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RESEARCH ARTICLE

Evaluation of Back of Queue at Signalized Intersections in Erbil City Using Different Software

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Abstract:

Aims:

The aim of this study is to evaluate the queue length of isolated signalized intersections, which used HCS2010 and SIDRA Intersection 8 traffic software.

Background:

One of the important parameters to evaluate the performance of a traffic management system is queue length, especially in congested traffic situations. For the estimation of back of queue length, many traffic analyzing models are used based on Highway Capacity Manual (HCM2010).

Objective:

The values of queue length obtained from these two softwares are to be compared with observed queue length from the field. The study also aids in conducting a model of optimization for the back of queue length to decrease the value of storage length of vehicles following the GA procedure.

Methods:

In this study, four isolated signalized intersections were used in Erbil city, the capital of the Iraqi Kurdistan Region. The values of the measured back of queue lengths are compared with the values obtained from Highway Capacity Software HCS2010(HCS+T7F) and Signalized and Unsignalized Intersection Design and Research (SIDRA Intersection 8) Aid Australian Road Research Board (ARRB) software.

Results and Discussion:

The results of regression analysis showed that the SIDRA Intersection 8 Back of Queue model with adjusted R^2 0.8465 have a stronger relationship with the field measured Back of the Queue for linear relationship compared to the HCS2010 back of queue model. Furthermore, the study tends to optimize the signalized intersections under study using HCS2010 and SIDRA Intersection 8 software based on the Genetic Algorithm (GA) to minimize the back of queue length. The percent of average reduction in HCS2010 and SIDRA Intersection 8 back of queue models are 36% and 29%, respectively. The main objective of optimizing the timing plan was to minimize the average storage queue length at signalized intersections that follow the Highway Capacity Manual (TRB 2010) procedure for queue length calculation. Moreover, 95th and 98th values of the percentiles were chosen to estimate the expectancy of upstream lane blockage and the expectancy of short lane overflow that was related to the back of the queue percentile.

Conclusion:

The improvement of vehicle storage for upstream lanes was conducted by the two software systems mentioned before. The results showed significant improvement in the performance of the intersections under study with a reduction in queue length.

Keywords: Signalized intersection, Back of queue, Software, HCS2010, SIDRA 8, Traffic.

Article History

Received: May 29, 2022

Revised: August 30, 2022

Accepted: September 29, 2022

1. INTRODUCTION

Queue length is an important measure of signalized intersection performance. Queue lengths greater than the available storage space for close-located intersections and

turning movements unfavorable influence the intersection's general operation and performance.

Scholars and researchers have distinguished that the vehicular queue length is necessary for both signal optimization and signal performance estimation of automobile stops and delays. Many scholars and researchers have allocated themselves to the purpose of prediction and minimization of

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