Overview of Presentation

• What is Active Traffic Management (ATM)
  – ATDM Context
  – ATM Strategies
  – Potential Benefits

• Overview of FHWA Guidance for Determining Feasibility of ATM
  – Some New Jersey Examples

• ATM Issues
  – Gantry Spacing
  – MUTCD “Gaps”

• Questions
Active Traffic Management (ATM)

“The ability to **dynamically manage** recurrent and non-recurrent congestion based on **prevailing and predicted traffic conditions**. Focusing on trip reliability, it maximizes the effectiveness and efficiency of the facility. It increases throughput and safety through the use of **integrated systems with new technology**, including the **automation of dynamic deployment** to optimize performance quickly and without delay that occurs when operators must deploy operational strategies manually. ATM approaches focus on influencing travel behavior with respect to lane/facility choices and operations.”

http://ops.fhwa.dot.gov/atdm/approaches/atm.htm
Part of Active Transportation and Demand Management (ATDM)

The fundamental concept of taking a dynamic approach to a performance based process

- **Active Demand Management (ADM):** Strategies intended to reduce or redistribute travel demand to alternate modes or routes
- **Active Parking Management (APM):** strategies designed to affect the demand on parking capacity.
ATM Strategies

**Dynamic Speed Limits (DSpL):**
- Adjust speed displays based on real-time traffic, roadway, and/or weather conditions.
- May be enforceable (legal “limits”) or advisories

**Dynamic Lane Use Control / Dynamic Lane Assignment (DLA)**
- Closing / opening individual traffic lanes as warranted, providing advance warning
- Often installed in conjunction with dynamic speed limits
ATM Strategies

Queue Warning (QW):
- Real-time displays of warning messages to alert motorists that queues or significant slowdowns are ahead
- May be included as part of DSpL / DLA strategies.

Dynamic Shoulder Lane (DShL):
- Use of the shoulder as a travel lane(s) based on congestion levels / in response to incidents, events, or other conditions
- May also be used as a managed lane (e.g., bus-only)
ATM Strategies

Dynamic Junction Control:
• Allocate lane access on mainline and ramp lanes in interchange areas
• Make lanes through only / exit & entry / combination
• Can be a form of dynamic shoulder lanes in area of interchange.

Other ATM Strategies
• Adaptive Ramp Metering
• Transit Signal Priority
• Adaptive Signal Control
• Dynamic Lane Reversal
### ATM Benefits - US

| Seattle I-5 (7-miles NB) | DSpl, DLA, QW | • A before-and-after study (3 years for each period) showed total crashes decreased 4.1 percent along the ATM segment.  
• During the same period, the southbound segment of I-5 (without ATM) experienced a 4.4 percent increase in the number of crashes.  
• Segment already actively managed via ramp metering and incident management |
## ATM Benefits - US

<table>
<thead>
<tr>
<th>Minneapolis I-35</th>
<th>DSpL, DLA, QW DShL for HOT</th>
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- On average, the morning peak experienced 17 percent less congestion with the DSpL system in place.
- The instances and spread of extreme congestion waves reduced.
- Crash reductions in first 6-months
  - 9% (fatal & injury)
  - 20% (property damage)
## ATM Benefits - US

| Los Angeles Northbound State Route 110 connector to northbound I-5 | Junction Control | • Average ramp delay reduced from greater than 20 minutes to under 5 minutes.  
• Crashes decreased 30 percent |
| Illinois (Chicago Area) | Bus on Shoulder | • Bus on-time performance increased from 68 to 92 percent.  
• Ridership increased threefold (requiring an increase in number of buses).  
• There were no impacts on safety. |
ATM Benefits – Europe

Summary From FHWA Scanning Tour

• 3-7% increase in average throughput during congested periods

• 3-22% increase in overall capacity (mostly DShL)

• 3-30% decrease in primary crashes

• 40-50% decrease in secondary crashes

• Increased trip reliability

• Ability to delay the onset of freeway breakdown
FHWA ATM Feasibility and Screening Guide

• Frequent question during FHWA Workshops on ATDM
  – ATM looks great. How do I get started?

• Guidance developed to assist transportation agencies in making informed investment decisions regarding ATM concepts and strategies. Answer the following questions:
  – What roadway networks and facilities would be best suited for ATM in my region?
  – What specific or combination of ATM strategies would work best?
  – What would be the range of expected benefits?
  – What would be the expected costs (capital and ongoing)?

• Determine feasibility of ATM prior to committing significant resources – MAKE A BUSINESS CASE FOR ATM
## Guidance Activities / Steps

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<td><strong>5 - Estimate Benefits and Costs; Finalize Preliminary ATM Recommendations</strong></td>
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Get Started – Preparation

• Ensure ATM supports regional goals
• Identify relevant objectives
• Identify network
• Collaborate with stakeholders
• Commence data collection
• Review recent literature

Potential ATM Strategies

L = Dynamic Speed Limits
D = Dynamic Lane Control
Q = Queue Warning
S = Dynamic Shoulder Running
R = Ramp Metering
T = Transit Signal Priority
A = Adaptive Signal Control
J = Junction Control
Common ATM Stakeholders

- State and Local DOTs
  - Senior Management
  - Operators
  - Planning
  - Maintenance
  - Engineering & Design
- Transit
- MPO
- Enforcement
- FHWA

Engagement Activities

- Workshops
- Peer Reviews
- FHWA

Public outreach and education very important; but comes later.
Assess Agency Policies & Capabilities for ATM

• Identify applicable ATM strategies in terms of network features, agency policies and legal considerations

• Ensure supporting institutional framework is in place (CMM).

Graphic: Signal–based strategies not applicable to freeway network. DOT has “policy” against ramp metering
Legal and Policy Considerations

• Speed limits or advisories
  – Maximum allowable spacing
  – Opinion of enforcement agencies
  – “Chain of evidence” for enforcement

• Use of shoulder as travel way
  – Passing on shoulder
  – Lane restrictions for trucks

• Can impact estimated costs; time required for new legislation
Workforce & Staffing

• Critical to understand changes to operator roles & responsibilities and impact to workload
  - Operators as “Stakeholders”
• Workforce and staffing needs vary by ATM strategy
Identify Major Roadway Segments for Potential ATM

• Determine level of TSM&O deployment along segments.
• Analyze segments based on congestion, crash rates, bottlenecks, and other considerations.

Graphic: “Blue dot” segments are less likely to benefit from ATM relative to others.
Importance of Having Some TSM&O and ITS Already in Place

ATM as the “Next Step in Congestion Management”

A continuum – not a “quantum leap”
Analyze Individual Links and ATM Strategies

- Analyze & prioritize individual links for ATM deployment
- Identify ATM strategies for each prioritized link
- Combine strategies for each link; provide consistency across the network

Graphic: Strategies L, D, and Q are recommended for “green” links with strategy S also included for “red arrow” links.
Dynamic Speed Limits & Dynamic Lane Assignment

High Priority Link for ATM

Does link experience high crash rate?

Does link experience recurring reductions/variations in speed?

Will link be impacted by major reconstruction?

Consider other safety improvements.

Link may benefit from DSpl/DLA.
New Jersey Example

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<th>SRI</th>
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Dynamic Shoulder Lanes
New Jersey Example

Congestion on I-287
Averaged by 1 hour for 2013 (every weekday)

Southbound

Northbound

2013 (every weekday)

Measured speed as a percentage of the free flow speed.

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Estimate Benefits & Costs

• Consider key ATM cost factors
• Perform high-level estimates of benefits and costs using available tools
  – Life-cycle
• Refine priorities & recommendations

Graphic: Segments outlined in yellow provide the greatest estimated B/C ratio
Issue – Gantry Spacing and Layout

- Concerns with costs of frequent “full” gantries
  - Every ½ - mile
- MUTCD requirements on guide sign distances
  - 600 to 800 feet
- Significant testing in UK of different spacing / layouts
  - Driver simulations
  - Visualization / response monitoring software

Moving towards more of a HYBRID approach
- Longer spacings between full gantries (e.g., after on ramps)
- Use of side-mounted signs in-between
- Significant reduction in costs
Hybrid Approach Examples
Issue – Sign Displays and MUTCD Conformance

- Advisory Speed Limit Displays
  - MUTCD: Can only be used with warning sign

- Dynamic Lane Assignment

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<th>Minneapolis / Minnesota DOT</th>
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<td>Drivers Should Proceed With Caution</td>
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Thank You

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Lou.Neudorff@ch2m.com