Examining Multistate Mobility in the Mid-America Region

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Great Lakes Regional Transportation Operations Coalition (GLRTOC)
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GLR'TOC!

Source: Star Trek of course
This map shows GLRTOC agencies and Mid-America Association of State Transportation Officials (MAASTO) states, as well as the Great Lakes megaregion population centers as depicted by America 2050.
Performance management

- Improvement
- Scope
- Time
- Monitored
- Goals
- Efficiency
- Priorities
- Balanced Scorecard

Source: Cape Chamber of Commerce
Great Lakes Regional Transportation Operations Coalition

Measuring/Managing...

- Delay
  - freight, passenger
  - work zone
  - signal
- Reliability
  - which metric?
- Transit Accessibility
- Transit Productivity
- Bicycle and Pedestrian
  - mode share
  - activity and safety
  - level of service
- Carbon Intensity
- Emissions
- Fuel Consumption
- VMT
  - per capita
  - per lane mile
- Mixed Land Uses
- Transportation Affordability
- Benefits by Income Group
- Land Consumption
- Average Vehicle Occupancy
- On-Time Performance
- Person Throughput
- Incident Response
- Calls / Visits
- Crashes
  - severity
  - frequency
  - rate
  - secondary
- Fluidity
  - And so on
- And on
- Etc.
- Etc.
## USDOT Implementation of MAP-21 Performance Provisions:
### Ten Interrelated Rules

<table>
<thead>
<tr>
<th>Rule</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan and Statewide Planning Rule</td>
<td></td>
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<tr>
<td>• Establish a performance-based planning process at metropolitan and state level.</td>
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<tr>
<td>• Define coordination in the selection of targets, linking planning and programming to performance targets.</td>
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<tr>
<td><strong>Highway Safety</strong></td>
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<tr>
<td>Safety Performance Measure Rule</td>
<td></td>
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<tr>
<td>• Propose and define fatalities and serious injuries measures, along with target establishment, progress assessment and reporting requirements.</td>
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<tr>
<td>• Discuss the implementation of MAP-21 performance requirements.</td>
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<tr>
<td>Highway Safety Improvement Program (HSIP) Rule</td>
<td></td>
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<tr>
<td>• Integration of performance measures, targets, and reporting requirements into the HSIP.</td>
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<tr>
<td>• Strategic Highway Safety Plan updates.</td>
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<tr>
<td>Highway Safety Program Grants Rule *</td>
<td></td>
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<tr>
<td>* Interim Final Rule issued by NHTSA in January 2013.</td>
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<tr>
<td>• State target establishment and reporting requirements.</td>
<td></td>
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<tr>
<td>• Highway safety plan content, reporting requirements, and approval.</td>
<td></td>
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<tr>
<td><strong>Highway Conditions</strong></td>
<td></td>
<td></td>
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<tr>
<td>Pavement and Bridge Performance Measure Rule</td>
<td></td>
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<tr>
<td>• Propose and define pavement and bridge condition measures, along with minimum condition standards, target establishment, progress assessment and reporting requirements.</td>
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<tr>
<td>Asset Management Plan Rule</td>
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<tr>
<td>• Contents and development process for asset management plan.</td>
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<tr>
<td>• Minimum standards for pavement and bridge management systems.</td>
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<tr>
<td><strong>Congestion/System Performance</strong></td>
<td></td>
<td></td>
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<tr>
<td>System Performance Measure Rule</td>
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<tr>
<td>• Define performance of the interstate system, non-interstate national highway system, and freight movement on the interstate system.</td>
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<tr>
<td>• Finalize interpretation of scope of CMAQ performance requirements, including congestion and on-road mobile source emissions.</td>
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<tr>
<td>• Summarize MAP-21 highway performance measure rules</td>
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<tr>
<td><strong>Transit Performance</strong></td>
<td></td>
<td></td>
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<tr>
<td>Transit Asset Management Rule</td>
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<td></td>
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<tr>
<td>• Define state of good repair and establish state of good repair performance measures</td>
<td></td>
<td></td>
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<tr>
<td>• Require transit providers to set targets and report on progress</td>
<td></td>
<td></td>
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<tr>
<td>• Transit asset management plans</td>
<td></td>
<td></td>
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<tr>
<td>National Transit Safety Program Rule</td>
<td></td>
<td></td>
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<tr>
<td>• Define transit safety criteria and standards</td>
<td></td>
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<tr>
<td>• Include definition of state of good repair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transit Agency Safety Plan Rule</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Transit safety plan content and reporting requirements</td>
<td></td>
<td></td>
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<tr>
<td>• Target setting requirements for transit agencies and States</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Indicates the comment period*
What About…

- Access
- Equity
- Efficiency
- Agility
- Social Costs

- Output vs Outcomes
  - vs consumption
- Management, not just Measurement
Access to Destinations

Level of Accessibility
- 406 - 2523
- 2524 - 4556
- 4557 - 6902
- 6903 - 10718
- 10719 - 17619
- 17620 - 28071
- 28072 - 51410

Data Sources
- Travel time: Met Council Transportation Model
- Employment Data: CURA, University of Minnesota
- GIS Files: US Census 2000

Source: U of MN / CTS / David Levinson / NEXUS Research Group
## Mobility: July 2016

**Wisconsin Department of Transportation**  
**MAPSS Performance Scorecard**

<table>
<thead>
<tr>
<th>Performance measure</th>
<th>How we measure it</th>
<th>Current report period</th>
<th>Goal</th>
<th>Goal met</th>
<th>Trend</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mobility:</strong> Delivering transportation choices that result in efficient trips and no unexpected delays.</td>
<td></td>
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</tr>
<tr>
<td><strong>Delay (hours of vehicle delay)</strong></td>
<td>Seasonal quarter Spring 2016, Number of hours spent in interstate traffic below posted speed</td>
<td>4,324,630 hrs.</td>
<td>1,464,331 hrs.</td>
<td></td>
<td>↓</td>
<td>Vehicle delay increased compared to spring 2015. The change in speed limit from 65 to 70 mph and the inclusion of 132 miles of I-41 appear to be the major contributing factors (a lower number is better).</td>
</tr>
<tr>
<td><strong>Reliability (planning time index)</strong></td>
<td>Seasonal quarter Spring 2016, Index based on extreme travel time in a period</td>
<td>1.18</td>
<td>1.10</td>
<td></td>
<td>↓</td>
<td>The planning time index increased this spring quarter with all corridors seeing an increase in their planning time index (a lower number is better).</td>
</tr>
<tr>
<td><strong>Transit availability</strong></td>
<td>Calendar year 2015, Percent of population served by transit</td>
<td>53.0</td>
<td>55.0</td>
<td></td>
<td>↓</td>
<td>There was a one percent decrease from 2014 to 2015. This decrease is largely the result of</td>
</tr>
</tbody>
</table>
The Iowa DOT is committed to providing the public, lawmakers, and partners with easy to understand information that demonstrates how we are managing the state’s transportation infrastructure. We are working hard to minimize costs and improve your transportation services in Iowa.

**Infrastructure condition**
View interactive maps for bridge and road conditions.

**Safety**
View the current weekly fatality count, weekly safety message, and fatality and major injury data.

**Projects**
View a list of current construction projects impacting travel throughout Iowa.

**Winter operations**
Get data for weather, salt, costs, and snow removal outcomes.

Performance Measures

MnDOT transportation performance reporting and management

Annual reports

2014 Annual Minnesota Transportation Performance Report
- Full report (PDF 8 MB)
- Scorecard (PDF)

Critical Connections

<table>
<thead>
<tr>
<th>Measure</th>
<th>Target</th>
<th>Result</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Congestion</td>
<td>6%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Intermittent Corridor Traffic</td>
<td>4%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>State Highway Asset Management</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

http://www.dot.state.mn.us/measures/
Performance

IDOT is committed to being accountable to the public for our work, and being transparent and open to scrutiny in the ways we go about doing that work. At IDOT, we represent and try to meet the best interests of all Illinois citizens, while providing efficient and effective travel options for businesses, industry, tourists, and individual travelers of every description.

Through the work we do, we strive to serve as an advocate and trusted adviser to state, local, and federal governments and other community agencies and partners involved in providing transportation access and services for all of Illinois. We invite you to visit the Reports section as well as the Awards and Recognition section below to see the work IDOT is doing and some direct results of that work.

Reports

The 2013 Illinois Motorist Survey Survey Results

http://www.idot.illinois.gov/about-idot/our-story/performance/index
PERFORMANCE MEASURES

**Safety**
- Annual number of fatalities:
  - 2014: 384
  - Target: Cut in half by 2020

**Bridges**
- Percent of bridges in good condition:
  - 2014: 87.2%
  - Target: 85%

**Pavement**
- Percent of pavement in good condition:
  - 2015: 90.3%
  - Target: 80%

**Program Delivery**
- Percent of highway construction projects completed early or on-time 2015:
  - 95.3%

**Operations**
- The MQA program measures the level of service of KDOT's maintenance efforts:
  - 2014:
  - 89%

**Modes**
- Number of counties with public transit 2015:
  - 83
  - Percent of short-line tracks that can accommodate 286,000 lb cars 2015:
  - 65%

https://kdotapp.ksdot.org/perfmeasures/
The purpose of this report is to provide data on the condition and performance of Michigan's publicly-owned* transportation system.

*All performance measures in this report refer to assets owned, maintained, or financed (in whole or in part) by the Michigan Department of Transportation.
Getting to Mobility

![Graph showing travel time in minutes with measures and calculations](image)

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>CALCULATION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Time Index* (PTI)</td>
<td>$\frac{95th \text{ Percentile of } TT}{Free \text{ Flow } TT}$</td>
<td>The extra time required to arrive at a destination “on time” 95 percent of the time. Can be calculated for trips, corridors, or segments. <strong>The PTI is the recommended measure because it gives intuitive and consistent results.</strong></td>
</tr>
</tbody>
</table>
Excel Limit Compared to One Month of Travel Times

- Excel Limit: 1,048,576
- California August 2013: 56,035,234
- Archive August 2012: 170,877,475
Freight Mobility Performance
I-70: Mobility Threshold (45 MPH)

Proportion of Miles < 45 MPH

Source: NPMRDS, weekday non-holiday peak periods, ten-state Mid-America region
I-70 Mobility Measures
Kansas - Missouri - Illinois - Indiana - Ohio

Source: NPMRDS 7/1/13-6/30/14 (~1200 miles)
I-70 Eastbound

(Work Zones through mid October)
Mobility Scanner
Major Incident Example

Incident starts morning of Jan 9, 2015

Count below -6 for two days and below -3 for three days

Speed below -9 for two days
I-275 Carroll Cropper Bridge Across Ohio River
33 thousand AADT, 6-month work zone lane reduction
I-275 Carroll Cropper Bridge Across Ohio River

The Mid-America “scanner” reports the major anomaly from probe data through a process control chart algorithm.

- Median speed stays below -10 for many sequential days.
- Lane closures start May 4, 2015.
- No change in epoch count.
- Lesser - but also persistent - effect on 20th %ile speed.
I-275 Northbound

Heatmap: 80th %ile Daily Speed

Source: NPMRDS Freight Travel Times

Ohio River

I-74 Interchange (East)

I-74 Interchange (West)

Feb 16 and 21 Winter Weather

Lane Closure Begins

Travel Direction ~27 miles shown
The NPRM Measures

- New annual, travel time based, performance measures
- Metric vs Measure vs Target

<table>
<thead>
<tr>
<th>Metric</th>
<th>Measure</th>
<th>Interstate</th>
<th>Other NHS*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time Reliability</td>
<td>% of Mileage Reliable (80th %ile)</td>
<td>Statewide</td>
<td>Statewide</td>
</tr>
<tr>
<td>Peak Hour Travel Time Ratio</td>
<td>% of Mileage Meeting Expectations</td>
<td>Metro**</td>
<td>Metro**</td>
</tr>
<tr>
<td>Truck Travel Time Reliability</td>
<td>% of Mileage Reliable (95th %ile)</td>
<td>Statewide</td>
<td>n/a</td>
</tr>
<tr>
<td>Average Truck Speed</td>
<td>% of Mileage Uncongested (50 mph)</td>
<td>Statewide</td>
<td>n/a</td>
</tr>
<tr>
<td>Total Excessive Delay</td>
<td>Hours of Delay per Capita</td>
<td>All NHS in Metros** in Nonattainment or Maintenance, e.g., St. Louis</td>
<td></td>
</tr>
</tbody>
</table>

* Other NHS reporting to be phased in
** Only applies to Urbanized Areas with population greater than one million, e.g., Kansas City, St. Louis
The NPRM Measures

- Three measures can be calculated right away
  - Subpart E – Reliability (LOTTR)
  - Subpart F – Truck Reliability
  - Subpart F – Truck Speed
- Others require consensus or additional data
  - Subpart E – PHTTR
    - desired baseline, metro boundaries
  - Subpart G – Total Excessive Delay
    - volumes, functional classes
Ten Metro Areas in our Megaregion

Maybe not all are in nonattainment or maintenance for the O3, CO, or PM (PM10 and PM2.5) NAAQS
NPRM – Handling Missing Data

In-fill with TT@PSL has Better Alternatives

- Example with a very low observation count (corrected ratios all very similar)
Great Lakes Regional Transportation Operations Coalition

NPRM Subpart Calculations
Subpart E – Reliability

Percent of the Interstate Mileage with Reliable Travel Times

Per NPRM, 80th to 50th ratio, 1.5 threshold, rank method

<table>
<thead>
<tr>
<th>Year</th>
<th>Illinois</th>
<th>Indiana</th>
<th>Iowa</th>
<th>Kansas</th>
<th>Kentucky</th>
<th>Michigan</th>
<th>Minnesota</th>
<th>Missouri</th>
<th>Ohio</th>
<th>Wisconsin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>94.0</td>
<td>94.9</td>
<td>93.2</td>
<td>99.3</td>
<td>99.1</td>
<td>99.1</td>
<td>98.7</td>
<td>95.9</td>
<td>97.7</td>
<td>96.8</td>
</tr>
<tr>
<td>2015</td>
<td>94.0</td>
<td>94.9</td>
<td>93.2</td>
<td>99.3</td>
<td>99.1</td>
<td>99.1</td>
<td>98.7</td>
<td>95.9</td>
<td>97.7</td>
<td>96.8</td>
</tr>
</tbody>
</table>

Note: The chart shows the percentage of the Interstate Mileage with reliable travel times for each state from 2014 to 2015.
MAP-21 Measures Probably too High

Report at 1.2 and 1.5?
Examining Multistate Mobility in the Mid-America Region

www.glrtoc.org/operations/performance

Peter Rafferty

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