Work Zone ITS Peer Exchange
May 22, 2013 Bettendorf, Iowa

New Technologies and Systems for ITS

W. D. Baldwin, P.E.
HDR
Introduction

- Why I’m here today.
ATSSA

- (American Traffic Safety Services Association)
- Made up of: manufacturers; suppliers; federal, state, and local agencies; researchers, consultants and others
- Information Exchange; Government Relations
- Annual Trade Show – manufacturer and supplier displays, training sessions, committee meetings
- Midyear Meeting
- National Work Zone Memorial
ATSSA'S core purpose is to advance roadway safety. Road safety is our utmost commitment for all road users including teens, older drivers, pedestrians, work zone workers, and drivers on rural roads.
ATSSA ITS Council

- ITS Council is one of 9 Standing Groups
- Currently made up of:
  - Manufacturers (7)
  - Suppliers (3)
  - Federal and State Agency Representatives (5)
  - Researchers (1)
  - Consultants (3)
  - Others
ATSSA ITS Council

What have we done:

- Provide input to FHWA and others on policy
- Discuss implementation
- Lobby for safety legislation and safety funding
- Provide input on research
- Exchange research findings
- ITS Architecture
- Review agency requirements and identify technologies to help meet these
Planning for:

- Inform others about WZ ITS (why I’m here)
- Website under development
  - Showcasing types of ITS technologies for various categories
    - Overview of System, Pictures, Typical Applications
  - Case Studies
  - FAQ’s
  - Specification Samples
WZ ITS Categories

- **Travel Time Systems**
  - Bluetooth, Card Readers, Radar, Aggregate System

- **Incident Management Systems**
  - Video, Smart Video systems

- **Queue Detection**
  - Detection of slowdowns – post warnings to motorists and WZ operators

- **Speed Management / Variable Speed Limit Systems**
  - Portable Speed Posting Systems
WZ ITS Categories

- **Dynamic Merge Systems**
  - Speed Detection combined with PCMS or Arrow Boards
- **Conflict Warning Systems**
  - Presence Detection, PCMS
- **Ramp Metering**
  - Automated Signals, Detection Systems
- **Data Collection and Reporting** *(I added this)*
  - Speed and Volume Detection, Aggregation and Reporting Tools
What is new?

- **Applications**
  - Performance Measures
  - Dynamic Work Zones?

- **Technologies**
  - Video comparison

- **Approaches**
  - Texas – Consistent Methodology for Deployment of Queue Detection and Reporting
  - Utah – Reduce Work Zone Queues and Delays for Paving
  - OBDP
OTIA III Statewide Bridge Program –
“Keep Traffic Moving During Construction”
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OTIA III Statewide Bridge Program – “Keep Traffic Moving During Construction”
“Impossible Job”: 365 Bridges in 8 years

- OTIA III Statewide Bridge Program
- OTIA III Bridge Locations
Safety and Mobility During Construction

- Minimize delays
  - Keep Freight and Traffic Moving – Legislative Goal #3 out of 5 for the Program
- Determine safe times for lane closures
  - Times when travel speeds are not significantly reduced
- Little to no problems
- Special cases
  - More data for better decisions
Smart Work Zone Elements

- **Speed Detection** (side-fire radar, detect select vehicles)
  - Monitor Queues
- **Traffic Volumes** (side-fire radar, lane sensors)
  - Count Vehicles
- **Motorist Information**
  - PCMS, Web, Smartphone
- **Alert Agency / Contractors**
- **Observe** (Video)
Developed/Recommended Final Construction Staging and TMP (from Design)

1. Coordinate Pre-Construction Activities:
   - Kick-Off Meeting
   - Re-Examine PS&E
   - Re-Examining TMP

2. Review Contractor’s Alternate Approach (as Needed):
   - Value Engineering
   - Partnering
   - TMP

3. Re-Assess Anticipated Work Zone Impacts (Revise TMP, if Necessary)

4. Implement TMP

5. Monitor Work Zone Safety and Mobility Impacts During Construction:
   - Recurring Delay
   - Non-Recurring Delay
   - Safety (Road User and Worker)
   - Community (Business/Residential)
   - User Costs
   - Combined with Nearby, Concurrent Projects

6. Assess Compliance with Performance Criteria

7. Document WZ Performance Findings:
   - Observed or Measured Impacts
   - Observed or Measured Management Strategies’ Effectiveness
   - WZ Impacts/Mitigation Lessons Learned
   - Recommended Policy/Procedural Charges

*Steps 1 and 2 are existing activities and are shown here solely for the sake of process continuity and integration.*
Smart Work Zone Processes for Congestion Management
Plan

- Need to establish lane closures in planning/design process of project
- ODOT data-robust process – Work Zone Traffic Analysis
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<thead>
<tr>
<th>Year of Analysis</th>
<th>Lane Type</th>
<th>Milepoint</th>
<th>Region</th>
<th>Roadway</th>
<th>Terminus Type</th>
<th>Speed Limit</th>
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<th>% Trucks</th>
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<th>PCE Limit</th>
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**I-5 Fairgrounds Interchange - Roseburg**

**Southbound - Weekday**

**Average PCEs for Monday**

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<th>Count</th>
<th>Percentage</th>
<th>24 Hour Count Volume</th>
<th>39,530</th>
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<td>259</td>
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**Average PCEs for Tuesday**

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**Average PCEs for Wednesday**

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**Average PCEs for Thursday**

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#### Westbound - Weekend

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Deploy and Verify

- Potentially inaccurate staging based on flawed traffic volume assumptions
- Time between staging design and construction could be several years
- Hand counts and calculations vs. automated data
  - Near real-time traffic volumes (side fire, pucks)
  - Historic data
- I-5 Salem preparation for overnight paving closure
Deploy and Verify
Deploy and Verify

- Plan
- Deploy & Verify
- Monitor & React
- Compliance Report
- Performance Assessment
Web-Based Reporting

- Turn-Key Service
- GPS located on devices
- Interactive Google maps interface
- Color coded for quick verification of traffic flow
- Download historic traffic data
  - User defined reporting period
  - CSV or Graph
Monitor and React

- Real-Time & Near Real-Time
- Automated notices to Agency / Contractor
- Call Correct Start Time for Lane Closure
  - I-5 Three-Lane paving – Closure start times
  - Mother’s Day ?– who knew?
- Construction activities often require adjustments to contractor work hours
  - Gain time for Contractor to increase production
Compliance Report

- **Performance Specifications**
  - Speeds
  - Volumes
  - For Design-Build Projects where Contractor is responsible to “Keep Traffic Moving”

- Automate process to meet needs of Agency

- Accelerate report development so Agency / Contractor can make adjustments to work zone processes
Performance Assessment

- Lessons learned in luxury
- Thanksgivings – 3 spent watching traffic?
- Test new work zone practices
- Note how surrounding activities can affect project work zone
Conclusions

- Dynamic work zone projects often call for the dynamic ability to respond
  - Not for every project, but for the more complex, high risk projects
- Data collection useful for making decisions during construction for comparison to original plans
- Benefits
  - Congestion and Safety – Pick best start time
  - Potential Schedule Improvements for Contractor
  - Information for Better Decision-Making
Where is WZ ITS going?

- In-vehicle technology
- Cell phone and other data sources
- Data-rich to data smart
- Little system handling – results only
- Technology ages rapidly
- Open platforms or those that meet national protocols
- Portability / Flexibility
- More collaboration - discussions on what you after, your challenges, then how to specify
Questions?
Questions for the Audience (YOU!)

- Who is deploying your WZ ITS? You, contractor, ITS expert?
- Do you want to own equipment or just want results?
- QPL (Qualified Products List)?
- Real time data for posting or for decisions?
Questions for the Audience (YOU!)

- Percentage of overall project cost?

- What is most important WZ ITS category to you? Incident management, queue detection, etc.?

- Where do you go to find information about systems? Is there something more or different you would like to see?

- Battery life? Power Supplies?
W. D. Baldwin, P.E.
Mobility Manager / NW Area Traffic Leader
HDR Engineering, Inc.
WD.Baldwin@hdrinc.com