Modelling Delay due to Curb-Side Bus Stops at Signalized Intersection: A Case Study of New Baneshwor Intersection

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Purpose: The aim of the presentation is to analyse the effects of curb side bus stops near intersections on vehicular delays. New Baneshwor Intersection located in Kathmandu; the capital city of Nepal has been taken as a case study. Variations in three parameters, namely the distance of bus stop from the intersection, the length of the bus loading area, and the maximum dwell time, have been simulated. These variations were done on both the upstream and downstream positions from the intersection.

Significance: This study will help the traffic management authorities of Kathmandu in assessing the most optimal placement and service time regulation for curb side bus stops at New Baneshwor Intersection, so as to minimize unnecessary vehicular delays. Furthermore, the delay results under numerous scenarios will be useful for understanding the blocking effects of buses as well as the interference between public transport vehicles and intersection queues. The study intersection represents mixed traffic with non-lane behaviour.

Rationale: Traffic congestion and vehicular delays are major problems of cities. One of the most cost-effective and efficient methods of reducing vehicular delays in short- and medium-term is the proper management of public transit facilities such as bus stops. Significant reductions in vehicular delays can be achieved by proper management and service time regulation of bus stops, usually placed at curb side in urban context.

Methodology: Videographic survey was used to collect traffic data for five days in June 2022, from 8:30 a.m. to 11:30 a.m. Microsimulation modelling was done using the latest version of PTV VISSIM 2022 (SP06, Academic License). The default driving behaviour parameters of VISSIM were calibrated to replicate the traffic conditions at the study intersection. 192 scenarios or combinations of bus stop configurations and maximum dwell times were simulated. Finally, analysis was done from the vehicular delays resulting in these scenarios.

Main Outcomes: The results show that when the delays due to optimum bus stop configurations and maximum dwell times are reduced by 82.84% in the Maitighar-Tinkune (West to East) direction and by 75.66% for the Tinkune-Maitighar (East to West) direction in comparison to the existing condition.

Conclusion: The significant reduction in delays as obtained from scenario analysis verify that delays due to stops near intersections are critical.