State Smart Transportation Initiative

Delivering on the Promise:
Improving the Performance of Massachusetts Transportation Agencies

Produced by:

Massachusetts Taxpayers Foundation

in collaboration with:

MBR
MASSACHUSETTS BUSINESS ROUNDTABLE

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State
Smart Transportation
Initiative

The State Smart Transportation Initiative promotes transportation practices that advance environmental sustainability and equitable economic development, while maintaining high standards of governmental efficiency and transparency.

SSTI, housed at the University of Wisconsin, operates in three ways:

- As a community of practice, where participating agencies can learn together and share experiences as they implement innovative smart transportation policies.
- As a source of direct technical assistance to the agencies on transformative and replicable smart transportation reform efforts.
- As a resource to the wider transportation community, including local, state, and federal agencies.

SSTI members include 19 state departments of transportation: Arizona, California, Colorado, Delaware, Illinois, Iowa, Kansas, Massachusetts, Maryland, Michigan, Oregon, New Hampshire, New York, North Carolina, Pennsylvania, Rhode Island, Tennessee, Vermont, and Washington. These states differ in many respects but share a commitment to rethinking policies and processes to produce better outcomes.

Massachusetts Taxpayers Foundation

The Massachusetts Taxpayers Foundation is a nationally recognized, independent, nonprofit research organization whose purpose is to promote the most effective use of tax dollars, improve the operations of state and local governments, and foster positive economic policies. The Foundation's extensive track record of high quality research and analysis has earned it a reputation for objectivity and credibility among legislators, policymakers, the media, and interest groups of all kinds. Over the past 15 years the Foundation has won 16 national awards for its work on health care access and costs, transportation reform, business costs, capital spending, state finances, MBTA restructuring, state government reform, and municipal health reform.

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The Massachusetts Business Roundtable is a member-driven, public policy organization comprised of CEOs and top executives representing many of the state's largest employers. MBR's members employ 250,000 people in a wide array of industry sectors across the state. Its mission is to strengthen the state's long-term economic vitality with the goal to make Massachusetts a highly desirable place to do business. MBR is working with leaders in industry, government and higher education to advance the development of sound public policy in areas including transportation, health care cost containment, STEM education and fiscal policy. To learn more about the organization's programs, policy work and its competitiveness agenda for 2013, please visit online at www.maroundtable.com.

Funding for this report was provided by the Barr Foundation.

Delivering on the Promise:

Improving the Performance of Massachusetts Transportation Agencies

This report, which was produced by the Massachusetts Taxpayers Foundation (MTF) in collaboration with the Massachusetts Business Roundtable (MBR), reviews progress by the Massachusetts Department of Transportation (MassDOT) in achieving reforms called for in the Transportation Reform Act of 2009, and makes additional recommendations based in part on best practices used by transportation agencies in other states. With funding from the Barr Foundation, MTF contracted with State Smart Transportation Initiative (SSTI) to conduct the review and to make findings and recommendations.

In addition to reviewing extensive documents and other materials, SSTI sent a team of experts (listed on page 10), two of whom have served as secretaries of transportation in their home states, to Massachusetts to meet with key staff at MassDOT. SSTI interviewed three dozen stakeholders, business leaders, and others to develop the findings and recommendations contained in this report. (See the appendices for a full list of interviewees and materials reviewed by SSTI.)

While MassDOT, which is an SSTI member, reviewed drafts and offered helpful suggestions, the agency had no control over the report's findings or recommendations.

After participating in the SSTI evaluation and reviewing the SSTI team's report, as well as conferring with study participants, MTF and MBR offer the following overview of recommendations to MassDOT and its stakeholders. SSTI's recommendations are summarized in the accompanying table on page 5 and in the body of the report.

We would like to recognize the important contributions of Stephanie Pollack, Associate Director of the Dukakis Center at Northeastern University, and writer and editor Phil Primack, who is a consultant to the Barr Foundation.

Overview of Recommendations

Massachusetts transportation agencies lack sufficient revenue to fulfill their critical role in advancing the Commonwealth's economy. Beacon Hill recognizes that reality, but as lawmakers consider proposals to fund the Massachusetts transportation system, they and the public alike correctly want to know that revenues going to transportation agencies are and will be well spent. This report examines the Massachusetts Department of Transportation's progress in achieving reforms called for in the Transportation Reform Act of 2009, including heightened customer focus, better internal and external communications, streamlined operations and project planning and delivery (including development and tracking of performance metrics), and changes in organizational culture. It also assesses the agency's performance against best practices that have been implemented in recent years by some of the nation's most forward-thinking state transportation agencies.

In this review, State Smart Transportation Initiative (SSTI) found that MassDOT has achieved important progress in delivering on the promise of improved performance. MassDOT has made major advances toward integrating a formerly disjointed transportation bureaucracy into a single, better managed agency. But much work remains in order to complete all of the reforms called for in 2009 and to implement additional and equally important performance improvements at both MassDOT and the state's Regional Transit Authorities. SSTI makes fourteen recommendations to assist MassDOT's ongoing efforts to become one of the top transportation agencies in the country, with the governance and management structures needed to support a modern transportation system. The kinds of recommendations made in this report are required not only because Massachusetts taxpayers and transportation system users deserve nothing less than the best, but because federal transportation funding is becoming increasingly tied to performance metrics. One critical goal of ongoing and enhanced efforts to improve MassDOT's performance must be to ensure that the Commonwealth is well positioned as it competes for federal dollars with other states that have adopted best practices, from accountability and transparency to criteria-based project selection and management.

The 2009 law represented a major step forward for the Commonwealth. It consolidated several transportation agencies into MassDOT and triggered other actions that have led to improved management of the state's transportation system. Due to the foresight and hard work of the administration, the Legislature, transportation officials and employees, and other stakeholders, much has been accomplished. A culture of innovation unimaginable just five years ago is now beginning to take hold. Policy makers and the public increasingly recognize the centrality of transportation to the Commonwealth's economic and environmental future.

Organizational change can be very challenging, especially for an agency such as MassDOT which was created just three years ago and has since had to merge the day-to-day operations of multiple agencies while maintaining and trying to improve an aging statewide system. And it has had to do so under severe fiscal constraints. The Transportation Reform Act of 2009 did not provide a long-term financial solution, instead stressing "reform before revenues." This report is not intended to propose or evaluate revenue solutions, but it is important to note that in Massachusetts and most other states even the most successful streamlining and other reform efforts will fall far short of generating sufficient savings to meet identified revenue needs.

This report presents important observations made by SSTI's expert team and then makes a series of recommendations. Some focus on completing the unfinished work of the 2009 reform legislation while others would move MassDOT in new directions. The SSTI team found significant accomplishment in some areas but lagging performance in others. SSTI also identified improvements beyond those called for in 2009 that could provide the Commonwealth with the tools needed to deliver more fully on the promise of making MassDOT one of the finest integrated state transportation departments in the country.

The table on page 5 offers a summary of SSTI's findings and recommendations, which are discussed in more detail later in this report. These recommendations generally fall into three categories:

MassDOT must select projects carefully and complete them on time and on budget.

- MassDOT should establish policy and investment priorities and enact measures to ensure their implementation.
- The MassDOT Board should become the primary forum for transportation policy-making in Massachusetts.
- MassDOT needs a comprehensive investment program that lays out in one place its plans to meet the state's needs and to enhance system performance and identifies how much funding is necessary to do so.
- In order to focus limited resources on the most viable and important projects, MassDOT should review its current list of projects to determine which deserve priority and which cannot or should not be implemented.

MassDOT should improve how it assesses and reports on transportation needs, project delivery and outcomes.

- MassDOT and stakeholders need better data to measure both progress and problems with respect to the agency as a whole and to specific projects. MassDOT should continue to develop its project information system in order to enable easier and timelier access to such information about performance.
- Since system preservation remains MassDOT's primary focus, the agency should accelerate the development of an asset management system to provide a strong foundation to help identify agency-wide transportation infrastructure needs.

SSTI Priority Recommendations
MassDOT should continue its development of a project information system to allow for easy and timely access to project information. This system should provide an early warning system for delayed projects.
In order to better respond to modern system-preservation demands, MassDOT should implement an agency-wide asset management system that maximizes the life of assets.

MassDOT needs greater transparency and improved communications.

- To build greater credibility with system users and funders, MassDOT needs to adopt additional strategies to better communicate and present information about projects and other activities.
- MassDOT must develop and provide performance measures that can be easily understood by policy makers and the public alike.

SSTI Priority Recommendation
MassDOT should complete its work in adopting a performance-oriented management approach, based on a set of desired outcomes, performance measures and performance targets.

SSTI Priority Recommendations
MassDOT should be allowed to use tools and techniques that have been proven to speed delivery of projects to deliver the agency's program.
MassDOT operations and maintenance staff that have been supported from bond funds since the 1990s should be moved onto the agency operating budget as soon as practicable.

While most of these and other recommendations are the responsibility of MassDOT or its board to implement, some require legislative action. For example, MassDOT cannot move toward a more fully integrated transportation system unless the Legislature makes changes to permit revenues from different sources to be used to meet any transportation need, regardless of mode.

The Legislature should also act to allow MassDOT to use tools and techniques that have been proven to speed project delivery, such as in the Accelerated Bridge Program. Other recommendations, such as the critical need to stop using capital funds for operating costs, require funding by the Legislature. (The 2009 reform law called for this funding transition to have been completed by July 1, 2010.)

Achieving many of the goals laid out by SSTI will require additional funding and continued hard work by all parties. But because of what has been achieved to date, Massachusetts is now in a position to talk about more than just saving a struggling transportation system. With consistent legislative and public support and an ongoing commitment to performance and transparency, we in Massachusetts can aim for nothing less than having one of the best transportation agencies in the nation, overseeing one of the country's most robust, multimodal and well-maintained transportation systems.

Priority	SSTI Recommendations
	Establishing clear policy and investment priorities and putting systems in place to ensure that they will be implemented
	The MassDOT Board should give more attention to strategic transportation policies and investment directions for the Commonwealth.
✓	MassDOT should continue to implement its GreenDOT policy, a comprehensive environmental responsibility and sustainability initiative, and examine ways to provide the resources for this to happen.
	MassDOT should develop a comprehensive investment plan/program that in one place articulates the needs facing the Commonwealth, desired directions for system performance and the levels of investment necessary to achieve specified goals.
	MassDOT should use scenario analyses as part of the planning process to assess likely consequences of differing levels of financial support for infrastructure investment.
	MassDOT should examine its project list and determine which projects cannot or should not be implemented. The agency should cancel or rethink those projects and focus resources on the most viable projects.
	Continuing to improve project delivery systems
✓	In order to better respond to modern system-preservation demands, MassDOT should implement an agency-wide asset management system that maximizes the life of assets.
✓	MassDOT should continue its development of a project information system to allow for easy and timely access to project information. This system should provide and early warning system for delayed projects.
✓	MassDOT should be allowed to use tools and techniques that have been proven to speed delivery of projects to deliver the agency's program.
	Rationalizing and stabilizing MassDOT's finances
✓	MassDOT operations and maintenance staff that have been supported from bond funds since the 1990s should be moved onto the agency operating budget as soon as practicable.
	The legislature should move further toward an integrated transportation system by removing barriers between modal funding sources.
	Establishing performance measures that drive the agency's performance and are understandable to the public
✓	MassDOT should complete its work in adopting a performance-oriented management approach, based on a set of desired outcomes, performance measures and performance targets.
	Improving transparency and communications
	MassDOT needs to develop new strategies to better communicate with key constituencies.
	Building on MassDOT's recent focus on innovation
	MassDOT should continue to encourage the use of innovative strategies in delivering a 21st century transportation system by supporting an innovation culture within the agency.
	MassDOT should develop a strategic plan for how technology can be used in both the delivery of services and on the transportation system.

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SSTI Findings and Recommendations

Introduction

Organizational change often presents significant challenges to those leading the change. These challenges are often multiplied when one includes in such change more than one organization connected financially, managerially, structurally and administratively with each other. In November 2009, Massachusetts implemented legislation whose intent was to reform state transportation agencies, creating the Massachusetts Department of Transportation (MassDOT). The reform was aimed at creating "one DOT" with centralized policy and administrative leadership, and with a goal to create a more efficient and effective state transportation agency. This was not an easy task. The institutional history of transportation agencies in the Commonwealth has been one of individual agencies, each with its own history, culture, enabling statutes, standard operating procedures and approach toward problem solving. The reform legislation integrated the Massachusetts Bay Transportation Authority (MBTA) into the new DOT along with the Massachusetts Highway Department (MHD), the Massachusetts Aeronautics Commission (MAC), the Registry of Motor Vehicles (RMV), the Massachusetts Turnpike Authority (MTA), and some roads and bridges operated by the Department of Conservation and Resources (DCR). The Massachusetts Port Authority remained separate, but MassDOT did take over the Tobin Bridge, a MassPort asset. Though it was clear that transportation systems in Massachusetts, as elsewhere in the country, were facing long-term shortfalls, the 2009 legislation did not provide a long-term financial solution, instead stressing "reform before revenues." It is beyond the scope of this report to propose or evaluate revenue solutions, but it is worth noting that in Massachusetts and most other states, even the most successful streamlining and other reform efforts will fall far short of generating enough savings to meet projected revenue needs.

The purpose of the SSTI assessment was to evaluate the progress of transportation reform efforts since November 2009 and to assess MassDOT's current performance against best practices in peer DOTs. The assessment was based on a review of documents and an intensive, two-day site visit in which key DOT officials and important stakeholders were interviewed. The assessment focused on the goals of the reform as stated by MassDOT in 2009, including heightened customer focus, better internal and external communication, administrative efficiencies, and changing organizational culture. More broadly, it addressed MassDOT's progress in achieving an efficient and effective transportation system that provides travelers and shippers with access to destinations and high-quality customer service, while also furthering the community and state interest in economic prosperity, livability and environmental quality.

The State Smart Transportation Initiative, based at the University of Wisconsin, is a two-year-old network of state DOT executives interested in modernizing their agencies. Before visiting MassDOT, SSTI performed reviews and strategy sessions with DOTs in Pennsylvania, Washington, Iowa, Oregon and Arizona, as well as focused technical assistance work in Delaware, Kansas, North Carolina, and Colorado.

For the Massachusetts project, SSTI assembled a team that reviewed documents, conducted interviews and took part in a two-day site visit. Team members are:

- Allen Biehler, P.E., former secretary of the Pennsylvania Department of Transportation and former president of the American Association of State Highway and Transportation Officials.
- Michael Meyer, Ph.D. and P.E., former chair of the Georgia Tech School of Civil and Environmental Engineering; former chair of the Transportation Research Board Executive Committee; and former Director, Bureau of Transportation Planning and Development, Massachusetts Department of Public Works.
- James Ritzman, P.E., Deputy Secretary for Planning at the Pennsylvania Department of Transportation.
- Eric Sundquist, Ph.D., SSTI Managing Director.
- Beverley Swaim-Staley, M.A., President of the Union Station Redevelopment Corporation and former Maryland Secretary of Transportation.
- Robbie Webber, M.S., SSTI Senior Associate.

Observations

Transportation in the United States is at a turning point as a business model dating to the Interstate-construction era has become obsolete. A large percentage of existing highways are at the end of their useful life, demanding ever-more resources for maintenance and rebuilding. And a uni-modal focus has proven an inefficient way to provide access to destinations. A more up-to-date model includes the provision of highway infrastructure, but as one item on a larger menu that includes facilities for other travel modes, demand management, higher-tech operations, coordination of transportation and land use and community development planning and more.

With the 2009 reform legislation and subsequent administrative measures at MassDOT, Massachusetts has made steps toward a new, more sustainable model of transportation. It is not clear yet what this new model will eventually evolve into. MassDOT and other innovative states are constructing this new model in real time, with changes adopted as circumstances dictate. Our recommendations here are informed by SSTI's work with states around the country that are modernizing their policies and practices. In general, states – as any other organization facing a major change – must go through two major steps to make progress: 1) Acknowledge the need for change and express it in a new vision, and 2) reorient their delivery systems to adapt to that new vision. Our review found that Massachusetts and MassDOT are expressing a new vision, e.g. in the 2009 legislation and in the Administration's recent policy declarations around mode shift, and have made major advances in integrating a formerly disjointed transportation bureaucracy.

As noted in the introductory section, organizational change can be very challenging. It is often strongly influenced by both internal and external factors, some of which agency managers have very little control over. The following observations made by the SSTI team emphasize factors that have the strongest influence on the substance and pace of organizational change.

MassDOT has made real progress

The SSTI team found much evidence of progress in implementing aspects of the reform effort. The Accelerated Bridge Program (ABP) has showcased what the MassDOT can accomplish when given the tools and resources. In this case, the legislature allowed MassDOT to use design/build contracts to speed the project development process, permitted the department to reimburse utilities for the work they undertook on the bridge projects and provided $2.9 billion in funding. Another noteworthy achievement was the GreenDOT policy, announced in 2010 and now being implemented, which pushes MassDOT's managers and staff to innovate in order to provide transportation more sustainably. The agency is at the forefront in moving into the post-Interstate era, stressing multimodalism and system preservation, rather than more lane-miles. Some salaries have been recalibrated to the labor market, e.g. toll collector salaries have been cut to reflect comparable market salaries. Senior management has held "town meetings" with employees; with restrictions on travel for conferences, the agency created MassDOT University to improve knowledge and skills; senior staff has met with all modal administrations; administrators from different modal backgrounds have received positions in other modal administrations (a cross-fertilization goal); and MassDOT has articulated a strategic vision. An integrated MassDOT Board, created in 2009, has been reformed in 2012 in order to better focus on strategy and vision.

Where many DOTs see their customers as highway contractors and other special interests, MassDOT's management puts a customer focus on users of the system. Catching up to other DOTs, MassDOT has installed Intelligent Transportation Systems signs on highways and next-train signs on transit. The Registry of Motor Vehicles, while cutting staff, is conducting more transactions online and has awarded a contract for a $78 million project to overhaul its 25-year-old IT system. Certain service units, e.g., human resources, legal, information technology, civil rights and communications, have been combined resulting in budget savings and better coordination. Since the merger of the former MassHighway and former Mass Turnpike into the MassDOT Highway Division, there has been a successful transfer of knowledge and experience between the two agencies. As a result, the combined MassDOT Highway Division now uses a consistent set of operations policies and design principles, including MassHighway's complete-streets design principles.

MassDOT is implementing a performance-oriented management approach, already in use at the MBTA, for the department as a whole. It has identified preliminary performance measures, and each of the administrations has been given a set of goals and objectives.

And most important, the previous, unproductive competition between individual modal agencies has been replaced with a cooperative, multimodal approach, and the agency has committed to an ambitious mode-shift initiative to more efficiently meet mobility needs. MassPort remains separate, as do transit systems outside of the Boston area and a large network of locally owned streets and roads. Although the MassDOT Secretary now chairs its Board, Massport remains separate, as do the non-MBTA regional transit authorities (which MassDOT is working with on a more integrated basis, following up on the recent *Beyond Boston* report) and a large network of locally owned streets and roads. The Commonwealth of Massachusetts could go further in its integration effort, but among state DOTs, MassDOT is better positioned than most.

Leadership

Most studies of organizational change focus on the importance of leadership and, critically, leadership that offers guidance on the goals of the change effort and provides mid-change corrections when the change is not occurring as desired. Massachusetts has had four transportation secretaries since 2008, each change also resulting in turnover among key senior executives. Several participants during the interviews pointed to this lack of stable leadership as a major reason why change has not occurred as fast or as substantively as desired. Secretary Richard Davey and his team have been in office for about 16 months, and Davey has committed to serving at least until the end of 2014, which offers hope for greater continuity and dedication to follow through implementation of the reform program.

The Central Artery legacy

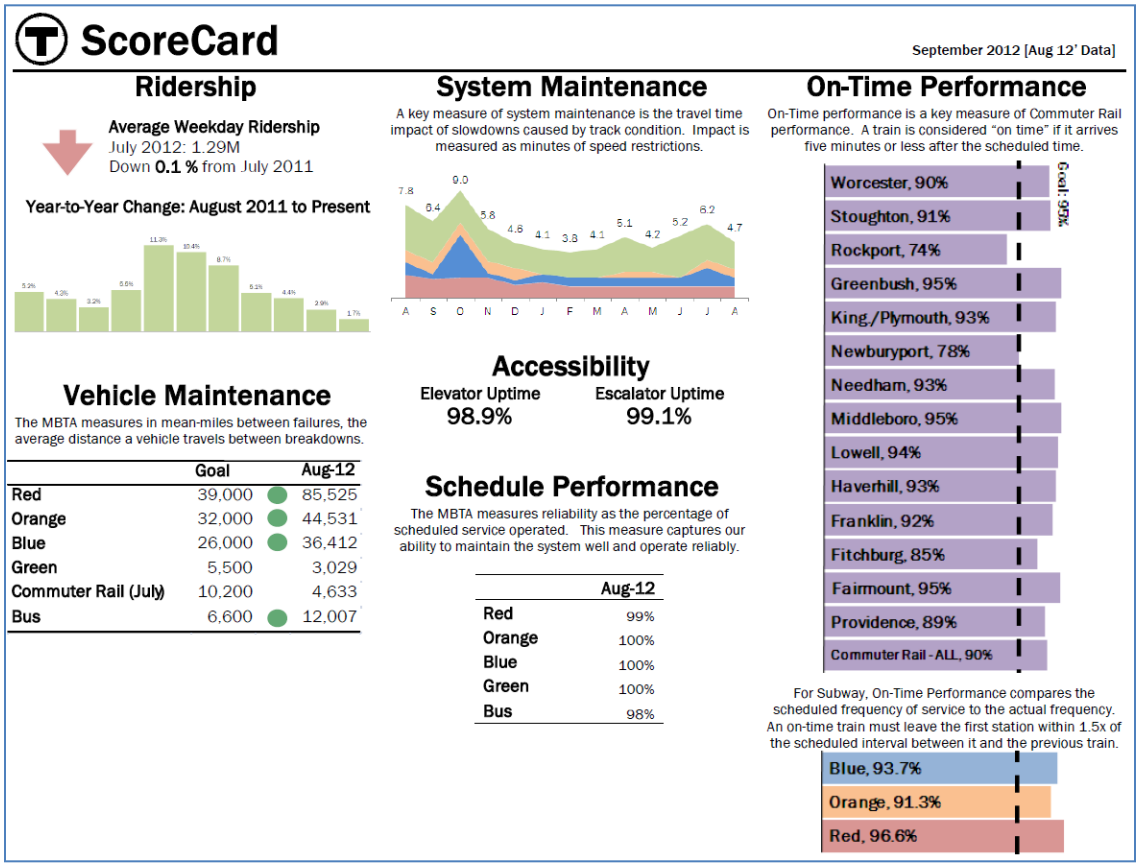
The Central Artery project has dominated the transportation agency efforts and investments for over 25 years. MassDOT still faces stakeholder perception that resources were unfairly directed away from other parts of the state and that the project was too costly or poorly managed; many of its staff still vividly recall the bad press and resulting pressures on the agency. The level and type of oversight currently exerted by the Federal Highway Administration (FHWA) Division Office can largely be traced to concern over the Central Artery project. And the MBTA's service provision and investments are constrained by the debt placed upon it by the Commonwealth's commitments for transit mitigation to allow Central Artery project to go forward. MassDOT management very much

wants transportation in Massachusetts to move beyond the Artery era. In part, changing perceptions will be a function of MassDOT's continuing progress in reform, and the recommendations below are designed to help. But in other areas, such as FHWA oversight and MBTA debt, actions of external stakeholders will also be critical.

Performance-based management and decision-making

The reform legislation instructed MassDOT to adopt and track performance measures, and it created an Office of Performance Management and Innovation to do so. MassDOT has not yet achieved a full set of agency-wide measures, acknowledging that it has only begun making real progress in the last 12 months. But it does use customer- and outcome-oriented performance metrics in some areas today: The MBTA reports its measures monthly online, in a form that is publicly accessible and oriented to important outcomes, such as ridership, delays from maintenance and schedule performance. The Registry has begun tracking wait times and other measures and reports them monthly to the Board; these measures show a positive trend in online transactions but a negative one in wait times in branches. The Accelerated Bridge Program has produced extensive quarterly progress reports. Extending performance management to new areas, managers are now setting their performance targets under GreenDOT.

Figure 1: MBTA Topline Performance Measures



In pursuit of the bigger, legislatively mandated goal of agency-wide measures, MassDOT is combining existing metrics discussed above with new measures for other modes. The Office of Performance Management and Innovation oversees and facilitates the creation of a MassDOT vision, goals, strategies and metrics for units within MassDOT. It is developing a dashboard that will be used to convey to those both inside and outside of MassDOT the level of achievement that is being made in key priority areas. An initial version of this dashboard, covering data through September 2012, is now on the website, though some measures remain to be developed. As with other agencies, it is likely MassDOT will change and adapt its measures over time. Critically, outcome measures in highways are notoriously difficult to achieve, as they involve factors outside of the agency's control, so agencies typically default to measuring outputs instead. MassDOT's highway measures are output-oriented, probably too numerous, and sometimes unclear in purpose (e.g. "ensure that projects are trending on-budget at completion of construction"), and so would benefit from internal and external stakeholder feedback as the agency refines them. Cross-cutting multimodal measures are even tougher and practically unknown in the field, but truly measuring access to destinations requires such a measure, and MassDOT, with its current emphasis on developing measures, could provide important leadership in this area.

The current highway measures do address concerns by some stakeholders about effectiveness of project delivery. The measures show that on the whole, highway construction projects are running under budget, meeting expectations in that area, but are not always meeting expectations for timeliness (at least 70 percent completed on time).

While SSTI focused on MassDOT in its review, the state's transportation system also includes Regional Transit Authorities, which independently operate buses, and local governments, which independently operate streets and roads. These agencies could likely also benefit from setting performance measures, and MassDOT is working with the RTAs toward this goal.

Transparency in planning, decision making, project delivery and funding

One of the critical characteristics of perceived organizational success is that those external to the organization, especially those who provide critical support, should understand what is being done and why. Several of the participants in the assessment process felt that MassDOT has not been overly successful in developing capital plans, project information systems and project selection criteria that are available to those outside the organization. For example, many participants pointed to the need for a multi-modal and multi-year capital investment program for the entire DOT that indicates the needs, the resources available, and the needs that will go unfulfilled without further funding. In addition, there was concern expressed about the process for selecting project priorities, and for the ability of MassDOT to show that it is delivering projects on time and on budget. MassDOT is planning more reporting systems in this area, including project status, and our recommendations below should be seen as suggestions for ways these systems could work.

Additionally, as noted above, there are two legislatively created funds established to support transportation investment. One is linked to the Massachusetts Turnpike's toll revenues, while the other includes all other transportation revenue sources, but money flows between the two. Several participants noted that it was difficult understanding the flow of revenues and expenditures given the different ways the revenues are administered.

Debt financing

Massachusetts relies heavily on debt financing. With an excellent credit rating, the Commonwealth does not seem to be too concerned about this form of finance. However, credit ratings only reflect the ability to pay back bonds, not the effect of borrowing on the long-term health of the system. It was surprising to see so many operations and maintenance functions being paid out of the debt-financed capital budget, a practice that began in the 1990s. This is very unusual among state DOTs, and although steps have been taken to remove such functions from the capital budget – more than 250 FTEs have been moved to the operating budget since FY 2009 – a substantial level of such support for maintenance and operations still remains. MassDOT management is aware of this problem and cites funding levels as a barrier to moving more staff and operations out of the capital budget.

Transportation planning and asset management

The Office of Transportation Planning was evolving with new responsibilities prior to the reform legislation. For example, in 2004 the Office took on responsibility for transit capital planning, with the short range, service planning remaining with the MBTA. The reform legislation caused a re-examination of the Office's mission, especially with respect to transit planning, and how one does multi-modal planning in the new DOT. One key factor in the effectiveness of such planning is the availability and management of quality data that provides some indication of the status of the transportation system as it relates to key objective – safety, congestion relief, environmental stewardship, state-of-good-repair, etc. MassDOT has data on pavement and bridges, but acknowledges that in other areas it has less information. While performance-based asset management came late to the transportation field – in the Interstate-building era there was little thought about operations, maintenance and rebuilding – DOTs have made progress, and all are being pushed in this direction with the MAP-21 requirement for performance-based planning and management. Some states have developed a comprehensive asset management and system performance information systems that can guide investment priorities. Such systems replace old rule-of-thumb investment strategies, such as addressing the worst road segments first, with one that matches investment with overall goals and seeks to forestall expensive rebuilds by providing timely maintenance. These systems have taken years to construct and in some cases millions of dollars. At three years in, MassDOT does not yet have such a system in place, but it can learn from others in order to shorten the development process.

Customer focus and innovation

MassDOT has sharpened its focus on improving services to its customers. Other states that have adopted this approach have enjoyed improvements in image and enhanced credibility, and have been able to implement a more thoughtful approach to investment (one that tries to optimize travel experience rather than simply provide infrastructure). Some of MassDOT's successes in this area include releasing MBTA bus and train data in order to prompt the development of third-party, free-to-MassDOT smartphone apps; smartphone ticketing on commuter rail; open-road highway and bridge tolling (now being implemented); next-train countdown signage; and new ITS signage on key freeways. Less directed at customers, but also involving innovation and technology, are the use of surplus brownfield land to generate solar electricity, greening MassDOT's operations and saving money. However, some constraints – including restrictions on travel to conferences and other opportunities to learn – may have limited the application of new technologies and approaches to enhancing the customer experience. Several participants said that MassDOT and, before 2009 its

predecessor agencies, had been slow to deploy highway message signs and electronic tolling. In reality, there are very real labor and funding issues associated with putting such functions in place, but MassDOT also has apparently untapped opportunities to learn from other states. SSTI review team members from Pennsylvania and Maryland, for example, found that MassDOT did not seem to be taking full advantage of resources available through the I-95 Corridor Coalition. This group is a major information-sharing venue not only for tolling technologies and processes, but or traveler information and data collection systems as well.

Communications

Part of having a customer focus is having an effective communications network and approach toward conveying information to key constituencies. According to MassDOT officials, the communications efforts during the first two years after the reform legislation were largely reactive, that is, providing information when asked, and only that which was requested. The communications effort has evolved into being more proactive and more oriented to the general public, employing a blog, social media, newsletters and public meetings. Still, the message may not always be getting through. As many participants in the site visit said, MassDOT should do a better job of communicating its progress not only to the general public, but also to key constituencies.

Recommendations

Though it has made notable progress, MassDOT can still improve in both vision and implementation, and our recommendations address both issues below. The most pressing issue is in building the human and technical systems to provide critical feedback on progress to both internal and external decision-makers and stakeholders. Again, this issue is not at all unique to MassDOT, and the quest for a system built around performance measures has become central in state and federal policy development. In Massachusetts, the legislature has charged MassDOT with establishing performance measures, but these are only partially in place. More broadly, while it appears the agency has broken down old silos and is functioning as a more modern multimodal agency, it does not have a flow of information that systematically informs its own policies and practices, nor – critically – provides assurance to stakeholders that things are functioning well, or when they are not, that there are good reasons for problems and actions are being taken to solve them. Our recommendations touch on several elements of this issue below, but one bears special mention:

Capital Project Information System

As an immediate, relatively inexpensive method of increasing accountability and transparency, we recommend that MassDOT rework its capital project information system, currently located at: *http://www.mhd.state.ma.us//ProjectInfo/*.

While this system may meet the letter of the law as a source of project information – at least for highways, as transit projects do not seem to be included – it falls far short of what is needed to inform decisions and assure stakeholders. Descriptions of project status are often dated, and they do not explain delays nor show whether projects are on time or on budget.

No state has perfected such a system, but best practices as described in the Observations section above should be helpful. Ideally, the system should include the descriptions of projects' progress and problems employed in PennDOT's war room, the user-friendliness of WSDOT's "project search" web pages, and the time and budget data of NCDOT's construction progress reports. It should also include comparable data for projects in all modes in a single resource. Once put in place, a basic system should not require significant new resources. The WSDOT project pages do need staff to develop web content, but if the budget cannot cover this function now, simply requiring project managers in the districts to regularly report project status, including qualitative accounts of problems encountered as well as quantitative accounts of time and budget status, can be a regular part of managing projects. As noted, NCDOT staff files these updates when contractors receive payments, when project accounting is being done anyway.

Data from this system can then be aggregated to serve as one or more agency-wide performance measures, e.g. the overall performance in delivering the capital program on time and on budget, reported in nearly real time. If MassDOT could say, whenever asked, that its projects were on average X days ahead or behind schedule, and X dollars over or under budget, and could show improvements in these measures over time, it would have a much stronger and more credible voice with its stakeholders. And by constantly paying attention to the information flowing in this system, it would be able to continually improve its performance.

Project Delivery Reporting

While project delivery is only one of many functions of a modern DOT, it is one where transparency can pay important dividends. The Central Artery demonstrates how perceived problems with a project can color everything the agency does, fairly or not. And internal communication about projects can help an agency learn and improve. MassDOT does have project summaries and updates online, but these could be improved, both to provide more information to customers and stakeholders and to provide important internal data. Practices in North Carolina, Pennsylvania and Washington may be helpful.

NCDOT, which until recent years had a highly politicized project selection process that engendered distrust, has taken pains to provide timely public updates on all capital projects. While this system could still improve, e.g. with qualitative descriptions of progress or problems, it includes information on the projects' budget and timeliness, compared with original plans. Each project is updated whenever payments are made to contractors; the update is part of an existing process, requiring little new work by NCDOT staff.

Figure 2: An example from NCDOT's project information system.

Contract Number:	C201977	**Route:**	I-295
Physical Division:	6	**County:**	Cumberland
Administrative Division:	6	**TIP Number:**	U-2519E, X-0002B
Length:	2.538 km	**Federal Aid Number:**	STM-0100(17)
Resident Engineer:	Randy K. Wise, PE	**RE Phone Number:**	(910)488-1070
Location Description:	FAYETTEVILLE OUTER LOOP FROM WEST OF NC-24 TO 1.3 MILES EAST OF NC-87/NC-210.		
Type of Work:	GRADING, DRAINAGE, PAVING, & STRUCTURES.		
Contractor Name:	R E GOODSON CONSTRUCTION CO INC		
Contract Amount:	$52,553,157.52	**Cost Overrun/Underrun:**	15.8%
Availability Date:	6/29/2009	**Letting Date:**	5/19/2009
Completion Date:	7/1/2012	**Work Began:**	7/7/2009
Revised Completion Date:	12/31/2012	**Estimated Completion:**	12/31/2012
Last Estimate Thru:	12/7/2012	**Scheduled Progress:**	100%
Last Estimate Paid:	12/18/2012	**Actual Progress:**	94.56%

PennDOT's example is not public or web-based, but is directed at internal information sharing. Working to improve project delivery times, the agency realized that some problems were taking too long to filter up to management, which needed such information both to analyze the pattern of such problems and in some cases, e.g. with slow-moving utilities, railroads or other third parties, to intervene to get projects unstuck. The agency created a "war room," with frequently updated project lists tacked to the walls, each project coded with green, yellow or red depending on the its progress. Managers can walk in, glance at the problem project, and work to determine solutions right away. Data for the reports comes from the district offices that are managing projects, requiring little extra work.

Finally, in addition to collecting and reporting system statistics in the "Gray Notebook," WSDOT has put considerable thought into online project descriptions, giving stakeholders clear and well-illustrated explanations. These are available at: *http://www.wsdot.wa.gov/projects/search/*.

MassDOT has established several measures relating to highway project delivery in its initial set of performance measures. We discuss the broader issue of performance measures below, but on the specific issue of reporting on project delivery: 1) With a more robust reporting system on individual projects, dashboard measures could be reported more frequently than yearly (in the case of budget) and with less lag time (in the case both of budget and on-time performance), and 2) the timeliness reporting should be clearer (disclosing when the clock starts) and more meaningful (by taking a similar approach to budget). On this last point, the simple percentages in the current dashboard treat a short delay the same as a long one, and a small project the same as a big one and by only including the relatively small number of projects concluded in a quarter, the measure fluctuates considerably. One approach might be to multiply all projects' dollar cost and the number of days ahead or behind schedule continuously, and sum the results to show net dollar-days, a measure of the entire programs schedule performance.

The remaining recommendations are organized in four sections, each representing one of the major areas of organizational function and decision making affected by a multi-agency reorganization. These areas are: 1) Policy making, 2) Planning, 3) Program delivery, and 4) Finance. In some cases, the SSTI review generated recommendations that turned out to be already mandated by state law, but not yet fully implemented. Rather than re-legislate these requirements in greater detail, we recommend that MassDOT report periodically to stakeholders on progress in key ongoing improvements, such as establishment of performance measures and employment and integration of asset management systems.

Policy Making

The 2009 reform legislation was intended to accomplish many goals. One of the most important was to enable the Commonwealth to provide a consistent vision for the future of transportation among many agencies, a vision that would be reflected in MassDOT policies and agency actions. As would be expected in most major reorganizations, it often takes time for new procedures and decision-making processes to take hold. The MassDOT Board has gone through a learning curve, changes have been made, and the Board now must assert itself in developing and driving policy.

1. <u>The MassDOT Board should give more attention to strategic transportation policies and investment directions for the Commonwealth</u>.

Transportation board roles vary greatly from state to state. In the current environment, with transportation funding in crisis nationally and a newly organized agency wrestling with the problem in Massachusetts, the board can play a key role in expressing a vision for the agency, and then achieving buy-in for that vision with the important stakeholders and the public. In the past, the board has tended to set its sights on the details of particular projects and other lower-level concerns, and stakeholders complained that during legislative oversight hearings in 2009-10, board members failed to attend. Reforms instituted in recent months show promise of improvement. **The MassDOT Board should be seen as the primary policy-making forum for transportation issues in the Commonwealth, and board members should be clear that that is their charge.** With the Secretary now serving on the Board, there will be a closer linkage between policy makers and executive leadership. The legislature should consider strengthening this link by making the Secretary the board chair. Additionally, as the Secretary plays a strong policy and outreach role, MassDOT and

the board should consider formalizing a COO role for an executive who can participate in board meetings on issues relating to internal processes and accountability.

2. MassDOT should complete its work in adopting a performance-oriented management approach, based on a set of desired outcomes, performance measures and performance targets.

Performance-oriented management and policy making have been adopted by many state DOTs as the foundation for agency actions. Not only will such a set of policies let MassDOT employees know what their agency is attempting to accomplish, but it would also inform those outside of the agency of overall directions and progress being made. The most expansive example comes from WSDOT's "Gray Notebook," while other notable examples can be found in Michigan, Minnesota and Ohio. (Note that we hold these up as good, but not perfect examples, as the performance-based management is still an emerging field in transportation.) With MAP-21, the use of performance measures to guide investment decisions will likely become even more prevalent, perhaps a requirement for receiving federal funding. As noted above, MassDOT has made important strides in establishing a performance-oriented capability in the agency, with some MBTA and the Registry already tracking and reporting their progress. Its initial release of its agency-wide dashboard, still under development, shows promise. Some areas for continued development include:

1) Enterprise-wide measures, such as multimodal accessibility (or generalized travel costs), traveler fatalities, travel energy use and emissions, and financials.

2) Outcome measures in highways, such as crashes on highways other than I-90 and delays from construction, and bike-ped usage. DOTs have begun to move in this direction by, for example, trying to measure such issues as fatalities, traveler energy use, traveler emissions and economic development impacts from transportation.

3) Organization, prioritization and clarity. The current dashboard comprises a large number of measures that are of varying importance and only categorized by division. MassDOT could consider

Stable DOT Leadership

While several internal and external stakeholders pointed to executive turnover as a problem, others seemed to dismiss it. The SSTI team is in the former camp. One of the site visit team members, former PennDOT Secretary and AASHTO President Al Biehler, made major advances in policy and practice in his state, but only because he worked persistently on these reforms for eight years. In another agency known for modern transportation practice, the Washington DOT, former Secretary Douglas MacDonald (who previously worked at MassPort and became head of the Massachusetts Water Resource Authority in charge of a multibillion-dollar cleanup of Boston Harbor) served for six years, and his successor, current Secretary Paula Hammond, has served for six years. It is not a coincidence that WSDOT is the national leader in performance measures and among the leaders in demand-management through pricing. Michigan, known for its performance measures and asset management system, has been led by Secretary Kirk Steudle since 2006, under both Democratic and Republican governors. And in North Carolina, Secretary Gene Conti served from the beginning of the outgoing governor's term in 2009, using the four years to reform that state's highly politicized project selection process.

organizing the measures hierarchically, with enterprise-wide metrics first, then division measures, with customer-oriented outcome measures first, followed by internally-oriented output measures (e.g. number of employees taking training). Some measures may need better labeling or explanation, e.g. "Ensure that projects are trending on-budget at completion of construction."

MassDOT should make sure that the set of performance measures includes enterprise-wide measures; both output measures and outcome-oriented measures of importance to travelers, shippers, and communities; and clear purpose and organization.

For a multimodal agency such as MassDOT, an accessibility measure could serve as a top-level, enterprise-wide gauge that takes into account performance of multiple modes and land use proximity. The readily available WalkScore metric (which measures transit and bike accessibility, as well as walkability), could be employed and perhaps expanded to cover automobile travel as well. There has been some discussion of this measure in the Transportation and Climate Initiative, which includes Massachusetts and SSTI would be eager to assist. Measures should also include indicators to judge progress on innovative policy initiatives, such as GreenDOT and the Mode Shift Initiative; this work is now proceeding. Approval of key performance measures should be a function of the board, in pursuance of its role as the visionary entity. The board should review performance data as often as practicable; an online dashboard will allow both board members and others to progress continually. No less than yearly, the board should devote at least a full meeting to the performance data, to review progress and MassDOT's response to problems, and to reassess whether the measures and goals should be adjusted.

3. <u>In order to better respond to modern system-preservation demands, MassDOT should implement an agency-wide asset management system that maximizes the life of assets.</u>

As with most states, Massachusetts is facing a serious backlog in system rehabilitation and preservation needs at a level that will create significant demand on financial resources. Many states – most notably Florida, Michigan, Ohio, Oregon, and Utah – have invested heavily in asset management systems that lead to the most cost effective investment in the transportation system. The MBTA has a nationally recognized asset management program, but other divisions do not yet have any modern asset management systems, despite a legislative mandate. **MassDOT should accelerate efforts to develop a MassDOT-wide asset management system that will provide a strong foundation for an assessment of transportation infrastructure needs in the Commonwealth.** Such a system can also be a major contributor to scenario-based planning that can illustrate likely future states of infrastructure condition given different levels of investment (see below). As noted in the Observations section, the Michigan model relies on a large dedicated staff as well as data-gathering and other tasks distributed throughout the organization. MDOT devoted many years to developing the processes and infrastructure to run its system – according to a representative of another agency with a well-known asset management plan, in this field "it takes five years to be an overnight sensation" – so MassDOT stakeholders should realize that resources will be needed as the agency works to implement its system, which involves changing people, processes and technology. SSTI encourages MassDOT and its stakeholders to make use of Michigan's experience, perhaps through our Community of Practice, which MDOT's director attends.

The Push for Performance

The notion that transportation agencies should be accountable for certain measurable goals, particularly those related to outcomes for travelers and shippers, is fairly new. Traditionally, DOTs provided the infrastructure; while they tried to apply good planning and professional judgment in selecting and designing projects, they were rarely accountable in a systematic way for how that infrastructure functioned. But as the crisis in highway funding developed over the last 20 years, so has pressure to show efficacy. The new federal transportation law, 2012's MAP-21, formalizes this practice nationally, though the areas being measured are limited and the penalties for failing to perform uncertain.

State DOTs have made progress in adopting and using performance measures, but this progress has not always been linear. Some states simply started reporting data they already collected, whether it was important or not -- or even constructive; at least one state until recently used existing VMT data, setting a goal for increases, with the rationale that more VMT means more travelers were enjoying the use of highways.

Probably the best model for performance measures to date is the Washington State DOT "Gray Notebook." Begun in 2001 as a response to a series of financial and political emergencies, the "Gray Notebook" began as a quickly assembled, five-page summary of existing data (published with gray cover that became its title). Today the "Gray Notebook" is published quarterly and weighs in at about 100 pages of "performance journalism," including not only numbers but also explanatory text and charts, requiring both highly trained, dedicated staff but also time and resources from a many other agency personnel. The effort to track performance, born of crisis, helped to renew confidence in WSDOT. The legislature passed two gas tax increases after the notebook's introduction, and Secretary Paula Hammond reports that she is often able to address stakeholder concerns by referring to the document or to the unpublished data being collected for the notebook. But the data is useful internally as well. WSDOT had long sought to reduce the time it took to clear crashes from highways, but could not find a way to do so – until it looked at the data in a new way. Instead of focusing on the average time, WSDOT examined crashes that took much longer to clear, sometimes hours. New coordination methods with first responders helped reduce these lengthy crash incidents, cutting congestion and getting the agency closer to its overall clearance time goal.

No state, Washington included, has yet perfected performance measures for transportation. Too often these still focus on agency outputs that may or may not benefit travelers. MassDOT, for example, cites the example of being asked to count transit trips daily. An agency could make up for breakdowns at the peak but running empty trains at night, but this would be counterproductive. Moreover, we are aware of no agency adequately tracking accessibility, bringing together multiple modes and land use. MassDOT's current effort, if it addresses accessibility, could set a new standard for practice in this emerging area.

4. MassDOT needs to develop new strategies to better communicate with key constituencies.

MassDOT and the Secretary have made important new efforts to communicate with the public. But such broad, general outreach may not address the issues of key constituencies whose support is needed to make changes that meet the evolving needs of a state. Communication strategies, which both provide information about agency activities to stakeholders and also bring stakeholder concerns back to the agency, become key elements of the success of transportation policy. **Not having communication strategies for key constituent groups can lead to misunderstanding and misperceptions of what MassDOT is actually doing.** This was certainly the case with the business community representatives as it related to several topics. Better communication does not simply mean convening new advisory groups or stakeholder meetings. Rather it first requires better systems for gathering and presenting information, as described throughout these recommendations. If project- and system-level data are readily available, MassDOT will be able to demonstrate competence and progress without special convenings. The exemplary case again is WSDOT, where the secretary reports that the "Gray Notebook" makes it easy for her to respond to concerns of legislators and other stakeholders. Yet relations with key stakeholders need to be improved even as information systems improve. The business community, a necessary ally in improving transportation in Massachusetts as in other states, seems willing to be supportive but is concerned about agency performance. MassDOT should use this list of recommendations as the basis for meetings with representatives of the business community. Once MassDOT and these stakeholders agree on the priority issues, the agency should provide regular updates on progress. Finally, as discussed above, MassDOT's board should be a public voice for the agency's vision, in order to create understanding and buy-in.

5. MassDOT should continue to implement its GreenDOT policy, a comprehensive environmental responsibility and sustainability initiative, and examine ways to provide the resources for this to happen.

The GreenDOT policy, which will incorporate the Mode Shift Initiative, is one of the signature policies within MassDOT, and establishes an image of the agency that is responding effectively to the concerns of a range of constituencies. This policy establishes an important framework for agency actions and use of different strategies (e.g., technologies, see Program Delivery) that promotes a sustainable, efficient program delivery. It is an important foundation for the future of MassDOT, and indeed promises to help set a new course for the post-Interstate building era for the nation. MassDOT leadership is committed to implementing the policy as much as resources and other constraints will allow, and stakeholders should provide support – even if this means that some highway projects are right-sized or eliminated in the process. In addition, MassDOT is now considering reforming its transportation impact assessment and mitigation program, to incorporate TDM and location efficiency considerations and thereby to encourage more sustainable development. This is an important effort and should be implemented as part of GreenDOT.

6. MassDOT should continue to encourage the use of innovative strategies in delivering a 21st century transportation system by supporting an innovation culture within the agency.

There were many examples of innovation in MassDOT (e.g., solar panels on MassDOT property and passenger information apps for cell phones), and MassDOT's efforts to create a "MassDOT University" and to encourage new ideas generally are positive steps. Bureaucratic structures, however, do not often reward innovation. **MassDOT has taken steps to acknowledge innovation; we believe that MassDOT should now examine how undertaking innovative solutions to system problems should be rewarded.** Much revolves around the workforce. Ideally, talented rank and file employees would want to move into management, but today the front-line jobs are sometimes seen as preferable due to union protections, and managers are themselves moving into unions. Moves to reinstate merit pay raises should be helpful going forward, but MassDOT and its stakeholders should strive to make the agency an attractive place for talented people to work. A related issue is that union protection can be an impediment to innovation. Workforce issues can take us far beyond the scope of this review – and they may implicate structures and stakeholders far beyond MassDOT – but programs for retraining front-line workers for new jobs, such as those offered in the private sector by the Commonwealth Corporation, may be able to improve the agency's ability to shift work where needed.[1] Finally, MassDOT is not the only DOT with stringent restrictions on conference travel and other learning opportunities. In the SSTI team's experience, the agencies that permit the least travel tend to be insular and slower to change. MassDOT and its stakeholders should seek a more reasonable approach to staff travel.

[1] Transportation reform legislation of 2009 included retraining for workers affected by the act. Here we are concerned with maintaining an appropriately trained and deployed workforce going forward.

Such an effort would involve working with the unions' layoff aversion/rapid response teams to set up a training program that will prepare workers in obsolete positions for other agency positions. Recommended features of such training programs include:

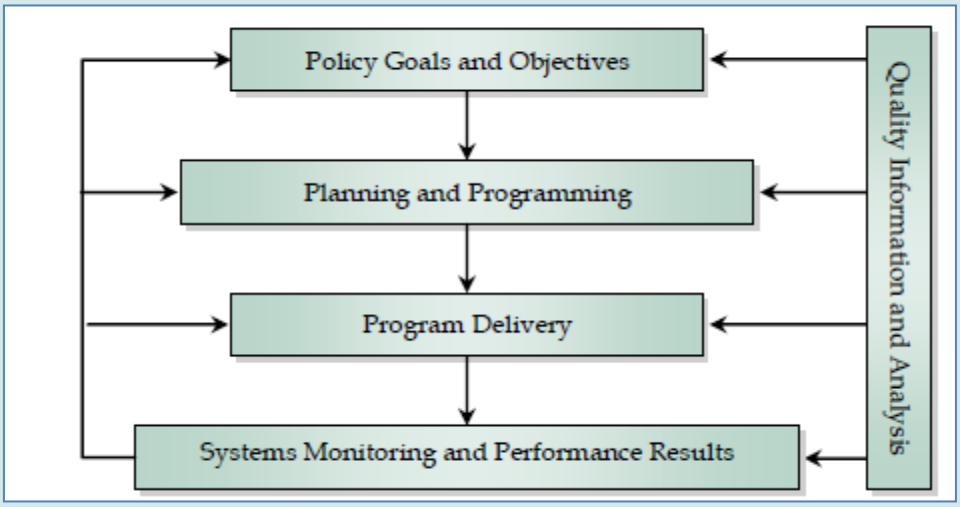
- Assessment of the skills and competencies associated with current positions.
- Identification of in-demand state jobs offering comparable wages, benefits and working conditions, and assessment of the skills required for those jobs.
- Outreach to transitioning workers regarding comparable opportunities with the state, and steps to qualify for those positions.
- Implementation of a training fund for transitioning workers to acquire state-recognized training for the identified positions. Efforts should be made to locate the training programs in a place that is conveniently located for workers, such as a union hall or job center. Training funds may allow payment of worker supports such as transportation and child care, in addition to expenses directly related to instruction (tuition, fees and materials).
- Coordination with the union, and state departments of labor and administration to ensure that workers maintain access to wage, healthcare and other social supports (e.g., union layoff or welfare funds, unemployment insurance, COBRA, and WIA/NEG or federal training dollars) during the transition to other state jobs.
- Assignment of preferential hiring status for successful graduates of the training, as demonstrated by a certification exam or other state-recognized assessment.

Michigan's Asset Management Approach

While MDOT's system in some ways is less complex than MassDOT's, lacking a big-city transit element, the agency's comprehensive approach to asset management -- going far beyond pavements and bridges to include assets such as airports, databases and even human capital -- is one of the leading examples among state DOTs. Director Kirk Steudle is a strong advocate for asset management, sharing his and his staff's time with peer agencies in pursuit of better practice.

According to an MDOT official, "the aim of our process is to maintain the initial investment in an asset by setting performance standards, monitoring facility condition and performance, and applying specific treatments at critical points to sustain or extend the facility's useful life." This process is run by 20 FTEs with input and collaboration agency-wide. Detailed descriptions of processes, databases and other elements of the system can be found in the report for NCHRP Project 20-68, "U.S. Domestic Scan Program: Best Practices in Transportation Asset Management" (2007), as well as materials on the MDOT website, including an in interactive introductory training program at http://mdotwas1.mdot.state.mi.us/public/asset_management_training/.

Figure 3: MDOT's Asset Management Process



Multimodal Transportation Planning

The purpose of multimodal transportation planning is to provide information on current needs across all modes and to outline future directions in meeting these needs. This often takes the form of investment plans and programs. Multimodalism can be fostered or hindered by the agency's revenue streams; see No. 14 for a related recommendation.

7. MassDOT should develop a comprehensive investment plan/program that in one place articulates the needs facing the Commonwealth, desired directions for system performance and the levels of investment necessary to achieve specified goals.

The MBTA develops a rolling five-year program of investment, but does not develop on a periodic basis a capital investment plan that outlines the investment needs for the system over a longer term, say 10 to 15 years. The Highway Division has a long list of backlogged projects, but many of these were conceived years ago and should be rethought. (See No. 9.) **A comprehensive investment plan/program for all of the modes under MassDOT's responsibility is an important component of developing public trust in the agency and in establishing credibility with those who one wants to support agency activities.** In this case, a comprehensive investment plan/program includes not only expected capital needs, but adopting a lifecycle perspective on infrastructure, leads also to estimates of funding levels for operating and maintaining the Commonwealth's transportation system. Such a system is described in the 2009 reform legislation.

8. MassDOT should use scenario analyses as part of the planning process to assess likely consequences of differing levels of financial support for infrastructure investment.

Scenario analysis, while a new addition to the federal transportation bill MAP-21, has been used for decades to assess the likely system outcomes of varying degrees of resource inputs. Thus, for example, scenario planning was used during the 1970s when it looked like the nation would be facing serious oil shortages; similar studies have been done today assuming different climate conditions. The most common approach is based on varying levels of transportation funding. **Such an approach (when combined with asset management systems) provides important information to decision makers on what will happen to the transportation system given (usually) inadequate levels of funding. Scenarios can also vary with land use outcomes, providing important policy links across agencies.** Scenario planning engages stakeholders and the general public, increasing transparency in project selection, corridor planning, and other decision-making. SSTI has worked with the Delaware DOT to develop a scenario planning tool based on off-the-shelf GIS and four-step demand modeling software, and DelDOT is now using it across the state both to consider transportation improvements but also to inform decisions of land use authorities. This tool could be adapted for Massachusetts if desired.

Program Delivery

Program delivery encompasses much more than the most visible element, construction. Program delivering includes selection and design of specific projects, tracking and reporting of progress and problems, and much more.

9. MassDOT should examine its project list and determine which projects cannot or should not be implemented. The agency should cancel or rethink those projects and focus resources on the most viable projects.

MassDOT has a tendency to begin a lot of projects for a variety of reasons, only to have many of the projects put on hold until funding becomes available. The result is a list of projects that far surpasses the amount of funding that will reasonably be expected to exist in the foreseeable future. There are currently $19 billion in projects on the list, in a state that delivers about $1 billion in projects

annually. This strategy is not unique among DOTs; it makes sense to have projects ready to go in the event that other projects are delayed or extra funding becomes available, as was the case with the American Recovery and Reinvestment Act of 2009. **However, in part due to earmarking, the MassDOT list seems unusually large, filled with highway projects conceived in an era before GreenDOT and moderating VMT – projects that may no longer be needed or that should be reconceived and redesigned.** Projects should be reviewed to determine whether they are still necessary, and if so, whether solutions, such as operational improvements, local street connectivity improvements, land use reforms or transit provision, might meet needs better than highway expansion. Going forward, as more modern paradigms such as GreenDOT and rigorous asset management take hold, MassDOT should look for better ways to rationalize project selection, and to review and reconsider pending projects periodically. Some stakeholders report a related perception, that MassDOT actually begins construction on too many projects at the same time, resulting in delays. MassDOT disputes this impression. The project reporting and performance management systems discussed elsewhere would be useful here, either in dismissing an erroneous impression or in bringing to light a real problem in need of management attention.

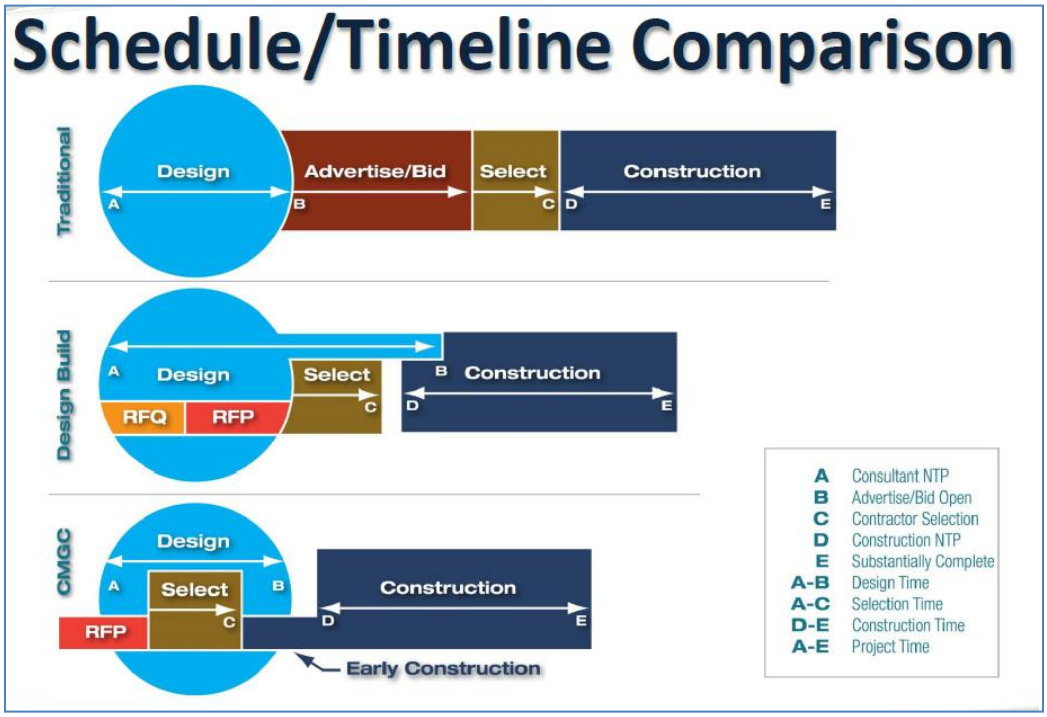
10. MassDOT should continue its development of a project information system to allow for easy and timely access to project information. This system should provide and early warning system for delayed projects.

See our key recommendation on page 15 above.

11. MassDOT should be allowed to use tools and techniques that have been proven to speed delivery of projects to deliver the agency's program.

The Accelerated Bridge Program is widely viewed as being successful in delivering projects throughout the Commonwealth. **Part of this success is due to the use of delivery mechanisms that were generally not allowed – for example, innovative procurement and payment to utility companies for utility work.** FHWA's "Every Day Counts," an effort to streamline projects, encourages the use of design/build and construction manager/general contractor in delivering projects (see chart), but Massachusetts law restricts these practices. In addition, state law permits partial reimbursement for utility work only for federal and ABP projects. The Administration has proposed allowing for a reimbursement – on a sliding scale depending on performance – for all projects. Stakeholders should support MassDOT as it attempts to employ innovative procurement and to incentivize utility work.

Figure 4: Accelerating Project Delivery



Source: FHWA.

12. MassDOT should develop a strategic plan for how technology can be used in both the delivery of services and on the transportation system.

State DOTs are not often the first to adopt new technologies that can provide a more efficient and effective program delivery, as well as improve the safety and operations of the transportation system. There are examples in MassDOT, e.g., the Registry of Motor Vehicles, where strides have been made in using technology to improve customer service. There are other examples where intelligent transportation systems (ITS) have been deployed on both the highway and transit system. **However, the SSTI team believes there are many more opportunities where technology applications could be used to enhance the performance of both the agency and the transportation system.** For example, emerging technologies in automatic sensing – such as pavement monitors that are mounted on DOT trucks to automatically collect pavement data – and other types of data collection, storage, analysis and dissemination hold much promise in delivering a modern transportation program. "Connected" vehicles provide another new frontier that will help lower infrastructure costs, if DOTs adapt, while improving safety and accessibility. To take advantage of these rapidly moving technologies, DOTs must have staff who are plugged into ITS conversations. As noted elsewhere, travel restrictions may have hampered MassDOT's ability to do so. Ideally, MassDOT would be represented at national and world ITS conferences. But a starting point for engagement, which involves minimal travel, would be to engage more deeply with the I-95 Corridor Coalition, a leading force in open-road tolling, travel data collection and traveler information systems.

Finance

As noted in the "Observations" section, the Commonwealth has relied on debt financing for its transportation investment much more than most states, and now has a large debt burden. Making recommendations on the form and substance on the Commonwealth's financing strategy is beyond the scope of this study. However, the SSTI team makes the following recommendation as it relates to the use of the funds.

13. MassDOT operations and maintenance staff that have been supported from bond funds since the 1990s should be moved onto the agency operating budget as soon as practicable.

The legislature required this change, and MassDOT leadership has been taking steps to do as recommended. However, moving appropriate staff completely out of the capital budget at this point would require draconian cuts. **The legislature is right to want this reform, but to be effective the mandate requires an adequate operating budget as well.**

Multimodalism in Maryland

The 2009 legislation and subsequent implementation put Massachusetts in the top ranks of states in terms of multimodal integration. But Maryland offers an example of an even more-well-integrated system:

- In contrast to the vestigial and confusing transportation funds in Massachusetts, Maryland uses an integrated multi-modal transportation fund. This approach is both simpler to administer and understand, and also allows for more unfettered multimodal planning.
- In contrast to Massachusetts, which left MassPort out of MassDOT, Maryland includes its port and airport in its integrated system. While there are some limitations on use of revenues – e.g. trust agreements with toll-road bondholders require toll proceeds to stay with the facility – the flexibility is important. Even airports, where airside revenues must generally stay with the facility, generate parking, concessions and other landside fees. And Maryland finds creative ways to integrate modes, as when the Maryland Transportation Authority (the toll road operator) issued revenue bonds to finance a large rental car facility at BWI airport – bonds that are being repaid with customer facility charges levied by the airport.

14. The legislature should move further toward an integrated transportation system by removing barriers between modal funding sources.

Maryland's multimodal system was a model for reform legislation, but Massachusetts stopped short of that mark, leaving confusing vestiges of the previous system. The two transportation funds, between which funding moves back and forth, are confusing and may raise distrust with stakeholders while erecting modal barriers that prevent optimization across modes. **In Maryland, proceeds related to various modes go to a single transportation trust fund.** In another contrast to Massachusetts, Maryland includes the port and airport in its multimodal system. These facilities depend on roads and transit to function, so it is fitting and proper that they be part of the larger system. If pursued in Massachusetts, such a consolidation would not solve the post-Interstate era funding crisis, which is much larger than MassPort, but it might advance the cause of multimodalism and coordination that was one of the motivations for the 2009 legislation, allowing for win-win efforts such as those described in the Maryland sidebar below.

Appendix A: Interview Subjects[2]

Jim Aloisi, former Executive Office of Transportation Secretary
Andy Bagley, Massachusetts Taxpayers Foundation
Rachel Bain, MassDOT Office of Performance Management & Innovation
Dave Begelfer, NAIOP
Eric Bourassa, Boston Region Metropolitan Planning Organization
Andrew Brennan, MBTA Director of Environmental Affairs
Tim Brennan, Pioneer Valley Planning Commission
J.D. Chesloff, Massachusetts Business Roundtable
Bernard Cohen, Former Executive Office of Transportation Secretary
Jeff Ciuffreda, Springfield Chamber of Commerce
Frank DePaola, MassDOT Highway Division Administrator
Erin Deveney, Chief of Staff, MassDOT Registry of Motor Vehicles
Rick Dimino, A Better City
Tom Donald, MassDOT Director Bridge Project Development
Thom Dugan, MassDOT Deputy Chief of Staff
Peter Forman, South Shore Chamber of Commerce
Abbie Goodman, American Council of Engineering Companies of Massachusetts
Chris Kealey, Massachusetts Business Roundtable
Jim Klocke, Greater Boston Chamber of Commerce
Joanne Lao, Massachusetts Competitive Partnership
Rick Lord, Associated Industries of Massachusetts
Alan Macdonald, Hallmark Health Systems, Past Executive Director Massachusetts Business Roundtable
Paul Matthews, 495/Metro West Partnership
Sen. Thomas McGee
David Mohler, Executive Director, MassDOT Office of Transportation Planning
Jeff Mullan, Former MassDOT Secretary
David Naderson, Deputy Chief Engineer for Design, MassDOT Highway Division
Dan O'Connell, Massachusetts Competitive Partnership
Jeanette Orsino, Massachusetts Association of Regional Transit Authorities
Rich Parr, A Better City
Charles Planck, MBTA Senior Director of Strategic Initiatives
Stephanie Pollack, Northeastern University
John Pourbaix, Construction Industries of Massachusetts
Paul Regan, MBTA Advisory Board
John Roberston, Massachusetts Municipal Association
Josh Robin, MBTA Director of Innovation
Bob Ross, Chief Policy Advisor for Sen. Therese Murray
Mary Runkel, MBTA Budget Chief
Tamara Small, NAIOP
Steve Silveira, Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
Mary Skelton Roberts, Barr Foundation

[2] Includes persons interviewed in person, by phone and/or as part of a meeting hosted by the Massachusetts Taxpayers Foundation and Massachusetts Business Roundtable.

Rep. William Strauss
Peter Welsh, Suffolk Construction
Steve Weolefel, Director of Strategic Planning, MassDOT Office of Transportation Planning
Michael Widmer, Massachusetts Taxpayers Foundation
Chris Willenborg, MassDOT Aeronautics Division Administrator

Appendix B: Documents Reviewed by SSTI

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