

MOVING THE BUS BACK INTO TRAFFIC SAFELY – SIGNAGE AND LIGHTING CONFIGURATION PHASE I

BACKGROUND

The Florida Department of Transportation (FDOT) has been working on the issue of crash reduction in transit vehicles for over the past 4 years. Much work has been accomplished in the analysis of bus crash data and in making recommendations for the potential reduction of crashes. Safety is one of the department's most important issues. Although bus crashes do not usually result in harm to the transit bus drivers or passengers, the drivers of the vehicles that crash into the buses are usually harmed more severely. Bus crashes are also a cause of traffic congestion, resulting in time loss by those not involved in the crash and increased air pollution.

A recent study of bus crash data by FDOT found that the most common cause of bus crashes was inattentive or careless driving on the part of private automobile operators. The study recommended the installation of more bus pull-out bays on state roads, more effective lighting configurations on the rear of buses, and state-wide bus stop design standards. These results led us to look at the engineering side of the YTB program to develop the recommendations to address the issue. This report provides hard core engineering recommendations for both engineering and public information solutions.

OBJECTIVES

The overall goal of this project is to help improve transit service by improving on-time schedules and the quality of service by assisting transit vehicles in safely reentering the traffic stream. In order to achieve the overall goal of this project, three primary objectives have been identified. The first objective is to make recommendations on lighting configuration and signage practices for the back of transit buses. The second objective would be to develop signage and pavement markings compliant with Manual on Uniform Traffic Control Devices (MUTCD) to address YTB safety issues. The third objective is to recommend drafting statutory language or modifications to existing statutes that would be needed to enforce the YTB law and help increase its viability.

FINDINGS AND CONCLUSIONS

This research was conducted to help buses merge back into traffic safely by focusing on three aspects: bus signage and lighting configuration, roadside signs, and YTB regulations. A statewide bus operators' survey was conducted to find their opinions regarding the effectiveness of different signage and current Florida YTB statutes. Field studies and preliminary crash data analysis were used to supplement the survey results. The study found that the decals currently in place on the back of buses have no significant safety and operational effects and there are no roadside signs or pavement markings for YTB. Recommendations were made for three different treatments as follows:

Bus Signage and Lighting Configurations

Everything has a trade off. By using bus bays, air pollution has decreased and the frustration of the driving public has diminished but the incidents of traffic failure due to YTB and bus rear end collisions have increased. The research indicates that a flashing YTB sign on the back of the bus like those allowed by state law in California and Oregon may be the most effective bus modification to improve operation and safety. A very large majority (73%) of the bus drivers interviewed indicated they felt the flashing LED signs would be the most effective technology in North America rather than the YTB decal on the back of the bus, which they thought was so ineffective that it might as well not be there. The majority of the bus operators felt the LED light made merging safer. The YTB LED lights cost between \$250 and \$600 per bus which is cheaper than a rear end bus collision. This is minimal in comparison to the money lost by the transit agencies in having a bus out of commission and the fuel loss by traffic congestion created by bus accidents. The YTB LED light is activated by a control switch and released when the left turn signal is released providing reduced distraction to the bus operator.

Roadside Signs and Pavement Markings

The second engineering solution would be to develop MUTCD accepted roadside signage, potentially including flashing lights and pavement markings in specific locations where the potential for rear end collisions are the greatest. This is especially true in areas with high traffic volumes and shorter headways where bus pull-out bays are present. This engineering solution may impact re-entry delay, relay propagation and schedule adherence depending on the number of lanes, location of the stop, and distance to the nearest intersection, hourly traffic volumes, speed limit and bus headway.

The YTB LED lighting should be supplemented with a standardized program of using the flashing warning lights so that motorists can understand what the sign means. Other states require a public awareness campaign to educate motorists on the YTB laws. A system should be set up to evaluate the necessity of the law based on the total number of traffic collisions, congestion and air quality savings, public opinion and the efficiency of transit operations.

Another unexpected result of this project was brought to light during the field observations made in areas where buses were entering the traffic stream from a bus bay. Cars will weave sharply into adjacent lanes to avoid the merging bus or getting stuck behind the merging bus. This lane weaving action could create accidents that go unreported as incidents involving the bus; therefore, potentially skewing the bus crash analysis.

Yield to Bus Laws

The YTB law does not give guidance as to how to implement the law which allows for some innovation in addressing the law. Changing the statutes to improve YTB safety would include:

- Allowing flashing directional signals on the left rear of the bus to indicate merging into traffic.
- The merging signal would be used when the bus enters a traffic lane after receiving or discharging passengers even if it is not exiting a bus bay.
- Transit agencies would not be required to install illuminated flashing lights.

- A report to the Governor and legislature, 24 months after the effective date of this amendatory act, on the effectiveness of the YTB program shall include but not be limited to any impact on the highway and local road safety and the efficiency of transit operations. This would require law enforcement agencies to report: (A) the total number of traffic collisions causing fatalities or injuries or property damage, (B) Traffic congestion issues, (C) Public opinion (accidents caused by weaving vehicles), (D) Efficiency of transit operations, (E) The impact of the public education program.
- Each transit agency participating in the YTB program shall undertake a public education program to inform motorists of the requirements of the program relating to the bus rights-of-way.

BENEFITS

Phase I of this research project presents a comprehensive overview of the existing signage, lighting configurations, and YTB laws that were used to help buses merge back into traffic from bus pull-out bays. General engineering recommendations were developed in these three areas based on the statewide bus operators survey, field observations and preliminary crash data analysis. The results will likely be useful to many transit agencies to improve transit on-time schedules and safety by implementing recommended signage and lighting configurations that were designed to assist transit vehicles in safely reentering the traffic stream from bus stops.

Further research may need to evaluate the latest YTB LED flashing signs on the back of buses, and develop new roadside signage to help buses merge back into traffic for MUTCD. Research should also be conducted to determine the bus re-entry delays and total person-minutes delays of both bus passengers and other vehicle passengers that result from the use of bus pull-out bays. A more detailed safety analysis should be conducted to investigate incidents around off-line bus stops

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