

Impact of Dedicated Bus Lanes on Intersection Operations and Travel Time Model Development

Project 2040
April 2022

Dr. Stephen Arhin Kevin Obike
Babin Manandhar Melissa Anderson



Introduction

To improve bus travel times and reliability, some transit bus agencies have turned to the implementation of designated bus lanes (DBLs). Designated bus lanes are those restricted to buses either permanently or during certain hours of the day. DBLs allow buses to bypass traffic congestion and avoid vehicular conflicts in mixed travel lanes, which helps improve bus service reliability. The District Department of Transportation (DDOT) proposed a dedicated bus lane pilot during the summer of 2019 on the H Street and I Street (NW) corridors in downtown DC. This study evaluated the impacts of DBLs on the general traffic flow at signalized intersections in Washington, DC following the installation.

Study Method

This research evaluated the impacts on the performance of transit buses and intersection performance on corridors with DBLs implemented in Washington, DC using a “before” and “after” approach to compare the measures of

effectiveness at intersections. The research team used non-intrusive video data collection to perform vehicular turning movement counts to assess the traffic flow and delays via a traffic simulation software (Synchro 10). Furthermore, the team also analyzed the Automatic Vehicle Locator (AVL) data provided by Washington Metropolitan Area Transit Authority (WMATA) for buses operating on the two segments (H Street and I Street, NW) to evaluate bus travel times. An Artificial Neural Network (ANN) model was also developed for the prediction of bus travel times along the corridor, using the AVL data.

Findings

The results showed that the delays at the study intersections generally decreased after the installation of DBLs. In addition, the results of the statistical analysis showed that vehicles traveling on H Street and I Street (NW) experienced significantly lower delays during both AM (7:00–9:30 AM) and PM (4:00–6:30 PM) peak hours

after the installation of dedicated bus lanes (at 5% level of significance). Vehicles traveling on the eastbound approach of H Street (NW), the westbound approach of I Street (NW), and all approaches of the five study intersections experienced lower delays, which directly translates to improved traffic flow.

The statistical analysis showed that the vehicles traveling on H Street and I Street (NW) experienced significantly lower delays during both AM (7:00–9:30 AM) and PM (4:00–6:30 PM) peak hours after the installation of bus lanes, at 95% confidence interval. The implementation of Dedicated Bus Lanes in the DC resulted in lower delays and improved traffic flow.

Policy/Practice Recommendations

The findings and models developed in this research can be used by the DC transit agency, WMATA, to evaluate the feasibility of installing dedicated bus lanes on other bus routes. Ultimately, this research can help provide better and more reliable transit service in addition to improving traffic flow.



About the Principal Investigator

Dr. Arhin is an Associate Professor and the Interim Chair of the Department of Civil and Environmental Engineering of Howard University, the director of the Howard University Transportation Research and Traffic Safety Data Center (HUTRC), and the director of this transit research project, conducted under the Mineta Consortium for Transportation Mobility.

To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2040



MTI is a University Transportation Center sponsored by the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology and by Caltrans. The Institute is located within San José State University's Lucas Graduate School of Business.