U.S. Department of Transportation
Federal Transit Administration

Proposed GD 17-1

UNITED STATES DEPARTMENT OF TRANSPORTATION

Federal Transit Administration

[General Directive No. 17-1]

Required Actions for Rail Fixed Guideway Public Transportation Systems and State Safety Oversight Agencies to Reduce the Frequency and Consequence of Stop Signal Overruns

In accordance with 49 CFR § 670.25, the Federal Transit Administration (FTA) is proposing a General Directive to address the combination of unsafe conditions and practices that lead to stop signal overruns and the risks of death or personal injury or damage to property or equipment. Specifically, this proposed directive would require each Rail Fixed Guideway Public Transportation System (RFGPTS) to (1) conduct a systematic safety risk evaluation of the potential for stop signal overruns on its system, and determine whether any deviations in operating practices or changes in operating parameters that may have occurred over time have negated the effectiveness of mitigations in place to prevent stop signal overruns or the consequences of stop signal overruns; (2) evaluate its operational activities to monitor the implementation and effectiveness of those mitigations; and (3) develop a corrective action plan, as necessary. In addition, this proposed directive would require each State Safety Oversight Agency (SSOA) to participate in the safety risk evaluation for stop signal overruns conducted by

each RFGPTS; review and approve that safety risk evaluation, including, specifically, the effectiveness of mitigations; and review, approve, and monitor the corrective action plan for an RFGPTS, if necessary. A timeline for meeting the proposed requirements is proved in Appendix A to this General Directive. An SSOA would be required to report the status of the corrective action plan in its annual report to FTA.

This proposed directive follows FTA's review and analysis of data and information submitted in response to the agency's *Safety Advisory 16-1: Stop Signal Overruns,* for RFGPTS operations during calendar year 2015. FTA's review of the data and information gathered in response to *Safety Advisory 16-1: Stop Signal Overruns,* for rail transit operations during calendar year 2015 indicates that RFGPTSs experience stop signal overruns with varying frequencies, and that most SSOAs do not actively investigate these events. Further, the responses to *Safety Advisory 16-1* indicate a wide range of practices, definitions and requirements in the rail transit industry to protect against unauthorized passing of stop signals.

FTA requests public comment on this proposed General Directive. Following a summary and analysis of the public comment, FTA will issue a final General Directive, and a notice of the availability of that final General Directive in the **Federal Register,** with a Web link to the agency's responses to the public comment**.**

Background

A. Safety Management Systems

FTA has adopted the principles and methods of Safety Management Systems (SMS) as the basis for enhancing the safety of public transportation. *See,* 49 CFR § 670.3. SMS is a management system consisting of activities and tools that provide management with information necessary to make informed decisions on where to spend resources to address prioritized safety concerns. An effective SMS identifies, evaluates and mitigates safety concerns in a proactive

manner. Core to the success of a transit agency's SMS is the interaction between its processes for safety risk management and safety assurance. When safety concerns and hazards are identified, a transit agency's safety risk management activities provide the opportunity to analyze and evaluate safety risks related to the potential consequences of the safety hazards. Safety risk management activities also include the development of mitigations to address the potential consequences. A transit agency's safety assurance activities include the ongoing monitoring of its operations to 1) determine how well current mitigations are performing and 2) identify additional safety concerns or hazards. The monitoring activities under safety assurance provide feedback to transit agency management on whether the resources committed to address safety risks are appropriate. With timely information, a transit agency's management is given an opportunity to make changes or adjustments to ineffective mitigations prior to a failure that may result in a safety event. Data from safety risk management and safety assurance activities allow the transit agency to continuously improve its safety performance. Both safety risk management and safety assurance activities are scalable, meaning each transit agency defines its activities based on its size, complexity, and operating characteristics.

In sum, SMS provides the activities and tools necessary to manage safety risks, such as the safety risks associated with stop signal overruns in a rail transit environment. The required actions set forth in this proposed General Directive are grounded on SMS principles and methods for identifying, evaluating and successfully avoiding or reducing the frequency and severity of the consequences of stop signal overruns.

B. Stop Signal Overruns

A stop signal overrun occurs when a rail transit vehicle fails to stop as required in advance of a stop signal, flag, or other indicator, as specified in a rail transit agency's operating rules and procedures. FTA considers a stop signal overrun to be a significant safety event, with

the potential to result in the derailment or collision of passenger trains and the striking of workers, passengers or equipment on the rail transit right-of-way.

In the rail public transportation industry, the unauthorized passing of stop signals can occur for any number of reasons, including, specifically, employee error or inattention, deficiencies in the design or performance of the signal system or the placement of signal masts, ineffective or insufficient employee training and supervision, overly aggressive train routing and scheduling practices, confusing or incorrectly set-up work zone and single-track configurations, poor communications or radio discipline, or other organizational factors that contribute to the ineffectiveness of mitigations.

Generally, an unauthorized passing of a stop signal is considered a major violation of a rail transit agency's safety rules, and has the potential to result in a range of consequences: (a) damage to switch components when operating over a misaligned switch; (b) derailments resulting from operating over a misaligned switch; and (c) collisions with persons, equipment, or another train on the rail right-of-way that could result in fatalities or serious injuries. The distance a train may travel after the stop signal overrun is perhaps the most significant factor in assessing the magnitude of the safety risk of these consequences. The further the train travels the more likely it will encounter another train, workers on the right-of-way, or rail grade crossing traffic and pedestrians, or suffer a derailment due to switch points not being set for the path taken.

Across the industry, RFGPTSs employ a variety of signal and train control system components to provide "hard" mitigations that prevent trains that pass signals from travelling into an occupied block through forced brake applications or penalties. Common examples are automatic train or trip stops, which mechanically or electronically apply the brakes should a train run through a stop signal. Other examples are logic systems in fixed block and cab signaling

systems, moving block signaling systems, and automatic train control systems, which limit train speeds or set speed commands, and in the more sophisticated systems, control train operations and enforce safe braking distances between moving trains.

Additionally, RFGPTSs use "soft" mitigations for stop signal overruns, such as procedures, protocols, bulletins and work orders; training of train and equipment operators and controllers, dispatchers and other workers that might interact with the signal system during train movement; reliance on train operator knowledge of signal and signal marker location; and communication, such as radio protocols and procedures. Various RFGPTSs take a number of steps to support their employees' knowledge of their rules, including, for example, safety rules of the day, safety meetings and workshops with operations personnel to communicate information regarding recent industry accidents or incidents, and training in explicit standards and protocols.

Similarly, across the industry RFGPTSs employ a number of safety performance monitoring strategies for the ongoing assessment of the effectiveness of their mitigations. Some RFGPTSs review reports from inspections, testing, and data from signal systems and vehicles to ensure their hard mitigations are effective and appropriate to prevent the occurrence of stop signal overruns and the unwanted potential consequences. Some RFGPTSs monitor the effectiveness of their soft mitigations through operational testing (including announced and unannounced observations); active monitoring of rules compliance, such as roving supervisors who observe operations or supervisor ride-alongs with train operators; and annual or biennial rules examinations and re-certification programs.

C. Safety Advisory 16-1

Even with the deployment of hard and soft mitigations, however, stop signal overruns continue to occur throughout the rail transit industry. Stop signal overruns pose safety risks to RFGPTS passengers and employees, including potentially catastrophic consequences. Thus, on

April 7, 2016, FTA issued *Safety Advisory 16-1, Stop Signal Overruns,* requesting that every SSOA provide certain information regarding stop signal overruns occurring during calendar year 2015 for each RFGPTS within the SSOA's jurisdiction. *See* 81 FR 21659 (April 12, 2016) and the material available at *http://www.transit.dot.gov/tso.html*. FTA continues to evaluate the preliminary information submitted by the SSOAs. The reported information confirms the diversity of signal systems deployed throughout the industry and suggests that both modal considerations and the operating characteristics and environment of a rail transit agency affect the type of stop signal system that agency uses and the effectiveness of that system. While FTA expected to find differences in the types of signal systems used across the industry, based on mode of transit operation, FTA found many inconsistencies in the definition of stop signal overruns across the industry, even within the same mode of operation.

The variety of industry signal system types and differences in definitions prevents FTA from conducting an in-depth, industry-wide analysis. Nonetheless, the data and information gathered for *Safety Advisory 16-1* indicates that stop signal overruns occurred with significant degrees of frequency across the rail transit industry in 2015. Further, FTA's analysis of the SSOAs' responses to *Safety Advisory 16-1* confirms that, in the near term, safety risks associated with stop signals need to be evaluated at the local level. Also, FTA's review of the responses to *Safety Advisory 16-1* indicates that the frequency of SSOA investigations may need to be increased even though many of these events may fall outside of the reporting thresholds under the longstanding State Safety Oversight rule at 49 CFR Part 659.

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Given the potential serious consequences of stop signal overruns, the differences in definitions, and the wide range of practices and requirements in the rail transit industry to protect against stop signal overruns, FTA finds there is a combination of unsafe conditions and practices

in the rail transit industry that create a risk of death or personal injury or damage to property or equipment. Therefore, FTA is proposing to issue a General Directive to Rail Fixed Guideway Public Transportation Systems and State Safety Oversight Agencies, as set forth below.

Readers should note the meaning of certain words and phrases used in this proposed directive, as follows:

Hard mitigation means mitigation applied through technological controls, systems, or devices for the purpose of preventing or minimizing the consequences of a stop signal overrun, independent of an employee's operational performance.

Non-consequential stop signal overrun means a stop signal overrun that did not result in an injury, fatality, or property damage. A "close call" or "near miss" is a non-consequential stop signal overrun.

Safety performance monitoring means activities that enable an RFGPTS to quantify its safety effectiveness and efficiency in its operations and service delivery, through a combination of safety performance indicators and safety performance targets.

Signal means a visual display device that conveys instruction regarding a train's authority to proceed. A signal may be located along the wayside, or in an operator's cab. Wayside signals may be fixed or temporary. Fixed wayside signals typically are structures set in place along the right-of-way that use colored lights for the purpose of controlling train movements. Examples of temporary wayside signals are hand signals, flags, lanterns, and cones.

Signal aspect means the visual appearance of a signal for controlling the movement of trains, as seen by a train operator from the direction of an approaching train.

Soft mitigation means mitigation applied through an employee's operational performance, as supported by training, rules, procedures, bulletins, and other forms of education or communication.

Stop signal means any signal displaying a visual aspect that indicates to an operator that a train does not have authority to proceed.

Stop signal overrun means a revenue or non-revenue rail transit vehicle passing any signal displaying a visual aspect that indicates to an operator that a train does not have authority to proceed, as specified in a RFGPTS's operating rules and procedures.

In accordance with 49 U.S.C. § 5329(f)(2), 49 CFR § 670.25, and the authority delegated to the Federal Transit Administrator by the Secretary of Transportation, 49 CFR § 1.91, FTA proposes that upon issuance of a final General Directive, every RFGPTS and SSOA must take the following actions:

Conduct a safety risk evaluation.

(a) Within 90 days of the issuance of this General Directive the RFGPTS must complete a safety risk evaluation of the potential consequences of hazards related to stop signal overruns. The safety risk evaluation must be a systematic analysis of stop signal overruns for the signal system(s); the safety risk evaluation does not require an RFGPTS to conduct an assessment of each individual signal in its system. The RFGPTS must convene a multi-disciplinary team, from within its own organization, to conduct this safety risk evaluation. The SSOA also must be represented on this team. The RFGPTS may retain consulting assistance for this team to support the safety risk evaluation, as appropriate. In conducting this safety risk evaluation, the RFGPTS must consider, at a minimum, data and information from the following sources:

(i) Stop signal overruns that occurred during the last three years, including identified common precursors, circumstances, and other contributing factors that led to the overruns, and any analysis of organizational factors or safety deficiencies that may have contributed to the overruns, and

(ii) Reports of non-consequential stop signal overruns.

(b) During its safety risk evaluation, the RFGPTS must evaluate the effectiveness of both hard and soft mitigations in place to prevent unacceptable safety risks resulting from stop signal overruns.

(c) During its safety risk evaluation, the RFGPTS must review the initial design premise of its signaling system and the subcomponents of that system, and any subsequent modifications, to determine whether deviations in operations or system changes have led to the passive acceptance of unknown or unevaluated safety risks. In conducting this review, the RFGPTS must evaluate the following, at a minimum:

(i) The relationship between signal spacing, line of sight, train speed and established braking distance, which influences the amount of time available to an operator to stop a train at the stop signal. (For purposes of conducting this evaluation, the RFGPTS may wish to review its response to FTA's *Safety Advisory 14-2: Verification of Rail Vehicle Safe Stopping Distances in Terminal Stations*, issued on June 13, 2014. *See* the notice of *Safety Advisory 14-2* at 79 FR 33992-3.)

(ii) The variation in signal spacing and the location of fixed signals on the approach to the stop signal.

(iii) The number of signal routes approaching the stop signal.

(iv) The features of infrastructure on each approach to and beyond the stop signal that either could increase the likelihood of a collision or worsen the consequences of a collision or derailment.

(v) The type of existing on-board train protection warning system, cab signaling, or automatic train protection system, or similar means of risk mitigation.

(vi) Signal visibility to determine the ease with which train operators can see and identify signals and signal markers. This determination must include all types of signals

used by the RFGPTS; for example, signals and signal markers that are permanent within the operating environment, and signals that are temporarily placed, such as cones and flags prior to work zones.

(d) If the RFGPTS identifies unacceptable safety risk or ineffective mitigations as the result of its safety risk evaluation, the RFGPTS must develop new mitigations or modify existing mitigations to bring the safety risk to a level deemed acceptable by the RFGPTS Accountable Executive and executive management.

(e) Within 60 days of the completion of the RFGPTS safety risk evaluation, the SSOA must (1) review the evaluation, including, specifically, the effectiveness of mitigations, (2) return the evaluation to the RFGPTS with specific direction for additional evaluation to be completed, if necessary, and (3) approve the evaluation.

Evaluate current safety performance monitoring activities in place to assess the effectiveness of mitigations.

Within 90 days of the issuance of this General Directive the RFGPTS must review and evaluate the activities it has designed to monitor, in an ongoing manner, the effectiveness of mitigations in place to prevent stop signal overruns. The RFGPTS also must evaluate its sources for data that would support the monitoring of mitigations in place to prevent stop signal overruns. Typical sources of data may include observation of operating practices, rules compliance checks and efficiency tests, inspections, dispatch logs or recordings, and employee reports. The RFGPTS must evaluate its ability to consistently monitor outputs from these and any other relevant data sources, and identify any areas in need of improvement.

Develop a corrective action plan.

As necessary and appropriate, the RFGPTS must develop a corrective action plan to address the findings of its safety risk evaluation and its assessment of the effectiveness of the

mitigations in place to prevent stop signal overruns. The RFGPTS must develop this corrective action plan within 150 days from the date of issuance of this General Directive, and submit the corrective action plan to its SSOA for review and approval. The corrective action plan must include a schedule with milestones for completion of the activities identified in that plan.

Review, approve, and oversee a corrective action plan.

In accordance with the FTA rule for State Safety Oversight at 49 CFR § 674.37, within 60 days of receipt of a corrective action plan submitted by an RFGPTS, the SSOA must (1) review the plan, (2) return the plan to the RFGPTS with specific direction for additional actions to be completed or revised, if necessary, and (3) approve the plan. The SSOA must monitor the RFGPTS's progress in carrying out the corrective action plan through unannounced, on-site inspections, or any other means the SSOA deems necessary or appropriate. The SSOA must report the status of the corrective action plan in the annual report to FTA required by 49 CFR § 674.39.

Please direct your questions regarding this proposed General Directive to Candace Key, Acting Director, Office of System Safety, 202-366-9178, or Candace.Key@dot.gov, or Scott Biehl, Senior Counsel, Office of Chief Counsel, (202) 366-0826 or Scott.Biehl@dot.gov.

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Acting Administrator

Appendix A: Timeline for Proposed General Directive Requirements