Building on the Success of Regional Data-sharing for Travel Times

Performance Management & Collaboration in New Jersey

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**Performance Planning Context (NJDOT)**

- Current environment of fiscal constraint and a “Fix It First” philosophy at NJDOT has shifted strategic focus for congestion relief:
  - Away from major capacity increases, new alignments
  - Towards targeting system inefficiencies and demand (bottleneck mitigation, improved systems operations, TDM)
  - Particular emphasis is on addressing high-need signalized intersections, optimizing signalized corridors and ITS/TSM

- The Department’s Asset Management policies and construct demand accountability for congestion relief investments:
  - Defined goals, measures, targets & report-outs on progress
  - Demonstrated expenditure effectiveness (“return on investment”)  
  - Information must be easily understood by a wide audience
Performance Planning Context (MAP-21)

- The recently enacted MAP-21 establishes a performance-based program that includes these goals*:
  - **Congestion Reduction** – to achieve a significant reduction in congestion on the NHS
  - **System Reliability** – to improve the efficiency of the surface transportation system
  - **Freight Movement & Economic Vitality** – to improve the national freight network, strengthen access of rural communities to trade markets, support regional economic development

- The **SCOPM Task Force** has recommended Annual Hours of Delay (AHD) and a Reliability Index (RI$_{80}$) as national-level (system) performance measures

- **FHWA** has acquired a national data set (National Performance Management Research Data Set or NPMRDS) of average travel times for use in performance measurement

(* - these goals impact NJDOT’s Congestion Relief Program)
Need to develop easy-to-understand performance measures, visualizations and report-outs that speak to senior leadership, elected officials and the public, in alignment with our strategic focus and MAP-21 requirements.

To accomplish this, quality data, powerful analytical tools and organizational collaboration are a MUST.
Some Performance Management Tools that Provide the Analytics

- UMD’s Vehicle Probe Project Suite
  - VPP Suite

- Iteris’ Performance Management System
  - iPeMS

- TRANSCOM’s Data Fusion Engine
  - Trip Data Analysis Tool (SPATEL)

- These tools use archived operations data from sources such as INRIX and [here]
Planning Application Areas of the PM Tools (@ NJDOT)

- **Problem ID/Project Development**
  - Identify problems on the highway network for potential Problem Statement development

- **Project Confirmation**
  - Evaluate projects already in Concept Development (CD) to help decide disposition within the Department’s Project Delivery Process

- **Before & After Studies**
  - Gather data and graphical representations of “Before & After” conditions of project areas for comparative purposes

- **Performance Reporting**
  - Performance measures for the NJDOT’s Tactical-Level Asset Management Plan (T-LAMP provides the strategic framework, context and guidance for capital program decision-making)
  - Can be enhanced to report out on MAP-21 National performance measures
Visualization Examples

The Vehicle Probe Project Suite

PROBLEM ID ➤ PROJECT DEVELOPMENT ➤ PROJECT CONFIRMATION ➤ BEFORE & AFTER ➤ PERFORMANCE REPORTING
In their Using Operations Data for Planning in the Delaware Valley Region Case Study, DVRPC used VPP raw data to identify areas of long periods of congestion that can be used to help develop strategies for increasing mobility and accessibility.
Analysis Area

Another example of how the VPP Suite can be used in problem identification & project confirmation, in this case confirming significant congestion at the I-280/Route 21 interchange. Coupled with a probable cause photo set (next page), these visualizations combine to better “tell the story”.

Assessment

VPP Bottleneck & Congestion Scan analysis for this segment of WB I-280 can be summarized as follows:

- Travel Time Indices show TTIs of 2-5 for most of the AM peak period, and 2-4 for the PM peak period, indicating that travel within this section is taking 2 to 5 times longer than under free-flow conditions during these periods.
- Queue Lengths generally range between 1.0 and 1.2 miles during the same AM & PM peak periods.
- Congestion Scan results show severely slow speeds (indicated by the circled dark red areas) between 5th Street and Cleveland Ave., from approximately 6:00-8:20 AM, and 6:15-7:00 PM. Excessively slow speeds (indicated by the red areas) occur between 5th Street and NJ Route 21, from approximately 7:45-8:30 AM and 5:30-7:00 PM.
- A 5-day average congestion scan (June 20th – June 24th, 2011) showed slightly better speed conditions during the WB peak periods. There are no apparent excessive to severe congestion problems in the EB direction.

Created on 07.08.11
Technical Analysis Unit, Bureau of Systems Planning
Stitching together a series of Google™ Earth images is quick and easy, and aids in identifying the “probable causes” of the congestion seen on I-280 WB.
Using the VPP Suite’s Historic Probe Data Explorer, 511NJ cameras and the NJCMS, a multi-faceted analysis of the McClellan Street Interchange was conducted, part of the PANYNJ’s EWR Southern Access Roadway Project. It was concluded that this location is not considered a high priority for the NJDOT from a congestion relief perspective.
Dipak Patel of SCDOT used VPP speed data and a unique circular speed graph approach to visualize speed variations along entire stretches of roadways. In this example, a series of average monthly hourly speed “snapshots” were developed to show how a construction project at I-26 affected speeds on I-526. Dipak won AASTHO’s Presidential Award for his creative work.
This is an example of a Before & After Study (Project Assessment Summary) developed as a possible prototype template. A “Technical Toolbox” approach was used that included VPP Suite, NJ OpenReach, Google™ Earth and data from various units within the NJDOT (pgs. 2-3 of an Exec. Sum.)
**New Jersey Pilot Study**

Evaluating AASHTO’s System Performance Measure Methodologies

**September 10, 2013**

**MAP-21**

Moving Ahead for Progress in the 21st Century

**NJDOT**, in partnership with **NJTPA**, is conducting a **New Jersey Pilot Study** to test the SCOPM system-level PM methodologies for two corridors: **I-78** and **NJ Route 18**. Using **AOD** from the **VPP Suite Massive Raw Data Downloader**, this effort looks to: use proposed, and alternative formulations for delay and reliability; assess results, and; note barriers, challenges and workarounds. A final report is pending.

### Annual Person-Hours of Delay per mile

<table>
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<tr>
<th>Route (Sub-Corridor)</th>
<th>Miles (Both Dir.)</th>
<th>Threshold Variations</th>
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<tr>
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<td>Free-flow Yearly Median Day/Hr Median Max Throughput “Accept.” Speed</td>
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Organizational Collaboration on Performance Management

I-95 Corridor Coalition VPP Team

- Regional Guidance
- National Perspective
- Collaborative Decision-Making

- Innovation
- Test Bed
- Product Development

VPP Suite User Group

Partners in Using Archived Operations Data

NJ MAP-21 Performance Measure Committee

Complete Team

-- Leverage Agency Synergy and Talent Pool to Get the Work Done --
**What is complete team?**

- **complete team** is a collaborative construct between NJ’s planners and operators whose mission is “MOVING PEOPLE AND GOODS MORE EFFICIENTLY” by facilitating better linkages between Regional Transportation Planning & Investment Decision-making, and, Transportation Systems Management and Operations.

- There are currently six linkage “activities”, that will achieve:
  - A more comprehensive, integrated transportation planning process
  - Consistent, comprehensive data sharing & information exchange
  - Cooperative performance measure development/use
  - Cohesive, comprehensive use of the NJCMS & MPO CMPs
  - An integrated NJ ITS Architecture Update (development & support)
  - A robust, effective Strategic ITS Deployment Plan

- Optimizing these linkages will bring about: integrated and enhanced data & information sharing; more efficient, cost-effective congestion relief/mobility projects; and, better system performance evaluation.

- The **complete team** construct is modeled after FHWA’s Scope of Linking Planning and Operations in their “Getting More by Working Together” Reference Manual (see Exhibit 1, next page).
EXHIBIT 1  Scope of Linking Planning and Operations

Requires Coordination Among Decisionmakers

Regional Transportation Planning and Investment Decisionmaking

Linkage Opportunities

Transportation Planning Process
Data Sharing
Performance Measures
Congestion Management Systems
Funding and Resource Sharing
Institutional Arrangements
Regional ITS Architecture
Regional Management and Operations Projects
Regional Concept for Transportation Operations

Requires Coordination Among Day-to-Day Operations Managers

Transportation Systems Management and Operations
The Bottom line is…

- Archived operations data (AOD) may be the most important advancement in data for planning purposes, and are the cornerstone for MAP-21 System Performance PMs (and SCOPM methodologies).

- Performance Management tools have the power and flexibility for analyzing and presenting AOD (though MAP-21 PMs are currently not included).

- Organizational collaboration provides the cooperative framework for:
  - Sharing information
  - Exchanging Ideas
  - Testing analytical methodologies, tools and techniques
  - Working together on MAP-21 performance and target-setting requirements

- There is, and will be a substantial amount of work and many considerations in developing NHS performance-based protocols and reporting practices.
Thank you for your time!

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