EVALUATING THE IMPACTS OF COORDINATED TRAFFIC SIGNAL SYSTEMS

Eranga Piushani Wannige

(138321C)

Degree of Master in Highway and Traffic Engineering

Department of Civil Engineering

University of Moratuwa
Sri Lanka

May 2018

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DECLARATION OF THE CANDIDATE AND SUPERVISOR

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ABSTRACT

Evaluating the Impacts of Coordinated Traffic Signal Systems

Traffic congestion due to increasing number of vehicles and pedestrians is one of the major problems that need to be tackled especially in urban areas. Numerous methods are available to reduce delays and financial losses and environmental problems caused by road traffic in major cities.

Signalizing is one of the main methods to control traffic at intersections. Most of the signalized junctions in Sri Lanka are isolated fixed-cycle type. Signal coordination is considered as one of the cost effective and successful strategies to reduce congestion problems worldwide. Sri Lankan road development and management agencies are in their initial stage of implementing this system for signalized intersections. However, little has done to quantify the benefits that can be obtained from coordinated traffic signal systems and hardly done studies to recommend a suitable guideline for Sri Lankan context. Therefore, objective of this research is to evaluate the impacts from traffic signal coordination in reducing delay and queue length and propose a guideline, which can be used in signal coordination in Sri Lankan context in optimized manner.

As a case study, closely spaced three signalized junctions are selected at for the analysis. SIDRA, Signalized (and unsignalized) Intersection Design and Research Aid is used to generate the timing plans for each junction. Manual calculations are also done. The system was modeled using PTV VISSIM software and each junction is analyzed considering as a non-coordinated isolated junction and as an individual junction of a coordinated system using that software model. Travel time, delay, effective stop rate and queue length are identified as important parameters to evaluate the benefit/impact of the coordinated system. Data related to above parameters taken from the VISSIM output is used to compare coordinated system and in the isolated system. Using the evaluation results, reduction of delay and reduction of queue length are presented as percentages, as quantified measures of the benefits of the signal coordination. Limitations of signal coordination such as time for pedestrians, longer waiting time to minor street traffic are also identified during the study. Various coordination strategies were modeled as both direction coordination, single direction coordination, multiple cycle times etc. Using the results of the case study, a proper methodology is proposed to optimize the signal coordination in a considered set of junctions.

Keywords: Coordination – Junctions – Peak time

ACKNOWLEDGEMENT

I am grateful to all the senior lecturers and all other supporting staff, friends and my family for their valuable support and help given throughout my research to success.

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Name: E.P.Wannige

Reg.No: 138321C

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