

Smarter Work Zones
2016 Rocky Mountain Asphalt Conference

Ken Wood – FHWA
Resource Center

Efficiency through technology and collaboration

Every Day Counts
Innovation, Integrity, Inspiration

US Department of Transportation
Federal Highway Administration

This slide features a blue header with the 'Smarter Work Zones' title and '2016 Rocky Mountain Asphalt Conference' subtitle. Below the title is the name 'Ken Wood – FHWA Resource Center' and the slogan 'Efficiency through technology and collaboration'. A green arrow graphic points from left to right across the middle. Below the arrow is a collage of four images: a road construction site, a car on a road, two people shaking hands, and a construction sign. The 'Every Day Counts' logo is in the top left, and the FHWA logo is in the bottom right.

AGENDA

- Smarter Work Zones – Overview
 - What are “Smarter Work Zones” (SWZ) and Why are they important?
 - What are we trying to accomplish?
- SWZ Project Coordination
 - What is it?
 - Challenges and Benefits
 - Case Study Example
 - Q&A Discussion
- SWZ Technology Application
 - What is it?
 - Challenges and Benefits
 - Case Study Example
 - Q&A Discussion

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This slide has a background image of a road construction site with orange traffic barrels and signs. The text is in green and black. The 'Every Day Counts' logo is in the bottom left corner.

Smarter Work Zones
Overview

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Source: FotoSearch.com

This slide features a background image of a highway interchange at night with lights. A large green arrow points from left to right across the middle. The text 'Smarter Work Zones Overview' is in the upper left. The 'Every Day Counts' logo is in the bottom left, and the source 'Source: FotoSearch.com' is in the bottom right.

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





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Why are SWZs Important? Statistics

Work Zone Statistics

- Work Zone **Safety** (2014):
 - 669 fatalities (10-15% workers)
 - Colorado – 10 (14 in 2013)
- Work Zone **Mobility**:
 - 24% of non-recurring delay
 - 10% of all congestion
 - NHS capacity loss 60 million vehicles/day



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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

Technology Application

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



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How will the SWZ Initiatives be mainstreamed?

- **Implementation Plan:** States will work toward a Vision and Mission through established Goals

Vision: Better managed work zones through innovative strategies that optimize safety and mobility.

Mission: Provide tools, technical assistance, and outreach that will accelerate the adoption of Smarter Work Zone strategies.

SWZ Implementation Plan completed by: January 2015



Source: FHWA 7

Support Provided by FHWA

- **Technical Assistance**
 - Examples include training, workshops, webinars, peer exchanges, fact sheets, brochures etc.
- **Funding**
 - **STIC Incentive Program**
 - Up to **\$100,000** available annually per STIC
 - Funds activities with statewide impact on turning innovation into standard practice
 - **AID Demonstration Program**
 - Incentive funding to offset risk of using an innovation
 - Award up to full cost of innovation (max of **\$1,000,000**)
 - Eligible projects - **all** aspects of highway transportation
 - **MAP-21 Section 1304**
 - **Increase of federal share** on a project by **up to 5%**
 - Restricted to NHPP, STP and PL funding categories

Source: FHWA 8


Smarter Work Zones project coordination



Source: FHWA 9

Project Coordination – What is it?


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



Project Coordination – Strategies and Examples

- Some successful coordination strategies deployed in metropolitan areas and along interstate corridors
- Strategies are not *standard practice* among most transportation agencies

| No. | Example Description | Location |
|-----|--|---------------------------------|
| 1 | Software-Based Systems used to coordinate right-of-way construction activities | Baltimore, MD Washington, DC |
| 2 | Corridor-Level TMPs used to address traffic-related impacts of construction projects | Oregon |
| 3 | Construction Traffic Management | Washington State |




Project Coordination – Example #1


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 & enhanced TMPs

Washington, DC
WZ Project Management System




Source: DOT



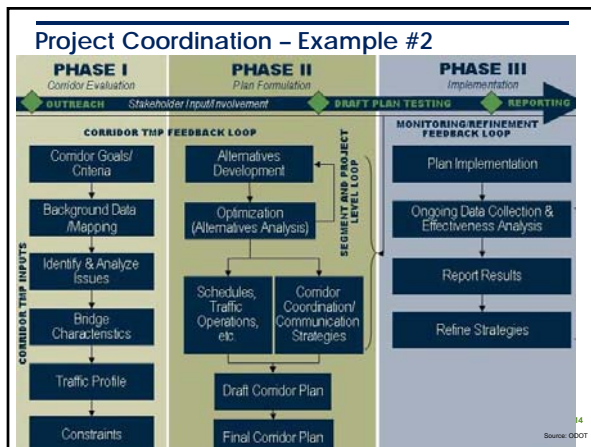
Project Coordination – Example #2

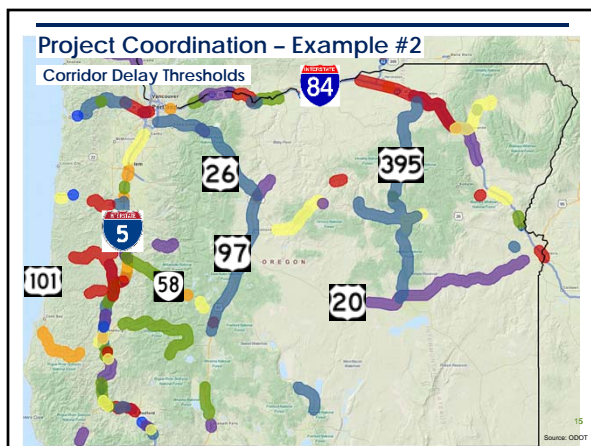
Corridor-level Traffic Management Plans (TMP) to address statewide work zone impacts – Oregon DOT

- Oregon OTIA Program – *Significant* new construction
 - \$3 billion, 13 years, 300+ Bridges
- Three TMP levels
 - Program, Corridor, and Project Level
- Identified six vital Corridors
- Corridor-Level TMP Objectives:
 - Assess Corridor traffic impacts
 - Develop Corridor segment “Delay Thresholds” & Work Zone Traffic Analysis (WZTA) tool
 - Suggest traffic management strategies
 - Develop Statewide Implementation Plan with *extensive* stakeholder involvement



Source: ODOT 13






Available Project Coordination Tool: *Work Zone Implementation Strategies Estimator (WISE)*

- Product of SHRP2 R11 Project
- WISE proactively reduces work zone impacts:
 - Effective project coordination upfront in planning/programming
 - Carrying coordination through to project planning/design decisions

WISE includes 2 modules:


| | |
|---|---|
| Planning Module <ul style="list-style-type: none">• Optimized sequencing of renewal projects | Operations Module <ul style="list-style-type: none">• DynusT platform evaluates impact of individual strategies at project level |
|---|---|



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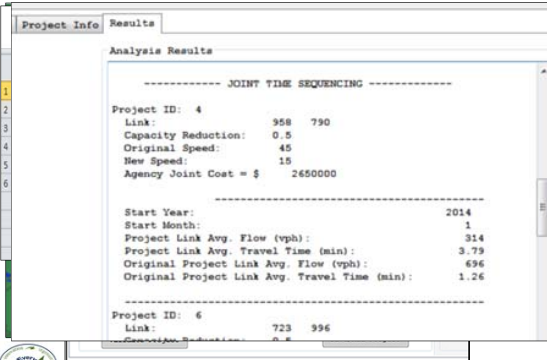
Available Project Coordination Tool: *Work Zone Implementation Strategies Estimator (WISE)*

- 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
- *Status of WISE*
 - Testing of tool is complete (field validation and pilot testing)
 - Tool and documentation are available (trb.org)
 - Currently assessing readiness of implementation



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WISE Screenshots



```
----- JOINT TIME SEQUENCING -----
Project ID: 4
Link:          958 790
Capacity Reduction: 0.5
Original Speed: 45
New Speed:     15
Agency Joint Cost = $ 2650000

-----
Start Year:                2014
Start Month:               1
Project Link Avg. Flow (vph): 314
Project Link Avg. Travel Time (min): 3.79
Original Project Link Avg. Flow (vph): 696
Original Project Link Avg. Travel Time (min): 1.26


-----
Project ID: 6
Link:          723 996
```



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Project Coordination – Barriers and Challenges

- Lack of coordination and Differences in priorities
 - Inter/Intra-Agency
 - Public/Private
- Lack of Incentives/Motivation for coordination; Fear of failure
- Resistance to change:
 - Cultural
 - Procedural
 - Technical
- Constrained resources




Source: matoc.org

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Project Coordination – Benefits

- Greater ability to reduce and manage traffic disruptions from road work
- Earlier identification of project impacts
- Fewer number of work zones
- Dynamic adjustments to project schedule



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Project Coordination – Benefits

- Improved communications within and across agencies
- Reduced numbers of street cuts
- Better quality road surfaces
- Cost savings
- Increased customer satisfaction



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Project Coordination - Resources

- **FHWA**
 - FHWA Every Day Counts Website <http://www.fhwa.dot.gov/everydaycounts/>
 - FHWA Work Zone Mobility and Safety Program – Project Coordination <http://www.ops.fhwa.dot.gov/wz/construction/crp/index.htm>
 - FHWA Work Zone Mobility and Safety Program – Peer-to-Peer Program <http://www.ops.fhwa.dot.gov/wz/p2p/index.htm>
 - FHWA Work Zone ITS Implementation Guide <http://ops.fhwa.dot.gov/publications/fhwahop14008/fhwahop14008.pdf>
- **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_413.pdf
- **Others**
 - Highway Construction Coordination to Minimize Traffic Impacts [http://planning.transportation.org/Documents/8-36/NCHRP8-36\(56\)FinalReport.pdf](http://planning.transportation.org/Documents/8-36/NCHRP8-36(56)FinalReport.pdf)



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Smarter Work Zones technology application



Source: FotoSearch.com

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Technology Application – What is it?

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




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Technology Application – Basic Criteria

Work Zone Technology Applications:


- Are **traffic responsive** – incorporate real-time data collection
- Provide **enhanced information delivery** to drivers
 - 1) Increase awareness of changes to traffic conditions arising from construction activity
 - 2) Enhance compliance with static traffic controls
 - 3) Facilitate improved decision-making by drivers approaching work zones
- Functions are **automated** and **dynamic**
- Complement static traffic controls
- Information delivery does not require special action on the part of drivers



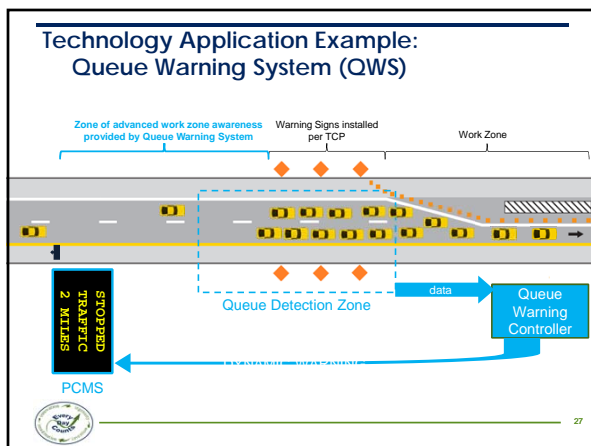
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Technology Application – Basic Criteria

- **Locally focused**
- **System solution**
- **May arise from maturation of agency practices using existing hardware**
- **Includes off-the-shelf systems as well as systems developed to agency specifications**



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Technology Application Example: 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



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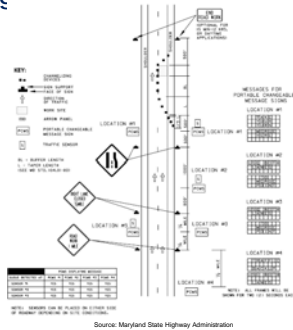
Technology Application Example: Dynamic Lane Merge

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.



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Technology Application – System Components

Infrastructure:

- Sensors
- Connected traffic control devices (e.g., signals, PCMS)
- Communications
- Data processing / archival
- **Business Processes:**
 - Assessment of need
 - Coordination with external stakeholders
 - System design / specification
 - Procurement / contracting mechanisms
 - Integration into performance measurement



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Technology Application – State of the Practice

Isolated Deployments

- Some states deployed ITS with varying degrees of success

Attempts for Standardization

- Initial attempts by states to standardize processes for design and implementation

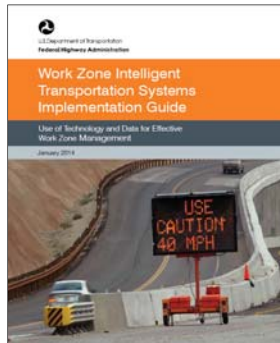
Product Improvements

- As technology matures we have more confidence in the effectiveness of commercially available products & turnkey solutions



FHWA's Work Zone ITS Implementation Guide

FHWA published guidance on process for implementing Work Zone ITS, along with Case Studies



Source: FHWA



Technology Application – Benefits

• 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

- Facilitates 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



Technology Application - Resources

- **FHWA**
 - FHWA Every Day Counts Website <http://www.fhwa.dot.gov/everydaycounts/>
 - FHWA Work Zone Mobility and Safety Program – Work Zone ITS & Technology <http://www.ops.fhwa.dot.gov/wz/its/index.htm>
 - FHWA Work Zone ITS Implementation Guide <http://ops.fhwa.dot.gov/publications/fhwahop14008/fhwahop14008.pdf>
 - FHWA Work Zone ITS Implementation Case Studies <http://ops.fhwa.dot.gov/publications/fhwahop14007/fhwahop14007.pdf>
 - Intelligent Transportation Systems Joint Program Office <http://www.its.dot.gov/index.htm>
- **NCHRP**
 - NCHRP Report 560: Guide to Contracting ITS Projects http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_560.pdf
- **Others**
 - National Work Zone Safety Information Clearinghouse <http://www.workzonesafety.org/search-results?query=its>



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