Performance Based Operations: Active and Integrated Approach to Transportation Management

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U.S. Department of Transportation
Federal Highway Administration
Office of Operations – Transportation Management
Travel Demand Growth and Supply

Source: U.S. DOT, FHWA *Highway Statistics* (Washington, DC: Various years)
Commuter Delay

Source: USA Today, September 27, 2011. Graphic based on data provided by TTI and INRIX
Why does FHWA focus on Operations?

- To reduce / manage impacts of congestion
- To keep people and commerce moving – a healthy economy needs a reliable transportation system
- To improve the safety and sustainability of the highway system
- To make more cost effective investment of limited resources
- To promote a more proactive approach
Pro-active Operations

- Real-time and forecasted information
- Measuring / monitoring performance
- Good analytical foundation / tools
- State of the art technologies and strategies
- Integration across system elements, jurisdictions, and modes
- An organization and workforce capable of managing all of the above
Operations activities...

- Influence travel demand (how much, when, where)
- Effectively manage traffic that results
- Anticipate and respond to planned and unplanned events (traffic incidents, work zones, bad weather, special events)
- Provide travelers with high quality traffic and weather information
- Ensure that the unique needs of the freight community are considered and included in all of the above
Systems Management Program Areas

- Active Transportation and Demand Management
- Integrated Corridor Management
ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT
Active Transportation and Demand Management

ATDM is the dynamic management, control, and influence of travel demand, traffic demand, and travel flow of transportation facilities.
Performance-Oriented Approach

- Dynamic management requires a performance/ objectives driven approach
- Feedback loops linking monitoring and implemented actions.
- Dynamic actions/strategies are deployed to address system breakdown before it occurs
# Moving Towards Active Traffic Management

<table>
<thead>
<tr>
<th>Variable Speed Limits</th>
<th>Manual operation based on identification of conditions</th>
<th>Automated operation based on pre-defined thresholds</th>
<th>Automated operations based on predicted travel conditions</th>
</tr>
</thead>
</table>

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**ATDM**

*U.S. Department of Transportation
Federal Highway Administration*
## Moving Towards Active Parking Management

### ATDM

<table>
<thead>
<tr>
<th>Parking Management</th>
<th>Static parking information with fixed pricing</th>
<th>Real-time availability information, reservation systems</th>
<th>+ Dynamic pricing like SF Park, wayfinding</th>
</tr>
</thead>
</table>

- **SFpark**
### Moving Towards Active Demand Management

**En-Route Traveler Information**
- Scheduled Work and Closures (press releases)
- + Incident information & Current TT
- + Comparative travel times and cost information (transit, rideshare, etc.)
- + Predictive information
  + Custom traveler based information and guidance

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**Bellevue Travel Time**

<table>
<thead>
<tr>
<th>Route</th>
<th>Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIA 5 TO 90</td>
<td>24 MIN</td>
</tr>
<tr>
<td>VIA 405</td>
<td>19 MIN</td>
</tr>
</tbody>
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**Images**

- Congestion Ahead sign
- Travel time display
- Travel time display with additional information
ATDM Approaches
Dynamic Ridesharing

Avego Real-time Ridesharing Demo
http://www.youtube.com/watch?v=P58Ug6JpdRU
Hard Shoulder Running

- Temporary use of shoulder as a travel lane
Ramp Metering

- Regulate the number of vehicles entering or leaving a freeway. Traffic smoothing
Junction Control

- Dynamic lane allocation for directional flow. On-ramp and Off-ramp
Lane Control

- Counter-flow lanes; Incident management
Dynamic Tolling

- Toll amount increases as traffic gets heavier and decreases as congestion eases. Ensures free-flow operation
- Area-wide, Zone-based, Roadways, Lanes
Access Control

- Intersection movements
- Managed lane access
- Ramp access
- Dynamic truck restrictions
ATDM Program Objectives

- Increase awareness and understanding of ATDM
- Develop, test, and evaluate strategies
- Provide tools and methods for performance analyses
- Provide tools and methods for benefit/cost analyses
- Develop tools and guidance for rapid adoption
- Train agencies to deploy effective ATDM systems
- Provide guidance to FHWA Division Offices
<table>
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<tr>
<th>Program Management</th>
<th>Stakeholder Engagement</th>
</tr>
</thead>
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<tr>
<td>Research</td>
<td>Tool Development And Guidance</td>
</tr>
</tbody>
</table>

- Institutional and policy
- Planning and organizing
- Analysis, modeling, and simulation
- Design and operations
- Strategies and technology
Research

- Analysis, Modeling, and Simulation (AMS) Methodology
- Highway Capacity Manual (HCM) Methodology
- Designing for Operations
- Benefit-Cost Analysis
- ATM Traffic Control Devices
- Safety
  - Variable Speed Limit (VSL) with Automated Enforcement System (ASE)
  - Shoulder Lane Safety Study
Tool Development and Guidance

- Guidebooks
- Management and Operations Handbooks
- State CEO Briefings
- Primers
- Workshops
- Peer support
INTEGRATED CORRIDOR MANAGEMENT
Integrated Corridor Management

- Pro-active
- Multi-modal
- Multi-jurisdictional
- Collaborative
- Cooperative
- Common objectives
- Focus on supply and demand
Supporting technologies

- ATDM
- Managed lanes
- Pricing
- Transit only lanes
- Actionable information
- Real-time signal control
- Adaptive systems
- Integrated payment
Supporting processes

- Business process, e.g. Joint Operating Plans
- Communications
U.S. DOT ICM Program

- Research, demonstrate and evaluate ICM
- Provide necessary tools, knowledge, and guidance for ICM
ICM Pioneer Sites

Three Stages of the ICM Initiative:
• All Sites – Concept of Operations, Sample Data, and Requirements
• 3 Sites – Analysis, Modeling, and Simulation
• 2 Sites – Demonstration and Evaluation
ICM Demonstration Sites

San Diego, CA

Dallas, TX
ICM Demonstration

- Construct ICM systems
- Integrate transportation operations
- Share and utilize data for decision making
- Operated differently
- Improve situational awareness
- Enhance response and control
ICM Evaluation Framework

- Institutional and Organizational
- Technical Capacity
- Decision Support Systems
- Traveler Response
- Corridor Performance
- Air Quality
- Benefit/Cost Analysis
Knowledge and Technology Transfer

- ICM Implementation Guide
- Analysis, Modeling, and Simulation Guide
- Model documents: ConOps, SysReq, Design, Testing, etc.
- ICM Early Adopter Workshops
- Peer Exchanges
Questions