RESEARCH
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Estimating HCM Default Parameters for Louisiana

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POINTS OF INTEREST:

Problem Addressed / Objective of Research / Methodology Used / Implementation Potential

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PROBLEM

The Highway Capacity Manual (HCM) is the United States' guide for evaluating highway, transit, bicycle, and pedestrian facilities. It also provides the procedures for determining capacity and level of service for interrupted flow facilities (signalized and unsignalized intersections), which are used for operational analyses and traffic planning applications. The HCM provides default parameters—saturation flow rate and critical headway—which are two building blocks of capacity estimation for signalized and unsignalized intersections respectively. Their representative values are typically used in place of actual field data for estimating input parameters used in the procedures for evaluating intersection capacity. However, the HCM default values may not be applicable to local conditions of a region or location [1] and may even lead to inaccurate delay and level of service (LOS) predictions. Therefore, the HCM suggests that input parameters at specific locations may vary because of unique features. According to the HCM, the ideal saturation flow rate is 1900 pc/hr/ln for signalized intersection, the critical headway values range from 4.1 s to 7.3 s depending on the roadway lane configuration and specific turning movements; whereas, the follow-up headway ranges from 2.2 s to 4 s for unsignalized intersection. A study on the effect of using default input parameters instead of measured values showed that locally measured values of parameters considerably reduced errors in delay estimation [2]. Several past research studies have shown that these input parameters vary across regions partly due to different driving behaviors, populations, geographic regions, etc. Therefore, great emphasis is made on utilizing local data to determine these input parameters for a more reliable computation [3]. This study will develop Louisiana values for saturation flow and headway parameters that are consistent with Louisiana traffic conditions, potentially providing a potential improvement on current traffic analysis and network-level planning. In the long-term, the Louisiana estimates of intersection capacity parameters could also work as a foundation for the state's future planning, incorporating different levels of connected and automated vehicles.

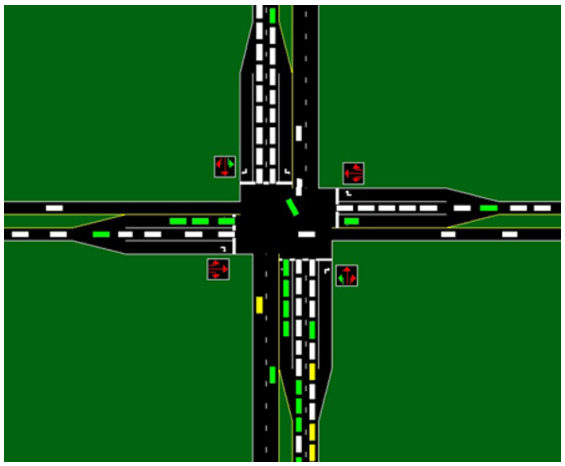

Figure 1. A still image of animated traffic operation on a signalized intersection [4].

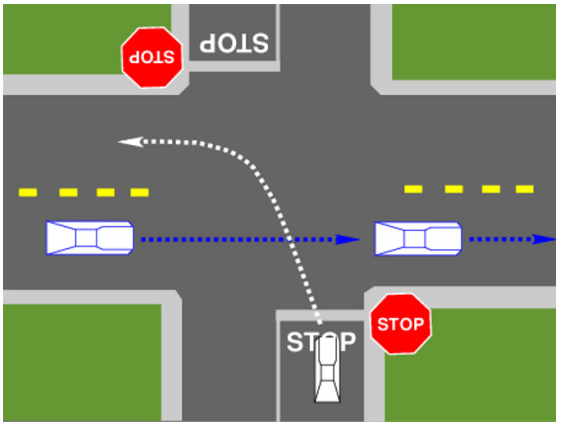

Figure 2. Gap acceptance concept on a two-way stop controlled intersection [5].

OBJECTIVE

The primary objective of this research is to develop intersection capacity parameters that are specific to Louisiana conditions. More specifically, the research aims to estimate the saturation flow rate for selected signalized intersections and analyze critical headway and follow-up headway at stop-controlled intersections.

METHODOLOGY

To achieve the objectives of this study, the following tasks will be performed.

1. An in-depth literature review will be conducted to identify relevant studies that estimated local parameters of saturation flow rate, critical headway, and follow-up headway in their jurisdictions.
2. The research team will develop a population list of intersections on state-controlled highways.
3. A sample of intersections from the population list of intersections will be identified.
4. The research team will collect video data and geographical data from the selected sites in real-time.
5. Field data on vehicle movement and associated time data will be collected from the video observation.
6. The research team will undertake an analysis to estimate parameters.
7. A final report will be developed detailing the findings of the study.

IMPLEMENTATION POTENTIAL

The results obtained from this study can help in avoiding erroneous measures of capacity and other traffic flow estimations. This will assist designers and planners with better design of intersection types as well as more accurate signal design, potentially resulting in congestion reduction. The findings in this study could be incorporated into the traffic flow simulation for intersections in Louisiana. Consequently, this project will be highly beneficial for network-level planning.

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