

Abstract

The main objective of this study was to develop traffic simulation model suitable for simulate queue at signalized junction/s both for single junction and network. The model was developed base on the CU. Traffic Simulation Model previously developed by the Transport Research Unit, Chulalongkorn University.

The previous model was redeveloped to be a fully macroscopic model Vehicles were generated randomly (or uniformly) into the first block of the network and moved to the next block according to the formular

$$AF_{k,t} = SFRT \cdot NLANE \text{ or}$$

$$EV_{k+1, t-1}$$

$$JDS \cdot UL \cdot NLANE - EV_{k,t-1}$$

where $AF_{k,t}$ = number of vehicles moving into block k at time t,

$EV_{k+1,t-1}$ = number of vehicles in block k+1 (upstream block) at time t-1,

SFRT = saturation flow rate, vehicles/lane/second,

NLANE = number of lane, UL = block length, metre,

JDS = Jam density in any block, vehicle/metre/lane.

Vehicles were moved between links based on similar condition as above depending on which one is lowest. Traffic detector were incorporated in some special links and pulse length was calculated using the formular

$$\text{Pulse Length} = \text{APL} + \frac{(\text{USI} - \text{APL}) \times (\text{EF}_1 - \text{AF}_1)}{\text{JAM FLOW}}$$

JAM FLOW

APL = Average pulse Length, second

USI = Unit scanning Time Interval, second

EF_t = number of vehicle in the block (with detector) at time t

AF_t = number of vehicles moving into the block (with detector) at time t

JAM FLOW = total number of vehicles (while moving) in the block, for this study use 2,

Results of the simulation were traffic volume pass over detectors entering signalized junction and volume and time occupancies detected at detectors. Next, the queued-length model is developed based on traffic parameters : volume and time occupancy. Finally, a suitable position of traffic detectors is recommended.

The queue length models were developed into two parts : based on traffic volume and time occupancy. If traffic volume parameter were used, a suitable position of detector from stop-line for a uniform arrival model is approximately 50 percent of road link. If the traffic arrival is random, the suitable position is approximately 90 percent. With regard to time occupancy, the suitable position of traffic detector from the stop-line is approximately 40 percent and 90 percent for uniform and random arrival, respectively.

From this research, it can be concluded that traffic queue at signalized junctions can be predicted by using traffic volume or time occupancy.