PROJECT NUMBER:
04203

PROJECT TITLE:
Applications of Freeway Ramp Metering in Alabama

PRINCIPAL INVESTIGATORS:
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PROJECT OBJECTIVE:
This project will examine the potential for using freeway ramp metering systems to enhance
traffic operations and safety in the State of Alabama. The objectives of the research are to
prepare a synthesis of ramp metering strategies and their potential applications within Alabama,
to identify candidate Alabama urban corridors, and to estimate the benefits and costs from ramp
metering. In addition, a test corridor in the Birmingham area will be simulated to determine the
impacts of various ramp metering strategies.

PROJECT ABSTRACT:
Freeway ramp metering systems have been successfully used in U.S. cities since the 1960s to
improve traffic flow on urban freeways, increase freeway speeds, reduce overall travel times, and
improve travel time consistency. These systems improve freeway flow by regulating the rate at
which vehicles are allowed to enter the freeway at the entrance ramps. By monitoring flow
conditions on the freeway in real-time, these systems can continually adjust the entrance ramp
flows to maintain optimum flow on the freeway. However, ramp metering options are not
without drawbacks. While they can reduce delays on the freeway, they typically increase delays
on the ramps and can adversely impact traffic flow on arterial operations. And, while they
typically reduce air pollution and emissions, they often increase system-wide fuel consumption
due to increased ramp delays. Also some public opposition has been observed in several areas
where ramp metering strategies were first introduced. The goal of this project is to assess the
applicability of various ramp metering strategies to congested freeway segments in Alabama.
The project involves a comprehensive review of ramp metering practices, a synthesis of best
practices based on experiences in other states, identification of Alabama interstate corridors that
may benefit from ramp metering, and evaluation of impacts of ramp metering on selected
Alabama corridors through a simulation study and a cost-benefit analysis.
PROJECT TASK DESCRIPTIONS:
Task 1: Literature Review
Task 2: Develop a State-of-the-Practice Synthesis
Task 3: Data Collection-Obtain traffic volume and geometric data for several congested interstate corridors in the Birmingham and Mobile.
Task 4: Estimate Benefits and Costs for Ramp Metering Strategies, using the IDAS software.
Task 5: Simulate a Case Study Corridor with the CORSIM or GETRAM micro-simulation tools.
Task 6: Technology Transfer
Task 7: Final Report

MILESTONES AND DATES:
Tasks 1-2: Jan. 1 – Apr 30, 2004
Task 3: Apr 1 – Jun 30
Task 4: Jul 1 - 31
Task 5: Aug 1- Sep 30
Tasks 6-7: Oct a – Dec 31, 2004

TOTAL BUDGET:
One-year project: UTCA $50,000; total budget $100,000.

STUDENT INVOLVEMENT:
The project will fund one full time graduate Civil Engineering student for twelve months.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
This project can build on some of the work currently being carried out under UTCA projects 03226, “Regional Traffic Simulation for Emergencies” and 02217, “Traffic Simulation Software Comparison”. As part of the study of “Regional Traffic Simulation for Emergencies” Dr. Sisiopiku is guiding the development of a CORSIM model of the Birmingham interstate network. This model can be used to evaluate the impacts of ramp metering strategies on the larger interstate network so that downstream impacts will be taken into account. The results of the “Traffic Simulation Software Comparison” study will be used to determine the most appropriate micro-simulation software to use for this study.

TECHNOLOGY TRANSFER ACTIVITIES:
A final report will be developed and presented to UTCA, and ALDOT Third Division staff and made available to all other interested parties. The findings of the study will be presented at local and national conferences such as ITE, ALSITE, and APA. The PIs will also explore the opportunity to publish the results of the research paper. This is expected to serve the UTCA technology transfer goals and increase the visibility of UTCA activities beyond the state level.

POTENTIAL BENEFITS OF THE PROJECT:
This project will develop a set of standards and best practices for ramp metering in the State of Alabama. It will also estimate the potential benefits and costs of such strategies and identify candidate corridors for implementation. This information could be incorporated into future ITS
deployment plans, first in the Birmingham region and then in other areas of the state as it becomes appropriate. The technology transfer activities will provide an opportunity to educate transportation professionals and agencies representatives about ramp metering as traffic management tool for the state of Alabama.

TRB KEYWORDS:
Ramp Metering, traffic management, metering options, traffic simulation, cost-benefit analysis.