FTA

FEDERAL TRANSIT ADMINISTRATION

REPORT SUMMARY

U.S. Department of Transportation
Federal Transit Administration

Evaluation of Transit Bus Turn Warning Systems for Pedestrians and Cyclists

Background

As part of a cooperative agreement with the Federal Transit Administration (FTA), the Tri-County Metropolitan Transportation District of Oregon (TriMet) conducted a demonstration test of three commercially-available pedestrian/cyclist turn warning systems for transit buses. Four bus-based, auditory turn warning systems were assessed, three of which were tested and evaluated. In addition, the potential use of an infrastructure-based crosswalk warning sign was investigated.

Objectives

Among the goals of the demonstration and evaluation included the following:

- Demonstrate the ability of several commercially-available turn warning systems to provide timely warning to pedestrians/cyclists that a bus is turning or pulling into or away from a bus stop.
- Demonstrate the ability of an innovative crosswalk warning sign to provide timely warning to pedestrians/cyclists that a bus is turning.
- Determine the effectiveness of the various technologies in terms of the perceptions and acceptance of bus operators, the general public, and TriMet personnel and management, and in getting pedestrian/cyclist attention and impacting behaviors.
- Develop benefit and cost estimates associated with the turn warning systems.

Findings and Conclusions

The findings from this study indicate that warning technologies can make a meaningful and cost-effective contribution to pedestrian and cyclist safety, but more needs to be done to deal effectively with this problem.

This report provides the details associated with the demonstration and evaluation of three commercially-available pedestrian turn warning systems and a limited test of an innovative crosswalk BUS blank-out sign. In total, 45 buses were equipped with turn warning systems and assigned to 5 pre-selected bus routes during March–September 2014; 2 BUS blank-out signs were placed at either end of one crosswalk at one intersection in downtown Portland.

The evaluation approach to the study linked the overall goals of the demonstration test to measurable technical objectives for each technology using a wide range of data collection and analysis methods. The findings showed a range of perceptions, levels of acceptance, and recommendations for improving the technologies.

A number of common themes emerged after testing of the turn warning systems, including determining the volume of the turn warnings, determining the right sensitivity setting of warning activation, selecting the right warning type/content, and determining when/where to activate the warnings. Overall, bus operators were generally less favorably impressed with the effectiveness of the systems than was the general public; fewer than half of operators thought the systems were effective at alerting pedestrians, and fewer than one third thought the systems were effective at reducing close calls. Nearly half of the operators agreed that the potential safety benefits of the warning systems outweighed the drawbacks; however, overall, only about one-third agreed with the prospect of wider deployment. A majority of pedestrians felt that the systems were effective at both alerting pedestrians and improving pedestrian safety.

Operators reported observing some changes in pedestrian behaviors related to the warning systems, but probably not as much as hoped, and most operators agreed that the turn warning systems had far less of an effect on cyclist behaviors than on pedestrian behaviors. BUS blank-out signs were felt to be effective at alerting pedestrians and cyclists that a bus is turning and at improving safety.

Related to cost-benefits, a baseline scenario yielded net present value benefits approaching $3 million overall for the 45 warning systems in the demonstration test, or about $65,300 per bus/warning system. The associated internal rate of return on the warning systems investment for the baseline scenario exceeded 34%, which translates into a payback period of about three years. All three scenarios (baseline, minimum, maximum) yielded net positive benefits, covering a fairly considerable range, with net present benefits from the maximum scenario more than 12 times greater than those from the minimum scenario.

Benefits

Approaching zero deaths from pedestrian/cyclist-bus collisions will take commitments on multiple fronts, and technology is one tool in an array of strategies that transit agencies should consider when working to improve safety. Although the findings indicate that the warning technologies can make a meaningful and cost-effective contribution to safety, there is still more to be done to deal effectively with this problem. This study should help transit agencies make informed decisions about investments in turn warning system technologies to increase pedestrian and cyclist safety.

Project Information

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