



Tennessee Analyzes Work Zone Impacts to Find a SmartFIX for I-40

Summer 2007

Tennessee Department
of Transportation

FACT SHEET

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In July 2005, the Tennessee Department of Transportation (TDOT) undertook the largest and most complex project in the State's history. The project consists of upgrading a mostly elevated 2-mile section of Interstate 40 (I-40), which includes widening sections and reconstructing several interchanges in downtown Knoxville. TDOT realized this project would have a major impact on traffic and the surrounding communities for several reasons: it will be located in areas with high Average Daily Traffic (ADT), high crash history, and a high percentage of truck traffic; consists mainly of bridge work; involves right-of-way constraints; and occurs in close proximity to buildings.

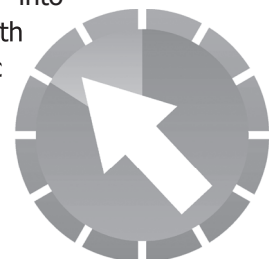
With such a high-visibility project, the TDOT team recognized the need for a systematic approach to quantifying the potential effects of construction alternatives and identifying the most appropriate strategies for completing the project with minimal impact.

Project Background

This section of roadway carries more than 103,000 vehicles daily, has experienced above average crash rates, and suffers from deteriorating mobility. The roadway was built in the 1960s and is in need of upgrading because of safety concerns, age, and increased demand on the roadway. The primary challenges in this project are to minimize construction time, right-of-way requirements, and adverse environmental and socioeconomic impacts to the community, which includes several historical districts adjacent to the highway. The initial design called for conventional construction methods, with anticipated work zone traffic impacts lasting more than 8 years. TDOT staff felt that these long term work zone impacts were unacceptable and decided to use innovative methods to reduce project length by at least 2 years.

Public Meetings and Community Workshops

TDOT has conducted dozens of public meetings and community workshops with the public, local elected officials, and local agencies about this project, some of which date back to the early 1980s. The key objectives for the public meetings and community workshops that TDOT hosted were developing partnerships, providing timely and easily understood information, integrating citizen concerns and needs into the planning and project development process, and working with traditionally underserved communities. As a result of the public meetings and the desire to meet the established objectives, TDOT opened a community center and project office to effectively communicate project information to the public. The community center and project office allow the public to view photographs, maps, timelines, and diagrams of the project as well as to ask questions of representatives from TDOT and the SmartFIX40 consultant. TDOT also developed an easily identified logo for the project.

smartFIX⁴⁰
BY TDOT

Accelerated Construction Technology Transfer Workshop

In April 2004, TDOT hosted an Accelerated Construction Technology Transfer (ACTT) workshop that brought together 82 transportation professionals from 19 States to discuss several approaches that could accomplish TDOT's primary goal of minimizing construction time for this project. The workshop concentrated on these main areas: structures; construction, materials, accelerated testing, and constructability; geotechnical challenges;

innovative contracting, worker health, and warranties; traffic, safety, and ITS; and environmental issues, public relations, and aesthetics. TDOT project personnel used ideas and results from the workshop to reduce overall project time. One of the ideas they took away from the experience was a full closure approach.

Full Closure Approach

In 2004, TDOT considered various strategies to complete this project, including a full closure with thru-traffic detoured to Interstate 640 Bypass (I-640). Some of the benefits expected from the full closure option compared to the traditional construction approach included:

- Reduced overall project duration.
- Potential project cost savings over the more traditional approaches.
- Improved worker safety.

Before deciding to implement the full closure approach, TDOT analyzed several issues. One issue TDOT had to address in the decision was where to divert traffic. I-640 was the most reasonable alternative, but would I-640 be able to handle the additional traffic?

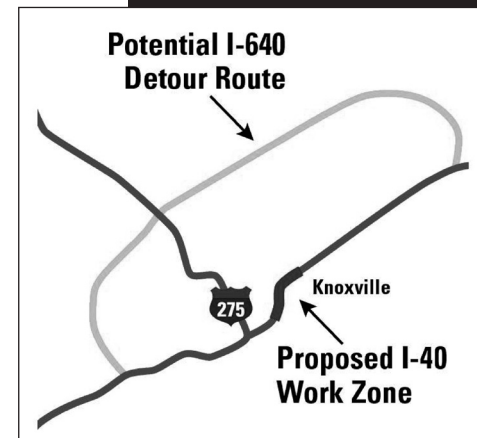
TDOT's Impacts Analysis

TDOT initiated a traffic study to estimate and analyze traffic volumes on I-640 to determine the impacts from a full closure. The results of field data collection were used to predict travel demand on I-640 during the construction period. In predicting the travel demand, the study took a tiered modeling approach that first used less detailed data and a less detailed network model to scope potential delays. Then, if necessary based on the initial modeling results, TDOT would use enhanced travel demand data with a more detailed network model.

In the first tier of the study, TDOT identified the prospect of significant congestion under the proposed full closure option by using QuickZone, a work zone delay estimation tool developed by the Federal Highway Administration. When TDOT identified that congestion was significant, the second tier of TDOT's study utilized more refined traffic demand data and input more detailed network geometry into the QuickZone model. The outputs from QuickZone identified the likely delay impacts and locations where congestion would occur, which will assist local and State agencies in managing traffic and preventing lengthy delays on I-640 and at the I-40/I-640 interchanges during construction. TDOT also used the study information to identify improvement projects on I-640 to upgrade the roadway to better handle detoured traffic on the alternate. In addition TDOT conducted some improvement projects on I-275 to help handle the traffic that would choose to detour via that route.

In July 2005, TDOT began construction on Phases 1 and 2 of this project and is currently progressing to a 14 month full closure for Phases 3 and 4, which will commence in 2008. The estimated completion date is in the summer of 2009.

Through the use of a systematic process to assess potential impacts from construction alternatives, TDOT successfully planned for the largest project in the history of the State. Enhanced planning and coordination, coupled with the use of innovative strategies, allowed TDOT to consider various alternatives and choose the most appropriate strategies to implement during construction.



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