Key Topics

- Challenges work zones present to effective TSM&O
- Work zone management
  - Key considerations
  - Who and when
  - Strategies
  - Resources
What Are Some Challenges You Experience With Work Zones?

- How do work zones affect operation of the transportation system?
Work Zone Challenges

- Worker & road user safety
- Work zone congestion & delay
- Roadway capacity & speed reductions
- Alternate routing & travel route availability
- Lack of coordination
- Day & night time condition awareness/visibility
- Traffic pattern changes
- Incident management
How Travelers Experience Work Zones

DELAY

OUT THERE

“FOREVER”

CONFUSING

THEY’RE EVERYWHERE

CONGESTION
Work Zone Management

- Need to balance:
  - Safety
  - Mobility
  - Constructability

Objective:
Achieve constructability without compromising safety and mobility
Federal Requirements Affecting Work Zones

- Manual on Uniform Traffic Control Devices (MUTCD) – Part 6
- Work Zone Safety and Mobility Rule (Subpart J)
- Temporary Traffic Control Devices Rule (Subpart K)
- What else?
- Are you familiar with these requirements?
Work Zone Safety and Mobility Final Rule

- Established requirements for
  - Systematically addressing WZ safety and mobility
  - Developing strategies to manage impacts of Federal-aid highway projects

- Published September 2004
- Effective date - October 2007
Overall Intent of the Rule

- Improve work zone safety and mobility
  - Reduce/manage impacts
- Better plan for, design, and implement work zones
  - Earlier
  - More comprehensively
  - With the right people involved
  - More consistently – have a process
Overall Intent of the Rule (cont.)

- Promote best practices for work zone traffic management
- Allow flexibility for differences in
  - States, regions, agencies
  - Project impacts
  - Stakeholder concerns
Work Zone Performance

What is the Agency aiming for in work zone performance?

- Avoid queues? Limit queues to 1 mile?
- Prevent increase in crashes?
- Keep additional delay under 15 minutes?

MOEs should track with Agency goals

- Policy goals
- Significant project criteria
- Agency performance measures
- Format for providing traveler info
Project and Its Impacts

- Type of Work
- Duration
- Facility Type
  - Bridge, Arterial, Highway, etc.
- Level of Expected Impacts
  - Traffic, Access, Other

What are other considerations?
Work Zone Impacts

- Identify impacts
  - Consider various stakeholders

- Tools
  - Lane closure spreadsheets
  - Templates/checklists
  - Modeling

- Determine level of impacts
  - Acceptable?

- Mitigate impacts accordingly
More Key Considerations

- **Stakeholder Needs**
  - Special events
  - Seasonal traffic

- **Constraints**
  - Budget
  - Alternate routes
  - Other work zones
  - Political sensitivities

What else?
Design and Contracting

- Design decisions and WZ operations
- Contracting decisions and WZ operations
- Do you interact with Design and Contracting?
- Is WZ traffic management considered?
What is a TMP?

- Transportation/Traffic Management Plan (TMP)
- Design documents show how a project will be built
  - TMP shows how traffic will be managed during construction
- Required on ALL Federal-aid projects
- Scalable to the project
- Considered a living document
  - Start early and update as needed
  - Monitor during construction and adjust if needed
Components of a TMP

- Three main components
  - Temporary Traffic Control Plan (TTCP)
  - Transportation Operations (TO) strategies
  - Public Information and Outreach (PI) strategies

- **Significant Projects** = All 3 components required
- **Other projects** = TTCP required
  - TO and PI considered as appropriate
Why TMPs? – Key Benefits

A well-planned method for managing traffic flow during construction can:

- Promote efficient construction phasing/staging, minimize contract duration and control costs
- Maintain safety for workers and road users
- Minimize traffic and mobility impacts
- Minimize impacts to local communities/businesses
- Address impacts at corridor and network levels
What’s Your Process for TMP Development?

- Who’s involved?
- When does it start?
- Does it work well?

FHWA TMP Guide: Developing and Implementing TMPs for Work Zones
TMP Development in Caltrans

- Begins during project initiation and planning
- Responsibility of 3 individuals
  - District traffic manager (DTM)
  - TMP manager
  - Construction traffic manager
- 3 levels - factors
  - Project characteristics
  - Projected delay

<table>
<thead>
<tr>
<th>LEVEL OF TMP</th>
<th>TYPES OF CONDITIONS</th>
<th>TYPES OF STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Blanket&quot; TMP</td>
<td>• No expected delays</td>
<td>• Portable changeable message sign (CMS)</td>
</tr>
<tr>
<td></td>
<td>• Off-peak work</td>
<td>• Freeway service patrol (FSP)</td>
</tr>
<tr>
<td></td>
<td>• Low volume roads</td>
<td>• Traffic management team (TMT)</td>
</tr>
<tr>
<td></td>
<td>• Moving lane closures</td>
<td>• Only working in off-peak hours</td>
</tr>
<tr>
<td>&quot;Minor&quot; TMP</td>
<td>• Minimal impacts expected</td>
<td>• Only working at night</td>
</tr>
<tr>
<td>(Majority of MPs fall into this category)</td>
<td>• Lane closure required for project</td>
<td>• Portable and fixed CMS</td>
</tr>
<tr>
<td></td>
<td>• Some mitigation measures required for project</td>
<td>• Construction Zone Enhanced Enforcement Program (CCZEEP) or MAZEEP for maintenance activities</td>
</tr>
<tr>
<td>&quot;Major&quot; TMP</td>
<td>• Significant impacts expected</td>
<td>• TMT</td>
</tr>
<tr>
<td>(≈5% of MPs are major)</td>
<td>• Multi-jurisdictional in scope</td>
<td>• Highway advisory radio</td>
</tr>
<tr>
<td></td>
<td>• Longer duration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Multiple contracts involved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Same as for Minor TMPs plus:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Public awareness campaigns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Extended closures to expedite work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Moveable barriers to reverse lanes during peak periods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Detours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reduced lane widths</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Website</td>
<td></td>
</tr>
</tbody>
</table>
Caltrans TMP Development Process

**Modify TMP Strategies as Needed / Monitor traffic initially / Provide Lessons Learned**
WZ Management Strategies

- Contract incentives
- Accelerated construction
- Off-peak/night work
- Narrowed lanes
- Ramp and road closures
- Contraflow lanes
- Traffic control
- Enhanced enforcement

Which of these strategies affect TSMO?

- Freeway service patrol
- Demand management
- Traveler information
- ITS
- Signal timing adjustments
- ...and many more
Construction Approaches - examples

- Basic approach to building the job
  - Part-width construction
    - Short term lane closures
    - Long-term lane closures
    - Night work vs peak vs off-peak
  - Close 1 side, crossover, run opposing traffic on 1 side
  - Full closure

- How does the choice of construction approach affect TSMO?
Columbus/I-670: Increased space for equipment, material
I-84/Portland: Crews work without interruption
Accelerating Projects - examples

Getting the work done sooner reduces impacts

- Construction using pre-fab components
- Contracts that include incentives to finish earlier
- Design-Build
Traffic Management - examples

- Traffic control devices – to provide clear guidance
  - Barrier, cones
  - Signage

- Managing speed
  - Reduced speed limits
  - Enforcement

- Traveler information
  - Alert, inform, guide motorists – conditions, alternate routes

- **ITS is a tool that can help**
Work Zone ITS - applications

- Traffic management systems
  - Traditional traffic management
    - Monitoring
    - Signals
    - Ramp metering
  - Dynamic merge systems
  - Variable speed limit/Active traffic management (ATM) systems
  - Queue warning systems

- Traveler information systems
- Incident management systems
- Intrusion alarm systems
- Automated speed enforcement/feedback systems
Dynamic Merge Systems

- Dynamic signs and devices control vehicle merging approaching lane closures
- Changes lane use instructions based on current traffic conditions
- Sensors determine congestion level or queue length
- “Early” and “Late”
Dynamic Late Merge

1.5 miles from Taper

At Taper
Variable Speed Limit (VSL)

- Provides ability to set speed limit based on work zone conditions
  - Type of work being done
  - Characteristics of work zone
Utah Portable Variable Speed Limit System (PVSL)
PVSL System Objectives

- Adjust speed limits based on detected speeds/queue
- Provide real-time detection for traffic speed & occupancy (queue):
  - Through ACTIVE work space
  - In advance of the work space
- Advanced notification to drivers about Variable Speed Limits
- Provide travel time or traffic delay through the work zone
- Ability to monitor work zone
Queue Warning Systems

★ Goals
- Reduce risk of crashes
- Inform public about delays and help with options to minimize delays

★ Functions
- Detect speeds
- Warn drivers of slowed/stopped traffic ahead
- Provide anticipated delay at decision points before WZ

★ Equipment
- Sensors
- Portable message boards
# IL DOT Queue Warning Benefits

**2010 – No ITS**

**2011 – With ITS**

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>Difference</th>
<th>% Change</th>
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</thead>
<tbody>
<tr>
<td>Total Miles I–55 Construction</td>
<td>19.5</td>
<td>20.2</td>
<td>+0.7</td>
<td>+3.6%</td>
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<tr>
<td>Total Lane Closure Days</td>
<td>355</td>
<td>540</td>
<td>+185</td>
<td>+52%</td>
</tr>
<tr>
<td><em>Total Vehicle Exposure (ADT x Lane Closure Days)</em></td>
<td>13,031,750</td>
<td>16,346,800</td>
<td>+3,315,050</td>
<td>+25.4%</td>
</tr>
<tr>
<td>Property Damage Accidents</td>
<td>75</td>
<td>64</td>
<td>–11</td>
<td>–14.6%</td>
</tr>
<tr>
<td>Injury Accidents</td>
<td>18</td>
<td>16</td>
<td>–2</td>
<td>–11%</td>
</tr>
<tr>
<td>Fatalities</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Queuing Accidents</td>
<td>94</td>
<td>81</td>
<td>–13</td>
<td>–13.8%</td>
</tr>
</tbody>
</table>

*Does not account for ADT using Alt Routes*
SHRP2 Project R11

WorkZone Impact & Strategy Estimator

- Software tool/Decision support system
  - Evaluate traffic impacts of combinations of work zones
  - Identify best sequencing to manage impacts

- Target Audience
  - DOT program managers in moderately and densely urbanized areas
  - Planners and program managers in moderate and large MPOs
Corridor Construction Impacts – Group Discussion

- What challenges do you face on coordinating nearby construction projects?
- How have you responded to these challenges?
  - What has worked well?
  - What hasn’t worked so well?
The TMP is implemented. Now what?

- Work is not done
- All the effort culminates in one thing:

**How does the TMP work in the field?**

- Are conditions as expected?
- Do major issues arise?
- Are there many complaints or “bad press”?
Did I expect this ➔��

But instead got this ⇪ ⇪ ⇪
Consider your Stakeholders

© Original Artist
Work Zone Take Aways

Are you familiar with your State’s work zone policies and the Work Zone Safety and Mobility Rule?

Where does Operations fit in TMP development within your agency?
  - Are you involved at the right level and stage?
  - If not, who can help to get you there?

Are there new strategies/knowledge that will benefit WZ management and operations in your State/region?
Work Zone Resources
Key Work Zone Resources

- **Work Zone Safety and Mobility Final Rule**

- **Developing and Implementing Transportation Management Plans for Work Zones**
  - TMP training online course

- **FHWA Work Zone Website**

- **National Work Zone Safely Information Clearinghouse**
  [http://www.workzonesafety.org](http://www.workzonesafety.org)

- **Work Zone Best Practices Guidebook**
Additional Work Zone Resources

- FHWA Work Zone ITS Implementation Guide

- AASHTO ITS in Work Zones
  http://stsmo.transportation.org/Pages/its.aspx

- ITS Safety and Mobility Solutions: Improving Travel Through America's Work Zones

- Minnesota DOT Intelligent Work Zone Toolbox

- WSDOT ATM SOP (section F covers ATM in Work Zones)

- NCHRP Synthesis 379: Selection and Evaluation of Alternative Contracting Methods to Accelerate Project Completion
EDC3: Smarter Work Zones

Innovative strategies designed to optimize work zone safety and mobility

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

http://www.workzonesafety.org/SWZ - webinars, case studies, and more