National Perspective - Operations Performance Measures

Rich Taylor
Federal Highway Administration, Office of Operations
January 22, 2006
Agenda

● Update on NTOC Initiatives
  ● Signal System Report Card
  ● Performance Measures Effort

● FHWA Initiatives
  ● Operations Performance Measures
    ● Travel Time Reliability measures

● Questions/Discussion
National Transportation Operations Coalition (NTOC)

- Signal System Report Card (Spring 2005)
  - Based on Self Assessments completed for traffic signal systems throughout the U.S.
- Operations Performance Measures (July 2005)
  - Undertaken by a group comprised of federal, state and local governments, academics, etc.
Signal System Report Card

- Self assessment – August 2004
  - Proactive Management
  - Coordinated Signal Systems
  - Individualized Signal Systems
  - Specialized Operations
  - Detectors
  - Maintenance

- All responses were anonymous
Signal System Report Card

- **378 Responses**
  - 49 states represented
  - 242 cities
  - 62 counties

- **Good distribution between**
  - Population
  - Signal system size

- **Results – Overall Grade D-**
  - Management & detection scored lowest
  - Individual Intersections scored highest
Signal System Report Card

Figure 1 National Report Card

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>58</td>
</tr>
<tr>
<td>Coordinated Systems</td>
<td>61</td>
</tr>
<tr>
<td>Individual Intersections</td>
<td>72</td>
</tr>
<tr>
<td>Specialized Operations</td>
<td>58</td>
</tr>
<tr>
<td>Detection</td>
<td>53</td>
</tr>
<tr>
<td>Maintenance</td>
<td>67</td>
</tr>
<tr>
<td>Overall</td>
<td>62</td>
</tr>
</tbody>
</table>
Signal System Report Card

- Large systems scored higher than national average
- Small systems noticeably lower

Table 2 Results by Signal System Size

- Large systems scored higher than national average
- Small systems noticeably lower
Signal System Report Card

- **Other Findings**
  - **Proactive Management: F**
    - 68% have no documented management plan or manage “ad hoc”
  - **Coordinated Operations: D-**
    - 50%+ do not conduct timing reviews every 3-5 years
  - **Individualized Operations: C-**
    - 75% have no documented process to trigger timing reviews
  - **Detectors: F**
    - 1/3 have no regular process for collecting data for timing
  - **Maintenance: D+**
    - Agencies operate with minimum staffing
Signal System Report Card

- More Resources needed
  - Total $965m/year
    - Signal Hardware $265m/year
    - Timing Updates $200m/year
    - Maintenance $500m/year
  - Would be 1% of total $104b/year spent on transportation

- If we had the resources for a high score
  - Delay would decrease by 15-20%
  - Travel time would reduce up to 25%
  - Emissions would reduce up to 22%
  - Fuel consumption would reduce up to 10%
Signal System Report Card

● What’s Next
  ● Capitalize on the press coverage
  ● Argue for appropriate funding and staff
  ● Use the National Report Card as leverage
  ● Keep up the attention locally

● Tools available at www.ite.org/reportcard/
NTOC Performance Measures

- National Transportation Operations Coalition (NTOC)
  - ITE, AASHTO, TRB, ITS America, ICMA, AMPO, plus other associations and the FHWA
- One of several NTOC task forces is focusing on operations performance measurement
  - Led by International City/County Managers Association (ICMA) with assistance from University of Maryland Center for Advanced Transportation
NTOC Performance Measures

- Literature Review
- Initial List of 14 Candidate Measures
- Development of Survey
  - Sent to association members
  - 333 responses (261 from State and local agencies)
- Candidate measures and survey results reviewed by oversight committee at the ITE Technical Conference in March
- “Final” list of 11 performance measures has been developed
Final List of 11 High-Level Measures

- Customer Satisfaction
- Extent of Congestion
  - Spatial and Temporal
- Recurring Delay
- Non-Recurring Delay
- Incident Duration
- Speed
- Throughput - Person
- Throughput - Vehicle
- Travel Time – Link
- Travel Time Reliability (Buffer Index/Buffer Time)
- Travel Time – Trip
# Applicability of Measures

The table below outlines the performance measures applicable to different roadway types, categorized as recurring, non-recurring, and area-wide.

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recurring</strong></td>
<td><strong>Non-Recurring</strong></td>
</tr>
<tr>
<td>Freeway</td>
<td>Delay, Speed, Travel Time, Throughput</td>
</tr>
<tr>
<td>Arterial</td>
<td>Delay, Throughput, Travel Time</td>
</tr>
<tr>
<td>System</td>
<td>Delay, Congestion, Customer Satisfaction, Travel Time</td>
</tr>
</tbody>
</table>

*Note: Table authored by Phil Tarnoff, University of Maryland*
NTOC PM Definitions

- Recurring Delay
  - Vehicle delays that are repeatable for the current time-of-day, day-of-week, and day-type.

- Non-Recurring Delay
  - Vehicle delays in excess of recurring delay for the current time-of-day, day-of-week, and day-type
    - Unit of measure is vehicle-hours
NTOC PM Definitions

● Throughput – Vehicle
  ● Number of vehicles traversing a roadway section in one direction per unit time. May also be the number of vehicles traversing a screen line in one direction per unit time.

● Throughput – Person
  ● Number of persons including vehicle occupants, pedestrians, and bicyclists traversing a roadway section in one direction per unit time. May also be the number of persons traversing a screen line in one direction per unit time.
NTOC PM Definitions

● Travel Time – Link
  ● The average time required to traverse a section of roadway in a single direction.

● Travel Time – Trip
  ● The average time required to travel from an origin to a destination on a trip that might include multiple modes of travel.
Travel Time Reliability (Buffer Time)

- The Buffer Time is the additional time that must be added to a trip (measured as defined by Travel Time – Trip), to ensure that travelers making the trip will arrive at their destination at, or before, the intended time 95% of the time.

Incident Duration

- The time elapsed from the notification of an incident until all evidence of the incident has been removed from the incident scene.
  - FHWA focus state initiative on this – report due soon
NTOC Performance Measures

- A report documenting these initial measures is available at the NTOC Talks web site

- Next steps
  - NCHRP panel is being put together that will allow state/local agencies to “test drive” the performance measures to determine their usefulness and whether or not the data is available to reliably compute the measures
  - Always looking for interested parties to pilot the measures
FHWA Initiatives

- Operations Performance Measures
  - Currently focused on congestion and reliability measures - Mobility Monitoring Program and Urban Congestion Reporting
  - Key Outcome Measures
    - Travel time index
    - Extent of congestion
    - Buffer index/planning time index
  - Uses include tracking national trends and educating state and local governments on use of performance measures
FHWA Initiatives

- *New!!* Travel Time Reliability Guidance Document and Brochure
  - Step-by-step instructions on how to develop Travel Time Reliability Measures
    - Specifically, 90th or 95th Percentile Travel Times, Buffer Index, and Planning Time Index
    - Examples provided
  - Developed from experience with the Mobility Monitoring Program and Urban Congestion Reporting
  - Brochure available in FHWA Office of Operations booth (1510)
FHWA Initiatives

- Other FHWA Performance Measures Activities
  - Freight delay measures
  - Incident delay measures
  - Measures in early stages
    - Work zone measures
    - Weather measures
Resources

- NTOC
  - http://www.ntoctalks.org
- FHWA Office of Operations
  - http://www.ops.fhwa.dot.gov/
- Travel Time Reliability Measures Guidance
  - http://www.ops.fhwa.dot.gov/perf_measurement/ (available later this week)
  - Reliability Guidance Brochure available in Office of Operations Booth (#1510)
Questions?

For More Information Contact:

Rich Taylor

Rich.Taylor@fhwa.dot.gov

202-366-1327