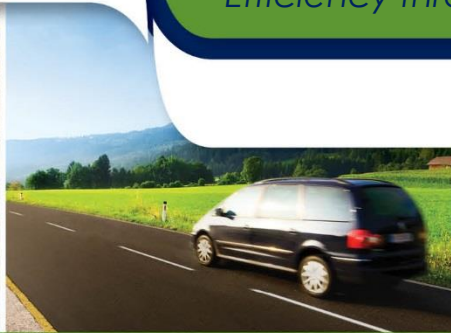


Smarter Work Zones

Overview of Queue Warning Systems

Efficiency through technology and collaboration



U.S. Department of Transportation
Federal Highway Administration

Smarter Work Zones

OVERVIEW



What are Smarter Work Zones?

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



What are Smarter Work Zones (cont.)?

Project Coordination

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

Technology Applications

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

Today's Focus



Types of Technology Applications Include...

- Real-Time Traveler Information
- Queue Warning
- Dynamic Lane Merge
- Incident Management
- Variable Speed Limits
- Automated Enforcement
- Entering/Exiting Construction Vehicle Notification
- Performance Measurement

For more information check out the SWZ TA website

<https://www.workzonesafety.org/swz/swztechnology-application/types-of-applications/>



Several States are already Utilizing SWZ!

- Over **40 states** have implemented technology applications, including:
 - Formalizing processes for planning and operating technology applications
 - Implementing “on-call” regional ITS SWZ contracts
 - Implementing steps towards institutionalizing technology:
 - Developing systems engineering documents
 - Developing specs to bid on technology
 - Piloting technology applications
 - Evaluating pilot to determine effectiveness for wider implementation
 - Fully implementing technology applications
 - Utilizing project funds to implement ITS – leading to institutionalization



Why Implement SWZ?

Capabilities of Technology Application

- **Improved driver awareness**
 - Changing traffic patterns
 - Downstream congestion
 - Construction vehicle ingress/egress
 - Expected delay / travel time
- **Dynamic and actionable guidance to drivers**
 - “Road work ahead” vs “Traffic Stopped 1 mile ahead”
 - “Road work – expect delays” vs. “Road Work I-95 past Exit 52 Use Alternate Routes”
- **Enhanced tools for on-site traffic management**
 - Speed monitoring
 - Automated speed enforcement
 - Queue formation



Why Implement SWZ?

Benefits of Technology Application

- **Empowers drivers to be proactive in responding to work zones**
 - Awareness of downstream hazards
 - Facilitates real-time decision-making and trip planning
- **Streamlines traffic management functions through partial automation**
 - Speed enforcement
 - Data collection
 - Performance measurement
- **Information increases customer satisfaction**
 - The More you Know...



Smarter Work Zones

QUEUE WARNING SYSTEMS



Queue Warning Systems (QWS)

- **What is it?**

- Technology used to alert drivers to traffic conditions (e.g., stopped traffic, slowing traffic) ahead using automated work zone monitoring

- **How does it work?**

- Uses technology (Sensors, Portable Changeable Message Signs (PCMS), Cameras, Rumble Strips) to:
 - Collect real-time vehicle data
 - Analyze data via software
 - Alert drivers of conditions (e.g., delay times, stopped traffic conditions, alternate route options)

- **End Result:**

- Reduces the number and severity of rear-end crashes
- eliminates driver surprise at stopped or slowing traffic



When is QWS Needed?

- Lack of driver awareness
 - Varying/temporary lane closure locations
 - Rural locations
- Increased severity risk
 - Locations with a high proportion of trucks
 - Work zones with loss of shoulders
- Others...



QWS Considerations

- **Project-Specific**
 - Estimated traffic volumes at location
 - Duration of delay due to project
- **Hardware/Software**
 - Sensor spacing
 - Sensor location
 - System update frequency
 - Logic thresholds for queue detection
- **Weather**
 - Equipment degradation due to inclement weather (precipitation, fog, darkness, dust, road debris)
- **Power and Communication**
 - Availability of power/alternate power sources (e.g., solar-powered)
 - Availability of communication (e.g., cellular, hardwired)



QWS Messaging

Sign Location

- Primary location should allow travelers to choose alternate route based on displayed information
- Additional locations could be added to provide road user addition information

Sign Message

- Alternating messaging when traffic slowed beyond specified threshold, for example:
 - “STOPPED TRAFFIC AHEAD / BE PREPARED TO STOP”
 - “STOPPED TRAFFIC / 8 MILES AHEAD”
- Anticipated delay times at approach to work zone and decision points



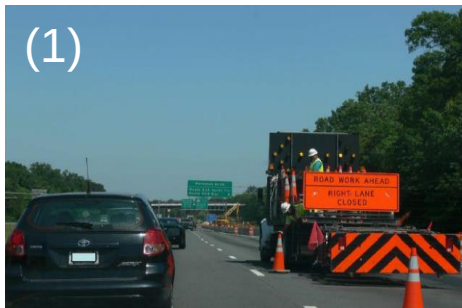
Examples of QWS Signage

Traffic Conditions	Phase I Message	Phase II Message
No Congestion	NO DELAY TO US51	ROADWORK XX MILES AHEAD
Speeds < XX mph	SLOW SPEEDS AHEAD	PREPARE TO STOP
Significant Delays	XX MIN DELAY	NEXT XX MILES
Even Greater Delays	XX MIN DELAY	CONSIDER ALT ROUTE
Delays > Threshold Value	EXPECT MAJOR DELAYS	ALT ROUTE EXIT 163



Source: <http://www.ops.fhwa.dot.gov/publications/fhwahop14007/chap2.htm>

Example QWS Messages



Additional QWS Resources

Guidelines and Training

- QWS Application Guidelines by MnDOT <http://www.dot.state.mn.us/trafficeng/workzone/iwz/IWZ-CongestionWarningSystem-June2005.pdf>
- End-of-Queue Training Module
https://www.workzonesafety.org/training_courses/atssa_back_of_queue_training_module/player.html

Case Studies and Fact Sheets

- QWS in Texas <https://www.workzonesafety.org/publication/innovative-end-of-queue-warning-system-reduces-crashes-up-to-45/>
- QWS in Illinois <http://www.ops.fhwa.dot.gov/publications/fhwahop14007/chap2.htm>

Bid Specifications

- QWS in Texas https://www.workzonesafety.org/files/documents/SWZ/special_specs6079.pdf
- QWS in Michigan
https://www.workzonesafety.org/files/documents/SWZ/special_provision_12OF800%28A020%29_rev1_Michigan_0.pdf
- QWS in Illinois https://www.workzonesafety.org/files/documents/SWZ/bid_specs_D9-78450-147%20Illinois.pdf

Deployment Plans

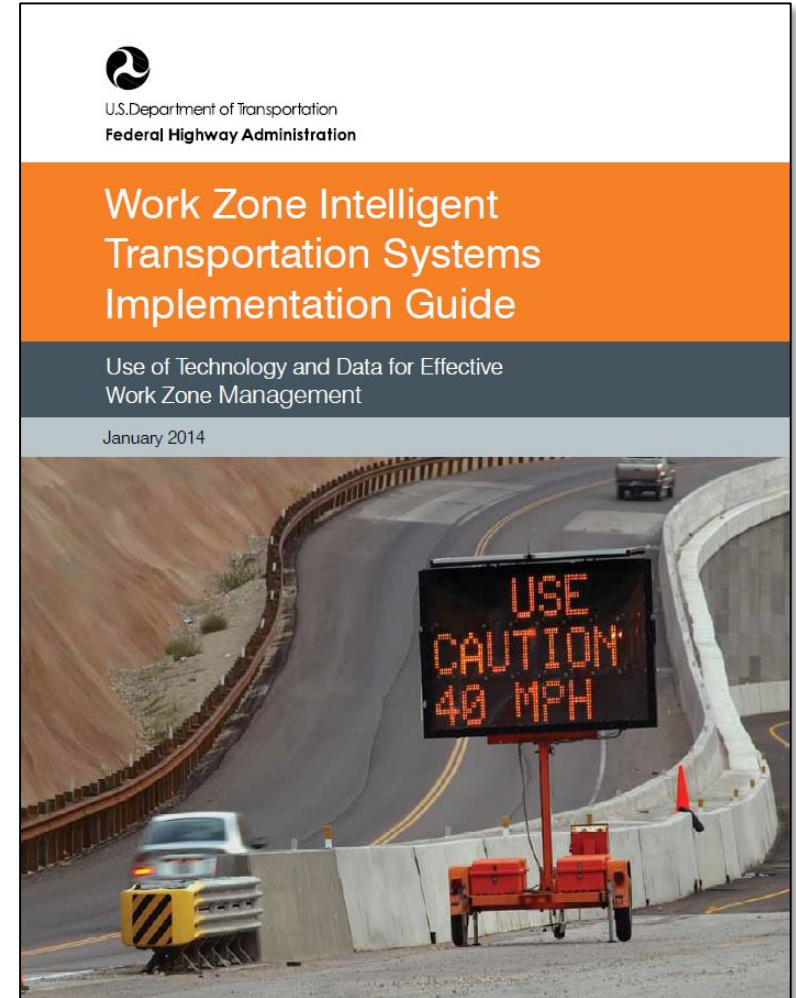
- QWS in Texas
https://www.workzonesafety.org/files/documents/SWZ/deployment_plans_Waco.pdf
- QWS in Pennsylvania
https://www.workzonesafety.org/files/documents/SWZ/deployment_plans_PennDOT.pdf



Implementation Guidance

Work Zone ITS Implementation Guide

- Provides guidance on implementing ITS in work zones to assist public agencies, design and construction firms, and industry stakeholders
- Presented through a 6-step Systems Engineering Approach to WZ ITS implementation
- Available for download at:
<http://www.ops.fhwa.dot.gov/publications/fhwahop14008/fhwahop14008.pdf>



Source: FHWA



Implementation Guidance

Work Zone ITS Implementation Guide Steps



Applies to any WZ ITS deployment regardless of scale



Smarter Work Zones

RESOURCES



Funding Opportunities

State Transportation Innovation Councils (STIC) Incentive Program	Accelerated Innovation Deployment (AID) Demonstration Program
• Funds activities which turn innovations into standard practices • All states are eligible • Up to \$100,000 available to each STIC annually • Can be used to fund multiple initiatives • Use to pay consultants to develop standards, specifications, design manuals, evaluations, implementation plans, workshops, training, and more!	• 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 • Current grants include ABC, high surface friction treatments, and ATMS/A.

www.fhwa.dot.gov/stic

<https://www.fhwa.dot.gov/accelerating/grants/>



Visit FHWA's SWZ Interactive Toolkit

<https://www.workzonesafety.org/swz/>

ABOUT CONTACT LISTSERV LOGIN/REGISTER Search this website ...

workzonesafety.org National Work Zone Safety Information Clearinghouse

Library of Resources to Improve Roadway Work Zone Safety for All Roadway Users

Crash Information Flagger Information Training Events and Conferences Data Resources Hot Topics

You are here: [Home](#) / Smarter Work Zones

Smarter Work Zones

Smarter Work Zones (SWZ) are among a few select initiatives being promoted by the FHWA Every Day Counts Program. SWZ are work zones that utilize innovative strategies to minimize work zone safety and mobility impacts. In EDC3, focus is on coordination of construction projects and use of technology applications to dynamically manage work zone impacts. These strategies include coordination of roadway construction projects to reduce work zone impacts and using technology applications to dynamically manage traffic in the work zone environment.

Project Coordination

- Peer Exchanges and Workshops
- Training Resources (webinars, web-based training modules)
- Outreach Materials (fact sheets, case studies, presentations, guidance documents)
- Tools (WISE software)
- Field Demonstrations
- Lead State Information

Technology Applications

- Types of Applications
 - Real-Time Traveler Information
 - Queue Warning
 - Dynamic Lane Merge

Project Coordination

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

Technology Applications

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

ADDITIONAL LINKS

- [FHWA Every Day Counts \(EDC-3\) Smarter Work Zones](#)
- [FHWA Work Zone Mobility and Safety Program](#)

Main Page

- [Smarter Work Zones Webinar Series](#)
- [Project Coordination](#)
 - [Peer Exchanges and Workshops](#)
 - [Training Resources \(webinars, web-based training modules\)](#)
 - [Outreach Materials \(fact sheets, case studies, presentations, guidance documents\)](#)
 - [Tools \(WISE software\)](#)
 - [Field Demonstrations](#)
 - [Lead State Information](#)
- [Technology Applications](#)
 - [Types of Applications](#)
 - [Real-Time Traveler Information](#)
 - [Queue Warning](#)
 - [Dynamic Lane Merge](#)

FAQs

- [Funding Opportunities](#)
- [Calendar of Events](#)
- [Regulation](#)
- [For More Info/Points of Contact](#)
- [Other Helpful Links](#)



Utilize Various Learning Opportunities!

- In-Person Workshops
- Virtual Peer Exchanges
- In-Person Peer Exchanges
- Demonstration Site Visits

Free educational opportunities are available!

Contact Jawad Paracha for more information

jawad.paracha@dot.gov

SMARTER WORK ZONES
IN-PERSON WORKSHOPS

SMARTER WORK ZONES
DEMONSTRATION SITE VISITS

SMARTER WORK ZONES
IN-PERSON AND VIRTUAL PEER EXCHANGES

WHAT ARE SMARTER WORK ZONES?

Smarter Work Zones (SWZ) is one of a few select innovations being promoted by the Federal Highway Administration's (FHWA) Every Day Counts Round 3 (EDC-3) initiative. SWZ are work zones that utilize innovative strategies to better coordinate construction projects and/or deploy innovative technology applications to dynamically manage and minimize work zone safety and mobility impacts.

Visit www.workzonesafety.org/swz to learn more about participation opportunities and to access our archive of resource materials!

PEER EXCHANGES

Peer exchanges offer agencies interested in adopting SWZ the opportunity to interact with staff in other agencies or with stakeholders who are experienced in successfully planning and deploying similar strategies and technologies. Understanding that agency needs differ, peer exchanges are customizable to best meet participant needs. Peer exchanges provide an opportunity for agencies to obtain technical assistance, ask questions, and generally learn from others while planning and implementing SWZ.

What is included in a peer exchange?

Peer exchanges can take many forms, including:

- Presentations at your agency's location by one or more peer experts with experience deploying similar tools or technologies within their own region or state.
- Facilitated, interactive discussions between expert peers and event participants to better understand how and why deployments occurred and/or how agency business processes were modified.
- Visits to another agency to view and discuss tools and procedures that are followed when implementing SWZ, or to see deployed technologies in action through field visits.

Discussions may include Q&A on how an agency has successfully implemented SWZ, lessons learned, as well as changes made over time to improve SWZ deployment. If needed, a follow-up call can be arranged to address any remaining participant questions.

In-Person vs. Virtual Peer Exchanges—What's Best for My Agency?

FHWA offers the opportunity to meet in-person at a location of your choice, or virtually through FHWA's web meeting tools.

In-Person Peer Exchanges—An in-person event will typically last 1 to 1½ days. These events can involve several of your agency staff and stakeholders, meeting with one to two peer experts brought in specifically for the meeting event. A pre-developed agenda is followed to guide the discussion on the topics of interest. Conversely, a peer exchange can be arranged to bring up to three of your agency staff to meet with staff from another agency. A pre-developed agenda would again guide the discussion of topics. In these types of exchanges, the potential also exists to visit multiple work zones, allowing participants to examine SWZ technology in action.

Virtual Peer Exchanges—Virtual events generally last between 2 to 4 hours and are geared towards specific topics of interest. Virtual peer exchanges allow participants an in-depth look at a particular SWZ topic, as well as the inclusion of several peer experts, for comprehensive feedback. For agencies interested in multiple topics, a series of virtual peer exchanges can be made available.



For More Information:

SWZ Initiative Leader

Jawad Paracha

FHWA Office of Operations

(202) 366-4628

Jawad.Paracha@dot.gov

Technology Applications

Todd Peterson

FHWA Office of Operations

(202) 366-1988

Todd.Peterson@dot.gov

Project Coordination

Martha Kapitanov

FHWA Office of Operations

(804) 775-3342

Martha.Kapitanov@dot.gov

