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RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS, RESEARCH & INNOVATION

TECHNICAL SUMMARY

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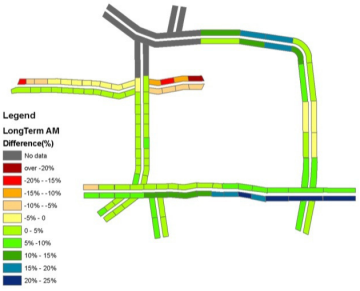
PROJECT COST:
$109,890



This project tracked the percentage volume difference in traffic on alternative routes when TH-36 was closed. The impact was mild but far-reaching.

TH-36 Full Closure Construction: Evaluation of Traffic Operations Alternatives

Researchers evaluated the impact of the first large-scale full closure construction project in Minnesota. They found full closure to be a viable, cost-saving construction alternative under these circumstances and gained valuable knowledge about the tools used to evaluate future project alternatives.

What Was the Need?

Upgrading existing road systems involves construction on roadways that normally serve considerable demand. Planners are consequently interested in mitigating road user costs associated with this construction, which include time lost due to slowed traffic or finding alternate routes. Typically, some lanes of a highway are kept open during construction, allowing traffic to go through though at slower speeds than normal. This approach introduces safety concerns for construction workers and for the traveling public. An FHWA study in 2003 showed that full closure construction, beyond addressing this safety issue, can dramatically reduce construction duration and ultimate RUCs. The potential downside to full closure is a temporary increase in daily RUCs as compared to partial closure since travelers are forced to find alternate routes.

When Trunk Highway 36 required reconstruction in spring 2007, Mn/DOT decided to employ full closure in the hope of reducing construction staging and costs. This opportunity allowed Mn/DOT to evaluate the actual impact of full closure in real time and collect data to compare RUCs for partial and full closure construction.

What Was Our Goal?

The goals of this project included:

- Comparing the impacts of full and partial closure construction
- Evaluating the impact of full closure using real data before and after construction
- Evaluating available tools and methodologies for selection and planning of full closure projects
- Gathering lessons and experience from stakeholders
- Drafting a lessons-learned guide to help future planners evaluate construction alternatives

What Did We Do?

Researchers collected and analyzed data regarding the impact of the TH-36 full closure on traffic conditions of highways and local roads using Mn/DOT's freeway traffic detection system and through collection equipment set up on major urban streets in the area.

The original goal was to then utilize a microscopic simulator to evaluate the differences between the full closure as it happened and the hypothetical impact of the project under partial closure. Early in the project, researchers realized that the cost in money and time of microscopic simulation far outweighed the potential benefits, so the objective for this portion of the research changed to investigating the pros and cons of available methodologies for evaluating full closure construction costs.

continued

"The research and lessons learned from this project created awareness of and a reference for institutional knowledge that planners will be able to draw on in the future."

–Christopher Roy,
Former Mn/DOT North Metro Area Manager

"As it turned out, full closure was by far the best choice not only in terms of the actual outcome of the project, but also in regard to the small, additional RUCs as compared to the overall savings in labor and time."

–John Hourdos,
Associate Program Director, Minnesota Traffic Observatory, University of Minnesota Department of Civil Engineering

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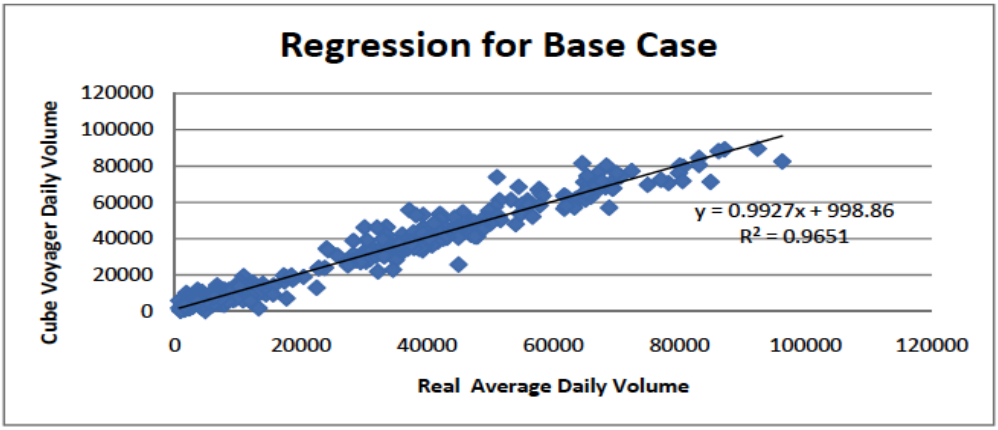

Real data collected during the project was compared with the data projected using different tools. The linear regression above compares real average daily volumes with daily volumes predicted using Cube Voyager, showing very close correlation.

Researchers tested three tools to calculate RUCs. In ascending order of cost, features and complexity, these were QuickZone, Cube Voyager and AIMSUN. Researchers calculated RUCs using each methodology and compared these estimates with the actual costs associated with the full closure of TH-36.

After construction was completed, researchers interviewed key stakeholders to record their viewpoints regarding the planning and execution of the project, public relations and reaction, and overall lessons learned.

What Did We Learn?

Researchers discovered that for this reconstruction, the cost savings and available capacity on roadways serving as detours made full closure clearly the best choice. The construction cost savings far outweighed the increase in daily RUCs.

The tools used to model the impact of full and partial closure construction projects were found to vary greatly in their accuracy and the amount of time, effort and data needed to use them. QuickZone required approximately 1 to 2 weeks of total labor to generate RUC estimates, and Cube Voyager took 1.5 months, while the more accurate microsimulation model took upwards of 12 months. For a project the size of TH-36, microsimulation as an estimation tool was considered overkill and would not be cost-effective to use in the future.

Researchers also discovered that the full closure impacted driver behavior far beyond the immediate construction zone. For example, there was an increase in traffic on Interstate 94 from Wisconsin to St. Paul during the project.

Market research before the project began showed the public split 50/50 on whether to use full or partial closure. After the project, surveys showed a dramatic increase in support of full closure. Agreement to use full closure was "strong" or "somewhat" in 92 percent of residents, 84 percent of businesses and 89 percent of through-commuters.

What's Next?

The lessons learned from this project were distilled into a seminar entitled "TH-36 Full Road Closure: Lessons for the Future." A best practices guide for evaluating full and partial closure still needs to be developed; the Mn/DOT Office of Construction and Innovative Contracting is considering this future effort. This Mn/DOT-funded research effort was aided by simultaneous analyses of the full closure of TH-36 by the Federal Highway Administration and by C2HM HILL; their insights were also used in preparing the report for this project.

This Technical Summary pertains to Report 2010-04, "TH-36 Full Closure Construction: Evaluation of Traffic Operations Alternatives," published January 2010. The full report can be accessed at http://www.lrrb.org/PDF/201004.pdf. *For more information about the TH-36 Full Road Closure seminar, contact* Shawn Haag *at the University of Minnesota.*