EDC-3 Smarter Work Zones

Overview

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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
Importance of SWZs

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

- Work Zone related injuries:
  - Occur every 14 minutes (97 injuries/day)
  - 35,526 injuries in 2015

- Work Zone related fatalities:
  - Occur every 12 hours (1.9 fatalities/day)
  - 700 traffic-related fatalities in 2015
  - 84% of fatalities were drivers or passengers

- Work Zone related mobility impact:
  - 10% (total congestion)
  - 25% (non-recurring congestion)
SWZ Strategies

- SWZ Initiative #1: **Project Coordination**
  - Coordination within a single project and/or among multiple projects within a corridor, network, or region, and possibly across agency jurisdictions

- SWZ Initiative #2: **Technology Application**
  - Deployment of Intelligent Transportation Systems (ITS) for dynamic management of work zone traffic impacts, such as queue and speed management
SWZ Goals

- **Project Coordination (PC)**
  - 25 State DOTS incorporating strategies into agency documentation and business processes
  - 5 State DOTs volunteering to pilot WISE software application
  
  **Goal Met!**
  
  Number of States Implementing: 34
  Number of States Piloting Wise: 4

- **Technology Application (TA)**
  - 35 State DOTs implementing business processes for planning, design, procurement, operation, and evaluation of WZ ITS and/or utilizing at least one WZ ITS TA
  
  **Goal Met!**
  
  Number of States Implementing: 41
Implementation Stages

- **Not Participating**: State chooses not to participate

- **Development Phase**: State is collecting guidance and best practices, building support with partners and stakeholders, taking training, attending Peer-to-Peer workshops, and/or developing a process necessary for implementation SWZ PC.

- **Demonstration Phase**: State has determined which strategy(ies) to implement and is testing/piloting them.

- **Assessment Phase**: State is assessing the performance and the process for carrying out the innovation to prepare for full deployment.

- **Institutionalized**: SWZ is adopted by the State’s transportation community as standard practice and used regularly.
SWZ TA Adoption by State (Dec 16)
SWZ Adoption by State (Dec 16)
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Project Coordination Examples
Organized by the five steps for achieving project coordination:

- Step 1: Establishing the Project Coordination Vision
- Step 2: Developing Details of How Coordination will Occur
- Step 3: Educating and Informing Personnel and Stakeholders
- Step 4: Implementing the Project Coordination Process
- Step 5: Refining the Process

Publication FHWA-HOP-16-013 Available in PDF only

PC Strategy #1
Software to coordinate right-of-way construction activities

- **Baltimore, MD: Online mapping tool used to track capital and maintenance/utility activities**
  - Real-time information across city
  - Accessible to all stakeholders
  - Earlier awareness of project conflicts/impacts and enhanced TMPs

- **Washington, DC: WZ Project Management System**
  - System includes:
    - DDOT, Developer, Utility WZ Projects
    - Work Zone Tracking Tool
    - Traffic Analysis Tool
  - Used to develop annual citywide TMP
  - Tracks performance measurement

Source: DDOT
PC Strategy #2
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
PC Strategy #3
Multi-agency construction traffic management activities

- **Washington State DOT**
  - Collaborative, multi-agency construction traffic planning effort
  - Long-term, mid-term, and short-term information sharing
  - Construction Impact Analysis Tool, Maps, Gantt Charts
  - Hot Spots, Watch Lists
PC Strategy #4
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
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Technology Application Examples
Work Zone ITS Implementation Guide
Publication FHWA-HOP-14-008
Available in print & PDF
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/
TA 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

DATA

Queue Warning Controller

PCMS

STOPPED TRAFFIC 2 MILES

U.S. Department of Transportation
Federal Highway Administration
TA 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 differentials
TA 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
TA 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
TA Case Study #2
Rural Queue Detection and Warning System

- 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
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)
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)
Resources
FWHA SWZ Support

**SWZ outreach materials**
- Toolkit (online)
- Webinar recordings, case studies and fact sheets

**Virtual and in-person training opportunities**
- 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

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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!
SWZ Interactive Toolkit

https://www.workzonesafety.org/swz/
FHWA Work Zone Management Web Site

- Facts & Statistics
- Best Practices
- Contracting Strategies
- Design & Construction Strategies
- ITS & Technology
- Performance Measurement
- WZ Process Review Toolbox
- Public Info Strategies
- Regulation & Policy
- Work Zone Final Rules
- Work Zone & Traffic Analysis
- Work Zone Traffic Management
- Worker Safety

- Training
- Peer-to-Peer Program
- National WZ Awareness Week
- Publications & Studies

https://ops.fhwa.dot.gov/wz/
FHWA WZM Website
Grant Program At-a-Glance

- Over **$40 million** in grants for developing and conducting work zone safety guidance and training
- Over **3,800** courses conducted for **101,000** field workers, state/local DOT personnel and other transportation agency staff
- Over **257,000** copies of grant materials have been mailed and **174,000** copies have been downloaded
- Web-based training modules utilized over **9,000** times while podcasts downloads number over **4,800**
Work Zone Safety Grantees
Questions

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