Agenda

• **Smarter Work Zones (SWZ) Overview**
  – What is SWZ, why is it relevant, and what are the goals?
  – What funding mechanisms are available?
  – What support will FHWA provide?

• **SWZ’s Project Coordination Initiative**
  – Strategies and Examples

• **SWZ’s Technology Application Initiative**
  – Strategies and Examples

• **Questions/Discussion**
Why are SWZs Important?

SWZs play major role in reducing WZ-related injuries, fatalities, and travel delays

- **Work Zone related injuries:**
  - Occur every 14 minutes (96 injuries/day)
  - Over 20,000 workers injured annually
  - 29,000 injuries in 2013

- **Work Zone related fatalities:**
  - Occur every 15 hours (1.6 fatalities/day)
  - 105 worker fatalities in 2013
  - 579 traffic-related fatalities in 2013

- **Work Zone related mobility issues:**
  - 24% of non-recurring delay
  - 10% of all congestion
  - NHS capacity loss ~180mil vehicles/day

Source: VDOT
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

**Smarter Work Zone Initiatives**
- Project Coordination
- Technology Applications
Every Day Counts (EDC) – program to accelerate state adoption of innovations for “shortening project delivery, enhancing the safety of our roadways, and protecting the environment.”

What are Smarter Work Zones?

PROJECT COORDINATION
Coordination within and/or between agencies to minimize work zone traffic impacts among multiple projects

TECHNOLOGY APPLICATIONS
Implementation of ITS tools for improved work zone traffic management
Project Coordination Definition and Goals

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.

Goal 1
By December 2016, 25 State DOTs have incorporated work zone project coordination strategies into agency documentation and business processes for improving safety and reducing work zone delays.

Goal 2
By December 2016, five State DOTs have volunteered to pilot the WISE (Work Zone Impact & Strategy Estimator) software application.

Source: TRB
Technology Applications Definition and Goals

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

**Goal**

By December 2016, **35 State DOTs** have:

- Implemented business processes for planning, design, procurement, operation, and evaluation of Work Zone ITS technologies as identified in the "Work Zone ITS Implementation Guide" **and/or**

- Have utilized at least one work zone ITS technology application for dynamic management of work zone impacts such as speed and queue management.
How do States fund these initiatives?

**State Transportation Innovation Councils (STIC) Incentive Program** [www.fhwa.dot.gov/stic](www.fhwa.dot.gov/stic)
- Funds activities which turn innovations into standard practices
- Up to $100,000 available to each STIC annually

**Accelerated Innovation Deployment (AID) Demonstration Program** [www.grants.gov](www.grants.gov)
- Projects may be any aspect of highway transportation
- Max of $1,000,000 (up to full cost of project)
- Monitoring, assessment, and technology transfer commitments
SWZ Adoption by State (as of July 2015)

*Final WISE Pilot grantee selection by end of Summer 2015
FHWA is supporting states in implementing SWZ strategies in a variety of ways!

**SWZ outreach materials**
- Case studies
- Fact sheets
- Toolkit (online and via thumb-drive)

**Virtual and in-person training opportunities**
- Monthly 90-min webinars
- 1-2 day in-person workshops

**Virtual and in-person peer-to-peer exchanges**
- Hosting and participant opportunities

**Regional Peer Exchange Workshops**
- Hosting and participant opportunities

**Demonstration Site Visits**
- Hosting and participant opportunities

Learn more about SWZ strategies and deployments!

Learn about SWZ concepts based on YOUR state needs!

Meet with agencies who have successfully adopted SWZ strategies!

See first-hand SWZ deployments across the country!
Some successful coordination strategies deployed in metropolitan areas and interstate corridors

Strategies are not standard practice among most transportation agencies
Project Coordination Strategy #1
Corridor-level TMPs to address traffic-related construction impacts

- **Oregon Transportation Investment Act**
  - Significant construction
  - Six corridors identified
  - Three levels of TMP
  - Corridor-Level TMPs
    - Assess corridor traffic impacts
    - Define corridor/segment delay thresholds
    - Suggest traffic mgmt. strategies
    - Discuss implementation plan

[Diagram of project coordination strategy phases]

Source: ODOT
Project Coordination Strategy #2
Building partnerships to enhance mobility during construction

• Michigan’s I-94 Corridor
  – I-94 Corridor Operation Partnership (COP) Mission: “Improve traffic operations and system reliability along the I-94 corridor statewide.”
  – I-94 COP Objectives:
    • Unification of I-94 corridor with one focus
    • Travel Reliability: 40 min delay max for entire corridor
Project Coordination Tool
Work Zone Implementation Strategies Estimator (WISE)

• Product of SHRP2 R11 Project
• Proactively reduces WZ impacts:
  – Effective project coordination upfront in planning/programming
  – Carrying coordination through to project planning/design decisions

• Helps bridge the gap between planning/MPOs and design-construction/DOTs
• Has ability to analyze demand and duration based strategies
• Supports better and more complex decision-making

WISE modules:

Planning Module
• Optimized sequencing of renewal projects

Operations Module
• DynusT platform evaluates impact of individual strategies at project level

Available at trb.org
Benefit / Cost
• System cost vs. agency budget constraints
• Lack of understanding of benefits (and how that offsets the cost)

No “one size fits all” approach
• Lack of standard procedures, specifications, etc. for implementing at state level
• Lack of practitioner knowledge (design, construction)
• Procurement challenges

Third-party issues
• Legislative requirements
• Stakeholder resistance to change (law enforcement, public, industry partners)
Technology Applications - Objectives and Criteria

Objectives

Safety
- Improved driver awareness of downstream congestion related to work zones
- Dynamic guidance to improve driver responsiveness to changes in traffic patterns
- Enhanced tools for on-site traffic management

Mobility
- Facilitate real-time decision-making and trip planning so drivers can divert trips to avoid adding to work zone congestion
- Enhanced transportation management facilitated by real-time data flows
- Increased customer satisfaction

Basic Criteria

Are traffic responsive - incorporate real-time data collection
- Provide enhanced information delivery to drivers
- Functions are automated and dynamic

System Components

- Infrastructure:
  ✓ Sensors
  ✓ Connected traffic control devices (e.g., signals, PCMS)
  ✓ Communications
  ✓ Data processing / archival
- Business Processes:
  ✓ Assessment of need
  ✓ Understanding of regulatory requirements (i.e., System Engineering)
  ✓ Coordination with external stakeholders
  ✓ System design / specification
  ✓ Procurement / contracting mechanisms
Work Zone ITS Applications
From the ITS Implementation Guide

- Real-time Traveler Information
- Queue Warning
- Dynamic Lane Merge (early/late)
- Incident Management
- Variable Speed Limits
- Automated Enforcement
- Entering / Exiting Vehicle Notification
- Performance Measurement
Technology Application Strategy #1
Queue Warning System (QWS)

Zone of advanced work zone awareness provided by Queue Warning System

Warning Signs installed per TCP

Work Zone

Queue Detection Zone

Queue Warning Controller

STOPPED TRAFFIC 2 MILES

PCMS

DYNAMIC WARNING

DATA
Technology Application Strategy #2
Variable Speed Limits (VSL)

• Multiple speed trailers in & approaching work zone

• Each unit monitors prevailing speed – relays information to upstream units.

• Posted speed limit dynamically adjusted to reduce downstream speed differential

Technology Application Strategy #3
Dynamic Lane Merge

**Early Merge**
- In low-volume conditions reduces the occurrence of high-speed merging at the point of lane closure.

**Late Merge**
- In high-volume conditions reduces the length of the queue.

Source: Maryland State Highway Administration
Technology Application Case Study #1
I-35 Traveler Information During Construction

• Provide **advance** notification of planned lane closures and their anticipated impacts

• Provide travelers with **predicted** delays for construction closures (web app http://i35-maps.tti.tamu.edu/)

• Provide **real-time** traveler information
Technology Application Case Study #2
Rural Queue Detection and Warning Systems

Central Illinois reconstruction projects used ITS for WZ rear-end crash concerns

- I-70/I-57 interchange, 6 mi of concurrent routes
- I-57/I-64 Interchange, 4 mi of concurrent routes

Key Concerns

- Unpredictable queues leading to severe rear-end crashes
- Lengthy delays when queues form

Solution Requirements

- Automatic detection of slow/queued traffic
- Ability to warn approaching motorists of slow/queued traffic
- Encourage diversion by informing motorists of current delays

Temporary, solar-powered system
Technology Application Case Study #2 (cont.)
Rural Queue Detection and Warming Systems

I-70/ I-57 Interchange

- Portable solar-powered trailers:
  - Radar sensors
  - Traffic sensors
  - Video surveillance cameras

- Traffic volume and speed data across multiple lanes of traffic

- Sensors not degraded by inclement weather conditions:
  - Precipitation, fog, darkness, dust, or road debris

- Cellular communications

Limits of the I-70/I-57 WZTMS (10-12 miles upstream in each direction)
Technology Application Case Study #2 (cont.)
Rural Queue Detection and Warning Systems

I-57/I-64 Interchange

- Portable traffic monitoring devices
- Self-contained, battery-powered unit with radar detector, GPS, cellular, and backup satellite communication capabilities and processors
- Sensors 3-14 miles upstream of interchange (depending on direction)

I-57/I64 Map layout of sensors
FHWA’s Work Zone ITS Implementation Guide

**Work Zone ITS Implementation Guide**
Publication FHWA-HOP-14-008
Available in print & PDF
[ops.fhwa.dot.gov/publications/fhwahop14008/](ops.fhwa.dot.gov/publications/fhwahop14008/)

**Work Zone ITS Case Studies**
Publication FHWA-HOP-14-007
Available in PDF only
[ops.fhwa.dot.gov/publications/fhwahop14007/](ops.fhwa.dot.gov/publications/fhwahop14007/)
ITS Implementation Guide - The 6-Step Process

• **Step 1:** Assessment of Needs
• **Step 2:** Concept Development and Feasibility
• **Step 3:** Detailed System Planning and Design
• **Step 4:** Procurement
• **Step 5:** System Deployment
• **Step 6:** System Operation, Maintenance and Evaluation
Where can I find out more about FHWA support opportunities?

**Support includes:**
- SWZ Outreach Materials
- Training Opportunities
- Peer-to-Peer Exchanges
- Regional Peer Exchange Workshops
- Demonstration Site Visits

**SWZ initiative co-leads:**
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Jawad Paracha: Jawad.Paracha@dot.gov

**FHWA's Every Day Counts Website:**
### Resources

#### Project Coordination

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#### Technology Applications

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Questions and Comments