# Smarter Work Zones Webinar Series

## Webinar #3: Smarter Work Zone Corridor-Based Project Coordination

Martha Kapitanov, John Habermann, and Steve Brink

October 15, 2015
12:30-2:00pm EDT

*Efficiency through technology and collaboration*


Every Day Counts (innovation, ingenuity, invention, imagination)

U.S. Department of Transportation
Federal Highway Administration

# Smarter Work Zones

## Introduction and Today's Speakers

# Today's Speakers

**Martha C. Kapitanov**
Transportation Specialist
FHWA Office of Operations

**John Habermann, P.E.**
Lead Mobility Coordinator, I-35 Expansion, Waco, TX
Texas A&M Transportation Institute

**Steve Brink, P.E.**
Southwest Region Traffic Safety and Operations Engineer
Michigan Department of Transportation

# Smarter Work Zones Webinar Series

- This is the third in a series of bi-weekly SWZ webinars
- Topics based on **what matters most to you!**
- Webinars include:
  - Previously Recorded:
    - Webinar #1: A Comprehensive Overview of the SWZ Initiative (9/9/2015)
      - https://www.workzonesafety.org/swz/project_coordination/training
    - Webinar #2: Implementing Technology Application Solutions (9/29/2015)
      - https://www.workzonesafety.org/swz/technology_application/training
  - Coming Up:

| | | |
|---|---|---|
| **October** | 10/26 | Webinar #4: TA Technology Showcase: Queue Warning Systems |
| **November** | 11/2 | Webinar #5: SWZ Program-Based Coordination |
| | 11/12 | Webinar #6: TA Case Studies: Variable Speed Limit and Dynamic Merge |
| **December** | 12/2 | Webinar #7: Work Zone Project Coordination Guide and Examples |
| | 12/15 | Webinar #8: TA/PC Showcase: Corridor Traffic Management |

**For additional information go to:**
**https://www.workzonesafety.org/SWZ/main**

# Purpose of Today's Webinar

***Provide a comprehensive overview of corridor-based project coordination and discuss real-world examples of successful corridor-based SWZ project coordination strategies.***

**Topics include:**

1. SWZ Project Coordination Initiative
   - Show how the SWZ Project Coordination initiative can be used by agencies to enhance their current work zone management practices
2. Corridor-Based Project Coordination Examples
   - Provide real-world examples of successful corridor-based SWZ project coordination strategies which resulted in:
     - Minimized travel delays
     - Enhanced safety for all road users and workers
     - Maintenance of business and resident access

# Smarter Work Zones

## Project Coordination Initiative

# What are Smarter Work Zones (SWZ)?

*Innovative strategies designed to optimize work zone safety and mobility*

- Policies and practices used to incrementally and continuously improve WZ operations
- Tools to reduce WZ crashes and delays
- Tools to enhance WZ management strategies

# Two Identified SWZ Initiatives:

## Project Coordination

Coordination within a single project and/or among multiple projects within a corridor, network, or region, and possibly across agency jurisdictions

*Today's Focus of Discussion*

## Technology Application

Deployment of Intelligent Transportation Systems (ITS) for dynamic management of work zone traffic impacts, such as queue and speed management

# Project Coordination – What is it?

Coordination within a single project and/or among multiple projects within a corridor, network, or region, and possibly across agency jurisdictions to minimize work zone traffic impacts.

Benefits:

- *For transportation agencies include*:
  - Ability to reduce and manage traffic disruptions from road work
  - Earlier identification of project impacts
  - Dynamic adjustments to schedule
  - Improved communications within and cross agencies
  - Cost savings
- *From the driver's perspective*:
  - Fewer numbers of work zones and street cuts
  - Better quality road surfaces
  - Increased customer satisfaction

Source: FHWA

# SWZ Project Coordination Goals:

## Goal 1

By December 2016, 25 State DOTs have incorporated work zone project coordination strategies into agency documentation and business processes.

**What does this mean?**

- Review of:
  - Existing PC-related policies/practices to identify strengths and weaknesses
  - Other agencies' PC-related best practices
- Identify and implement of SWZ PC strategies
- Develop agency documentation and business processes

# SWZ Project Coordination Goals:

## Goal 2

By December 2016, 5 State DOTs have volunteered to pilot the Work Zone Implementation Strategies Estimator (WISE) software.

**What does this mean?**

- Use WISE tool to optimize project schedules and analyze mitigation strategies to minimize work zone traffic impacts
- Pilot, evaluate, suggest enhancements, and demonstrate WISE's value for work zone management

# Smarter Work Zones

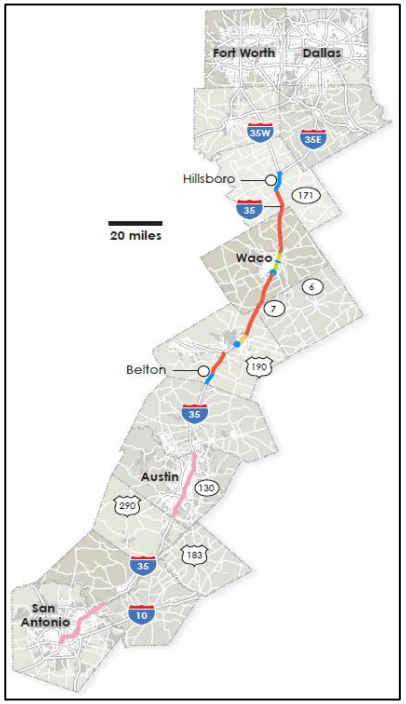
## Corridor-Based PC Examples

1. TxDOT's I-35 Expansion Project (Waco District)
2. MDOT's I-94 Corridor

# Example 1: TX's I-35 Expansion Project

TxDOT project to upgrade and widen I-35 to six lanes from San Antonio to Hillsboro, projects divided into four regional areas:

- Dallas/Fort Worth District
- Austin District
- San Antonio District
- Waco District

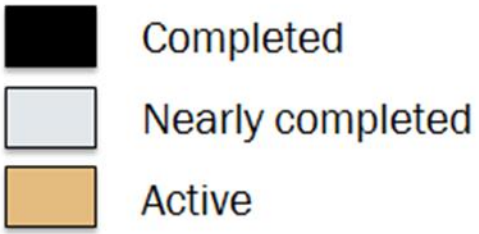

Source: http://ftp.dot.state.tx.us/pub/txdot-info/sla/projects/i35-central-expansion.pdf

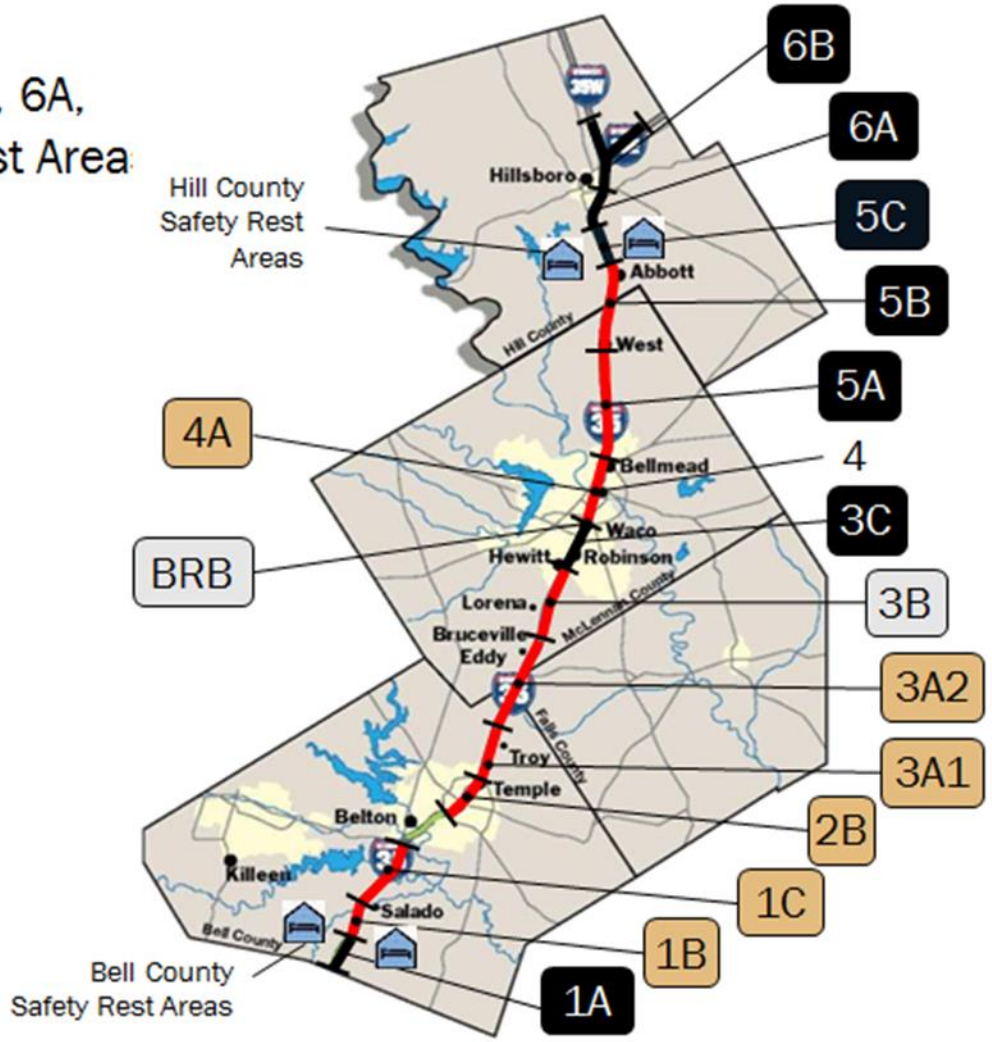
# I-35 Expansion Project: Waco District

- Receiving $2.1 billion to upgrade and widen 96 mile corridor (to minimum of six lanes) through central Texas
- I-35 In the Waco District:
  - 55,000 – 111,000 vehicles/day
  - 25-30% truck traffic
  - Up to 64 miles under construction at once
  - 14 road segments with 17 projects

# I-35 Waco Overview

- **Complete:** 1A, 3C, 5A, 5B, 5C, 6A, 6B, Bell Co. & Hill Co. Safety Rest Area
- **Nearly complete:** 3B, BRB
- **Active today:** 1B, 1C, 2B, 3A1, 3A2, 4A
- **Complete in early 2019**



# I-35 Planning & Design Phase Considerations (1 of 2)

- Established an I-35 Special Project Office
  - Goal: Quickly complete planning & design, secure funding, and get construction underway while still had support
  - Included key staff members
  - Early coordination efforts with TxDOT Divisions, FHWA, state and local environmental resource agencies
- Divided the corridor into six segments
  - Three project engineers were assigned two segments each

# I-35 Planning & Design Phase Considerations (2 of 2)

- Multi-tiered Public Meetings
  - First Set of Meetings:
    - Introduced corridor expansion plan to adjacent local governments and the general public
  - Second Set of Meetings:
    - Established a vision for each segment and began to draw out historically sensitive areas, non-negotiables, cemeteries, etc.
  - Third set of meetings:
    - Project specific meetings with draft schematics, route options, etc.
  - Fourth set of meetings:
    - Public hearings on final, approved schematics for each segment
- Pulled in resources from other TxDOT Districts
  - Assist with right-of way acquisitions
  - Design of specific projects
  - Support of ‘routine’ Waco district business, etc.

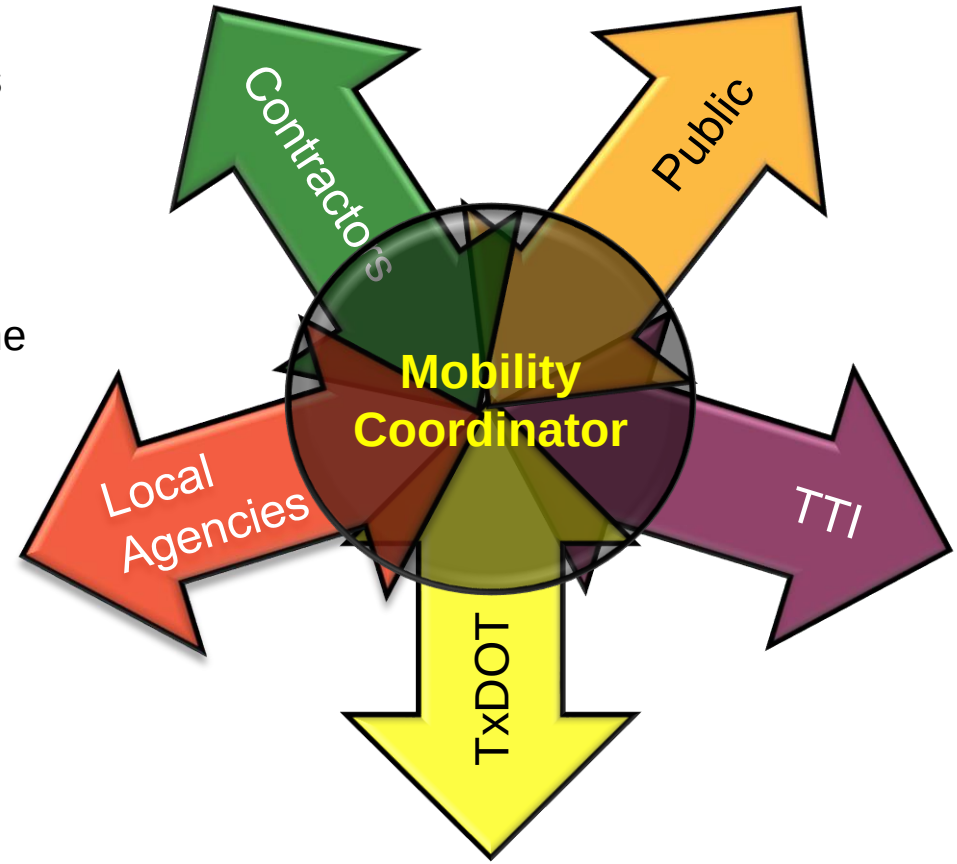
# I-35 Corridor Construction Coordination (1 of 4)

- Advanced Mainline Closure Notification
- Mainline Closure restrictions
- Project to Project Coordination
- Significant Community Events
- Significant Calendar Dates
- Shippers' Needs
- Milestones for each project (high use exits, high use intersections, etc.)

# I-35 Corridor Construction Coordination (2 of 4)

**Project Ombudsman/Technical Advisor**

- Engage and assist those impacted
- Attend weekly construction meetings
- Participate in District Safety Meetings
- Examine mobility across all I-35 construction projects
- Keep internal / external stakeholders informed (e.g., city council meetings)
- Facilitate flow of information (e.g., lane closures, maintenance work, traffic control changes, etc.)
- Assist Public Information Officer
- Mitigate traffic and access impacts
- Listen
- Manage Expectations

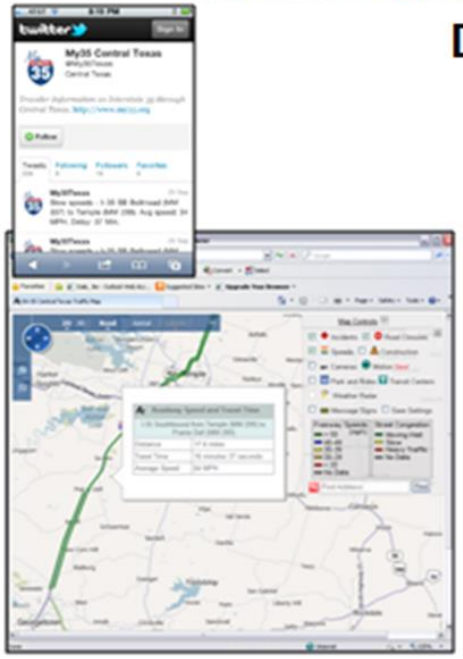


# I-35 Corridor Construction Coordination (3 of 4)

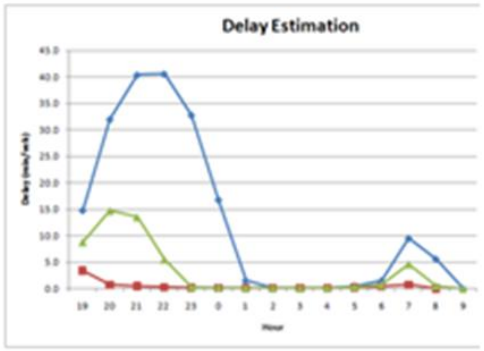
# I-35 Corridor Construction Coordination (4 of 4)


Disseminate Info

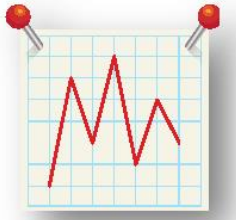
Monitor Conditions



Estimate Delay

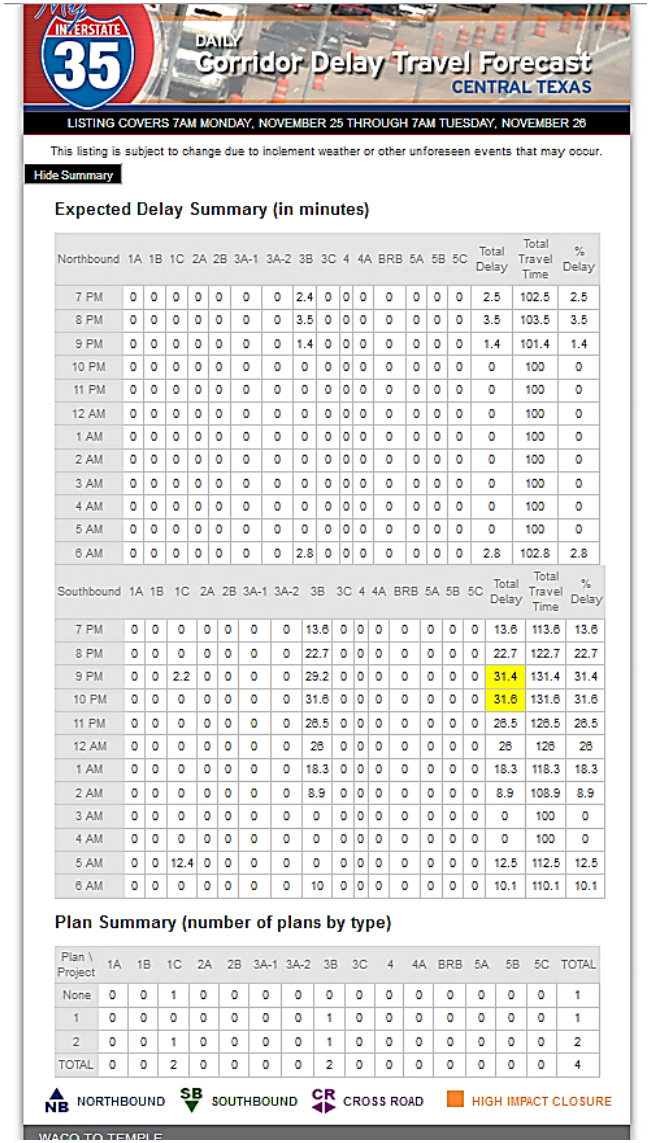


# What do I-35 Travelers Want?

| | | | |
|---|---|---|---|
| DELAYS  | CURRENT TRAVEL TIMES  | INCIDENTS  | LANE CLOSURES  |
| FORECASTED TRAVEL TIMES  | DETOUR ROUTES  | CURRENT SPEEDS  | SNAPSHOTS   |

# Multiple Lane Closures on the Same Night (1 of 4)

| Southbound | 1A | 1B | 1C | 2A | 2B | 3A-1 | 3A-2 | 3B | 3C | 4 | 4A | BRB | 5A | 5B | 5C | Total Delay | Total Travel Time | % Delay |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.6 | 113.6 | 13.6 |
| 8 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22.7 | 122.7 | 22.7 |
| 9 PM | 0 | 0 | 2.2 | 0 | 0 | 0 | 0 | 29.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.4 | 131.4 | 31.4 |
| 10 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.6 | 131.6 | 31.6 |
| 11 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26.5 | 126.5 | 26.5 |
| 12 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 126 | 26 |
| 1 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18.3 | 118.3 | 18.3 |
| 2 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.9 | 108.9 | 8.9 |
| 3 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 4 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 5 AM | 0 | 0 | 12.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.5 | 112.5 | 12.5 |
| 6 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.1 | 110.1 | 10.1 |



INTERSTATE 35

DAILY Corridor Delay Travel Forecast CENTRAL TEXAS

LISTING COVERS 7AM MONDAY, NOVEMBER 25 THROUGH 7AM TUESDAY, NOVEMBER 26

This listing is subject to change due to inclement weather or other unforeseen events that may occur.

Hide Summary

**Expected Delay Summary (in minutes)**

| Northbound | 1A | 1B | 1C | 2A | 2B | 3A-1 | 3A-2 | 3B | 3C | 4 | 4A | BRB | 5A | 5B | 5C | Total Delay | Total Travel Time | % Delay |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 102.5 | 2.5 |
| 8 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 103.5 | 3.5 |
| 9 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 101.4 | 1.4 |
| 10 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 11 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 12 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 1 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 2 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 3 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 4 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 5 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 6 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 102.8 | 2.8 |

| Southbound | 1A | 1B | 1C | 2A | 2B | 3A-1 | 3A-2 | 3B | 3C | 4 | 4A | BRB | 5A | 5B | 5C | Total Delay | Total Travel Time | % Delay |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13.6 | 113.6 | 13.6 |
| 8 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22.7 | 122.7 | 22.7 |
| 9 PM | 0 | 0 | 2.2 | 0 | 0 | 0 | 0 | 29.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.4 | 131.4 | 31.4 |
| 10 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31.6 | 131.6 | 31.6 |
| 11 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26.5 | 126.5 | 26.5 |
| 12 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 126 | 26 |
| 1 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18.3 | 118.3 | 18.3 |
| 2 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.9 | 108.9 | 8.9 |
| 3 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 4 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| 5 AM | 0 | 0 | 12.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.5 | 112.5 | 12.5 |
| 6 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.1 | 110.1 | 10.1 |

**Plan Summary (number of plans by type)**

| Plan \ Project | 1A | 1B | 1C | 2A | 2B | 3A-1 | 3A-2 | 3B | 3C | 4 | 4A | BRB | 5A | 5B | 5C | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| None | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| TOTAL | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |

NB NORTHBOUND SB SOUTHBOUND CR CROSS ROAD HIGH IMPACT CLOSURE

WACO TO TEMPLE

# Multiple Lane Closures on the Same Night (2 of 4)

Closure ID: 2822
Last Modified: 3/28/2015 5:17:35 PM by d-middleton@tamu.edu
Planned Start Time: 4/1/2015 07:00 PM
Planned End Time: 4/2/2015 07:00 AM
Duration: Nightly
Number of Main Lanes: 2
Lane(s) Closed: Left Lane; Right Lane
Closure Length: 4.0 mi.

Date: Wednesday, 4/1/2015
Maximum Queue Length

- Expected: 1.3 mi.
- Worse Case*: 3.7 mi.

| From | To | Expected Queue (mi) | Expected Delay (min/veh) | Worse Case* Queue (mi) | Worse Case* Delay (min/veh) |
|---|---|---|---|---|---|
| 07:00 PM | 08:00 PM | 0.9 | 8.0 | 1.7 | 13.7 |
| 08:00 PM | 09:00 PM | 1.0 | 9.1 | 2.6 | 19.7 |
| 09:00 PM | 10:00 PM | 1.3 | 10.8 | 3.5 | 26.8 |
| 10:00 PM | 11:00 PM | 0.9 | 9.1 | 3.7 | 30.5 |
| 11:00 PM | 12:00 AM | 0.0 | 0.0 | 3.3 | 29.3 |
| 12:00 AM | 01:00 AM | 0.0 | 0.0 | 2.6 | 25.5 |
| 01:00 AM | 02:00 AM | 0.0 | 0.0 | 1.8 | 19.4 |
| 02:00 AM | 03:00 AM | 0.0 | 0.0 | 0.9 | 11.2 |
| 03:00 AM | 04:00 AM | 0.0 | 0.0 | 0.0 | 0.0 |
| 04:00 AM | 05:00 AM | 0.0 | 0.0 | 0.0 | 0.0 |
| 05:00 AM | 06:00 AM | 0.0 | 0.0 | 0.1 | 4.1 |
| 06:00 AM | 07:00 AM | 0.6 | 6.6 | 1.5 | 12.5 |

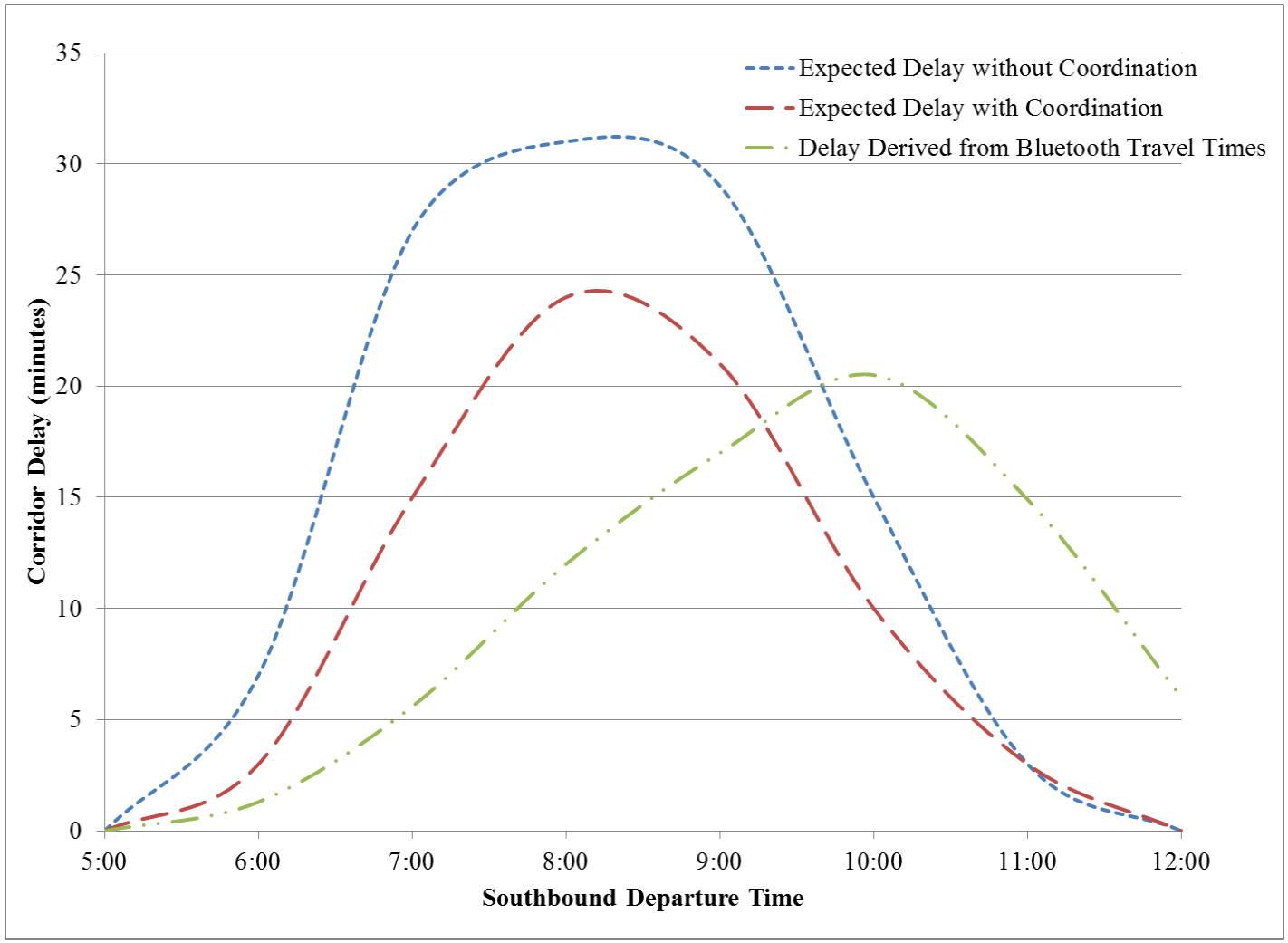
# Multiple Lane Closures on the Same Night (3 of 4)

Closure ID: 2822
Last Modified: 4/1/2015 12:38:12 PM by g-thomas@tamu.edu
Planned Start Time: 4/1/2015 09:00 PM **(Modified)**
Planned End Time: 4/2/2015 07:00 AM
Duration: Nightly
Number of Main Lanes: 2
Lane(s) Closed: Left Lane; Right Lane
Closure Length: 4.0 mi.

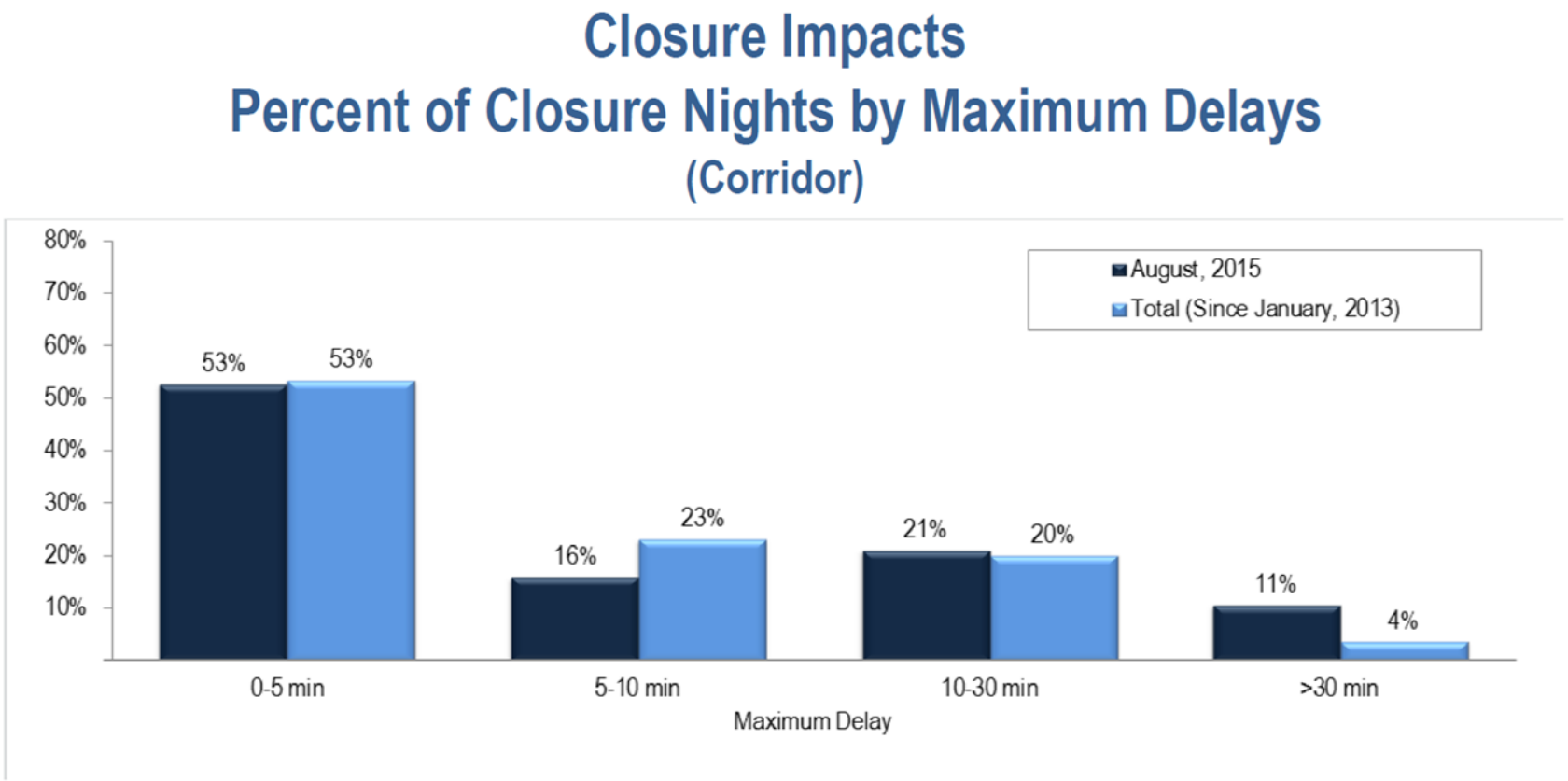
Date: Wednesday, 4/1/2015
Maximum Queue Length
- Expected: 0.6 mi.
- Worse Case*: 1.5 mi.

| From | To | Expected Queue (mi) | Expected Delay (min/veh) | Worse Case* Queue (mi) | Worse Case* Delay (min/veh) |
|---|---|---|---|---|---|
| 09:00 PM | 10:00 PM | 0.2 | 4.7 | 0.9 | 9.5 |
| 10:00 PM | 11:00 PM | 0.0 | 0.0 | 1.1 | 11.8 |
| 11:00 PM | 12:00 AM | 0.0 | 0.0 | 0.7 | 9.0 |
| 12:00 AM | 01:00 AM | 0.0 | 0.0 | 0.1 | 3.9 |
| 01:00 AM | 02:00 AM | 0.0 | 0.0 | 0.0 | 0.0 |
| 02:00 AM | 03:00 AM | 0.0 | 0.0 | 0.0 | 0.0 |
| 03:00 AM | 04:00 AM | 0.0 | 0.0 | 0.0 | 0.0 |
| 04:00 AM | 05:00 AM | 0.0 | 0.0 | 0.0 | 0.0 |
| 05:00 AM | 06:00 AM | 0.0 | 0.0 | 0.1 | 4.1 |
| 06:00 AM | 07:00 AM | 0.6 | 6.6 | 1.5 | 12.5 |

# Multiple Lane Closures on the Same Night (4 of 4)



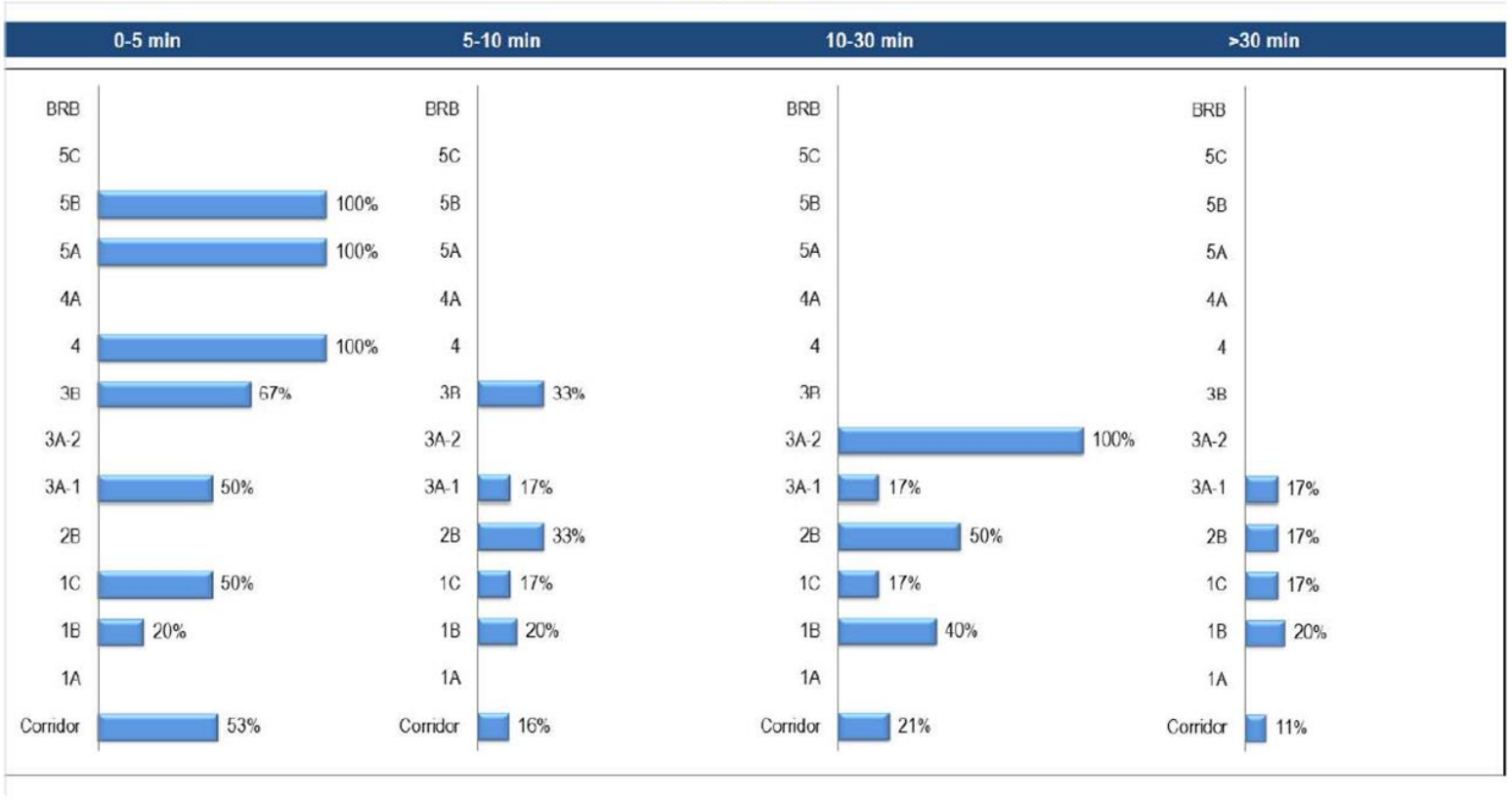
# Corridor Performance Review (1 of 2)



# Corridor Performance Review (2 of 2)

## Percent of Closure Nights by Maximum Delays
### (by Project Sections)

**August, 2015:**



# I-35 Corridor Construction Coordination – Lessons Learned (1 of 2)

- Early and continued conversations with decision makers and the public
- During planning and design, a dedicated, special project office staff can make consistent advances in getting projects ready for construction
- Have bid documents/bid specifications/construction documents contain language that is consistent across projects and sustains coordination
- Advanced lane closure notifications

# I-35 Corridor Construction Coordination – Lessons Learned (2 of 2)

- Traffic data collection equipment was essential to good decision making
- Mobility coordination creates space to have advanced conversations to minimize delays during construction
- Feedback from road users helped improve project decisions along the corridor
- TxDOT developed a Traffic Incident Management Plan

# For more information:

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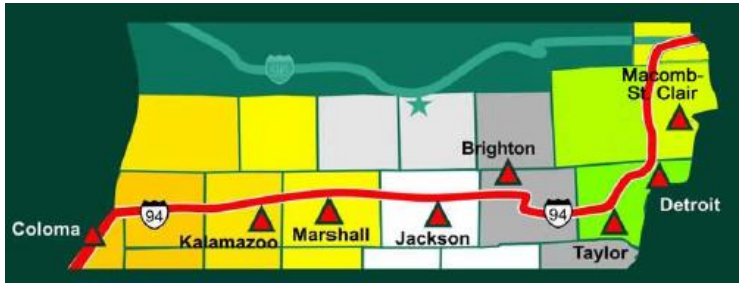
Additional information and resources on this project are available on the National Work Zone Safety Information Clearinghouse website:
https://www.workzonesafety.org/SWZ/main

# Example 2: Michigan's I-94 Corridor

- Michigan's I-94 Corridor is a major thoroughfare stretching 271 miles across the state from Indiana to Canada:
  - 3 Regions (southwest, metro, university)
  - 8 Transportation Service Centers
  - 9 Counties
- In 2010, 19 consecutive construction projects on the corridor led to lengthy delays resulting in creation of "One Corridor Focus" initiative:
  - I-94 managed as one single unit with one overall travel time delay (TTD)
  - Led by Corridor Operations Partnership (COP)

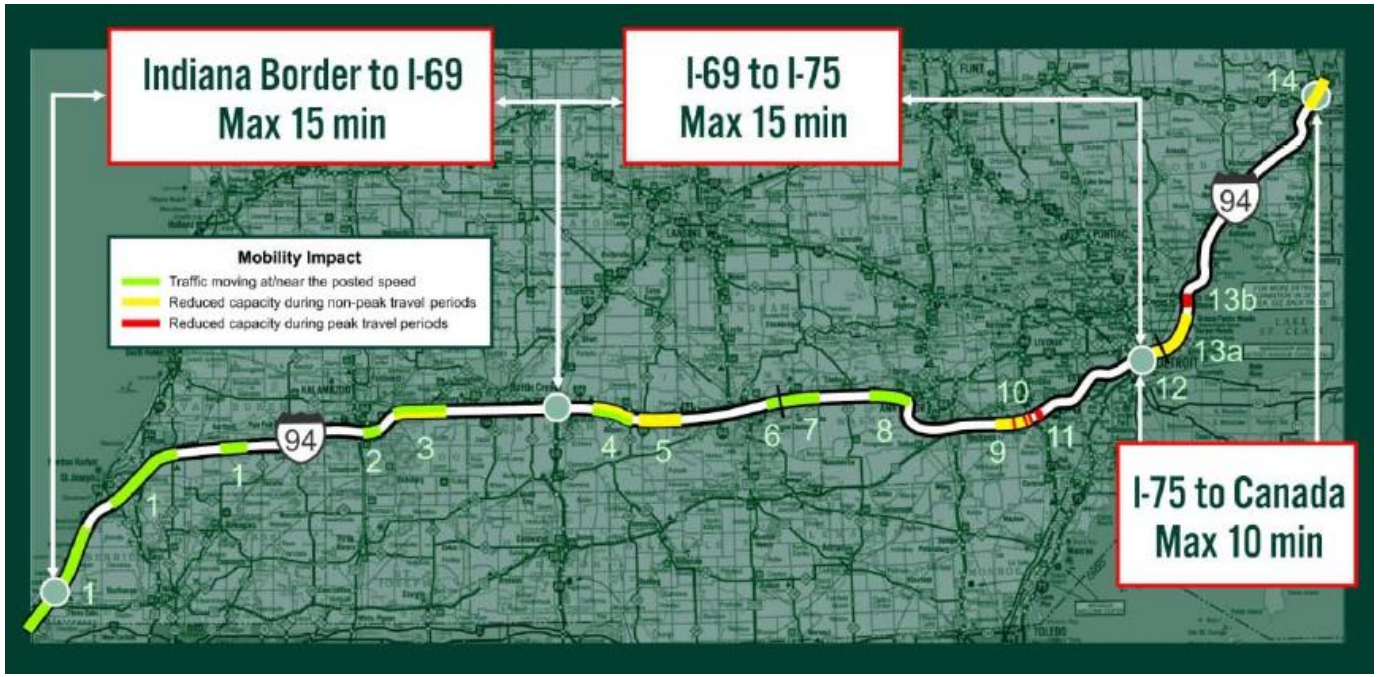


# I-94 Corridor Operations Partnership (COP)

- COP created to implement “One Corridor Focus”
- COP Mission:
  - Improve traffic operations and system reliability along the I-94 corridor statewide
- COP Objectives:
  - Unification of the I-94 corridor with one focus
  - Travel Reliability – 40 min delay max for entire corridor
- COP sub-teams:
  - Corridor Performance Team
  - Active Corridor Management Team

# Current Performance Measures – Travel Time Delay (1 of 2)

- TTD threshold of 40 minutes (15% increase in total travel time from end to end)
  - Segment 1: Indiana Border to I-69 (TTD max 15 min)
  - Segment 2: I-69 to I-75 (TTD max 15 min)
  - Segment 3: I-75 to Canada (TTD max 10 min)



# Current Performance Measures – Travel Time Delay (2 of 2)

- TTD threshold of 40 minutes (15% increase in total travel time from end to end)

## Southwest Region I-94 Work Zone Summary for 2012

Special Events: Senior PGA, Mem Day, Indep. Day, Labor Day

| TSC | Route | Location | Direction | Begin MM | End MM | Distance (miles) | Begin DATE | End DATE | Work Description | Impact | Traffic Control Description | JN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | I-94 | Indiana State Line to Three Oaks Road | Both | 0 | 10 | 10 | 5/17/2012 | 6/30/2012 | Crack Seal | High | Peak hr 1-Lane | 113017 |
| C | I-94 | Indiana State Line to M-40 | Both | 0 | 60 | 60 | 9/17/2012 | 4/1/2013 | DMS | Low | | 109707 |
| C | I-94 | Various Pavement Marking | Both | 0 | 67 | 67 | 5/1/2012 | 6/29/2012 | Pavement Marking | Medium | | 113905 |
| C | I-94 | New Buffalo to Sawyer | Both | 1 | 12 | 12 | 8/1/2012 | 8/30/2012 | Ditching | Low | | Maint |
| C | I-94 | New Buffalo to Stevensville | Both | 1 | 23 | 23 | 7/16/2012 | 8/30/2012 | Brush & Tree Removal | Low | | Maint |
| C | I-94 | Between New Buffalo and Union Pier | WB | 3 | 3 | 1 | 8/1/2012 | 8/7/2012 | Culvert Repair | Low | | Maint |
| C | I-94 | ~~Harbert to Red Arrow~~ | EB | 11 | 16 | 5 | 10/8/2012 | | Major Rehab | High | | 79871 111273 |
| C | I-94 | Lake Street to Stevensville | Both | 18 | 23 | 5 | 5/7/2012 | 6/4/2012 | HMA Mill & Pave | Medium | | Maint |
| C | I-94 | Lake Street to Stevensville | Both | 18 | 23 | 5 | 5/7/2012 | 6/4/2012 | HMA Shld. Paving | Medium | | Maint |
| C | I-94 | John Beers over I-94 | Both | 22 | 22 | 1 | 4/11/2012 | 8/10/2012 | Bridge Rehab | High | Peak hr 1-Lane | 88086 |
| C | I-94 | at Lakeshore Dr (Exit 23) | Both | 23 | 24 | 1 | 9/17/2012 | 9/30/2012 | Bridge Joint Repl. | Medium | | Maint |
| C | I-94 | Stevensville to St. Joseph | Both | 23 | 27 | 3 | 5/7/2012 | 5/20/2012 | Median Berm Removal | Low | | Maint |
| C | I-94 | M-63 over I-94 | Both | 27 | 27 | 1 | 5/29/2012 | 8/18/2012 | Bridge Rehab | High | Peak hr 1-Lane | 109093 |
| C | I-94 | Napier, Empire, .2 miles east of I-196 | Both | 29 | 35 | 6 | 8/13/2012 | 8/31/2012 | Pavt rehab-isolated areas | High | | M51203 |
| C | I-94 | Pipestone | EB | 29 | 30 | 1 | 4/16/2012 | 4/21/2012 | Cocnrete pavt repair | Medium | | Maint |
| C | I-94 | Britain Ave | Both | 32 | 32 | 1 | 4/1/2012 | 5/30/2012 | Bridge Replacement | Low | | 104002 |
| C | I-94 | Park to Hennesey Road | EB | 38 | 40 | 2 | 7/9/2012 | 11/2/2012 | Overlay | Medium | Off-peak Closures | 106483 |
| C | I-94 | Park to Hennesey Road | EB | 38 | 40 | 2 | 7/13/2012 | 7/15/2012 | Weekend LN Closures | High | Peak hr 1-Lane | 106483 |
| C | I-94 | Hennesey | WB | 41 | 42 | 1.5 | 4/23/2012 | 4/27/2012 | Concrete Pavt Repair | Medium | | Maint |
| C | I-94 | Lawrence Bridge Deck Repair | WB | 51 | 53 | 2 | 4/11/2012 | 4/27/2012 | Deck Repair | Medium | | Maint |
| K | I-94 | Kalamazoo County line to 12th Street | Both | 67 | 73 | 6 | 9/4/2012 | 9/29/2012 | Mill and resurface | Medium | Off-peak Closures | 113381 |
| K | I-94 | Various Pavement Marking | Both | 67 | 92 | 25 | 6/1/2012 | 7/3/2012 | Pavement Marking | Medium | Moving Closures | 113899 |
| M | I-94 | Various Pavement Marking | Both | 92 | 124 | 32 | 5/1/2012 | 12/1/2012 | Pavement Marking | Medium | | |
| ~~M~~ | ~~I-94~~ | ~~6 1/2 to 11 mile~~ | ~~Both~~ | ~~99~~ | ~~104~~ | ~~5~~ | ~~TBD~~ | ~~TBD~~ | ~~Diamond Griding~~ | | ~~Off-peak Closures~~ | ~~Maint~~ |
| M | I-94 | M-311 WB entrance ramp | WB | 104 | 104 | 1 | 7/5/2012 | 8/31/2012 | Ramp, Sewer, Signing | Medium | Off-peak Closures | 108715 113474 |
| | | | | | | | | | Weekend | | | (min) |
| | | | | | | | | | Weekday | | | (min) |

# Corridor Level Standards

- Developed to:
  - Ensure customer experience from one work zone to another is consistent and reliable
  - Reduce confusion and driver frustration
  - Improve compliance with work zone signage, thus improving safety and reducing crashes

- Standards include:
  - Left lanes will be closed first
  - Minimum 11’ work zone lane width (12’ preferred)
  - 2’ minimum paved shoulder
  - Emergency pull-outs where no refuge

# Active Corridor Management

- Goals:
  - Improved performance of individual work zones
  - Coordinated effort for corridor projects
  - Sharing of challenges, solutions and best practices

- Actions include:
  - Work zone Delay Measurement
  - Bi-Weekly corridor work zone meeting
    - Incident and messaging coordination
    - Discussing performance results and determining actions to reduce impacts if necessary

# Current Performance Measures - User Delay Cost

- User Delay Cost: A fairly easily defined and comprehendible metric for transportation professionals as well as the public and other partners in highway operations

| User Delay Cost | Travel Time Reliability |
|---|---|
| Tangible, relatable Unit of measure | More complex “Index” |
| Real time, up to the minute | Good for long term trends, but loses meaning at hourly increments |
| Accounts well for variation in volume, location, and time of day impacts | Not as reflective of volume, location, and time of day impacts |
| Actionable: allows for proactive and active management that connects to results | Difficult to tie actions to outcomes |

# Customer Groups

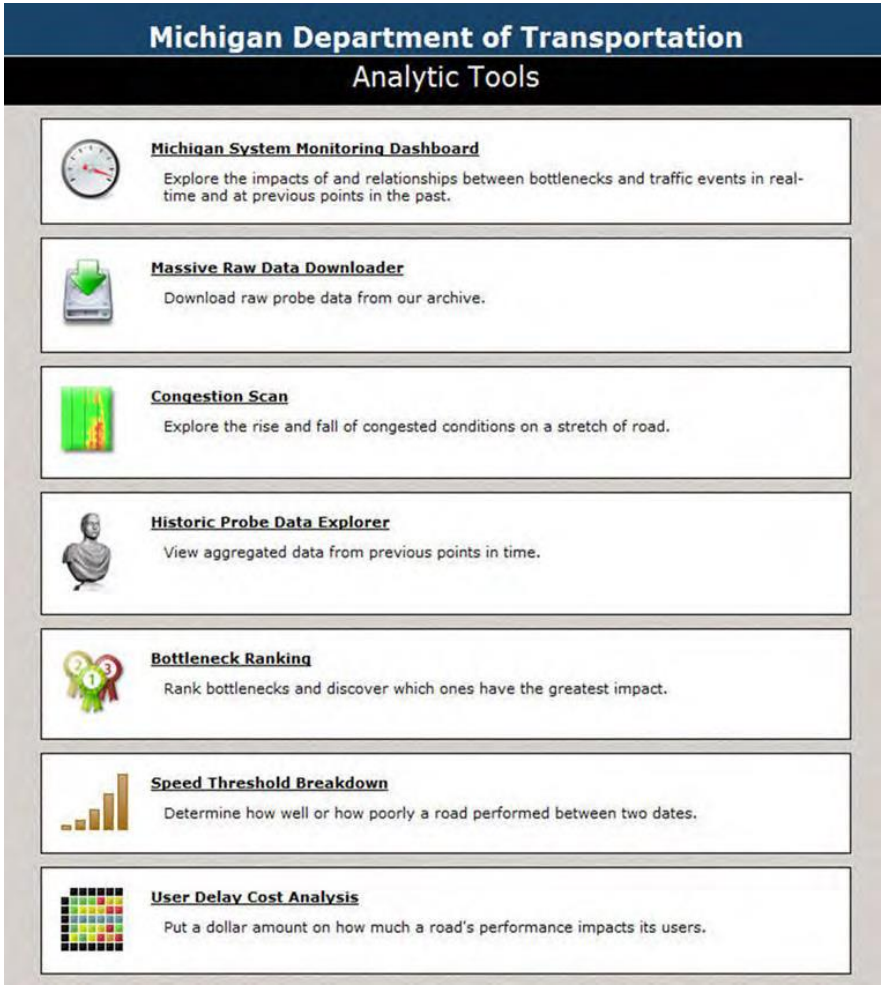
- MDOT focused efforts on three customer causes of non-recurring congestion:
  - Work Zones
  - Emergency responders along the corridor
  - Winter operations along I-94

# User Delay Cost Metrics On I-94 Since 2011

- 2011: Reduce UDC on I-94
  - Used speed map snapshots to determine delay
  - Tracked on 124 miles of SW Region
- 2012: Reduce UDC on I-94
  - Continued speed map methodology
  - Expanded to all three regions to cover all 271 miles
- 2013: Limit UDC on I-94
  - Changed to RITIS Software to calculate UDC for speeds under 60 MPH
  - Customer satisfaction became overall MDOT WIG
- 2014: Limit UDC on I-94
  - Continued RITIS Methodology
  - UDC continued to support customer satisfaction

# Regional Integrated Transportation Information System (RITIS)

- Operation focus shift
- ITS infrastructure
- Vehicle speed probe data
- Manual calculation of delay
- Auto calculation of delay

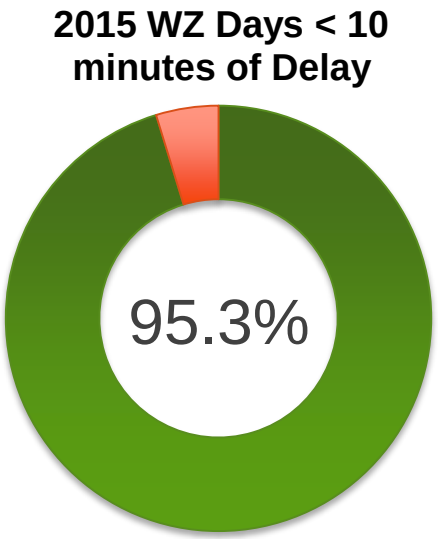


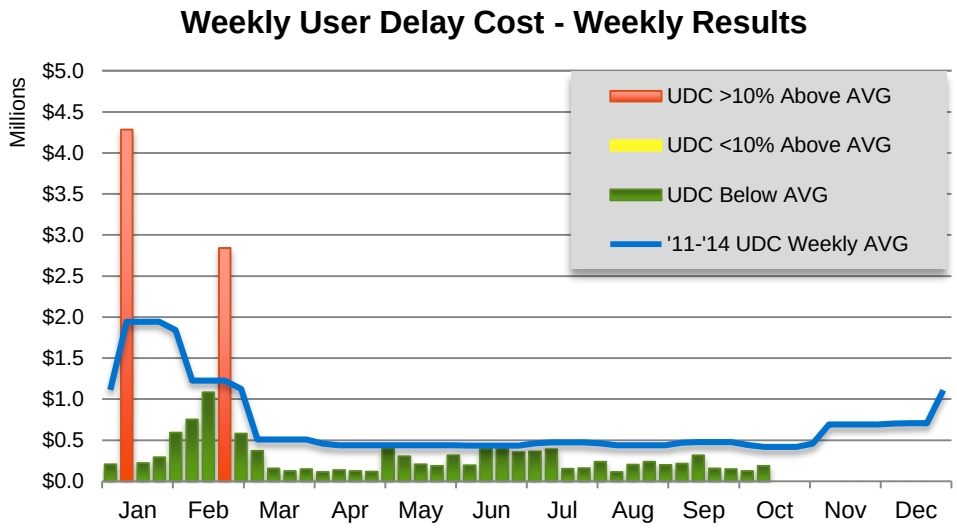
# Measuring Work Zone Performance on I-94

| Type | Name | Description |
|---|---|---|
| Time | Travel Time Delay | Delay measurements taken twice per week and after stage changes |
| MOT | WZ Set-Up Compliance | Perform two WZ reviews per week at each project set-up and stage change 90% of the time |
| Time | Travel Time Delay | Analyze 95% of projects where delay is 25% outside of predicted values. |
| Time | Closure Times | Update allowable freeway lane closure hours. |
| Comm. | WZ Action | Hold Maintenance of Traffic Huddles 90% of weeks with lane closure. |
| Time | Travel Time Delay | Compare actual WZ traffic data to predicted for significant WZ's |

# Current Performance Measures – SW Region

- Limit delays through all work zones to less than 10 minutes for 90% of days each work zone is in place during the 2015 construction season.
- Hold weekly work zone meetings to discuss upcoming impactful work and coordinate messaging.



# Findings

- Performance metrics are necessary to find if your program is successful.
  - Are we measuring the right things? Choosing the right measures and thresholds takes time.
- Tracking a project's 24-7 performance maintains staff focus on mobility and improves decision making toward operations.
- Process requires full support from top management.
- User Delay Cost has a relationship to actual contract bid cost. Finding appropriate balance isn't easy, however measuring it provides a better end result for motorists.

# For more information:

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Michigan DOT
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# Smarter Work Zones

## FHWA Resources

# SWZ Interactive Toolkit Available!

https://www.workzonesafety.org/SWZ/main

# Other Resources

| Project Coordination Resources | |
|---|---|
| FHWA | • FHWA Work Zone Mobility and Safety Program – Project Coordination http://www.ops.fhwa.dot.gov/wz/construction/crp/index.htm<br>• FHWA Work Zone Mobility and Safety Program – Peer-to-Peer Program http://www.ops.fhwa.dot.gov/wz/p2p/index.htm |
| TRB SHRP2 | • WISE Software Users Guide http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2_S2-R11-RW-2.pdf |
| NCHRP | • NCHRP Synthesis 413: Techniques for Effective Highway Construction Projects in Congested Urban Areas http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_41.pdf |
| Others | • Highway Construction Coordination to Minimize Traffic Impacts http://planning.transportation.org/Documents/8-36/NCHRP8-36(56)FinalReport.pdf |

# Thanks for joining us!

- **Upcoming Events**
  - Webinar #4: Technology Application Showcase: Queue Warning Systems
    - Monday, October 26, 2015, 1:00-2:30pm EDT
    - Registration: https://connectdot.connectsolutions.com/e5lqes6yqnl/event/event_info.html
  - Webinar #5: Program-Based Project Coordination
    - Monday, November 2, 2015, 1:00-2:30pm EDT
  - Regional Peer Exchanges

| FHWA DFS Region | Location | Dates |
|---|---|---|
| Mid-America | Des Moines, Iowa | October 22-23 |
| North | Springfield, Massachusetts | October 28-29 |
| South | Raleigh, North Carolina | November 5-6 |
| West | Denver, Colorado | November 17-18 |

  - Check The National Work Zone Safety Information Clearinghouse website for updates https://www.workzonesafety.org/SWZ/main
  - **Questions or Comments?**
    - Jawad Paracha (FHWA Operations, WZ Team) Jawad.Paracha@dot.gov