



# Evaluating New Tools for Long-Lasting Efficiencies

*Requested by*  
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# Executive Summary

## **Background**

In 2015 California Department of Transportation (Caltrans) launched its first wave of Lean 6-Sigma (L6S) initiatives to find innovative ways to increase efficiency and add value to business processes. In two previous Preliminary Investigations, Caltrans examined the implementation of these efficiencies. This Preliminary Investigation evaluates whether L6S is the appropriate tool to deliver the long-lasting efficiencies that Caltrans is seeking.

To provide information for this evaluation, other state departments of transportation (DOTs) were surveyed about their experience with Lean, L6S and similar efficiency tools and practices. A literature search of publicly available domestic resources and in-progress research was conducted to supplement the survey findings. Results from these efforts are summarized below and will be used to inform Caltrans' analysis of the benefits and drawbacks of each tool, and the effective practices used to ensure initial improvements translate into long-term efficiencies.

## **Summary of Findings**

### **Survey of Practice**

An online survey was distributed to members of the American Association of State Highway and Transportation Officials (AASHTO) Committee on Performance-Based Management. In addition to providing general information about agency tools, the survey respondents also described tracking and reporting methods, and best practices for establishing a continuous process improvement/efficiency initiative that generates long-lasting results.

Transportation agencies from six states—Alaska, Kansas, Michigan, Texas, Utah and Vermont—completed the survey:

- Three state transportation agencies—Michigan DOT, Texas DOT and Vermont Agency of Transportation—have successfully implemented a continuous process improvement initiative as part of a coordinated agencywide program. (*Note:* Respondents from Arizona DOT and Kentucky Transportation Cabinet reported that their agencies have also implemented a successful initiative, however, the respondents did not complete the survey.)
- Utah DOT is currently developing a process improvement initiative. The agency's operational excellence program, which was based on the theory of constraints, was discontinued after a change in state leadership in November 2020. Today the agency is investigating L6S, design thinking and other alternative improvement methods to add to the lessons learned from the theory of constraints and is using them to document and improve agency processes.
- Alaska Department of Transportation and Public Facilities (DOT&PF) and Kansas DOT have not implemented an initiative:
  - From 2015 to 2019, Alaska DOT&PF had some success implementing an initiative but it never was well-integrated throughout the agency. Although the agency recently began reconsidering the efficiency effort and has conducted some training sessions, it is not a priority.

- Kansas DOT is currently incorporating continuous improvement practices into its performance management process, but the process has not been fully implemented.

Summarized below are survey findings from Michigan DOT, Texas DOT and Vermont Agency of Transportation, and a phone interview with Utah DOT. The information is presented in two topic areas:

- Current implementations.
- Initiatives under development.

**Current Implementations**

*Description of Continuous Improvement Initiative*

Table ES-1 presents the features of each agency’s continuous process improvement initiative, including a description of the tools or practices used, the date the initiative was implemented, the office or division that provides oversight, program staffing and functional areas that participate in the efficiency initiative.

**Table ES-1. Description of State DOT Continuous Improvement Initiative**

State	Description of Tools/Practices	Implementation Date	Administration of Initiative
Michigan	<ul style="list-style-type: none"> <li>• Lean process improvement</li> <li>• Strategic Planning</li> <li>• Team Building</li> <li>• Coaching</li> <li>• Knowledge management</li> <li>• Talent Review</li> <li>• Internal Communications efforts</li> <li>• Employee engagement survey and team process mapping action</li> </ul>	Approximately 2006	<ul style="list-style-type: none"> <li>• <i>Oversight:</i> Office of Organizational Development</li> <li>• <i>Staffing:</i> <ul style="list-style-type: none"> <li>○ Full time: 15</li> <li>○ Part time: 3</li> </ul> </li> <li>• <i>Participating Functional Areas:</i> <ul style="list-style-type: none"> <li>○ Recruitment</li> <li>○ Organizational Effectiveness</li> <li>○ Learning, Development and Surveys</li> </ul> </li> </ul>
Texas	<ul style="list-style-type: none"> <li>• The Innovation and Cost Efficiency team collects and analyzes public and employee suggestions for cost savings, innovation and efficiencies, and implements some with appropriate subject matter experts.</li> <li>• State law requires that the public vote on the suggestions.</li> </ul>	2019	<ul style="list-style-type: none"> <li>• <i>Oversight:</i> Innovation and Cost Efficiency program, Strategic Planning Division</li> <li>• <i>Staffing:</i> <ul style="list-style-type: none"> <li>○ Full time: 5</li> <li>○ Part time: 0.5 full-time-equivalent (FTE) (section director/manager)</li> </ul> </li> <li>• <i>Participating Functional Areas:</i> All Texas DOT divisions and districts</li> </ul>

State	Description of Tools/Practices	Implementation Date	Administration of Initiative
Vermont	<ul style="list-style-type: none"> <li>Continuous improvement tools, including Lean and change management.</li> <li>Initially tools were adopted quite extensively in many programs. Today, the rate of use has slowed.</li> <li>Small teams are being created to build better, more efficient processes by: <ul style="list-style-type: none"> <li>Launching new programs to promote continuous improvement and solicit innovative ideas.</li> <li>Seeking buy-in from executives.</li> </ul> </li> </ul>	2014	<ul style="list-style-type: none"> <li><b>Oversight:</b> Performance Section</li> <li><b>Staffing:</b> <ul style="list-style-type: none"> <li>Full time: 2</li> <li>Part time: N/R</li> </ul> </li> <li><b>Participating Functional Areas:</b> <ul style="list-style-type: none"> <li>Continuous improvement programs</li> <li>Performance Management and Data Analytics</li> </ul> </li> </ul>

N/R No response.

### Defining Efficiency

Texas DOT and Vermont Agency of Transportation have definitions for an efficiency. In Vermont, an efficiency is simply defined as process improvement. In Texas, cost-efficiency is defined as saving money or reducing cost by improving a process or product.

### Tracking Methodologies

Only Vermont Agency of Transportation tracks efficiencies to ensure they persist over time. The agency uses various spreadsheet practices, including Excel Power BI dashboards. Both Michigan DOT and Texas DOT would like to track efficiencies over time. Currently when Michigan DOT tracks efficiencies, it uses the methodology from its statewide continuous improvement office. Texas DOT has very limited tracking of cost savings but not over time. It plans to begin tracking cost avoidance soon.

None of the agencies has encountered an L6S process that doesn't continue. Experience with tracking the efficiencies gained varied among these agencies, as summarized in Table ES-2.

**Table ES-2. Continuous Improvement Tracking Methodologies**

State	Quantification Process	Differentiates Hard/Soft Savings*	Counting Innovation/ Efficiency Savings**
Michigan	<ul style="list-style-type: none"> <li>An application process.</li> <li>Documentation provided during a recent audit.</li> </ul>	No	Year of implementation only
Texas	<ul style="list-style-type: none"> <li>Doesn't quantify all efficiencies gained. Tracks hard savings (materials and equipment or travel savings) when possible.</li> <li>Incorporates some hard savings in a cost savings account for executive team. The division produces a cost savings report in Excel that is shared quarterly with the executive team at program updates.</li> </ul>	Yes. (The agency is developing a tracking methodology for cost avoidance.)	The agency operates on a biennial appropriation cycle, so it counts cost savings over both years of the biennium if the effort started in the first year of the biennium.
Vermont	<ul style="list-style-type: none"> <li>Cost reduction</li> <li>Cycle time improvement</li> <li>FTE reduction</li> </ul>	N/A	The agency is developing tracking programs for innovation but has not yet implemented them.

N/A Not applicable.

\* The survey inquired whether the agency differentiated between hard savings (actual money saved) and soft savings or cost avoidance (efficiencies not tied to direct dollar savings) when tracking efficiencies.

\*\* Survey respondents described how their agencies count an innovation, efficiency savings or cost avoidance: year to year, year of implementation only or other practice.

### *Successes Developing and Implementing a Tracking Methodology*

Vermont Agency of Transportation began rolling out dashboard sets several years ago, and adoption has varied across the organization. For example, maintenance and construction teams use dashboards quite extensively but other operations areas are only beginning to adopt dashboards.

### *Challenges Developing and Implementing a Tracking Methodology*

All three agencies reported challenges with tracking methodologies:

- In Michigan, the statewide continuous improvement methodology is not a “one-size-fits-all” practice. Projects vary in nature, and all or some parts of the methodology may apply. Additionally, the agency recognizes the need to focus on people and behavior as they relate to continuous improvement. Understanding change management is a crucial piece in applying continuous improvement.
- While many efforts are producing cost savings and efficiency within Texas DOT, they are unknown to the small continuous improvement team due to the “vast” nature of the agency. Also, divisions and districts have concerns about budget visibility if they produce savings, such as whether savings would be “swept,” how much manpower would be required to collect the information and what process would be used to gather information.
- In Vermont, identifying the difference between performance measures and operational measures is challenging. Operational measures assess volumes of work without assessing how well the agency is performing. Most of management wanted to stay with operations rather than performance.

### *Reporting Practices*

None of these agencies publishes reports that describe the short- or long-term impacts of their agencies’ continuous process improvement or efficiency initiative. They also don’t prepare an annual report or other deliverable to report on efficiencies, although the survey respondent from Vermont Agency of Transportation indicated that there was some internal reporting.

### *Recommendations for Implementation*

Survey respondents provided the following recommendations for agencies that are considering establishing a continuous process improvement or efficiency:

#### **Michigan**

- Understand change management and how it applies to continuous improvement.
- Ensure tracking methodologies use metrics. They are crucial to tracking success.
- Prioritize the initiative and involve sponsors in the process. (Prioritization and sponsorship have been two large barriers in Michigan DOT’s implementation.)

#### **Texas**

- Conduct regular briefings with executives to get feedback; create and maintain buy-in; and share program inputs and suggestions, tracking and successes. (Texas DOT conducts quarterly briefings.) The continuous improvement team should include at least some internal hires with institutional knowledge, especially about district and field operations.

- Establish a program focused on building the culture of process improvement throughout the agency since the small team directly responsible for efficiencies can have only a small impact. Potential strategies for this program include creating training courses and a community of practice.
- Recognize employees who participate in the process. At Texas DOT, employees who make suggestions receive personally signed thank-you notes from the executive director; those whose suggestions are implemented receive eight hours of time off and are recognized in the agency’s employee magazine.

**Vermont**

- Obtain executive buy-in. Without it and without maintaining it, the efforts will be lost and not sustainable.
- Train the staff initiating the program before training members of the agency.
- Dashboard the program and provide reporting to executive staff.

**Initiatives Under Development**

Utah DOT is currently developing a process improvement initiative. The agency’s operational excellence program, which was based on the theory of constraints, was discontinued after a change in state leadership in November 2020. Since then, the agency has been investigating L6S, design thinking, human-centered design and other improvement methodologies to add to the lessons learned from the theory of constraints. Table ES-3 summarizes information about this effort.

**Table ES-3. Description of Utah DOT’s Pilot Continuous Improvement Initiative**

Topic	Description
	<ul style="list-style-type: none"> <li>• Continuous improvement cycle of performance management, idea generation and change management.</li> <li>• Six-step process improvement method:               <ul style="list-style-type: none"> <li>○ <i>Discover</i>: Generate ideas.</li> <li>○ <i>Define</i>: Identify the issue.</li> <li>○ <i>Analyze</i>: Identify the root causes.</li> <li>○ <i>Imagine</i>: Identify potential solutions.</li> <li>○ <i>Implement</i>: Test improvements.</li> <li>○ <i>Review</i>: Measure performance and adjust.</li> </ul> </li> </ul>
<b>Date Initiated</b>	November 2020
	<ul style="list-style-type: none"> <li>• <i>Oversight</i>: Transportation Performance Management Division</li> <li>• <i>Staffing</i>:               <ul style="list-style-type: none"> <li>○ Full time: 1</li> <li>○ Many consultants</li> </ul> </li> <li>• <i>Participating Functional Areas</i>:               <ul style="list-style-type: none"> <li>○ Employee Development</li> <li>○ Communications</li> <li>○ Performance Management</li> <li>○ Enterprise Risk</li> <li>○ Innovation and Implementation</li> <li>○ Internal Audit</li> </ul> </li> </ul>

Topic	Description
<b>Tracking Methodology</b>	Currently, the agency does not track results. There isn't a procedure for tracking, and reporting is not required. When the theory of constraints was used for continuous improvement, the agency tracked efficiencies closely, reporting on a monthly basis for most efficiencies and annually for others.

*Initial Assessment of the Initiative*

Utah DOT points to successes of the initiative under development such as cost savings, time savings and improved customer service. However, creating a culture of continuous improvement can be challenging and requires that the agency address the independent nature of individual group practices, provide guidance to employees and obtain agency buy-in.

**Related Research and Resources**

Resources from state DOTs and other state government agencies present continuous improvement and efficiency efforts underway that supplement the survey findings. Among these resources is the Lean Interchange web site, which is managed by Colorado DOT and includes members from several transportation agencies to help promote Lean business management. Additional state DOT resources include tools and metrics supported by Colorado DOT, Iowa DOT's Transportation Systems Management and Operations program and Wisconsin DOT's MAPSS [mobility, accountability, preservation, safety and service] program. Other state agency resources and guidance based on the principles of Lean include the Arizona management system and programs in Connecticut, Minnesota, Nebraska, New Hampshire, Ohio and Washington. Also cited is the Lean Government Center, a web site with numerous links to Lean web sites in states and cities throughout the United States.

**Gaps in Findings**

A very small number of state transportation agencies participated in this information-gathering effort, limiting the amount of information and experience available for reporting. Additionally, only three agencies have successfully implemented a continuous process improvement initiative. Reaching out to other state transportation agencies could potentially increase the findings of this effort and provide further recommendations about tools and practices that produce long-term efficiencies.

**Next Steps**

Moving forward, Caltrans could consider:

- Contacting the survey respondents from Arizona DOT and Kentucky Transportation Cabinet for information about their continuous process improvement initiatives. Both respondents indicated that their agencies have implemented a successful initiative, but neither respondent completed the survey.
- Following up with:
  - Utah DOT as it develops and refines its practices.
  - Alaska DOT&PF and Kansas DOT for progress about their efforts implementing continuous improvement.

- Contacting those state DOTs that did not participate in the survey to potentially uncover additional experience and recommendations.
- Reviewing the findings of the literature search for additional analysis of the benefits and challenges of continuous improvement, and the effective practices used to ensure initial improvements translate into long-term efficiencies.



## Detailed Findings

### Background

Lean 6-Sigma (L6S) initiatives seek to improve the quality of process outputs by finding innovative ways to increase efficiency and add value to business processes. These initiatives focus on growth and continuous improvement through process optimization.

In 2015 California Department of Transportation (Caltrans) launched its first wave of L6S initiatives. Two previous Preliminary Investigations examined the implementation of efficiencies: Implementing Efficiencies as Part of an Investment Strategy (December 2017) and Implementing and Reporting on Efficiencies and Process Improvements (December 2019) (see **Related Research and Resources**, page 19).

This Preliminary Investigation evaluates whether L6S is the appropriate tool to deliver the long-lasting efficiencies that Caltrans is seeking. For this evaluation, other state departments of transportation (DOTs) were surveyed about their experience with Lean, L6S and similar efficiency tools and practices. A literature search of publicly available domestic resources and in-progress research was conducted to supplement the survey findings. Results from these current efforts will inform Caltrans' analysis of the benefits and drawbacks of each tool, and the effective practices used to ensure initial improvements translate into long-term efficiencies.

### Survey of Practice

An online survey was distributed to members of the American Association of State Highway and Transportation Officials (AASHTO) Committee on Performance-Based Management. In addition to providing general information about agency tools, the survey respondents also described tracking and reporting methods, and best practices for establishing a continuous process improvement/efficiency initiative that generates long-lasting results. Survey questions are provided in [Appendix A](#). The full text of survey responses is presented in a supplement to this report.

Six state transportation agencies completed the survey. Three agencies—Michigan DOT, Texas DOT and Vermont Agency of Transportation—have successfully implemented a continuous process improvement initiative as part of a coordinated agencywide program. (*Note:* Respondents from two additional state transportation agencies—Arizona DOT and Kentucky Transportation Cabinet—indicated that their agencies have implemented a successful initiative, however, the respondents did not complete the survey.)

Utah DOT is currently developing a process improvement initiative and has some preliminary experience using the tools and practices, which was shared through the survey and in a follow-up phone interview. The agency's operational excellence program, which was based on the theory of constraints, was discontinued after a change in state leadership in November 2020. According to the survey respondent, one of the incoming governor's strategic priorities is to streamline and modernize state government. The governor has appointed a chief innovations officer to oversee this task. In the interim, Utah DOT has been "learning and experimenting" with alternative improvement methods such as L6S and design thinking to add to the lessons learned from the theory of constraints. While not a full implementation, the agency has had opportunities to use these methodologies and their associated tools and principles to document and improve agency processes.

The remaining two state transportation agencies have not implemented an initiative:

- *Alaska Department of Transportation and Public Facilities* attempted to implement an initiative during the previous administration (2015 to 2019) with “a few successes,” but the respondent noted that “it never was well-integrated into the agency.” The agency has recently had some discussions about reinvigorating the effort and has conducted a few training sessions. But the respondent added that the initiative “has not been a priority.”
- *Kansas DOT* is currently revising its performance management process to incorporate continuous improvement practices, but the process has not been fully implemented.

Survey findings are summarized below in two topic areas:

- Current implementations.
- Initiatives under development.

## Current Implementations

Survey results from Michigan DOT, Texas DOT and Vermont Agency of Transportation are summarized below in the following topic areas:

- Description of efficiency tool or practice.
- Tracking methodologies.
- Reporting practices.
- Recommendations for implementation.

## Description of Efficiency Tool or Practice

Use of continuous improvement tools and practices is voluntary in these agencies. Below are summaries of the efficiency tools or practices adopted by each agency:

- Michigan DOT has adopted Lean process improvement, strategic planning, team building, coaching, knowledge management, talent review, internal communications efforts, employee engagement survey and action team, and process mapping. Use of these practices has been building over the past 15 years.
- Texas DOT created the Innovation and Cost Efficiency team in 2019 to replace a cost savings workgroup established in 2018. The team collects and analyzes public and employee suggestions for cost savings, innovation and efficiencies, and implements some with appropriate subject matter experts. State law requires that the public vote on the suggestions.

In 2020, a process improvement program was created within the team to manage a training program; the program includes a one-day process improvement fundamentals course and a 4.5-day L6S course. A community of practice was also created to promote the culture throughout the agency.

- Vermont Agency of Transportation uses tools of continuous improvement, including Lean and change management, for business process improvements across the agency. Use of the tools began in 2014 when they were adopted quite extensively in many programs through 2017. Today, the processes still exist, but changes in leadership have slowed the rate of use.

The survey respondent recently became the new director of the Performance Section. Instead of using five-day kaizen events (a Lean tool that brings together stakeholders to improve a process) within the agency, he is developing small teams to build better, more efficient processes. These teams are launching new programs to move forward with continuous improvement and capture innovative ideas, and will be selling these concepts to executives to get their buy-in once again.

### Defining Efficiency

Process improvement is at the core of an efficiency in Texas DOT and Vermont Agency of Transportation. The Texas DOT survey respondent added that cost-efficiency is defined as saving money or reducing cost by improving a process or product. Michigan DOT does not have a definition of an efficiency.

### Administering an Efficiency Initiative

Administrative features of an agency’s continuous process improvement or efficiency initiative varied among these agencies, especially related to staffing, which ranges from 15 full-time staff (Michigan) to two (Vermont). Table 1 summarizes survey responses.

**Table 1. Administration of a Continuous Process Improvement/Efficiency Initiative**

State	Oversight Office/Division	Director/Manager of Efficiency Initiative	Full Time Staff	Part Time Staff	Functional Areas Participating in Initiative
<b>Michigan</b>	Office of Organizational Development	Amber Thelen, Organizational Development Officer	15	3	<ul style="list-style-type: none"> <li>• Recruitment</li> <li>• Organizational Effectiveness</li> <li>• Learning, Development and Surveys</li> </ul>
<b>Texas</b>	Innovation and Cost Efficiency program, Strategic Planning Division	Moses Garcia, BPI Section Director, Strategic Planning Division	5	0.5 FTE (section director/manager)	All Texas DOT divisions and districts provide suggestions and project ideas, or help to implement projects.
<b>Vermont</b>	Performance Section	Manuel Sainz, Director, Performance	2	N/R	<ul style="list-style-type: none"> <li>• Continuous improvement programs</li> <li>• Performance management and data analytics</li> </ul>

N/R No response.

### Supporting Documents

#### *Texas*

#### **Innovation and Cost Efficiency: Program Highlights for the 87th Legislature, Texas**

Department of Transportation, February 2021.

See [Appendix B](#).

This program briefing summarizes recent efficiency activities implemented within the agency, including enhanced electric utility account management, travel cost savings and the process improvement program’s efficiency courses and community of practice.

**TxDOT Innovation and Cost Efficiency**, Texas Department of Transportation, undated.

<https://www.txdot.gov/inside-txdot/txdot-innovation-and-cost-efficiency.html>

Agency employees and the general public are invited to submit suggestions to Texas DOT through this web page. Both employees and the public may also vote for cost-efficiency

suggestions from this page. The Vote Now button links to suggestions received in the second quarter of 2021. An additional link on the page accesses the fourth quarter 2020 and first quarter 2021 suggestions.

*Related Resources:*

**Innovation and Cost-Efficiency Suggestions Program—To the Public**, Texas

Department of Transportation, undated.

<https://www.txdot.gov/inside-txdot/division/planning/efficiency.html>

This web page provides “an opportunity for public citizens to contribute feedback on [Texas DOT’s] operations.”

**Strategic Planning**, Texas Department of Transportation, undated.

<https://www.txdot.gov/inside-txdot/division/planning.html>

Access to the suggestions program is available from the Strategic Planning Division’s web page.

**§206.56 Suggestions for Agency Cost Savings**, Texas Administrative Code, March 2014.

[https://texreg.sos.state.tx.us/public/readtac\\$ext.TacPage?sl=T&app=9&p\\_dir=P&p\\_rloc=187750&p\\_tloc=&p\\_ploc=1&pg=2&p\\_tac=&ti=1&pt=10&ch=206&rl=70](https://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=T&app=9&p_dir=P&p_rloc=187750&p_tloc=&p_ploc=1&pg=2&p_tac=&ti=1&pt=10&ch=206&rl=70)

This statute provides the foundation for the process improvement program’s suggestions program. *From the code:*

To the extent possible using available resources, a state agency with 1,500 or more employees shall provide on the agency’s intranet or internet website an electronic form or link to a tool by which an employee may submit suggestions and ideas for cost savings.

- (1) A state agency must provide an employee the options of submitting the suggestion or idea with attribution or anonymously.
  - (A) An anonymous suggestion may not be traceable to the employee; and
  - (B) The system or tool by which an anonymous suggestion is submitted shall not record any data that would link the suggestion or idea to the computer used for the submission.
- (2) A state agency shall provide a means by which the public may:
  - (A) [M]onitor, in real time or on a weekly, monthly or quarterly basis, submissions made under this rule; and
  - (B) [V]ote for a favorite submission.
- (3) Suggestions or ideas submitted under this rule shall be moderated by or on behalf of the agency to exclude, at a minimum, overtly political or offensive language.

*Vermont*

**Continuous Improvement**, Performance Section, Vermont Agency of Transportation, undated.

<https://vtrans.vermont.gov/finance-admin/performance/continuous-improvement>

Continuous improvement in the workplace is briefly explained along with a summary of the continuous improvement program at the agency. Also available on this web page is access to archived blog posts (from December 2015 to winter 2018); a graph of continuous improvement projects (active, inactive complete, closed and cancelled); and Lean resources.

## Tracking Methodologies

Survey respondents also discussed their agencies' experience tracking the efficiencies gained, including:

- Practices used to quantify the efficiencies gained.
- Tracking efficiencies to ensure they persist over time.
- Successes and challenges in developing and implementing a tracking methodology.
- Experience with L6S processes that don't continue.
- Differentiating between hard savings (actual money saved) and soft savings or cost avoidance (efficiencies not tied to direct dollar savings) when tracking efficiencies.
- Methods used to count an innovation, efficiency savings or cost avoidance.

Only Vermont Agency of Transportation tracks efficiencies to ensure they persist over time. The agency uses various spreadsheet practices, including Excel Power BI dashboards. Both Michigan DOT and Texas DOT would like to track efficiencies over time. When Michigan DOT tracks efficiencies, it uses the methodology from its statewide continuous improvement office. Texas DOT has very limited tracking of cost savings but not over time.

None of the agencies has encountered an L6S process that doesn't continue.

Survey responses from these agencies are summarized in the case studies below.

### Michigan Department of Transportation

<b><u>Topic</u></b>	<b><u>Description</u></b>
<b>Quantification Process</b>	The agency has an application process. It also provided documentation during a recent audit.
<b>Tracks Efficiencies Over Time</b>	No, but the agency would like to. The agency currently uses the methodology from its statewide continuous improvement office.
<b>Successes Developing/Implementing a Tracking Methodology</b>	N/R
<b>Challenges Developing/Implementing a Tracking Methodology</b>	<ul style="list-style-type: none"> <li>• The continuous improvement office methodology is not a "one-size-fits-all" practice. Projects vary in nature, and all or some parts of the methodology may apply.</li> <li>• Additionally, the agency recognizes the need to focus on people and behavior as it relates to continuous improvement. Understanding change management is a crucial piece in applying continuous improvement.</li> </ul>
<b>Differentiates Between Hard Savings and Soft Savings/Cost Avoidance</b>	No
<b>Practice Used to Count an Innovation/ Efficiency Savings/Cost Avoidance</b>	Year of implementation only

N/R No response.

## Texas Department of Transportation

### Topic

**Quantification Process**

### Description

- The agency doesn't quantify all efficiencies gained. When possible, it tracks hard savings (for example, in materials and equipment or travel savings).
- Some items have hard savings that are incorporated in a cost savings account for use by the executive team. A cost savings report is produced in Excel and shared quarterly with the executive team at program updates.

**Tracks Efficiencies Over Time**

No, but the agency would like to.

**Successes Developing/Implementing a Tracking Methodology**

The agency has very limited tracking of cost savings but not over time. It plans to begin tracking cost avoidance soon.

**Challenges Developing and Implementing a Tracking Methodology**

- Many efforts are producing cost savings and efficiency within the "vast agency," but they are unknown to this small team.
- Divisions and districts have concerns about budget visibility if they produce savings:
  - Would it be swept?
  - How much manpower and what process would be required to collect information?

**Differentiates Between Hard Savings and Soft Savings/Cost Avoidance**

Yes. The agency is developing a tracking methodology for cost avoidance.

**Practice Used to Count an Innovation/Efficiency Savings/Cost Avoidance**

The agency operates on a biennial appropriation cycle, so it counts cost savings over both years of the biennium if the effort started in the first year of the biennium.

## Vermont Agency of Transportation

### Topic

**Quantification Process**

### Description

- Cost reduction
- Cycle time improvement
- FTE reduction

**Tracks Efficiencies Over Time**

Yes, using various spreadsheet practices, including Excel Power BI dashboards.

**Successes Developing/Implementing a Tracking Methodology**

The agency began rolling out dashboard sets several years ago, and adoption has varied across the organization. For example, maintenance and construction teams use dashboards quite extensively but other operations areas are just now adopting.

**Challenges Developing/Implementing a Tracking Methodology**

Identifying the difference between performance measures and operational measures. Operational measures assess volumes of work without assessing how well they are doing. Most management wanted to stay with operations rather than performance.

**Differentiates Between Hard Savings and Soft Savings/Cost Avoidance**

N/A

**Practice Used to Count an Innovation/Efficiency Savings/Cost Avoidance**

The agency is developing tracking programs for innovation but has not yet implemented them.

N/A Not applicable.

## Reporting Practices

None of these agencies publishes reports that describe the short- or long-term impacts of their agencies' continuous process improvement or efficiency initiative. Similarly, none of these agencies prepares an annual report or other deliverable to report on efficiencies, although the survey respondent from Vermont Agency of Transportation indicated that there was some internal reporting.

### Supporting Documents

#### *Texas*

**Innovation and Cost Efficiency Program (I/CE)**, Texas Department of Transportation, undated.

See [Appendix C](#).

Texas DOT's internal web site (Crossroads) provides an overview of the program, the value that efficiency efforts add to the agency and recent accomplishments.

## Recommendations for Implementation

Below are survey respondents' recommendations for agencies that are considering establishing a continuous process improvement or efficiency initiative that generates long-lasting results:

### **Michigan**

- Understand change management and how it applies to continuous improvement.
- Ensure tracking methodologies use metrics. They are crucial to tracking success.
- Prioritize the initiative and involve sponsors in the process. Prioritization and sponsorship have been two large barriers in Michigan DOT's implementation.

### **Texas**

- Conduct regular briefings with executives to get feedback; create and maintain buy-in; and share program inputs and suggestions, tracking and successes. (Texas DOT conducts quarterly briefings.) The team should include at least some internal hires with institutional knowledge, especially about district and field operations.
- Establish a program focused on building the culture of process improvement throughout the agency since the small team directly responsible for efficiencies can have only a small impact. Potential strategies for this program include creating training courses and a community of practice.
- Recognize employees who participate in the process. At Texas DOT, employees who make suggestions receive personally signed thank-you notes from the executive director; those whose suggestions are implemented receive eight hours of time off and are recognized in the agency's employee magazine.

### **Vermont**

- Obtain executive buy-in. Without it and without maintaining it, the efforts will be lost and not sustainable.
- Train the staff initiating the program before training members of the agency.
- Dashboard the program and provide reporting to executive staff.

## Initiatives Under Development

### Utah Department of Transportation

Utah DOT is currently developing a process improvement initiative. The agency's operational excellence program, which was based on the theory of constraints, was discontinued after a change in state leadership in November 2020. Since then, the agency has been investigating L6S, design thinking, human-centered design and other improvement methodologies to add to the lessons learned from the theory of constraints. Information about this effort, gathered through the survey and in a follow-up phone interview, is summarized below and in the presentations following this summary.

<b><u>Topic</u></b>	<b><u>Description</u></b>
<b>Description of Practice</b>	<p>To encourage innovation and overcome resistance to change, the agency relies on a three-component continuous improvement cycle of performance management, idea generation and change management.</p> <p>Utah DOT's process improvement method has six steps:</p> <ul style="list-style-type: none"><li>• <i>Discover</i>: Generate ideas to address an issue.</li><li>• <i>Define</i>: Identify the issue and ensure that everyone is on the same page.</li><li>• <i>Analyze</i>: Identify the root causes.</li><li>• <i>Imagine</i>: Brainstorm ideas and identify potential solutions.</li><li>• <i>Implement</i>: Initiate and test improvements.</li><li>• <i>Review</i>: Measure performance and make adjustments.</li></ul> <p>This method is based on the L6S DMAIC (define, measure, analyze, improve and control) methodology and other tools.</p>
<b>Initiative Oversight</b>	<ul style="list-style-type: none"><li>• <i>Division</i>: Transportation Performance Management</li><li>• <i>Director of efficiency initiative</i>: Patrick Cowley</li><li>• <i>Staffing</i>: 1 FTE and consultants. (<i>Note</i>: The division is currently recruiting for this position to replace the previous FTE.)</li></ul>
<b>Functional Areas Participating in Initiative</b>	<ul style="list-style-type: none"><li>• Employee Development</li><li>• Communications</li><li>• Performance Management</li><li>• Enterprise Risk</li><li>• Innovation and Implementation</li><li>• Internal Audit</li></ul>
<b>Tracking Methodology</b>	<p>Currently, the agency does not track results. There isn't a procedure for tracking, and reporting is not required. When the theory of constraints was used for continuous improvement, the agency tracked efficiencies closely, reporting on a monthly basis for most efficiencies and annually for others.</p>
<b>Successes Developing and Implementing Initiative</b>	<ul style="list-style-type: none"><li>• <i>Cost savings</i>. For example, improvements to the collections process for claims from damaged roadside equipment reduced the collection time and allowed the agency to purchase snowplows.</li><li>• <i>Time savings</i>.</li><li>• <i>Improved customer service</i>.</li></ul>



<b>Topic</b>	<b>Description</b>
<b>Challenges Developing and Implementing Initiative</b>	<p>Creating a culture of continuous improvement requires that the agency:</p> <ul style="list-style-type: none"> <li>• Address the independent nature of individual group practices.</li> <li>• Provide guidance for employee use and reference.</li> <li>• Obtain buy-in to the process throughout the agency.</li> </ul>

Supporting Documents

**Performance Management and Continuous Process Improvement**, Utah Department of Transportation, 2021.

(This presentation has been provided to Caltrans separately.)

Utah DOT's continuous improvement system is described along with tools and techniques that support continuous improvement efforts.

**A Culture of Continuous Improvement Through the Continuous Improvement Cycle**, Utah Department of Transportation, October 2021.

(This presentation has been provided to Caltrans separately.)

This presentation explores the three components of the agency's continuous improvement cycle.

**Organizational Management**, Transportation Performance Management, Utah Department of Transportation, undated.

<https://www.udot.utah.gov/connect/about-us/technology-innovation/transportation-performance-management-division/organizational-management/>

Process improvement methods used within Utah DOT are presented at this web site, including the theory of constraints, human-centered design and L6S. The agency promotes a continuous improvement mindset by:

- Learning from groups to outline their strengths in how they do their jobs.
- Creating space by defining processes that open more time for innovation.
- Facilitating discussions and providing tools to expand job satisfaction.
- Promoting knowledge management by documenting processes.

## **Related Research and Resources**

A literature search of recent publicly available domestic resources and in-progress research identified publications and other resources, which are presented below in these topic areas:

- National resources.
- State resources.
- Related resources.

### **National Resources**

**Improving Business Processes for More Effective Transportation Systems Management and Operations**, Lisa Burgess, Thomas Fowler, Amy Minowitz and Louis Neudorff, Federal Highway Administration, Office of Operations, January 2016.

<https://ops.fhwa.dot.gov/publications/fhwahop16018/fhwahop16018.pdf>

*From the abstract:* Many agencies are shaping their Transportation Systems Management and Operations (TSMO) programs to more effectively address those planned and unplanned events that affect road and travel conditions and can have an effect on overall system reliability.

Business processes, in the context of TSMO, refer to activities such as planning, programming, agency project development processes and those organizational aspects that govern various technical or administrative activities (such as training, human resource management or agreements). Business processes get at the heart of many of the organizational issues that can influence TSMO. This primer presents business processes across several TSMO areas, including traffic incident management, planned special event traffic management, road weather management, work zones and freeway traffic management. Case studies in each area illustrate where agencies have made concerted changes to their respective business processes and modified aspects such as contracting, training, resource allocation, planning and other business processes. The primer also highlights available tools and resources to help assess business processes, provides strategies for engaging the right stakeholders and provides a guide to next steps.

### **State Resources**

#### **Arizona**

**Arizona Management System: Resources**, Office of the Arizona Governor, State of Arizona, undated.

<https://ams.az.gov/resources>

*From the web site:*

The Arizona management system is based on principles of Lean, a proven people-centered approach that has delivered effective results in both public and private sectors. Lean focuses on customer value, continuous improvement and engaged employees to improve productivity, quality and service.

Lean training and tools are available from this web site.

## Arkansas

**Arkansas Efficiency Project**, Greg Kaza, Arkansas Policy Foundation, undated (refers to 2016-2017 budget).

<http://arkansaspolicyfoundation.org/EFFICIENCY%20PROJECT.docx>

This document presents the efforts of a state government beginning to identify and incorporate efficiency concepts and strategies into its core functioning. L6S is briefly mentioned.

The goal of the Arkansas Efficiency Project, initiated in December 2015 by Gov. Asa Hutchinson, was to “streamline state government and make it more cost-effective and citizen accountable. ... The [p]roject seeks to identify cost savings from efficiency reforms such as consolidation and privatization.” Twenty-one executive branch agencies were reviewed; the Efficiency Project made 60 policy recommendations. L6S was included as a recommended management strategy to eliminate waste.

## California

**“Investigation of the Use of Lean Construction Practices in Transportation Construction Projects,”** Mohammad R.A.H. Al Heet, Thais da C.L. Alves and Nensi Lakrori, *28th Annual Conference of the International Group for Lean Construction*, July 2020.

Publication available at

[https://www.researchgate.net/publication/345488493\\_Investigation\\_of\\_the\\_Use\\_of\\_Lean\\_Construction\\_Practices\\_in\\_Transportation\\_Construction\\_Projects](https://www.researchgate.net/publication/345488493_Investigation_of_the_Use_of_Lean_Construction_Practices_in_Transportation_Construction_Projects)

*From the abstract:* The use of Lean Construction (LC) concepts and tools has advanced in different sectors in the United States, including but not limited to, delivery of commercial, educational and hospital buildings. Many contractors working on these sectors appear to use more collaborative forms of contracts and have been more willing to [experiment] with LC. However, in the transportation sector [LC] appears to be in its early phases of adoption. This sector has used tools aiming at fostering collaboration which are developed based on recommendations from departments of transportation in different states. Yet, the sector has not embraced Lean practices that could support the design, planning and construction of these projects. This study aimed at identifying management practices used by organizations building or managing the construction of transportation projects in Southern California and identifying opportunities to use Lean practices to deliver these projects. Interviews were carried out with contractors, owners and consultants and later categorized to identify the practices used, gaps where LC practices could be implemented and the level of maturity of the organizations investigated regarding the use of [LC] practices. Findings revealed that organizations use collaborative practices, visual management tools, 5S [sort, set in order, shine, standardize and sustain] and root cause analysis to investigate problems.

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*Note:* The current Preliminary Investigation builds on the following two reports, which examined the implementation of efficiencies.

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**Implementing and Reporting on Efficiencies and Process Improvements**, California Department of Transportation, December 2019.

<https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/preliminary-investigations/pi-0243v3-a11y.pdf>

Process improvement strategies are presented that other state transportation agencies use to identify, assess, improve and report efficiencies. Results from this project were used to inform the development of a business plan and accompanying materials that would allow Caltrans to

meet the reporting requirements of California Senate Bill 1, the Road Repair and Accountability Act of 2017.

*Related Resource:*

**Implementing Efficiencies as Part of an Investment Strategy**, California Department of Transportation, December 2017.

<https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/preliminary-investigations/implementing-efficiencies-as-part-of-an-investment-strategy-pi-a11y.pdf>

Efficiency-related practices and programs from state DOTs are presented along with best practices to quantify efficiencies, track and report results, and implement accountability practices.

**Mapping and Improving the Delivery Process of Highway Pavement Rehabilitation Projects**, Iris Tommelein and Nigel Blampied, California Department of Transportation, January 2018.

[http://ucconnect.berkeley.edu/sites/default/files/file\\_uploads/2016-TO-43-65A0529.pdf](http://ucconnect.berkeley.edu/sites/default/files/file_uploads/2016-TO-43-65A0529.pdf)

*From the executive summary:* Highway pavement rehabilitation (HPR) is a service provided by departments of transportation (DOTs) worldwide. The process of delivering HPR projects involves not only a transportation department but also many other project participants and stakeholders; furthermore, it is subject to numerous technical- as well as socio-political considerations. Interestingly—though not surprisingly—the processes DOTs use to deliver this service vary widely, not only between countries or between states in the U.S., but also regionally within a given state such as California. While some variation is to be expected, it is not necessarily of value to some or all concerned. Management practices such as Lean and Six Sigma can be key to driving out unwanted variation and thereby lead to performance improvements locally and overall.

Addressing “Goal 5 Operational Excellence” in Caltrans’ (2015a) Strategic Management Plan, this research set out to view HPR projects through the lenses of Lean and Six Sigma, in combination referred to as Lean Six Sigma. These management philosophies—herein broadly referred to by the broad term “Lean Thinking”—overlap in concepts and methods, but they all aim to promote continuous improvement and value delivery.

## **Colorado**

**Lean Interchange**, Colorado Department of Transportation, 2021.

<https://sites.google.com/state.co.us/leaninterchange/home>

The Lean Interchange, currently managed by Colorado DOT’s Office of Process Improvement, is an online resource that members of the Transportation Lean Forum (TLF) use to share information and resources. TLF comprises members from state DOTs and other government highway/transportation organizations in the United States, Canada and England.

*Related Resources:*

**Previous TLF Recordings**, Colorado Department of Transportation, undated.

<https://sites.google.com/state.co.us/leaninterchange/previous-tlf-recordings?authuser=0>

This web page provides TLF member videos and presentations from 2013 to the present.

**Transportation Lean Forum**, American Association of State Highway and Transportation Officials, undated.

<https://www.tpm-portal.com/collections/transportation-lean-forum/>

*From the web site:* To help promote Lean business management and provide support to each other, several transportation agencies have formed the “Forum for Lean Process Improvement in Governmental Highways/Transportation [O]rganizations.” This group is also referred to as the Transportation Lean Forum (TLF). The TLF Toolkit collects resources links and targeted background information to help you get started and continue to advance your Lean practice.

**“Lean Innovation and Improvement,”** Tools and Resources, Process Improvement, Colorado Department of Transportation, 2021.

<https://www.codot.gov/business/process-improvement/self-service/tools>

A wide range of resources related to Lean principles and practices are presented, among them the resource cited below:

**Output, Customer and Process Metrics**, Process Improvement, Colorado Department of Transportation, April 2018.

<https://sites.google.com/state.co.us/process-improvement/tools-resources/output-customer-process-metrics>

*From the web page:*

The following is a list of metrics frequently used in Lean process improvement projects to measure the outcomes of a process and various aspects of the process itself, in order to identify opportunities for improvement and monitor changes over time. These metrics help to pinpoint sources of waste, variability and/or customer dissatisfaction. By focusing on them, managers and the improvement teams they charter will have a greater potential to find the root causes of problems and thus high-leverage areas for improvement.

Metrics related to the following topics are described:

- Output.
- Process and customers.
- Time (efficiency).
- Quality and customers (effectiveness and elegance).
- Process complexity.
- Cost.

## **Connecticut**

**LeanCT**, Office of Policy and Management, State of Connecticut, undated.

<https://portal.ct.gov/OPM/Fin-LeanCT/Lean/LeanCT>

Lean videos: <https://www.gembaacademy.com/quests/state-of-connecticut>

LeanCT is “responsible for the daily management and coordination of Connecticut’s statewide process improvement initiative.

“The program assists agencies in using organizational, process and programmatic improvement techniques, such as Lean, to help create a sustainable, customer-focused and more efficient future for Connecticut.” This web page provides access to videos that describe the state’s Lean efforts.

## Iowa

**Transportation Systems Management and Operations (TSMO) Program Plan**, Iowa Department of Transportation, February 2016.

<https://iowadot.gov/TSMO/TSMO-Program-Plan.pdf>

*From the introduction:*

The overall purpose of Iowa's TSMO plan is to improve the capabilities of Iowa DOT to operate and proactively manage the state's transportation system. The TSMO plan provides: 1) strategic direction, 2) program development and 3) specific strategies and actions .... In this context, the TSMO Program Plan focuses specifically on program development within the Iowa DOT and bridges the TSMO strategic vision with the specific actions needed to achieve the vision. The programmatic focus provides the organizational, procedural and resource framework needed to move TSMO from a group of ad hoc activities and services to an integrated approach.

A discussion of continuous improvement (including the capability maturity model) begins on page 39 of the report (page 47 of the PDF).

## Minnesota

**Minnesota Office of Continuous Improvement**, Department of Administration, State of Minnesota, undated.

<https://mn.gov/admin/continuous-improvement/>

The mission of the Minnesota Office of Continuous Improvement is "to improve Minnesota state government services every day by solving problems that change lives. We do this by leading and supporting our [s]tate government agencies as they build a culture of CI [continuous improvement] and capacity for implementing CI projects in their day-to-day business practices. We use time-tested CI tools and methodologies, including Lean, Six Sigma, [h]uman-centered [d]esign and more to empower employees and improve the efficiency and effectiveness of government services for Minnesotans." The web site provides access to training, a continuous improvement toolbox and success stories.

## Nebraska

**Center of Operational Excellence**, Department of Administrative Services, State of Nebraska, undated.

<https://das.nebraska.gov/coe/>

The goal of the Center of Operational Excellence is to "help agencies simplify processes, resulting in a more effective, efficient and customer-focused government." Promoting continuous process improvement, the center provides training and certification in L6S across all state agencies. Access to program results and current projects is available from the web site.

## New Hampshire

**Lean New Hampshire: Continuous Improvement**, Department of Administrative Services, State of New Hampshire, 2021.

<https://lean.nh.gov/>

Blog: <https://prd.blogs.nh.gov/das/NHLEAN/>

This web site provides links to a range of resources related to Lean practices, including a blog that provides scheduling and reporting of member events.

## Ohio

**LeanOhio**, Ohio Department of Administrative Services, undated.

<https://lean.ohio.gov/>

*From the web site:* The mission of LeanOhio is to make government services in Ohio simpler, faster, better and less costly. Using the improvement methods of Lean and Six Sigma, Ohio's state agencies are cutting red tape, removing inefficiencies, improving customer service and achieving measurable results.

The LeanOhio Network includes over 1,000 state employees who have been involved in [k]aizen events and other process improvement projects. Many have earned Lean certifications through our training program. The [n]etwork includes state employees who promote Lean, improve processes and partner with the state to teach Lean tools and strategies.

Each state agency has a Lean Liaison. This ensures communication and coordination throughout state government. Liaisons identify improvement opportunities, engage agency staff in improvement efforts, and ensure that changes are implemented and sustained.

LeanOhio is coordinated by the LeanOhio office within the Ohio Department of Administrative Services. Office associates are Lean Six Sigma experts who serve as internal systems improvement consultants.

### *Related Resource:*

**LeanOhio Resources**, LeanOhio, Ohio Department of Administration, undated.

<https://lean.ohio.gov/Resources.aspx>

This web page offers a list of links to 19 L6S resources relevant to the LeanOhio endeavor. Included are documents addressing L6S terminology, methods and metrics, as well as a 92-page LeanOhio toolkit that offers “clear how-to descriptions of crucial tools to analyze processes, generate ideas, reach consensus, build plans and more.”

## Washington

**Results Washington**, Office of the Governor, State of Washington, undated.

<https://results.wa.gov/>

Results Washington was established in 2013 to “strengthen performance management and continuous improvement in state government.”

### *Related Resource:*

**What's Ahead at Results Washington**, Office of the Governor, State of Washington, February 18, 2021.

[https://results.wa.gov/sites/default/files/AgencyUpdate\\_FINAL\\_20210505.pdf](https://results.wa.gov/sites/default/files/AgencyUpdate_FINAL_20210505.pdf)

This presentation addresses three current tasks at Results Washington, including developing a strategic framework for 2021 and beyond. Slide 11 describes Results Washington's role and work in continuous improvement, including what agencies need from Results Washington and how to integrate continuous improvement and performance management.

## Wisconsin

**Lean Six Sigma and Performance Measurement at Wisconsin DOT**, Blog Post, International Society of Six Sigma Professionals, undated.

<https://isspp.org/lean-six-sigma-and-performance-measurement-at-wisconsin-dot/>

*From the web page:*

Wisconsin DOT uses their MAPSS [mobility, accountability, preservation, safety and service] [p]rogram to measure how they are doing and have implemented Lean Six Sigma to drive improvement where needed. These core measures from MAPSS represent the corporate measures that Wisconsin DOT feels are of greatest interest to the public and align with the department's strategic goals.

MAPSS performance measurement areas as defined by Wisconsin DOT are:

- Mobility—Delivering transportation choices that result in efficient trips and no unexpected delays.
- Accountability—The continuous effort to use public dollars in the most efficient and cost-effective way.
- Preservation—Protecting, maintaining and operating Wisconsin's transportation system efficiently by making sound investments that preserve and extend the life of our infrastructure, while protecting our natural environment.
- Safety—Moving toward minimizing the number of deaths, injuries and crashes on our roadways.
- Service—High quality and accurate products and services delivered in a timely fashion by a professional and proactive workforce.

This blog post also offers a video from Wisconsin DOT in which department managers describe how L6S was used to drive improvements in three project areas:

- Highway sign provision.
- Division of Motor Vehicles driver's license skill test demand.
- Let project (projects awarded by bidding) closeout.

*Related Resources:*

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

<https://wisconsin.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 January, April, July and October. 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.



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

<https://wisconsin.gov/Pages/about-wisdot/performance/lean-qvmt/leangovt-practice.aspx>

This web page provides links to Lean projects related to MAPSS measurement areas:

- Mobility (no current projects listed).
- Accountability (36 projects).
- Preservation (2 projects).
- Safety (6 projects).
- Service (17 projects).

## **Related Resources**

**Lean Government Center**, Quality and Productivity Improvement Center, undated.

<https://leangovcenter.com/govweb.htm>

This web site provides an extensive list of links to Lean government web sites in states and cities across the country.

**“Journey Toward Lean Construction: Pursuing a Paradigm Shift in the AEC Industry,”** Iris Tommelein, *Journal of Construction Engineering and Management*, Vol. 141, Issue 6, June 2015.

Citation at [https://ascelibrary.org/doi/abs/10.1061/\(ASCE\)CO.1943-7862.0000926](https://ascelibrary.org/doi/abs/10.1061/(ASCE)CO.1943-7862.0000926)

*From the abstract:* This paper presents a personal historic view on [L]ean construction, referring to the application of [L]ean thinking to the delivery of capital projects in the architecture–engineering–construction (AEC) industry. Lean construction has caused a paradigm shift: [I]t offers a new way of thinking to those involved in designing and managing AEC projects. The systems thinking that [L]ean promotes began to develop in the AEC industry 20-some years ago and was spurred by the recognition that the then current thinking about the delivery of projects was incongruent in many ways. The writer first offers conceptual underpinnings to frame this new way of thinking, and then describes her journey of discovery of incongruences in construction project management theory and practice. Along the way, the writer offers several partial yet complementary definitions of [L]ean construction while giving examples and illustrations of the underlying [L]ean thinking. The writer’s thesis is that [L]ean thinking helps eliminate much self-inflicted, unwanted complexity from systems, so that people can accomplish more using simpler systems. Readers may not necessarily agree with this thesis, but are challenged to at least consider that [L]ean thinking offers a new paradigm for the AEC industry, and that it is worth pursuing.

**“Lean Principles Application in Public-Private Partnership Projects’ Procurement,”**

Ramtin Malek and Ghada Gad, *Second International Conference on Public-Private Partnerships*, 2015.

Citation at <https://ascelibrary.org/doi/abs/10.1061/9780784480267.035>

*From the abstract:* With the budget pressures that state departments of transportation (DOTs) are facing, slow revenue growth, congestion resulting in a need for new highway capacity, increasing costs of aging infrastructure maintenance and construction, in addition to, traditional project delivery methods falling behind on meeting those complex challenges, there is a crucial need to employ new innovative project delivery methods, such as, public-private partnerships (PPPs). However, the additional risks associated with PPPs due to the integration of the operation and maintenance phases need attention during the procurement stage. With 55% of

PPP projects being renegotiated between the public and private sectors after [three] years of project award, the effect of operation and maintenance risks clearly emerges. On the other side, [L]ean application has been proven to achieve sustainability through enhancing value and eliminating waste offering potential benefits to PPP projects. The objective of this study was to investigate the importance of [L]ean assessment during the procurement phase in PPP projects from the DOTs' perspectives. To achieve this objective, surveys were sent to the 33 DOTs that have PPP legislation, to investigate if [L]ean was considered as one of the evaluation criteria in their bid documents. Results of the survey showed that 37% of state DOTs were not familiar with [L]ean definition. In addition, none of the state DOTs reported considering [L]ean applications as one of the evaluation criteria in their bid documents. These results indicated that developing a consistent definition for [L]ean in RFP/RFQ documents that includes all the aspects of [L]ean principles is the first step for successful [L]ean implementation on PPP projects. If state DOTs are to start requesting [L]ean qualifications in their bidding documents, it becomes important to also investigate the weight placed on [L]ean principles as an evaluation criteria in the bid documents.

## Contacts

CTC contacted the people below to gather information for this investigation.

### **State Agencies**

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## Appendix A: Survey Questions

The following survey was distributed to members of the American Association of State Highway and Transportation Officials (AASHTO) Committee on Performance-Based Management.

### **Survey on State Transportation Agency Use of Efficiency Tools**

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*Note:* The response to the question below determined how a respondent was directed through the survey.

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(Required) Has your agency successfully deployed a continuous process improvement/efficiency initiative as part of a coordinated agencywide program?

- No. (Directed the respondent to the **Wrap-Up** section of the survey.)
- Yes. (Directed the respondent to the **Efficiency Tool or Practice** section of the survey.)

#### **Efficiency Tool or Practice**

1. Please name and briefly describe the efficiency tools or practices your agency has adopted.
2. When did your agency adopt this efficiency tool or practice?
3. Please indicate whether this tool or practice is:
  - Mandated by law
  - Mandated by an internal office or division
  - Mandated by a state agency
  - Voluntary
4. Does your agency have a definition of an efficiency?
  - No
  - Yes (Please provide your agency's definition of an efficiency.)
5. Please describe the administration of your agency's continuous process improvement/efficiency initiative.
  - Name of the office/division providing oversight
  - Name and title of the efficiency initiative's director or manager
  - Number of full-time staff
  - Number of part-time staff
  - Functional areas participating in the efficiency initiative

#### **Tracking and Reporting**

1. Please briefly describe how your agency quantifies the efficiencies gained.
2. Does your agency track efficiencies to ensure they persist over time?
  - No, and we have no plans to do so. (Please skip to **Question 3**.)
  - No, but we'd like to. (Please skip to **Question 3**.)
  - Yes (Please describe the tracking methodology and respond to **Questions 2A** and **2B**.)
- 2A. Please describe the successes your agency encountered in developing and implementing a tracking methodology.
- 2B. Please describe the challenges your agency encountered in developing and implementing a tracking methodology.
3. Has your agency encountered a Lean 6-Sigma (L6S) process that doesn't continue?
  - No
  - Yes (Please describe how the discontinued L6S process is captured and handled.)

4. Does your agency differentiate between hard savings (actual money saved) and soft savings or cost avoidance (efficiencies not tied to direct dollar savings) when tracking efficiencies?
  - Not applicable
  - No
  - Yes (Please describe how you make this differentiation and how it is reflected in your tracking.)
5. How does your agency count an innovation, efficiency savings or cost avoidance?
  - Year to year (Please respond to **Question 5A.**)
  - Year of implementation only
  - Other (Please describe your agency's practice.)
- 5A. If your agency counts year to year, what factor is used to determine when the innovation, efficiency savings or cost avoidance is considered a standard practice and is no longer counted?
6. Has your agency published reports that describe the **short-term impacts** of your agency's continuous process improvement/efficiency initiative?
  - No
  - Yes (Please provide a link to examples of these reports or send a hard copy to [carol.rolland@ctcandassociates.com](mailto:carol.rolland@ctcandassociates.com).)
7. Has your agency published reports that describe the **long-term impacts** of your agency's continuous process improvement/efficiency initiative?
  - No
  - Yes (Please provide a link to examples of these reports or send a hard copy to [carol.rolland@ctcandassociates.com](mailto:carol.rolland@ctcandassociates.com).)
8. Does your agency prepare an annual report or other deliverable to report on efficiencies?
  - No (Please respond to **Question 9.**)
  - Yes (Please respond to **Questions 8A** and **8B.**)
- 8A. Is the annual report or deliverable required?
  - Yes
  - No
- 8B. Is the annual report or deliverable public-facing or internal?
  - Public-facing
  - Internal
9. If available, please provide links to documentation not already provided (or send a hard copy to [carol.rolland@ctcandassociates.com](mailto:carol.rolland@ctcandassociates.com)) that describes your agency's continuous process improvement/efficiency initiative.

### Recommendations

What are the top three recommendations you have for an agency considering establishing a continuous process improvement/efficiency initiative that generates long-lasting results?

- Recommendation 1:
- Recommendation 2:
- Recommendation 3:

### Wrap-Up

Please use this space to provide any comments or additional information about your previous responses.

## I/CE Program Overview

The Innovation and Cost Efficiency (I/CE) Program is an internal cost savings and process efficiency program originally established as a result of the 83<sup>rd</sup> Legislature's focus on fostering stewardship by ensuring efficient use of state resources<sup>1</sup>. While the Program is still dedicated to this directive - offering employees the opportunity to submit suggestions and allowing the public to vote for their favorites - it has evolved significantly since its inception. Today, the I/CE Program exists within the Strategic Planning Division (STR) and remains determined to help EVERYONE within the Texas Department of Transportation improve processes, products, and services by ensuring that every idea is valued, supported, and shared across the department.

The I/CE Program accomplishes these goals and adds value to the department by:

- Discovering innovative ideas to improve efficiencies and increase savings
- Planning potential projects to optimize department services and stakeholder benefits
- Designing more cost effective and efficient ways of performing everyday work
- Delivering management analysis and implementing solutions to enable better government

CostSavings   
Efficiency. Innovation. TxDOT.

 **SUBMIT  
YOUR SUGGESTION**

### I/CE Program Snapshot (STR)

- 2 project managers
- 3 management analysts
- Supports 34 divisions and 25 districts
- 63 suggestions received during FY21 year-to-date

## Better Utility Account Management

**UTILITY PORTAL:** More than half of TxDOT's 20,000 electric accounts and \$26 million in annual electric costs are administered through current Retail Electric Provider Gexa Energy serving the deregulated energy market. Roadway assets rather than facilities comprise the vast majority of our electric accounts and are challenging to manage due to daily changes. In partnership with Gexa Energy, TxDOT implemented an online portal in 2020 to replace a form-based process to connect and disconnect electrical service.

- More account transparency: Availability of reports eliminates at least 50% of the need under the old process to contact the utility provider for status of connection/disconnection requests. Account and usage reports provide information not previously accessible.
- Fewer account rejections and time delays: The new process reduces the time required, standardizes data, and improves the accuracy of meter add/delete requests.

**LED/METERING OF ILLUMINATION STATEWIDE:** TxDOT is developing a proposal for an LED luminaire and metering statewide initiative that will realize significant cost savings and improve safety. TxDOT maintains 80,000 luminaires, currently a mix of LED and high-pressure sodium (HPS).

- Potential of LED/Metering cost savings: El Paso District upgrading one un-metered string of 1,285 high-pressure sodium (HPS) bulbs to LED would save \$165,912 annually. Additional savings possible by metering flat-rate accounts.
- LED offers safer and better light: LED illumination provides better light, and LED luminaire lifespans of 15-25 years (compared to 18-24 months for HPS) require less maintenance, improving safety.
- \$7M LED retrofit by Colorado DOT (CDOT): CDOT acquired \$7M funding from their transportation commission for a statewide retrofit of 10,000 luminaires to LED.
- State DOTs trending toward LED/metering: A market-driven trend toward LED use and metering exists both at TxDOT and other state DOT's, but opportunities exist to address illumination and metering consistency issues statewide.



Figure - HPS luminaires vs. LED luminaires

<sup>1</sup> 10 T.A.C. § 206.56 "Suggestions for Agency Cost Savings"

# Travel Cost Savings

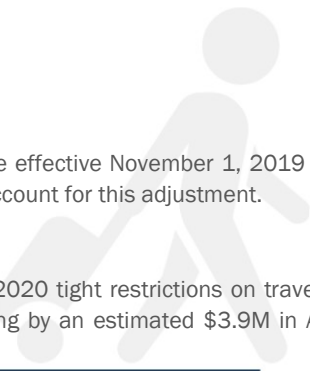
## PERSONAL VEHICLE MILEAGE RATE REDUCED

TxDOT decreased the personal vehicle mileage reimbursement rate from \$0.54/mile to \$0.32/mile effective November 1, 2019 to increase utilization of fleet. A three percent across-the-board travel budget cut was made in AY20 in part to account for this adjustment.

## AY20 PANDEMIC DRIVES TRAVEL REDUCTION

In response to the pandemic, TxDOT Executive Director Bass announced via email on March 13, 2020 tight restrictions on travel statewide during Appropriation Year 2020 (AY20). This action resulted in reduced department travel spending by an estimated \$3.9M in AY20. AY21 currently tracking towards producing similar results.

**\$3.9M**



# Developing a Culture of Efficiency

The I/CE program strives to act as a catalyst for change both through serving TxDOT as the employee suggestions “think tank” and through promoting a culture of cost savings and efficiency throughout the department.

## PROCESS IMPROVEMENT (PI) PROGRAM

I/CE is launching a Process Improvement Program that consists of a newly developed one-day course, Process Improvement Fundamentals, and a five-day course, Lean/Six Sigma, that are supported by a Process Improvement Community of Practice. This program is designed to teach basic process improvement tools across the department and enable all employees to utilize these tools to improve their processes and realize cost savings, amplifying the impact of the small I/CE team.

## EMPLOYEE RECOGNITION

TxDOT recognizes employees who submit suggestions that are implemented through recognition in TN Magazine articles and performance leave awards. All suggesters receive personal notes from TxDOT executive leadership thanking them for their commitment to stewardship.

## RECENTLY IMPLEMENTED SUGGESTIONS

Optimizing the Utility Connect/Disconnect Portal	Decommissioning the Outdated Bid Proposal Request System
Reducing Use of Petty Cash across Districts	Rethinking Construction Plans and Proposal Printing
Upgrading the TN Magazine Printing and Distribution Model	Personal Vehicle Mileage Reimbursement Rate Reduction

Illustrations – I/CE Program articles published recently in the TxDOT Transportation News magazine



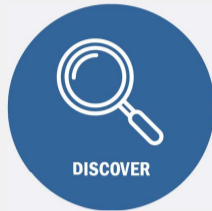
- STR Home
- Continuity of Operations
- Emerging Technology and Innovation
- Enterprise Policy Governance
- Innovation and Cost Efficiency
- Innovation & Cost Efficiency Suggestions Program**
- QLT101 Process Improvement Tools
- Knowledge Management
- Performance Management and Analytics
- Risk Prevention and Management Program
- STR Division TxDOT.Gov
- STR SharePoint Team Site

## Innovation & Cost Efficiency Program (I/CE)

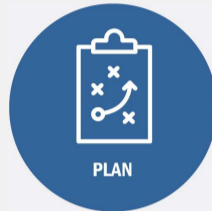
### What is the Innovation and Cost Efficiency Program?

The Innovation and Cost Efficiency (I/CE) Program is an internal cost savings/recovery and process efficiency initiative. It was originally established as a result of the 83rd Legislature's focus on fostering stewardship by ensuring efficient use of state resources<sup>1</sup>. While the Program is still very much dedicated to this directive - offering employees the opportunity to submit suggestions and allowing the public to vote for their favorites - it has evolved significantly since its inception. Today, the I/CE Program exists to help EVERYONE within TxDOT improve processes, products and services by ensuring that every idea is valued, supported and shared across the department.

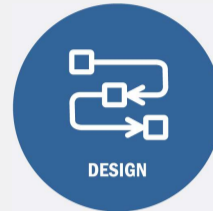
The I/CE Program accomplishes this by:



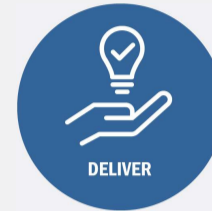
Discovering innovative ideas to improve efficiencies and increase cost savings



Planning projects to maximize benefits to the Department and stakeholders



Designing more cost effective and efficient ways of performing everyday work



Delivering implementable and sustainable improvement solutions

### The I/CE team and STR staff manage and administer the program in the following ways:

- Monitor the department's external, employee suggestion web-portal and conduct required public voting.
- Process suggestions received to evaluate potential efficiency gains, service delivery effectiveness, and other administrative improvements.
- Plan, design, and deliver projects to realize cost savings/recovery and efficiency improvement benefits.
- Meet with executive administration every quarter to review suggestions received, related project work, cost savings reporting, and gather feedback on issues encountered.
- Conduct program outreach activities, as requested by administration, such as: breakout sessions during executive and senior leadership meetings to gather information related to cost savings opportunities and leadership surveys to identify cost recovery opportunities.
- Offer process improvement training classes (QLT101 & QLT100) and host a Process Improvement Community of Practice (PICoP).

### What value the I/CE Program adds:

- The I/CE program provides all department employees the opportunity to [submit ideas](#) for improvements and have those ideas evaluated and considered for implementation.
- Provides [resources for process improvement projects](#) and support throughout the project life-cycle.
- Increases and encourages collaboration between divisions and districts through process improvement efforts.
- Creates tangible cost savings/recovery and increased process efficiencies across the department.
- Empowers department employees at all levels to make innovative process improvement part of their daily routine.

### Recent Accomplishments

- Department-wide Utility Meter Management Project [Click here »](#)
- Created Process Improvement Community of Practice & Training Class- Process Improvement Fundamentals (QLT101) [Click here »](#)
- Reduced Number of Petty Cash Accounts Statewide [Click here »](#)
- Cost Savings Exercise at Senior Leadership Meeting [Click here »](#)
- Recognized Employees For Their Suggestions in TN Magazine [Click here »](#)
- "Recognizing Cost Savings and Efficiency Suggestions" – May/June 2020, pp. 14-15 [Click here »](#)
- "Recognizing Employee Suggestions for Innovation and Cost Efficiency Program" – Sep/Oct 2020, p. 26 [Click here »](#)



### Meet the I/CE Team



**Dana R. Williams,**  
I/CE Program Manager

Areas of expertise:

- Administrative operations
- Facilities management
- Logistics
- Process improvement
- Contract administration (CTCM)

[See Resume »](#)

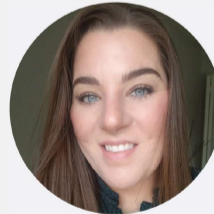


**Darrin Jensen,** Innovation Program Manager

Areas of expertise:

- Project and portfolio management
- Process improvement
- Contract administration and management
- Research and implementation

[See Resume »](#)



**Tiffany Creuzbaur,** Management Analyst

Areas of expertise:

- Process improvement
- District operations
- Change management (Prosci certified)
- Research and data analysis

[See Resume »](#)



**Jason M. Gray,** Management Analyst

Areas of expertise:

- Project management and delivery
- Legal research, analysis, and writing
- Process improvement
- Financial data analysis and reporting

[See Resume »](#)



**Katelyn Kasberg,** Management Analyst

Areas of expertise:

- Process improvement
- District operations
- Research, analysis, and writing
- Project management and delivery
- Training and curriculum development (certified instructor)

[See Resume »](#)



<sup>1</sup> 10 T.A.C. § 206.56 "Suggestions for Agency Cost Savings"