2009-24TS
Published February 2010

RESEARCH
SERVICES SECTION

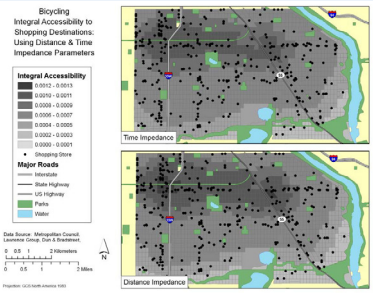
TECHNICAL SUMMARY

Technical Liaison:
Lisa Austin, Mn/DOT
lisa.austin@state.mn.us

Administrative Liaison:
Linda Taylor, Mn/DOT
linda.taylor@state.mn.us

Principal Investigators:
Kevin Krizek, University of Colorado
Robert Johns, University of Minnesota

PROJECT COST:
$143,000



The project generated measurements showing accessibility to destinations by bicycle (above), walking and transit services.

Access to Destinations: Application of Accessibility Measures for Non-Auto Travel Modes

What Was the Need?

Accessibility, defined as the ease of reaching desirable destinations, is one of the measures that define transportation system performance. A greater understanding of how accessibility is changing would help Mn/DOT determine how well transportation and land use systems are working. Although transportation planners have been addressing accessibility since the 1950s, most planning efforts have focused on improving automobile mobility, and transportation research has tended to look at access to employment.

Broadening the scope of accessibility to include a variety of destination types and non-motorized modes of transportation—for example, walking and bicycling—has been much discussed but many feel inadequately addressed by planning initiatives and transportation research. One of the primary challenges in conducting research in this area has been the lack of reliable data and knowledge of non-motorized travel behavior that could be used to develop accessibility measures. Mn/DOT was interested in developing a methodology that could provide detailed accessibility measures for transit, walking and cycling that cover the entire seven-county Twin Cities metropolitan area.

What Was Our Goal?

The objective of this research—the final in a set of four Mn/DOT projects to address non-auto accessibility measures—was to develop accessibility performance measures for the Twin Cities metro area for three time periods (1995, 2000 and 2005) for transit, walking and cycling to see how accessibility has changed over that time. Researchers aimed to analyze travel data for these modes across a variety of corridor routes and correlated with local and regional patterns of land use. This information could then be used in planning transportation systems and optimizing land use policies.

What Did We Do?

Researchers used a measure of accessibility that forecasts the spatial distribution of trips; this is the same type of measure used in forecasting models for motorized vehicle travel. The model calculates accessibility at Zone A by measuring the activity opportunities in Zone B and applying a function to this that represents the travel time (time and distance were found equally effective as variables here), money and other costs involved in traveling from Zone A to Zone B.

Researchers used a variety of data sets to calculate accessibility measures for three modes (walking, cycling and transit) and several destination types (employment, retail, restaurant, school and recreation). A travel-related subset of metropolitan travel surveys provided travel behavior data. Public land use data and commercially available business inventory data were used to create the high-resolution land use data for the model.

To represent the finer-scale networks used for walking and cycling, researchers used data purchased from a commercial vendor that classifies businesses and used specialized software to match it with a parcel-level map of the region. The end result was a parcel-level geographic information systems layer that represents typical land uses at neighborhood and regional scales.

Time and distance, the final components of the model, were estimated using detailed data on trip distribution from a variety of sources, including transit on-board surveys and specialized trail use surveys.

continued

"Detailed and robust accessibility measures geared to non-motorized modes provide an additional option to form and evaluate land use transportation planning efforts."

–Kevin Krizek,
Associate Professor,
University of Colorado
Department of Design
and Civil Engineering

"This study is the development of a scientific methodology to measure access for non-auto modes. Instead of measuring the number of vehicles a corridor can carry, we can start measuring the people-carrying capacity of a corridor."

–Lisa Austin,
Mn/DOT Bicycle and
Pedestrian Planner

Produced by CTC & Associates for:
Minnesota Department
of Transportation
Research Services Section
MS 330, First Floor
395 John Ireland Blvd.
St. Paul, MN 55155-1899
(651) 366-3780
www.research.dot.state.mn.us

This representation of an eight-block area of south Minneapolis is a sample of the parcel-level land use data researchers generated for use in the study's travel forecasting model.

What Did We Learn?

To illustrate the procedures used to produce estimates of non-motorized accessibility, researchers calculated accessibility measures for a study area in south Minneapolis that contains approximately 1,600 block groups, with one block group equal to an eight-block area. Results of this test provided proof of concept: The extensive data set and procedures developed in the study resulted in detailed measures of accessibility for transit, bicycling and walking in this area.

Unlike previous research, this project introduced more behavioral realism into accessibility calculations by considering the time/cost factors going into travel choices and by employing highly detailed land use data. Researchers also improved on previous studies by applying calculations to relatively small units of analysis and constructing pedestrian and cycling networks that captured a fuller range of route choices than most travel mode networks include.

What's Next?

The study's accessibility measures can be used to inform the design of accessibility-related policies, identify where improvements in pedestrian infrastructure are warranted and assist in formulating land use transportation planning goals. Discussion will be required among Minnesota practitioners about how the findings of this study would best be put into practical use by planners at Mn/DOT and the Metropolitan Council.

This study is part of an ongoing effort to understand accessibility. More information about the methodologies, data and analysis procedures applied in this study can be found in three previous Mn/DOT research reports in the *Access to Destinations* series:

- "Refining Methods for Calculating Non-Auto Travel Times" (2007-24)
- "How Close is Close Enough? Estimating Accurate Distance Decay Functions for Multiple Modes and Different Purposes" (2008-11)
- "Parcel Level Land Use Data Acquisition and Analysis for Measuring Non-Auto Accessibility" (2008-19)

This Technical Summary pertains to Report 2009-24, "Access to Destinations: Application of Accessibility Measures for Non-Auto Travel Modes," published July 2009. The full report can be accessed at http://www.lrrb.org/PDF/200924.pdf.