UTC RESEARCH PROJECT DESCRIPTION

PROJECT NUMBER:
04308

PROJECT TITLE:
Bridge Vulnerability Assessment

PRINCIPAL INVESTIGATOR:
Alisha D. Youngblood, Ph.D.
Assistant Professor
Department of Industrial and Systems Engineering & Engineering Management
The University of Alabama in Huntsville
Tel: 256-824-6637
Fax: 256-824-6733
Email: ady@ise.uah.edu

PROJECT OBJECTIVE:
This research will analyze the economic effects resulting from the destruction or damage of individual bridges along the Tennessee River in Northwest Alabama where highway traffic would be detoured to a nearby bridge. The model will examine the effects of increased travel distance and time on the total costs incurred by commercial trucks. It is expected that the assessment methodology and cost modeling developed could be extended to other areas in Alabama. Submission of a proposal to a larger agency to apply these results to other areas of the country is anticipated.

PROJECT ABSTRACT:
This research will examine commercial highway traffic in Northwest Alabama across the Tennessee River and evaluate the effects should one of the primary bridges be eliminated due to an accident, a natural disaster, or act of terrorism or sabotage. A damaged or destroyed bridge along a major highway or roadway necessitates rerouting of traffic to other bridges which are often not designed or currently rated to accommodate the increased volume of traffic. Particularly in the trucking industry, this would result in greater costs that often can not be easily passed along directly to the customer. A simulation model will be developed to predict the effects on commercial trucks in terms of increased number of miles, increased travel time, and resulting increased costs. The data necessary for this will be obtained through previously-conducted research and truck transportation providers. The resulting economic analysis could be used to prioritize future spending of transportation funding, and to justify funding requests for improvements to area bridges. It could also be incorporated into cost models used by the transportation industry. The results can also be used for decision analysis with respect to identification of potential targets for terrorist activities.

TASK DESCRIPTIONS:
1) Background Analysis
2) Elicit Data for Local Commercial Traffic
3) Model Bridge Elimination
4) Model Economic Effects
5) Develop Recommendations and Prepare Final Report

MILESTONE DATES:
Project Startup: July 31, 2004
Complete Modeling: Oct 15, 2004
Complete Economic Analysis: Nov 15, 2004
End Project: December 31, 2004

BUDGET:
One year project; UTCA $16,826; total budget $33,429

STUDENT INVOLVEMENT:
An undergraduate research assistant will be hired on an hourly basis to assist with this research.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
This is a stand-alone project. However, it deals with the same general topics as UTCA projects 03114, “ITS Applications for Transportation Infrastructure,” and 03229 “Vulnerability Reduction for Bridge Structures.”

TECHNOLOGY TRANSFER ACTIVITIES:
This Project directly supports the goals of UTCA, and the results available to all interested parties. The knowledge gained will also be disseminated through peer-reviewed publications, conference proceedings, and other means. Also, the modeling techniques and results from this research will be incorporated into undergraduate and graduate courses.

POTENTIAL BENEFITS OF THE PROJECT:
By identifying the bridges along the Tennessee River in Northwest Alabama that have the greatest costs associated with them in the event of destruction and the factors that contribute to vulnerability, several benefits could result:
- The bridges whose elimination would cause the greatest economic impact could be re-examined in other research to determine feasible means for improved protection.
- Future plans for the construction of new bridges could incorporate plans to better handle rerouting of traffic.
- By identifying smaller, less-utilized bridges that may serve as an alternate route, it may be easier to justify funding requests to outside agencies for structural improvements.
- Information about the economic impacts on the trucking industry resulting from a bridge failure could be useful to agencies involved with Homeland Security.
- The methodology developed for the Northwest Alabama area could be used to assess vulnerabilities across the state of Alabama.

TRB KEYWORDS:
Traffic diversion, Detours, Trade routes, Intermodal systems, Infrastructure, Bridge Vulnerability, Simulation