



## Implementing Efficiencies as Part of an Investment Strategy

*Requested by*  
Coco Briseno, Office of the Director

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# Executive Summary

## Background

California Senate Bill 1 (SB-1), the Road Repair and Accountability Act of 2017, was signed into law on April 28, 2017. SB-1 invests \$54 billion over the next decade to fund deferred maintenance on the state highway system and local streets and roads, and to improve the state's trade corridors, transit and active transportation facilities. SB-1 emphasizes additional oversight and establishes accountability requirements to ensure funds are spent appropriately, and includes measures to ensure the funds are not used for nontransportation purposes. SB-1 also requires Caltrans to implement efficiency measures with the goal of generating at least \$100 million annually in savings to redirect toward maintaining and rehabilitating the state's highways.

To inform its efforts to address the requirements of SB-1, Caltrans is interested in learning about best practices and experiences of other state departments of transportation (DOTs) in implementing efficiencies as part of an investment strategy. To assist in this effort, CTC & Associates conducted a literature search to gather information in these topic areas:

- Best practices to quantify efficiencies, apply performance measures and implement accountability practices across all modes and in a broad range of areas.
- Methods to track and report results of these practices at the project and program levels.
- State DOT efficiency-related practices and programs, including relevant documents.

## Summary of Findings

### **State Practices**

The table below provides brief descriptions of the efforts of six state DOTs (Colorado, Minnesota, Missouri, Utah, Washington and Wisconsin) to quantify efficiencies, apply performance measures or implement accountability practices. The column labeled "For More Information" provides the page number where a discussion of each practice begins in this report.

<b>State Practices to Implement and Track Efficiencies</b>			
<b>State DOT</b>	<b>Practice</b>	<b>Description</b>	<b>For More Information</b>
<b>Colorado</b>	<b>Lean Process Improvement</b>	Since 2011, Colorado has applied its Lean process improvement strategies in all state agencies, counting efficiencies as one-time savings in the year they are developed.	7
	<b>Efficiency and Accountability Committee</b>	A 2009 legislative directive created this committee to identify efficiencies to allow for increased investments in the transportation system.	8
<b>Minnesota</b>	<b>Evaluating Efficiencies</b>	A 2016 Minnesota DOT report on expenditures and efficiencies associated with major highway projects recommends an approach for identifying efficiencies.	9

## State Practices to Implement and Track Efficiencies

State DOT	Practice	Description	For More Information
Minnesota	<b>Evaluating Efficiencies</b>	The approach adopted—best practice case-analysis—is similar to practices used by Florida, Missouri and Utah DOTs. The 2016 report describes results of an efficiency analysis of 21 best practice areas.	9
	<b>Productivity Measures</b>	A limited set of productivity measures, also identified in the 2016 report highlighted above, will supplement the more traditional performance measures already in use by the agency.	10
	<b>Measuring Performance</b>	An extensive set of performance measures are used to measure progress toward agency goals.	11
Missouri	<b>Measuring Performance</b>	First published in 2005, the agency’s Tracker publication examines performance in seven areas of tangible results. Most measures do not appear to be correlated to cost savings.	12
	<b>Practical Design</b>	In 2005, the agency also implemented practical design, which employs a more flexible approach to design that provides the best value for the least cost.	13
Utah	<b>Reporting on Innovation and Efficiencies</b>	The agency’s first annual report of innovations and efficiencies was published in 2006. This report is based on employee submissions selected by agency leadership for further analysis and recommended for adoption.	13
	<b>Analyzing Assets</b>	Two recent asset-related studies addressed cost savings: <ul style="list-style-type: none"> <li>• A 2015 project developed a plan of action to improve the agency’s strategic asset management capabilities to ensure the sustainability of cost savings in the near and short terms.</li> <li>• A 2013 study examined revenue and cost efficiency opportunities in connection with a wide range of the agency’s nonmonetary assets.</li> </ul>	14
	<b>Measuring Performance</b>	In 2013, the Governor’s Office of Management and Budget developed the SUCCESS Framework to measure performance and reduce costs across state agencies. The framework includes a performance equation and reporting tools.	15

<b>State Practices to Implement and Track Efficiencies</b>			
<b>State DOT</b>	<b>Practice</b>	<b>Description</b>	<b>For More Information</b>
<b>Utah</b>	<b>Practical Design</b>	The agency implemented practical design in 2011, citing cost savings achieved by other state DOTs.	18
<b>Washington</b>	<b>Measuring Performance</b>	The agency has a long record of monitoring and reporting on performance through its Gray Notebook, a quarterly report of performance and accountability that was first published in 2001.	19
	<b>Results Washington (Lean)</b>	The state DOT participates in the statewide Results Washington initiative launched by the governor's executive order in 2013. The initiative is based on Lean thinking and tools.	19
	<b>Evaluating Efficiencies</b>	A 2013 legislative directive led to a series of recommendations for potential actions to increase efficiencies.	20
<b>Wisconsin</b>	<b>Measuring Performance</b>	Mobility, Accountability, Preservation, Safety and Service (MAPSS) is Wisconsin DOT's program to examine performance measures in the five key areas identified in the program's name.	21
	<b>Lean Six Sigma</b>	The agency employs the Lean Six Sigma process, which includes the five phases of define, measure, analyze, improve and control, to improve processes and generate project savings. Savings in dollars and staff hours are redirected to other department activities and priorities.	22

Michigan and Wyoming DOTs also track efficiencies and have reported on the resulting cost savings. A 2015 Caltrans Preliminary Investigation examines the practices of multiple states with regard to design innovations, including practical design.

**National Guidance**

Performance management is addressed in a 2015 NCHRP report and online portal that was developed to identify challenges and opportunities associated with a national-level approach to performance management. The portal provides a range of guidance, including a toolbox with examples of target setting, performance-based planning and programming, and data management and analysis.

Other publications examine innovative and effective practices to track efficiencies and generate cost savings, including:

- A 2012 handbook published by Smart Growth America and the State Smart Transportation Initiative organizes 31 innovative approaches in eight focus areas. Each approach includes a description of the innovation and how it has been implemented, followed by case studies illustrating application of the innovative practice.

- Streamlined methods for meeting federal funding requirements for small-scale highway projects are documented in a 2011 NCHRP synthesis report. Also published in 2011, an NCHRP Research Results Digest examines performance measures and performance management approaches that can be used by state DOTs in connection with public transportation programs.
- An NCHRP report published in 2011 sought to identify best practices associated with construction schedules and budget performance. Study results include a user-friendly web database that the 39 state DOTs participating in the project can use to review their results.
- A 2010 NCHRP report examines state DOT practices that accelerate transportation project and program delivery.
- Best practices in project delivery management are identified through observations and interviews with representatives from six DOTs participating in a 2009 domestic scan—Arizona, Florida, Missouri, Utah, Virginia and Washington.
- The authors of a 2007 book “present a proven set of methodologies for evaluating transportation projects that ensures that all costs and impacts are taken into consideration.”

## **Gaps in Findings**

Given the breadth of the information available and the limited scope of a Preliminary Investigation, the results presented in this report are only a sampling of the practices employed to implement, track and quantify efficiencies in the management of state transportation programs and program funding.

While we found that most agencies provide a significant level of detail about their efficiency-related practices in publicly available resources, the state DOTs highlighted in this report may have additional guidance to share that is not available through agency web sites.

## **Next Steps**

Moving forward, Caltrans could consider:

- Discussing the implementation of Lean process improvement practices with Colorado, Washington State and Wisconsin DOTs, and the impact of these efforts on cost savings.
- Reviewing in detail the 2016 Minnesota DOT report that described the agency’s estimated cost savings and how they were achieved using a more targeted approach to identify and quantify efficiencies.
- Consulting with Missouri and Utah DOTs to review the benefits, including cost savings, associated with the agencies’ application of practical design.
- Contacting Minnesota, Missouri, Washington State and Wisconsin DOTs to discuss the agencies’ performance measurement systems, and how performance measurement can translate to cost savings.
- Consulting with Utah DOT to learn more about:
  - The SUCCESS Framework and use of a formalized performance equation.
  - The agency’s asset analyses and the cost savings or revenues that are expected to be derived from the assets.

## Detailed Findings

State departments of transportation (DOTs) and other transportation agencies across the country are actively monitoring and assessing transportation system efficiencies by evaluating and measuring performance, identifying efficiencies and documenting cost savings. The results of these activities are then presented to internal stakeholders and the public through online dashboards, case studies and reports.

Caltrans is interested in learning about best practices and experiences of other state DOTs in implementing efficiencies as part of an investment strategy. To assist in this effort, CTC & Associates conducted a literature search to gather information in these topic areas:

- Best practices to quantify efficiencies, apply performance measures and implement accountability practices across all modes and in a broad range of areas.
- Methods to track and report results of these practices at the project and program levels.
- State DOT efficiency-related practices and programs, including relevant documents.

Given the breadth of the information available about these activities and the limited scope of a Preliminary Investigation, the results of the literature search presented below provide only a sampling of the state practices and national guidance that illustrate efforts to implement, track and quantify efficiencies in the management of state transportation programs and program funding. Publications and related resources are organized in two categories:

- State Practices.
- National Guidance.

### State Practices

The table below highlights the efforts of six state DOTs (Colorado, Minnesota, Missouri, Utah, Washington and Wisconsin) to quantify efficiencies, apply performance measures or implement accountability practices. Following the table is a more detailed summary of each practice by state. (See the column labeled “For More Information” for the page number where the detailed discussion of each state practice begins in this Preliminary Investigation.)

<b>State Practices to Implement and Track Efficiencies</b>		
<b>State DOT</b>	<b>Practice</b>	<b>For More Information</b>
<b>Colorado</b>	Lean Process Improvement	7
	Efficiency and Accountability Committee	8
<b>Minnesota</b>	Evaluating Efficiencies	9
	Productivity Measures	10
	Measuring Performance	11
<b>Missouri</b>	Measuring Performance	12

<b>State Practices to Implement and Track Efficiencies</b>		
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<b>Missouri</b>	Practical Design	13
<b>Utah</b>	Reporting on Innovation and Efficiencies	13
	Analyzing Assets	14
	Measuring Performance	15
	Practical Design	18
<b>Washington</b>	Measuring Performance	19
	Results Washington (Lean)	19
	Evaluating Efficiencies	20
<b>Wisconsin</b>	Measuring Performance	21
	Lean Six Sigma	22

In addition to these six states, we briefly highlight activities in Michigan and Wyoming that track efficiencies and identify the resulting cost savings. We also cite a 2015 Caltrans report that examines the practices of multiple states with regard to design innovations, including practical design.

## **Colorado**

Colorado is among the many states using Lean process improvement practices and tools to identify, assess and improve efficiencies. (Lean is a system for continuous process improvement developed initially for use in industrial production settings. Lean processes in Utah, Washington and Wisconsin are also highlighted in this Preliminary Investigation.)

Lean is applied throughout the state DOT and in other Colorado state agencies. The Colorado Office of State Planning and Budgeting notes that its nationwide survey indicated “Colorado had more Lean projects underway than any other state during the period measured. The Lean program has supported agencies in eliminating waste within their processes and providing an ideal customer experience.”

### **Lean Process Improvement**

Colorado DOT participated in a 2014 Minnesota DOT project that examined the state of practice for defining and documenting transportation efficiencies (see page 10 for more information about the report produced for this project). In the Minnesota DOT report, the Colorado DOT director of process improvement noted that cost savings from efficiencies identified through the application of Lean processes are considered one-time savings in the year the efficiency is developed and become standard practice in subsequent years.

*Related Resources:*

**Process Improvement at CDOT: A Quick Summary**, Colorado Department of Transportation, November 2013.

[https://www.codot.gov/business/process-improvement/summary-of-results-from-cdot-improvements/summary-of-results-from-improvement-efforts-11-1-2013/at\\_download/file](https://www.codot.gov/business/process-improvement/summary-of-results-from-cdot-improvements/summary-of-results-from-improvement-efforts-11-1-2013/at_download/file)

This report provides results of Lean-related efforts several years after the 2011 announcement of the statewide Lean initiative. The report describes cross-functional process improvements, localized process improvements, everyday ideas and efforts to track employee engagement in improvement activities.

**Information 3: Lean Process Improvement Tools and Techniques**, Colorado Department of Transportation, undated.

<https://www.codot.gov/business/process-improvement/tools-and-techniques>

The web site provides links for documents associated with Lean process improvements, including an evaluation and implementation tool and a template for the Lean problem-solving process. Guidance for managers is provided on:

- Performance and process measurement.
- Engaging employees.
- Communicating about change.
- Developing output, customer and process metrics.
- Local process improvement.
- Improving the functionality of a form.
- Process mapping.
- Project selection assessment.
- Benchmarking.

### **Efficiency and Accountability Committee**

In 2009, the Colorado Legislature created the Efficiency and Accountability Committee to assist Colorado DOT in identifying efficiencies that would allow for increased investments in the transportation system. The most recent annual report describes the committee's efforts in 2012.

*Related Resources:*

**Efficiency and Accountability Committee**, Colorado Department of Transportation, undated.

<https://www.codot.gov/about/committees/efficiency-and-accountability-committee/>

This web site provides access to meeting minutes, reports and other documents associated with the agency's Efficiency and Accountability Committee. The committee does not appear to be active.



**2012 Annual Report**, Standing Committee on Efficiency and Accountability, Colorado Department of Transportation, undated.

[https://www.codot.gov/library/AnnualReports/2012-efficiency-accountability-annual-report/at\\_download/file](https://www.codot.gov/library/AnnualReports/2012-efficiency-accountability-annual-report/at_download/file)

*From the report:*

In 2009, the [L]egislature created the Standing Efficiency and Accountability Committee within section 43-1-106(17), CRS [Colorado Revised Statutes]. The Committee was formed as a part of the Funding Advancement for Surface Transportation and Economic Recovery (FASTER) Act to assist CDOT in finding ways “to maximize efficiency of the Department and to allow for increased investment in the transportation system over the short, medium, and long term.” Transparency is a key focus for the Colorado Department of Transportation (CDOT) and this report is part of CDOT’s efforts to enhance transparency.

While the report addresses a wide range of programs or activities that could be targeted for potential efficiencies (from precontract award authority to performance measurements and the agency’s contract improvement initiative), detailed descriptions of specific cost savings are not provided.

## **Minnesota**

Minnesota DOT supplements its use of traditional performance measures with a process to evaluate efficiencies and separate measures of productivity. A 2014 synthesis report examining the state of practice for defining, demonstrating and documenting transportation efficiencies may have informed the agency’s development of these measures.

### **Evaluating Efficiencies**

The 2016 report below describes Minnesota DOT’s approach to identifying and quantifying efficiencies in major highway projects and expenditures. The authors note that three states—Florida, Missouri and Utah—are reporting overall efficiencies in a manner similar to the one chosen by Minnesota. This approach, which highlights examples of efficiencies on a case-by-case basis, is described in more detail in the report cited below.

Minnesota DOT’s approach in measuring efficiency is conservative as compared to other states “by only tracking savings that are directly attributed to deliberate decisions in planning, project management and delivery that advance efficient outcomes. Although external market forces can have an impact on MnDOT’s ability to stretch each dollar further, the agency is not counting savings that can be attributed to external market forces in this analysis.”

*Related Resources:*

**Report on Major Highway Projects, Trunk Highway Fund Expenditures and Efficiencies**, Minnesota Department of Transportation, December 2016.

<http://www.dot.state.mn.us/govrel/reports/2017/mhpr-report.pdf>

A detailed discussion of efficiencies begins on page 57 of the report, including this background:

Starting in 2015, the department decided to take a more targeted approach to identify and quantify these efficiencies, while looking for additional best practices and

improvements. In fiscal year 2016, MnDOT identified an estimated \$71 million in savings from new and revised practices deployed across the organization. Including fiscal year 2015 savings, MnDOT achieved an estimated \$134 million in saving from these practices over the previous two fiscal years. The majority of these efficiencies identified in FY 2016 came from construction program delivery and project development. Savings identified in the analysis led to program and project costs that were lower than if the efficient strategies had not been implemented.

Minnesota DOT's approach to measuring efficiency is described on page 58 of the report:

MnDOT used a best practice case-analysis approach to evaluate and measure efficiency. Best practice evaluation reviews dimensions of efficiency in quality, time and cost. It analyzes what has worked, why it has worked, in what conditions it has worked, and how it may work in the future. MnDOT analyzed each case for implementation of cost saving strategies, designs and processes. Efficiencies were determined by evaluation against the sample of cases across the state. Best cases were determined by comparison of the standard approaches being employed.

The report describes the agency's efficiency analysis of state road construction practices at the project level; program-level analyses were conducted for practices and activities related to administration, maintenance and operation. The report describes 21 best practice areas that were examined in the efficiency analysis.

**State of Practice for Defining, Demonstrating and Documenting Transportation Efficiencies**, *Transportation Research Synthesis*, Office of Policy Analysis, Research and Innovation, Minnesota Department of Transportation, June 2014.

<http://www.dot.state.mn.us/research/TRS/2014/TRS1410.pdf>

This research synthesis used a survey of state DOTs and follow-up interviews to examine agency practices for demonstrating and tracking cost savings through efficiencies. Twelve DOTs responded to the survey; seven of those agencies—Arizona, Colorado, Florida, Georgia, Missouri, New Jersey and Utah—were selected to participate in follow-up interviews. The report presents survey results and summaries of the follow-up interviews; appendices provide detailed examples of cost savings achieved from the efficiencies described by respondents.

## **Productivity Measures**

A 2016 report presents a set of productivity measures designed to help Minnesota DOT “evaluate how efficiently MnDOT’s products and services are delivered.” This type of measure is contrasted with traditional performance measures, in use by MnDOT since the 1990s, that are “measures of product and service delivery effectiveness.”

*Related Resource:*

**Report on Major Highway Projects, Trunk Highway Fund Expenditures and Efficiencies**, Minnesota Department of Transportation, December 2016.

<http://www.dot.state.mn.us/govrel/reports/2017/mhpr-report.pdf>

*From the introduction:*

The first legislative report on Major Highway Projects was delivered by the Minnesota Department of Transportation to the [L]egislature in January 2009. ... This is one of MnDOT's most comprehensive reports. The purpose of the report is to provide the

reader with information about major projects, financial management, budgeting by products and services, and efficiencies achieved.

Productivity measures are provided for:

- Bridges:
  - Inspection cost per square foot of deck area.
  - Maintenance cost per square foot of deck area.
- Pavement: Cost per roadway mile-year added. (Mile-years are defined as the number of miles of roadway that receive treatment in a given year multiplied by the design life (in years) of that treatment.)
- Snow and ice: Cost per plow mile driven.
- Pavement markings: Cost per mile striped.
- Transit: Minnesota DOT administrative cost per transit passenger trip.
- Freight: Minnesota DOT cost per oversize/overweight permit issued.
- Program planning and delivery to construction expenditure ratio.

## Measuring Performance

Like many state DOTs, Minnesota DOT tracks and reports on performance measures. The 2015 report cited below is the seventh annual report produced by the agency.

*Related Resources:*

**Performance Measure and Target Adoption**, Minnesota Department of Transportation, 2017.

<http://www.dot.state.mn.us/policy/admin/ad006.html>

This web site provides the agency's policy for establishing performance measures, procedures, forms and instructions, and frequently asked questions. As the site indicates, the agency's performance measures are used to:

- Measure progress toward goals or objectives identified in the Statewide Multimodal Transportation Plan or another statewide transportation plan.
- Guide investment on the state highway system or the development or improvement of a modal system.
- Assess the effectiveness or efficiency of Minnesota DOT products and services.

**Annual Minnesota Transportation Performance Report: 2015**, Minnesota Department of Transportation, October 2016.

<https://www.dot.state.mn.us/measures/pdf/12-2%20publicationsmall.pdf>

This report of system performance includes a 2015 Minnesota Transportation Results Scorecard beginning on page 5 of the report (page 10 of the PDF). The scorecard presents results for performance measures in five areas—accountability, transparency and communication; traveler safety; transportation in context; state highway asset management; and critical connections.

## **Missouri**

Missouri DOT's Tracker, a periodic report that associates performance metrics with tangible results, is described in a 2013 Federal Highway Administration (FHWA) publication as ensuring "efficient and effective decision-making." Many of these efficiencies appear to be focused on benefits that are not translated to cost savings. In another efficiency-related effort, the agency's emphasis on practical design allows for flexibility to "produce the best value for the least cost."

### **Measuring Performance**

Missouri DOT published its first edition of Tracker in January 2005. This report of performance is built around seven types of "tangible results." Outcome-based performance management, benchmarking with past performance, the practices of peer state DOTs and feedback from industry leaders are measures used to assess agency performance.

#### *Related Resources:*

**MoDOT Tracker: Measures of Performance**, Missouri Department of Transportation, 2017.

<http://www.modot.org/about/Tracker.htm>

This web site provides access to the current edition of the Tracker publication in individual chapters (one for each type of tangible result):

- Keep customers and ourselves safe.
- Keep roads and bridges in good condition.
- Provide outstanding customer service.
- Deliver transportation solutions of great value.
- Operate a reliable and convenient transportation system.
- Use resources wisely.
- Advance economic development.

Each chapter includes measures related to its specific topic area, with a description of the measure's purpose and how data is collected and measured. Charts show how data is trending and whether the agency is meeting targets. While most measures do not identify cost savings, savings have been realized through the agency's value engineering program (see Deliver Transportation Solutions of Great Value), and the use of recycled material (see Use Resources Wisely).

**"Missouri's Performance Tracker: Flexibility and Accountability,"** *FHWA Transportation Performance Management: TPM Noteworthy Practice Series*, Federal Highway Administration, 2013.

<https://www.fhwa.dot.gov/tpm/noteworthy/mo2013.pdf>

This FHWA document offers background information about Missouri DOT's Tracker and summarizes results to date. Improvements in customer satisfaction and increases in highway condition ratings are cited but not specific cost savings.

## Practical Design

In 2005, Missouri DOT implemented practical design, a more flexible approach to design that has the goal “to produce the best value for the least cost. Life cycle costs must be considered so the burden is not shifted to maintenance.” Interviewed for a 2014 Minnesota DOT Transportation Research Synthesis, Missouri DOT staff noted that cost savings from efficiencies are evaluated as one-time savings, with the assumption that the efficiency becomes standard practice in subsequent years and is folded into the agency’s larger application of practical design.

### *Related Resources:*

**Category: 143 Practical Design**, Engineering Policy Guide, Missouri Department of Transportation, April 2017.

[http://epg.modot.org/index.php?title=Category:143 Practical Design](http://epg.modot.org/index.php?title=Category:143_Practical_Design)

*From the introduction:*

Practical Design defines the scope by focusing on achieving the project purpose and need while considering the surroundings of each project. It encourages sensitivity to where the project is located, whether it is an interstate or a letter route and allows the surrounding context to help determine the design criteria. Practical Design’s goal is to produce the best value for the least cost. Life cycle costs must be considered so the burden is not shifted to maintenance.

MoDOT identified the small percentage of its standards that accounted for the vast majority of its expenditures. Those standards were studied and rewritten with greater flexibility, allowing for more innovation on the part of designers. Even with the greater flexibility, standards in the practical design system function as a starting point for project decisions, rather than a destination. The real project decisions are based entirely on the purpose and need of the facility as well as its context.

**Practical Design: Implementation**, Missouri Department of Transportation, undated.

<http://www.modot.org/business/documents/PracticalDesignImplementation.pdf>

This web site provides access to the agency’s manual for implementing practical design.

## Utah

Utah DOT takes a multipronged approach to encourage efficiencies and effective use of agency assets. Efforts include:

- Reporting on innovation and efficiencies.
- Analyzing assets.
- Measuring performance.
- Practical design.

## **Reporting on Innovation and Efficiencies**

The first annual report documenting agency innovation and efficiencies was published in 2006. Produced every year since then, the now-titled Innovation and Efficiencies Report summarizes the efficiencies and innovations described by Utah DOT employees who submit fact sheets each year that describe efficiencies and innovations, or the implementation of a TRB idea or

SUCCESS Framework initiative. (See **Measuring Performance** below for more information about the SUCCESS Framework.) Agency leadership reviews the submissions and selects topics to be highlighted in the annual report. The final report is shared with employees, key stakeholders, industry partners and the public.

*Related Resource:*

**Innovation and Efficiencies Report: 2016**, Utah Department of Transportation, 2017.

<https://www.udot.utah.gov/main/uconowner.qf?n=33555910653502116>

This is the most current version of the agency's report of innovations and efficiencies. Projects or innovative efforts are organized into five categories (technology, construction, community, engineering and maintenance). The report uses five "tags" (efficiency, innovation, mobility, quality and safety) within each project description and includes a link to additional information about a specific project. Previous annual reports are available at <http://www.udot.utah.gov/main/f?p=100:pg:::1:T,V:4850>.

## Analyzing Assets

Utah DOT undertook two projects to identify cost savings and revenue generation opportunities. A 2015 project developed a plan of action to improve the agency's strategic asset management capabilities to ensure the sustainability of cost savings in the short and long terms. A previous study, completed in 2013, examined revenue and cost-efficiency opportunities in connection with a wide range of the agency's nonmonetary assets.

*Related Resources:*

**Asset Management: Current Assessment, Strategic Vision and Improvement Opportunities**, Utah Department of Transportation, February 2015.

<https://www.udot.utah.gov/main/uconowner.qf?n=28619609575766329>

This goal of this project was to develop a plan of action for improving the agency's strategic asset management capabilities to allow for cost savings over the near and long terms.

Recommendations to improve the agency's asset management program follow:

- Review performance measures and level of service targets.
- Implement field activity feedback loops.
- Expand current risk matrix into organizational risk framework.
- Dashboard reporting (financial, technical and operational).
- Data/document strategy and governance plan.
- Integrate long-range planning with the State Transportation Improvement Program.
- Life cycle cost approach for nonpavement assets (improving bridge, roadside, fleet, facilities).
- Organizational "values matrix" for optimized asset management decision-making.
- Asset management maturity strategy by asset class.

**Asset Opportunities Study**, Utah Department of Transportation, November 2013.

<http://www.udot.utah.gov/main/uconowner.qf?n=28688911621334850>

This project sought to "identify and analyze revenue and cost efficiency opportunities" within Utah DOT's nonmonetary assets. The asset opportunities analysis and assessment included the following:

- Comparison of selected Utah DOT practices with national and international leading practices to identify opportunities for significant cost savings and revenue generation.
- Identification of 22 assets as opportunities, selecting 11 that could meet Utah DOT's target revenue or cost savings threshold of \$500,000.
- Identification of revenue and cost-efficiency opportunities in three major asset groups:
  - **Core DOT operations.** Provides the most significant revenue generation or cost savings opportunities; includes asset management, performance-based bundling of highway maintenance contracts and fleet maintenance.
  - **Alternative revenue sources.** Includes six assets in order of "value potential": naming rights, 511 systems, commercialization of rest areas, advertising, traffic operations center and freeway service patrol.
  - **Real estate.** Includes revenue opportunities associated with cell towers, licensing and facilities management.

A table on page 6 of the report (page 8 of the PDF) provides cost savings/revenue generation estimates for all 22 assets examined in the report. The table on the following page ranks the 11 asset opportunities recommended by the authors by dollar value and level of complexity to reach implementation.

An appendix (beginning on page 25 of the report, page 27 of the PDF) provides information supporting the report's analysis of 16 of the 22 assets examined in the report, including annual revenue or cost savings associated with other agencies' application of the recommended strategies:

- |   |   |
|---|---|
| • Commercialization of rest areas.                                    | • Highway operations and maintenance concessions. |
| • Naming rights.  | • Highway lighting.                               |
| • Freeway service patrol.   | • Excess lands.                                   |
| • 511 systems.  | • Occupations/encroachments.                      |
| • Express lanes public/private partnerships and tolling operations.   | • Licensing.                                      |
| • Asset management.   | • Cell towers.                                    |
| • Fleet maintenance (outsourcing maintenance, equipment utilization). | • Facilities management.                          |
| • Operations and maintenance bridge bundling.                         | • Parking.  |

The authors recommend investigation of partnering options, benchmarks, timelines and schedules, and identification of risks and rewards as the next stage of this analysis.

## Measuring Performance

In 2013, the Governor's Office of Management and Budget (GOMB) developed the SUCCESS Framework to "help agencies improve quality, reduce costs and create the capacity to do more with the same or fewer resources (improved throughput). The specific charge from the Governor is to realize a 25 percent improvement in state government operations by January 2017.

Fundamental to this framework is a measurement approach that attempts to address all of the challenges inherent in the existing measurement systems.”

*Related Resources:*

**Operational Excellence**, Governor’s Office of Management and Budget, State of Utah, 2017.

<https://gomb.utah.gov/operational-excellence/>

This web site offers access to resources related to Utah’s SUCCESS program, including an overview of the program, results and reporting.

**“Budget and Policy Brief: Transportation,”** *Cultivating Utah’s Economic Prosperity and Quality of Life: Budget Recommendations, Fiscal Year 2018-Fiscal Year 2017 Supplementals*, Gov. Gary R. Herbert, State of Utah, 2016.

<https://gomb.utah.gov/wp-content/uploads/sites/7/2016/12/FY-2018-Governors-Budget-Recommendations.pdf>

This policy brief begins on page 71 of the report (page 75 of the PDF) and includes a discussion of the SUCCESS Framework and its application to Utah DOT. As the brief notes, “[o]verall, the six UDOT systems [heavy equipment, snow and ice removal, ports of entry, access permits, procurement and preconstruction] currently reporting in SMIS [SUCCESS Management Information System] have experienced a 23 percent improvement from the January 2013 baseline through October 2016.”

**SUCCESS Framework: Guide to Measurement**, Governor’s Office of Management and Budget, State of Utah, 2015.

<https://site.utah.gov/gomb/wp-content/uploads/sites/7/2015/11/SUCCESSMeasurementGuide.pdf>

This publication highlights the challenges associated with traditional performance measures (too many measures, local optimization, poor alignment, lack of baseline measures, and confusion between performance measures and operational indicators) and recommends an alternative.

Page 7 of the report provides a technical description and a performance equation:

Effectiveness and efficiency is a product of “output” divided by “input.” This percentage measures the quantity of services rendered (or units produced) per unit of input. Output is defined by both the quality (Q) and quantity (or throughput) of productivity (T). Operating expenses (OE) describe input. In terms of the Governor’s challenge to improve state operations by 25 percent, the goal is to increase quality (Q) and throughput (T) per dollar expended (OE).

Accordingly, the GOMB performance equation is:

$$\text{Effectiveness and efficiency} = QT / OE$$

All three efficiency variables must have quantifiable measures that directly gauge system performance.

GOMB advises agencies to prepare OE measures that are comprehensive and replicable using these practices:

- Document the time period for the measure.



- Provide the source of information (FINET reports or specific internal reports). (FINET is the state's centralized accounting system.)
- Include categories or objects of expenditure.
- Provide justification for any excluded expenditures.
- Include relevant budget classifications (line items, appropriations codes and/or units).
- Specify which expenditures are cost-allocated.
- Include the method for cost allocation.

**QT/OE Description Template: SUCCESS Framework**, Governor's Office of Management and Budget, State of Utah, October 2015.

<https://gomb.utah.gov/wp-content/uploads/sites/7/2015/12/QTOE-Description-Template-10-2015.xlsx>

This Excel workbook includes spreadsheets for use in preparing a QT/OE description, instructions for calculating operating expenses, and guidance for including backup expenditure data from the state's accounting system and staffing-related data. The user is advised to link the operating expenses worksheet to the backup data provided. The last spreadsheet in the workbook is a template operating expenses worksheet.

**Reporting: SUCCESS Management Information System**, Governor's Office of Management and Budget, State of Utah, 2017.

<https://gomb.utah.gov/operational-excellence/smis-success-management-information-system/>

*From the web site:*

The SUCCESS Management Information System, or SMIS, is designed to assist GOMB and state agencies by tracking implementation of the SUCCESS Framework and progress toward the Governor's goal of a 25% improvement in performance across all cabinet agencies.

The purposes of the SUCCESS Management Information System include:

- Simplify reporting.
- Measure progress and performance.
- Inventory projects and documentation.
- Spotlight success and provide feedback.

The site provides access to YouTube videos that offer training on how to access SMIS, enter data into the system and view reports.

## Practical Design

Utah DOT implemented practical design in 2011, apparently encouraged to do so by the successes of other state DOTs employing this practice to more effectively use limited resources.

### *Related Resources:*

**Implementation of Practical Design**, Memorandum, Utah Department of Transportation, February 2011.

<https://www.udot.utah.gov/main/uconowner.gf?n=3169532550850600>

*From the memorandum:* UDOT is implementing Practical Design, effective immediately. Practical Design supports UDOT's continuing emphasis on innovation, cost savings, and providing the public with the transportation system that meets their needs. The goal of Practical Design is to only build "right sized" projects that meet focused needs. This allows UDOT to spread limited resources more effectively throughout the transportation system.

**Practical Design Guide: Planning and Designing Practical Transportation Solutions for Utah**, Utah Department of Transportation, February 2011.

<http://www.udot.utah.gov/main/uconowner.gf?n=3142031557718121>

*From the background:*

Practical design has been used successfully by other transportation departments throughout the United States. The most prominent of these are Missouri, Idaho and Kentucky. Each department has their own set of guidelines but the overall concept remains the same. The success they have achieved includes:

#### Missouri (MoDOT)

- Implemented in 2004.
- Saved \$1.2 billion from 2005-2009.

#### Idaho (IDT)

- Implemented in 2007.
- Saved \$27.2 million in first year of implementation.
- Saved over \$50 million since 2007.

#### Kentucky (KYTC)

- Implemented in 2008.
- Saved \$4.7 million on one intersection.

The document describes the difference between practical design and value engineering (see page 5):

#### Value Engineering

- Method to determine the most cost effective way to achieve proposed improvements.
- Typically focuses on maximizing project improvements.
- Tool for practical design.

## Practical Design

- Method to determine the most cost effective way to achieve the objective statement.
- Focuses on maximizing roadway system improvements and UDOT's strategic goals.

See <http://www.udot.utah.gov/main/f?p=100:pg:0::::T,V:3195>, for more information about Utah DOT's application of practical design.

## **Washington**

Washington State DOT has a long record of monitoring and reporting on performance through its Gray Notebook, a quarterly report of performance and accountability that was first published in 2001. Since 2013, the agency has participated in a statewide Results Washington initiative launched by an executive order from the governor. The Results Washington initiative is based on Lean thinking and tools. Also in 2013, a legislative directive led to a series of recommendations for potential actions to increase efficiencies.

### **Measuring Performance**

Washington State DOT's quarterly Gray Notebook provides updates on the agency's programming, policy goals and new initiatives. The current report includes sections on safety, preservation, mobility, environment, economic vitality and stewardship. Front matter addresses the agency's participation in Results Washington and presents performance dashboards.

#### *Related Resource:*

**Navigating the Gray Notebook**, Washington State Department of Transportation, 2017.  
<http://wsdot.wa.gov/Accountability/GrayNotebook/navigateGNB.htm>

This web site provides access to all issues of Washington State DOT's quarterly performance and accountability report. As the web site notes, "[e]ach edition features quarterly and annual updates on key agency functions and provides in-depth analysis of topics aligned with the agency's strategic plan emphasis areas as well as the state's transportation goals."

### **Results Washington (Lean)**

As the Results Washington web site indicates, "Results Washington calls on state agencies to apply Lean thinking and tools, report regularly on their progress on the Governor's five goals and be accountable for making improvements and delivering results for the citizens of Washington through regularly held review meetings."

#### *Related Resources:*

**Executive Order 13-04: Results Washington**, Office of the Governor, State of Washington, September 2013.

[http://www.governor.wa.gov/sites/default/files/exe\\_order/eo\\_13-04.pdf](http://www.governor.wa.gov/sites/default/files/exe_order/eo_13-04.pdf)

This executive order directs the director and staff of Results Washington to develop "the

framework to create a Lean culture enterprise wide” and “the deployment of the Lean Fellowship and the Lean Expert Partnership Program.”

**Results Washington**, State of Washington, 2014.

<http://www.results.wa.gov/>

This web site home for Washington’s Lean-based Results Washington initiative includes a public dashboard, examples of results and resources for state employees participating in Lean processes.

**Strategic Lean Project Report**, For the Reporting Period January 1, 2016 through June 30, 2016, Washington State Department of Transportation, May 2016.

<https://www.results.wa.gov/sites/default/files/WSDOT%20-%20Jan.%20-%20June%202016.pdf>

This report is an example of the reporting the agency produces to demonstrate savings associated with Results Washington. The report indicates whether the Lean project is associated with any agency performance measure.

**Synthesis of Lean Information and Practice in Government**, Office of Research and Library Services, Washington State Department of Transportation, November 2013.

<http://lean.nh.gov/documents/LeanPracticesInGovSynthesisUpdate112013.pdf>

*From the synthesis:* This synthesis and literature review ... includes state, local, and federal government lean programs and practice and sources related to lean practice in the public sector and other service organizations.

## Evaluating Efficiencies

In 2013, the state Legislature required Washington State to “conduct a study to identify the major cost drivers and evaluate efficiency initiatives in the construction and operation of Washington State highway and bridge improvement and preservation projects.” The 2014 report cited below is the result of that directive.

*Related Resource:*

**Efficiencies in the Construction and Operation of State Transportation Projects**, Washington State Joint Transportation Committee, January 2014.

[http://leg.wa.gov/JTC/Documents/Studies/Transportation%20Efficiencies/WEB\\_FinalCombinedReport.pdf](http://leg.wa.gov/JTC/Documents/Studies/Transportation%20Efficiencies/WEB_FinalCombinedReport.pdf)

This report arose from a directive from the state Legislature to examine costs and evaluate efficiencies associated with the state DOT’s highway and bridge preservation projects.

Among other objectives, the report’s authors were tasked with identifying potential reforms or efficiency measures. Among the project’s findings:

- *From page ES-3 (page 5 of the PDF):* Eighty-eight percent of Washington State DOT (WSDOT) projects completed over the study period accounted for only 20% of expenditures. Meanwhile, projects over \$25 million accounted for 3% of projects but 59% of expenditures.

At a programmatic level, this distribution suggests that opportunities for cost savings should focus on how WSDOT manages the planning, design and delivery of large projects.

- *From page ES-6 (page 8 of the PDF):* Practical Design is an emerging approach to transportation system design. ... According to a 2013 Transportation Research

Board report, six DOTs have adopted Practical Design Policies, including Utah and Oregon.

As an example of Practical Design's potential, Missouri adopted a formal Practical Design policy in 2005 and claims to have saved approximately \$400 [million] on projects included in its 2005-2009 Statewide Transportation Improvement Program (STIP). Savings were invested in additional transportation projects.

A summary of potential actions to increase efficiencies begins on page ES-14 of the executive summary (page 16 of the PDF) in the following categories:

- Project design.
- Sales and use tax.
- Prevailing wage.
- Environmental review and permitting.
- Project delivery methods.
- Other potential actions.

## **Wisconsin**

Wisconsin DOT uses two complementary initiatives to improve efficiencies and contain costs: a performance improvement program and Lean Six Sigma. (Wisconsin DOT combines Lean process improvement with Six Sigma, a set of techniques that uses statistical analysis to improve processes.)

### **Measuring Performance**

Mobility, Accountability, Preservation, Safety and Service (MAPSS) is Wisconsin DOT's program to examine performance measures in the five key areas identified in the program's name.

#### *Related Resources:*

**MAPSS Performance Improvement Program**, Wisconsin Department of Transportation, undated.

<http://wisconsindot.gov/Pages/about-wisdot/performance/mapss/default.aspx>

*From the web site:* The Wisconsin Department of Transportation MAPSS Performance Improvement Program focuses on the five core goals and associated performance measures that guide us in achieving our mission "to provide leadership in the development and operation of a safe and efficient transportation system." Establishing goals and measuring results is essential to running a successful and efficient organization and meeting public expectations. The department is committed to quarterly reporting of progress, with updates published in February, May, August and November. The schedule for review and reporting on individual measures is based on pertinent program cycles, the availability of data and the department's business need for the information.

**MAPSS Performance Improvement Report**, Wisconsin Department of Transportation, October 2017.

<http://wisconsin.gov/Documents/about-wisdot/performance/mapss/perf-report.pdf>

*From the report:* The Wisconsin Department of Transportation's (WisDOT) Performance Improvement program focuses on the core goal areas of Mobility, Accountability, Preservation, Safety and Service (MAPSS). The Scorecard measures in this report have been deemed of highest importance to our customers to show the current state of Wisconsin's transportation system. The progress of these measures is reported on the two-page Scorecard and in the body of this report. The department also has interactive web pages within each core goal area for customers who are interested in "drilling down" into the data.

## **Lean Six Sigma**

Wisconsin DOT's 2016 Lean Government Annual Report provides this description of the agency's Lean Six Sigma process:

WisDOT Lean Six Sigma teams use the DMAIC process to complete their projects. DMAIC is an acronym that refers to the five phases: Define, Measure, Analyze, Improve and Control. The DMAIC process provides teams with a methodological framework to work logically through a process improvement from issue identification through solution implementation and improvement control.

### *Related Resources:*

**The Define, Measure, Analyze, Improve and Control (DMAIC) Methodology**, Wisconsin Department of Transportation, 2016.

<http://www.tpm-portal.com/wp-content/uploads/2016/02/Lean-Six-Sigma-Resources-LDP.pdf>

This document describes the principles of the Lean Six Sigma process and how the process can be used to measure improvements within a process. Included are a Lean Six Sigma project plan (see page 11 of the PDF), definitions, diagrams and other high-level guidance for agencies wishing to apply the practice.

**Lean Government Annual Report**, Fiscal Year 2016, Wisconsin Department of Transportation, 2016.

<http://wisconsin.gov/Documents/about-wisdot/performance/lean-gvmt/lean-govt-initiative-annual-report-2016.pdf>

This annual report identifies the 47 projects subject to the Lean Six Sigma process since 2012 and provides summary data and details for a few key projects. As the report notes, "To date, the department has generated project savings in excess of \$1.5 million and improved the time spent on these processes by roughly 30,000 hours. The dollars and staff hours will continue to be redirected to other department activities and priorities."

The report describes the relationship between Lean Six Sigma and MAPSS, noting that "[s]trategic initiatives, including the Lean Government Initiative, provide a mechanism for ongoing progress toward meeting performance targets, through the implementation of process improvements aligned with MAPSS core goal areas. There are process metrics associated with these projects to quantify improvements. WisDOT's Lean projects are focused on their ability to contribute to the overall organizational MAPSS goals and progress toward moving performance targets in a positive direction."

**Lean Government Initiative: Lean Project Results**, Wisconsin Department of Transportation, undated.

<http://wisconsindot.gov/Pages/about-wisdot/performance/lean-gvmt/leangovt-practice.aspx>

This web site provides links to a range of one-page Lean Summary Reports that summarize the results of applying the Lean Six Sigma process to a topic or issue. Each summary report describes the issue, the Lean Six Sigma process applied, results and next steps.

## **Other Efficiency-Related Resources**

**Better, Faster, Lower Cost: An Efficiency Report from the Wisconsin Department of Transportation**, Wisconsin Department of Transportation, December 2016.

<http://wisconsindot.gov/Documents/about-wisdot/performance/mapss/efficiency-report-2016.pdf>

*From the report:*

The following report details the many technologies, cutting-edge research, best practices and policies WisDOT is utilizing to deliver transportation projects and services in an efficient and responsible fashion. In the 2016 state fiscal year alone, we generated approximately \$100 million in savings that stem directly from vigilant project management and improvements to processes, products and services.

Efficiencies are described in three topic areas: project management; system operations; and innovation, research and technology. Emerging opportunities are described on page 11 of the report (page 13 of the PDF).

## **Other State Practices**

### **Michigan**

**Economies, Efficiencies and Innovations**, Michigan Department of Transportation, February 2017.

[http://www.michigan.gov/documents/mdot/MDOT\\_CumulativeListofEfficiencies\\_450744\\_7.pdf?20140611075617](http://www.michigan.gov/documents/mdot/MDOT_CumulativeListofEfficiencies_450744_7.pdf?20140611075617)

This report highlights savings identified from 2010 through 2016. *From the report:*

This report reflects implemented actions since CY2010 [calendar year 2010]. To prevent overstating budgetary savings, actions for which good estimates of dollar savings can be generated will reflect those savings. Other actions, which generate improvement, but where accurate dollar savings either cannot be calculated or where the savings result in a redirection of the resources, will not show a dollar value. Summary figures for previous years may change as more accurate data become available.

Initial Year of Savings represents the first calendar year in which benefits accrued from the innovation. Savings Expiration Year represents the final calendar year in which benefits accrued from the innovation, or the point in time where the change became ingrained in MDOT's business processes and was no longer deemed innovative.

## Wyoming

**Efficiencies, Saved Resources and Reduced Expenditures**, Wyoming Department of Transportation, November 2013.

<http://www.dot.state.wy.us/files/live/sites/wydot/files/shared/Budget/Efficiencies%2C%20Saved%20Resources%2C%20Reduced%20Expenditures.pdf>

This document takes a case-study approach to identify efficiencies and cost savings in the functional areas of aeronautics, highways, highway patrol, operations, support services and multidivisional activities. Each brief case study provides a project description, benefit and project status.

## Multiple States

**Identifying Best Practices for Evaluation of Design Innovations**, *Preliminary Investigation*, Caltrans, June 2015.

[http://www.dot.ca.gov/newtech/researchreports/preliminary\\_investigations/docs/identifying\\_best\\_practices\\_for\\_evaluation\\_of\\_design\\_innovations\\_preliminary\\_investigation.pdf](http://www.dot.ca.gov/newtech/researchreports/preliminary_investigations/docs/identifying_best_practices_for_evaluation_of_design_innovations_preliminary_investigation.pdf)

This report presents the results of interviews with representatives from seven state DOTs—Idaho, Minnesota, Missouri, New Jersey, Oregon, Utah and Virginia—about the practices used to evaluate design decisions when projects are complete. Literature search results and agency interviews address the use and implications of practical design.

## National Guidance

**Advancing Performance Management Under a National Framework**, NCHRP Project 20-24(97), November 2015.

[http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24\(97\)\\_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24(97)_FR.pdf)

*From the report:* The TPM [Transportation Performance Management] Research Roadmap Website [now called the AASHTO Transportation Performance Management Portal, cited below] is a tool to identify and organize completed, needed and future research efforts surrounding TPM issues and approaches. This online research portal will enable increased coordination between research teams and AASHTO or TRB panel partners.

Researchers and practitioners alike can use the portal to help identify and respond to challenges and opportunities associated with the preparation and application of national-level transportation system performance information.

In the near term, the Roadmap will offer a consolidated set of resources on performance management. Transportation practitioners can use the Roadmap website to help plan future research and development activities to be undertaken by the transportation industry.

Over the long term, the Roadmap will help identify challenges and opportunities associated with preparation of national-level transportation system performance information—and identify research needs to improve the state of the practice in TPM.



*Related Resources:*

**AASHTO Transportation Performance Management Portal**, AASHTO and Transportation Pooled Fund Program, 2017.

<http://www.tpm-portal.com/>

*From the web site:*

The Transportation Performance Management (TPM) pooled fund project helps contributing members to research and assess training and educational needs, develop and deliver training, and facilitate the sharing and retention of performance management best practices. The TPM Portal website is part of this effort, intended to showcase PM best practices, foster collaboration and serve as a repository for PM resources.

The site provides access to a TPM guidebook ([www.tpmtools.org/guidebook/](http://www.tpmtools.org/guidebook/)) that addresses strategic direction, target setting, performance-based planning and programming, monitoring and adjustment, reporting and communication, organization and culture, external collaboration and coordination, data management, and data usability and analysis.

**TPM (Transportation Performance Management) Toolbox**, Federal Highway Administration, 2017

<https://www.tpmtools.org/>

*From the web site:* This is the website for the FHWA TPM Toolbox. The tools available here are intended to assist staff from transportation agencies in learning about and implementing TPM practices. The TPM Guidebook and Resources tools enable you to learn more about TPM: the Guidebook uses case studies and illustrative examples to demonstrate how performance management results in improved decision-making through better-informed planning, programming, monitoring and reporting.

The TPM Capability Maturity Model Self-Assessment is a tool for identifying logical next steps for strengthening TPM processes. It allows users to assess current TPM capabilities and identify actions to improve those capabilities. The assessment results are linked to the TPM Guidebook in order to provide clear practical actionable steps that state DOT leadership, management, and staff can implement to enhance performance-management practices.

**The Innovative DOT: A Handbook of Policy and Practice**, Smart Growth America and the State Smart Transportation Initiative, September 2012.

<https://smartgrowthamerica.org/app/uploads/2016/08/the-innovative-dot.pdf>

*From the handbook:*

This handbook collects the innovative approaches that state transportation leaders are already using to make systems more efficient and effective in today's challenging economy. Smarter transportation investments are both possible and popular: the challenge is determining where to begin and to whom to reach out for support and guidance.

The report organizes 31 innovative approaches in eight focus areas:

- Revenue sources.
- Revenue allocation and project selection.
- Pricing.
- Increasing transportation system efficiency.

- Improving options for mobility and access.
- Providing efficient, safe freight access.
- Integrating transportation and land use decision-making.
- Improving DOT processes.

Each approach includes a description of the innovation and how it has been implemented, followed by case studies illustrating application of the innovative practice and resources to obtain more information.

**NCHRP Synthesis 414: Effective Delivery of Small-Scale Federal-Aid Projects: A Synthesis of Highway Practice**, Leslie Ann McCarthy, David Mensching and Andrew Horgan, 2011.

Description at <http://www.trb.org/Publications/Blurbs/165335.aspx>

*From the report:* This report compiles and documents streamlined methods for meeting federal funding requirements for small-scale highway projects. A primary objective of this study is to explore ways that state departments of transportation (DOTs) work with local agencies to implement small projects eligible for federal funding. For this study, small-scale is defined as projects administered by state or local transportation agencies that contain federal funding of \$300,000 or less.

**NCHRP Research Results Digest 361: State DOT Public Transportation Performance Measures: State of the Practice and Future Needs**, Michael Grant, Terence Plaskon, Stephanie Trainor, Sonya Suter and Joe Crossett, September 2011.

Description at <http://www.trb.org/Publications/Blurbs/166065.aspx>

*From the digest:* While use of performance measures in public transportation is well established, typical practices for public transportation performance measures are oriented to collection and reporting of data on operations performance via metrics for issues such as ridership and service cost effectiveness. ... The purpose of this digest is to provide more information on performance measures and performance management approaches that can be used by state DOTs in relation to public transportation programs.

**Measuring Performance Among State DOTs: Sharing Best Practices—Construction Schedule and Budget Performance Update**, Joe Crossett and Kyle Schneweis, NCHRP Report 20-24(37)A(01), April 2011.

[http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24\(37\)A\(01\)\\_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24(37)A(01)_FR.pdf)

*From the introduction:*

This study evaluates the comparative performance of 39 state DOTs in delivering transportation construction projects within their originally anticipated cost and schedule. The study examines each state's performance track record for all projects finished over a period from January 1, 2001 to June 30, 2010. Typical projects included in the analysis span the full range of a DOT's activities including operations work, such as installation of ITS devices or traffic signals; maintenance activities, such as guard rail installation or striping; pavement preservation work, such as resurfacing; bridge preservation work, such as deck replacement; and capacity additions. A major work product of the study is a user-friendly web database that participating states can use to review their results.

**NCHRP Report 662: Accelerating Transportation Project and Program Delivery: Conception to Completion**, Dennis Keck, Hina Patel, Anthony J. Scolaro, Arnold Bloch and Christopher Ryan, 2010.

Description at <http://www.trb.org/Publications/Blurbs/163936.aspx>

*From the foreword:*

This report describes the experiences of eight state departments of transportation (DOTs) that made improvements in their project delivery and the lessons to be learned from their experiences. The information will be useful to DOT managers seeking to ensure that their agencies' organization, policies and program operations facilitate project delivery.

Among the state DOTs highlighted in the report's conclusions (beginning on page 89 of the report):

- **Maryland:** "Maryland SHA's [State Highway Administration's] best practices focus on performance measures for the agency's six modal administrations. The publication of the Annual Attainment Report encompasses the health of its infrastructure and sets new targets for the coming years. Considered to be the leads in CSS [context sensitive solutions], MDOT incorporates CSS as a standard operating procedure. Acceleration is also accomplished through environmental streamlining and design-build delivery systems."
- **Missouri:** "Missouri's Tracker measures the department's internal and external organizational effectiveness. Accountability of 'drivers' for and transparency of results create the momentum for continuous monitoring and constant improvement of their benchmarks."
- **New Jersey:** "[P]ipelines for project delivery selectively map the activities of a project based on its complexity and characteristics. Acceleration is achieved through a customized, well-scoped project that follows a defined process and network logic."
- **North Carolina:** "The Merger 01 process, a multiagency initiative, seeks to formally register the concurrence of all concerned parties at strategic points in the development of a project, from the earliest conception and planning phases. North Carolina's organizational performance dashboard provides a set of gauges that are linked to a performance management program."
- **Texas:** "Procurement strategies such as evergreen contracts, which prequalify contractors to perform specific types of work, have helped TxDOT accelerate smaller projects. Its comprehensive development agreements allow a given contractor to perform all services of a project from design and construction to maintenance and operation."
- **Utah:** "[A] pilot contracting program ... involves a design consultant and a construction contractor to collaborate on a project early on ... [which] opens greater possibilities for parallel processes to occur."

**Best Practices in Project Delivery Management**, NCHRP Project 20-68A, Scan 07-01, National Cooperative Highway Research Program, October 2009.

[http://onlinepubs.trb.org/onlinepubs/nchrp/docs/nchrp20-68A\\_07-01.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/nchrp20-68A_07-01.pdf)

This domestic scan report includes best practices identified through observations and interviews with representatives from six DOTs: Arizona, Florida, Missouri, Utah, Virginia and Washington. Best practices address project management, performance measurement, contracting practices and community involvement.

Chapter 4, Performance Measurement (beginning on page 4-1 of the report, page 46 of the PDF), includes descriptions of publicly available systems and reports produced by four of the participating agencies:

- **Missouri:** The agency's Tracker system produces a quarterly report "chronicling the DOT's progress against many important metrics."
- **Utah:** The agency's internal performance management system, ePM, "tracks many elements of the project delivery process, including schedule and finance. ... UDOT adopted a series of performance measures that are reported in its Project Delivery Dashboard."
- **Virginia:** The agency's "Dashboard system is a front-end reporting tool that uses information collected nightly from other sources to create the graphs and charts. This data is stored in a data warehouse until incorporated into the Dashboard system. The daily Dashboard updating makes this system the most responsive of all the states visited by the scan team. It offers as close to a real-time view of the agency's performance as possible."
- **Washington:** The quarterly Gray Notebook includes "many of the same measurement and performance information found in [Missouri DOT's] Tracker system." At the time of the scan, the Gray Notebook was organized in five sections: safety, preservation, mobility (congestion relief), environment and stewardship.

The scan identified these best practices associated with performance measurement:

- What gets measured gets done (Virginia DOT), and when it's measured it becomes important to your agency (Missouri DOT).
- Some of the observed systems require substantial work to sustain, such as the effort associated with data input so that the data can be aggregated and reported.
- Each system grew from the influence of strong leaders who felt the need to create a tool to help them with project delivery and in serving the public.
- Metrics used in these systems provided Arizona, Utah and Washington a means to measure contractor and consultant performance, which could then be used for other purposes by the agencies (e.g., selection for other work).

### **Transportation Decision Making: Principles of Project Evaluation and Programming,**

Kumares C. Sinha and Samuel Labi, John Wiley & Sons, Inc., May 2007.

<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0471747327.html>

*From the publisher:* This pioneering text provides a holistic approach to decision-making in transportation project development and programming, which can help transportation professionals to optimize their investment choices. The authors present a proven set of methodologies for evaluating transportation projects that ensures that all costs and impacts are taken into consideration.

The text's logical organization gets readers started with a solid foundation in basic principles and then progressively builds on that foundation. Topics covered include:

- Developing performance measures for evaluation, estimating travel demand and costing transportation projects.
- Performing an economic efficiency evaluation that accounts for such factors as travel time, safety and vehicle operating costs.

- Evaluating a project's impact on economic development and land use as well as its impact on society and culture.
- Assessing a project's environmental impact, including air quality, noise, ecology, water resources and aesthetics.
- Evaluating alternative projects on the basis of multiple performance criteria.
- Programming transportation investments so that resources can be optimally allocated to meet facility-specific and systemwide goals.