Continuous Improvement at WisDOT

DTSD Streamlines Local Bridge Design and Plans Assembly Process

Seeking ways to become more efficient in the delivery of the local program, the Division of Transportation System Development (DTSD) reviewed the bridge design process. Historical local bridge design was completed on a bridge-by-bridge basis based on location. Comparing historical bridge replacements on the local system, many were relatively simple and very similar. This similarity resulted in a lack of efficiency in designing and drafting similar bridges. DTSD discussed a plan to streamline the process by creating a tool that would perform the routine design and drafting portions of the bridge replacement work in a consistent manner and provide a set of standard bridge plans that require minimal effort to finalize by the designer. "The Standard Bridge Design Tool (SBDT) was conceptualized and created to gain efficiencies within the bridge design and plans production process in order to shift more funds into construction, which ultimately will get more bridges replaced," says Aaron Bonk, Chief Structures Design Engineer for WisDOT.

Standardized Bridge Design Tool Creation

The SBDT was created to be used in the design process of single span concrete slab bridges. This bridge type comprises roughly 40%-50% of local bridge replacement in any given year. The use of the SBDT on this percentage of local program bridge replacements reduces the overall dollars being spent in the design process and allows more funds to be put towards building transportation structures. "The SBDT is a database filled with 12,000+ combinations of predesigned and drafted bridge plans based on set parameters that the designer determines. The plans are delivered from a website user interface located on the WisDOT Bureau of Structures website," says Bonk.

The tool piloted nine bridge replacement projects throughout the state in FY22 and FY23. Estimated design fee cost avoidance for these projects was approximately 25%. An additional 134 candidate bridge replacement projects have been identified between 2023 and 2027. These candidates come from both the typical local bridge replacement program and programs stemming from the additional federal funds provided through the Infrastructure Investment and Jobs Act. By saving time, these programmatic improvements also create great potential to preserve program dollars and enable the department to advance future year projects into production. The department's analysis of data so far suggests a design cost avoidance of approximately 50-60% at each bridge location, which keeps those cost avoidance dollars within the local program and over time can help accelerate additional work elsewhere in the program. WisDOT will continue to identify additional candidate projects for those bridges going out of service to continue to create economic savings.

LEAN AND CONTINUOUS IMPROVEMENT SUMMARY REPORT

Wisconsin Department of Transportation DT2097 2/2018

Project or Initiative Name: WisDOT Standard Bridge Design Tool (Standard Bridge Plans)

Team Lead: Aaron Bonk **Division:** DTSD

The Process (Background): What happens currently?

Historically, all state and local system bridges have been designed uniquely on a location-by-location basis. On the local system, many of the bridges that are designed are relatively simple and laid out in a very similar manner to others.

Problem/Opportunity Statement: What's the problem? What's the value in solving it?

The value of the new WisDOT Standard Bridge Design Tool is that it streamlines the design and plans assembly processes for these 'simple' bridges. By performing the routine design and drafting portions of the bridge replacement work in a consistent manner, the overall efficiency gained in the design resourcing/level of effort can then be moved into the total dollars allocated into the construction end of project development (i.e., fewer design dollars used can lead to more construction dollars being available/projects being built).

Scope: What are you focusing on? What related processes are you not making changes to?

The focus of the development of this tool was to create a database of pre-designed and drafted plan sets for single span concrete slab bridges. This bridge type equates to approximately 40%-50% of the local bridge replacement program in any given year. By having standardized bridge plans available that reduce the design costs for approximately half of the program, more dollars can be put towards building more structures.

Stakeholders: Who is affected by this process? Who is involved in this process?

WisDOT, Bureau of Structure Staff, FHWA, Consulting Engineering firms and Locals

Magnitude: How many people are affected by this problem? How often does it occur?

This bridge type equates to approximately 40%-50% of the local bridge replacement program in any given year.

Goals: What do you hope to accomplish in this project? What does success look like?

Improvement Methodology: PDCA/PDSA

Results: Describe the solution implemented and its outcomes.

The WisDOT Standard Bridge Design Tool has been completed and has been used for 9 pilot projects throughout the state in the past year. The estimated saving in design fees from the 9 pilots is about $90, 000 which equates to $10, 000 per bridge. Those pilot projects are in various phases of design, bidding, letting, and construction. To date, only minor issues have been encountered with the tool that will be updated in early 2022. Due to the relative success of the pilots, WisDOT has identified the next round of bridges that are eligible to utilize the tool due to the likely characteristics of the bridges that will be built replacing those going out of service.

Performance Metrics:

Metric Name	Initial Unit	Final Unit	Difference

Annual ongoing cost Annual cost avoidance	$150,000	$0	$150,000
Annual hours required Annual hours repurposed	45 hours	0	45 hours

After Metric Summary: Provide a brief explanation of how you arrived at the final unit.

Annual cost avoidance = Design fee savings per bridge * Yearly estimates of these types of bridges
= $ 10,000/ project *15 designs = $150, 000
$10,000 per bridge design fee savings is based on $50/hr. for the type of engineering staff that typically designs these types of bridges and 150% overhead rate
Yearly estimate of number of bridges of this type = 15
Annual hours repurposed = Average number of hours for preliminary and final design reviews * Yearly estimates of these types of bridges = 3 hours * 15 designs = 45 hours

(Only one MAPSS Core/Statewide Goal Area is required)

MAPSS Core Goal Area: Accountability

Statewide Goal Area: Cost avoidance

MAPSS Core Goal Area:

Statewide Goal Area: Staff hours repurposed

Date Completed: 12/31/2022