

Estimation of Delay Due to Loading-Unloading of Passengers by Buses and Reduction of Number of Lanes at Selected Intersections in Dhaka City

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Abstract : One of the significant reasons that increase the delay time in the intersections at heterogeneous traffic condition is a sudden reduction of the capacity of the roads. In this study, the delay for this sudden capacity reduction is estimated. Two intersections at Dhaka city were brought in to the study, i.e., Kakrail intersection, and SAARC Foara intersection. At Kakrail intersection, the sudden reduction of capacity in the roads is seen at three downstream legs of the intersection, which are because of slowing down or stopping of buses for loading and unloading of passengers. At SAARC Foara intersection, sudden reduction of capacity was seen at two downstream legs. At one leg, it was due to loading and unloading of buses, and at another leg, it was for both loading and unloading of buses and reduction of the number of lanes. With these considerations, the delay due to intentional stoppage or slowing down of buses and reduction of the number of lanes for these two intersections are estimated. Here the delay was calculated by two approaches. The first approach came from the concept of shock waves in traffic streams. Here the delay was calculated by determining the flow, density, and speed before and after the sudden capacity reduction. The second approach came from the deterministic analysis of queues. Here the delay is calculated by determining the volume, capacity and reduced capacity of the road. After determining the delay from these two approaches, the results were compared. For this study, the video of each of the two intersections was recorded for one hour at the evening peak. Necessary geometric data were also taken to determine speed, flow, and density, etc. parameters. The delay was calculated for one hour with one-hour data at both intersections. In case of Kakrail intersection, the per hour delay for Kakrail circle leg was 5.79, and 7.15 minutes, for Shantinagar cross intersection leg they were 13.02 and 15.65 minutes, and for Paltan T intersection leg, they were 3 and 1.3 minutes for 1st and 2nd approaches respectively. In the case of SAARC Foara intersection, the delay at Shahbag leg was only due to intentional stopping or slowing down of buses, which were 3.2 and 3 minutes respectively for both approaches. For the Karwan Bazar leg, the delays for buses by both approaches were 5 and 7.5 minutes respectively, and for reduction of the number of lanes, the delays for both approaches were 2 and 1.78 minutes respectively. Measuring the delay per hour for the Kakrail leg at Kakrail circle, it is seen that, with consideration of the first approach of delay estimation, the intentional stoppage and lowering of speed by buses contribute to 26.24% of total delay at Kakrail circle. If the loading and unloading of buses at intersection is made forbidden near intersection, and any other measures for loading and unloading of passengers are established far enough from the intersections, then the delay at intersections can be reduced at significant scale, and the performance of the intersections can be enhanced.

Keywords : delay, deterministic queue analysis, shock wave, passenger loading-unloading

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