Evaluating the Accessibility of Destinations in the Twin Cities Metropolitan Area

What Was the Need?
In evaluating the performance of transportation systems, agencies have traditionally focused on the concept of mobility: how quickly travelers can move between any two points in the system via automobile or transit. One key mobility performance measure is delay, or the amount of time vehicles spend moving at below-average speeds because of traffic congestion.

Focusing on mobility, though, does not tell the entire story about how well a transportation system is functioning. Depending on land use, travelers may have the ability to reach desired destinations, such as place of employment, in a reasonable amount of time in spite of congestion and slower travel. For example, slower speeds in a dense urban area like downtown Minneapolis are mitigated by the high density of destinations that serve commercial, residential and other purposes. Thus travelers enjoy a high level of accessibility, a measure that includes land use as well as the transportation system. Research was needed to add accessibility to MnDOT’s current list of transportation performance measures.

What Was Our Goal?
The objective of this implementation effort was to identify data sources, measures and methods for evaluating accessibility; build a set of tools that MnDOT can use to easily evaluate accessibility on a regular basis; and apply these tools to evaluating accessibility for the Twin Cities area in 2010.

What Did We Implement?
This project built on the Access to Destinations research effort that University of Minnesota researchers have been working on in association with MnDOT since 2006. Previous studies in this series (totaling more than $1 million, with $857,845 in MnDOT support) have used computer models to create estimates of how accessibility has changed over recent years in the Twin Cities metropolitan region and to forecast future accessibility. Researchers still needed to develop a procedure to track accessibility on actual transportation data.

How Did We Do It?
Researchers began by detailing the total population, number of jobs and number of workers in the Twin Cities metropolitan region using 2010 census data; labor and employment data from the U.S. Census Bureau’s Longitudinal Employer-Household Dynamics program; and publicly available data sources on commercial locations. Then they evaluated average Twin Cities area roadway speeds during the AM peak period in 2010 using data on automobile travel time and roadway speeds from loop detectors and GPS devices. They similarly evaluated transit travel times using Metro Transit schedule data.

Researchers used this data to calculate accessibility for 2010 in terms of the number of job-related destinations reachable by automobile within various time thresholds for each
“The concept of accessibility allows us to broaden our assessment of transportation performance to look at how well our system fits into the context of land use, connecting people in the metropolitan area to where they really want to go.”

—Jason Junge,
Senior Engineer,
MnDOT Office of Capital Programs and Performance Measures

“Evaluating transportation network efficiency in terms of mobility alone can be misleading, focusing on the costs of travel while ignoring the benefits.”

—David Levinson,
Associate Professor,
University of Minnesota Department of Civil Engineering

Researchers evaluated the number of jobs accessible for various time thresholds by automobile and transit. Accessibility is higher in central locations and far higher by automobile than by transit.

What Did We Learn?
The study generated some options for accessibility performance measures and provided information about the costs and benefits of reporting them. Research results reaffirmed the importance of centrality to accessibility, with workers of outlying counties separated from many job opportunities by rivers that limit automobile accessibility.

Destinations were universally more accessible by automobile than by transit. During the AM peak period, transit did not provide access for any time threshold to more than 40 percent of the number of jobs to which driving provided access, and in most cases was much lower. For a 30-minute threshold, most areas had a transit-to-automobile access ratio of less than 5 percent; only six areas had an access ratio higher than 20 percent. This advantage for automobiles increased rapidly as the travel time threshold increased.

While these results reinforce the same general patterns found in previous evaluations of Twin Cities accessibility, the increased reliance on observed rather than modeled data in this study makes a direct comparison to results from previous studies problematic. Most notably, average arterial roadway speeds as measured for the current study were generally much higher than as modeled in previous studies.

What’s Next?
The Statewide Multimodal Transportation Plan includes Transportation in Context as an objective. MnDOT will use the results of this implementation project to inform the tracking and reporting of accessibility as a performance measure in this area. MnDOT will continue to evaluate possible sources of travel speed data, including data from GPS vendors.