

RESEARCH SPOTLIGHT

Project Information

REPORT NAME: Assessing System Performance of the Michigan Trunkline: Measures and Analytical Procedures for Planning and Operations

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Measuring Michigan's highway network performance is critical for planning

Measuring, tracking and forecasting the operational performance of the state's highway system all help the Michigan Department of Transportation (MDOT) make strategic and cost-effective transportation decisions. New performance measures, developed from emerging and evolving data sources, focus on reducing delays and improving the reliability of travel times. These measures will help planners prioritize the agency's improvement projects to better meet the current and future needs of the traveling public.

PROBLEM

To manage Michigan's network of roads and highways, MDOT's planners forecast travel demand, identify trends, and prioritize improvement projects. Ensuring the state's transportation needs will continue to be met into the future requires an understanding of how well the system is operating.

Previously, MDOT relied on an annual volume-to-capacity ratio and level-of-service report, both of which measured traffic volumes relative to the designed capacity of a roadway segment. But these metrics are no longer being reported, and emerging crowdsourced data and other high-tech tools offer opportunities to gauge traffic and roadway conditions like never before. To ensure MDOT's planners have meaningful options for defining and measuring success, this project sought to identify performance measures that will support the efficient investment of resources and enhance MDOT's ability to communicate the state of the road system to the public.



To improve the efficiency and cost-effectiveness of its transportation investments, MDOT needs performance measures that are sensitive to planning and operational functions.

RESEARCH

A comprehensive review of state and federal transportation system performance management resources was followed by a nationwide survey of state DOTs and metropolitan planning organizations. Researchers asked about common performance measures and how they are used, data sources, analysis methods, and reporting strategies.

A review of MDOT's current and historical performance management practices

(continued)

“By reviewing MDOT’s needs and performance measurement practices from across the country, we now have system-level planning tools to understand congestion and travel time reliability on our roads and highways.

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provided a backdrop for interviews with agency staff and others within Michigan. With input from MDOT, researchers spoke with staff from regional offices and transportation service centers, as well as a few larger metropolitan planning organizations across the state about their experiences measuring performance. These discussions led to the identification of possible road and highway system performance measures for MDOT.

Researchers ranked potential measures by importance and relevance to three categories of uses: operational evaluation, project prioritization and short- and long-range transportation planning. A follow-up survey distributed to transportation agencies across the country provided information to determine parameters of the chosen performance measures, including definitions, thresholds, calculation methods, and targets.

RESULTS

Performance measures traditionally used by the MDOT Planning Division, such as volume-to-capacity ratio and level of service, are quickly becoming outdated and no longer meet the requirements of current planning-level analysis. MDOT and other transportation agencies around the country indicated that more informative aspects of congestion and travel time reliability tend to

be more applicable to current needs. Also, data sources have changed over time to support such measures.

The national review and survey identified the most used mobility and travel time reliability measures. Reviewing MDOT’s performance management practices and in-state interviews led researchers to recommend these new system-wide performance measures:

Total Delay: A representation of traffic density and its consequences for travelers, total delay measures the extra time spent driving in congested conditions as compared to free-flow travel conditions on a roadway segment.

Travel Time Index: Defined as the ratio of average peak-period travel time to free-flow travel time on a roadway segment, travel time index compares the actual time it takes to travel between two points against the ideal time.

Planning Time Index: Based on a distribution of the most common travel times, planning time index determines the extent of unexpected delay.

Researchers also modified historical measures of volume-to-capacity and level-of-service to better assess system performance and provide consistency with past data and reporting.

Finally, researchers recommended thresholds and targets to gauge success within each of the three performance measures, as well as reporting methods to improve MDOT’s transparency and communications with other agencies and members of the public. As existing information sources have become more sophisticated and can facilitate the calculation and reporting of performance measures, MDOT could supplement future printed reports with an online performance dashboard that serves a variety of user needs and potential applications.

IMPLEMENTATION

Updated performance measures will help MDOT planners assess system performance, identify needed improvements and ensure

the state’s highway operations align with the agency’s short- and long-term goals, including the Michigan Mobility 2045 Plan that outlines the state’s transportation objectives for the next 20 years. The revised indicators will also help MDOT more accurately predict and estimate the impacts of its investments, resulting in a more efficient allocation of resources.

Moreover, the data and visualization products potentially developed from this project, if properly adapted, could meet the needs of other units and programs across the agency.

Research Administration

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