Control Strategies for Corridor Management
Agreement 65A0329 TO008
Quarterly Progress Report (Second Quarter FY 2015-16) Version 2
Reporting Period: October 1, 2015 to December 31, 2015.

Brief Project Description

Considerable attention has been given to new approaches for improving the transportation system because of limited funding and environmental concerns for constructing new highway facilities. One promising approach is integrated management of travel corridors comprising of freeways and adjacent arterial streets controlled by traffic signals. However, the implementation and effectiveness of corridor management strategies is limited because of the lack of information on traffic conditions on arterials. Recently the availability of High-resolution (HR) data at signalized intersections consisting of time-stamped records of every event involving vehicles, together with the signal phase provides significant opportunities for assessing the performance of existing control and developing new control strategies. We propose to analyze real-time and archived HR data from real-world test sites and calculate performance measures. We will next utilize the HR data to develop improved control strategies for signalized arterials, and to propose and test corridor management control strategies for both recurrent and non-recurrent (incident related) congestion.

Work Completed This Quarter

The contract was executed in late March 2015. Authorization to proceed was received on April 2, 2015. The kick-off meeting for the project took place on June 11, 2015 at the Caltrans Division of Research & Innovation and Systems Information (DRISI) offices in Sacramento. A project progress meeting was held at the Caltrans DRISI offices on October 13, 2015 to discuss the work performed and findings in the first quarter (July-September 2015).

This quarter the following activities were performed:

Task 1. High Resolution Data Collection and Estimation of Performance Measures

Task 1 of the project is concerned with the collection and analysis of HR data at signalized intersections, and the calculation of performance measures. We obtained a data set from a multiphase intersection in Beaumont, South Carolina, and developed and applied methodologies for obtaining basic data (traffic flows per movement and saturation flows), and performance measures (delay and V/C ratio).

This period we developed and tested an algorithm for estimating queue lengths from the HR data. We also developed procedures for developing robust timing plans based on clustering of volume data derived from the processing of HR data.

Task 2. Development and Testing of Signal Control Strategies

The scope of work in Task 2 involves the development and evaluation of signal control algorithms on signalized arterials. We will extend and refine the “max pressure” algorithm and simulate its performance using a mesoscopic simulation model called .Q. Both the control

algorithm and the simulation model were developed at UC Berkeley.

This period we continued the application of the .Q model at the San Pablo Avenue test site focusing on link based performance measures, e.g., travel times and delays. We compared the model predictions with the outputs of the SYNCHRO model at the site. We also applied the .Q model to the real-world intersection in Beaumont, South Carolina using the input and performance data obtained in Task 1.

Task 3. Freeway/Arterial Coordination

The scope of work in Task 3 involves the development and evaluation of control algorithms for coordination of ramp meters and traffic signals on adjacent signalized arterials. This quarter the control algorithm designed to restrict the entry of vehicles to the on-ramp from arterial phases to avoid queue spillover on the metered on-ramp was enhanced. Improvements consisted of a) improved modeling of arterial traffic considering the movement of vehicle platoons, and b) constraints to prevent queue spillbacks at the upstream signalized intersections. Also, we formulated control concepts for freeway-arterial coordination under incident conditions.

Meetings/Presentations

A meeting was held in Berkeley with Professor Zong Tian of the University of Nevada Reno on December 16, 2015. We discussed Dr. Tian's developed analysis tool for processing and visualization of signal timing plans and it can be potentially used in Tasks 2 and 3 (development of signal control strategies).

A project progress meeting is scheduled for February 18, 2016 at the Caltrans DRISI offices to present the work performed in each project task and future work.

Work Planned Next Quarter

Task 1. High Resolution Data Collection and Estimation of Performance Measures

This task has been completed.

Task 2. Development and Testing of Signal Control Strategies

Documentation of the findings from the evaluation of the .Q model at the selected arterial test site and isolated intersection. Application of the "max pressure" at the selected sites and assessment of its effectiveness compared to existing used tools.

Task 3. Freeway-Arterial Coordination

We will test the refined control algorithm through simulation for a range of operating conditions. We process the results and develop recommendations.

Task 4. Prepare Final Report

A final report for the project will be performed describing in detail the work performed and the study findings and recommendations.

Problems/Issues Encountered This Quarter

There are no problems to report.

Project Budget Summary

The award amount is $114,222 for agreement number 65A0529 TO008. The agreement ends on February 29, 2016.

Projected expenditures for the Second Quarter of FY 15/16 covering the months of October, November and December 2015 are shown below. These are draft estimates and will be refined when the financial statements will be made available by the University.

Month	Projected Expenditure ($)
April	10,000
May	11,500
June	11,000

Project Management References

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