

Development of Guidelines for Traffic Signal Coordination for Intersection Clusters

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Abstract

With the ever-increasing traffic congestion, it is needed to initiate sustainable traffic management solutions. There is a need to establish signal design standards taking in to account the latest trends in traffic signal development so that there will be consistency in traffic signal designs and also to make provision to incorporate future coordination and other automation such as monitoring violations and gathering traffic flow information for real time updates. More importantly standardization will minimize user confusion and improve safety at traffic signals and help improving traffic flow and user satisfaction.

The congestion issues that are related to signalized intersections are not only inherent to a particular intersection, but rather can be a result of the signal arrangements at nearby intersections. This research identifies the issues with the typical intersection arrangements, and aims at developing a guideline to be followed for traffic signal designs especially when traffic signals are to be coordinated intersection clusters.

The necessity of a properly calibrated software for the local condition has been identified as a key component in related literature. VISSIM traffic simulation software was calibrated for the Sri Lankan condition after collecting information from more than 10 intersections in and around Colombo. From the video surveys and manual observations considered, the traffic volumes along with the turning movements, vehicle mix and queue lengths were obtained and compared with the simulated results with an accuracy of ± 10 .

With the calibrated VISSIM software, the guidelines to be followed were developed considering the factors such as; identification of the coordinated phase, determination of individual signal timings for intersections, determination of phase timings for coordinated & non-coordinated directions and optimizing the offsets.

The developed guidelines were tested for the Baseline Road intersection cluster and simulation results shows significant delay reductions over xx% for any approach can be achieved in the coordinated directions without adversely affecting the non-coordinated directions.

Keywords: Delays, Traffic Signal Coordination, Intersection Clusters

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