

Evaluating the Impacts of Coordinated Traffic Signal Systems

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Traffic congestion due to ever-increasing number of vehicles and pedestrians is one of the major problems that need to be tackled especially in metropolitan areas. Numerous methods are available to reduce delays and financial losses as well as 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 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. When traffic signals work together (or are coordinated), they provide a greater opportunity for motorists to travel through adjacent traffic signals without making unnecessary stops. This reduces fuel use, saves motorists travel time, diminishes wear and tear on vehicles, and cuts vehicular emissions.

Sri Lankan road development and management agencies are in their planning stage to implement this system for signalized intersections. However, little has been done to quantify the benefits that can be obtained from coordinated traffic signal systems. Although it is important to have quantified measure of the benefits compared to prevailing system, such measure is not yet available in Sri Lankan context. Therefore, objective of this research is to evaluate the benefits from Traffic signal coordination in reducing delay and reducing travel time to vehicles.

As a case study, closely spaced three signalized junctions are selected at for the analysis. The junctions selected are Park Road Junction, Narahenpita Junction and Kirimandala Mawatha Junction on Baseline Road. SIDRA, Signalized (and unsignalized) Intersection Design and Research Aid is used to generate the timing plans for each junction. Each junction is analyzed considering as a non-coordinated isolated junction and also as an individual junction of a coordinated system. Travel time, delay, effective stop rate and proportion queued are identified as important parameters to evaluate the benefit/impact of the coordinated system. Data related to above parameters taken from the SIDRA output is used to calculate the travel time and delay of the coordinated system and in the isolated system separately. Using the evaluation results, travel time saving, reduction of delay and

reduction of stop rate are presented as percentages, as quantified measures of the benefits of the signal coordination. Limitations of signal coordination such as time for pedestrians, non-uniformity of intersections are identified and evaluated to take a quantified measure of the negative impacts of the system.

Key words: traffic signal systems, intersection