

Development of a Congestion Management System Using GPS Technology

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Problem

The Louisiana Department of Transportation and Development (DOTD), in collaboration with the nine Metropolitan Planning Organizations (MPOs), is developing a statewide congestion management work plan to meet the requirements of the federal Intermodal Surface Transportation Efficiency Act.

The Baton Rouge metropolitan area has been designated as an ozone non-attainment area. The act requires the Louisiana Department of Transportation and Development to submit initial data on congestion by October 1995.

DOTD and the Capital Region Planning Commission (the Baton Rouge MPO) have identified twenty-two corridors for which a congestion management system should be developed.

Currently, traffic information from different sources is not collected and stored in a form easily useable in an integrated traffic management system.

Objectives

Using performance indicators such as volume to capacity ratios, level of service, and delay, the Capital Region Planning Commission must evaluate major corridors for inclusion in the congestion management system. Corridors incorporated in the system must be regularly monitored to evaluate changes in traffic volumes, travel time, and mobile emissions. This information must be assembled in a management system which provides a mechanism for evaluating the impact of recently completed and proposed projects.



A researcher receives satellite information through a portable receiver.



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Description

This statewide congestion management plan is being developed for DOTD through efforts of LTRC and the LSU Remote Sensing and Imaging Laboratory. In cooperation with the Capital Region Planning Commission and the East Baton Rouge Parish Department of Public Works, the laboratory at LSU is developing the congestion management system for Baton Rouge as a first step in the statewide project.

Using Global Positioning System (GPS) satellites, researchers gather traffic pattern information in the Baton Rouge area. Through satellite transmission, the positioning system calculates latitude and longitude. Mobile GPS receivers are installed in probe vehicles which drive congested routes during peak traffic periods.

While mobile units collect data, a fixed location base station at LSU also records satellite data. The distance traveled by the vehicles each second is calculated to obtain vehicle speed.

Using data gathered in actual traffic conditions, Intergraph Geographic Information System (GIS) software is used to create spacial maps to graphically illustrate traffic patterns. These maps graphically illustrate traffic conditions by (1) depicting variations in average speed, (2) showing travel time contours for morning and afternoon commuting, (3) identifying intersections with very high delay, and (4) documenting the onset and dissipation of congestion on freeways using contour maps.

Also in coordination with this congestion management project, the East Baton Rouge Parish Department of Public Works operates portable vehicle counting equipment to obtain measurements such as average daily traffic, peak hour volume, and peak hour factor.

Implementation Potential

At the conclusion of this study, a fully operational congestion management system will be

delivered to DOTD and the Capital Region Planning Commission.

Reports will be prepared on data collection and reporting procedures and baseline congestion for Baton Rouge. Based on these reports, congestion management systems can be implemented in other Louisiana MPOs.

The study will give Baton Rouge quantitative justification for selecting transportation network improvement projects. For the state, the study will help program long-term transportation projects to promote economic growth.

In addition, a one-day seminar will be conducted to train DOTD and Capital Region Planning Commission staff on data collection methods and reporting procedures.