

# An Efficiency Report from the Wisconsin Department of Transportation

December 2016

## **Better Faster Lower Cost**

## An Efficiency Report from the Wisconsin Department of Transportation

### Message from WisDOT Secretary Mark Gottlieb:



Since becoming Secretary of the Wisconsin Department of Transportation (WisDOT) in 2011, one of my top priorities was to implement a comprehensive, transparent performance improvement system that sets ambitious yet realistic goals, identifies opportunities for cost savings and efficiencies, without compromising WisDOT's primary mission of public safety.

This ongoing effort—focused on getting the very most from existing resources—is returning significant and measurable results. 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.

While not an exhaustive list, this report itemizes numerous measures WisDOT is implementing to enhance the safety, durability and reliability of Wisconsin's nearly 11,800 miles of state and federal highways. This report also highlights savings and efficiencies in the Division of Motor Vehicles and Division of State Patrol. Some important points to keep in mind:

- Since 2011, WisDOT has documented over \$1.5 billion in one-time or on-going savings which includes nearly \$100 million in FY 2016.
- The department has implemented numerous process and customer service improvements that will produce greater long-term savings to include digital documentation and digitized (portable) manuals and guides.
- WisDOT will continue its nationally-unique partnership with county highway departments to improve snow-plowing and routine maintenance activities. For example, WisDOT and counties will maximize the benefits of Route Optimization—sophisticated computer software that creates "blended" plow routes including state and local roadways to develop safer, seamless and efficient plowing and salting loops.
- WisDOT allocates over 85 percent of state highway construction costs to preservation-related improvements; less than 15 percent of construction costs are used to expand capacity where necessary to improve public safety and mobility.

Throughout WisDOT, our dedicated managers and staff remain committed to being responsible stewards of our limited public resources. We look forward to working with state and federal policymakers, our many public and private stakeholders and citizens on transportation policies that keep people and commerce moving safely and efficiently.



#### Mark Gottlieb, P.E.

Secretary Wisconsin Department of Transportation

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## **Project management**

Of the nearly 115,000 miles of road in Wisconsin, about 11,800 miles make up the State Highway System. While federal, state and Interstate highways account for only 10 percent of the system, they carry 60 percent of all traffic.

The primary focus of the state highway improvement program is on preserving the existing system. Less than 15 percent of construction costs are used to expand highway capacity where needed to improve safety and mobility.

## **BEST PRACTICES IN DESIGN**

## Programmatic exceptions to standards

#### \$21.6 million estimated FY16 savings

WisDOT worked with FHWA in calendar 2015 to streamline methodology allowing certain roadway features to remain as is, with no additional work, if historically the area has not experienced problems with safety. In the first year of using the new design standards, the Department tracked a cost avoidance of \$21.6 million (savings based on costs that would have been incurred had a redesign been mandated).

## **J-Turns**

#### \$11.8 million estimated FY16 savings



While J-Turns are not the solution for every interchange, they have been found to increase safety and reduce cost in several WisDOT projects. Cost savings are estimated based on likely alternative construction options, which can require additional planning, material or real estate. In addition to being a safe alternative, J-Turns typically carry a price tag of roughly \$1 million, something that can often make them the most cost-effective intersections. Three J-Turns opened in Wisconsin in 2016. Compared to alternatives, the three created a cost avoidance of \$11.8 million.

- ▶ US 53/CTH B in Washburn County
- WIS 54/CTH U in Portage/Wood counties
- WIS 57/CTH C in Door County

http://wisconsindot.gov/Pages/ safety/safety-eng/j-turn.aspx

## FY16 INNOVATIVE DESIGN PILOT

## 3D modeling

Shows 20–30 percent savings on construction costs for earthwork/paving



- WisDOT launched a pilot program in late 2015 to provide contractors with 3D Engineered Models on projects with a total earthwork bid price of approximately \$2.9 million.
- Although it is too early to say specifically what savings have been captured, our expectations are that the 3D models will save money by reducing risk and creating construction efficiencies.
- Assuming the FHWA's national figures of a 20–30 percent reduction apply, it's estimated the potential cost savings on these projects is \$740,000.

#### MEANS AND METHODS OF CONSTRUCTION

## **Project and design savings**

\$38.5 million estimated FY16 savings



By closely evaluating project staging and practical options, WisDOT identified and implemented a number of cost-saving solutions statewide totaling \$38.5 million. Highlights include:

- French drain: An innovative ditch design that addressed the drainage needs of a flat area of the WIS 441 construction. The design reduced the amount of storm sewer and concrete barrier wall needed, and also avoided utility impacts. Total savings: \$3.2 million.
- Practical design: A decision to construct a high-level fixed bridge in Winneconne to replace an existing lift bridge as part of work on WIS 116 is creating \$7 million in direct savings and long-term maintenance cost avoidance.
- Finishing faster: Eliminating a temporary bridge from a project on US 51 in Marathon County saved \$500,000. This decision was made once traffic and staging plans were reviewed and determined that the schedule could be changed to complete work prior to Memorial Day to reduce traffic impacts.

## BEST PRACTICES IN RESURFACING

## **Cold-in-place recycling**

\$1.47 million estimated FY16 savings



Cold-in-place recycling mills existing road surface and processes the material on-site for reuse by way of a convoy of equipment that crushes and paves simultaneously. A total of 28.47 centerline miles of road were resurfaced using cold-in-place recycling this year, leading to an estimated onsite reuse of 93,450 tons of material—enough to fill more than 4,600 quad-axle dump trucks.

## Hot mix asphalt-extended life

#### \$1.6 million estimated FY16 savings

Hot mix asphalt, a combination of stone, sand and gravel bound together by asphalt cement, has long been a cost-effective roadway pavement material. In recent years, the department has looked closely at ways to improve the effectiveness of hot mix asphalt and has developed methods to improve durability and performance. Testing on several projects this year, including WIS 13 north of Marshfield, US 51 north of Wausau, WIS 32 south of Chilton and WIS 33 east of St. Joseph has shown savings.

"WisDOT's policies have resulted in some of the highest quality pavements and one of the most well-maintained pavement networks in the United States."

> Gerald F. Voigt, President/CEO American Concrete Pavement Association

## **System operations**

### REFINED FOCUS FOR IMPROVED SERVICE

## **Electrical locating improvements**

#### Savings assessment ongoing

During peak construction season, some WisDOT regions were seeing nearly 500 requests to locate underground systems including electrical cable, conduit and fiber optic cable used for traffic signals, ITS systems and roadside facilities. The department opted to develop contracted services in the NE, NW, SE and SW regions in order to save time and money. So far, we have seen monthly ITS locating cost reductions of over \$15,000.

## **Combined inspections**

#### \$90,000 estimated FY16 savings

WisDOT's North Central Region is coordinating bridge and tub girder inspections to coincide whenever possible. This creates efficiency by completing multiple work operations within the same traffic control closures and utilizes teams of inspectors to complete inspections on over 55 other structures all within a few days.

## FY16 LEAN INITIATIVE IMPROVEMENT

### **Contract closeout process**

- As of February 2016, it was determined that the final contract closeout process was taking an average of 181 days, a significant decrease from the average of 325 days in 2013.
- Closeout time nearly cut in half

## **VALUE OF PARTNERSHIPS**

WisDOT has long enjoyed valuable partnerships with county maintenance crews. A recent analysis of winter maintenance showed Wisconsin's cost per lane mile was \$2,149, versus nearly \$3,000 in Minnesota and more than \$3,600 in Michigan. Some of the state/county initiatives include:

## Performance based maintenance

#### Savings assessment ongoing

The department partnered with counties on 182 Performance Based Maintenance (PbM) projects in FY16 valued at approximately \$18.2 million. The workload has increased dramatically since the 100 projects launched in the 2014 pilot. FY16 savings will be calculated as the projects close out. The PbM projects are meant to extend the life of pavements and bridge decks by standardizing best practices that hold down costs and reduce traffic impacts.

## Liquid brine

#### \$1.3 million estimated FY16 savings

Last winter, WisDOT used seven million gallons of brine, which reduced treatment costs by \$39 per lane mile over 34,486 miles. Liquid brines are used to treat bridge decks and other trouble spots prior to winter storms and to dampen road salt prior to application, helping to minimize costs and overall use of road salt.

## Statewide materials purchase program

#### \$138,700 estimated FY16 savings

Modeled after the statewide salt contract, the department developed a contract to take advantage of consolidated buying power for the statewide purchase of deck sealing and bridge deck protective surface treatment materials. Statewide, this created savings of roughly \$23 for every crack sealant kit and \$323 for every 55-gallon drum of bridge deck sealant, saving more than \$138,000.

## Area-wide service providers

#### Savings assessment ongoing

WisDOT is working with county highway departments to save money by sharing certain responsibilities across county borders. Examples include anti-icing on backbone highway corridors to reduce salting costs and build more consistent safety and service levels. This past year, progress has been made in identifying new or expanded routine service opportunities.

### **FREIGHT PLANNING**

### **Multimodal freight network tool**



#### Savings assessment ongoing

WisDOT's Bureau of Planning and Economic Development worked with IT specialists to create a new tool allowing the department to map and analyze freight-related data. The desktop tool allows staff to complete tasks that traditionally required GIS expertise or software.

- Estimated annual staff hours previously = 200
- Estimated annual staff hours using new tool = 150

## **Rail GIS/SharePoint collaboration**

#### Savings assessment ongoing

WisDOT staff, railroads, municipalities and citizens often need access to fragile historic railroad documents. WisDOT's Rails and Harbors Section is modernizing rail property records through an online, interactive and geographically-referenced database of state owned rail corridors.

This involved scanning and indexing over 10,000 historic rail records onto a WisDOT SharePoint site to seamlessly collaborate state-owned rail property and asset management with railroad and rail transit commissions. The data forms the records base for development of a GIS-based application to modernize rail property and asset management capabilities. The system allows for enhanced access to documents and data for ongoing management of state-owned rail corridors, WisDOT's Freight Railroad Preservation Program and Freight Railroad Infrastructure Improvement Program.

- Estimated annual staff time savings = 1,300 hours
- Estimated annual staff cost savings = \$40,000
- Elimination of about 200,000 pages of physical documents
- Estimated savings of \$7,500 in file storage costs

### **VALUE ENGINEERING (VE)**

#### \$2 million estimated FY16 savings

The department held two cost-risk analysis workshops and one value engineering study in FY16. Due to the nature of individual project roll out and implementation, it is too early to determine full savings. A final report due in 2017 is expected to highlight two VE studies, as well as the risk-analysis workshops. In past years, WisDOT has realized a return on investment as high as 253:1 as value engineering studies focus on functions, values, priorities and needs. Although VE has created more than \$170 million in cost avoidance since 2014, it's important to note that the VE studies are not about cost-cutting as much as finding ways to build and design more effectively and efficiently.

## System operations: service enhancements

## **ENHANCING DIVISION OF MOTOR VEHICLES SERVICES**

## **Email notices for motor carriers**

#### \$18,200 savings CY16

Email notification for tax filings and motor fuel tax renewal notices to trucking companies meets industry expectations and provides mutual efficiencies and cost savings.

- Eliminates five U.S. Postal Service mailings to over 4,000 carriers per year.
- Cost reduction = \$18,200 in postage, envelopes and printing.

#### FY16 LEAN INITIATIVE IMPROVEMENTS DMV Service Center

## DMV Service Center southwest scheduling

- Rebalanced the schedules of four DMV service centers in the SW Region to better fit customer demand
- One-time cost reduction = \$929 in travel costs
- Reduced variation in customer demand by 26 percent
- Three percent fewer customers affected by holiday closures

## Late title reporting

- Annual staff hours repurposed = 106
- Ensured car dealerships and agents are meeting the statutory expectation for title processing

## **DMV travel site consolidation**

#### \$90,000 estimated savings FY16

Consolidation of DMV travel sites generated a savings in staff time and limited the need to purchase equipment for travel teams. This involved an analysis of operational hours, locations and staffing needs at travel sites.

- Cost avoidance = \$90,000 by not purchasing new equipment
- Annual staff hours repurposed = 300

#### iPad kiosks at DMV Customer Service centers \$11,000 savings FY16



The electronic kiosks help save time on vehicle registrations for DMV customers and staff. Additional transactions are being added to kiosks to further minimize wait times and the need for customers to take a number/ticket.

- Reduces registration renewals done at the counter by approximately 11 percent.
- 20 kiosks throughout the state save approximately
  6.7 hours per day or 553 annual staff hours.
- Annual cost reduction of approximately \$11,000 for registration renewals.

## Seller notification online application

#### Savings assessment ongoing

The Wisconsin DMV established a new online service (Seller Notify) allowing customers to submit vehicle sales transactions electronically mitigating the need for DMV staff to input information manually. Of the 16,748 vehicle sellers who submitted notifications from January to July of 2016, 83 percent were submitted via the online process. DMV developed the Seller Notify system through the state e-portal contractor, WIN, allowing development and implementation of the online application without using IT resources.

## Innovation, research and technology

Our priority is to foster an organizational culture that supports innovative thinking and sharing ideas. We're focused on identifying opportunities for piloting, testing and adopting promising procedures, materials and technologies. This will lead to innovative approaches to complex issues, implementation of best practices and the deployment of modern tools. Combined, these efforts produce more efficient and timely delivery of transportation projects, safer public roads and higher-quality, longer-lasting infrastructure.

We advance research through the Wisconsin Highway Research Program and in other national and state pooled-fund efforts. The Federal Highway Administration (FHWA) has a number of programs to support innovation within state DOTs. These include Every Day Counts (EDC) and the Strategic Highway Research Program (SHRP and SHRP2).

EDC is a state-based model to identify and rapidly deploy proven, but underutilized innovations that shorten the project delivery process, enhance roadway safety, reduce congestion and improve environmental sustainability. WisDOT is a very active EDC participant in the program, participating in 38 of the 50 EDC innovations.

SHRP focuses on four key areas: safety, renewal, reliability and capacity. FHWA has made discretionary grants available to states through SHRP and SHRP 2. To date, we have received seven SHRP2 grants totaling over \$1.25 million.

### **MODERNIZING OUR ROADWAYS**

### **LED lighting replacement**

#### Savings assessment ongoing

On the Milwaukee Metro freeway systems in the past three years, WisDOT invested \$24.6 million to upgrade lighting system infrastructure. This includes poles, cabling, control systems and LED luminaries. Currently, 16 percent of the system is LED, the majority of which has been installed in conjunction with improvement projects.



## Advanced traffic signal systems

#### Savings assessment ongoing

During FY16, we continued to add remote communication to traffic signals to monitor their status and collect real time performance data. Currently, about 45 percent of signals have remote communication. Of those, approximately 170 signals are connected to our automated traffic signal performance metric system, a federal "Every Day Counts" initiative for which WisDOT has been an early adopter. This system allows us to make performance based decisions to reduce delay at intersections and improve traffic flow. We also expanded the number of WisDOT traffic signals that are adaptive; 15 intersections were added to an adaptive traffic signal system in the Janesville area. This technology was deployed on the I-39/90 alternate route to better manage traffic diversions during planned and unplanned incidents.

### ACCELERATED BRIDGE CONSTRUCTION (ABC)

#### Savings assessment ongoing



Savings through ABC is projected to be \$5 million annually, factoring in shorter project duration, reduction in delays for motorists and freight, and lower risk of work zone crashes.

ABC technologies and techniques remain in the infancy stage. There were four ABC projects implemented in 2016. WisDOT is taking advantage of strategic initiatives and federal partnerships, such as SHRP2, to push the innovation forward. A federal grant and county match totaling nearly \$845,000 made two small bridge projects in Dodge County (CTH S and KW) possible to replace two WWII-era structures that were aging and falling into disrepair.

### MODERN TOOLS FOR TODAY'S WORK

## **Pile driver analyzer**

#### \$500,000 estimated FY16 savings

WisDOT began using this equipment based on industry research, best practices and positive experiences reported in other states. WisDOT worked with major stakeholders such as FHWA to adopt and implement the procedure. Computer equipment is used during pile installation to measure movement and applied load. This helps to create accurate and timely measurements that can save on material costs by optimizing piling depth. Total savings since using the equipment exceed \$3 million.

## Concrete pavement thickness measurement

#### \$28,000 estimated FY16 savings

MITSCAN T2 is a new non-destructive technology that replaces contractor probing and WisDOT coring to determine concrete pavement thickness. This technology allows us to verify the thickness of all concrete paving projects.

## Trimble GE07X GPS devices

#### Savings assessment ongoing

WisDOT has 30 Geo7X Trimble devices deployed after a successful pilot that began in FY16. The devices ensure accuracy to within a centimeter. Trimble technology was used during the St. Croix Crossing project. The subcontractor's original measurement would have led WisDOT to pay for three extra inches of base over 1,300 feet, avoiding a \$10,000 expense by using the more precise device for project oversight.

In addition to its use on highway projects, the Division of State Patrol has fully implemented Trimble devices for mapping crash scenes. In 2016, the department saved 475 hours in staff time by leveraging this technology. By mapping scenes faster, law enforcment officers spend less time in dangerous roadside situations and the likelihood of secondary crashes is reduced.

### ENHANCED CONNECTIONS FOR EFFECTIVE PROJECTS

## **Automated parcel mapping**

#### 8,000 hours staff time

Automated parcel mapping, which links the department's real estate system with a Wisconsin Department of Administration database, has saved the equivalent of four full-time jobs over the past year.

## DocuSign

#### Estimated FY16 savings = time savings Decreases average review and approval by three weeks

DocuSign is a tool that will allow the department to electronically sign documents that were previously routed to various individuals to be signed before being delivered via hard copy to the Governor's Office for the final signature. Since launching the process in July, we have saved three weeks in review and approval time.

## Time of use metering for street lighting

#### \$150,000 estimated FY16 savings

The Northeast Region has worked with local utility companies to get "Time of Use" metering on lighting used in off-peak hours.

### Mobile devices: tablets/smart phones

Average time savings = eight hours per week for bridge inspectors



Bridge inspectors have gained an average of eight hours in productivity each week through the use of smart phones and tablets. The technology keeps a world of information and connectivity right at the inspectors' fingertips when out in the field.

## RECYCLING

## **Recycled materials**

#### \$19.7 million estimated FY16 savings

The department's goal is to have 10 percent of virgin materials replaced with recycled materials in projects and to continually strive to improve by increasing the tonnage and finding new materials to recycle. Materials include fly ash, slag, shingles, pavement materials, and foundry sand.





## Creating a culture of continuous improvement

Our department's MAPSS Performance Improvement Program focuses on the five core goal areas of Mobility, Accountability, Preservation, Safety and Service. MAPSS is helping us be more transparent about the performance of the state transportation system and be a data-driven agency that makes cost-effective decisions.

In 2012, Governor Walker signed an Executive Order requiring every state agency to implement Lean strategies to support continuous improvement.

Lean Six Sigma is an internationally-recognized program that uses facts, data and statistical analysis to improve existing processes. Approximately 425 WisDOT employees are trained to use Lean Six Sigma tools to analyze current practices with the goal to improve customer service, save time and taxpayer dollars.

To date, WisDOT has completed over 47 Lean projects with projected savings of \$1.5 million and roughly 30,000 hours of staff time that can be redirected to other department priorities.



The Wisconsin Department of Transportation MAPSS Performance Scorecard reviews five key goals and over-arching 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 organization and meeting public expectations.

For more information on MAPSS, visit www.mapss.wi.gov

## **Emerging opportunities**

In addition to the FY16 savings, already quantified, the department strives every day for continuous improvement. Some of these emerging opportunities include:

Opportunity	Description
Streamlining Project/ Contract Management	The department began invoicing electronically through CARS (Contract Administration Reporting System) in July 2015. Efforts are continuing to build on this system with the implementation of Aurigo MasterWorks in mid-2017. The project management software will enhance communications and transparency in the department's work with consultants, saving time and money.
Winter Plow Route Optimization	The Bureau of Highway Maintenance has been working with GIS technology in an effort to cover more ground— faster—in county-led plow operations. Early results have been encouraging in Dane and Green counties with the analysis identifying reduction in cycle times and the number of left hand turns. This creates benefits in terms of operational efficiencies and safety. In Brown County, the optimization comes at an opportune time as 160 lane miles have been added to the system. Despite this, the county does not foresee a need to add equipment or staff.
Salt Storage	With the optimization of snow plow routes, the department will begin to have a better understanding of where salt storage facilities can be placed for the most effective distribution. These changes have potential to save time and money, as optimizing capacity will enhance the department's readiness for inclement weather and decrease the need for emergency purchases.
Area-wide Service Providers	WisDOT is working with county maintenance teams to save money by sharing some responsibilities across borders. Examples include anti-icing on backbone highway corridors to reduce salting costs and build more consistent safety and service levels. This past year, progress has been made in identifying new or expanded routine service opportunities.
Unmanned Aerial Vehicle Bridge Inspection	UAVs or "drones" have been tested for use in the collection of aerial imagery for survey applications as well as some bridge inspection applications. WisDOT is engaging in a pilot project in hope of using UAVs to reduce time/cost while increasing safety for bridge inspection workers.
WAZE Connected Citizen Program	Waze Connected Citizens Program agreement will allow the exchange of data with public agencies to share information about incidents, traffic speeds, road closures, etc. in return for Waze's crowd-sourced user data and quality indicators at no cost to the Department. This will improve service without increasing costs through enhanced clarity of incident reporting and increased information for emergency responders. Crowd-sourced data will potentially avoid the need for future camera installations to monitor traffic and detect incidents. WisDOT will gain attribution as a contributor on the Waze website, which is a free advertising/branding opportunity.

Opportunity	Description	
Project Development Process	The North Central Region completed a process review of their project review process from project identification through preliminary design to identify ways of making improvements to reduce scope changes with the goal of improving program stability. The process review involved several focus group meetings with staff in all functional areas to identify areas for process improvements. The result was a new region project development process that incorporates more investigation during scoping to ensure a solid scope is defined prior to beginning design.	
TC3 Courses	TC3 is a technical service program within AASHTO that focuses on developing training products for technical staff in the areas of construction, maintenance and materials. This is an example of the department more fully utilizing a strategic partnership with AASHTO. In October, the department began publishing a number of training courses for staff on the Learn Center (intranet) page. The major benefit to the training comes as employees gain the opportunity to sharpen their technical knowledge on a topic without the added cost of more formalized additional schooling.	

## **Appendix: Summary of FY16 savings**

## **PROJECT MANAGEMENT**

Title	Savings
Programmatic exceptions to standards	\$21.6 million
J-Turns	\$11.8 million
Project and design savings	\$38.5 million
Cold-in-Place recycling	\$1.47 million
Hot Mix Asphalt-extended life	\$1.6 million

### SYSTEM OPERATIONS

Savings
\$90,000
\$1.3 million
\$138,700
\$2 million
\$18,200
\$11,000
\$90,000

## INNOVATION, RESEARCH AND TECHNOLOGY

Title	Savings
Pile driver analyzer	\$500,000
Concrete pavement thickness measurement	\$28,000
Time of use metering for street lighting	\$150,000
Recycled materials	\$19.6 million

## **TOTAL SAVINGS: \$98.9 million**

## **Follow us**

WisDOT uses social media to let people know more about our efforts to innovate and be more efficient, and the public is responding.

Follow us on social media to find out more about how we're doing things better, faster and at a lower cost.

Total number of #AccountableGov Tweets: 32 (August 2016 – November 2016) Total impressions: 164,408 Total engagements: 2,153 Total retweets: 159





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