Smarter Work Zones
2016 Rocky Mountain Asphalt Conference
Ken Wood – FHWA Resource Center

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

Smarter Work Zones Overview
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

Why are SWZs Important? 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

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
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

Support Provided by FHWA

- **Technical Assistance**
  - Examples include training, workshops, webinars, peer exchanges, fact sheets, brochures etc.

- **Funding**
  - STIC Incentive Program
  - AID Demonstration Program
  - MAP-21 Section 1304

**STIC Incentive 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

**AID Demonstration Program**
- Up to $100,000 available annually per STIC
- Funds activities with statewide impact on turning innovation into standard practice

**MAP-21 Section 1304**
- Increase of federal share on a project by up to 5%
- Restricted to NHPP, SIP and PL funding categories

Smarter Work Zones project coordination
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.

<table>
<thead>
<tr>
<th>No.</th>
<th>Example Description</th>
<th>Location</th>
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<tr>
<td>1</td>
<td>Software-Based Systems used to coordinate right-of-way construction activities</td>
<td>Baltimore, MD Washington, DC</td>
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<td>2</td>
<td>Corridor-Level TMPs used to address traffic-related impacts of construction projects</td>
<td>Oregon</td>
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<td>3</td>
<td>Construction Traffic Management</td>
<td>Washington State</td>
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Project Coordination – Example #1

- Real-time information across city.
- Accessible to all stakeholders.
- Earlier awareness of project conflicts, impacts & enhanced TMPs.

Baltimore, MD
- Online mapping tool used to track capital and maintenance/utility activities.

Washington, DC
- WZ Project Management System.
Project Coordination – Example #2

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

- Oregon OIA 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

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

Project Coordination – Example #2

Corridor Delay Thresholds
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: Optimized sequencing of renewal projects
- Operations Module: DynusT platform evaluates impact of individual strategies at project level

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

WISE Screenshots
**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

**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

**Project Coordination – Benefits**

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

- **FHWA**
  - FHWA Every Day Counts Website: [http://www.fhwa.dot.gov/everydaycounts/](http://www.fhwa.dot.gov/everydaycounts/)

- **TRB SHRP2**

- **NCHRP**

- **Others**

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.
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

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

Technology Application Example:
Queue Warning System (QWS)

Queue Warning System (QWS)
**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

**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.

**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
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

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/index.htm
  – FHWA Work Zone ITS Implementation Guide
  – FHWA Work Zone ITS Implementation Case Studies
  – Intelligent Transportation Systems Joint Program Office
    http://www.its.dot.gov/index.htm

• NCHRP

• Others
  – National Work Zone Safety Information Clearinghouse
    http://www.workzonesafety.org/aspx-h-result?query=its

Contact Information

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