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RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS, RESEARCH & INNOVATION

TECHNICAL SUMMARY

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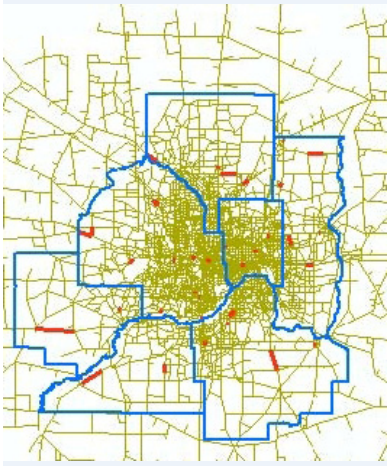
PROJECT COST:
$150,000



In 2005 there were 72 ATRs on arterial links throughout the Twin Cities region (identified in red).

Access to Destinations: Arterial Data Acquisition and Networkwide Travel Time Estimation (Phase II)

Researchers used updated traffic volume and signal timing data to calculate travel time estimates for arterial links in the Twin Cities region. These estimates can be used to develop accessibility measurements and evaluate changes in the transportation network over time.

What Was the Need?

The Access to Destinations series of projects was initiated to produce accessibility measurements for the Twin Cities metropolitan area. This information can aid in all aspects of urban transportation planning, from road construction decisions to deployment of transit resources and traffic control measures. The specific need addressed by this report (the 10th in the series) is the production of arterial link travel time data.

Extensive use of inductive loop sensors on area freeways makes it possible to obtain travel time estimates for those freeways, but monitoring capabilities on arterial roads are much less developed. Usable travel time estimates on these arterial roads constitute a necessary component for creating accessibility measurements for the region.

The previous phase of this project (described in Mn/DOT Report 2007-35) identified a methodology for producing these estimates that uses the demand traffic flow (a measure of expected traffic used in designing the road and its signals) on an arterial segment and the timing of a signal at the segment's end.

What Was Our Goal?

The objective of the current study was to use the findings of Phase I to produce historic estimates of travel times on Twin Cities arterials for 1995 and 2005, and to develop an initial architecture and database that could, in the future, produce timely estimates of arterial traffic volumes and travel times.

What Did We Do?

The Phase II effort was divided into three main tasks. The first task involved an examination and update of traffic volume estimates from a Twin Cities planning model; the investigation focused on the years 1995 and 2005. Automatic traffic recorder data were extracted from files provided by Mn/DOT for each of these years (1996 ATR data was used because 1995 data was unavailable) and used to update the predicted demand flows from a transportation planning model. Researchers then applied an algorithm obtained from the U.S. Bureau of Public Roads to the updated traffic volume estimates to produce default travel time estimates on arterial roads for a.m. and p.m. peak travel times.

For the second task, researchers collected available signal location and timing data from each jurisdiction in the Twin Cities, creating a geographic database of signalized intersections.

Finally, researchers combined the results of the first two tasks. The new traffic volume estimates and signal timing data were used to produce updated link-by-link, peak-period travel time estimates for Twin Cities arterials for 1995 and 2005.

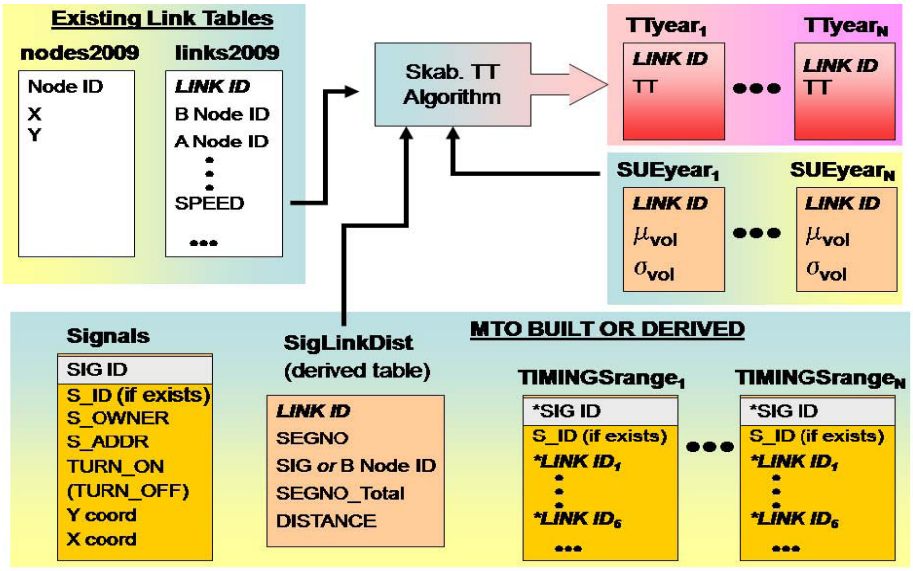
continued

"This type of travel time formulation could help inform a travel demand model that more accurately predicts future travel times, which would be useful information to transportation planners."

–Gene Hicks,
Mn/DOT Principal Engineer

"In this project we put together a geographic database of the arterials in the Twin Cities, with the long run goal of constructing a system for using available data to monitor traffic conditions."

–Gary Davis,
Professor, University of Minnesota Department of Civil Engineering



A travel time algorithm was implemented using the above schema to ultimately determine the travel time calculation using available signal information.

What Did We Learn?

Researchers faced several challenges as they attempted to apply the methodology identified in Phase I of the research. First, updating the traffic volume estimates from the transportation planning model did not produce significantly improved estimates because of the lack of historical ATR data. In 1996, there were 146 working ATRs and in 2005, there were only 72. In a network with thousands of arterial links, the number of ATRs was not sufficient to improve the initial modeled estimates.

In addition, researchers had difficulty collecting and correlating signal location and timing data for the designated years. Historical timing data was often simply unavailable, and the older Twin Cities planning models contained more generalized representations of the road system, complicating the task of establishing correspondence between the 1995 and 2005 networks.

Researchers were able to produce travel time estimates for arterial links to and from each traffic analysis zone and downtown Minneapolis for peak a.m. and p.m. periods in 1995 and 2005. The estimates were usable for the broader Access to Destinations accessibility research program.

Researchers also produced a geographic database of signal locations for the region and began the process of building a signal timing database that when complete, will aid in the monitoring of traffic conditions on arterial links within the network.

What's Next?

The data produced by this research was used in Phase III to produce automobile accessibility measurements for the Twin Cities region. The project report recommends that further work in this area should be focused on producing estimates of future traffic volume and travel times that would be useful in the design and planning of the transportation network.

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This Technical Summary pertains to Report 2010-12, "Access to Destinations: Arterial Data Acquisition and Network-Wide Travel Time Estimation (Phase II)," published March 2010. The full report can be accessed at http://www.lrrb.org/PDF/201012.pdf. *The Phase I and III reports referred to can be accessed at* http://www.lrrb.org/PDF/200735.pdf *and* http://www.lrrb.org/PDF/201009.pdf, *respectively.*