

ABSTRACT

Bus is one of the most widely used public transport modes in Indian cities, but it suffers significant losses due to traffic congestion. The resulting high travel time of buses is a major deterrent for road users. In general, considerable delays occur at the traffic signals where buses are affected both by signal and queuing delays. Therefore, this research is aimed to identify a suitable measure to reduce bus delays at the signalized intersections, evaluate it and develop a step-by-step guide for practitioners to implement the same giving due consideration to the prevailing roadway, traffic and control conditions in Indian cities. The bus priority measure selected for evaluation was a short bus lane upstream of a traffic signal that enables buses to travel through congested areas with reduced delays by avoiding long queues of vehicles at signalized intersections, known as Queue Jump Lane (QJL). In order to reduce the bus conflicts with the traffic along the same approach and to maximize vehicle throughput at the intersection, a bus advance area along with pre-signals for the non-priority traffic was also provided in conjunction with the QJL. Both traffic micro-simulation and field implementation based evaluation of the selected priority measure was carried out to develop the implementation guide. Prior to simulation, the model was also calibrated and validated for heterogeneous traffic conditions. The major contributions of the thesis are as follows: (a) a comprehensive research methodology is established to identify, evaluate and implement a suitable bus priority treatment for heterogeneous traffic conditions prevailing in urban India; (b) a qualitative analysis technique is demonstrated to review different bus priority treatments in light of the traffic, roadway and control conditions in Indian cities and identify QJL with bus advance area and pre-signal as a potential bus priority treatment; (c) a methodology is developed for calibration of traffic micro-simulation model for non-lane based mixed traffic operations. The methodology is applied to estimate different sets of optimized parameter values for different vehicle classes present in a mixed traffic stream; (d) QJL with bus advance area and pre-signal is implemented and evaluated in heterogeneous traffic conditions; (e) the influence of different factors on the effectiveness of the bus priority treatment is investigated. Based on the outcomes, a step-by-step guide to practitioners is suggested for implementation of the selected bus priority treatment in the context of Indian cities.
