FTA Report No. 0216 MAY 2022





# FTA STANDARDS DEVELOPMENT PROGRAM: TRANSIT RAIL ROADWAY/PEDESTRIAN GRADE CROSSING EXPLORATORY REPORT

#### Background

Rail grade crossing incidents are one of the most frequent types of mishaps reported by rail transit agencies. Ensuring that roadway and pedestrian crossings of transit rail system tracks are designed, constructed, and maintained to appropriate standards is critical to transit safety and risk minimization. With the recent advent of many new communication, navigation, and connected devices, there is great potential and opportunity to evaluate the current practices and technologies implemented as part of an effort to reduce the number of grade crossing accidents/incidents.

## **Objectives**

The objective of this research was to develop findings that can be used to develop safety standards that will reduce the number of incidents and accidents that occur at rail highway/pedestrian grade crossings in transit rail service.

### **Findings and Conclusions**

The exploratory research and findings presented in this report can serve as background information to develop safety standards that will help reduce incidents and accidents at transit rail roadway/ pedestrian grade crossings with a focus on light rail, including street-running rail operations.

This study included an industry survey, development of general use cases for transit rail grade crossings, case studies on four transit properties, and development of findings. Findings related to street-running and street intersection crossings as well as existing standards and recommended practices are as follows:

- The total number of reported incidents at street intersection grade crossings was about 10 times higher than the number of incidents at conventional (exclusive rail right-of-way) grade crossings; the rate of incidents for street intersection crossings was about 6 times higher than the rate of incidents at conventional grade crossings.
- Street-running is used by all light rail agencies participating in this study; in many agencies, the number of street intersection grade crossings is greater than the number of conventional grade crossings. In some agencies, there are very few conventional crossings, and the majority of their crossings are at street intersections.
- Street intersection grade crossings typically present challenges and limitations in terms of the engineering solutions that can be applied, particularly because motor vehicle traffic runs parallel to the rail in addition to crossing the rail.
- Some agencies noted a significant paperwork/bureaucratic burden for street intersection grade crossings compared to conventional grade crossings.
- Many standards and recommended practices apply to transit rail grade crossings.



- Identified areas that should be incorporated into existing standards or recommended practices to address light rail transit include street intersection grade crossings, grade crossing databases and inventories, crossing gate detection systems, obstruction detection/alert systems, smartphone navigation applications, grade separation and crossing closure policies, and hazard analysis.
- Crossing risk evaluations typically have focused on traffic volume, speeds (rail and road), design, and surroundings (sight lines).
- Dynamic signage is used by all visited agencies, but there are no standards or best practices in the way signs and messages are used by the agencies.
- Grade crossing safety treatments that were found effective at conventional crossings include quad gates, swing gates, gate skirts, channelization devices, and fencing and anti-trespass devices.
- New and emerging technologies have the potential to improve grade crossing safety.
- There is no national inventory grade crossing database for transit crossings as there is for FRA-governed freight and passenger rail crossings.

#### **Benefits**

This study developed findings that can be used by the industry to create safety standards intended to help reduce incidents and accidents at transit rail roadway/pedestrian grade crossings with focus on light rail operations, including street-running rail operations. The exploratory research and findings presented can serve as background information to develop safety standards that will help reduce incidents and accidents at transit rail roadway/ pedestrian grade crossings with a focus on light rail, including street-running rail operations.

#### FTA Report No. 0216 Project Information

This research project was conducted by Duane Otter, Benjamin Bakkum, and Dingqing Li of the Transportation Technology Center, Inc. For more information, contact FTA Project Manager Raj Wagley at (202) 366-5386 or Raj.Wagley@dot.gov

All FTA research reports can be found at https://www.transit.dot.gov/about/research-innovation.