Presentation Outline

• What is Work Zone ITS?
• Why Use It?
• Examples of Applications
• FHWA WZ ITS Activities
• WZ ITS and the Revised WZ Rule
What is *Work Zone ITS*?

- Use of technology to support effective work zone *management* and *operations*
- Used both *in* and *around* work zones
- Can have a *safety* or *mobility* main focus, but often supports *both*
- *Portable* and *temporary* in *most* cases
- May be *leased* or *purchased*
What is *Work Zone ITS*?

*Includes some combination of:*

- Input devices: Sensors, cameras
- Automated analysis of data
- Output to: VMS, websites, highway advisory radio, pagers, 511, a TMC
- Via a local PC, a virtual TMC, or a TMC
What is *Work Zone ITS*?

*Users of information may include:*

- DOTs
- Public and road users
- Media outlets
- Contractors
- Trucking companies
- Emergency services providers
- Motorist assistance patrols
- Third party traveler information providers
Why Use Work Zone ITS?

• The effects of road work on road users and workers are increasing.

• We are seeing:
  – More congestion on our roads
  – More work zones
  – More lost lives
  – Growing exposure
  – Growing public frustration
Why Use Work Zone ITS?

Because it can help:

• **Improve** safety, mobility, traveler satisfaction, incident response, relationship with emergency responders

*Or stated another way…*

• **Reduce** congestion, crashes, secondary crashes, complaints from the public
ITS Applications in Work Zones

- Traffic monitoring and management
- Traveler information
- Incident management
- Tracking and evaluation of contract incentive/disincentives
- Worker safety/protection
- Speed management and enforcement
Example ITS Work Zone Applications

• Traffic monitoring and management
  – Sensors, queue detectors, counters, cameras and VMS
  – Dynamic “no passing zone” at taper based on traffic conditions
• Traveler information
  – Alternate route information
  – Estimated delay (time, distance)
  – Notification of stopped/slowed traffic
Dynamic Lane Merge

Creates a dynamic no-passing zone based on detected traffic volume and back-ups

- Sensors detect traffic conditions
- Next upstream sign activated when traffic threshold met
- “Do Not Pass When Flashing”
- Signs are regulatory and enforceable
Interstate North of Detroit, Michigan

- Used to improve traffic flow, prevent dangerous merging
- System reduced travel time delays, number of crashes, aggressive driving during AM and PM peak periods
- Study found the system effective for roads with moderate traffic volumes

$120,000 cost for system
Traveler Information

- Sensors to monitor real-time traffic conditions
- Data used to calculate delay/speed/travel time
- Info automatically displayed on CMS’s and website (map, CMS messages)
- Info can also be distributed via HAR
- Cameras to gather additional condition info
Traveler Information
I-95 Outside of Fayetteville, NC

- Deployed May 2002
- 6 sensors to monitor real-time traffic conditions
- Data used to calculate delay
- Delay info automatically displayed on CMSs and website (map, CMS messages)
- 6 cameras to gather additional condition info, verify system CMS messages
I-95 Outside of Fayetteville, NC

- When delay > threshold, alternate route info also given on CMS
- Traffic signal added to alternate route to handle increased flow during diversions
- **Results**
  - **Before**: NB Queues of 3.5 to 4 mi
    SB Queues of 2.5 to 3 mi during lane closures
  - **After**: Queues 1 mi or less
  - *ITS considered major contributing factor*
Work Zone Incident Management

Albuquerque Big I
- Cameras, some detectors
- Temporary TMC co-located with police substation
- HELP trucks patrolling, wrecker on call

Used to:
- Quickly detect incidents, call for appropriate, efficient response
- Guide drivers through work zone and detours
Benefits of Using ITS at the Big I

• Mobility
  – Incident clear time reduced from 45 minutes in past to 25 minutes in work zone

• Safety
  – Less incidents than expected (7% increase during WZ)

• Cost savings
  – Help ensure response is commensurate with incident to save costs and avoid clogging roadway
  – Automation

• Improved relations with incident response community

• Better public relations/better informed public
Tracking and Evaluation of Contract Incentive/Disincentives

*Arizona SR 68 travel time system*

Rural corridor: Major route for commuting casino workers, recreational users, trucks
Arizona State Route 68

**Why use ITS?**

- Lengthy delays during past projects significantly impacted the public
- No viable alternate routes, so ADOT focused on reducing travel time in WZ
- To assess contractor compliance with travel time incentive/disincentive
Arizona State Route 68

- Avg travel time before WZ = 17 minutes
- Contractor required to keep average travel time to < 27 minutes
  - Otherwise $400k incentive pool reduced
- License plate reader system used to measure travel times
Arizona State Route 68 - Results

• Greater contractor participation in and commitment to keeping traffic moving
  – Limited number of flagging stations
  – Scheduled work to reduce impacts to travelers

• Incentive pool only charged about $15,000
  – System helped keep traffic moving
  – Contractor received most of the possible $400k incentive
Worker Safety/Protection

*Work space intrusion alarms*

- Detect vehicles entering buffer area between work crews and passing vehicles
- Sound a warning alarm to alert workers and drivers
- Not extensively used to date
- Some deployments:
  - During rehab of 8 miles of U.S. Rte 22 in Pennsylvania
  - Some projects on I-64 in West Virginia
Speed Management and Enforcement

- Variable speed limits
- Automated enforcement
Variable Speed Limits in Work Zones

• Enables an agency to automatically adjust speed limit based on changing conditions
  – Whether workers are present
  – As traffic flow changes
  – Weather (fog, rain, ice)

• May result in
  – More credibility of speed limits
  – Increased compliance
  – Improved safety
  – Improved traffic flow
Automated Enforcement

• Help address limited space in WZs
• Move enforcement activity outside the WZ
• May require changes to law
• Need to overcome public/political opposition
FHWA ITS in WZ Activities

- Cross-Cutting Study
- Case Studies
- Implementation Guide
- VSL Field Operational Test
- Assessment of Effectiveness
WZ ITS Cross-Cutting Study

• 4 sites
  – Albuquerque, NM   Big I (I-40 & I-25)
  – Lansing, MI   I-496
  – Springfield, IL   I-55
  – West Memphis, AR   I-40 near I-55

• Additional research/information gathering on other applications

• Brochure and Report developed

FHWA-OP-01-043 and FHWA-OP-02-025
Challenges/Lessons Learned

- Communications must be reliable
- Allow start-up time
- Need to develop public awareness
- Information must be accurate (public credibility)
- Involve partners early
- Carefully gauge amount of information delivered
- Portability can be key
- Systems must be maintained
- Lack of data analysis done to quantify benefits
Benefits

• Improved mobility and traffic management
• More informed public
• Quicker incident response
• Greater safety of workers and travelers
• Better PR and relationships with other stakeholders
• Enhanced speed management
• Potential for cost savings
• Better understanding of traffic conditions
WZ ITS Case Studies

• Highlight 4 successful applications
  – Incident Mgmt System, Albuquerque
  – Traffic Mgmt & Traveler Info System, Springfield, IL
  – Contract Incentive Monitoring, Arizona
  – Dynamic Lane Merge, Detroit

• Provide more detailed information

• 4 individual reports, about 15 pages each
Implementation Guide

• Provide guidance for implementing ITS in work zones
• Share knowledge and lessons learned from those experienced with ITS in work zones
• Available in late 2005
Implementation Guide

- System Concept
  - Planning and System Development
  - Procurement

- Deployment
  - Operations, Maintenance, and Sustainability
  - System Evaluation
VSL Field Operational Test

• State self-evaluations, independent national evaluation
• Evaluate effectiveness and benefits
• Locations
  – Michigan (completed)
  – Maryland (about to deploy)
  – Possibly a 3rd site
Assessment of Effectiveness

• Gather quantifiable results on effectiveness of ITS in work zones
• Look at mobility and safety measures, delivery of traveler info, reliability
• 5 or 6 sites where ITS is deployed in a work zone
  – NC site (I-40 in Winston-Salem)
  – AR site (I-30 between Benton and Little Rock)
  – MI site (US 131 in Kalamazoo)
  – Selection of other sites in process
WZ ITS and the Revised WZ Rule

• ITS not required by the Rule
• How does it relate?
  – May be an element of some Transportation Management Plans (TMPs)
  – Source of information for the data provision of the Rule
    • To manage project impacts during implementation
    • To improve processes and procedures (multi-project)
  – Support process reviews
  – Support WZ impacts assessment
For further Information/Resources:

http://tig.transportation.org

www.fhwa.dot.gov/workzones

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