Summary of Final Report, BC-137-16
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EFFECTIVENESS OF BUS SIGNAL PRIORITIZATION

PROBLEM STATEMENT

Bus Signal Priority (BSP), for on-street transit service, is being more widely deployed in North America to address traffic congestion caused by traffic signals. Signal priority for transit vehicles is expected to improve transit operations and service quality. In theory, an improvement in transit performance provides additional incentive for people to switch modes and, consequently, reduce traffic congestion. However, the use of BSP has been an issue of debate among traffic engineers and transit planners. Traffic engineers have been resistant to the implementation of BSP because of concern that overall traffic performance may be unduly compromised when signal timing intended to optimize traffic flow is overridden to provide a travel advantage to transit vehicles.

OBJECTIVES

The objective of this project was to evaluate how traffic operations are affected by BSP—especially regarding the effectiveness of BSP on transit vehicles and its impact on traffic operations. More broadly, this study addressed the implications of BSP, in order to provide an objective analysis of its advantages and disadvantages in general; that is, to provide a more thorough knowledge base for dealing with the deployment of BSP.

FINDINGS AND CONCLUSIONS

The key to an effective bus priority system is to ensure that transit vehicles traveling in all directions can be assisted without significantly delaying non-transit vehicles in the process. There is a lack of documented test results regarding the effect of BSP on non-transit vehicles, especially for projects that are in operation in North America. The perception of traffic engineers is that, provided the timing strategy is tailored for the area, non-transit vehicle delay is not significant. Transit planners interviewed for this study explained that BSP did not create any significant delays to non-transit vehicles. However, BSP offers fewer benefits in areas with extremely high bus volumes or with very light traffic.

Overall, the implementation of BSP requires that sufficient measures be taken to prevent traffic operations being negatively affected by bus priority. Real-time control strategy is the best solution, although any system must be designed with the particular area needs in mind. The literature search revealed the importance of implementing a direct priority strategy in areas with low congestion and an indirect priority strategy for areas with a high congestion, and of using of a real-time system with a variety of priority strategies to minimize non-transit delay. However, although these valuable generalizations can be made about heavy or light congestion and employed to reduce delay, a specific approach for each area is the best solution for increasing the positive impact BSP can have on traffic operations.

Researchers developed a "Pre-Implementation Checklist" to help determine the viability of bus priority in a given area. The checklist operates under the assumption of each variable being equally significant for bus priority. There was, however, insufficient evidence to warrant considering one variable more significant than another. This checklist is combined with the "Intersection Specific Guidelines" and the Analysis of Bus Priority Systems spreadsheet in SCRITS (SCReening for ITS).

Finally, the checklist can help an agency to determine the potential effectiveness of bus priority in its area and whether any changes would be needed prior to implementation. Once an agency has decided to move forward with BSP, the "Operational and Design Guidelines" determine either the type of priority that would best suit the conditions of the given area or the design and operational conditions that would need to be changed to ensure that the area is suitable for BSP.

BENEFITS

Agencies that wish to implement a BSP System can use the final report of this research to support their justification for a priority system. The research addresses the effects that a BSP system would have on non-transit traffic. This information could prove especially useful to agencies that may have shied away from implementing a BSP system due to concerns regarding the potential disruption that such a system would have on non-transit traffic. The research indicates that a major disruption of non-transit traffic does not necessarily accompany the implementation of BSP. Disruption is dependent on the type of BSP and on the implementation strategy. The checklist included in the final report should prove a useful tool to help agencies determine whether BSP would be beneficial to a given area.

Ultimately, this research should help to eliminate some of the myths regarding the effects of BSP on non-transit travel and so help to establish BSP as a more accepted practice.

This research project was conducted by Shireen Chada at the Center for Urban Transportation at the University of South Florida. For more information, contact Gene Glotzbach at (850) 410-5616, gene.glotzbach@dot.state.fl.us.