RESEARCH PROJECT DESCRIPTION

PROJECT NUMBER:
04408

PROJECT TITLE:
U.S. Highway 280 Access Management Alternatives Analysis and Visualization

PRINCIPAL INVESTIGATORS:

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OBJECTIVE:
The purpose of this project is to develop computer simulation models for U.S. 280 in Jefferson and Shelby Counties and use them to evaluate proposed improvements to the corridor. The project entails off-the-shelf traffic simulation to develop visualizations of potential alternatives access management scenarios. In addition to simulation, an investigation will be conducted of using high performance computing to develop detailed three-dimensional visualization of transportation alternatives.

ABSTRACT:
The project is sponsored by the Regional Planning Commission of Greater Birmingham (RPCGB). It involves simulation of improvements, primarily urban interchanges, at 10 locations along U.S. 280. Certain sections of the corridor (e.g., the proposed urban interchange at AL Hwy. 119) will be coded using the AIMSUN simulation package to develop 3-D animations. The animations will become a technical resource for meetings and public hearings. An additional simulation will model the portion of U.S. 280 extending southeast from Hugh Daniel Drive to the Shelby County line. All major intersections and geometric features in this corridor will be coded and the network will be validated using existing traffic volumes, observed speeds, and current travel times. UAB will collect current travel speed and travel time data. Using a modified CORSIM model, a short segment of U.S. 280 from Cahaba River Road to Highway 119 will be simulated with and without access management improvements. 3-D animations of traffic flow in the study corridor (with and without access management control) will be developed in a prepackaged (movie) format. A tool will be developed to use available data files (terrain, CORSIM) and generate the movie on the background. The 3-D animation movie file will be suitable for presentations and public involvement meetings, running on a standard
Windows-based laptop computer. There will also be opportunities for RPCGB and other parties to view the 3-D animations using the high performance computing and visualization equipment in the UAB Department of Mechanical Engineering.

TASK DESCRIPTIONS:
1. Collect speed and travel time data for model validation.
2. Refine and validate existing CORSIM model.
3. Expand CORSIM model.
4. Validate expanded model.
5. Evaluate candidate scenarios, US 280 west of Hugh Daniel Drive.
7. Develop detailed 3-D visualization.
8. Present findings at meetings and public hearings, if needed.
9. Prepare a final report summarizing the findings of the study.

MILESTONES AND DATES
1. Sep – Dec 2003
2. Sep 2003 – Mar 2004
4. Jan – Apr 2004
5. Dec 2003 – Aug 2004
6. Apr – Sep 2004
7. Sep 2003 – Aug 2004
8. June – Aug 2004

YEARLY AND TOTAL BUDGET:
One-year project; RPCGB $92,933.

STUDENT INVOLVEMENT
Two graduate students from the Civil and Environmental Engineering Department at UAB and one from UAH will be involved in this study.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
This project utilizes simulation techniques to analyze access management treatments as identified in UTCA Project 02217.

TECHNOLOGY TRANSFER ACTIVITIES:
The project will involve extensive interaction with public officials, property owners, and interest groups. During these interactions, the benefits of access management and the utility of traffic simulation will be conveyed to important local decision makers. The investigators will also seek publication of project-derived results in appropriate peer-reviewed journals and conference proceedings.

POTENTIAL BENEFITS OF THE PROJECT:
There has been much discussion of improvement plans to address congestion in the U.S. 280 corridor but thus far there have been no comprehensive evaluations of the plans. Detailed
simulation modeling will provide the means to evaluate each proposal, compare its impacts to those of other proposals, and determine the optimum plan for implementation. It will also allow planners to evaluate combinations of proposed actions, such as utilizing different approaches on different segments of the highway. Once a plan is selected, the simulation results can then be used to determine optimum construction phasing and the impacts of traffic control plans. As an example, the construction of urban interchanges in the corridor (if deemed appropriate) should likely be phased over a period of several years. Selecting the locations for interchanges and the optimum sequence of construction would be essential to the success of the plan.

Just as important as the technical evaluation, the simulation outputs will be very useful for presenting the project findings in a format that is easily understood by public officials and the general public. It is anticipated that the animations will be particularly helpful in presenting the various alternatives to the public an ultimately building support for the selected alternatives. A more general benefit of the visualization will be the exposure of transportation professionals and decision makers in Alabama to the need for and impact of access management. The proposed effort will produce a 3-D animation of traffic flow for the study corridor on a topologically and geographically accurate domain. Such a visualization tool will assist the RPCGB in gaining support among various stakeholders toward implementation of access management strategies in Alabama. It will also demonstrate to RPCGB, ALDOT, and other interested parties the simulation and visualization capabilities at UAB that may be useful for other regional transportations initiatives (transit alternatives, emergency preparedness, etc.).

TRB KEY WORDS:
access management, traffic operations, planning, simulation, 3-D visualization