“Collaboration at Work”

Communicating Pooled Fund Study Research Results

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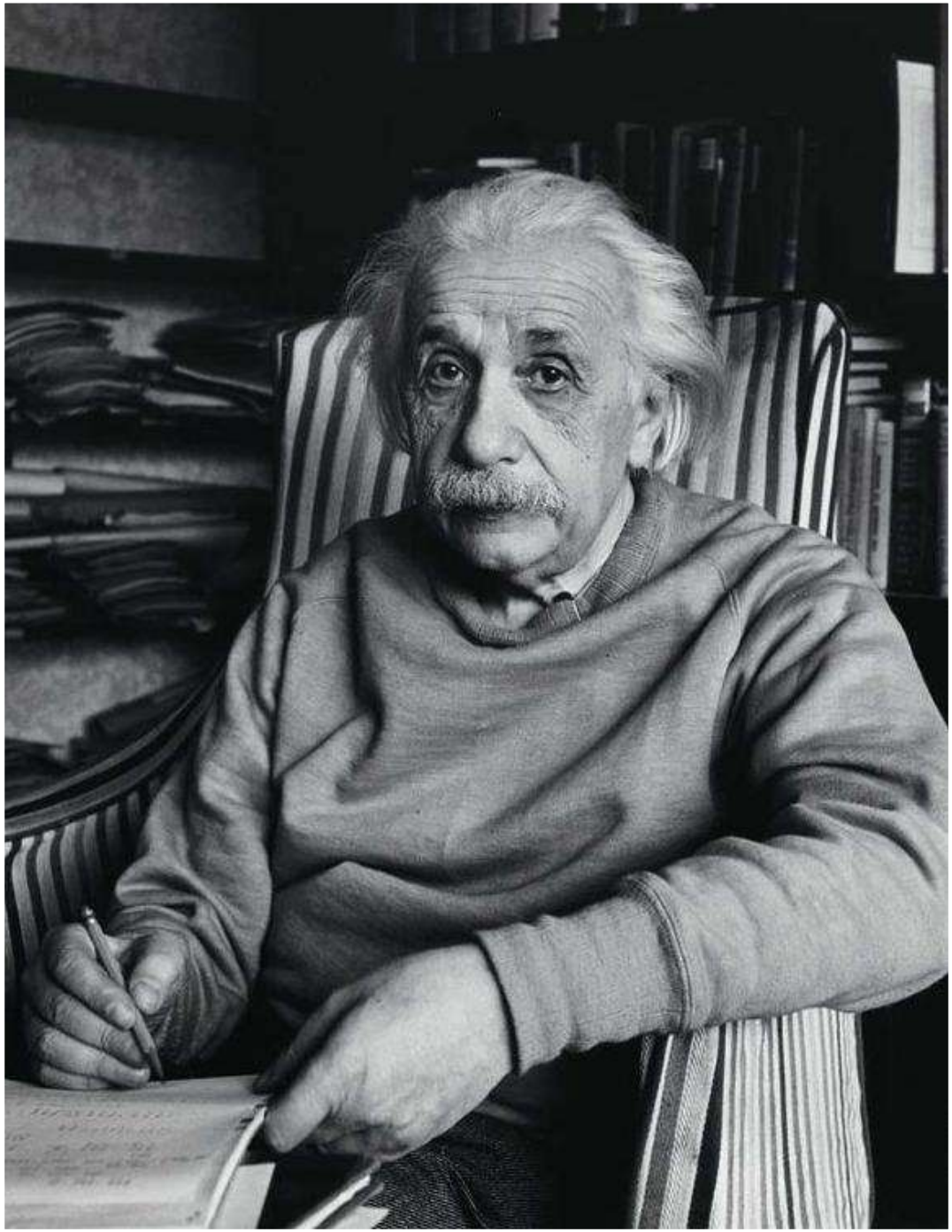
AASHTO RAC Meeting
July 2025
Billings, Montana

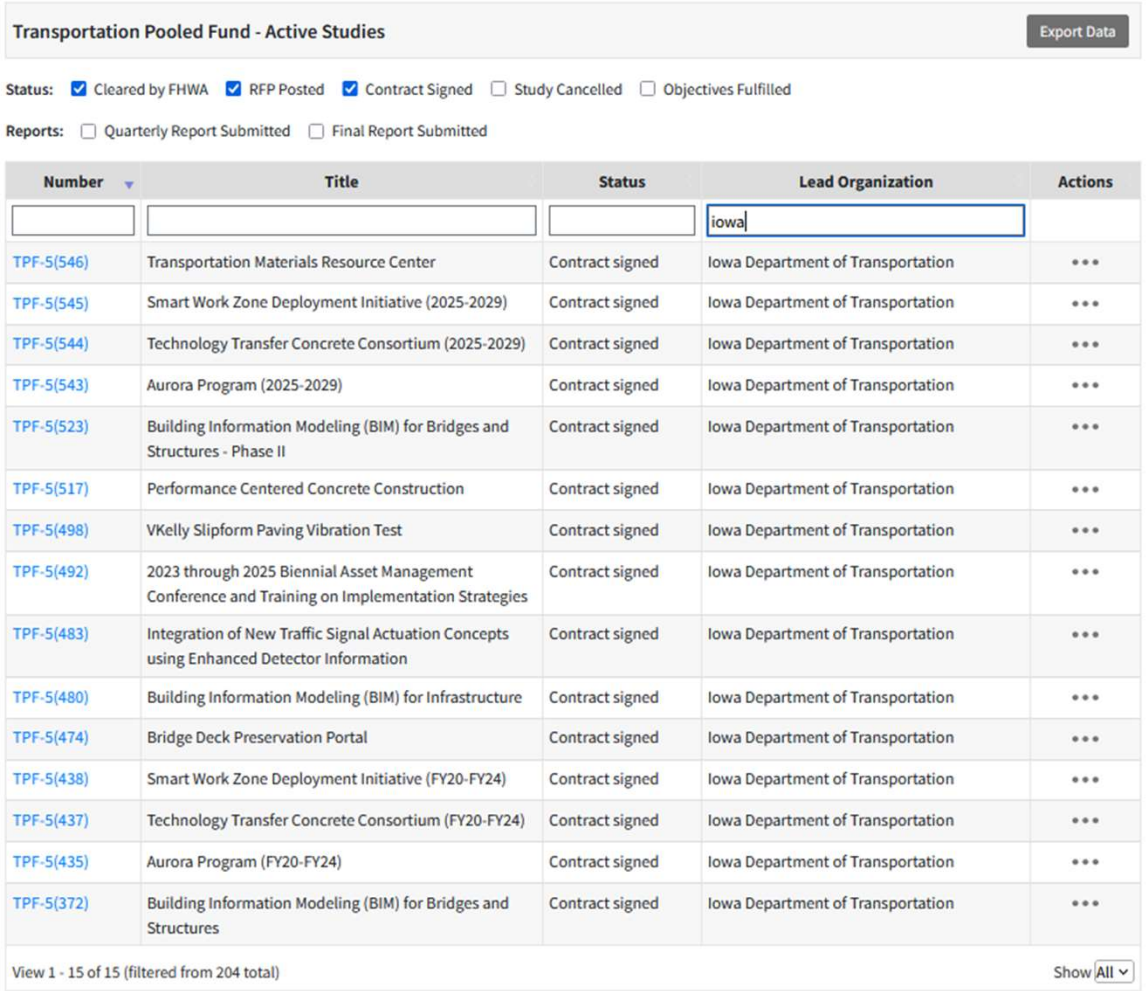
“Nothing truly valuable can be achieved except by the unselfish cooperation of many individuals.”

Albert Einstein
1949



You may know…

- …that Iowa leads a few pooled funds
- (not that it's a competition)



Transportation Pooled Fund - Active Studies Export Data

Status: ☑ Cleared by FHWA ☑ RFP Posted ☑ Contract Signed ☐ Study Cancelled ☐ Objectives Fulfilled

Reports: ☐ Quarterly Report Submitted ☐ Final Report Submitted

Number	Title	Status	Lead Organization	Actions
			iowa	
TPF-5(546)	Transportation Materials Resource Center	Contract signed	Iowa Department of Transportation	•••
TPF-5(545)	Smart Work Zone Deployment Initiative (2025-2029)	Contract signed	Iowa Department of Transportation	•••
TPF-5(544)	Technology Transfer Concrete Consortium (2025-2029)	Contract signed	Iowa Department of Transportation	•••
TPF-5(543)	Aurora Program (2025-2029)	Contract signed	Iowa Department of Transportation	•••
TPF-5(523)	Building Information Modeling (BIM) for Bridges and Structures - Phase II	Contract signed	Iowa Department of Transportation	•••
TPF-5(517)	Performance Centered Concrete Construction	Contract signed	Iowa Department of Transportation	•••
TPF-5(498)	VKelly Slipform Paving Vibration Test	Contract signed	Iowa Department of Transportation	•••
TPF-5(492)	2023 through 2025 Biennial Asset Management Conference and Training on Implementation Strategies	Contract signed	Iowa Department of Transportation	•••
TPF-5(483)	Integration of New Traffic Signal Actuation Concepts using Enhanced Detector Information	Contract signed	Iowa Department of Transportation	•••
TPF-5(480)	Building Information Modeling (BIM) for Infrastructure	Contract signed	Iowa Department of Transportation	•••
TPF-5(474)	Bridge Deck Preservation Portal	Contract signed	Iowa Department of Transportation	•••
TPF-5(438)	Smart Work Zone Deployment Initiative (FY20-FY24)	Contract signed	Iowa Department of Transportation	•••
TPF-5(437)	Technology Transfer Concrete Consortium (FY20-FY24)	Contract signed	Iowa Department of Transportation	•••
TPF-5(435)	Aurora Program (FY20-FY24)	Contract signed	Iowa Department of Transportation	•••
TPF-5(372)	Building Information Modeling (BIM) for Bridges and Structures	Contract signed	Iowa Department of Transportation	•••

View 1 - 15 of 15 (filtered from 204 total) Show All

"Collaboration at Work"

Many state DOTs have well developed tools for sharing research…

Annual Programs

Project Progress

Project Results

"Collaboration at Work"

These tools are less common for Transportation Pooled Fund Studies, though there are some…

CLEAR ROADS
research for winter highway maintenance

RESEARCH BRIEF

RESULTS SUMMARY

Best practices and related guidance about data and performance measures will support transportation agency use of dashboards to improve winter maintenance operations.

PROJECT DETAILS

Project Title: Use of Dashboards for Winter Operations
Project Number: CR22-05
Project Cost: $74,477
Report Date: December 2024

Project Chair:
Doug McBroom
Montana Department of Transportation
dmcbroom@mt.gov

Investigator:
Mallory Crow, PhD, PE
AECOM Technical Services, Inc.
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FEBRUARY 2025

USING DASHBOARDS TO IMPROVE WINTER OPERATIONS

Need for Research

Transportation agencies collect vast amounts of data about their winter operations. To use this information productively, many state departments of transportation (DOTs) and other transportation agencies responsible for winter maintenance operations are using dashboards to summarize data and measure performance. These summaries are useful for decision-making during winter weather events and for poststorm reviews to inform future planning. Dashboards are also a valuable mechanism for communicating important winter weather information to both the public and agency leadership.

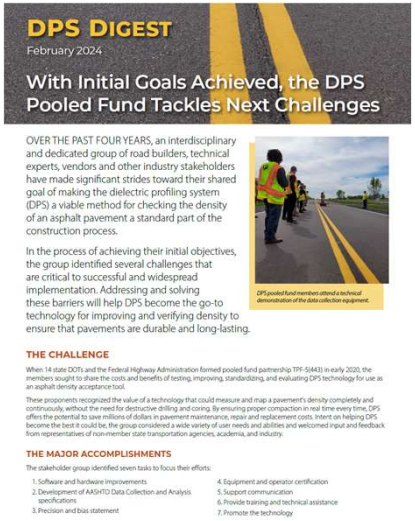
The specific data gathered and performance measures calculated for dashboards vary by agency based on their operational needs. Though each agency has unique needs, there are innovative and best practices along with lessons learned from agencies already deploying dashboards that could be useful. By better understanding how to develop and implement dashboards, agencies may be able to improve the use of data and information at their disposal to enhance winter maintenance operations.

Objectives and Methodology

The primary goal of this project was to provide state winter maintenance managers with a more complete understanding of dashboard use for tracking and managing information and data that will assist with winter maintenance operations decision-making. The project looked at all aspects of dashboard use, but specifically focused on ways to increase and track level of service, reduce materials use (such as salt) and labor costs, and track overall cost of maintenance operations to identify potential areas for savings.

An expansive literature review examined the current use of dashboards among transportation agencies to assess current strategies and identify innovative and effective practices. A survey of state DOTs and municipalities collected a wide range of information related to dashboard use to identify:

- Number of dashboards within each agency.
- Data inventories and performance measures.
- Methods to link, clean, use and store data.



DPS DIGEST
February 2024

With Initial Goals Achieved, the DPS Pooled Fund Tackles Next Challenges

OVER THE PAST FOUR YEARS, an interdisciplinary and dedicated group of road builders, technical experts, vendors and other industry stakeholders have made significant strides toward their shared goal of making the dielectric profiling system (DPS) a viable method for checking the density of an asphalt pavement a standard part of the construction process.

In the process of achieving their initial objectives, the group identified several challenges that are critical to successful and widespread implementation. Addressing and solving these barriers will help DPS become the go-to technology for improving and verifying density to ensure that pavements are durable and long-lasting.

DPS pooled fund members attend a technical demonstration of the data collection equipment.

THE CHALLENGE

When 14 state DOTs and the Federal Highway Administration formed pooled fund partnership TPF-5(443) in early 2020, the members sought to share the costs and benefits of testing, improving, standardizing, and evaluating DPS technology for use as an asphalt density acceptance tool.

These proponents recognized the value of a technology that could measure and map a pavement's density completely and continuously, without the need for destructive drilling and coring. By ensuring proper compaction in real time every time, DPS offers the potential to save millions of dollars in pavement maintenance, repair and replacement costs. Intent on helping DPS become the best it could be, the group considered a wide variety of user needs and abilities and welcomed input and feedback from representatives of non-member state transportation agencies, academia, and industry.

THE MAJOR ACCOMPLISHMENTS

The stakeholder group identified seven tasks to focus their efforts:

1. Software and hardware improvements
2. Development of AASHTO Data Collection and Analysis specifications
3. Precision and bias statement
4. Equipment and operator certification
5. Support communication
6. Provide training and technical assistance
7. Promote the technology

(and others…)

"Collaboration at Work"

The Need

- Is great!
- (And possibly self-evident)

The Challenges

- Are also great!
  - Who pays for these?
  - Who creates and delivers these?
  - What templates are available to get started?

Iowa's Approach

- Establish a publication series with common features
  - Visual standard and look-and-feel
  - Series title — *spoiler alert!* → "Collaboration at Work"
  - Tagline
  - Headers and sections
  - General layout

"Collaboration at Work"

Iowa's Approach

- Allow flexibility for customization to meet each pooled fund study's needs…
  - Study types
    - Single research project
    - Multiple research projects
    - Conferences
    - Communities of practices
    - Whatever!
  - Study branding (if established)
    - Logo/wordmark
    - Color scheme
    - Website

Happening Now! An Example…

- Study Wrap-Up on TPF-5(445)
- Single project-type pooled fund study

STUDY WRAP-UP

COLLABORATION AT WORK

States joining forces to tackle common challenges

Transportation Pooled Fund Study TPF-5(445)
Design Guidelines and Mitigation Strategies for Reducing Sedimentation of Multi-Barrel Culverts

June 2025

DESIGNING CULVERTS THAT REQUIRE LESS MAINTENANCE

Culverts are an important feature of transportation infrastructure, designed to carry stormwater and runoff away from a road's surface. But in erosion-prone areas, sediment can wash into the culvert and impede the water's flow. Without frequent maintenance to remove this sedimentation, backed-up water can produce flood conditions that damage the road and create hazardous driving conditions. To develop a culvert design that requires less maintenance, five states from different regions of the United States pooled their knowledge and financial resources to research and test innovative culvert configurations. The resulting specifications can be applied at any location in the country where sedimentation is an issue.

> "This pooled fund gave us confidence to develop a prototype and experiment with one of the methods developed in this study."
>
> —**Steve Morgenstern**
> New Mexico DOT

Optimizing the location of SFTs in work zones will have the greatest effect on reducing vehicle speeds.

THE CHALLENGE

Culverts serve a critical role in keeping road surfaces clear and improving safety by redirecting excess water downstream. However, in erosion-prone watersheds, the water can carry sand and silt along with it, depositing the sediment near the culvert's opening where it quickly builds up and disrupts the stream flow. Routine maintenance to remove this sediment is key to keeping the culverts and surrounding infrastructure in good working order, but can be a time-consuming and costly process for transportation maintenance crews.

> "It has been really helpful to see that other states face similar problems with their culverts and understand how they handle these issues."
>
> —**Van Wilson**
> Mississippi DOT

A self-cleaning culvert presents an appealing solution. This concept, developed by researchers in Iowa more than a decade ago, leverages the hydraulic power of the moving water to carry the sediment through the culvert, minimizing the amount of accumulated debris that must be removed manually. To determine exactly how culverts should be built or modified to maximize their self-cleaning potential under various hydrological and geological conditions, five states from across the country — Iowa, Mississippi, Missouri, New Mexico, and Utah — formed a pooled fund study to share the costs and benefits of testing various culvert configurations and developing guidance that all states can use.

THE PROCESS

Though each of the five member states has its own unique challenges when it comes to erosion and culvert sedimentation, they are united in their common goal of identifying solutions that can work well for everyone. Members focused their research efforts on multi-barrel culverts, which have multiple parallel channels and are typically used with larger infrastructure like state-owned highways and bridges designed to accommodate higher traffic volumes. Meetings to discuss the states' sedimentation issues and research objectives were primarily conducted virtually, though two in-person meetings took place in Iowa and New Mexico to allow members to see firsthand how sedimentation buildup can affect stream flow and infrastructure integrity.

With each state's minimum annual contribution of $20,000, this four-year study funded more than 180 laboratory tests of different multi-barrel culvert configurations and challenged each design with conveying precipitation from replicated real-world storm events. As floods and other high-flow events are more likely to deposit sediment, researchers sought to design culverts that can maintain a steady stream of water. The effort required developing prediction models for how sediment might realistically flow into and out of the culvert, and culminated in

Pooled fund members conducted site visits to better understand different sedimentation issues.

guidance that states can apply to any new or existing multi-barrel culvert.

THE RESULTS

Despite the challenges provided by state-specific soil types and geologic conditions, the research identified several recommendations that all states can use to design new or retrofit existing multi-barrel culverts that minimize sediment accumulation:

- Make the width of the culvert as close as possible to the width of the natural channel as it approaches the culvert opening.
- Mirror the natural channel's slope when installing the culvert.
- Set the culvert so that it follows the same direction as the natural channel to avoid introducing angles in the water's flow.
- Keep the headwater depth at the culvert inlet at half-full (and no more than two-thirds full) of the culvert height.

The research produced guidance based on sediment conveyance principles that should be considered depending on the culvert's particular location; however, designs that follow these basic parameters were found to have significantly less sedimentation buildup as compared with designs that do not, regardless of where they are located.

The pooled fund's member states are already putting the findings to use. Iowa DOT is applying the new self-cleaning culvert designs

> "The great thing about this study is that we developed designs for building new culverts, but also for retrofitting culverts we already have."
>
> —**Brandon Cox**
> Utah DOT

to any new multi-barrel culverts that it builds. In New Mexico, a culvert design that had been developed before the pooled fund study has since been optimized with the research findings and is now undergoing experimental testing.

This pooled fund study has advanced the state of understanding for how water and sediment flow through multi-barrel culverts. The knowledge will be critical as precipitation events are anticipated to become more extreme across the country in the coming years.

The research involved monitoring sediment levels to evaluate different culvert designs.

STUDY WRAP-UP SUMMARY

Five states worked together to develop guidelines and best practices that can be applied to new or existing culverts to reduce sediment buildup and the need for costly and time-consuming maintenance.

Members met in Iowa City, Iowa, in 2021 and in Albuquerque, New Mexico, in 2022 to better understand other states' culvert sedimentation issues and potential solutions.

After testing more than 150 designs, the research produced guidance for creating culverts that leverage the water's flow to carry sediment away from the structure.

ABOUT THIS POOLED FUND

Name: Design Guidelines and Mitigation Strategies for Reducing Sedimentation of Multi-Barrel Culverts

Study Detail: TPF-5(445)

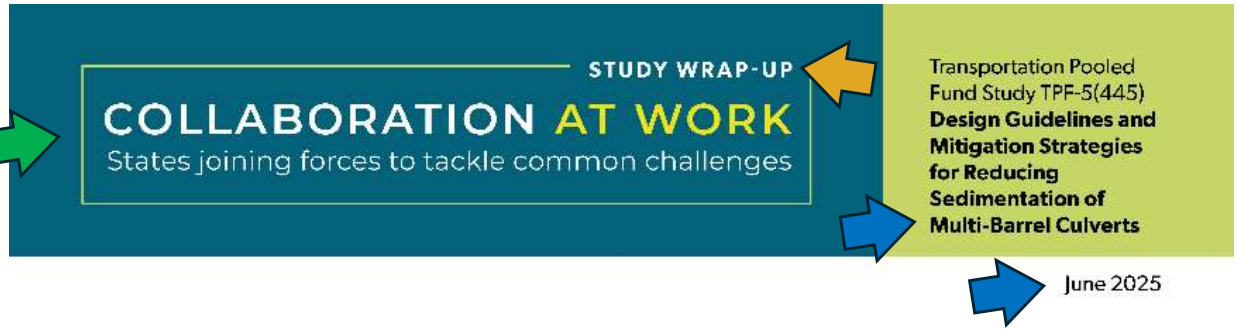
Participating Agencies:
Iowa DOT
Mississippi DOT
Missouri DOT
New Mexico DOT
Utah DOT

Lead Agency Contact:
Khyle Clute
Iowa DOT
khyle.clute@iowadot.us
515-239-1646

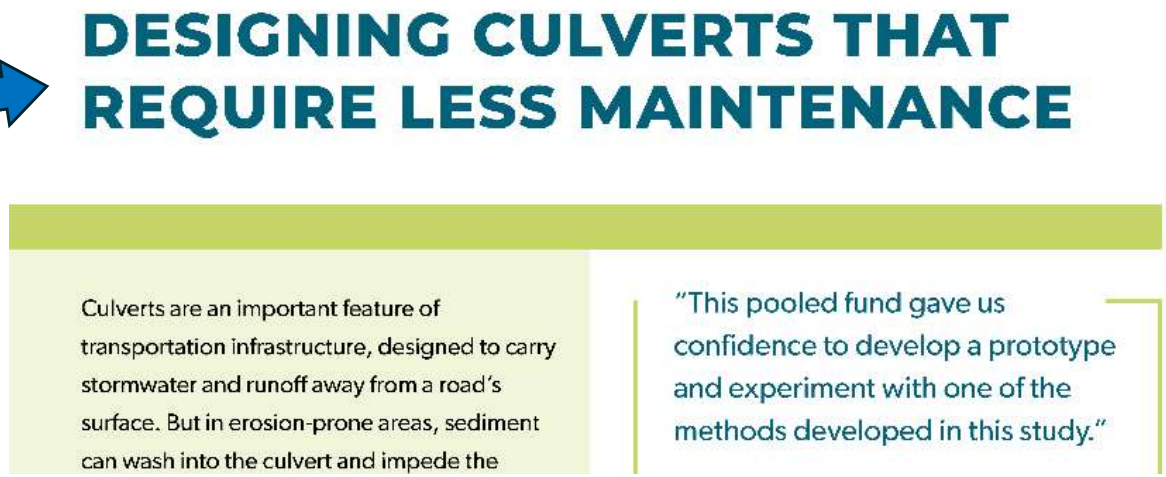
Features

- Blend of common and custom branding

Uniform across the series



Will vary by publication



Four options here:

- STUDY KICKOFF
- RESEARCH IN PROGRESS
- RESEARCH BRIEF
- STUDY WRAP-UP

"Collaboration at Work"

Features

- Representation from multiple participants supporting shared project ownership
  - Input and featured quotes
  - Anticipated implementation efforts

"This pooled fund gave us confidence to develop a prototype and experiment with one of the methods developed in this study."

Steve Morgenstern
New Mexico DOT

"It has been really helpful to see that other states face similar problems with their culverts and understand how they handle these issues."

—**Van Wilson**
Mississippi DOT

"The great thing about this study is that we developed designs for building new culverts, but also for retrofitting culverts we already have."

—**Brandon Cox**
Utah DOT

"Collaboration at Work"

Another Example

- Research Brief on a project under TPF-5(438)
  - One project of many under a program-type pooled fund

RESEARCH BRIEF

COLLABORATION AT WORK

States joining forces to tackle common challenges

Transportation Pooled Fund Study 5(438)
Smart Work Zone Deployment Initiative

June 2025

DEPLOYING SPEED FEEDBACK TRAILERS TO IMPROVE WORK ZONE SAFETY

Vehicles traveling above the speed limit through work zones are a safety concern. The Smart Work Zone Deployment Initiative, or (SWZDI), is the collective effort of a group of states seeking to identify innovative tools and strategies to slow traffic and make work zones safer for all road users. SWZDI recently evaluated speed feedback trailers (SFTs), designed to encourage drivers to slow down to posted speed limits. After measuring the speed reduction effect of SFTs at various locations approaching and within the work zone, SWZDI provided recommendations to optimize SFT use and increase safety.

> "This evaluation of speed feedback trailers offers practical guidance for their deployment in work zones to help maximize speed reductions throughout the work zone."
>
> —**Chris Brookes**
> Michigan DOT Work Zone Engineer

THE NEED

In 2021, more than 100,000 work zone crashes occurred in the United States, resulting in 874 fatalities. Transportation agencies employ numerous countermeasures to encourage safe driving speeds, including an SFT. This trailer-mounted speed feedback sign uses a radar device to detect and display current speed, providing drivers with immediate feedback. While SFTs have been proven to reduce speeds, their specific location relative to the work zone can affect the degree of speed reduction.

Optimizing the location of SFTs in work zones will have the greatest effect on reducing vehicle speeds.

> "Speed feedback trailers are an effective tool to help reduce speeding through work zones. I look forward to using the guidance in this study to place SFTs at more impactful locations to optimize speed reduction through Missouri work zones."
>
> **Daniel Smith**
> Missouri DOT Work Zone Engineer

Previous research has explored work zone speed limit policies and practices for utilizing SFTs to improve compliance. This project expands on that research, analyzing deployment strategies to maximize the effectiveness of SFTs in work zones.

RESEARCH APPROACH

An expansive literature review and survey of state departments of transportation (DOTs) focused on SFT policies and practices, performance, and implementation challenges.

A field study, conducted primarily in Michigan, involved a series of evaluations that assessed the speed reduction impacts of SFTs strategically placed within freeway work zones. To measure speed reductions, police lidar operated by technicians were spaced throughout the work zone and used to continuously track speeds of vehicles traveersing the work zone. This procedure allowed for the effect of the SFT to be measured over a longer distance of highway, rather than at only one location.

STUDY FINDINGS

The literature review and survey results showed nationwide use of SFTs. Among the 40 state DOTs responding to the survey, 78 percent use SFTs in work zones, most regularly for lane closures and traffic shifts. Further, 19 states have developed policies, guidance, or standards for their use in work zones. Requirements for the use of SFTs vary across states, ranging from optional to mandatory under specific conditions.

Highway work zone field evaluations showed speed reductions regardless of SFT deployment location, but reductions were greater with SFTs positioned closer to the work activity area, with the maximum average speed reductions of 3.6 mph. SFTs were also found to be effective when positioned within 1,000 feet beyond the end of the lane closure taper, within 1,000 feet in advance of the start of the taper, and within freeway crossovers. Additional speed reductions occurred when SFTs were paired with a law enforcement vehicle (1.4 mph) or a digital speed limit sign (1.8 mph).

In general, SFTs sustained speed reductions for at least one-half mile beyond the SFT. While an SFT every half-mile is likely impractical, 2-mile spacing is acceptable when deploying multiple units.

PUTTING IT TO WORK

The findings of this project led to recommendations for deploying SFTs that are relevant to transportation agencies throughout the country. Below are some of these recommendations:

- When deploying a single SFT, position it 200 feet upstream from the start of active work but avoid placing it too far upstream from the work area.
- In work zones with multiple work areas, use an SFT in advance of each area where workers are present.
- Use SFTs at additional locations, including within 1,000 feet upstream of a lane closure, lane shift, or median crossover, especially if there is no barrier to protect workers.
- Combine SFTs with police enforcement vehicles (whether or not they are actively enforcing) or with a digital speed limit sign (to reduce driver ambiguity as to which speed limit is in effect).

ABOUT THIS POOLED FUND

Name: Smart Work Zone Deployment Initiative

Study Detail: TPF-5(438)
Study Website

Participating Agencies:
Iowa DOT
Illinois DOT
Kansas DOT
Michigan DOT
Minnesota DOT
Missouri DOT
Nebraska DOT
Texas DOT
Wisconsin DOT

Lead Agency Contact:
Khyle Clute
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515-239-1646

SWZDI

ABOUT THIS RESEARCH PROJECT

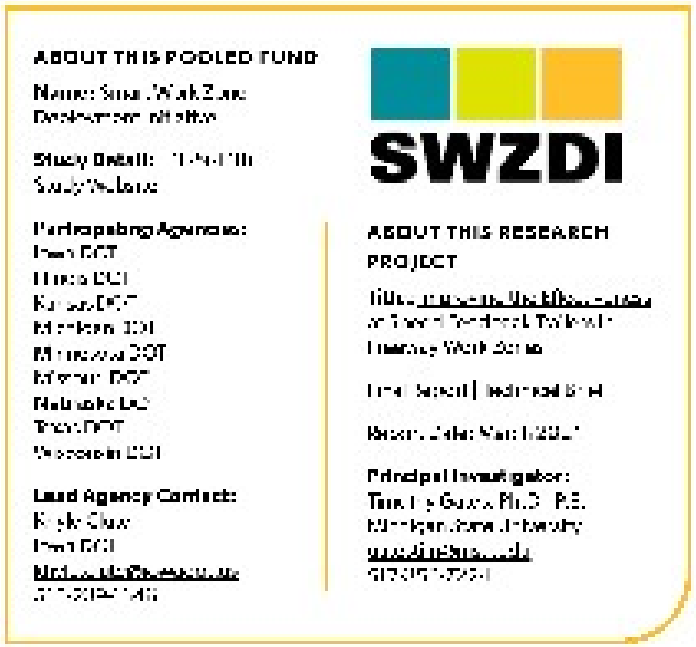
Title: Improving the Effectiveness of Speed Feedback Trailers in Freeway Work Zones

Final Report | Technical Brief

Report Date: March 2024

Principal Investigator:
Timothy Gates, Ph.D., P.E.
Michigan State University
gatestim@msu.edu
517-353-7224

Note use of SWZDI logo and incorporation of logo color elements



- Template can be similarly adapted to other color schemes.

How does this work?

- Contracting
- Coordination with pooled fund study participants
- Coordination with consultant

What's next?

- Publishing these
- Creating a steady stream of "Collaboration at Work" publications for the next seven years across at least 14 active Iowa-led pooled fund studies

"Collaboration at Work"

Is this just an Iowa product?

They belong to all the partners…

- The 14 pooled funds already identified are estimated to generate 75+ “Collaboration at Work” publications.
- Based on current TPF partnerships, these publications could be leveraged by their 232 pooled fund partners representing 46 states and FHWA.
- To get the same reach, those partners would have to create **1,054 separate** communication products.

“Collaboration at Work”

What is needed from the partners…

- Hopefully just a “minimal lift”… for **maximum leverage**
  - Developed as a turnkey communication product
    - Post to the TPF page
    - Ready to send out through your own channels
  - Intentionally maximize partner representation (quotes, implementation efforts, callouts)

The BIG QUESTION: How do we get these in the right hands?!

- Are your technical or funding contacts the right people?
- Iowa has created and posted earlier versions on the TPF site since Fall 2023.
  - If you have no idea what we're talking about, ***then it isn't getting into the right hands***.
- Additional avenues and ideas?

Commitments by Organizations

Export Data

Organization	Year	Commitments	Technical Contact Name	Funding Contact Name
Idaho Department of Transportation	2022	$12,000.00	Drew Meppen	Amanda Laib
Iowa Department of Transportation	2022	$12,000.00	Vanessa Goetz	-- --
Iowa Department of Transportation	2023	$0.00	Vanessa Goetz	-- --
Kansas Department of Transportation	2022	$12,000.00	Tod Salfrank	David Behzadpour
Louisiana Department of Transportation and Development	2022	$12,000.00	David North	Tyson Rupnow
Michigan Department of Transportation	2022	$0.00	Tracie Leix	Andre' Clover
Michigan Department of Transportation	2023	$12,000.00	Tracie Leix	Andre' Clover
Missouri Department of Transportation	2023	$12,000.00	Ashley Buechter	Jennifer Harper
Ohio Department of Transportation	2023	$12,000.00	Mark Eicher	General Research
Texas Department of Transportation	2022	$12,000.00	Lacy Peters	Ned Mattila
Virginia Department of Transportation	2023	$12,000.00	Hari Nair	Bill Kelsh

View 1 - 11 of 11 Show 20

thank you!

Questions?

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