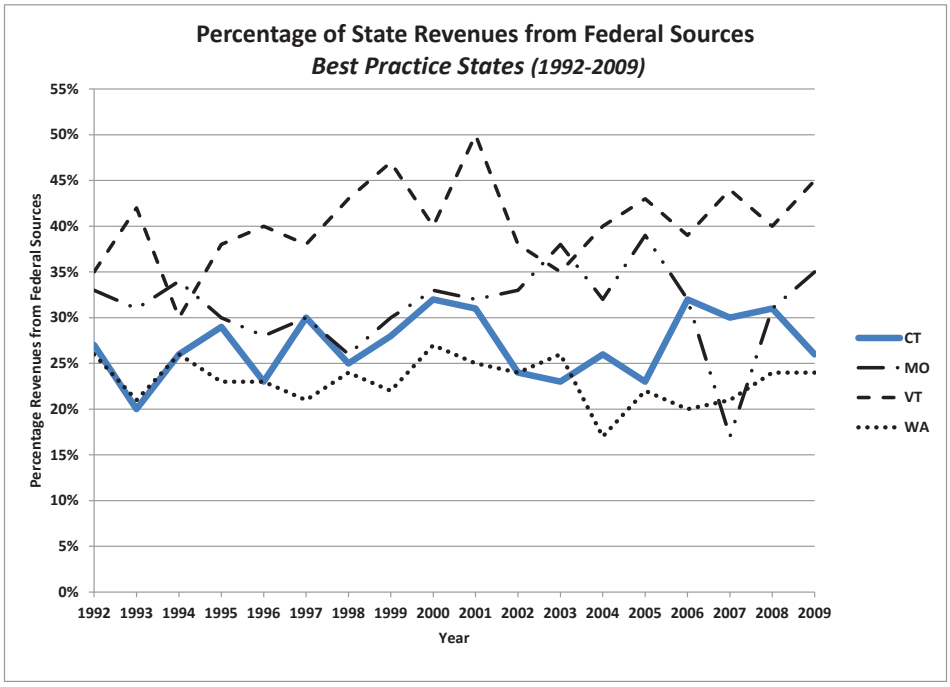



FIGURE 3(B): PERCENTAGE OF STATE REVENUES FROM FEDERAL SOURCES (1992 – 2009): BEST PRACTICE STATES
(SOURCE: HTTP://WWW.FHWA.DOT.GOV/POLICYINFORMATION/STATISTICS; TABLE SF-1

Figures 4(a) and 4(b) shows the ratio of revenues from federal sources to capital expenditures from 1992 to 2009 for the benchmark and best practice states, respectively. Based on analysis of the available data, the research team made the assumption that all but a negligible amount of federal funding is invested in capital projects. However, a close examination of Figure 4(b) reveals that the amount of federal funding received by Vermont in 2001 and 2002 exceeded the state's total capital expenditures. This anomaly has not yet been explained by the data used by AASHTO and FHWA in compiling these financial statistics, as they do not provide sufficient detail between source and expenditure of either federal or state funds.[1]

Connecticut's federal funding to capital program expenditures ratio is higher than that of the benchmark states and similar to best practice states. Other than Vermont, Connecticut's ratio appears higher and persists over time as compared to the referenced states. This could indicate a heavier reliance on federal funding for capital program funding, or it could be a demonstration of the state's effectiveness in securing federal funding.

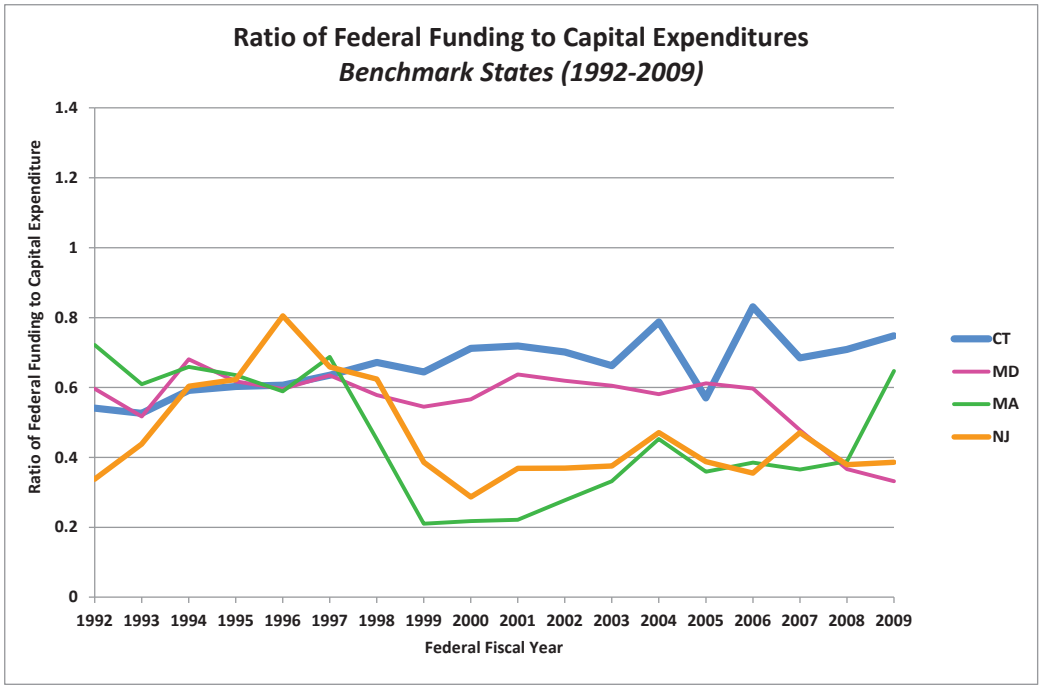



FIGURE 4(A): RATIO OF FEDERAL FUNDING TO CAPITAL EXPENDITURES (1992-2009): BENCHMARK STATES
(SOURCE: COMPILED FROM FHWA HIGHWAY STATISTICS WEBSITE [HTTP://WWW.FHWA.DOT.GOV/POLICYINFORMATION/STATISTICS.CFM];

1 Data in Figures 4(a) and 4(b) compiled from FHWA highway statistics website (http://www.fhwa.dot.gov/policyinformation/statistics.cfm) Federal funding data is found in table SF-1 and capital expenditures data is found in table SF-2.

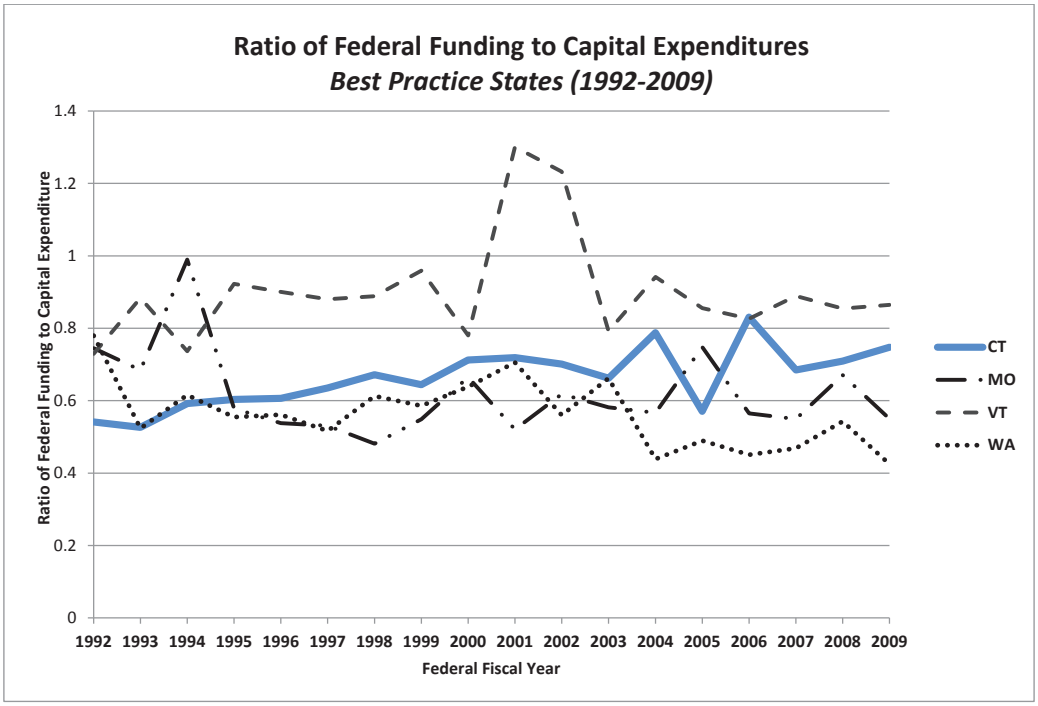



FIGURE 4(B): RATIO OF FEDERAL FUNDING TO CAPITAL EXPENDITURES (1992-2009): BEST PRACTICE STATES

(SOURCE: COMPILED FROM FHWA HIGHWAY STATISTICS WEBSITE [HTTP://WWW.FHWA.DOT.GOV/POLICYINFORMATION/STATISTICS.CFM];

### *Survey Methodology*

The study research team developed preliminary questions and data requests that were sent to each of the selected state transportation agencies. These questions delved into the states' short-term capital plans, LRTPs, performance measures, capital programming processes, and approaches to addressing project deliverability concerns. State responses to the survey questions are provided in Appendix A. The study research team followed up with a more detailed telephone survey to clarify initial responses and to secure additional information about each state's agency's structure and relationship with the state legislature.

### *Summary of State Agency Survey Responses*

A summary of the survey response from each state includes a description of the agency's relationship to its state government followed by the agency's specific responses to the survey questions. Table 4 provides a brief overview of responses to several selected survey questions.

TABLE 4: OVERVIEW OF STATE AGENCY RESPONSES TO SELECTED SURVEY QUESTIONS

| **Selected Survey Questions** *(See Note)* | **CT** | **Benchmark States** | | | **Best Practice States** | | |
|---|---|---|---|---|---|---|---|
| | | **MD** | **MA** | **NJ** | **MO** | **VT** | **WA** |
| **1(a)** Does your state maintain a document or process within which short-term capital programming projects are planned in detail? | Yes | Yes | No | Yes | Yes | Yes | Yes |
| **1(b)** Does this document/ process identify the funding amounts and sources of funding for the projects? | Yes | Yes | - | Yes | Yes | Yes | Yes |
| **1(c(i))** Is there any specific link between the capital programming document/process and the high-level goals of the long-range transportation plan? | No | Yes, required by state law | No | Yes, Capital Invest-ment Strategy | Yes, required by federal law | Yes, VTrans LRT Business Plan | Yes |
| **1(c(ii))** Is there any specific link between the capital program and performance metrics? | No | Yes | No | Yes | Yes | Yes | Yes |
| **3(a)** Identify, or provide links to the performance measures used and maintained by your state? | Refer to ConnDOT Website | Attain-ment Report | - | NJ Center-line | MO Tracker | See Table A.1 | WA Gray Notebook |
| Note: Table does not include all survey questions. See Appendix A for state responses to all questions. | | | | | | | |

## BENCHMARK STATES

This section provides a summary of the practices of the three selected benchmark states: Maryland, Massachusetts, and New Jersey.

### *Maryland*

The head of Maryland's Department of Transportation (MDOT), the secretary of transportation, reports directly to the governor. The governor is responsible for setting the agenda and compiling the Consolidated Transportation Plan (CTP), a budget with a six-year horizon. State legislators are offered the opportunity to make suggestions for the direction of the budget, but are unable to add items or advocate for specific projects. The primary role of the state's legislature (the Maryland General Assembly) in the transportation budgeting process is to ensure that projects align with the state's long-term transportation and economic goals. The legislature recently adopted legislation (Chapter 725)[2] which requires MDOT to establish links between the state's long-range plan (MTP) and the CTP. A first draft of the CTP is publicly posted annually in September. The secretary of transportation then goes on a statewide tour to each county to explain the governor's proposed budget and seek input from local planning agencies, stakeholders, and residents. County governments are responsible for creating a priority list of local projects, as well as more detailed project reports. The CTP is finalized and sent to the legislature annually in January for approval.

In addition to the CTP, Maryland also has a five-year State Transportation Improvement Program (STIP) that provides greater detail on project prioritization and funding sources and amounts. Though MDOT publishes an annual Attainment Report (AR) which includes extensive performance measures, these measures are not formally or quantitatively linked to the programming process. Maryland's LRTP outlines five major goals. The survey response identified safety as MDOT's primary goal, followed closely by preservation of the existing system and mitigating and avoiding harmful environmental impacts. To mitigate some of the challenges associated with funding uncertainty, Maryland has chosen to be very conservative in obligating funds to specific projects. Further, according to the survey response, at the beginning of a fiscal year, only 80% of available funds are designated to specific projects. Given the high level of uncertainty with federal funding for state transportation projects, Maryland is considering strategies to decrease its reliance on federal funds. Federal funding currently accounts for approximately 30% of MDOTs capital expenditures. Maryland is considering increasing capital program revenue through Public-Private Partnerships (PPP) and possibly increasing taxes to pay for its Regional Transit Authority (RTA). Identifying alternative sources of revenue was identified as one of the most pressing needs of MDOT, though it was noted that MDOT has been very successful in effectively utilizing its limited funding.

### *Massachusetts*

The Massachusetts Department of Transportation (MassDOT) is in the process of implementing significant structural and operational changes. Currently, MassDOT is split into four major divisions: Highways, Transit, Aeronautics, and Registration of Motor Vehicles. Additionally,

2 A copy of this Chapter 725 can be found at the following link: http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/County_Priority_Letters/Documents/Ch_725_hb1155.pdf

MassDOT oversees the Massachusetts Bay Transit Authority (MBTA) and Regional Transit Authorities (RTAs). Each of the divisions operates in relative isolation, with allotted funds and separately developed capital investment plans. MPOs and RPAs are responsible for project programming. Though Massachusetts maintains a STIP in accordance with federal requirements, it is a collection of the MPO and RPA programming documents rather than an independently developed plan. The department's decentralized and basically operationally independent modal divisions, as well as the delegation of programming responsibilities to MPOs and RPAs, have made it difficult for MassDOT to direct resources in support of the commonwealth's established long-range transportation goals. The survey response indicated that instead of focusing on the state's LRTP, the divisions focus their capital project selection decision making around the department's mission and values. Recently, MassDOT also began to focus on the ten "themes" derived from the youMove Massachusetts program, an attempt at bottom-up transportation planning that sought to increase public participation in the planning process. Currently, performance measures are collected by the MassDOT's Office of Performance Management and Innovation for each of its divisions. These measures are not directly linked to the state's long-term transportation goals or the programming process.

MassDOT, recognizing the limitations of their segregated structure and operations, is in the process of drafting a multimodal strategic transportation plan, weMove Massachusetts. The respondent expects weMove Massachusetts to be implemented in February 2013. This plan will help to align long-term goals, performance measures, and the programming process, as well as improve communications and encourage greater cooperation between MassDOT divisions. Once long-term goals are linked to specific performance metrics, MassDOT will attempt to link performance metrics to funding by developing a new analytical process to guide project selection and programming decisions. MassDOT's survey response also indicated that the department intends to make this new process as quantitative as possible. weMove Massachusetts will also synthesize the modal capital investment plans into a single, unified plan.

Massachusetts currently takes a very conservative approach to project programming. MassDOT advises MPOs to estimate cost inflation at a rate of 4%, while estimating revenue inflation at a rate of 3% for the later years of its STIP. The highway division also sets aside some federal money and state matching funds to cover any unexpected project costs. In recent years, the state has set aside nearly $40 million a year in this reserve. MassDOT mitigates highway project deliverability concerns through weekly meetings between the highway division and the department's Office of Transportation Planning.

### *New Jersey*

By law the New Jersey Department of Transportation (NJDOT) is required to present the New Jersey State Legislature with an annual Transportation Capital Program which outlines all projects receiving funding in the upcoming state fiscal year. The legislature reviews and approves this document, focusing on overall goals and funding levels. Though they do not play a large role in project selection, the state legislature may question why a particular project has not been funded or has been pushed to later years. NJDOT also maintains a database of capital projects for a ten-year horizon with the earliest five years reported as a supplement to its annual Transportation Capital Program. In the past, NJDOT chose to make intentionally

conservative cost estimates to create a buffer in its capital program. However, in recent years NJDOT has fully programmed based on a realistic estimate of future funding, assuming static levels of funding from both federal and state sources. Generally, NJDOT maintains a shelf, or bin, of shovel-ready projects. However, due to the amount of funding received from the American Recovery and Reinvestment Act (ARRA), NJDOT's bin of projects has been depleted. They are currently working on restocking it with simple, small-scale projects such as pavement restoration.

NJDOT connects its capital program to New Jersey's long-range transportation goals through its asset management-based capital investment strategy. The state's capital investment strategy outlines investment categories, which align with LRTP goals, and sets ten-year average annual investment targets for each of these categories. The ten-year average annual investment targets are used in conjunction with performance measures to guide the project selection and programming process. NJDOT uses performance curves to demonstrate the expected performance improvements resulting from a specific average annual investment over a ten-year period. Currently, New Jersey has a capital budget of approximately $2 billion per year with about $1 billion coming from federal sources.

## BEST PRACTICE STATES

This section provides a summary of the practices of the three selected best practice states: Missouri, Vermont, and Washington.

### *Missouri*

Due to the structure of Missouri's state government, the Missouri Department of Transportation (MoDOT) does not need to spend significant time advocating for support of the state legislature (the Missouri General Assembly) for its capital project program. MoDOT is led by an independent bipartisan commission that oversees the prioritization and selection of projects to be placed in the state's STIP and LRTP. In Missouri, the commission, rather than the state legislature, has the authority by vote to approve or reject new capital projects. This structure has led MoDOT to develop into a very customer-oriented organization. One of MoDOTs main organizational priorities is to provide excellent customer service. Each year, MoDOT conducts a phone survey to identify the transportation priorities of its customers. Another way MoDOT involves and informs the public is by publishing its performance measures quarterly online using an interactive, user-friendly interface (Missouri Tracker). With the department's focus on customers, it is also important for MoDOT to maintain effective communication with the agencies responsible for more localized planning. MoDOT meets with the formal coalition of Regional Planning Agencies (RPAs) and all of the state Metropolitan Planning Organizations (MPOs) on an annual basis.

MoDOT prepares an annual STIP with a five-year planning horizon. The STIP includes a list of programs with funding amounts and sources. The first year of the STIP is over-programmed, while the fourth and fifth years are under-programmed. Project surpluses are reallocated to other projects that are included in the STIP. MoDOT also keeps a queue of projects ready in case additional funding becomes available. State law requires every project and project

phase in the STIP to be consistent with the state's long-term goals. The extensive performance measures published in the Missouri Tracker are considered in a general, qualitative sense in the programming process; however, MoDOT does not perform any quantitative analysis of performance measures when creating its STIP. A detailed scoping process is used to determine the deliverability of projects before they are included in the STIP. MoDOT treats the STIP as a contract with the public, so a project must be deliverable to be included.

Missouri is currently in the process of revising its long-term transportation plan. The current plan emphasizes the importance of preserving and improving the existing system, spending money efficiently ("getting the most for your dollar"), and identifying new funding sources. Like most states, Missouri is searching for creative capital project program funding solutions due to the uncertainty in federal funding, which currently accounts for 37% of MoDOT's capital program. MoDOT is currently leveraging "design-build" and "alternate technical concepts" contracting methods to promote efficient use of funds.

### *Vermont*

The Vermont Legislature is very involved in overseeing the Vermont transportation agency (VTrans) and plays a major role in deciding which projects are included in the state's transportation capital plan. This requires VTrans to stay in constant contact with the legislature. VTrans employees are frequently asked to give testimonies and presentations before the legislature. This high level of political involvement does not seem to create significant obstacles for VTrans. One respondent stated that most state politicians shared VTrans' goal of emphasizing the importance of maintenance and system preservation.

VTrans publishes a five-year STIP which is submitted to the legislature annually for approval. The STIP identifies projects for the next five years, as well as the project funding sources (federal, state or local). VTrans considers performance measures when selecting projects to include in its STIP. Not all measures are incorporated into the programming process, but a few metrics are used to select safety, pavement, bridge, and transit projects. The state's long-range goals are outlined in the VTrans Long Range Transportation Business Plan (LRTBP). The document identifies safety, preservation, planning, and excellence as VTrans' major goals. The survey response indicated that of these goals, VTrans places the greatest emphasis on safety and preservation. VTrans prides itself on its ability to incorporate stakeholders into the scoping process with context-sensitive solutions. This process helps to ensure that customers' actual needs are met. VTrans, like most state transportation agencies, is currently trying to identify new funding sources and implement more efficient contracting methods, such as design-build. Approximately 40% of VTrans budget comes from the federal government. The state is seeking to decrease reliance on federal funding, but it is having difficulty identifying revenue sources that would be viable in such a small, rural state. One option under consideration to raise additional state revenue to support the state's capital project program is a mileage tax.

### *Washington*

The Washington State Legislature plays a significant role in transportation planning and capital programming. The legislature sets the state's long-term transportation policy goals and pro-

vides the Washington Department of Transportation (WSDOT) with specific short-term objectives for achieving the LRTP goals. Washington's current LRTP and all other policy documents, such as agency strategic plans and performance reports, reflect the six state policy goals defined in statute:

- Safety (safety and security of transportation customers)
- Preservation (maintain, preserve and extend the life of prior investments)
- Environment (quality of life, promote energy conservation, enhance health and protect environment)
- Mobility (predictable movement of people and goods)
- Stewardship (improve quality, effectiveness, efficiency of transportation system)
- Economic Vitality (stimulate, support and enhance movement of people and goods to ensure prosperous economy)

The legislature selects all congestion relief and economic vitality projects, but allows WSDOT flexibility to select projects designed to meet safety, environmental, and preservation goals. For projects selected by WSDOT, the department is required to provide the legislature with a specific action plan identifying that the project will meet state transportation goals and objectives. Washington creates separate budgets for highways, ferries and rail. The highway budget is further categorized into preservation projects and improvement projects. Each budget is required to create a 20-year needs survey. For the highway preservation budget, WSDOT is required to provide the legislature with a 10-year plan that identifies the expected outcomes and performance improvements for various levels of investment. Additionally, WSDOT produces a quarterly report, called the Gray Notebook, on an extensive set of performance measures. The comprehensive reporting provided to the legislature helps to ensure that WSDOT meets the state's LRTP goals. (RCW 47.04.280 Transportation system policy goals. http://apps.leg.wa.gov/rcw/default.aspx?cite=47.04.280 )

Rather than producing a formal capital plan, WSDOT maintains a database of all capital projects, the Transportation Executive Information System (TEIS). TEIS allows WSDOT staff and the legislature to track the progress of capital projects and produce reports to address specific issues. A summary report generated by the TEIS for the purpose of this survey showed that Washington's current capital program receives 44% of its funding from federal sources. To address funding uncertainty, WSDOT makes conservative cost estimates for all programmed projects, while simultaneously maintaining a bin of shovel-ready projects. When projects are included in its budget, WSDOT is able to redistribute funding to projects in the bin. Also, at the end of each federal fiscal year, when the federal government is redistributing obligated funds unused by other states, Washington is able to effectively compete for available funding. According to the survey response, Washington has received over $100 million in redistributed federal funds over several years. WSDOT is hoping to improve its efficient use of funds by implementing a more holistic corridor transportation planning approach.

## SYNTHESIS OF STATE SURVEY RESULTS

The survey findings revealed no evidence that a dependency on federal funds over state funds, with the associated lack of flexibility, limits a state transportation agency's ability to link funding decisions to its long-term transportation goals. Two of the three best practice states have a greater reliance on federal funding than Connecticut, while all of the benchmarking states were less dependent on federal funds. This does not imply that a greater reliance on federal funding is desirable; rather, it suggests that effectively linking programming to long-term capital project programming is not related to dependency on federal funds alone. A closer examination of Figures 2a and 2b shows that while Connecticut falls mid-range in terms of the percentage of revenue from federal funds, it also has the highest percentage of disbursements dedicated to bond retirement and the second lowest percentage of disbursements dedicated to capital expenditures, maintenance, and administration of the selected survey states. Bond retirements and interest payments, as well as state funding dedicated to matching federal funds, play a role in creating the inflexible funding environment currently being experienced by ConnDOT. However, it is important to note that nearly all of the selected states reported interest in decreasing their reliance on federal funds due to federal funding uncertainty.

Another common issue identified in the survey was the importance of better incorporating customer input into the planning process and measuring the level of customer service. For example, Missouri, a leader in this area, conducts an annual customer survey to assess customer satisfaction and determine how well the public believes MoDOT is performing at prioritizing and selecting projects. The reasoning behind the drive for more public involvement varied with different state government structures. In Missouri, the Missouri Highways and Transportation Commission, rather than the state legislature, has the authority to approve or reject new transportation projects. Therefore it is in MoDOT's best interest to emphasize customer service. This is very different from Connecticut, where the General Assembly plays a greater role in the transportation planning process. However, even some of the benchmarking states with similar governmental and organizational structures, such as Massachusetts, Maryland, and Washington, had formal mechanisms for measuring and promoting customer satisfaction and public participation.

All of the states surveyed are currently looking for ways to utilize their limited funding resources more efficiently. Most states are approaching this challenge by looking for new revenue sources, as well as implementing innovative contracting techniques to promote the efficient use of existing funds. Some of the proposed revenue sources include raising the gas tax, implementing a mileage tax, and adding more toll roads. The most commonly mentioned innovative contracting technique was design-build, which was adopted by the General Assembly in 2012 for use in Connecticut. Another interesting contracting method, currently being used in Missouri, is of the use of "alternative technical concepts." If a contractor identifies alternative methods for meeting a project's goals at a lower cost than expected, they split the cost savings with MoDOT. Additionally, some states actually include the number of projects completed through innovative contracting techniques in their performance metrics.

The implementation of advanced capital project tracking methods and successfully linking the process to specific performance metrics typically requires additional information technology (IT) resources.

- Washington and Maryland use a Capital Program Management System (CPMS) to manage and track their capital programs. These systems were custom developed for these DOTs, with Washington's dating back to the late 1980s and Maryland's dating to the late 1990s. Both systems have undergone modifications and additions since their development to accommodate different modal administration (Maryland) and to link with performance measures (Washington).
- Missouri uses a custom STIP Information Management System (SIMS) that serves as a capital plan management tool, with features customized to fit the aspects of Missouri's DOT that are highlighted in this report.
    - The STIP is used heavily and exclusively as their capital planning document.
    - The SIMS program has special features built to accommodate the regional coordination that is central to Missouri's capital programming process.
- New Jersey uses a Project Reporting System (PRS) to track capital projects with a supplementary data warehouse linking this tracking system to a variety of performance and condition data for use in project prioritization.
- Vermont and Massachusetts do not have any specialized software for capital planning or programming, though they do have project tracking software and asset condition software they use in their overall asset management program.

# FINDINGS

State transportation agencies are continually challenged with maintaining transportation infrastructure that is in need of repair and improvement to ensure the safety and mobility of the traveling public. This is accomplished through implementation of capital project programming supported by federal and state funding. However, federal funding uncertainty and constrained capital program budgets that are significantly dependent on federal funding make effective long-term planning and programming challenging.

The study findings identify several concepts that were used for the development of study recommendations intended to provide guidance and tools for comparing Connecticut with selected benchmark and best practice states for the purpose of improving project deliverability, and strengthening the planning/programming linkage. In addition to strengthening the planning/programming linkage, ConnDOT, like most state transportation agencies, also needs to identify ways to generate more revenue and spend funds more efficiently in the current constrained funding environment.

The following five major findings are based on the research conducted for this study:

- **Incorporating a select subset of performance metrics into the programming process helps to align capital programming with long-term goals.** While the literature clearly indicates the need to incorporate performance metrics into the planning process, it offers little practical guidance for agencies looking to create analytical methods for ranking potential projects by their ability to achieve long-term goals. Based on the research, it appears that no state is currently using a formal quantitative method to incorporate a full range of performance metrics into the programming process. This largely reflects the difficulty of predicting the effect of specific projects on many performance metrics. However, Massachusetts is in the process of developing this type of performance metric tool as part of its new weMove Massachusetts plan. Also, Vermont currently uses a subset of easily predicted performance metrics (crashes and fatalities per VMT, percent lane miles in poor/very poor condition, number of structurally deficient bridges, and transit ridership) in its programming process. Therefore, with regard to Connecticut, there is a need to incorporate LRTP goals into the planning/programming process for developing ConnDOT's STIP. Also, ConnDOT measures progress towards the state's LRTP goals using performance metrics, but the goals do not align perfectly with the performance metrics. However, ConnDOT is planning to develop a new LRTP that will provide an opportunity to better align its LRTP goals with selected performance measures.
- **Establishing a formal process for evaluating project deliverability prior to project selection and programming can promote more efficient use of funds.** While all of the benchmark and best practice states mentioned the importance of evaluating project deliverability, none of the states used a formalized, quantitative analysis for measuring performance. Some states, such as Missouri, use a detailed scoping process to assess the deliverability of projects before they are included in the STIP. Other states, such as Massachusetts, evaluate project deliverability at weekly project meetings. Results

of the ConnDOT focus groups seemed to indicate that Connecticut currently falls into the second category, but would benefit from a deliverability assessment earlier in the planning/programming process. Georgia DOT recently released a report on their detailed, quantitative methodology for assessing deliverability that is further described in the literature review section of this report.

- **Utilizing innovative contracting techniques to promote efficient use of limited funds.** ConnDOT staff who participated in the study focus group sessions and most of the benchmark and best practice state transportation agencies identified the need to leverage innovative contracting techniques to complete projects in less time and more cost effectively. The most commonly mentioned contracting methodology to accomplish this was design-build, which was authorized for use in Connecticut by the General Assembly's adoption of Public Act 12-70, effective, June 6, 2012. Missouri also mentioned using a contracting technique known as alternative technical concepts. This methodology provides contractors with an incentive for use of alternative, more cost-effective solutions by offering to split any cost savings from the alternative design between MoDOT and the contractor. Also, some states have added performance measures to monitor how many projects are completed and how much money is being saved through innovative contracting.

- **Formally incorporating Metropolitan Planning Organizations, Regional Planning Agencies, and other local stakeholders into the planning process.** The literature on strengthening the planning/programming linkage emphasized the importance of incorporating MPOs, RPAs, and other local planning agencies into the planning process. The survey of selected benchmark and best practice states of this study revealed that most states had formal channels for communicating and coordinating with these various planning agencies. In Maryland, the secretary of transportation conducts an annual tour that includes visits to each of the counties in the state, as well as the city of Baltimore. The purpose of these visits is to explain the proposed STIP to county stakeholders and receive feedback on project prioritization. Missouri's MPOs and RPCs meet in their respective regions on a regular basis and meet with MoDOT, formally, on an annual basis. This organization creates a sense of unity between individual MPOs and RPCs and provides a formal channel for communicating with the MoDOT.

- **Using customer surveys as an effective tool to support the capital project planning process.** Missouri, Vermont, Washington, Maryland, and Massachusetts use customer surveys and public involvement in the capital project planning process. For some states, like Missouri, major transportation decisions are affected by customer input. In other states, like Washington, Massachusetts, Vermont and Maryland, where the legislative and executive branches of government have the responsibility of selecting projects, customer service is also an important factor. Elected officials may be much more likely to vote for projects that benefit, or at the very least do not anger, their constituents. Frequently evaluating customer needs and satisfaction also helps to ensure that selected projects are actually meeting the needs of the customers. Several of the referenced states have performance metrics for measuring customer service and satisfaction. Missouri, for example, measures public participation through the number of people attending planning meetings and customer satisfaction through an annual statewide survey.

# RECOMMENDATIONS

Based on the study findings the CASE study committee offers the following recommendations.

- **Establish performance measures to track project deliverability and innovative contracting methods.** Project deliverability performance should be measured by monitoring the percentage of capital projects that are completed on time and on budget. Connecticut currently measures the percentage of construction contracts completed within budget and the percentage of construction contracts completed on time. While these are useful measures, they do not necessarily reflect the experience of transportation users. Therefore, an additional performance measure should be used that identifies whether a project is fully functional and open for public use on time. Enhanced tracking capabilities and linking to performance metrics may require additional information technology (IT) resources, as was the case for most case study states. ConnDOT should consider contracting with a third party to develop a capital projects management system, customized to the department's needs and organizational structure. Additional performance measures to consider for measuring project deliverability include:
    - Cause(s) of delay for project delivery
    - Variance between project budget and actual cost
    - Measures for projects undertaken using alternative innovative contracting methodologies, such as design-build, should include number of projects, estimated time and cost savings, number of change orders, and number of contractor claims filed. Data measured for alternative contracting methodologies should be analyzed and compared with traditional design-bid-build methodology to assess the value achieved, if any.
- **Under-program (under-commit) the capital project plan while maintaining a bin of fully-designed, non-programmed projects.** For most of the states surveyed, the inclusion of a project in the state's capital program is a guarantee that it will be delivered. All of the selected benchmark and best practice states interviewed in the study's survey chose to under-program their capital budgets, though the methods used to under-program varied from state to state. Some of the states, such as Washington, make conservative project cost estimates. Other states, such as Maryland, simply do not program to the full amount of expected funding. However, these conservative programming methods often lead to unused funding becoming available at the end of a fiscal year. Therefore, to fully utilize available funding, it is crucial to have a bin of projects that have been designed and have completed the permitting process that are not included in the capital plan. It should be noted that because ConnDOT has depleted their project bin through use of ARRA funding, in the short-term it may be necessary to over-program to replenish the bin to achieve balance for under-programming over the long-term.
- **Develop and maintain a Transportation Investment Dashboard to monitor Connecticut's transportation investment performance as compared to that of selected**

**states.** The dashboard is intended to communicate data and information clearly and visually to ConnDOT and the state's leadership for their use is assessing Connecticut's capital planning/programming and project deliverability performance. Preferably the dashboard would be issued annually. Annual issuance will provide data and information at a frequency well suited for analysis of performance and program review. The dashboard should be web-based for easy access by decision-makers, policymakers and the general public. The performance metrics chosen for inclusion should be consistent with LRTP and TICP priorities.

- It is suggested that ConnDOT consider using the dashboard to compare Connecticut with other selected states regarding the level of state funding versus federal funding provided for capital projects. This will be a useful tool for determining the level of state funding appropriate to support Connecticut's LRTP and investment in the state's transportation infrastructure.
- However, this effort would require ConnDOT staff resources to develop and maintain the dashboard system for ongoing reporting and analysis, and collaboration and communication with other states for the comparative analysis. Therefore, the implementation and frequency of issuance of the dashboard system should be considered in the context of the commitment of resources along with the potential value of analysis to ConnDOT.

## SELECTION OF COMPARATIVE STATES

Options for the selection of states include:

- The benchmark states (Maryland, Massachusetts, New Jersey) and best practice states (Missouri, Vermont, and Washington) selected and surveyed for this study
- New England Transportation Consortium states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)
- Northeast Association of State Transportation Officials states (includes the New England states, as well as Delaware, Maryland, New Jersey, New York, and Pennsylvania) as well as the District of Columbia, and the Province of Ontario, Canada, or a subset of these states.

## DASHBOARD DATA CONSIDERATIONS

Most of the statistical and financial data used for the sample and proposed dashboards are submitted by each state annually to the Federal Highway Administration (FHWA). See Appendix B for data source information for the sample dashboards.

However, there is a two-year time lag from submittal of data by the states to public release of the data by FHWA on its website. This time lag in reporting unfortunately makes the suggested dashboard data outdated and less useful for analysis to assess capital planning/programming and project deliverability performance. This reporting time lag could be reduced by having ConnDOT take the lead in establishing a collaborative network of selected states willing for

mutual benefit to make state-level data available in a timelier manner. The dashboard concept could also be extended to provide a comparison of other aspects of state highway, public transportation, and other modes of transportation performance.

The purpose of the multi-state collaborative would be to:

- Determine data and information to include in the individual state and summary dashboards
- Report the commonly defined data
- Meet periodically to review the findings from the dashboard update, identify best practices to address capital planning/programming and project deliverability challenges.

## SAMPLE DASHBOARDS

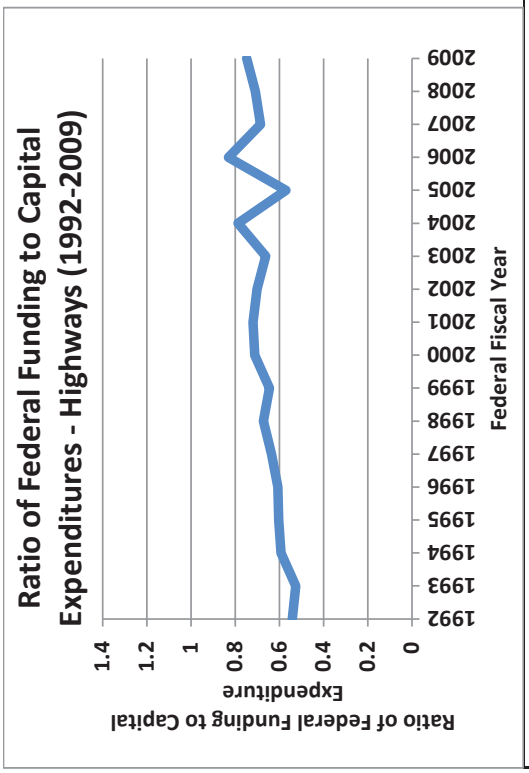
Two types of dashboards are conceptualized: an individual state dashboard, and a summary dashboard that provides an overview of the comparative states.

Individual state dashboards could include key statistics on demographics, infrastructure, and finance in conjunction with a select group of performance measures that provide a linkage between LRTPs and TICPs.

An example of a state dashboard for Connecticut is shown in Figure 5. The proposed state dashboard also could include a table similar to Table 3 of this report (see page 20) that provides data on key demographic and infrastructure factors for each state.

## Capital Program Investment Dashboard: Connecticut

| | |
|---|---|
| Population (2010) | 3,405,565 |
| Rural to Urban Ratio (2010) | 0.14 |
| Miles of State Owned Roads (2010) | 3,717 |
| Number of State Owned Bridges (2010) | 2,800 |
| Total Expenditures ($M) (2009) | 1,370 |
| Capital Expenditures ($M) (2009) | 554 |
| Approx. Capital Exp. from State (%) (2012) | 40.7 |
| Approx. Capital Exp. on Transit (%) (2012) | 45.8 |




| Performance Measure | Latest Reporting Period | Performance |
|---|---|---|
| Fatalities per 100 M VMT | 0.71 (CY 2009) | Improving |
| Fatalities per 100,000 population | 6.34 (CY 2009) | Improving |
| Pavements with Good Ride Quality (% with IRI < 95) | 20 (CY 2010) | No Change |
| State Roadway Bridges in Good Condition (%) | 32 (CY 2010) | Improving |
| Road Network with Traffic Volumes > Capacity (%) | 8.67 (CY 2010) | Improving |
| Rail Passenger Trips | 9,847,219 (CY 2011-Q3) | Declining |
| Bus Passenger Trips | 6,856,175 (CY 2011-Q3) | Improving |

FIGURE 5: CAPITAL PROGRAM INVESTMENT DASHBOARD (STATE EXAMPLE: CONNECTICUT)

The summary dashboard compares each state's transportation revenues, disbursements, and ratios of federal funds to capital expenditures over time. A sample summary dashboard using the benchmark and best practice states included in this study is shown in Figure 6. The State Transportation Revenues Sources and State DOT Disbursement tables at the top of the dashboard are the same as Figures 2(a) and 2(b) from the state survey section of this report. Also, the Ratio of Federal Funding to Capital Expenditures graph shown at the bottom of the dashboard is a composite of Figures 4(a) and 4(b) from the state survey section of this report. Analysis of the information provided in the summary dashboard could lead to follow-up analysis to gain a more detailed understanding of commonalities or differences between the states.

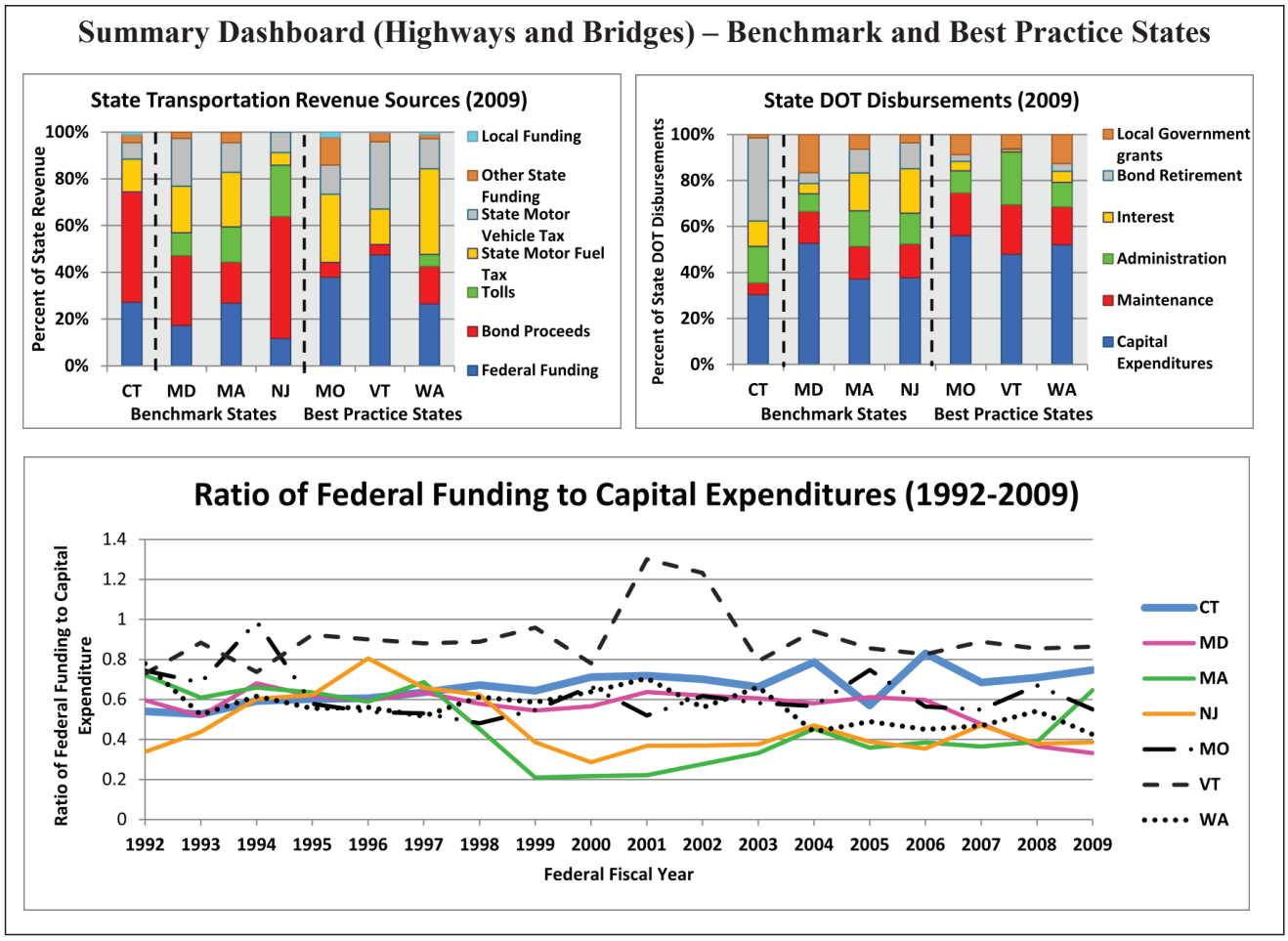



FIGURE 6: SUMMARY DASHBOARD (HIGHWAYS AND BRIDGES) – BENCHMARK AND BEST PRACTICE STATES

- **Administer periodically a customer survey to provide insight into user preferences and to gauge customer satisfaction.** ConnDOT should consider conducting an annual customer survey to best assess timely trends in customer satisfaction. Survey results would be used to report customer satisfaction with ConnDOT's performance and

to serve as a guide for setting priorities. The survey should be used by ConnDOT in conjunction with other performance measures to determine actions for improving work systems, project deliverability and overall public satisfaction with the state's transportation system over time.

As noted in the study findings, most of the benchmark and best practice states included in this study have significant experience in using customer surveys to provide an independent assessment of customer satisfaction that can serve as models for ConnDOT. Consideration should be given to contracting with a company/organization experienced in developing, conducting, analyzing, and reporting through the use of surveys. Also, ConnDOT should engage in a public awareness effort to make available and inform the public of its LRTP goals and its capital planning/programming process using its web presence and opportunities available through public project meetings and other events.

## CONCLUDING REMARKS

The study recommendations provide a framework for continually reviewing and assessing ConnDOT's capital planning/programming process and project deliverability performance, as well as linkage with the goals of the state's LRTP.

Providing transparent data and information to the state's leadership and the general public through the use of visible dashboards could help increase accountability and serve as a basis for establishing a better understanding of ConnDOT's capital program, the condition of the state's transportation infrastructure, and the need for resources to support the goals of the LRTP. Involving the public in this process requires increasing public awareness and measuring customer satisfaction.

The development of a multi-state collaborative of benchmark and best practice states could be considered by ConnDOT to provide the department with opportunities to share its experience with other states and to learn about innovative solutions to improve the efficiency and effectiveness of its capital program investments.

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# APPENDIX A:
# STATE SURVEY (PHASE I) WITH STATE RESPONSES

This appendix contains the Best Practice and Benchmark States' survey responses, which have not been edited. Links provided by the states have been verified. Additional links or clarifying comments added by the Study Research Team appear in bracketed italics.

Though many agency staff members contributed to each state's survey responses, the names and email addresses of the primary contacts are:

| | |
|---|---|
| Maryland: | Brian Martin (bmartin@mdot.state.md.us) |
| Massachusetts: | Trey Wadsworth (trey.wadsworth@state.ma.us) |
| Missouri: | Michael Henderson (michael.henderson@modot.mo.gov) |
| New Jersey: | David Kuhn (david.kuhn@dot.state.nj.us) |
| Vermont: | Joe Segale (joe.segale@state.vt.us) |
| Washington: | Sreenath Gangula (gangulas@wsdot.wa.gov) |

## CONNECTICUT ACADEMY OF SCIENCE AND ENGINEERING BENCHMARKING CONNECTICUT'S TRANSPORTATION INFRASTRUCTURE CAPITAL PROGRAM WITH OTHER STATES

## STATE SURVEY: PHASE I

**Best Practice States:** Missouri, Vermont, Washington
**Benchmark States:** Maryland, Massachusetts, New Jersey

**General Description:**
The following is a preliminary request for information. The Connecticut Academy of Science and Engineering's Research Team for a study on "Benchmarking Connecticut's Transportation Infrastructure Capital program with Other States" is utilizing a two-phase process of information gathering to make the most efficient use of time for those responding to the surveys.

The intent of the first-phase survey is to collect basic budgetary and procedural data from each of the case study states that will guide the Research Team in developing significantly better and more specific questionnaires for a follow-up interview.

**(1) Short-Term Capital Plan (equivalent to ConnDOT's five-year capital plan)**

a. Does your state maintain a document or process within which short-term capital programming projects are planned in detail?

(MO) Yes, the Statewide Transportation Improvement Program (STIP) is an annually prepared list of projects that will be undertaken in a given five-year period.

(VT) Yes. VTrans prepares a five-year capital program each year which is submitted to the legislature for approval. Current and past programs are available at this link: http://www.aot.state.vt.us/Budget.htm

(WA) Yes. (Transportation Executive Information Systems)

(MD) MDOT has a six-year budget document, the Consolidated Transportation Program (CTP) that is submitted to the legislature each year for budget approval. *[http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/CTP/Index.html]*

(MA) Not definitively. MassDOT has capital plans for each of our modes, but they are not currently documented in a single capital plan, unless you would consider our STIP that document. (Please see: Highway, MBTA, Regional Transit Authorities, Aeronautics and our STIP for additional information). *[Link to STIP: http://www.massdot.state.ma.us/planning/Main/StatewidePlans/StateTransportationImprovementProgram.aspx]*

(NJ) Yes, NJDOT maintains a database of capital projects that are planned over a ten-year period, constrained by reasonably expected federal and state revenues. The first five years is outlined as a supplement to our annual Transportation Capital Program. The full ten years is outlined as part of the federally required STIP, even though the federal government only recognizes the first four years of the document.

b. Does this document/process identify the funding amounts and sources of funding for the projects?

(MO) Yes, the STIP provides this information along with other important programming information.

(VT) Yes. State, federal and local funding sources are identified by program area at the front of the capital program.

(WA) Yes. Initial project estimates are determined with parametric estimating tools and include risk for unforeseen elements. These estimates are refined as the design is refined and becomes final.

.

(MD) This document, as the budget identifies the funding and source of funding for each project phase currently funded.

(MA) Yes the modal capital plans do identify funding sources for projects contained with the capital plans.

(NJ) The five-year plan and the STIP outline the funding amounts and the sources of funds for each phase of work.

c. Is there any specific link between:

i. The capital programming document/process and the high-level goals of the long-range transportation plan?

(MO) According to CFR 450.216 (4)(k)- Each project or project phase included in the STIP shall be consistent with the long-range statewide transportation plan

developed under §450.214 and, in metropolitan planning areas, consistent with an approved metropolitan transportation plan developed under §450.322. MoDOT programming is consistent with this federal requirement.

(VT) The VTrans Long Range Transportation Business Plan emphasizes safety, preservation, planning and excellence. These broad goals are reflected in the overall funding levels for each program. [http://www.aot.state.vt.us/planning/lrtbp.htm]

(WA) Yes. The projects in the capital six-year plan come from long range transportation plan which address needs identified by the legislature's transportation policy goals..

(MD) The CTP is developed consistent with our long-range plan, the Maryland Transportation Plan (MTP). We have recent legislation that requires us to show the link between the MTP and the CTP, Chapter 725.

(MA) Not definitively. Currently, MassDOT's modal divisions identify projects by project sponsor and therefore there is a loose association with high-level goals. MassDOT is currently in the process of tightening that association with the weMove Massachusetts statewide strategic multimodal plan. weMove Massachusetts will result in a transportation investment prioritization tool that will have evaluation criteria for modal projects that directly link to high-level goals. *[weMove Massachusetts Link: http://www.massdot.state.ma.us/wemove/]*

(NJ) Yes. The STIP links to the long-range transportation plan via our asset-management based capital investment strategy. The capital investment strategy outlines investment categories and ten-year average annual investment targets for each of these categories which guide programming of projects and programs. The capital investment strategy is guided by the goals of the long-range plan.

ii. The capital program and performance metrics?

(MO) MoDOT prepares a quarterly document called Tracker that measures the performance of the organization. Link: http://www.modot.org/about/general_info/documents/January2012TrackerReduced.pdf

**(**VT) Projects within each program area are ranked using a prioritization process that also reflects the LRTP goals.

(WA) Yes. The capital projects address system deficiencies based on the lack of performance for the legislature's transportation policy goals.

(MD) We have an Attainment Report done yearly that shows how the CTP is helping our designated performance measures.

(MA) Not right now. The weMove Massachusetts initiative will result in a capital planning performance management capability. MassDOT's Office of Performance Management and Innovation will incorporate what it sees as necessary to evaluate the performance of our capital planning from the evaluation criteria

established in weMove Massachusetts. *[Office of Performance Management and Innovation Link: http://www.massdot.state.ma.us/InformationCenter/Scorecards.aspx]*

(NJ) Yes, the capital investment strategy is performance based to the extent possible for both physical assets as well as service improvements such as safety and congestion relief.

**(2) Statewide Long-Range Transportation Plan (LRTP)**

a. What are the primary long-range policy goals for your state's transportation system identified by the LRTP?

(MO) MoDOT is currently involved in the initial steps of developing a new Long-Range Transportation Plan (LRTP). Missourians agreed to pursue three main goals in the current LRTP. Those are:
- Focus on preserving and improving Missouri's transportation system.
- Explore new ideas that give Missourians the most for their transportation dollars.
- Secure more transportation funding. Link: http://www.modot.mo.gov/plansandprojects/documents/Map_000.pdf

(VT) See Table A.1

(WA) Legislative transportation policy goals include
- Preservation of existing assets
- Congestion relief and reliable transportation times
- Safety
- Economic Vitality
- Environmental retrofit
- Stewardship

Please visit www.wsdot.wa.gov/accountability for detail performance reporting based on the above stated transportation policy goals.

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) weMove Massachusetts will serve as our Long-Range Transportation Plan, and is currently in development with an expected delivery date of February 2013. As of right now the primary policy goals are framed around our mission statement, values and the ten themes gleaned from the youMove Massachusetts civic engagement effort lead by the Office of Transportation Planning in 2009. *[youMove Massachusetts Ten Themes Link: http://youmovemassachusetts.org/themes.html]*

(NJ) Improve and maintain transportation infrastructure
- Integrate transportation and land-use planning
- Increase safety and security
- Increase mobility, accessibility and reliability of travel
- Enhance the environment
- Optimize freight movement
- Continually improve the process of providing transportation facilities and services
- Operate the transportation system efficiently

More details are available at the following link:. http://www.state.nj.us/transportation/works/njchoices/pdf/GoalsObjectivesIndicators.pdf

b. How are these goals used to guide short-term programming and planning decisions?

(MO) The LRTP identifies goals the public expects of the state transportation system—an ideal transportation system, if you will. Missouri, however, cannot afford all the components of this ideal system so MoDOT works with federal, state, and local partners to prioritize projects to determine which receive the limited funding available.

(VT) Some performance measures are incorporated into the project prioritization process (See Table A.1). Measures used in monitoring may lead to identification of projects, some of which could be implemented in the short term. For example, crash data are used for the High Risk Rural Road safety program which identifies low cost, easy to implement safety improvements on an annual basis.

(WA) WSDOT establishes specific objectives under each goal and performance metrics to achieve them. Network performance data are used to identify system needs. Capital projects are developed to fix those needs. Economic analysis is performed to identify the projects that make the greatest improvement in performance metrics to the dollar spent (required by law).

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) weMove Massachusetts will incorporate our highest priorities and policies into our evaluation criteria so that we evaluate projects advanced through our project development process. We will have a better understanding of the projects that best meet our needs according to our priorities and policies.

(NJ) See discussion above regarding capital investment strategy.

**(3) A list and description of performance measures being used by the state**

a. Identify, or provide links to the performance measures used and maintained by your state?

(MO) Tracker: http://www.modot.org/about/general_info/documents/January2012TrackerReduced.pdf

(VT) See Table A.1

(WA) Please visit the following websites for detailed performance metrics
www.wsdot.wa.gov/accountability

http://www.wsdot.wa.gov/Accountability/GrayNotebook/SubjectIndex.htm
http://www.wsdot.wa.gov/Accountability/GrayNotebook/gnb_archives.htm
http://www.wsdot.wa.gov/Accountability/Congestion/

(MD) *[http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/CTP/CTP_Documents/Final_CTP/2012_Attainment_Report.pdf]*

(MA) Currently, the capital programming process is not linked to the performance measures strongly. This will change with weMove Massachusetts. You can find

our scorecards here: Highway, Transit, and Aeronautics. *[Scorecard Link: http://www.massdot.state.ma.us/InformationCenter/Scorecards.aspx]*

(NJ) http://www.yourmoney.nj.gov/transparency/performance/dot/index.html
http://www.state.nj.us/transportation/about/asset/performance.shtm
http://www.state.nj.us/transportation/about/asset/centerline.shtm

b. How are these measures used in project selection?

(MO) Measures are created to achieve tangible results. Tracker measure results are data used to make more informed decisions. Project selection involves incorporating Tracker results and other information along with planning partner input to achieve the best value for the dollar.

(VT) Some performance measures are used for project prioritization and/or monitoring and some are under development *[See Table A.1]*

(WA) See the answer 2.b.

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) Currently, they are not strongly linked, but this will change in weMove Massachusetts.

(NJ) Performance measures and ten-year targets are the basis for making trade-off decisions for investment in one category versus another. Performance curves or other means are generated to demonstrate what an annual average investment will achieve over a ten-year period.

c. How do these measures relate to the LRTP goals? If so, in what way?

(MO) The underlying goals and vision of the LRTP are the basis for all transportation decisions made in Missouri. Tracker measures are developed with these goals in mind.

(VT) See Table A.1.

(WA) These performance measures were established to determine how much progress is made in reaching the legislative goals by project and by program.

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) Currently, they are more strongly associated with our mission statement and values than the LRTP. However, going forward with weMove Massachusetts the mission statement, values and LRTP goals will all be strongly associated with each other, project selection and performance management.

(NJ) *[See New Jersey response to Question 3b].*

**(4) A detailed capital program budget including funding sources and the allocation of funding to specific categories of investment. Please provide the following information and answer the questions below:**

a. Capital program budget for the next 3-10 years (depending on the time frame your state uses as a short/medium term planning horizon)

(MO) STIP: http://www.modot.org/plansandprojects/construction_program/STIP2012-2016/

(VT) The capital program is available here: http://www.aot.state.vt.us/Budget.htm

(WA) During the next six years 2013-2019; the current revenue projection for the capital program is approximately $7.72 billion.

(MD) *[Pointed us to Consolidated Transportation Plan: http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/CTP/Index.html]*

(MA) Please see the following: Highway, MBTA, Regional Transit Authorities, Aeronautics and our STIP for additional information. Going forward it is MassDOT's ultimate intent to unify these documents. *[Link to STIP: http://www.massdot.state.ma.us/planning/Main/StatewidePlans/StateTransportationImprovementProgram.aspx]*

(NJ) Annual capital program budget is approximately $2 billion per year.

b. State/federal breakdown of the capital program budget

(MO) Section 5 of the STIP

(VT) See capital program.

(WA) $4.32 billion in state funds / $3.4 billion in federal funds.

(MD) *[Pointed us to Consolidated Transportation Plan: http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/CTP/Index.html]*

(MA) See: STIP *[Link to STIP: http://www.massdot.state.ma.us/planning/Main/StatewidePlans/StateTransportationImprovementProgram.aspx]*

(NJ) Current breakdown is about $1 billion federal and $1 billion state, not including federal earmark funding or other non-formula funds.

c. Correlation between capital program budget and LRTP goals (or performance measures, or other means of identifying the policy goals of the expenditure)

(MO) Tracker: http://www.modot.org/about/general_info/documents/January2012TrackerReduced.pdf

(VT) Not Available

(WA) The LRTP does not have a specified goal in terms of performance for the next six years.

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) Up to this point the capital program budget was also very loosely associated with LRTP goals. Going forward with weMove Massachusetts, the relationship between high-level goals and funding will be examined and linked. The primary issue is

whether our revenue sources are fungible between uses and to what extent. If not, then a strong link between our goals and capital program budget may still be loose.

(NJ) We utilize investment categories that relate to the LRTP. Each project or program is identified/tagged with a specific investment category.

d. Any documents describing the state's project planning/selection/design process.

(MO) Planning Framework: http://www.modot.mo.gov/plansandprojects/planning_projects/PlanningFramework.htm

(VT) See attached "Legislative Report, Project Prioritization and Addition of New Projects for the State Transportation Program," VTrans Policy and Planning Division, December 1, 2008.

(WA) Highway System Plan. Mobility Project Prioritization Program. http://www.wsdot.wa.gov/projects/prioritization/default.htm

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) See: general summary of MassDOT planning process *[Link: http://www.massdot.state.ma.us/planning/Main/PlanningProcess/ProjectDevelopmentProcess.aspx]*, Highway project development process *[Unable to open link]* and MBTA capital plan *[Link: http://www.mbta.com/about_the_mbta/financials/?id=1052]*.

(NJ) See the introduction/overview to the STIP. It provides a good starting point. http://www.state.nj.us/transportation/capital/stip1221/

e. Describe the level of stability/certainty associated with the various sources of funding used by your state for capital projects. What strategies does your agency use to mitigate the problems caused by uncertainty in funding?

(MO) The certainty of federal sources is the same in Missouri as in other states in the country. These days, the ability to rely on federal funding is low with the gas tax producing lower and lower revenues and the insolvency of the Highway Trust Fund. State funding in Missouri is much the same with the reliance on a gas tax that is one of the lowest in the country. To a lesser extent, license fees and vehicle sales taxes provide less and less of a relative share of available revenue. Fuel consumption and vehicle sales have declined mainly due to a weak economy. MoDOT employs the strategy of only fully programming the first three years of the STIP because of the uncertainty in funding. The last two years are programmed to no more than a 50% level. This allows for some cushion in case revenues fail to meet projections.

(VT) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(WA) Nickel and TPA gas tax and fixed fee causes uncertainty in the revenue as the vehicle miles traveled is volatile in the current environment.

- Minor adjustments in vehicle user fee.
- Implementing tolling on major routes for partial project funding.

- Lower cost incremental improvements for gaining maximum performance.
- Moving Washington http://www.wsdot.wa.gov/movingWashington/

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) MassDOT can never be quite sure of the level of funding associated with our capital plan except for the first year of the STIP. The second, third and fourth years are estimated based on the first year of the STIP and project costs are inflated at a rate of 3% (year of expenditure cost). MassDOT advises our MPOs to inflate project costs at a rate of 4% for their regional transportation plans (RTP), and estimates a 3% rate of revenue growth for RTP financial guidance. Therefore, MassDOT takes a fairly conservative approach in long-term financial guidance since we assume projects costs will inflate faster than revenues grow. When a project is programmed in on the highway side of the STIP, MassDOT holds a portion of federal aid and state match in reserve annually to account for project cost increases after project advertisement, should an unforeseen event that necessitates additional funding go to the project. In the past this was approximately $40 million a year set aside.

(NJ) New Jersey's transportation program is funded by a state transportation trust fund that is predictable for five-year period and the federal trust fund, which has been predictable for a very long time. At present the federal funding has been operating on continuing resolutions and a new reauthorization remains unresolved.

Our capital program and STIP are based on reasonable revenue expectations agreed to by the MPOs and FHWA. These relate to programming levels, not actual authorizations. Actual authorizations can be affected by projected shortfalls in the federal highway trust fund revenues or state trust fund revenues. To this point, there have not been any serious impacts on the program.

**(5) Documents (or a description of) the process of measuring project deliverability and its role in the capital programming process.**

(MO) MoDOT develops projects through a detailed scoping process. The construction estimate derived from this process is concrete enough that MoDOT is able to commit funds to the project. Because of this, MoDOT deems projects programmed for construction in the STIP as commitments to the taxpayers.

(VT) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(WA) Please refer to Gray Notebook Project Reporting (Beige Pages) section. http://www.wsdot.wa.gov/Accountability/GrayNotebook/SubjectIndex.htm#beige

(MD) *[State Agency did not provide a written response to this question in Phase I of the survey. We received a verbal response in Phase II.]*

(MA) Staff members from the Highway Division and the Office of Transportation Planning meet weekly to discuss programmed projects to determine project advertisement dates and discuss any issues, such as right of way acquisition, environmental permitting and general project design. These meetings allow the Office of Trans-

portation Planning, which is responsible for the coordination of project programming, and the Highway Division to know where projects stand in terms of advertising, project cost etc., and any amendments to the STIP can happen in a timely fashion.

(NJ) Project and program delivery are assessed in two ways. First, as we go through the programming process each year, we review project schedules and risks to determine when funds will be needed for projects so we program funds at the right time.

Secondly, as we develop our investment strategy and trade-offs between investments in broad categories, we consider obligation performance as a means to assess our ability to delivery. For example, we would not program an amount of funding for bridges that our system is not capable of delivering.

## TABLE A.1: VTRANS STRATEGIC PLAN GOALS AND PERFORMANCE MEASURES

| VTrans Goal | Performance Measure | Performance Measure Application | | |
|---|---|---|---|---|
| | | *Project Selection* | *Monitoring* | *Under Development* |
| Provide for a Safe and Resilient Transportation System | a. Reduce annual number of crashes and fatalities per vehicle miles traveled | X | X | |
| | b. Incorporate resiliency in prioritization of bridge and road programs | | | X |
| | c. Reduce the frequency and severity of workforce injuries | | X | |
| Preserve, Maintain and Operate the Transportation System in the Most Cost Effective and Efficient Manner | a. Reduce the percent of lane miles of state owned highway in poor or very poor pavement condition | X | X | |
| | b. Reduce the number of structurally deficient bridges on the state-owned highway system | X | X | |
| Provide Vermonters with Travel Choices/Options | a. Reduce percentage of commute trips made in single occupancy vehicles | | X | |
| | b. Increase public transit ridership | X | X | |
| | c. Increase passenger rail ridership | | X | |
| Provide Quality Customer Service | a. Increase percentage of DMV customers waited on within 15 minutes | | X | |
| | b. Increase percentage of electronic registration renewals | | X | |
| Protect the Natural Environment and Promote Energy Efficiency | a. Maintain annual growth in vehicle miles travelled no greater than 1.5% per year | | X | |
| | b. Increase the percentage of vehicles registered in the state that use renewable energy | | X | |
| | c. Increase car-pool and van-pool participation | | X | |
| Support and Reinforce Vermont's Historic Settlement Pattern of Compact Village and Urban Centers Separated by Rural Countryside | a. Work with Agency of Commerce and Community Development to develop other measures | | | X |
| Secure Sustainable Funding and Finance Sources | a. Have no amount of FHWA annual formula funds lapse at the end of the FFY | | X | |
| | b. Utilize 100% of FHWA annual formula obligation limitation | | X | |
| | c. Track state and federal formula capital and operating funds available to VTrans | | X | |

# APPENDIX B:
# INFORMATION SOURCES FOR TRANSPORTATION INVESTMENT DASHBOARD MODELS

State performance measures can be found at the following websites:

MO: http://www.modot.org/about/general_info/Tracker.htm

VT: http://www.vtrans.org/performance_reports.asp

WA:http://www.wsdot.wa.gov/accountability (Gray Notebook Link)

MD:http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/Dashboard/AR_Highlights.html

MA:http://www.massdot.state.ma.us/InformationCenter/Scorecards.aspx

NJ: http://www.state.nj.us/transportation/about/asset/centerline.shtm

Information on the state capital projects can be gleaned from the following websites. For consistency we have recommended using STIPs instead of capital plans:

MO:http://www.modot.org/plansandprojects/

VT: http://www.aot.state.vt.us/Budget.htm

WA:http://www.wsdot.wa.gov/LocalPrograms/ProgramMgmt/STIP.htm

MD: http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/Index.html (STIP)

MA: http://www.massdot.state.ma.us/planning/Main/StatewidePlans/StateTransportationImprovementProgram.aspx

NJ: http://www.state.nj.us/transportation/capital/stip1221/

The demographic data shown on the dashboard can be found on the US Census Bureau's American Fact Finder website: http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

The infrastructure data shown on this dashboard can be found on RITA's BTS website:

http://www.bts.gov/publications/state_transportation_statistics/state_transportation_statistics_2010/index.html

Staff contacts from the benchmark and best practice states that provided data and information for the sample dashboards are as follows:

| | |
|---|---|
| Missouri: | Michael Henderson (michael.henderson@modot.mo.gov) |
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| Washington: | Sreenath Gangula (gangulas@wsdot.wa.gov) |
| Maryland: | Brian Martin (bmartin@mdot.state.md.us) |
| Massachusetts: | Trey Wadsworth (trey.wadsworth@state.ma.us) |
| New Jersey: | David Kuhn (david.kuhn@dot.state.nj.us) |

Summary Dashboard Data Sources: The data for revenue sources and federal funding came from FHWA Highway Statistics Table SF-1. The data for state disbursements and capital expenditures came from FHWA Highway Statistics Table SF-2. The most recently updated versions of these tables can be downloaded at: http://www.fhwa.dot.gov/policyinformation/statistics.cfm.

# APPENDIX C: ACKNOWLEDGEMENTS

The following is a list of guest speakers who provided presentations to the CASE Study Committee.

**November 4, 2011**

- **Benchmarking Connecticut's Transportation Program**
  Lance A. Neumann, PhD, Member, Board of Directors, Cambridge Systematics, Inc.
- **Moving Toward a Performance-based Federal Highway Program: An Overview**
  Peter J. Stephanos, P.E., Director, Office of Program Performance Management (proposed), Federal Highway Administration

**January 5, 2012**

- **Georgia Department of Transportation Management Review**
  - Jack Basso, Director of Program Finance and Management, American Association of State Highway and Transportation Officials
  - Joung H. Lee, Associate Director for Finance and Business Development, American Association of State Highway and Transportation Officials
  - Georgia DOT
    - Angela Whitworth, Treasurer
    - Angela Alexander, Director, Organizational Management
  - Jonathan P. Adams, Senior Fellow, LMI
  - Max Inman, Senior Advisory for Project Management and Program Initiatives, Mercator Advisors LLC
- **Organization Performance Measures: Time to Measure Up**
  Jim Dickson, Organizational Performance Specialist, MoDOT
- **Vermont Transportation Benchmarking Overview**
  Richard Tetrealt (*Study Committee Member*), Director of Program Development, VTrans
- **Washington DOT Presentation**
  - Daniela Bremmer (*Study Committee Member*), Director of Strategic Assessment, Washington DOT
  - Patrick E. Morin, P.E., Capital Program Development & Management Office, Washington DOT

# MAJOR STUDIES OF THE ACADEMY

**2012**

- Alternative Methods for Safety Analysis and Intervention for Contracting Commercial Vehicles and Drivers in Connecticut

**2011**

- Advances in Nuclear Power Technology
- Guidelines for the Development of a Strategic Plan for Accessibility to and Adoption of Broadband Services in Connecticut

**2010**

- Environmental Mitigation Alternatives for Transportation Projects in Conecticut
- The Design-Build Contracting Methodology for Transportation Projects: A Review of Practice and Evaluation for Connecticut Applications
- Peer Review of an Evaluation of the Health and Environmental Impacts Associated with Synthetic Turf Playing Fields

**2009**

- A Study of the Feasibility of Utilizing Waste Heat from Central Electric Power Generating Stations and Potential Applications
- Independent Monitor Report: Implementation of the UCHC Study Recommendations

**2008**

- Preparing for Connecticut's Energy Future
- Applying Transportation Asset Management in Connecticut
- A Study of Weigh and Inspection Station Technologies
- A Needs-Based Analysis of the University of Connecticut Health Center Facilities Plan

**2007**

- A Study of the Feasibility of Utilizing Fuel Cells to Generate Power for the New Haven Rail Line
- Guidelines for Developing a Strategic Plan for Connecticut's Stem Cell Research Program

**2006**

- Energy Alternatives and Conservation
- Evaluating the Impact of Supplementary Science, Technology, Engineering and Mathematics Educational Programs
- Advanced Communications Technologies
- Preparing for the Hydrogen Economy: Transportation
- Improving Winter Highway Maintenance: Case Studies for Connecticut's Consideration
- Information Technology Systems for Use in Incident Management and Work Zones
- An Evaluation of the Geotechnical Engineering and Limited Environmental Assessment of the Beverly Hills Development, New Haven, Connecticut

**2005**

- Assessment of a Connecticut Technology Seed Capital Fund/Program
- Demonstration and Evaluation of Hybrid Diesel-Electric Transit Buses
- An Evaluation of Asbestos Exposures in Occupied Spaces

**2004**

- Long Island Sound Symposium: A Study of Benthic Habitats
- A Study of Railcar Lavatories and Waste Management Systems

**2003**

- An Analysis of Energy Available from Agricultural Byproducts, Phase II: Assessing the Energy Production Processes
- Study Update: Bus Propulsion Technologies Available in Connecticut

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## Connecticut Academy of Science and Engineering

The Connecticut Academy is a non-profit institution patterned after the National Academy of Sciences to identify and study issues and technological advancements that are or should be of concern to the state of Connecticut. It was founded in 1976 by Special Act of the Connecticut General Assembly.

## Vision

The Connecticut Academy will foster an environment in Connecticut where scientific and technological creativity can thrive and contribute to Connecticut becoming a leading place in the country to live, work and produce for all its citizens, who will continue to enjoy economic well- being and a high quality of life.

## Mission Statement

The Connecticut Academy will provide expert guidance on science and technology to the people and to the State of Connecticut, and promote its application to human welfare and economic well-being.

## Goals

- Provide information and advice on science and technology to the government, industry and people of Connecticut.
- Initiate activities that foster science and engineering education of the highest quality, and promote interest in science and engineering on the part of the public, especially young people.
- Provide opportunities for both specialized and interdisciplinary discourse among its own members, members of the broader technical community, and the community at large.

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