

Research Project

95-5SS

Capsule

Technology Transfer Program

LTRC

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Performance Evaluation of Traffic System Using Simulation Techniques

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Problem

Traffic signal control systems along arterial routes are complex and difficult to accurately analyze. Corridor travel time and delay is obtained using estimates of running time between intersections and the total delay for the arterial through movements, according to the procedure outline in Chapter 11 of the 1994 Highway Capacity Manual.

However, when corridors begin to approach saturated conditions, Highway Capacity Manual procedures for computing the through movement delay have

some significant limitations. For example, the impact of left-turn storage lanes that spill back and impede the through movement of traffic can not be properly considered.

The Highway Capacity method does not explicitly use actuated control parameters. Instead, the Highway Capacity method adjusts the calculated delay, assuming an isolated fixed time controller, based on factors for actuated controllers and "quality of progression." These delay adjustment factors are not sensitive to how the actuated controller is configured (loop layout, extension times). For projected



Airline Highway in Baton Rouge, Louisiana.



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traffic volumes, it is impossible to determine where in the range of exceptional to very poor the quality of progression falls.

Objectives

The objective of this research is to develop analysis procedures for evaluating corridor delay along arterial routes having coordinated, actuated controllers. It is important that this methodology work under saturated and over-saturated conditions.

The methodology will be based on the FHWA CORSIM microscopic simulation environment. It will be sensitive to left turn bay spill-back, down stream intersection spill-back, configuration of actuated controllers, and coordination of adjacent intersections. In addition, the model can

provide estimates for emissions of HC, CO, and NOX.

Description

A report will be prepared detailing the application of this method on a section of Airline Highway between Beechwood Drive and Winbourne Avenue in Baton Rouge, Louisiana. In addition, CORSIM networks will be prepared for Florida Boulevard between O'Neal Lane and Acadian Thruway and Airline Highway between Greenwell Springs Road and Coursey Boulevard.

Implementation Potential

Simulation techniques are useful for evaluating the performance of transportation system improvements before large sums of money are committed to new construction or system upgrades. This project will demonstrate the feasibility of using the CORSIM environment for evaluating

projects associated with signalized arterial routes in Louisiana.

In the short term, it is expected that this method of evaluation will be useful in two areas: 1) quantitatively assessing benefits associated with signalized arterial improvements and 2) establishing an evaluation methodology, independent of the design process, that can be used for validating the viability of a new signal timing strategy.

To facilitate implementation of this study, two different training classes will be conducted. A one-day introductory class will be held in July to detail problems with current HCM methods and show how the CORSIM environment can be used to address those problems.

Subsequently, two-day, hands-on, laboratory-oriented classes will be held where attendants build small signalized arterial routes and perform the evaluation. These training exercises will be incorporated into LSU Course CE 7700 - "Traffic Signal Systems," during the 1997 Fall Semester.