



RESEARCH SERVICES SECTION

TECHNICAL SUMMARY

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PROJECT COST:

\$50,100



A key factor in the study's proposed transit solution is the level of service desired for Twin Cities roadways, such as Highway 36 (shown above).

Balancing Transit and Roadway Investment to Meet Twin Cities Travel Demand

What Was the Need?

A number of polls conducted over the past several years suggest that traffic congestion has become a top concern for residents of the Minneapolis-St. Paul metropolitan area. Mn/DOT sponsored a comprehensive research study (documented in the 2002 report "[Building Our Way Out of Congestion](#)," 2002-01) that examined the feasibility of a "roads-only" solution—the addition of lane miles to existing freeways and expressways—to handle the upsurge in travel demand. The study found that more than 1,000 lane miles (or 70 percent of the existing highway system) would need to be built to meet demand in 2020.

Given the expense and other difficulties of such a great expansion, Mn/DOT needed to better understand the degree to which investments in transit that reduce the demand for new roads would mitigate the need for increasing freeway capacity. What mix of these two types of investments could most efficiently address current and anticipated congestion?

What Was Our Goal?

Researchers' objectives were to:

- Modify the methods and software used in the 2002 study to enable modeling of the range of effects that transit can have on travel demand.
- Use these tools to estimate the quantity and mix of transit and roadway investment needed to accommodate the travel demand forecasted for Minneapolis-St. Paul in the year 2030.
- Design the software to be usable by Mn/DOT planners on a typical personal computer, allowing them to conduct further analyses and evaluate scenarios of interest not covered in the final report.
- Identify construction cost models that Mn/DOT planners could use to estimate the price of adding enough lane miles to satisfy future travel demand in uncongested driving conditions.

What Did We Do?

Researchers modified the custom program used for the 2002 study to incorporate transit investments as represented by reduced travel demand; i.e., fewer trips made by single occupancy vehicles. Using Twin Cities network and demand forecasts for 2030 as data input, they developed repeatable procedures for determining the range of effects that transit and other measures could have on travel demand and capacity needs, and documented their analysis of several scenarios depicting different levels of interaction between the added transit options and the remaining auto traffic:

- Minimal interaction, such as via a grade-separated transit system (for example, a train), ride sharing or a decrease in required trips because of telecommuting.
- Maximum interaction, with all transit trips made by standard bus traveling nonstop between origin and destination on the road network.
- Realistic interaction, with transit trips aggregated to a district level, then made by standard bus traveling nonstop.

“This research provides a timely look at options that may be more cost-effective than building roadways.”

–Mark Filipi,
Manager, MTS
Technical Planning
Support, Twin Cities
Metropolitan Council

“We learned that to some extent, transit could substitute for new capacity if we could get adequate ridership.”

–Gary Davis,
Professor, University of
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of Civil Engineering

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Researchers found that greater use of light rail and other transit could reduce future capacity needs.

In addition, researchers conducted a literature review to locate adaptable freeway construction cost models for Mn/DOT planners.

What Did We Learn?

Researchers determined that the amount of freeway capacity expansion needed in the Twin Cities will be largely defined by the level of service (defined by transportation planners with an A through F rating, with A being the best and F the worst) that Mn/DOT would like the system to achieve. For example:

- With no demand reduction from transit or other measures, providing LOS C would require 66 percent (1,041) more lane miles than LOS D under the three scenarios documented.
- If the Twin Cities could reduce automobile use by 20 percent (equivalent to one day per week of alternate travel), LOS D could be achieved on all freeways with 36 percent less expansion than would otherwise be required. While this may seem an unrealistic increase over current transit usage in the Twin Cities area, it is low for many cities around the world, and higher gas prices have led more people to consider alternate modes of travel.
- Researchers estimated that capacity expansion for LOS D could be decreased by 7 percent (113 lane miles) if an express bus system were developed in which buses follow the same routes as cars, traveling the shortest possible path between origin and destination.

Researchers' literature review of freeway construction cost models did not yield any formulations suitable for this project.

What's Next?

Investigators suggest that a follow-up study could be performed to maximize the accuracy of this research by incorporating a detailed model of the existing Twin Cities transit system into their methodology; Metro Transit currently serves Minneapolis-St. Paul with an integrated network of buses and trains.

Though the program produced via this study does not integrate directly with existing transportation planning software, its design allows data from Mn/DOT's standard model to be postprocessed for input, and the program can be used by planners using standard computers.

This Technical Summary pertains to Report 2006-44, "Capacity Expansion in the Twin Cities: The Roads-Transit Balance," published December 2006. The full report can be accessed at <http://www.lrrb.org/PDF/200644.pdf>. The 2002 study referred to above was documented in Report 2002-01, "Building Our Way Out of Congestion," published October 2001. This report can be accessed at <http://www.lrrb.org/PDF/200201.pdf>.