CMP Roadway Performance Monitoring

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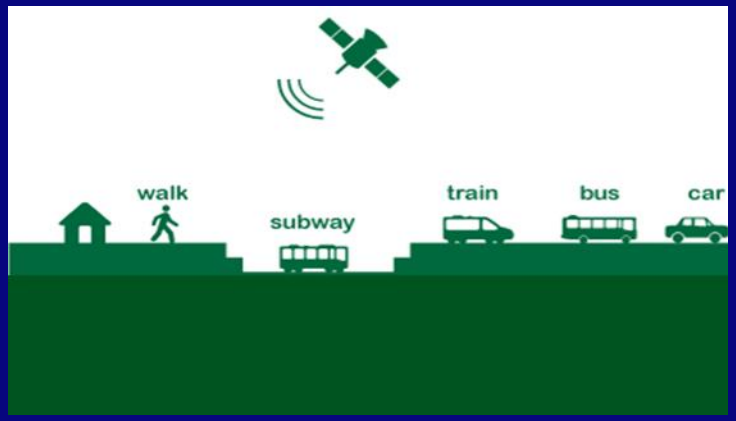
CMP Background

- A congestion management process (CMP) is federally required for MPOs with a population greater than 200,000
- It monitors performance of a region's transportation facilities



Previous Data-Collection Method

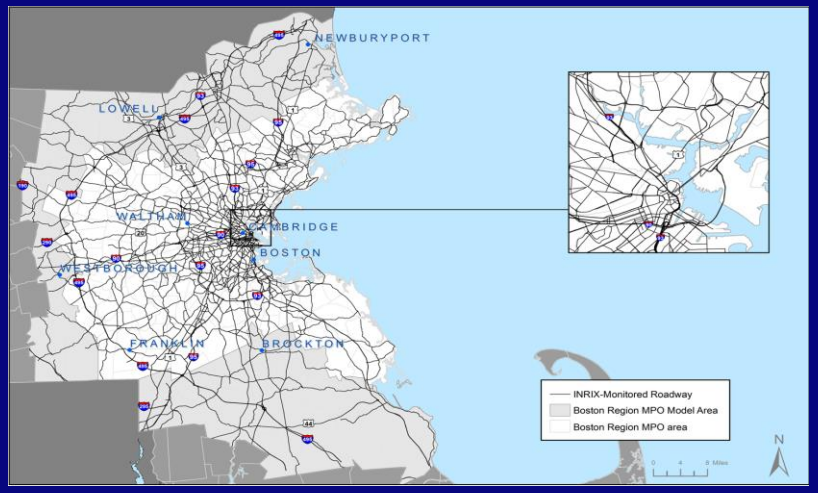
- Floating-car technique using global positioning system (GPS) devices
- Provided intersection delay
- Yielded limited number of samples
- Was costly and labor intensive
- Could monitor only the intensity of congestion

INRIX Vehicle Probe Travel-Time Data

- INRIX partners (more than 400 customers in automotive, mobile-device, public-sector markets) would collect travel-time data
- The purchased data covers Boston Region MPO area, and Worcester county
- Data was acquired for an entire year (2012)
- Reported in one-minute increments

INRIX Data in Boston MPO Model Area

- Number of traffic message channels (TMCs) in Boston MPO model area: 9,280
- Number of speed records for each TMC: 527,040
- Total number of speed records: 4,890,931,200



Findings from Purchased Data

- Vehicle-probe data showed freeway travel speeds that were slightly faster than those using previous data-collection technique
- Sometimes a high variability in travel speed records because of the presence of outliers

Challenges of Vehicle-Probe Data

- Shapefile direction errors
- Accuracy of the arterial data
- Database size
- Display extent of congestion
- Missing data from certain dates

Data Standards for CMP

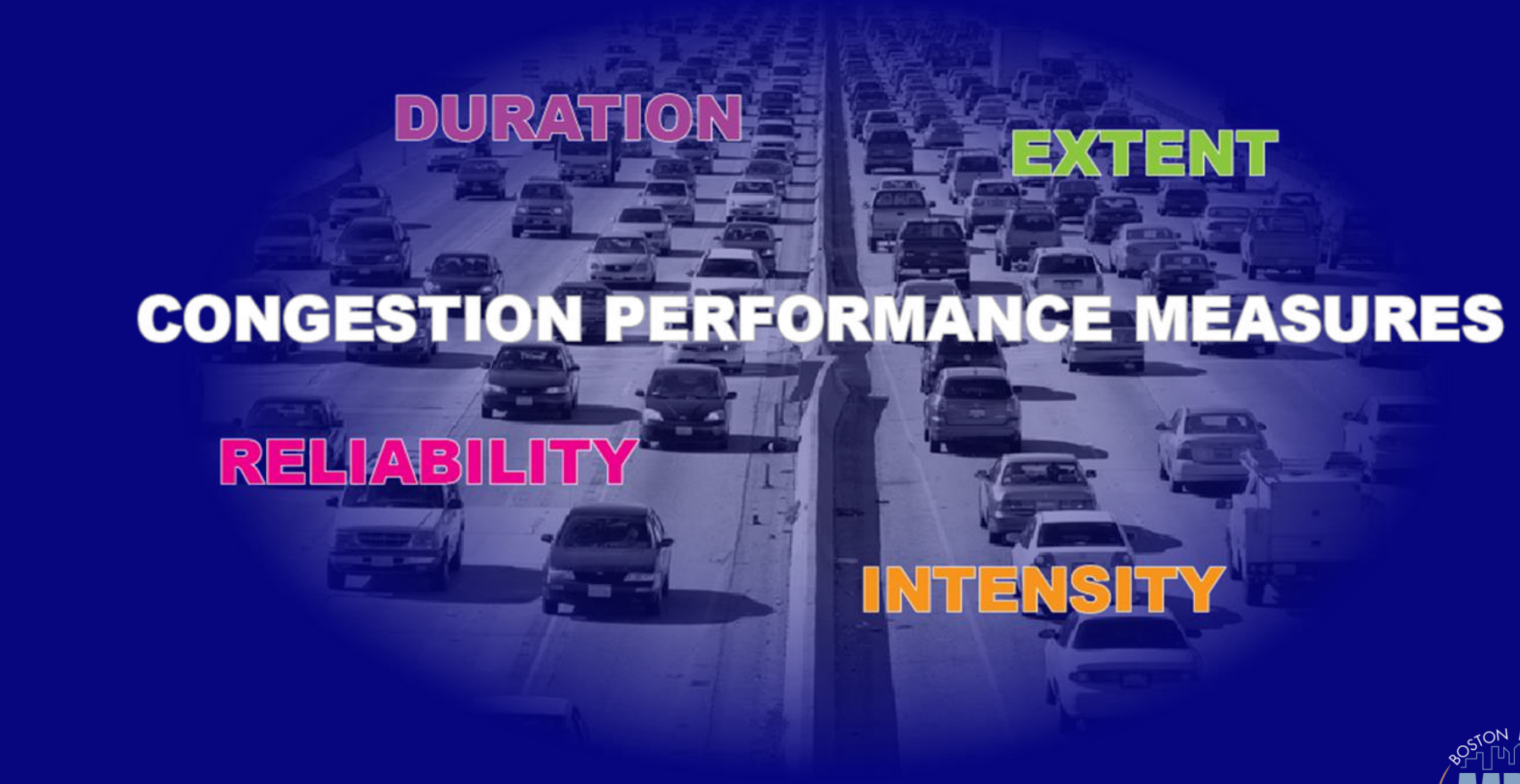
2012 Data Acquired from INRIX

- Samples obtained from 42 days in 2012
- Expressway peak period: 6:00-10:00 and 3:00-7:00 PM
- Arterial peak period: 6:30-9:30 AM and 3:30-6:30 PM
- Free flow speed: 85-percentile speed between 2:00-4:00 AM

Uses for Application

- Calibrate model; select congested corridors for Long-Range Transportation Plan (LRTP)
- Determine congested locations for planning studies
- Determine bottlenecks in individual municipalities
- Transportation Improvement Program (TIP) project evaluations
- By public to plan daily commute

Roadway Performance Measures



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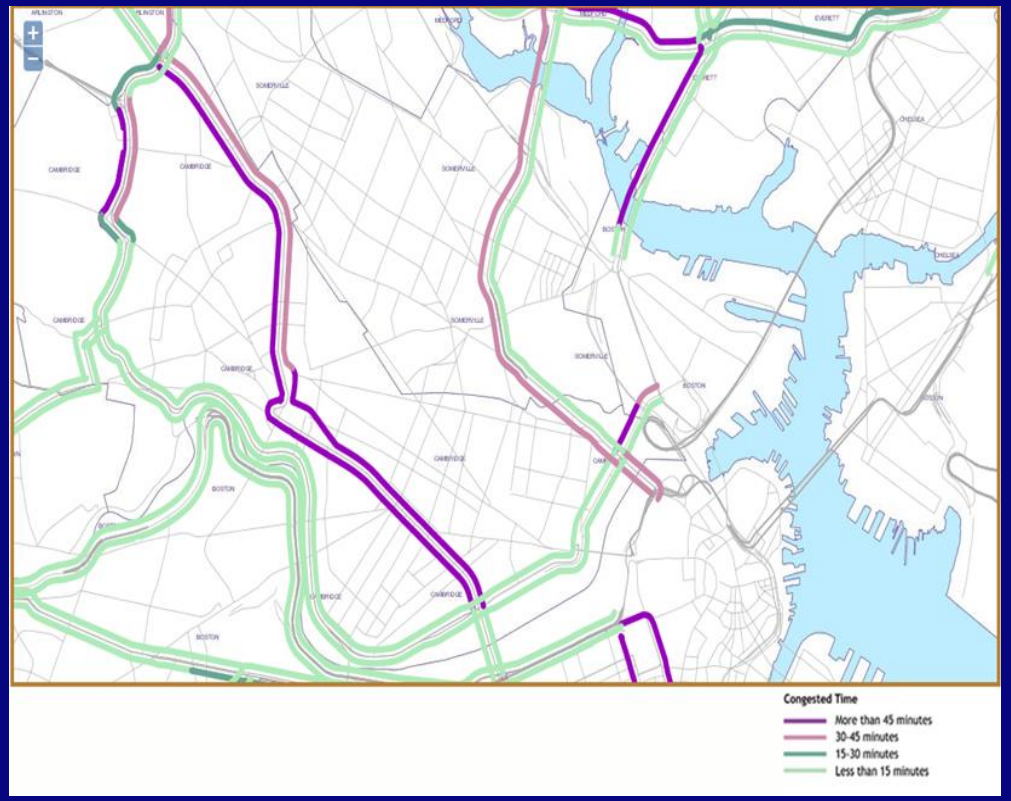
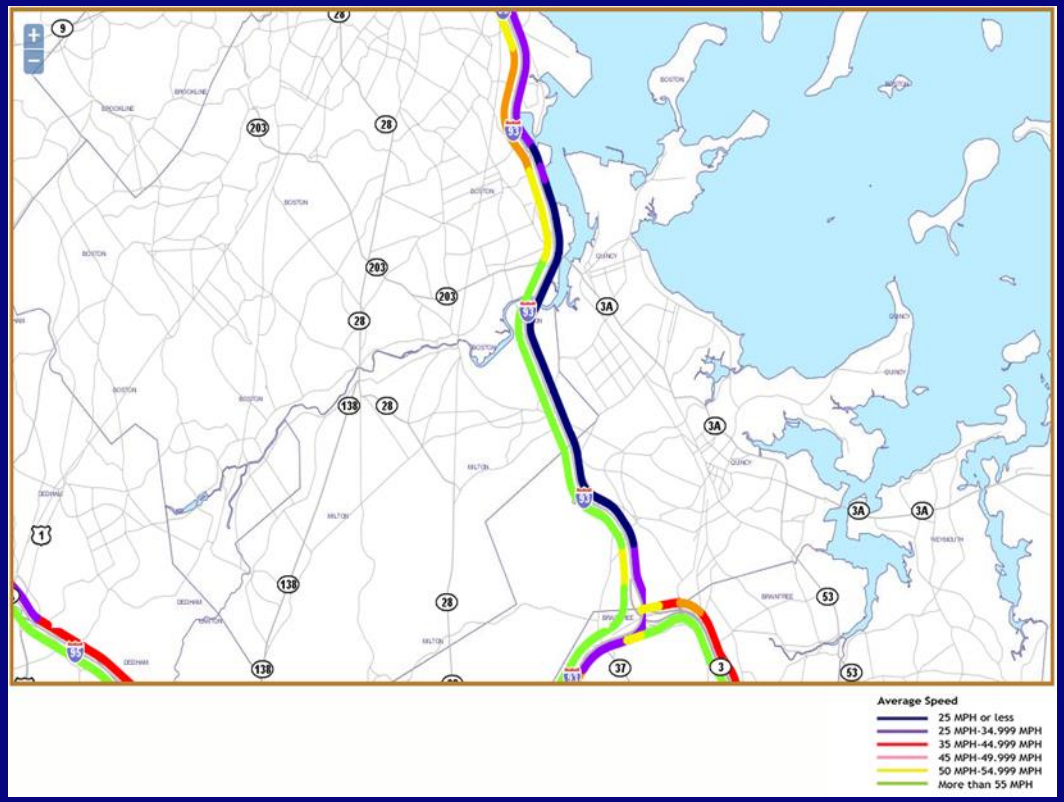
Duration — Congested Time

Average number of minutes that drivers experience congested conditions – at average speed below 35 mph (19 mph for arterials) – per peak period hour



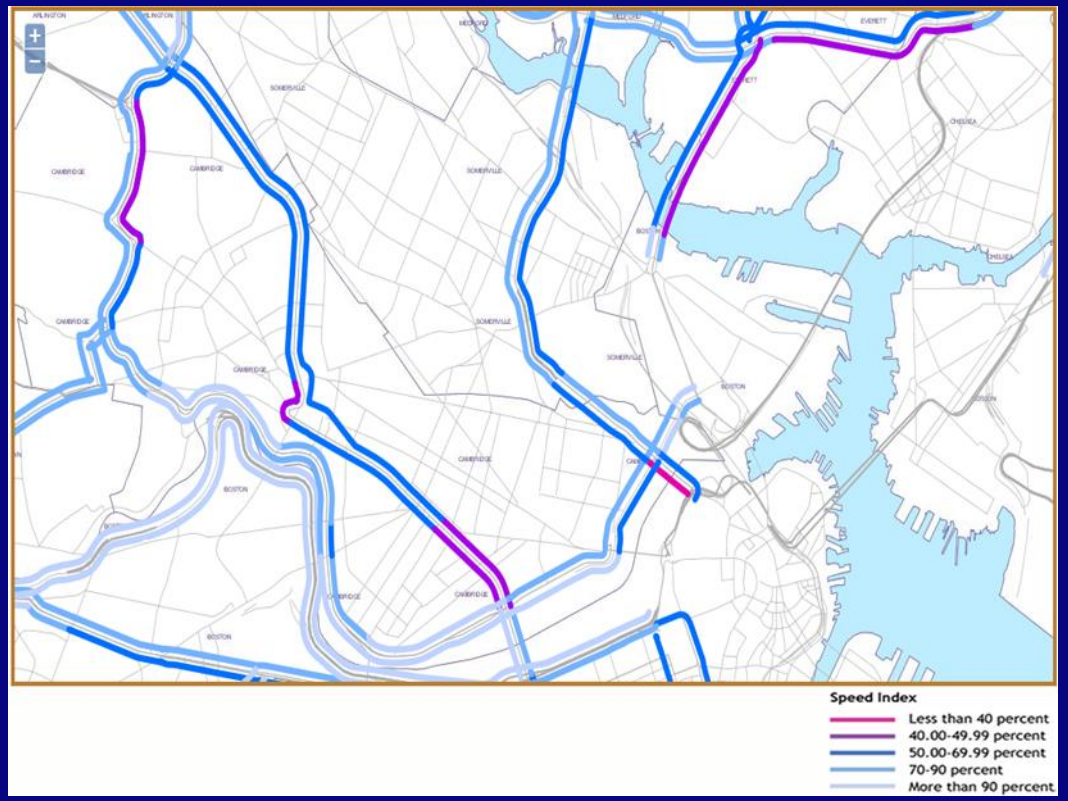
Intensity — Average Travel Speed

Average travel speed of all records used within the CMP defined peak period



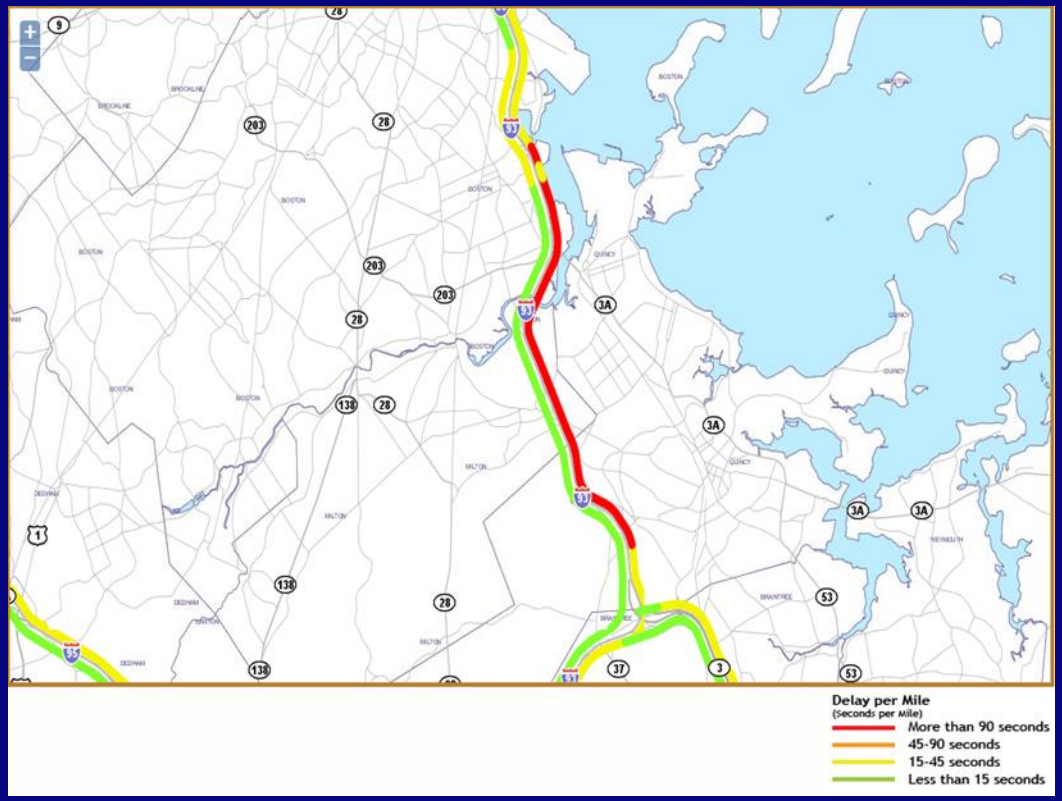
Intensity — Speed Index

Equal to average speed divided by posted speed limit of a roadway segment



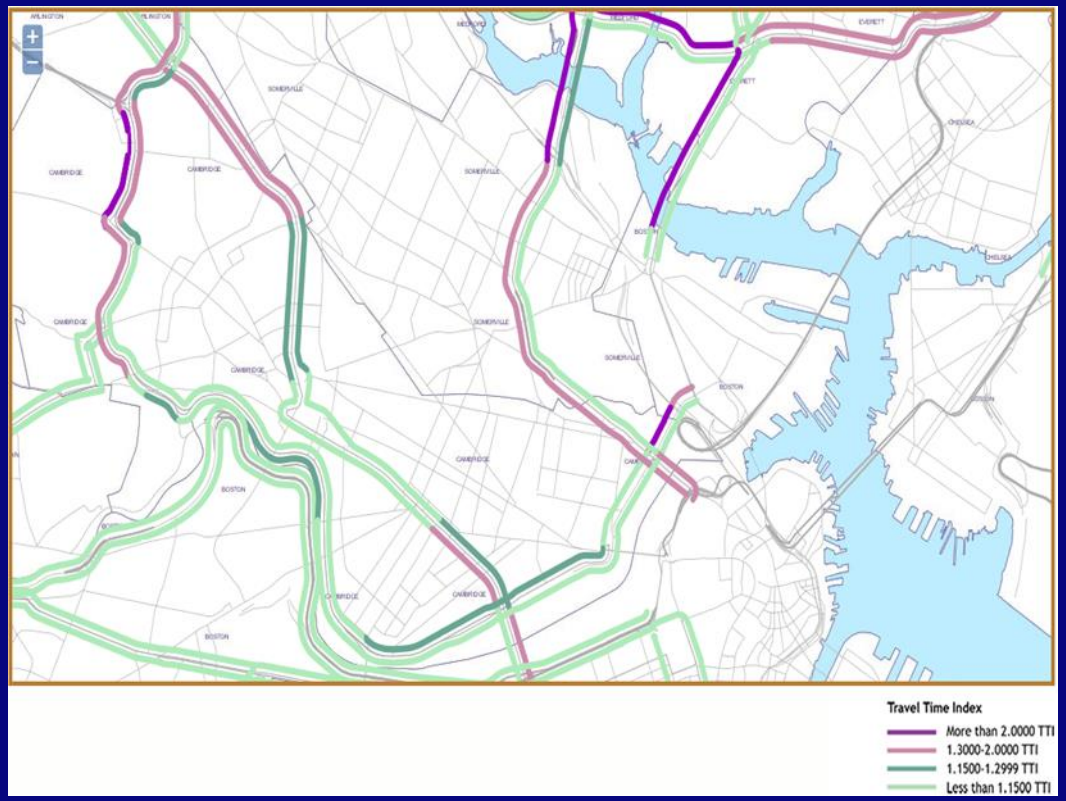
Intensity — Delay Per Mile

Amount of delay a vehicle expects to experience per mile of travel on a roadway segment



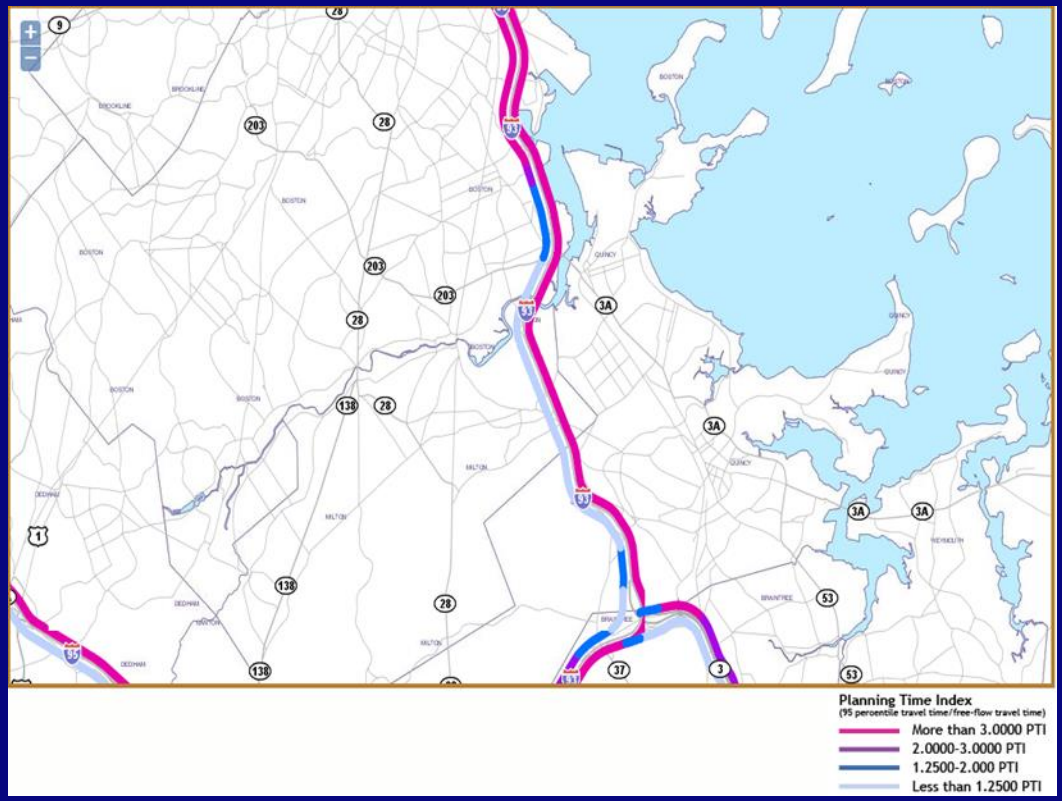
Reliability — Travel Time Index

The ratio of peak-period travel time to free-flow travel time



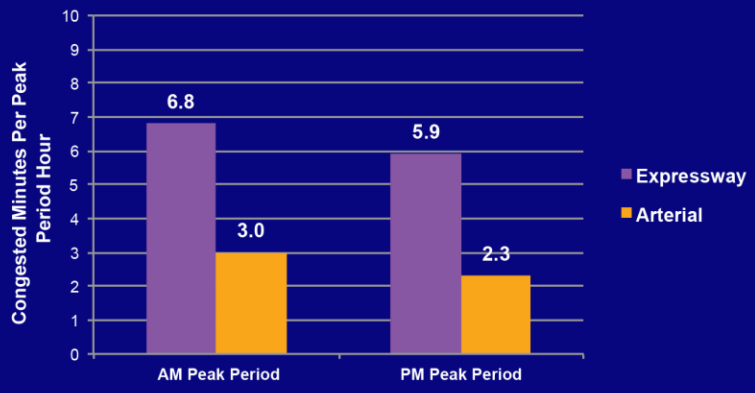
Reliability — Planning Time Index

Compares near-worst-case travel time to free-flow travel time to determine contingency time needed to ensure 95% on-time arrival

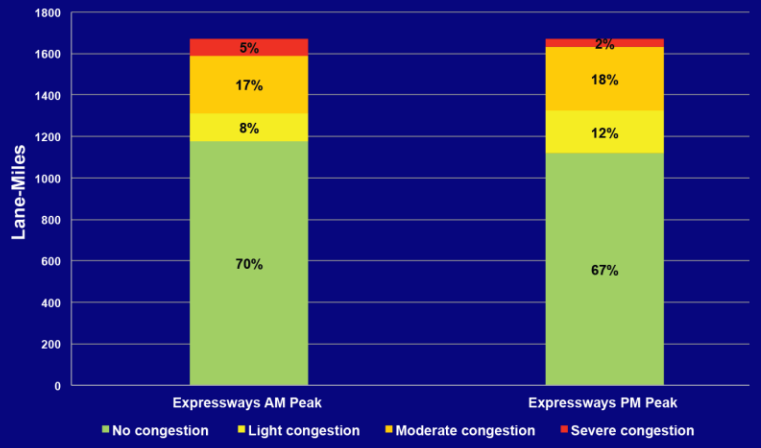


Overview of Congestion in the Boston Region

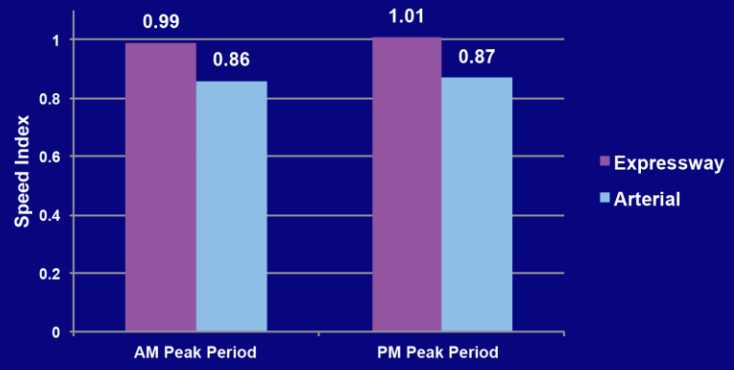
Duration
Congested Time per Peak-Period Hour



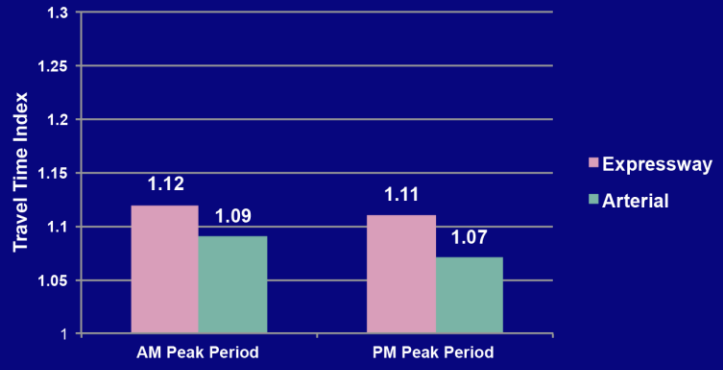
Extent
Lane-Miles of Congestion



Intensity
Speed Index



Reliability
Travel Time Index



Next Steps

- Expand expressway dashboard to include all expressways within MPO Model Region
- Create congestion scans for expressways and select arterials
- Calculate and analyze costs of congestion
- Compare congestion trends between years