Integrated Corridor Management (ICM) Initiative

2012 ITS America Annual Meeting & Exposition
ICM Workshop
National Harbor, MD
May 23, 2012

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Federal Transit Administration
What is ICM?

- The integrated management of freeway, arterial, transit, and parking systems within a corridor
- Management of the corridor as a system, rather than the more traditional approach of managing individual assets
ICM System (ICMS)

An **ICMS** is the set of procedures, processes, and information systems that support transportation system managers in making coordinated decisions involving the **optimal performance of transportation networks in a corridor**.

- Manage demand and balance loads across the networks by facilitating
  - Mode shifts
  - Route shifts
  - Departure/arrival time shifts

- Respond to events with coordinated multi-agency actions
  - Incidents
  - Construction
  - Special Events
  - Weather
Examples of Supporting ITS Technologies and Strategies

- Active Traffic Management
- Managed Lanes
- Transit signal priority
- Actionable, multimodal traveler information
- Real-time traffic signal control
- Integrated electronic payment

Learn More: http://www.its.dot.gov/icms/
ICM Initiative Goals

- Demonstrate and evaluate strategies and ITS technologies that help transportation operators efficiently and proactively manage corridors

- Provide the necessary tools, knowledge, and guidance, for ICM

Stakeholder Working Group

- Phase 1: Foundational Research
- Phase 2: Corridor Tools, Strategies and Integration
- Phase 3: Corridor Site Development, Analysis and Demonstration
  - (FY07-08) Pioneer Site Concept of Operations and Requirements
  - (FY09-10) Analysis, Modeling and Simulation of Selected Sites
  - (FY10-13) Pioneer Site Demonstration Projects and Evaluation
- Phase 4: ICM Outreach and Knowledge and Technology Transfer
  - Standards Completion and Deployment

Learn More:  http://www.its.dot.gov/icms/
3 Stages for the Pioneer Sites:
• Stage 1 – Concept of Operations, Sample Data, and Requirements
• Stage 2 – Analysis, Modeling, and Simulation
• Stage 3 – Demonstration and Evaluation

Pioneer Sites

- Seattle
- Minneapolis
- Oakland
- San Diego
- Montgomery County
- Dallas
  - San Antonio
  - Houston

Learn More:  http://www.its.dot.gov/icms/
### Pioneer Site Corridor Assets

The table below shows the corridor assets to be integrated with ICM for each Pioneer Site Location:

<table>
<thead>
<tr>
<th>Pioneer Site Location</th>
<th>HOV</th>
<th>Tolling</th>
<th>Value Pricing</th>
<th>Real-Time Control</th>
<th>Fixed Route</th>
<th>Express Buses</th>
<th>Bus Rapid Transit</th>
<th>Commuter Rail</th>
<th>Light Rail</th>
<th>Subway/Heavy Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dallas, Texas</td>
<td>★</td>
<td>★</td>
<td></td>
<td>★</td>
<td>★</td>
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<tr>
<td>Houston, Texas</td>
<td>☆</td>
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<td>★</td>
<td>★</td>
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<td></td>
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<td>★</td>
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<tr>
<td>Minneapolis, Minnesota</td>
<td>★</td>
<td>★</td>
<td></td>
<td>★</td>
<td>★</td>
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<td></td>
<td></td>
<td>★</td>
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<tr>
<td>Montgomery County, Maryland</td>
<td>★</td>
<td></td>
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<td>★</td>
<td>★</td>
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<td></td>
<td></td>
<td>★</td>
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<tr>
<td>Oakland, California</td>
<td>★</td>
<td></td>
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<td>★</td>
<td>★</td>
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<td>★</td>
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<tr>
<td>San Antonio, Texas</td>
<td>★</td>
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<td>★</td>
<td>★</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>San Diego, California</td>
<td>★</td>
<td>★</td>
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<td>★</td>
<td>★</td>
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<td>★</td>
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<tr>
<td>Seattle, Washington</td>
<td>★</td>
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</tbody>
</table>

ICM Data Types and Performance Measures

- **Arterial** Performance Measures
  - Link speeds
  - Intersection approach volumes
  - Ramp queues
  - Link and ramp capacity

- **Transit** Performance Measures
  - Schedule adherence
  - Speed/travel time
  - Transit capacity utilization
  - Parking space utilization

- **Associated Corridor** Performance Measures
  - Travel time
  - Travel delay time and predictability
  - Incident duration and frequency
  - Fuel consumption and pollution reduction
  - Corridor capacity utilization (vehicle & traveler throughput)
ICM Analysis, Modeling, and Simulation (AMS)

- Determine the right strategies
- Invest with confidence
- Improve the effectiveness and success of implementation
- Provide long-term capability to continually improve implementation based on experience
ICM AMS Methodology

Regional patterns and mode shift, transit analysis capability

Traveler information, HOT lanes, congestion pricing, and regional diversion patterns

Traffic control strategies, such as ramp metering and arterial traffic signal control
# ICM AMS Sites

<table>
<thead>
<tr>
<th>ICM Strategies</th>
<th>Dallas</th>
<th>Minneapolis</th>
<th>San Diego</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhanced Traveler Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earlier Dissemination</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Enhanced DMS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Comparative, Multimodal (pre-trip and en-route)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Decision Support System</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Traffic Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp Metering</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Selective Closures (Freeway)</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Signal Timing Optimization</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Multi-Agency Data Exchange</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>Managed Lanes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOT</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Transit Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking Space Availability Information</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Capacity Increases (Increased Transit Service Frequency)</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Station Parking Expansion</td>
<td>✓</td>
<td></td>
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</tbody>
</table>
## ICM AMS Results – Performance Measures

<table>
<thead>
<tr>
<th>PERFORMANCE MEASURE AREAS</th>
<th>San Diego</th>
<th>Dallas</th>
<th>Minneapolis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Travel Time Savings (Person-Hours)</td>
<td>246,000</td>
<td>740,000</td>
<td>132,000</td>
</tr>
<tr>
<td>Improvement in Travel-Time Reliability (Reduction in Travel-Time Variance)</td>
<td>10.6%</td>
<td>3%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Fuel Saved Annually (in Gallons)</td>
<td>323,000</td>
<td>981,000</td>
<td>17,600</td>
</tr>
<tr>
<td>Tons of Mobile Emissions Saved Annually (in Tons)</td>
<td>3,100</td>
<td>9,400</td>
<td>175</td>
</tr>
</tbody>
</table>
ICM AMS Results – Benefit/Cost

![Graph showing benefit/cost ratios for San Diego, Dallas, and Minneapolis.]

- San Diego: 10:1, $104M
- Dallas: 20:1, $264M
- Minneapolis: 22:1, $82M

**KEY:**
- Green bars: 10-Year Net Benefit
- Light green bars: 10-Year Cost

**Benefit Cost Ratio (italicized)**
ICM Demonstration Sites

San Diego, CA

Characteristics:
- Popular freight, tourist and commuter corridor
- Lengthening peak travel periods

Corridor Infrastructure
- Decision-Support System
- Actionable traveler information
  - 511 (phone and website)
  - Comparable travel times
- Managed lanes
- Rerouting of traffic
  - Responsive signal operations
  - Coordinated ramp metering and traffic signals
- Mode shift
  - Bus rapid transit
  - Transit signal priority

Dallas, TX

Characteristics:
- Major employers
- No ability to expand
- Surrounding construction planned

Corridor Infrastructure
- Decision-Support System
- Actionable traveler information
  - 511 (phone and website)
  - Comparable travel times
- Rerouting of traffic
  - Responsive signal operations
- Mode Shift
  - Light rail
  - Parking management
  - Real-time service adjustments
## ICM Evaluation

<table>
<thead>
<tr>
<th>U.S.DOT Hypotheses</th>
<th>Evaluation Analysis Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Improve Situational Awareness</td>
<td>• Technical Assessment of the Capability to Monitor, Control, and Report on the Status of the Corridor</td>
</tr>
<tr>
<td>- Enhance Response and Control</td>
<td></td>
</tr>
<tr>
<td>- Better Inform Travelers</td>
<td>• Traveler Response (also relates to Enhance Response and Control)</td>
</tr>
<tr>
<td>- Improve Corridor Performance</td>
<td>• Quantitative Analysis of the Corridor Performance – Mobility</td>
</tr>
<tr>
<td>- Positive or No Impact on Safety</td>
<td>• Quantitative Analysis of the Corridor Performance – Safety</td>
</tr>
<tr>
<td>- Positive or No Impact on Air Quality</td>
<td>• Air Quality Analysis</td>
</tr>
<tr>
<td>- Have Benefits Greater than Costs</td>
<td>• Benefit-Cost Analysis</td>
</tr>
<tr>
<td>- Provide a Useful and Effective Tool for ICM Project Managers</td>
<td>• Evaluation of Decision Support Systems</td>
</tr>
</tbody>
</table>
ICM Knowledge and Technology Transfer (KTT)

- Technical Workshops
- Peer-to-Peer Support
- Presentations at Conferences
- Webinars
- Knowledgebase
  - Guidance Documents
  - Sample Documents/Templates
  - Magazine Articles
  - Newsletter
  - Fact Sheets

Check-out the ICM Knowledgebase at: [http://www.its.dot.gov/icms/knowledgebase.htm](http://www.its.dot.gov/icms/knowledgebase.htm)
ICM Initiative Next Steps

- Release ICM AMS and Implementation guides
- Post ICM documents on Knowledgebase
  - Demonstration Sites ConOps, Requirements
  - Stage 2 AMS documents
- Finalize evaluation planning materials and commence data collection
- Conduct ICM Early Adopter Workshops/Peer Exchanges
- Begin ICM operations at Demonstration Sites in early 2013
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