

**Regulatory Impact Analysis**  
**and**  
**Initial Regulatory Flexibility Act Analysis**  
**Proposed Rule:**  
**Public Transportation Agency Safety Plans**

**FTA-2015-2021**

**Federal Transit Administration**  
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## Executive Summary

This report analyzes the costs of the proposed regulatory changes and uses a breakeven analysis to conclude that the benefits of the proposed rule justify the costs. The proposed rule would require all public transportation providers that receive Federal financial assistance under 49 U.S.C. Chapter 53 to develop and implement Public Transportation Safety Plans as required by Section 20021 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), using the Safety Management System (SMS) approach. The statutory provisions which require this rulemaking recently were reauthorized through the Fixing America's Surface Transportation Act (FAST Act).

SMS is a flexible, scalable approach to safety that has been widely adopted across multiple modes of transportation in both the public and private sectors. It employs a systematic, data-driven approach in which risks to safety are identified, then controlled or mitigated to acceptable levels. SMS brings business-like methods and principles to safety, similar to the ways in which an organization manages its finances, through safety plans, with targets and performance indicators, and continuous monitoring of safety performance throughout an organization.

In addition to responding to the specific legislative mandate, the proposed rule responds to National Transportation Safety Board (NTSB) recommendations about expanding the use of SMS to reduce the risks of transit crashes. From 2004 to 2013, NTSB reported on nine transit accidents that, collectively, resulted in 15 fatalities, 297 injuries, and over \$30 million in property damages. Although transit systems have historically been among the safest means of surface transportation, the transit industry is facing increased pressures at a time when ridership is growing, infrastructure is aging, and large numbers of the workforce are retiring. During that same 2004-2013 time period, transit agencies reported over 40,000 incidents, approximately 2,000 fatalities, and over 76,000 injuries to Federal Transit Administration's (FTA) National Transit Database (NTD).

This Regulatory Impact Analysis (RIA) provides quantitative estimates of the expected compliance costs associated with the proposed rule. Costs for transit agencies were estimated based on the staff labor costs associated with implementing the requirements of the proposed rule, with adjustments for agency size and for agencies' existing level of maturity with SMS approaches. Three main cost areas were estimated: developing and certifying safety plans; implementing and documenting the SMS approach; and associated recordkeeping. Staff time was monetized using data on wage rates and benefits in the transit industry. Over the 20-year analysis period, total costs are estimated at \$752 million in present value (7% discount rate), or the equivalent of \$71 million per year. These cost estimates do not account for actions by agencies to mitigate safety risks based on implementing their safety plans.

FTA could not estimate the benefits of this rule. Instead, due to the range of potential SMS implementations and their impacts, FTA performed a breakeven analysis by estimating the amount of safety benefit needed to equal the estimated costs of certain requirements. The benefits of this rule would be based on the impact of the SMS approach, and the impact of the mitigating actions identified and implemented as a result of the SMS approach, on reducing transit crashes and their associated societal costs, including fatal and non-fatal injuries, property damage, and other costs. Inputs to the breakeven analysis included historical data on crash rates, and transit crash costs, including direct costs and U.S. Department of Transportation recommended standard statistical values for fatality and injury prevention.

Executive Summary Table 1 presents the pool of potential safety benefits for rail and bus agencies, forecasted based on actual information over the period 2010-2014 as described in more detail in the benefits section. Sensitivity analysis was conducted to test the impact of different values of statistical life and discount rates for future benefits, as well as assuming relatively lower cost for the very small agencies.

As Executive Summary Table 1 shows, the amount of bus and rail incident reduction needed to breakeven with estimated costs is low. However, benefits of SMS will primarily result from mitigating actions, which are largely not accounted for in this analysis. FTA has not estimated the benefits of implementing SMS without mitigating actions, but expects they are unlikely to be large. Estimated costs for agencies' safety plans do include certain activities that could yield safety improvements, such as improved communication, identification of hazards, and greater employee awareness. It is plausible that these activities alone could produce accident reductions that surpass the breakeven level, though even greater reductions could be achieved in concert with other mitigating actions, but the cost of those would need to be considered for determining whether net benefits are achieved.

**Executive Summary Table 1: Summary of Breakeven Analysis<sup>1</sup>**

	<b>Current Dollar Value</b>	<b>7% Discounted Value</b>	<b>3% Discounted Value</b>
<b>Bus Incidents (20-Year Estimate)</b>	\$86,999,489,120	\$40,894,178,605	\$58,084,884,054
<b>Rail Incidents (20-Year Estimate)</b>	\$37,680,410,444	\$17,711,706,703	\$25,157,185,334
<b>Total Pool of Benefits (20-Year Estimate)</b>	\$124,679,899,564	\$58,605,885,309	\$83,242,069,388
<b>Estimated Costs (20-Year Estimate)</b>	\$1,407,680,883	\$752,319,890	\$1,050,876,643
<b>Benefits and Costs of Mitigating Actions*</b>	Not Estimated	Not Estimated	Not Estimated
<b>Estimated Cost (Annualized)</b>	-	\$71,013,675	\$70,635,417
<b>Breakeven Threshold Including Bus and Rail</b>	-	1.28%	1.26%

<sup>1</sup> The costs and breakeven threshold in this table do not account for actions by agencies to mitigate safety risks identified through implementation of their safety plans (beyond those specifically required by the rule such as training).

## **1 Introduction**

This report analyzes the costs of the proposed regulatory changes and uses a breakeven analysis to conclude that the benefits of the rule justify the costs. Executive Orders 12866 and 13563 require agencies to regulate in the “most cost-effective manner,” make a “reasoned determination that the benefits of the intended regulation justify its costs,” and develop regulations that “impose the least burden on society.” The proposed rule is intended to improve transit safety and reduce the societal costs of transit crashes by implementing Public Transportation Safety Plans for all transit providers, using an SMS approach.

The proposed Public Transportation Agency Safety Plan rule is part of a program of rules and guidance under development by FTA in response to Section 20021 of MAP-21, which was reauthorized through the FAST Act and is codified at 49 U.S.C. § 5329. MAP-21’s Public Transportation Safety Program identified four areas for FTA to address to improve safety of the public transportation systems. These consist of the following requirements:

1. National Transportation Safety Plan: This plan will be a guidance document outlining the statutory requirements for safety performance criteria, define state of good repair, outline minimum safety performance standards for vehicles, and include FTA’s Public Transportation Safety Certification Training Program.
2. Public Transportation Safety Certification Training Program: This rule outlines the training requirements for Federal, State, and transit agency staff with oversight responsibilities for the rail public transportation systems.
3. Public Transportation Agency Safety Plan: This rule defines how operators will implement safety management systems and develop safety plans.
4. State Safety Oversight Program: This rule strengthens State safety oversight by giving State Safety Oversight Agencies (SSOAs) the authority to review, approve, oversee, and enforce transit agency safety plans and provide SSOAs with investigative authority.

The four areas are interconnected in the final outcome to improve safety performance. In developing the following regulatory impact analysis, effort is made to separate the costs and benefits attributable to other rules and the guidance. This document covers the third item, the proposed rule for Public Transportation Agency Safety Plans.

## **2 Summary of Proposed Rule**

The proposed rule would require all operators of public transportation systems to develop and implement Public Transportation Agency Safety Plans as required by Section 20021 of the Moving Ahead for Progress in the 21st Century Act (MAP-21), using the Safety Management System (SMS) approach. Appendix A provides a section-by-section summary of the proposed rule in more detail.

Following recommendations from FTA’s designated Federal Advisory Committee – the Transit Advisory Committee for Safety (TRACS),<sup>2</sup> the SMS approach has been adopted internally at FTA to support all future safety rules and guidance. On May 13, 2013, the FTA Administrator issued a Dear Colleague Letter to the transit industry outlining FTA’s intention to adopt the SMS approach as the basis for FTA’s initiatives to improve safety of public transportation.<sup>3</sup>

SMS is comprised of four essential components, or “pillars”: (1) Safety Management Policy, (2) Safety Risk Management, (3) Safety Assurance, and (4) Safety Promotion. Safety Management Policy is the foundation SMS. The safety management policy statement clearly outlines the organization’s safety objectives and sets forth the policies, procedures, and organizational structures necessary to accomplish the safety objectives. It clearly delineates management and employee responsibilities for safety throughout the organization. It also ensures that management is actively engaged in the oversight of the organization’s safety performance by requiring regular review of the safety policy by a designated Accountable Executive. Modern SMS practices that systematically and proactively identify the factors that contribute to unsafe events, and prevent or minimize the likelihood of their occurrence, have proven effective in other transportation sectors. SMS is a significant improvement over more “reactive” safety activities, which tend to focus on discovering and mitigating the cause of an accident only after that accident has occurred. Background on SMS and details of the SMS framework developed by FTA are provided in Appendix B.

Under the proposed rule, transit agencies would establish goals and performance targets in their Public Transportation Agency Plans, based on criteria and standards outlined by FTA in the National Transportation Safety Plan. The rule expands on the current practice of voluntary transit safety plans developed by some bus transit providers, as well as the safety plans required by 49 C.F.R. Part 659 for rail transit agencies. The proposed rule would promote practices that can change organizational safety management culture, where management and employees work together to identify potential safety risk hazards and solutions to improve safety performance.

### **3 Identification of the Problem and the Need for the Rule**

In 2010, nearly 10 billion unlinked passenger trips were made in the U.S. using public transportation systems; more than half of these were by bus and nearly 36% by heavy rail (subway systems).<sup>4</sup> Nearly 200,000 revenue vehicles are operated over approximately 12,500 miles of track and thousands of miles of roadways by over 4,000 agencies. The safety performance of these systems generally compares favorably to automobile travel, and historically, public transportation has been one of the safest modes of surface transportation. Today, however, the transit industry is facing increased pressures at a time when ridership is growing, demand is increasing, infrastructure is aging, and large numbers of the workforce are retiring, all in a challenging economic climate.

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<sup>2</sup> Implementing Safety Management System Principles in Rail Transit Agencies, available at [http://www.fta.dot.gov/documents/TRACS\\_Ltr\\_Rpt\\_SMS\\_fnl.pdf](http://www.fta.dot.gov/documents/TRACS_Ltr_Rpt_SMS_fnl.pdf).

<sup>3</sup> The Dear Colleague Letter is available at [http://www.fta.dot.gov/newsroom/12910\\_15391.html](http://www.fta.dot.gov/newsroom/12910_15391.html).

<sup>4</sup> Status of the Nation’s Highways and Bridges, and Transit: Conditions and Performance, Report to Congress, U.S. Department of Transportation (2013).

In recent years, there have been several major transit accidents that resulted in fatalities, injuries, and significant property damage. From 2004 to 2013, NTSB reported on nine transit accidents that, collectively, resulted in 15 fatalities, 297 injuries, and over \$30 million in property damage. During that same period, transit agencies reported over 45,000 incidents, more than 2,000 fatalities, and over 84,000 injuries to NTD.

While highways have seen a fairly steady decline in the number and rate of fatalities over time, the transit sector has not had the same experience. Total transit fatalities have fluctuated over the past decade, with some indications of an upward, rather than a downward, trend.<sup>5</sup>

Since 2000, twenty transit incidents (all on rail services) have occurred that were serious enough to be investigated by the National Transportation Safety Board (NTSB).<sup>6</sup> In sixteen of the twenty investigations, the causation-related findings suggested that an SMS approach would have helped avoid or mitigate the incident, and in nine of those cases NTSB made a specific recommendation that transit agencies adopt SMS (or related concepts, such as a “safety system plan” or “safety system program”) to address safety performance. For example, following a Washington Metropolitan Area Transit Authority (WMATA) rail accident in 2004, NTSB noted shortcomings in the agency’s safety practices with respect to operator fatigue and recommended that FTA require agencies to address issues of scheduling and fatigue “through the system safety program and hazard management process, if necessary” (R-06-3) and “assess the adequacy of WMATA’s current organizational structure and ensure that it effectively identifies and addresses safety issues” (R-06-4).<sup>7</sup>

In addition to operator fatigue, other factors that were identified by NTSB as potential or probable causes of the incidents investigated were: communication failures; lack of safety briefings; inadequate safety procedures for carrying out work; and inadequate safety oversight by the agencies, including inadequate follow-up on safety recommendations and lack of a single point of responsibility.

A 2011 Governmental Accounting Office (GA-11-199)<sup>8</sup> report noted that of the eight accidents investigated by NTSB between 2004 and 2010, the probable cause of five of the accidents involved employee errors, such as the failure of train operator to comply with operating rules and of track inspectors to maintain an effective lookout for oncoming trains while working on the tracks. Of the remaining three accidents, NTSB found that problems with equipment were a probable cause of two accidents and that weakness in management of safety by transit agency was probably a cause in all three accidents. In six of these accidents investigated by NTSB, NTSB identified deficiencies in safety

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<sup>5</sup> Bureau of Transportation Statistics, National Transportation Statistics, October 2015, Tables 2-1, 2-17, and 2-32. For example, from 2000 to 2013, the fatality rate per 100 million vehicle-miles traveled fell from 1.53 to 1.09 for highways, while the rate for transit rose slightly from 9.8 to 9.9 during that period. Transit’s higher rate reflects its greater vehicle occupancy of roughly 12 persons per vehicle, versus 1.6 for automobiles; reporting standards and definitions also differ across modes, preventing a more precise comparison.

<sup>6</sup> An additional investigation is underway regarding the January 2015 tunnel fire in the Washington, DC metro system.

<sup>7</sup> NTSB, Collision Between Two Washington Metropolitan Area Transit Authority Trains at the Woodley Park-Zoo/Adams Morgan Station in Washington, D.C., November 3, 2004 <http://www.nts.gov/investigations/AccidentReports/Reports/RAR0601.pdf>.

<sup>8</sup> GAO, Rail Transit: FTA Programs Are Helping Address Transit Agencies’ Safety Challenges, But Improved Performance Goals and Measures Could Better Focus Efforts, (GA)-11-199, January 2011.



management and oversight, such as weaknesses in transit agencies' safety rules and procedures, lack of safety culture within the transit agency and lack of oversight by the state safety oversight agency and FTA. GAO defines safety culture as an awareness of and organizational commitment to safety shared by all employees at all levels within the organization.

Use of an SMS approach is expected to reduce the probability of future incidents by elevating safety to a higher level of decision making and accountability; by incorporating proactive risk and hazard identification; and by allowing increased employee involvement, for example through near-miss reporting and training.

### **3.1 Congressional Mandate and Legal Authority**

The accompanying proposed rule directly responds to the congressional mandate in Section 20021 of MAP-21, which was reauthorized in the FAST Act and codified at 49 U.S.C. § 5329. In this legislation, Congress directed FTA to establish a comprehensive Public Transportation Safety Program, one element of which is the requirement for Public Transportation Agency Safety Plans. Pursuant to 49 U.S.C. 5329(d), FTA must issue a final rule requiring operators of public transportation systems that receive financial assistance under Chapter 53 to develop and certify Public Transportation Agency Safety Plans.

Pursuant to 49 U. S.C. 5329(d)(1), each Public Transportation Agency Safety Plan must include, at minimum:

1. A requirement that the board of directors, or equivalent entity, approve the plan and any updates;
2. Methods for identifying and evaluating safety risks throughout all elements of the recipient's public transportation system;
3. Strategies to minimize the exposure of the public, personnel, and property to hazards and unsafe conditions;
4. A process and timeline for conducting an annual review and update of the plan;
5. Performance targets based on the safety performance criteria and state of good repair standards set out in the National Public Transportation Safety Plan;
6. Assignment of an adequately trained safety officer who reports directly to the general manager, president, or equivalent officer of the recipient; and
7. A comprehensive staff training program for operations personnel and personnel directly responsible for safety that includes the completion of a safety training program and continuing safety education and training.

### **3.2 Discussion of Existing Programs**

Prior to MAP-21, FTA's authority to require safety plans was limited to rail transit agencies subject to FTA's State Safety Oversight Rule. Under 49 C.F.R. Part 659, any State that has a rail fixed guideway system not subject to FRA regulation is required to establish a State Safety Oversight Agency (SSOA), and each SSOA must require each rail fixed guideway system within its jurisdiction to develop a system safety and a system security program plan. These plans are reviewed and approved by state safety oversight agencies.

In addition to requiring safety and security plans for rail fixed guideway systems, FTA established and currently manages a voluntary Bus Safety Program that has encouraged bus transit agencies to develop system safety program plans to implement safety program activities. The voluntary program has been very well received and has promoted coordination among FTA, the Community Transportation Association of America (CTAA), and the American Public Transportation Association (APTA) to provide technical assistance to bus transit agencies to support system safety program plan development and implementation. Through FTA’s Bus Safety Program, more States have recommended that their bus transit agencies develop safety plans using templates provided by FTA through its safety website. In addition, a number of States require both rail and bus transit agencies to develop system safety program plans. According to APTA, thirty-four agencies have agency safety plans that comply with APTA guidelines, but in total about fifty bus transit agencies have system-wide plans. Given that there are potentially over four thousand transit service providers in the U.S., only a very small number of them have plans that meet the current industry standards.

The current voluntary practice for bus transit providers to develop safety plans has unfortunately not been adopted rapidly across the industry, suggesting a need for the proposed rule to expand the use of the safety plan approach to the rest of the industry. The proposed rule will require all large and rail operators that receive FTA financial assistance through FTA’s Urbanized Area Formula Program at 49 U.S.C. § 5307 (Section 5307) to develop a plan of their own. Smaller operators will have the option of allowing the State to develop their plans, minimizing the burden on them. In addition, transit providers will be required to adopt an SMS approach in developing their plans. The SMS approach is scalable to the size of the agency and will enable transit providers to proactively identify potential safety hazards through enhanced incident investigations, looking beyond the immediate cause or responsible party for the incident. Often, many decisions and actions lead up to the point when a safety incident occurs. Identifying the chain of events can prove very useful in avoiding future safety incidents.

#### **4 Identification of Available Alternative Approaches**

To develop regulatory requirements for the proposed NPRM, FTA examined the requirements outlined in MAP-21, 49 U.S.C. 5329(d), and the safety policy of the U.S. Department of Transportation (USDOT). U.S.DOT supports a comprehensive approach to safety decision-making as promoted by the Safety Management System approach. This approach is endorsed by TRACS, many public transportation agencies, and public transportation industry associations. To facilitate the decision making process, FTA conducted a crosswalk between the statutory provisions of MAP-21 and the SMS approach. As outlined above in Section 2 of this analysis and presented in more detail in the appendix to this document, SMS is comprised of four essential components: (1) Safety Management Policy, (2) Safety Risk Management, (3) Safety Assurance, and (4) Safety Promotion. The details of the four components of SMS were compared to the legislative requirements of MAP-21. It was found that each of these components or “pillars” largely overlapped with the requirements of the statute 49 U.S.C. § 5329(d) to develop the Public Transportation Agency Safety Plan.

Table 1 below illustrates the cross-walk between the statutory provisions and the SMS pillars.

**Table 1: Crosswalk between the Statutory Requirements for Safety Plans and the Pillars of SMS**

<u>Statutory Provision</u>	<u>Safety Plan Must Include:</u>	<u>SMS Pillar</u>
49 U.S.C. § 5329(d)(1)(A)	“a requirement that the board of directors (or equivalent entity) of the recipient approve the agency safety plan and any updates to the agency safety plan”	Safety Management Policy
49 U.S.C. § 5329(d)(1)(B)	“methods for identifying and evaluating safety risks throughout all elements of the public transportation system of the recipient”	Safety Risk Management
49 U.S.C. § 5329(d)(1)(C)	“strategies to minimize exposure of the public, personnel, and property to hazards and unsafe conditions”	Safety Risk Management
49 U.S.C. § 5329(d)(1)(D)	“a process and timeline for conducting an annual review and update of the safety plan of the recipient”	Safety Assurance
49 U.S.C. § 5329(d)(1)(E)	“performance targets based on the safety performance criteria and state of good repair standards”	Safety Management Policy
49 U.S.C. § 5329(d)(1)(F)	“assignment of an adequately trained safety officer who reports directly to the general manager, president, or equivalent officer of the recipient”	Safety Management Policy
49 U.S.C. § 5329(d)(1)(G)	“a comprehensive staff training program for the operations personnel directly responsible for safety of the recipient”	Safety Promotion

Safety Management Policy is the foundation of the organization’s SMS. The safety management policy statement clearly states the organization’s safety objectives and sets forth the policies, procedures, and organizational structures necessary to accomplish the safety objectives. It clearly delineates management and employee responsibilities for safety throughout the organization. It also ensures that management is actively engaged in the oversight of the organization’s safety performance by requiring regular review of the safety policy by a designated Accountable Executive (general manager, president, or other person with similar authority). Within the context of the Public Transportation Agency Safety Plan, an organization’s safety objectives will be articulated through the setting of performance targets based on, at a minimum, the safety performance criteria established in the National Public Transportation Safety Plan,

and state of good repair standards based on the definition of that term established under the National Transit Asset Management System Rule. See 49 U.S.C. 5329(d)(1)(E).

Pursuant to the statutory requirements at 49 U.S.C. 5329(d)(1)(B) and (C), each agency's Public Transportation Agency Safety Plan must include "methods for identifying and evaluating safety risks throughout all elements of the public transportation system," and "strategies to minimize the exposure of the public, personnel, and property to hazards and unsafe conditions." Each of these requirements is consistent with the second component of SMS—Safety Risk Management—which requires the development of processes and activities to help the organization better identify hazards associated with its operational systems. Once identified, a transit agency would evaluate the safety risk associated with the potential consequences of these hazards, and then institute mitigations, as necessary, to control the consequences or minimize the safety risk. Additionally, FTA proposes to require a transit agency to perform hazard identification activities on those assets that do not meet the state of good repair standards established under the National Transit Asset Management System.

The statutory requirements at 49 U.S.C. 5329(d)(1)(B), (C), and (D) also encompass the requirements of the third component of SMS—Safety Assurance. Safety Assurance requires an organization to monitor the effectiveness of safety risk mitigations established under Safety Risk Management. Safety Assurance is also designed to ensure that the organization meets or exceeds its safety objectives through the collection, analysis, and assessment of data about the organization's performance. One of the key elements of Safety Assurance is a regular review and update of a transit agency's SMS and overall safety plan to ensure their effectiveness.

The fourth component of SMS—Safety Promotion—involves the training, awareness, and communication that support safety. The training aspect of SMS is consistent with the statutory requirement for a comprehensive staff training program for operations personnel and personnel directly responsible for safety. See 49 U.S.C. 5329(d)(1)(G).

Service providers within the public transportation industry can vary greatly based on size, complexity, and operating characteristics. Transit agencies need safety processes, activities, and tools that scale to size, complexity, and uniqueness of the transit system. SMS provides such an approach. SMS is flexible, and can be scaled to the mode, size, and complexity of any transit operator, in any environment—urban, suburban, or rural. The extent to which the transit agency's SMS processes, activities, and tools are used and documented will vary from agency to agency. For a small bus operation, SMS is going to be simple and straightforward. For a larger transit agency with hundreds or thousands of employees and multiple modes, SMS is going to be more complex.

SMS scales itself to reflect the size and complexity of the operation, but the fundamental accountability remains the same. SMS establishes the accountabilities, processes and activities necessary to ensure that appropriate information rises to the highest levels of the organization to support decision-making related to safety risk. However, each transit agency will determine the level of detail necessary to identify and evaluate its own unique safety risks and target its resources to manage those safety risks.

## 4.1 Alternatives Considered

FTA first developed very detailed and specific regulatory requirements for developing a public transportation agency safety plan to fully adopt the SMS approach. The cost of implementing the rule for transit service providers was estimated for this proposed language. Table 2 below shows the costs by SMS component and other requirements.

**Table 2: Alternative 1: Agency Safety Plan Cost – Comprehensive SMS Approach**

<b>Regulatory Requirements</b>	<b>Initial, Non-Recurring Costs</b>	<b>Annually Recurring Costs</b>
<b>Subpart B</b>		
General Requirements	\$2,489,654	\$227,617
Certificate of Completion	\$241,526	\$54,409
Subpart B Travel, Materials, Records, and IT	\$1,837,857	\$141,598
<b>Subpart C</b>		
Safety Management Policy	\$8,009,598	\$6,149,066
Safety Risk Management Process	\$10,102,049	\$7,728,113
Safety Assurance Process	\$33,718,662	\$25,910,834
Safety Promotion Program	\$13,168,600	\$10,126,624
Subpart C Travel, Materials, Records, and IT	\$7,379,844	\$5,716,692
<b>Subpart D</b>		
Safety Plan Documentation	\$3,552,742	\$3,552,742
Safety Plan Records	\$18,319,998	\$18,319,998
Subpart D Travel, Materials, Records, and IT	\$10,739,180	\$10,739,180
<b>TOTAL</b>	<b>\$109,559,711</b>	<b>\$88,666,873</b>

\*The estimates in the above table exclude the cost of actions to mitigate safety risks that are not specifically prescribed in the proposed rule such as training.

Alternative 1 will incur an estimated cost of approximately \$110 million in the first year and \$89 million each year thereafter. FTA reviewed Alternative 1 to identify requirements that could be removed to lessen the burden on the transit industry, but maintain the essence of the SMS approach to develop the agency safety plan. FTA modified Alternative 1 by eliminating and modifying certain provisions, such as requiring an explicit commitment to safety objectives and a description of agency resources for safety management and many other requirements that were very prescriptive. Alternative 2 is less prescriptive than Alternative 1, in particular, for safety policy, risk management, risk assurance, and safety promotion. By being less prescriptive, Alternative 2 would enable transit service providers greater flexibility to develop processes and structures more appropriate to their agency, mode, and available resources, at a lower estimated cost.

FTA estimated the costs for Alternative 2, the modified SMS approach. Table 3 below shows the costs of the modified proposed alternative.

**Table 3: Alternative 2: Agency Safety Plan Costs: Modified SMS Approach<sup>9</sup>**

<b>Regulatory Requirements</b>	<b>Initial, Non-Recurring Costs</b>	<b>Annually Recurring Costs</b>
<b>Subpart B</b>		
General Requirements	\$2,412,336	\$229,265
Certificate of Completion	\$207,456	\$37,996
Subpart B Travel, Materials, Records, and IT	\$1,802,500	\$156,363
<b>Subpart C</b>		
Safety Management Policy	\$6,637,956.36	\$5,045,817.70
Safety Risk Management Process	\$6,561,779	\$4,983,425
Safety Assurance Process	\$22,390,376	\$17,028,316
Safety Promotion Program	\$9,526,702	\$7,275,102
Subpart C Travel, Materials, Records, and IT	\$7,379,844	\$5,687,797
<b>Subpart D</b>		
Safety Plan Documentation	\$3,171,921	\$3,171,921
Safety Plan Records	\$16,356,261	\$16,356,261
Subpart D Travel, Materials, Records, and IT	\$9,588,038	\$9,588,038
<b>TOTAL</b>	<b>\$86,035,168</b>	<b>\$69,560,301</b>

The estimated cost of Alternative 2 is roughly \$24 million less than for Alternative 1 in initial costs, and roughly \$19 million less in annually recurring costs. The cost reductions are significant for the SMS components of the rule.

Since the introduction of SMS is recent to the transit service sector in the U.S., there is little measured evidence of the effect this approach would have in improving safety performance. It was therefore decided to select the less stringent and less costly alternative to propose for this rulemaking. One of the advantages of SMS is its scalability and flexibility. By eliminating some of the burdensome regulatory requirements of Alternative 1, it will help transit service providers to tailor the SMS approach more closely to their circumstances to maximize the return for safety performance. FTA invites comment on the alternatives considered and the application of SMS to drafting the public transportation agency safety plan. The details of the requirements for the two alternatives can be found in Appendix A to this document. FTA invites comments on additional alternatives that more cost-effectively satisfy the statutory requirements and help ensure the safety of the nation's public transportation systems. FTA also seeks information about their benefits and costs compared to FTA's proposed approach.

<sup>9</sup> The estimates in the above table exclude the cost of actions to mitigate safety risks that are not specifically prescribed in the proposed rule such as training.

FTA acknowledges the financial challenge for small transit service providers to respond to additional regulations. FTA therefore limited the applicability of the rule to those agencies that provide a regular, fixed route, open to all public transportation service. The proposed rule does not therefore require most of the recipients under 49 U.S.C. § 5310 who provide specialized services to seniors and people with disabilities to develop and implement an agency safety plan. Additionally, to reduce the administrative, regulatory, and financial burdens on smaller transit operators, FTA is proposing that small operators which receive FTA funds under 49 U.S.C. §§ 5307 and 5311 have the opportunity to get their safety plans drafted and certified by the State in which they are located. The scalability of SMS would allow small operators to implement simpler safety plans that are more tailored to their needs and satisfy each of the basic statutory requirements of 49 U.S.C. § 5329(d). FTA would not prescribe any specific methodology for satisfying any of the statutory requirements for safety plans. FTA would provide extensive technical assistance and develop safety plan templates for small operators, and all other operators of public transportation.

Detailed cost estimates and the underlying assumptions are presented for Alternative 2 in Section 5 of this document as that is the proposed rule.

## 4.2 No-Action Case

For the purposes of this Regulatory Impact Analysis, the expected impacts of the proposed rule are compared against current industry practices to estimate the incremental costs of the proposed rule.

Existing practices vary substantially across transit providers. Safety plans are already required under 49 C.F.R. Part 659 for the 60 rail transit agencies. Currently, 7 States require transit service providers to develop safety plans and at least 13 other States provide guidance or templates to develop safety plans. Under these programs, 989 plans have been developed, that is roughly 44% of the bus transit agencies to be included in the proposed NPRM. This data is used to develop assumptions on the extent to which agencies comply with the requirements of the NPRM. The detail level and content of the current safety plans likely varies considerably and it is likely that most of them will not meet the requirements of the current NPRM. To be conservative, the cost estimates developed in this document assume that even the most detailed plans would still need to incur 50% of the cost to develop a plan under this NPRM.

Looking beyond the safety plan to the underlying SMS approach, both Transit Cooperative Research Program Report 174<sup>10</sup> and FTA's own gap analysis found that SMS has not yet been adopted across the transit industry. As part of the bus program onsite review process, FTA has conducted 57 SMS gap analysis since 2007. The SMS gap analysis consists of interviews with key safety personnel and employees. FTA uses a gap analysis checklist of nearly 70 questions to conduct the SMS gap analysis to identify the level of SMS maturity at the bus agencies. The maturity level tiers include: initiating, planning, implementing and managing and monitoring. FTA also has conducted SMS gap analyses for a few large rail agencies recently. Although many agencies are at the stage of initiating, planning, and implementing some *elements* of the SMS, most agencies are not at the managing and monitoring level for all the components of SMS. Often, the major elements such as safety risk management and safety assurance are not fully developed. According to TCRP Report 174, many agencies had weaknesses in

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<sup>10</sup> TCRP Report 174, Improving Safety Culture in Public Transportation, TRB.

areas such as visible action on all reported safety issues; accident focus is preventing recurrence; high level of trust between management and employees; and near miss accident reporting in place (data collection). One of the major focuses of SMS is developing an agency-wide culture of safety and being proactive to prevent future incidents through data on near misses, increasing employee trust, and performance.

It is possible that over time more transit agencies would adopt components of SMS, even in the absence of the proposed rule or other initiatives. However, it is difficult to predict how broad and rapid that diffusion would be. For purposes of this analysis, the baseline assumes no agency would adopt any additional components of SMS in the absence of this rule.

## **5 Definition and Evaluation of the Benefits and Costs**

### **5.1 Data Sources and Methodology**

Costs are estimated here using both FTA and external datasets as detailed more specifically in the sections below. As safety practices vary significantly across agencies, FTA needed to make a number of assumptions in order to estimate costs. FTA seeks comment on the accuracy of the assumptions used and suggestions for other potential sources of relevant data.

The analysis takes a societal perspective, including benefits and costs regardless of to whom they accrue. It uses a 20-year period from an assumed start date of 2016 through 2035 to capture the mix of upfront and recurring costs. Future benefits and costs are discounted to reflect the time value of money, using a 7% discount rate and using a 3% discount rate as a sensitivity case and a base year of 2015.

For estimation purposes, transit providers are divided into groups based on funding classification, size, and mode.

- “Rail” agencies are those that are funded via Section 5307 and operate at least one fixed-guideway rail transit service. These agencies are subject to the existing State Safety Oversight Rule at 49 C.F.R. Part 659.
- “Large 5307” agencies are those funded via Section 5307 that do not operate rail transit service and have more than 100 vehicles operated in revenue service.
- “Small 5307” agencies are those funded via Section 5307 that do not operate rail transit service and have 100 or fewer vehicles operated in revenue service.
- “Section 5311” agencies are those that receive FTA financial assistance through FTA’s Rural Area Formula Program at 49 U.S.C. § 5311 (Section 5311), including rural and tribal transit providers.
- “Section 5310” agencies are those that receive FTA financial assistance through FTA’s Enhanced Mobility of Senior and Individuals with Disabilities Formula Program at 49 U.S.C. § 5310 (Section 5310) and do not provide service that is closed to the general public and only available for a particular clientele.



## 5.2 Costs

The costs estimates presented below are for Alternative 2 discussed above. FTA estimated costs in the following major categories for the proposed rule: the development and certification of the agency safety plan; implementation and documentation of an SMS approach; and recordkeeping costs. Each of these areas has associated activities as described in more detail below. In general, these costs are estimated based on the required number of staff labor-hours for each task, the wage rates for those labor-hours, and the number of affected transit providers. Separate figures are estimated for initial, non-recurring activities and for annually recurring activities. Anticipated increases in technology and travel costs to support the rule also are included.

Regarding agency actions to mitigate risks identified through their SMS programs, the compliance costs as estimated in this analysis include only certain basic mitigating actions, such as developing strategies to reduce identified risks, developing improved training programs, and the assignment of a safety officer. The analysis does not estimate costs for other types of mitigating actions by agencies, such as vehicle modifications, additional training, technology investments, or changes to operating procedures. FTA lacks information to estimate such cost and is unable to reliably predict the types of actions agencies may take to address safety risks, and the impact of those actions. FTA seeks public comments on information to do so.

To represent the *incremental* costs of the proposed rule more accurately, adjustments were made to the initial estimates to reflect relevant programs and initiatives that already exist. For example, many larger transit agencies already have implemented components of SMS. Likewise, agencies with rail transit systems are subject to FTA's State Safety Oversight Rule and have safety programs and plans in place that will address portions of the proposed rule. Further adjustments were made to the estimates to account for the use of group plans (versus individual plans) and the savings associated with the use of FTA-supplied document templates.

Wage rates for transit agency labor hours are based on a combination of sources. Hourly wage rates are estimated using annual average salaries for various classifications of labor, divided by 2,080 hours of work per year. The average Accountable Executive salary for Rail agencies was determined by a random sampling of publicly available Chief Executive Officer (CEO) salary information and total compensation data available through NTD. Other salaries for rail agencies were determined as a ratio of the Accountable Executive salary based on the same ratios exhibited by the available May 2013 Bureau of Labor Statistics (BLS) data for urban transit systems and interurban and rural bus transportation.<sup>11</sup> Salaries for Large and Small 5307 agencies also were estimated based on this BLS data. The annual salaries were adjusted to account for benefits, using BLS data on benefits.<sup>12</sup>

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<sup>11</sup> See [http://www.bls.gov/oes/current/naics3\\_485000.htm](http://www.bls.gov/oes/current/naics3_485000.htm).

<sup>12</sup> Bureau of Labor Statistics News Release. Employer Costs for Employee Compensation – September 2014. Table 3, state and local workers, service-providing industry group.

[http://www.bls.gov/news.release/archives/ecec\\_12102014.htm](http://www.bls.gov/news.release/archives/ecec_12102014.htm).

For these employees, BLS data show wages as 64.1% of total compensation, with benefits at 35.9%.

**Table 4: Summary of Transit Industry Salaries and Fringe Benefits**

Title	Average Industry-Wide Salary			Fully-Loaded Salary		
	Rail	Large 5307	Small 5307	Rail	Large 5307	Small 5307
Accountable Executive	\$207,389	\$165,080	\$90,450	\$323,527	\$257,525	\$141,102
Chief Safety Officer <sup>13</sup>	\$131,245	\$104,470	\$53,670	\$204,742	\$162,973	\$83,725
Safety Staff	\$112,262	\$89,360	\$61,730	\$175,129	\$139,401	\$96,299
Safety Data Analyst	\$86,621	\$68,950	\$56,390	\$135,129	\$107,562	\$87,968
Operations / Maintenance Manager <sup>14</sup>	\$131,245	\$104,470	\$53,670	\$204,742	\$162,973	\$83,725
Training Staff <sup>15</sup>	\$35.92	\$28.59	\$23.00	\$56.03	\$44.60	\$35.88

In addition to the rates listed above, the estimated State Program manager salary based on industry knowledge is \$60,000. Applying the benefit adjustment leads to a total annual salary of \$93,600. Wage rates for Section 5311 agencies are estimated as 75% of the rates for Small 5307 agencies, and wage rates for Section 5310 agencies are estimated as 75% of the rates for Section 5311 agencies.

The estimated number of hours of effort for each activity required in the NPRM was developed by FTA staff with input from consultants who have extensive experience with transit safety-related programs and SMS under the voluntary bus safety program and State Safety Oversight Agency Program. Estimates were reviewed by FTA for reasonableness and finalized based on discussions with the consultants, but they remain subject to uncertainty given the number of transit agencies and differences in their current level of SMS maturity. To account for differences between agencies providing rail and bus services, bus-only services, and State agencies, separate estimates were made for the number of hours for each of these groups. The number of hours is estimated for the representative average agency, whereas in practice the smaller agencies may have lower costs and the bigger ones higher costs for the same activity.

For each cost category, the estimated per agency hours needed to fulfill each requirement are multiplied by the hourly wage rates derived from the fully-loaded annual salaries listed above. Additional expenses are factored in, and the per agency rates costs are multiplied by the number of agencies in each category. Finally, as described below, various discounting methods are used to accurately represent the current state of the industry.

<sup>13</sup> For Small 5307 operators, this likely would not be its own position, but duties would be filled by a Supervisor or Training Staff (and estimated compensation is an estimate for these positions).

<sup>14</sup> For Small 5307 operators, this likely would not be its own position, but duties would be filled by a Supervisor (and estimated compensation is an estimate for this position).

<sup>15</sup> These wage rates are represented as hourly wage rates.

Based on available data from NTD, as well as estimates from FTA and industry experts, the estimated number of agencies impacted by the rule, and the estimated number of agency safety plans that will be required, is listed below by agency type. The agencies included below are those that provide a public transportation service that is accessible to all transit users. This excludes providers who only serve members of specific community organizations.

**Table 5: Agencies by Group (2013)<sup>16</sup>**

	<b>Rail</b>	<b>Large 5307</b>	<b>Small 5307</b>	<b>Section 5311</b>	<b>Section 5310</b>
Number of Agencies	60	127	625	1,300	200
Estimated Number of Agency Safety Plans	60	127	94	195	30
Estimated Number of Agencies Covered by State-Level Plans	0	0	531	1,105	170

Agencies not preparing their own Public Transportation Agency Safety Plan will be covered by the fifty-five state-level plans that will be developed by each of the fifty States, plus the District of Columbia and U.S. territories. Under the proposed rule, these 55 State entities will be responsible for plan development in coordination with some small agencies and plan certification for others.

The sections below detail the estimated costs required for these agencies by the following cost areas: agency safety plan development and certification, SMS implementation and documentation, and recordkeeping.

### 5.2.1 Agency Safety Plan Development and Certification

Estimated costs in this section relate to the development of the safety plan itself, including documentation of processes (e.g., delineating management and employee responsibilities for safety throughout the organization), target-setting, and review and approval by the Accountable Executive. Relevant staff positions for this work include safety staff, a safety data analyst, an operations/maintenance manager, and a chief safety officer, in addition to the Accountable Executive. The number of hours required for each position will vary with agency size and will depend on each agency's degree of existing plans and programs.

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<sup>16</sup> Source: National Transit Database, FTA, 2013. This is the latest year for which data are available. Estimates also were based on consultation with industry experts.

**Table 6: Estimated Initial Hours Required for Plan Development and Certification**

	<b>Accountable Executive</b>	<b>Chief Safety Officer</b>	<b>Safety Staff</b>	<b>Safety Data Analyst</b>	<b>Operations / Maintenance Manager</b>	<b>TOTAL</b>
Rail Agencies	3	82	120	40	80	325
Large 5307	3	85	112	48	83	331
Small 5307	21	68	0	0	44	133
Section 5311	75% of estimated Small 5307 agency hours					
Section 5310	75% of estimated Section 5311 agency hours					

In addition to the hours detailed above, it is estimated that State Agency Program Managers will spend approximately 226 hours completing the necessary requirements for safety plan development and certification. This includes developing a group safety plan for small agencies within each State. FTA estimates that, on average, each State Agency Program Manager will develop and certify 33 small agency plans, (1,806 total agency plans divided by 55 States and other territories). FTA further estimates that each manager will spend, on average, 8 hours developing and certifying each plan (as discussed below, the analysis assumes an additional 4 hours per plan for coordination). These hours serve as the basis for the State agency costs associated with this cost category.

Along with the above estimates of per agency hours, which are converted to costs, estimated additional expenses for travel (\$5,000 for Large 5307 agencies; \$1,000 for Small 5307 agencies; \$750 for Section 5311 agencies; \$563 for Section 5310 agencies) and materials, records, and IT expenses (such as supporting software or additional workstations) (\$5,000 for Small 5307 agencies; \$3,750 for Section 5311 agencies; and \$2,813 for Section 5310 agencies) were factored in.

The total labor and other costs were then adjusted based on the two factors listed below in order to derive the final costs.

- (1) Use of FTA-provided templates that will facilitate and ease plan development. It is estimated that Large 5307 agencies and Small 5307 agencies will experience costs reduced by approximately 50% for use of FTA templates. Section 5311 and Section 5310 agencies will experience a lesser reduction as their overall cost burden is estimated to be smaller. These estimated adjustment rates are based on consultation and discussion with industry experts as well as the anticipated level of detail included in the FTA-provided templates.
- (2) Maturity of existing safety plans and procedures. The varying degree of existing agency practice was separated into the following three categories:
  - High: Assumes plans are in place currently or require little revision. Total estimated costs were reduced by 50% for agencies in this category.

- Medium: Assumes current plans require some revision, or State templates or moderate documentation exists. Total estimated costs were reduced by 25% for agencies in this category.<sup>17</sup>
- Low: Assumes minimal existing plans or documentation. Agencies in this category received no cost reduction.

The estimated numbers of agencies within each maturity category are based on information provided by consultants working with the transit industry on safety programs. These estimates are somewhat uncertain due to the wide range of agency sizes and types, and FTA seeks public comment on their reasonableness. Table 7 below describes the adjustment assumptions.

**Table 7: Adjustments and Maturity Assumptions for Plan Development and Certification**

	Labor Cost Adjustment due to Use of FTA-Provided Templates	Estimated Number of Agencies in Each Maturity Category		
		High	Medium	Low
Rail Agencies	50.0%	20	30	10
Large 5307	50.0%	24	51	52
Small 5307	50.0%	137	223	265
Section 5311	37.5% (75% of Small 5307)	204	350	746
Section 5310	28.1% (75% of 5311)	31	54	115
State	50.0%	6	22	27
Federal <sup>18</sup>	NA	0	1	0

For Small 5307, Section 5311, and Section 5310 agencies, it is estimated that individual plans will only be developed by 15% of these agencies, resulting in a total of 94 individual Small 5307 plans (625 agencies multiplied by 15%), 195 individual Section 5311 plans (1,300 agencies multiplied by 15%), and 30 individual Section 5310 plans (200 agencies multiplied by 15%). Agencies completing an individual plan were classified as having a high level of maturity. These estimates are based on consultation and discussion with industry experts. Additionally it is assumed that States will require one hour of time at each agency, at the State Program Manager wage rate, to certify plans for each Small 5307, Section 5311, and Section 5310 agencies, plus \$2,500 in travel costs for coordination. For the 85% of agencies that are involved in group plans, it is assumed that each State will require four hours of time for each agency, at the State Program Manager wage rate, for plan development and coordination. These per agency coordination costs incurred by States are in addition to the estimated 226 hours necessary for State program managers to develop and certify plans described above.

<sup>17</sup> With the exception of Large 5307 agencies, whose total estimated costs were discounted by 50%. This was based on the assumption that these agencies would receive additional State support in the form of templates or guidance.

<sup>18</sup> FTA does not expect to incur incremental costs to implement the proposed rule. FTA is supporting the implementation of MAP-21 and FAST Act provisions, and as those efforts are finalized, staff and resources will shift toward guidance and oversight, with little to no change in staffing levels or other costs.

Total costs are estimated based on the total staff hours required, the associated wage rates, and then adjusted by the factors described above. Finally, the total per agency cost in each category was multiplied by the respective number of agencies.

Recurring costs to maintain and update the plan for each agency type are based on calculating 25% of the estimated initial safety plan documentation for each agency type, and multiplying by the number of agencies. Costs per agency for Section 5311 agencies are estimated at 75% of the per-agency costs for Small 5307 agencies. For Section 5310 agencies, the per-agency costs are estimated at 75% of those for Section 5311. State agency recurring costs are based on the time required (1 hour per agency) to recertify each safety plan. The total initial and recurring costs for agency safety plan development and certification are listed below. Again, these figures are best estimates and reflect uncertainties regarding the existing SMS maturity levels of transit agencies and the staff time required for implementation. FTA seeks information that could be used to refine these estimates.

**Table 8: Agency Safety Plan Development and Certification Initial and Recurring Costs, By Agency Type**

	<b>Initial, Non-Recurring Costs</b>	<b>Annually Recurring Costs</b>
Rail Agencies	\$618,697	\$74,142
Large 5307	\$1,500,158	\$124,918
Small 5307	\$420,302	\$44,987
Section 5311	\$655,670	\$70,180
Section 5310	\$75,654	\$8,098
State	\$1,091,810	\$61,298
Federal <sup>19</sup>	\$60,000	\$40,000
<b>TOTAL</b>	<b>\$4,422,292</b>	<b>\$423,624</b>

### 5.2.2 SMS Implementation and Documentation

Estimated costs in this section relate to each agency developing and implementing a safety management policy, a safety risk management process, a safety assurance process, and a safety promotion program. These policies and processes will include the following:

- Safety Management Policy (SMP): Establishing accountabilities and responsibilities regarding safety objectives and performance targets, establishing an employee safety reporting program, communicating the safety management policy.
- Safety Risk Management Process (SRMP): Developing and implementing processes to identify and analyze safety hazards and risks for all elements of a public transportation system, and taking into account analysis, data, and information provided by an oversight

<sup>19</sup> Federal costs reflect estimated FTA costs for the development of templates and other startup costs, as well as ongoing coordination with transit agencies. These costs are relatively limited because FTA will assess each transit agency's compliance with the rule as part of the normal triennial review process.

authority and FTA, establishing criteria for incorporating hazard identification into system and operations changes, establishing activities to evaluate and prioritize safety risks, and establishing criteria for hazard mitigation.

- Safety Assurance Process (SAP): Establishing safety performance monitoring and measurement by collecting and monitoring data, investigating safety events to identify causal factors, conducting annual auditing and reviewing of SMS effectiveness and compliance, and conducting an annual safety performance assessment.
- Safety Promotion Program (SPP): Establishing safety management training programs and ensuring employees are trained on SMS duties and are aware of safety duties.

Relevant staff positions for this work include safety staff, a safety data analyst, an operations/maintenance manager, training staff, and a chief safety officer, in addition to the Accountable Executive. The number of hours required for each position will vary with agency size and will depend on each agency’s degree of existing policies and processes. Table 9 below provides a summary of the assumptions used with regard to required hours by job title and cost category. A more detailed set of tables is in Appendices C and D.

**Table 9: Estimated First Year Hours Required for SMS Implementation per Agency<sup>20</sup>**

	Cost Category	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations / Maintenance Manager	Training Staff	TOTAL
Rail	SMP	3	51	54	8	11	0	127
	SRMP	0	19	88	48	88	6	249
	SAP	10	110	277	84	105	0	586
	SPP	1	36	56	0	16	24	133
	<i>Total</i>	<i>14</i>	<i>216</i>	<i>475</i>	<i>140</i>	<i>220</i>	<i>30</i>	<i>1095</i>
Large 5307	SMP	2	76	64	0	56	0	198
	SRMP	0	31	94	66	38	0	229
	SAP	10	114	333	52	125	0	634
	SPP	0	36	100	0	48	24	208
	<i>Total</i>	<i>12</i>	<i>257</i>	<i>591</i>	<i>118</i>	<i>267</i>	<i>24</i>	<i>1269</i>
Small 5307	SMP	6	36	0	0	36	0	78
	SRMP	7	36	0	0	24	0	67
	SAP	14	162	0	0	88	0	264
	SPP	3	68	0	0	38	24	133
	<i>Total</i>	<i>30</i>	<i>302</i>	<i>0</i>	<i>0</i>	<i>186</i>	<i>24</i>	<i>542</i>
Section 5311		75% of estimated Small 5307 agency hours						
Section 5310		75% of estimated 5311 agency hours						

FTA seeks public comments on the accuracy of the estimates in this table.

<sup>20</sup> Note: “SMP” means “Safety Management Policy”; “SRMP” means “Safety Risk Management Process”; “SAP” means “Safety Assurance Process”; and “SPP” means “Safety Promotion Program.” Also note that hours may not sum properly due to rounding.

Along with these per agency hours, which are converted to costs, estimated additional expenses for travel (\$5,000 for Rail Agencies) and materials, records, and IT (\$5,000 for Small 5307; \$3,750 for Section 5311 agencies; and \$2,813 for Section 5310 agencies) were factored in. The total costs per agency were then adjusted based on the maturity of existing safety policies and processes. The varying degree of existing agency practice was separated into the following three categories:

- High: Assumes SMS process and program maturity. Total estimated costs were reduced by 50% for agencies in this category.
- Medium: Assumes moderate SMS process and program maturity. Total estimated costs were reduced by 25% for agencies in this category.
- Low: Assumes minimal existing SMS processes or programs. Total estimated costs were reduced by 5% for agencies in this category.

The estimated numbers of agencies within each maturity category are based on discussions with industry experts and research performed by consultants. Table 10 below describes the adjustment assumptions.

**Table 10: Adjustment and Maturity Assumptions for SMS Implementation**

	Estimated Number of Agencies in Each Maturity Category		
	High	Medium	Low
Rail Agencies	5	45	10
Large 5307	13	102	13
Small 5307	63	313	250
Section 5311	130	390	780
Section 5310	10	10	180
States	0	0	0

Total costs are estimated based on the total staff hours required, the associated wage rates, and then adjusted by the factors described above. Finally, the total per agency cost in each category was multiplied by the respective number of agencies.

Recurring costs to maintain and update the safety policies and processes are based on conducting a percentage of the initial activities on an annual basis. It is assumed that in order to maintain the systems, 20% of the initial safety management policy costs will be required, 85% of the initial safety risk management costs will be required, 85% of the initial safety assurance cost will be required, 70% of the initial safety promotion cost will be required, and 100% of the estimated additional expenses will be required. Recurring costs for Section 5311 agencies were calculated based on the ratio of recurring to initial costs of Small 5307 agencies, and recurring costs for Section 5310 agencies were based on the Section 5311 ratio of recurring to initial costs. The total initial and recurring costs for SMS implementation and documentation are listed in Table 11 below.

One could consider the recurring cost estimates in Table 11 to be overstated since it is possible that, over time as transit agencies mature in the use of SMS, the recurring costs decline in years beyond the first few



years. It is difficult to predict if and how rapidly the costs may decline in the future based on current experience, so comment on this assumption is requested from the industry before a Final Rule is issued.

**Table 11: SMS Implementation and Documentation Initial and Recurring Costs, By Agency Type**

	<b>Initial Non-Recurring Costs</b>	<b>Annually Recurring Costs</b>
Rail Agencies	\$4,614,087	\$3,532,486
Large 5307	\$8,444,752	\$6,063,049
Small 5307	\$13,838,330	\$10,667,758
Section 5311	\$22,660,481	\$17,468,619
Section 5310	\$2,839,007	\$2,188,547
States	\$0	\$0
<b>SUBTOTAL</b>	<b>\$52,396,657</b>	<b>\$39,920,458</b>
Federal <sup>21</sup>	\$100,000	\$100,000
<b>TOTAL</b>	<b>\$52,496,657</b>	<b>\$40,020,458</b>

In addition to the “by agency type” initial and recurring costs, for the SMS implementation and documentation cost category, it is informative to demonstrate the costs by sub-cost category as well. The re-organized costs can be found in Table 12 below.

**Table 12: SMS Implementation and Documentation Initial and Recurring Costs, By Sub-Cost Category**

	<b>Initial Non-Recurring Costs</b>	<b>Annually Recurring Costs</b>
Safety Management Policy	\$6,612,956	\$5,044,224
Safety Risk Management Process	\$6,536,779	\$4,958,425
Safety Assurance Process	\$22,365,376	\$17,081,805
Safety Promotion Program	\$9,501,702	\$7,282,417
Travel, Materials, Records, and IT	\$7,379,844	\$5,710,872
<b>TOTAL</b>	<b>\$52,396,657</b>	<b>\$39,920,458</b>

### 5.2.3 Recordkeeping

This section presents cost estimates for the documentation and recordkeeping associated with the other provisions of the proposed rule.

Relevant staff positions for this work include safety staff, a safety data analyst, an operations/maintenance manager, training staff, and a chief safety officer, in addition to the Accountable Executive. The number of hours required for each position will vary with agency size and will depend on each agency’s degree of existing policies and processes.

<sup>21</sup> Federal costs are based on estimated FTA resources required for providing oversight on these processes.

**Table 13: Estimated Initial Hours Required for Recordkeeping**

	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
Rail Agencies	0	56	136	16	24	80
Large 5307	0	56	136	16	24	80
Small 5307	4	30	60	60	66	80
Section 5311	75% of estimated Small 5307 agency hours					
Section 5310	10% of estimated 5311 agency hours					

Along with these per agency hours, which are converted to costs, estimated additional expenses for materials, records, and IT (\$20,000 for Rail Agencies; \$15,000 for Large 5307 agencies; \$5,000 for Small 5307 agencies; \$3,750 for Section 5311 agencies; \$2,813 for Section 5310 agencies; and \$10,000 for State agencies) were factored in. The total per agency costs were then adjusted based on the maturity of existing recordkeeping processes. The varying degree of existing agency practice was separated into the following three categories:

- High: Assumes maturity of recordkeeping processes. Total estimated costs were reduced by 50% for agencies in this category.
- Medium: Assumes moderate maturity of recordkeeping processes. Total estimated costs were reduced by 25% for agencies in this category.
- Low: Assumes minimal recordkeeping maturity. Total estimated costs were reduced by 5% for agencies in this category.

The estimated numbers of agencies within each maturity category are based on discussions with industry experts and research performed by consultants. Table 14 below describes the discounting assumptions.

**Table 14: Adjustments and Maturity Assumptions for Recordkeeping**

	Estimated Number of Agencies in Each Maturity Category		
	High	Medium	Low
Rail Agencies	5	45	10
Large 5307	13	102	13
Small 5307	63	313	250
Section 5311	130	390	780
Section 5310	10	10	180
States	0	0	0

Total costs are estimated based on the total staff hours required, the associated wage rates, and then adjusted by the maturity level factors described above. Finally, the total per agency cost in each category was multiplied by the respective number of agencies.

It is assumed that all record keeping costs will remain constant overtime. As a result, the initial and recurring costs are equivalent. Table 15 below lists the total initial and recurring costs for recordkeeping.

**Table 15: Recordkeeping Initial and Recurring Costs, By Agency Type**

	<b>Initial, Non-Recurring Costs</b>	<b>Annually Recurring Costs</b>
Rail Agencies	\$2,051,779	\$2,051,779
Large 5307	\$3,290,570	\$3,290,570
Small 5307	\$8,714,824	\$8,714,824
Section 5311	\$14,270,660	\$14,270,660
Section 5310	\$238,386	\$238,386
States	\$550,000	\$550,000
Federal <sup>22</sup>	\$0	\$0
<b>TOTAL</b>	<b>\$29,116,219</b>	<b>\$29,116,219</b>

#### 5.2.4 State and MPO Target Setting

Under the performance management framework established by MAP-21 and reauthorized under the FAST Act, States, MPOs, and transit providers must establish targets in key national performance areas to document expectations for future performance and assist with capital programming priorities and activities. Pursuant to 49 U.S.C. §§ 5303(h)(2)(B)(ii) and 5304(d)(2)(B)(ii), States and MPOs must coordinate the selection of their performance targets, to the maximum extent practicable, with performance targets set by transit providers under 49 U.S.C. § 5326 (transit asset management) and 49 U.S.C. § 5329 (safety), to ensure consistency.

In the Joint Planning NPRM, FTA and FHWA indicated that their performance-related rules would implement the basic elements of a performance management framework, including the establishment of measures and associated target-setting. Because the performance-related rules implement these elements, and given the difficulty in estimating costs of target-setting associated with unknown measures, the Joint Planning NPRM did not assess these costs. Rather, FTA and FHWA proposed that the costs associated with target setting at every level would be captured in each agency’s respective “performance management” rules. For example, FHWA’s second performance management rule NPRM, published after the joint planning NPRM, assumes that the incremental costs to States and MPOs for establishing performance targets reflect the incremental wage costs for an operations manager and a statistician to analyze performance-related data.

The RIA that accompanied the Joint Planning final rule captured the costs of the effort by States, MPOs, and transit providers to coordinate in the setting of State and MPO transit performance targets for state of good repair and safety. FTA believes that the cost to MPOs and States to set transit performance targets

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<sup>22</sup> FTA does not expect to incur incremental costs in this area.

is included within the costs of coordination. FTA requests comment on this point. Will there be any additional costs for states and MPOs in target setting beyond the coordination costs included in the planning rule? If so, what would those costs be? To the extent responses to these questions cause the agency to adjust any of its cost assumptions, those changes will be reflected in the final rule and any related information collections.

### 5.2.5 Cost Summary

The costs estimated in the subsections above have been based on best estimates of the required labor hours and other costs of implementing the required components of the agency safety plan and SMS policies and processes available to the agency. They are inherently imprecise given the lack of consistent data on existing agency practices, and the variability in costs across agencies due to different labor rates, system sizes, system complexities, and other factors. As such, FTA invites comment on the assumptions used to estimate costs and other information that could be used to estimate costs more precisely.

Another limitation is that costs estimated here are focused largely on policy and processes, including activities such as communication, hazard identification, monitoring, assessment, and employee training. They do not necessarily include the costs of other actions that transit agencies may take to mitigate safety risk as a result of their SMS orientation, such as vehicle modifications, additional training, technology investments, or changes to operating procedures. These more specific costs cannot be estimated because they will vary considerably based on agency-specific circumstances. However, the flexible nature of the SMS framework suggests that agencies will select the mitigation measures that are most cost-effective for them. In some cases, effective measures may carry little to no direct cost, such as implementing best practices to reduce driver distraction and fatigue. FTA invites comment on the issue of additional costs not tallied here, including those from mitigating risks.

Table 16 below shows the total estimated costs for the agency safety plan, SMS, and recordkeeping activities under the proposed rule, aggregated by agency type and separated by initial and recurring costs.

**Table 16: Summary of Agency Costs, By Agency Type**

	<b>Initial Non-Recurring Costs</b>	<b>Annually Recurring Costs</b>
Rail Agencies	\$7,284,563	\$5,658,407
Large 5307	\$13,235,480	\$9,478,537
Small 5307	\$22,973,456	\$19,427,569
Section 5311	\$37,586,812	\$31,809,459
Section 5310	\$3,153,046	\$2,435,030
States	\$1,641,810	\$611,298
Federal	\$160,000	\$140,000
<b>TOTAL</b>	<b>\$86,035,168</b>	<b>\$69,560,301</b>

Table 17 below shows the total costs and the present value of the proposed rule over the 20-year analysis period. For the purposes of this analysis, 2015 serves as the discounting base year and the dollar figures appear as 2015 dollars. The annualized cost of the proposed rule is \$71 million (at the 7% rate) and \$70.6 million (at the 3% rate).

**Table 17: Undiscounted and Present Value of Costs (2016-2035)**

<b>Year:</b>	<b>Total Cost (Millions, Undiscounted)</b>	<b>7% Discounted Value</b>	<b>3% Discounted Value</b>
2016	\$86.0	\$80.4	\$83.5
2017	\$69.6	\$60.8	\$65.6
2018	\$69.6	\$56.8	\$63.7
2019	\$69.6	\$53.1	\$61.8
2020	\$69.6	\$49.6	\$60.0
2021	\$69.6	\$46.4	\$58.3
2022	\$69.6	\$43.3	\$56.6
2023	\$69.6	\$40.5	\$54.9
2024	\$69.6	\$37.8	\$53.3
2025	\$69.6	\$35.4	\$51.8
2026	\$69.6	\$33.0	\$50.3
2027	\$69.6	\$30.9	\$48.8
2028	\$69.6	\$28.9	\$47.4
2029	\$69.6	\$27.0	\$46.0
2030	\$69.6	\$25.2	\$44.6
2031	\$69.6	\$23.6	\$43.3
2032	\$69.6	\$22.0	\$42.1
2033	\$69.6	\$20.6	\$40.9
2034	\$69.6	\$19.2	\$39.7
2035	\$69.6	\$18.0	\$38.5
<b>Total:</b>	<b>\$1,407.7</b>	<b>\$752.3</b>	<b>\$1,050.9</b>

### 5.2.6 Uncertainty and Sensitivity Testing

FTA developed the cost estimates above using assumptions about the numbers of agencies at each maturity level with regard to existing use of SMS, as well as differences in compliance costs across agency size and maturity level, and the required labor hours for each activity in relevant job categories. FTA seeks comment on the reasonableness of these assumptions and other information that may help to refine the estimates.

One area of particular uncertainty is the cost assumptions for the smallest agencies. In the analysis above, implementation costs for a Section 5311 agency were assumed to equal 75% of those for a Small 5307 agency, and Section 5310 agencies were assumed to have costs that were 75% of those for a Section 5311 agency (and thus 56.25% of the cost for Small 5307 agency). These figures were used to be conservative, but may overstate the total costs, given that these agencies are mostly small bus-only agencies with lower staff levels. There also could be significant economies of scale associated with the creation of State plans that cover multiple small operators. As a sensitivity test on the assumptions related to small agencies, FTA re-calculated compliance costs as 25% of the level for small urban agencies, for both Section 5311 and Section 5310 providers. Table 18 below compares the results.

**Table 18: Sensitivity Cost Comparison**

	<b>Annualized Cost (7%)</b>	<b>Annualized Cost (3%)</b>
Base Case	\$71.0 million	\$70.6 million
Lower Cost Scenario for Smallest Agencies (Sections 5311, 5310)	\$48.8 million	\$48.5 million

### **5.3 Benefits**

This section provides an overview of SMS, its role in promoting transit safety, and documented results from SMS implementations across modes and industries; and a description of the data and methods used to conduct a breakeven analysis of the proposed rule.

#### **5.3.1 Objectives of Safety Management Systems**

The proposed rule would require transit providers to develop and implement a safety plan that is based on SMS principles. The objective of SMS is to manage safety, identify potential hazards, determine risk, and implement measures that mitigate the risk. FTA envisions transit operators being able to use all of the components of SMS to enhance a transit agency's ability to identify safety issues and spot trends before they result in accidents, incidents, or near-misses. For instance, transit agencies would collect and analyze safety data to identify trends that are the basis for corrective action, which transit agencies could implement to mitigate or eliminate safety risks. A successful implementation of SMS would enable organizations to better comply with regulations and requirements while minimizing the likelihood of an adverse event. SMS improves employee and passenger safety through early identification of hazards. SMS positively affects staff through safety promotion by creating trust, increasing morale, and developing a safety culture leading to greater safety. SMS empower employees to be involved in their own safety and as a result are more conscientious of safety, in general, and are more productive. FTA believes the implementation of this rule will prevent and reduce accidents and incidents resulting in lower direct and indirect costs.

#### **5.3.2 Pilots and SMS Benchmarks**

While FTA is in the process of planning pilot safety programs at transit agencies, FTA has found that efforts to implement SMS and SMS-like safety approaches in other industries have resulted in benefits to those industries.<sup>23</sup> FTA anticipates similar benefits in the transit industry.<sup>24</sup>

Other industries have benefited from SMS. A study in the journal *Safety Science* found quantifiable benefits to companies whose employees received training in, and used, an employee-driven, behavior-based safety improvement methodology over a period of several years. This method involves

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<sup>23</sup> FTA has started developing Public Transportation Agency Safety Plan Pilot Projects for execution at transit agencies. The effort is nascent and cannot lend itself to the instant rulemaking.

<sup>24</sup> While the Federal Aviation Administration relied on NTSB studies and recommendations, FTA is unable to rely on similar studies for bus transit because NTSB does not typically investigate bus accidents. NTSB investigates rail fixed guideway accidents and incidents. In these rail transit instances, NTSB has noted deficiencies in safety, safety culture, and safety plans.

commitment on the part of management to improve safety outcomes, along with training for employees to identify and remedy safety issues in the workplace. Seventy-three companies out of 229 who met the study's inclusion criteria provided data for the study. Comparisons of pre- to post-initiative incident levels across groups revealed a significant decrease in incidents following the behavior-based safety implementation. Effect sizes were estimated from the average percentage reduction from a baseline. The average reduction from the baseline amounted to 26% in the first year, increasing to 69% by the fifth year. The authors noted some selection bias, in that firms included in the study had, on average, more employees covered and had fewer safety initiatives than other firms; however, there was little difference on the key metric of self-assessed effectiveness of the program.<sup>25</sup> A more qualitative case study of an SMS-type process of improving the safety culture at General Motors showed a roughly 50% reduction in recordable injuries.<sup>26</sup>

Coulter and Ksaibati studied the societal costs of roadway crashes on highways.<sup>27</sup> They noted that FHWA has required the implementation of SMS to pursue and promote safety and accident investigations. In 2006, the Wyoming Department of Transportation SMS Committee organized an effort to reduce the number of fatal and serious injury crashes on Wyoming roadways. The plan focused on four areas: roadway departure crashes, use of safety restraints, impaired driving, and speeding. Coulter and Ksaibati focused on roadway departure crashes and the effect of two types of safety devices installed on selected roadway sections: shoulder rumble strips and cable median barriers. Coulter and Ksaibati found that implementation of the Wyoming State Highway Safety Plan contributed to a reduction in the number of critical and serious crashes on both the interstate and state highway sections due to the installation of rumble strips. Moreover, the installation of cable median barriers reduced accidents by 44% during the analysis period. This also included a reduction of nearly 79% of critical cross-median crashes and about 43% of critical rollover crashes in the median. They noted that property damage by cable median barriers increased by 53%. Lastly, they noted that crash reduction also could have resulted from other safety devices implemented by Wyoming Department of Transportation during the analysis period. The study documents how SMS, in combination with mitigating measures (i.e., rumble strips and cable median barriers), can achieve safety benefits. Regarding whether SMS was a necessary condition to Wyoming's identification of rumble strips and cable median barriers, SMS is integral to FHWA's highway safety planning and programming process, so the identification of the problem and mitigating action can be attributed to SMS.

While there has been some research into the effectiveness of SMS and safety programs implemented across all industries, one of the major limitations with regards to the transit industry is the limited number of agencies that have a complete safety program in place. Therefore, FTA is not aware of any studies of the effectiveness of SMS in the transit industry. Furthermore, while safety is a concern at all of the transit

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<sup>25</sup> Krause, T. R., K. J. Seymour, and K. C. M. Sloat. "Long-Term Evaluation of a Behavior-Based Method for Improving Safety Performance: A Meta-Analysis of 73 Interrupted Time Series Replications." *Safety Science* 32 (1999): 1-18, available at <http://www.elseviersocialsciences.com/transport/pdf/article.pdf>.

<sup>26</sup> Simon, Steve I. and Patrick Frazee. "Building a Better Safety Vehicle: Leadership-Driven Culture Change at GM." *Professional Safety*: January 2005, available at <http://www.culturechange.com/wp-content/uploads/2014/11/GMJan2005.pdf>.

<sup>27</sup> Coulter, Zebulun and Khaled Ksaibati, "Effectiveness of Various Safety Improvements in Reducing Crashes on Wyoming Roadways." Report to the U.S. Department of Transportation, 2013, available at <http://www.mountain-plains.org/pubs/pdf/MPC13-262.pdf>.

agencies around the country, due to the low probability/high consequence nature of some transit accidents, such as those on crowded rush-hour trains, it is difficult to directly attribute quantifiable improvements in safety measures to any particular component. However, as cited in this section, there is limited evidence from other industries that SMS can improve safety, especially in situations where constant employee involvement in the safety process is required. A report commissioned for the Australian Transport Safety Bureau conducted a systematic review of the effectiveness of safety management systems. The report reviewed 37 papers that met the study's inclusion criteria. Very few of the papers were undertaken in the transportation domain, and many measured subjective perceptions of safety rather than objective measures. The report concluded that:

[A] synthesis of the findings of this systematic review would suggest that the effectiveness of SMS may well not lie in specific components of the system, but rather in the level of sophistication and effort applied across the system as a whole. To this end, the lack of evidence for SMS effectiveness may well reflect the simplistic approach adopted within the scientific research, and the lack of scientific rigor applied to answering this critical question.<sup>28</sup>

The report also concluded “that recent studies have demonstrated that well-implemented SMS, especially those where the organization invests effort into the SMS, are associated with enhanced safety performance.”<sup>29</sup> The report found that 30 of the studies reviewed supported the correlation of improved safety statistics with the implementation of an SMS or SMS-like program.<sup>30</sup> The study noted that attitudes and involvement of management was one of the most critical elements in many of these studies. The other 7 studies included in the report concluded that there simply was not sufficient data to make any claims about the impact on safety performance from SMS.

FTA envisions a similar impact on transit agencies as SMS infuses into the everyday operations. FTA foresees that SMS will help some transit agencies detect problems early, while recognizing that both the severity of the problem and possible mitigations impact the rate at which future accidents would be prevented. In some cases SMS may result in nearly no benefits or cost savings solutions. In other cases, SMS may require additional funds for a resolution. However, with SMS, a transit operator can select practical mitigations and the cost of SMS and the mitigation may be below the cost of an incident. Based on limited findings in the transportation sector, FTA believes that the proactive approach espoused by SMS will yield a reduction in the probability of accidents and incidents.

FTA seeks comments on additional studies or other information that can be used to quantify the benefits of SMS programs or other alternatives that satisfy the relevant statutory language.

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<sup>28</sup> Thomas, Matthew J.W. “A Systematic Review of the Effectiveness of Safety Management Systems” Report to the Australian Transport Safety Bureau, 2012, available at [http://www.atsb.gov.au/media/4053559/xr2011002\\_final.pdf](http://www.atsb.gov.au/media/4053559/xr2011002_final.pdf).

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.



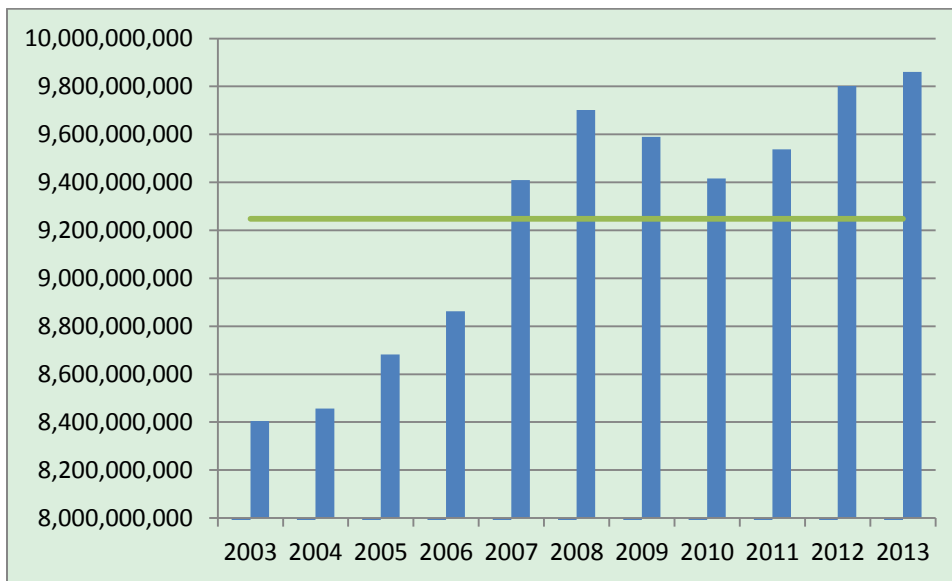
### 5.3.3 National Transit Database

Congress established NTD to be the primary source for information and statistics on the transit systems of the United States.<sup>31</sup> Recipients or beneficiaries of grants from FTA under Section 5307 or Section 5311 are required by statute to submit data to the NTD. Over 660 transit providers in urbanized areas currently report to the NTD through the Internet-based reporting system. Each year, FTA employs NTD performance data to apportion funds to transit agencies. Today, the transit industry consists of over 140,000 vehicles, traveling over 48 billion passenger miles annually, and collecting over \$8.5 billion in passenger fares. In the past ten years, the transit industry has grown by over 20% faster than either highway or air travel.

As a point of reference, and as noted above, the transit industry has been growing over the past ten years—nearly 20% over this time period. In aggregate (including bus, rail, and other transit modes), passenger trips have increased steadily from 2003 to 2013, from a starting point of slightly over 8.41 billion trips to 9.86 billion trips in 2013, with an average of 9.25 billion trips annually over the ten-year period.<sup>32</sup> This data is shown in Figure 1 below. Another metric to show a similar increase is passenger miles. Passenger miles increased from 35.86 billion to 44.39 billion over the same ten-year period with an average of 40.54 billion.<sup>33</sup> This data is shown in Figure 2 below.

The data shows that transit has become an even more popular means of transportation, as ridership on all modes has increased nearly 20% and safety has become even more important as transit services become a vital mode in the way that our nation moves on a daily basis.

**Figure 1: Total Passenger Trips All Modes 2003-2013**



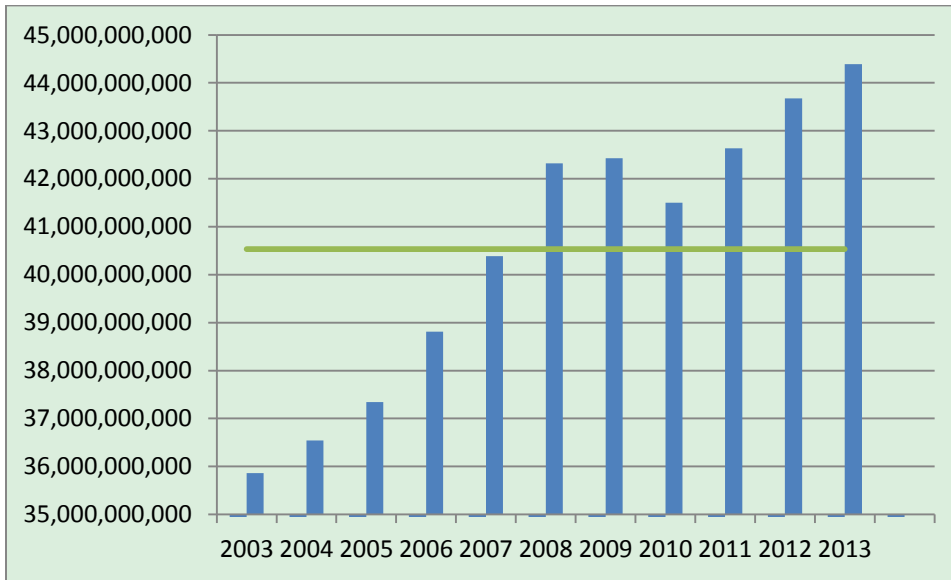
Source: National Transit Database.

<sup>31</sup> See: Welcome to the National Transit Database, “What is the National Transit Database,” available at <http://www.ntdprogram.gov/ntdprogram/ntd.htm>.

<sup>32</sup> The latest year for which complete trip data is available in NTD is 2013.

<sup>33</sup> The latest year for which complete trip data is available in NTD is 2013.

**Figure 2: Total Passenger Miles All Modes 2003-2013**



Source: National Transit Database.

For the safety analysis presented below, FTA extracted two categories of data from the NTD: (1) major reports (damages greater than \$25,000 and/or a major injury) and (2) minor reports (incidents and accidents with less than \$25,000 in damages). As definitional changes occurred within the NTD in 2008, FTA used five years of data from 2010 to 2014 as the time-period for the benefits analysis for which consistent data series was available.

#### 5.3.4 The Analysis Framework

To analyze benefits, a twenty-year analysis period is used, with discount rates of 7% and 3%. The 2015 Value of a Statistical Life (VSL) of \$9.4 million and non-fatal injury values were set according to the 2015 Memorandum issued by the Office of the Secretary of Transportation (OST) at USDOT.<sup>34</sup> For sensitivity analysis a low VSL of \$5.2 million and a high value \$13 million is used for fatalities.

#### 5.3.5 Baseline Data

To develop the baseline of data for the transit industry, FTA extracted data from 2010 to 2014 from the NTD. As mentioned previously, since consistent data is only available for the previous five years, a five year annual average is used to develop metrics to calculate the pool of potential benefits that could be realized by implementing the requirements of this rule. Data on safety incidents or events; fatalities,

<sup>34</sup> Kathryn Thomson and Carlos Monje “Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses,” June 25, 2015, Office of the Secretary of Transportation, [available at http://www.transportation.gov/office-policy/transportation-policy/guidance-treatment-economic-value-statistical-life](http://www.transportation.gov/office-policy/transportation-policy/guidance-treatment-economic-value-statistical-life).

injuries and property damage was used to develop the benefits analysis. The data reported includes any safety or security related incident that involves a transit system’s property. An incident must meet the following criteria:

- A fatality resulting from the event occurs within 30 days;
- Injuries to one or more persons resulting from the event that require immediate transportation for medical attention;
- The estimated property damage from the event is at least \$25,000; or
- An evacuation is made for life safety reasons.

FTA extracted data for the period from 2010 to 2014 for bus and rail transit agencies. The data can fluctuate from year to year, suggesting some level of randomness to the occurrence of safety events, fatalities, injuries, and property damage. Table 19 presents the data to be used for this analysis.

**Table 19: Total Bus and Rail Incidents, Fatalities, injuries and Property Damage: 2010-2014**

Year	Bus				Rail			
	Incidents	Fatalities*	Injuries*	Property Damage	Incidents	Fatalities*	Injuries*	Property Damage
2010	12,968	95	16,638	\$33,517,886	9,612	74	7,383	\$7,289,224
2011	11,002	92	14,660	\$40,170,613	9,360	58	5,522	\$6,629,779
2012	10,998	110	14,982	\$31,245,391	9,360	91	5,457	\$6,825,620
2013	11,672	117	15,695	\$33,861,317	9,929	82	5,356	\$12,156,301
2014	12,196	100	16,351	\$35,672,341	8,520	72	4,471	\$19,629,123
<b>Annual Average</b>	<b>11,767</b>	<b>103</b>	<b>15,665</b>	<b>\$34,893,510</b>	<b>9356</b>	<b>75</b>	<b>5,638</b>	<b>\$10,506,009</b>

\*Note: This data excludes data related to suicides.

Source: National Transit Database

Due to the randomness and unpredictability of natural events, such as hurricanes or landslides, the property damage caused by such events is excluded from the data above. For instance, the Congress appropriated nearly \$11 billion for emergency recovery and resiliency efforts related to property damage suffered by transit agencies from Hurricane Sandy in 2012, and this data would have distorted the average derived from such a short period. Also, transit agencies that anticipate their systems to be affected by such events likely will develop separate contingency plans which fall outside the purview of the proposed rule.

### 5.3.6 Quantitative Analysis

It is difficult to predict, with any certainty, the rate at which safety incidents will be reduced following the adoption of SMS. Studies in other industries and transportation modes found that reductions in safety incidents may be possible over a period of time following the adoption of safety programs similar to the SMS approach that FTA is proposing. To transfer this experience to the transit industry for calculating

future benefits is not feasible. The transit industry is very different from the industries in the case studies and agencies vary significantly within the transit sector to predict with any level of accuracy the rate at which safety performance would be improved due to the adoption of this rule. Instead, a breakeven analysis was performed that estimates the minimum reduction in safety costs necessary to cover the cost of the proposed rule (absent mitigation actions). To do this, the safety costs experienced by the transit users and the providers will be estimated. These safety costs will be used as the pool of potential benefits that could be realized if all safety incidents were eliminated.

To estimate the potential pool of benefits, the annual average of incidents, fatalities, injuries, and property damage data presented in Table 19 is used. The number of fatalities and injuries are monetized using the VSL and injuries recommended by USDOT. For the twenty year analysis period, it is assumed that the number of incidents, fatalities, injuries, and property damages will remain constant. In addition, for the bus transit agencies, the cost of investigations following an incident to determine the cause of the accident is calculated and included in the pool of benefits that can be realized through the adoption of SMS and the development of a safety plan. For the rail transit providers, the investigation costs are excluded because that cost is already included for the benefits of the State Safety Oversight rule.<sup>35</sup>

### *Cost of Fatalities and Injuries*

The average number of fatalities per year for the period from 2010 to 2014 is used for bus and rail transit agencies. This data includes the fatalities incurred by patrons of the system and employees of the agencies. The data excludes suicides on site of transit agencies because, to a certain extent, these events are out of the control of transit agencies.

As data reported to NTD does not breakdown injury by severity level, a methodology was developed to distribute the injuries according to severity based on research in Europe. The abbreviated injury scale (AIS) values recommended by USDOT were then applied to the injury type to derive the total injury. Table 20 below presents the percentage of VSL to apply to each injury type.

**Table 20: Relative Disutility Factors by Injury Severity Level (AIS)**

<b>AIS Level</b>	<b>Severity</b>	<b>Fraction of VSL</b>
AIS 1	Minor	0.003
AIS 2	Moderate	0.047
AIS 3	Serious	0.105
AIS 4	Severe	0.266
AIS 5	Critical	0.593
AIS 6	Unsurvivable	1.000

Source: USDOT, Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses, 2015 Adjustment.

To calculate benefits from reduced injuries, FTA started by developing a five-year average of transit injuries contained in the NTD. The NTD does not provide for AIS coding in its normal course of data

<sup>35</sup> See FTA’s State Safety Oversight NPRM, 80 FR 11002, Feb. 27, 2015, available at <http://www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03841.pdf>.

collection.<sup>36</sup> To conduct the allocation, FTA conducted two special studies on NTD data and researched literature as to the typical allocation for non-rail transit injuries.

In a study conducted by Björnstig, Albertsson, Björnstig, Bylund, Falkmer, and Petzäll entitled, “Injury Events Among Bus and Coach Occupants—Non-Crash Injuries as Important as Crash Injuries,” the authors used data from the health sector regarding accidents and incidents involving bus and coach occupants.<sup>37</sup> They identified and analyzed 284 incidents and the details thereof. The authors found that injury prevention should focus not only on crash-based incidents, but also on non-crash incidents. In the process of their analysis, the authors provided information on the allocation of the sample by AIS levels for crash and non-crash injuries. FTA used this information by aggregating crash and non-crash data and developing percentages of injuries by AIS level. Table 21 below presents this information and the calculations.

**Table 21: Injuries by Percent of Total by AIS Scale for Björnstig *et al.* Study**

Injury Severity	Crash Injuries	Non-Crashes Injuries	Total	Percent
AIS-1	105	92	197	69%
AIS-2	15	57	72	25%
AIS-3	5	5	10	4%
AIS-4	5	0	5	2%

Source: Björnstig *et al.*

FTA then analyzed NTD data for injuries using the number of injuries and the amount of property damage as proxies for severity levels. For injuries, FTA developed a scatter plot of the data and found that the data subdivided into four groups. The first grouping included incidents with only one injury and FTA marked these as the AIS-1 grouping. The next grouping included two to three injuries and the third group included four to eight injuries, these were marked as AIS-2 and AIS-3, respectively. The last grouping included nine or more injuries and was delineated as AIS-4. Similarly, FTA analyzed the data for the value of the damage associated with an incident and found an analogous step function. FTA marked damages of \$5,000 or less as AIS-1; \$5001 to \$15,000 as AIS-2; \$15,001 to \$30,000 as AIS-3; and damages greater than \$30,001 as AIS-4. Table 22 below presents the data grouped in the natural step functions that we observed.

**Table 22: Injuries and Damages as a Proxy for AIS Determination using NTD Data**

Injury Severity	Injuries	Percent	Value of Damage	Percent
AIS-1	1	63%	\$5,000 or Less	65%
AIS-2	2-3	26%	\$5,001 to \$15,000	22%
AIS-3	4-8	9%	\$15,001 to \$30,000	8%
AIS-4	9+	2%	Greater Than \$30,001	5%

<sup>36</sup> The Abbreviated Injury Scale is an anatomical-based coding system created by the Association for the Advancement of Automotive Medicine to classify and describe the severity of injuries.

<sup>37</sup> Björnstig, Albertsson, Björnstig, Bylund, Falkmer, and Petzäll, “Injury Events Among Bus and Coach Occupants—Non-Crash Injuries as Important as Crash Injuries,” 2005, IATSS Research, Volume 29, Issue 1, pp 79-87, available at <http://www.sciencedirect.com/science/article/pii/S038611214601217>.

To be conservative, FTA allocated injuries to the AIS levels using percentages developed by Björnstig *et al.* as this undercounts the aggregate benefits derived from a reduction in injuries.

***Incident Investigations***

To calculate the benefits from a reduction in incident investigations, FTA used a five-year average of non-rail transit incidents contained in the NTD. The NTD does not provide for a breakout of incidents by severity, other than noting minor and major incidents separately. Using this data, FTA extracted the 59% of the incidents marked as minor. To allocate the remaining 41%, FTA relied on Björnstig *et al.* as a proxy to determine that 20% of the remaining 41% is attributable to major incidents and 80% of the 41% is attributable to moderate incidents. FTA then consulted the Transportation Safety Institute to develop accident and incident investigation times. Using data from a course titled, “Advanced Problems in Bus Collision Investigation,” FTA developed average investigation times for each type of incident (minor, moderate, and major).<sup>38</sup> For the calculations, FTA used 38.59 hours for minor incidents, 65.34 hours for moderate incidents, and 122.59 hours for major incidents.<sup>39</sup> Lastly, FTA used U.S. Department of Labor rates for Insurance Investigators and Adjusters and adjusted this rate with 40% fringe benefits to calculate a fully loaded hourly rate of \$40.28 per hour.<sup>40</sup>

Table 23 below shows the numbers used to develop the potential pool of benefits to be derived from the current safety cost incident costs.

**Table 23: Bus Annual Average Safety Costs**

Major Category	Averages	Cost per Unit	Total Annual Cost
Fatalities	103	\$9,400,000	\$968,200,000
Injuries	15,665	\$211,876	\$3,319,037,540
Property Damage			\$37,026,021
Incidents Investigations	11,767	\$2,185	\$25,710,895
<b>Total</b>			<b>\$4,349,974,456</b>

It is assumed that the benefits from implementing the proposed rule will not be immediate. It is possible that it may take the transit providers at least a year after the first plan in complete to start realizing some improvements in safety performance. The annual average cost for the bus transit providers and users is \$4.3 billion. Table 24 below shows the pool of potential benefits from the proposed Rule.

<sup>38</sup> See FTA Sponsored Training, “Advanced Problems in Bus Collision Investigation,” available at <http://transit-safety.fta.dot.gov/Training/new/CourseDetails.aspx?csid=51>.

<sup>39</sup> Ibid.

<sup>40</sup> See Bureau of Labor Statistics, “Claims Adjusters, Appraisers, Examiners, and Investigation,” available at <http://www.bls.gov/ooh/business-and-financial/claims-adjusters-appraisers-examiners-and-investigators.htm#tab-5>.

**Table 24: Bus Providers and Users**

<b>Year</b>	<b>Current Dollar Value</b>	<b>7% Discounted Value</b>	<b>3% Discounted Value</b>
2016			
2017			
2018	\$4,349,974,456	\$3,799,436,157	\$4,100,268,127
2019	\$4,349,974,456	\$3,550,874,913	\$3,980,842,842
2020	\$4,349,974,456	\$3,318,574,685	\$3,864,895,963
2021	\$4,349,974,456	\$3,101,471,668	\$3,752,326,178
2022	\$4,349,974,456	\$2,898,571,653	\$3,643,035,124
2023	\$4,349,974,456	\$2,708,945,470	\$3,536,927,305
2024	\$4,349,974,456	\$2,531,724,738	\$3,433,910,005
2025	\$4,349,974,456	\$2,366,097,886	\$3,333,893,208
2026	\$4,349,974,456	\$2,211,306,436	\$3,236,789,523
2027	\$4,349,974,456	\$2,066,641,529	\$3,142,514,100
2028	\$4,349,974,456	\$1,931,440,681	\$3,050,984,563
2029	\$4,349,974,456	\$1,805,084,748	\$2,962,120,935
2030	\$4,349,974,456	\$1,686,995,092	\$2,875,845,568
2031	\$4,349,974,456	\$1,576,630,927	\$2,792,083,075
2032	\$4,349,974,456	\$1,473,486,848	\$2,710,760,267
2033	\$4,349,974,456	\$1,377,090,512	\$2,631,806,085
2034	\$4,349,974,456	\$1,287,000,478	\$2,555,151,539
2035	\$4,349,974,456	\$1,202,804,185	\$2,480,729,649
<b>Total</b>	<b>\$86,999,489,120</b>	<b>\$40,894,178,605</b>	<b>\$58,084,884,054</b>

As Table 24 shows, the public bus service providers and users could experience bus related accident/incident costing \$87 billion undiscounted, and \$40.8 billion discounted at 7% and \$58.1 billion discounted at 3% during the period of time that the proposed rule would take effect. Since the safety plans will not be fully effective for the first two years, the safety costs for these two years are not included in the pool of benefits to be realized.

Similarly, to estimate the annual safety costs to the rail system providers and users, the NTD data was used for the number of fatalities, injuries, property damage, and number of incidents. The investigation costs for rail transit safety events are not included here, because it is covered by FTA’s State Safety Oversight NPRM.<sup>41</sup>

In addition to the SSO rule, the rail transit providers are subject to the requirement of one other safety rule developed by FTA, the Safety Certification Training Program Rule.<sup>42</sup> Transit agencies subject to these rules would realize benefits that may be attributable to the actions taken under these rules. Breakeven

<sup>41</sup> See <http://www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03841.pdf>.

<sup>42</sup> See 80 FR 10619, Feb. 27, 2015, available at <http://www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03842.pdf>.

analyses were developed for the SSO NPRM and the Safety Certification Training Program NPRM using the safety data for estimating the pool of benefits for the rail transit component of this rule. To avoid double counting the benefits, adjustments were made to the pool of benefits for rail transit agencies. To account for the benefits attributable to these related rules, the cost of the SSO rule and the Safety Certification Training Program rule was subtracted from the pool of benefits calculated for the rail transit component of the Public Transportation Agency Safety Plan rule. The estimated cost of these two rules was approximately \$26 million. The estimated annual rail transit benefits pool for the Public Transportation Agency Safety Plan rule is therefore reduced by \$26 million.

Table 25 summarizes the annual average estimates by cost type and the adjustment due to the cost of the other related rules. The safety cost per year for the rail providers and users is \$1.9 billion, which is subtracted by the cost of the related rules to derive the pool of benefits of \$1.88 billion a year.

**Table 25: Rail Transit Annual Average Cost**

<b>Major Category</b>	<b>Annual Averages</b>	<b>Cost per Unit</b>	<b>Total Annual Cost</b>
Fatalities	75	\$9,400,000	\$705,000,000
Injuries	5637.8	\$211,876	\$1,194,514,513
Property Damage			\$10,506,009
<b>Total</b>			<b>\$1,910,020,522</b>
<b>Cost of Other Rail Safety Rules</b>			<b>\$26,000,000</b>
<b>Net of Other Rules</b>			<b>\$1,884,020,522</b>

Source: NTD

Table 26 presents the projected safety cost for the rail transit sector. Again it is assumed that benefits will not be realized until two years after a final rule is published.



**Table 26: Rail Transit Providers and User Costs: 2016-2035**

<b>Year</b>	<b>Current Dollar Value</b>	<b>7% Discounted Value</b>	<b>3% Discounted Value</b>
2016			
2017			
2018	\$1,884,020,522	\$1,645,576,489	\$1,775,870,037
2019	\$1,884,020,522	\$1,537,921,952	\$1,724,145,667
2020	\$1,884,020,522	\$1,437,310,236	\$1,673,927,832
2021	\$1,884,020,522	\$1,343,280,594	\$1,625,172,652
2022	\$1,884,020,522	\$1,255,402,424	\$1,577,837,527
2023	\$1,884,020,522	\$1,173,273,294	\$1,531,881,094
2024	\$1,884,020,522	\$1,096,517,097	\$1,487,263,198
2025	\$1,884,020,522	\$1,024,782,334	\$1,443,944,852
2026	\$1,884,020,522	\$957,740,499	\$1,401,888,206
2027	\$1,884,020,522	\$895,084,578	\$1,361,056,511
2028	\$1,884,020,522	\$836,527,643	\$1,321,414,088
2029	\$1,884,020,522	\$781,801,536	\$1,282,926,299
2030	\$1,884,020,522	\$730,655,641	\$1,245,559,514
2031	\$1,884,020,522	\$682,855,739	\$1,209,281,081
2032	\$1,884,020,522	\$638,182,934	\$1,174,059,302
2033	\$1,884,020,522	\$596,432,648	\$1,139,863,400
2034	\$1,884,020,522	\$557,413,690	\$1,106,663,495
2035	\$1,884,020,522	\$520,947,374	\$1,074,430,578
<b>Total</b>	<b>\$37,680,410,444</b>	<b>\$17,711,706,703</b>	<b>\$25,157,185,334</b>

An estimated benefits pool for rail transit service providers and users is \$37.7 billion undiscounted, and \$17.7 billion discounted at 7% and \$25.2 billion at a 3% discount rate.

### 5.3.7 Qualitative Analysis

FTA also expects various non-quantifiable benefits derived from safety enhancements and synergies within this rule and other FTA safety NPRMs.<sup>43</sup> FTA also foresees an acceleration of accrued benefits as SMS permeates all aspects of transit agency functions. Transit agencies also may benefit from lower insurance costs (as risks decrease throughout the industry with the adoption of SMS).

While SMS and similar comprehensive safety prevention programs have existed for some time, there is a wide variance in both the adoption and maturity of such programs within the transit industry. By requiring a set of standardized guidelines to be used in transit agency safety actions, FTA hopes to unify

<sup>43</sup> See FTA’s SSO NPRM, 80 FR 11002, Feb. 27, 2015, available at <http://www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03841.pdf>; 80 FR 10619, Feb. 27, 2015, available at <http://www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03842.pdf>.

and harmonize the current state of the practice. These efforts should promote and facilitate cooperation and sharing of best practices between agencies.

The adoption of SMS and the development of Public Transportation Agency Safety Plans will help promote a safety culture within the transit industry. The change in safety culture will engage all employees in promoting the safety goals of the transit providers. Increased safety training and protection and inclusion of employees to identify safety hazards will improve the morale of the staff at all levels of the organization. This can lead to greater employee satisfaction with their jobs and hence increases in productivity and reduced staff turnover. These impacts could result in a significant reduction in the cost of providing transit services.

#### **5.3.8 Comparison of NPRM Costs to Pool of Potential Benefits**

The breakeven threshold at which the estimated cost of the proposed rule equals the benefits from reducing transit accidents is low. However, the benefits of SMS primarily will result from mitigating actions. As noted above, the benefits and costs of such actions largely are not accounted for in this analysis. FTA has not estimated the benefits of implementing SMS without mitigating actions, but FTA expects it is unlikely to have large benefits. Estimated costs for the Public Transportation Agency Safety Plans include certain activities that could yield safety improvements, such as improved communication, identification of hazards, and greater employee awareness. It is plausible that these changes alone could produce accident reductions that surpass this very low breakeven level, though even greater reductions could be achieved in concert with other mitigating actions. Table 27 shows the results of the breakeven analysis.

**Table 27: Summary of Breakeven Analysis<sup>44</sup>**

	<b>Current Dollar Value</b>	<b>7% Discounted Value</b>	<b>3% Discounted Value</b>
<b>Bus Incidents (20-Year Estimate)</b>	\$86,999,489,120	\$40,894,178,605	\$58,084,884,054
<b>Rail Incidents (20-Year Estimate)</b>	\$37,680,410,444	\$17,711,706,703	\$25,157,185,334
<b>Total Pool of Benefits (20-Year Estimate)</b>	\$124,679,899,564	\$58,605,885,309	\$83,242,069,388
<b>Estimated Costs (20-Year Estimate)</b>	\$1,407,680,883	\$752,319,890	\$1,050,876,643
<b>Benefits and Costs of Mitigating Actions</b>	Not Estimated	Not Estimated	Not Estimated
<b>Estimated Cost (Annualized)</b>	—	\$71,013,675	\$70,635,417
<b>Breakeven Threshold Including Bus and Rail</b>	—	1.28%	1.26%

The rule would need to reduce transit incident costs by 1.28% (7% discount rate) and 1.26% (3% discount rate) to equal the costs of developing and implementing SMS.

As noted above, FTA did not estimate the cost of other actions to mitigate the safety risks identified through the new practice or the policy developed in the plan, such as changes to operational practices or vehicle and station modifications. This rule would help transit agencies identify the hazards in a more effective manner. It is anticipated that through a more proactive and holistic approach to safety management, transit agencies can make better safety investments than under current practice. Increased communication between different agency departments (safety management, asset management, and programming) will result in synergy to take appropriate actions to reduce safety incidents.

## **6 Summary and Conclusion**

This proposed rule responds to NTSB recommendations on the use of SMS and a statutory mandate to develop a rule which implements the requirements related to Public Transportation Agency Safety Plans. The overall goal is to improve the safety of public transportation using a flexible, scalable SMS approach.

Compliance costs for transit agencies were estimated based on the staff labor costs associated with developing and certifying their safety plans; implementing and documenting the SMS approach; and associated recordkeeping. Staff time was monetized using data on wage rates and benefits. Estimates were adjusted based on agency size and existing level of maturity with SMS. Over the 20-year analysis period, total costs are estimated at \$752 million in present value (7% discount rate), annualized as \$71

<sup>44</sup> The costs and breakeven threshold in this table do not account for actions by agencies to mitigate or eliminate safety risks identified through implementation of their safety plans (beyond those specifically required by the rule, such as training).

million per year. These cost estimates do not include mitigation costs pertaining to capital investments, staffing levels, or other operational changes.

The pool of benefits was forecasted based on the estimated societal costs, including fatal and non-fatal injuries, property damage, and other costs. Estimates were developed using historical data on crash rates and the VSL recommended by USDOT. The benefits pool is estimated to be \$124.7 billion over the twenty year period, undiscounted and \$58.6 billion (7% discount rate) and \$83.2 billion (3% discount rate).

The analysis shows that if societal cost of safety could be reduced by 1.28% (7% discount rate) the cost of the proposed rule would be covered by these improvements. Additional costs would need to be incurred to mitigate identified hazards to significantly improve safety performance. Sensitivity analysis was carried out using the 3% discount rate and lower and higher VSL.

FTA further notes that there may be important non-quantifiable benefits from the proposed rule, stemming from stronger safety cultures at transit agencies.

## **7 Initial Regulatory Flexibility Act Analysis**

### **7.1 Reasons for Agency Action**

FTA is acting to enhance the safety of the nation's public transportation systems in accordance with the requirements of MAP-21, as reauthorized under the FAST Act and codified at 49 U.S.C. § 5329(d).

### **7.2 Objectives of, and Legal Basis for, the Proposed Rule**

The proposed rule would require all operators of public transportation systems to develop and implement Public Transportation Safety Plans as required by 49 U.S.C. § 5329(d).

### **7.3 Impact on Small Entities**

Affected entities for the proposed rule are operators of public transportation systems as defined in the proposed rule. In general, these entities are public sector organizations, typically metropolitan, regional, or State-level transit authorities, though there are also counties, municipalities, territories, and Native American Tribes, as well as non-profit service providers and other entities. Under the definitions established in the Regulatory Flexibility Act (RFA), local governments and other public sector entities are generally considered "small entities" (or more specifically, "small governmental jurisdictions") if their population is under 50,000. FTA datasets such as the NTD provide information on the population of the Census-defined urbanized areas in which each agency operates, rather than the population of the operating jurisdiction itself. As such, the correspondence between FTA definitions and the RFA definition is imperfect. However, because urbanized areas are also defined as having populations greater than 50,000, one can consider that agencies outside of urbanized areas are likely to have populations that meet the RFA definition of "small government entity." (In other words, if the entire urbanized area has fewer than 50,000 people, any given governmental jurisdiction within that area most likely has fewer than 50,000 people.) Based on the 2013 NTD and FTA estimates, there are approximately 2,125 transit

agencies (including recipients and sub-recipients) affected by the proposed rule that are located outside of urbanized areas.<sup>45</sup>

Compliance costs for these small entities will vary according to their size and complexity and their existing maturity level with SMS. Using the estimated labor requirements, rates, and other assumptions from the draft Regulatory Impact Analysis, annual compliance costs range from an average of \$12,000 per Section 5310 agency, to roughly \$31,000 per Small 5307 agency. For the sake of comparison, while transit agencies' operational budgets vary significantly, the average for Small 5307 agencies is around \$6.3 million per year, and Section 5311 agencies average \$1 million per year. Thus, the costs of the rule are around 0.5% to 1.5% of agency budgets. Transit providers implementing Public Transportation Agency Safety Plans also would be expected to realize benefits from reduced incident costs, reduced employee injuries, lower liability exposure, and potentially lower insurance premiums.

While the costs of preparing a Public Transportation Agency Safety Plan ordinarily would be proportionately higher for a small agency, the proposed rule allows smaller transit providers to have their Public Transportation Agency Safety Plans drafted and certified by the State in which they are located. This proposal would allow for some of the fixed costs of implementation to be borne by the group plan sponsor, or spread across a larger number of entities, reducing the cost for each.

#### **7.4 Alternatives Considered**

To facilitate the implementation of the 49 U.S.C. § 5329(d), FTA first conducted a crosswalk between the statutory provisions of 49 U.S.C. § 5329(d) and the key elements of SMS. SMS is comprised of four essential components, or “pillars”: (1) Safety Management Policy, (2) Safety Risk Management, (3) Safety Assurance, and (4) Safety Promotion. Each pillar is connected to one of statutory requirements of Public Transportation Agency Safety Plans. FTA therefore decided to implement 49 U.S.C. § 5329(d) using an SMS framework, particularly given the fact that SMS is flexible and scalable to the needs of individual agencies. FTA developed two possible alternatives to incorporate SMS: (1) a Comprehensive SMS Approach and (2) a Modified SMS Approach. The details for the two alternatives are presented in Appendix C. FTA selected an alternative that met statutory requirements at a lower overall cost, as described in the Regulatory Impact Analysis above, without sacrificing many of the benefits of SMS. FTA also elected to exempt smaller grantees from the requirements of this proposed rule to the extent that they are not operators of public transportation systems, and it proposes to require States to draft and certify plans on behalf of smaller operators, thus reducing the administrative, financial, and regulatory burdens on small entities.

#### **7.5 Effect on the cost of credit**

The proposed rule would not affect the cost of credit for affected small entities.

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<sup>45</sup> These 2,125 agencies are comprised of 625 Small 5307 agencies that operate 100 or fewer vehicles; 1,300 rural Section 5311 agencies; and 200 Section 5310 agencies.

## **7.6 Summary and conclusion**

The proposed rule would affect roughly 2,125 small entities, most of whom are small government entities and small non-profit organizations that operate public transit services in non-urbanized areas. Compliance costs will vary according to agency size and complexity and the extent of current asset management practices, but appear to represent no more than about 0.5% to 1.5% of annual operating budgets, and could be offset by reduced incident-related costs. Participating transit providers would also see benefits from greater safety and reduced incidents. Overall, while the proposed rule would affect a substantial number of small entities, these impacts would not be significant due to the low magnitude of the costs and the potential for offsetting benefits. Moreover, FTA has designed the proposed rule to allow flexibility for small entities.

## **Appendix A: Summary of Proposed Rule Alternatives**

### **Alternative 1: Comprehensive SMS Approach**

#### **Subpart B—Public Transportation Agency Safety Plans**

##### *673.11 General Requirements*

This section proposes the minimum requirements for the elements to be included in a Public Transportation Agency Safety Plan. Pursuant to 49 U.S.C 5329(d)(1), this section proposes that each operator of public transportation that receives Federal financial assistance under 49 U.S.C. Chapter 53 must develop and certify a Public Transportation Agency Safety Plan. As provided by 49 U.S.C. 5329(d)(3)(A), Section 673.11(d) proposes that a State must draft the Public Transportation Agency Safety Plan for 49 U.S.C. 5310 and 5311 providers, as well as for any small public transportation providers as defined in today's NPRM. A State is not required to develop a Public Transportation Agency Safety Plan for a particular transit agency that receives Federal financial assistance under 49 U.S.C. 5310, 49 U.S.C. 5311, or a small public transportation provider, if that agency notifies the State that it will develop its own plan.

Section 673.11(a)(1) proposes that the Public Transportation Agency Safety Plan, and any updates, must be signed by the transit agency's designated Accountable Executive and be approved by the transit agency's Board of Directors, or equivalent entity. This proposal is consistent with the statutory requirement in 49 U.S.C. 5329(d)(1)(A) that a Board of Directors (or equivalent entity) approve the transit agency's safety plan. In short, under today's NPRM, accountability for the contents in the Public Transportation Agency Safety Plan is formally elevated to the Accountable Executive and Board of Directors. Section 673.11(a)(7) proposes that this occurs annually to a timeline established by the agency, or State, in accordance with 49 U.S.C. 5329(d)(1)(D).

Pursuant to 49 U.S.C. 5329(d)(1)(B), (C), and (G), a transit agency must establish: methods for identifying and evaluating safety risks throughout all elements of its public transportation system; strategies to minimize the exposure of the public, personnel, and property to hazards and unsafe conditions; and a comprehensive staff training program for the operations personnel and personnel directly responsible for safety. These three statutory requirements fit into three of the four key pillars of SMS, as discussed in more detail above: Safety Risk Management, Safety Assurance, and Safety Promotion. Consequently, FTA proposes to require each transit agency to develop and implement an SMS under Section 673.11(a)(2); this SMS will satisfy the statutory requirements of 49 U.S.C. 5329(d)(1)(B), (C), and (G). In this proposal, FTA recognizes that a Public Transportation Agency Safety Plan for a large, multi-modal, complex public transportation system most likely will be more complex than that of a very small bus operator. The scalability of SMS will allow transit agencies to develop safety plans that will meet the unique needs of their operating environments.

Proposed Section 673.11(a)(3) explains that each Public Transportation Agency Safety Plan must include safety performance targets based on the safety performance criteria and state of good repair measures established by FTA. A State or transit agency must make its safety performance targets available to States and Metropolitan Planning Organizations to aid in the planning process.

Section 673.11(a)(4) proposes that a Public Transportation Agency Safety Plan must address any future standards or requirements, as applicable, set forth in FTA's Public Transportation Safety Program and FTA's National Public Transportation Safety Plan.

Proposed Section 673.11(a)(5) would require that each Public Transportation Agency Safety Plan must include, or address by reference, an emergency preparedness and response plan. FTA intends that each emergency preparedness and response plan would address, at a minimum: the assignment of employee responsibilities, as necessary and appropriate, during an emergency; the integration of responses to all hazards, as appropriate; and coordination with Federal, State, regional, and local officials with roles and responsibilities for emergency preparedness and response in the transit agency's service area. FTA understands that a transit agency may have developed an emergency preparedness and response plan that addresses these minimum requirements in accordance with regulations from other Federal and State agencies. FTA is not proposing a duplication of plans and encourages a Public Transportation Agency Safety Plan to reference an existing emergency preparedness and response plan so long as it addresses the minimum requirements of this section.

Section 673.11(a)(6) proposes that each Public Transportation Agency Safety Plan include measures that would address bicycle and pedestrian safety to the maximum extent possible, which is consistent with the Secretary's bicycle and pedestrian safety initiative (see [http://www.dot.gov/sites/dot.gov/files/docs/safer\\_people\\_safer\\_streets\\_summary\\_doc\\_acc\\_v1-11-9.pdf](http://www.dot.gov/sites/dot.gov/files/docs/safer_people_safer_streets_summary_doc_acc_v1-11-9.pdf)).

Section 673.11(a)(7) proposes that each transit agency must establish a process and timeline for conducting an annual review and update of its Public Transportation Agency Safety Plan.

Section 673.11(b) proposes that the Public Transportation Agency Safety Plan may include more than one mode of service. However, if a transit agency has a safety plan for its commuter rail service, passenger ferry service, or aviation service, then the transit agency may not use that plan for purposes of satisfying 49 CFR part 673; the transit agency must develop a separate Public Transportation Agency Safety Plan consistent with this part. FTA invites specific comment on how FTA could support the development of Public Transportation Agency Safety Plans for Transit Agencies of different sizes and modes.

Section 673.11(c) proposes that a transit agency must maintain its Public Transportation Agency Safety Plan in accordance with the recordkeeping requirements of Subpart D of this Part.

Section 673.11(d) proposes that a State must develop and certify a Public Transportation Agency Safety Plan on behalf of any 49 U.S.C. 5310, 49 U.S.C. 5311, or small public transportation provider. A State is not required to develop a Public Transportation Agency Safety Plan if a 49 U.S.C. 5310, 49 U.S.C. 5311, or small public transportation provider notifies the State that it will develop its own plan. In either instance, the transit agency must carry out the plan.

If a State develops and certifies a Public Transportation Agency Safety Plan on behalf of a transit agency, and the transit agency later opts to develop and certify its own Public Transportation Agency Safety Plan, then the transit agency would be required to notify the State, and the transit agency would have one year from the date of the notification to develop and certify a Public Transportation Agency Safety Plan that is compliant with this part.



Section 673.11(e) proposes that any rail fixed guideway system that had a system safety program plan, as per requirements set forth in 49 CFR part 659 as of October 1, 2012, may keep that plan in effect until one year after the effective date of the final rule.

Section 673.11(f) proposes that agencies that operate passenger ferries regulated by the United States Coast Guard (USCG) or commuter rail service regulated by the Federal Railroad Administration (FRA) are not required to develop agency safety plans for those modes of service.

#### *673.13 Certification of compliance*

This section provides that not later than one year after the effective date of the final rule, each transit agency must certify its compliance with the requirements of this part. For transit agencies that receive Federal funding under 49 U.S.C. 5310, 49 U.S.C. 5311, and those identified as small public transportation providers under 49 U.S.C. 5307, a State must certify compliance unless the provider opts to draft and certify its own safety plan. In those cases where a State certifies compliance for 49 U.S.C. 5310, 49 U.S.C. 5311, or small public transportation provider under 49 U.S.C. 5307, this certification must also occur within one year after the effective date of the final rule. In addition to certification, Public Transportation Agency Safety Plans that are developed by transit agencies with rail transit systems must also be reviewed and approved by the appropriate State Safety Oversight Agency as per the requirements set forth in 49 CFR part 659, and the future recodification of those requirements at 49 CFR part 674. In accordance with 49 U.S.C. 5329(e)(4)(iv), State Safety Oversight Agencies must have the authority to review, approve, oversee, and enforce the implementation of the Public Transportation Agency Safety Plans of transit agencies operating rail fixed guideway public transportation systems.

#### *§ 673.15 Coordination with metropolitan, statewide, and non-metropolitan planning processes*

This section proposes to require a State or transit agency to make its safety performance targets available to States and Metropolitan Planning Organizations to aid in the planning process. This section also proposes to require, to the maximum extent practicable, a State or transit agency to coordinate with States and Metropolitan Planning Organizations in the selection of State and MPO safety performance targets.

### **Subpart C – Safety Management Systems**

#### *673.21 General requirements*

This section outlines the SMS elements that each transit agency must establish in its Public Transportation Agency Safety Plan. Under today's NPRM, each transit agency would be required to implement an SMS; however, FTA would require that each transit agency would scale the SMS to the size, scope, and complexity of the transit agency's operations. Each transit agency would be required to establish its activities to include the four main pillars of SMS: (1) Safety Management Policy; (2) Safety Risk Management; (3) Safety Assurance; and (4) Safety Promotion. FTA expects that the scope and detail for each activity will vary based on the size and complexity of the system. FTA anticipates that activities, and documentation of those activities, for a small bus transit agency will be substantially less than those of a large multi-modal system. To help clarify SMS development and implementation, FTA intends to provide guidance to the industry, including templates designed to accommodate the variance in transit system mode, size and complexity.

### *673.23 Safety Management Policy*

Under proposed Section 673.23(a), a transit agency would be required to establish the organizational accountabilities and responsibilities necessary for implementing SMS and capture these under the first component of SMS, Safety Management Policy. The success of a transit agency's SMS is dependent upon the commitment of the entire organization and begins with the highest levels of transit agency management. FTA expects that the level of detail for organizational accountabilities and responsibilities would be commensurate with the size and complexity of the transit agency.

Pursuant to Section 673.23(a)(1), the Safety Management Policy statement would contain the transit agency's safety objectives. Pursuant to Section 673.23(a)(2), the Safety Management Policy statement would include an explicit statement from executive management that commits that transit agency to fulfill the transit agency's safety objectives and meet safety performance targets. In addition, Section 673.23(a)(3) would require a clear statement that resources will be provided in order to meet the transit agency's safety objectives and safety performance targets. Section 673.23(a)(4) proposes minimum contents for a Safety Management Policy statement that must be formally documented, signed by the Accountable Executive and reviewed by the transit agency no less than once per year.

Under Section 673.23(b), a transit agency would need to include in its Safety Management Policy statement an explicit commitment to the implementation and operation of an employee safety reporting program, which would provide employees an ongoing opportunity to report identified concerns. This commitment would also describe the applicable conditions under which employees would be exempt from disciplinary actions as a result of safety reporting. A transit agency would also need to include in the Safety Management Policy statement a definition of behaviors that are unacceptable and that would not be exempt from disciplinary actions.

Section 673.23(c) proposes that the Safety Management Policy statement is communicated throughout the transit agency, as well as to the Board of Directors (or equivalent authority), and is made readily available to all employees of the transit agency and contractors.

Section 673.23(d) proposes that the transit agency establish its accountabilities and responsibilities necessary to meet the established safety performance targets. In general, a transit agency would need to describe its organizational structure and the procedures it must adopt in order for it to meet its safety performance targets. A transit agency would describe the authorities, accountabilities, and responsibilities for safety management as they relate to the development and management of the transit agency's SMS. The level of detail in this section would be commensurate with the size and complexity of transit agency operations.

Finally, Section 673.23(e) of the Safety Management Policy component proposes that a transit agency must establish how its emergency preparedness and response programs, plans, or procedures would be integrated with the SMS.

### *673.25 Safety Risk Management*

Section 673.25(a) proposes that each transit agency establish and implement its process for managing safety risk, including the identification of hazards, analysis of hazards, evaluation of safety risk, and mitigation of safety risk.

Section 673.25(b)(1) would require a transit agency to establish its activities for hazard identification analysis, including the identification of the sources, both proactive and reactive, for identifying hazards. This section also would require a transit agency to develop and implement a process for safety risk evaluation and safety risk mitigation.

Section 673.25(b)(2) would require a transit agency to include, as a source for hazard identification and analysis, data and information provided by an oversight authority and the FTA.

Section 673.25(b)(3) would require a transit agency to establish criteria for the application of its hazard identification and analysis activities to the design of a new public transportation system; changes to the existing public transportation system, including changes to operations or maintenance procedures and organizational structures; new operations of service for the public; findings from investigations; and, as necessary, findings from activities under the safety assurance section of today's rule.

FTA proposes that hazard identification and analysis activities are commensurate with the size of the transit agency operations. For example, FTA would anticipate that the number of identified hazards for a small, rural bus system may be less than the number of hazards identified for a large, multi-modal system.

Section 673.25(c) proposes that a transit agency establish activities for the evaluation and prioritization of safety risks related to the potential consequences of hazards identified and analyzed in Section 673.25(b). Transit agencies would need to evaluate safety risks in terms of both probability (the likelihood of the hazard producing the potential consequences) and severity (the damage the potential consequences of hazard that may be caused if the hazard is not eliminated or its consequences are not successfully mitigated). This section also proposes that a transit agency establish criteria for elevating safety risks to the Accountable Executive and for the development of safety mitigations. In addition, this section would require that a transit agency also establish criteria for determining when safety risk mitigation would require approval and formal documentation by the Accountable Executive prior to implementation. Should the Accountable Executive determine that the need for safety risk mitigation is immediate, prior formal documentation would not be necessary. Further, this section proposes that a transit agency must establish criteria for reporting results from Safety Risk Management activities to the Board of Directors or equivalent authority. FTA recognizes that the criteria should be commensurate with the size and complexity of the transit agency.

#### *673.27 Safety Assurance*

This section proposes that a transit agency develop and implement safety assurance activities that include safety performance monitoring and measurement, management of change, and continuous improvement. FTA would expect that a transit agency's safety assurance activities would be scaled to the size and complexity of its operations, with the objective being that a transit agency can accurately determine whether or not it is meeting its safety objectives and safety performance targets, as well as the extent to which its SMS is being implemented effectively.

Each transit agency would be required to conduct an annual review of its safety risk mitigations. FTA anticipates that each transit agency would identify those safety risk mitigations that should be reviewed each year to ensure they are still effective.

In Section 673.27(b)(1), FTA proposes that a transit agency identify the data and information that it must collect from its operations, maintenance, and public transportation services so that it may monitor the agency's safety performance as well as the effectiveness of its SMS. Under this section, a transit agency would be responsible for the ongoing monitoring of its operations and maintenance protocols and procedures to assure that they are being implemented as planned. In addition, a transit agency would be required to monitor its operational environment to detect changes (planned or unplanned), so that identified changes could be evaluated to determine their potential impact to safety. If a transit agency determines that a change might impact safety, then the transit agency would need to evaluate the change using Safety Risk Management activities established under Section 673.25.

This section would also require a transit agency to conduct reviews, at least once per year, to assure its compliance with applicable Federal and State safety regulations, standards, and guidance. A transit agency also would be required to conduct an annual audit of the effectiveness of its own SMS.

This section proposes that a transit agency investigate safety events (as defined in this NPRM) and any reports from non-compliance with applicable regulations, standards, and applicable legal authority. Finally, the section would require the continuous monitoring of information reported through the employee safety reporting program.

Section 673.27(b)(2) proposes that each transit agency establish and document the safety performance indicators used to determine whether the agency is meeting its safety objectives and safety performance targets. For a small transit system, this may involve no more than a few safety performance indicators, whereas a large multi-modal system may require dozens of indicators as a means to monitor safety performance.

Section 673.27(c) proposes that a transit agency monitor its system for performance changes and develop criteria to determine whether or not a proposed or identified change may impact the agency's safety performance. FTA anticipates that a transit agency would identify the activities to be implemented for continuous monitoring as well as the sources of potential change.

In Section 673.27(d), a transit agency would be required assess its safety performance at least annually. At a minimum, a transit agency's safety performance assessment would include results from the activities conducted under Section 673.27(b)(1), as well as those areas in which the transit agency has identified that it is not meeting its safety performance targets. FTA anticipates that the annual safety performance assessment results are reported to the Board of Directors (or equivalent authority) and are given due consideration in the transit agency's decision-making on investment prioritization and reflect coordination with the policies, goals, objectives and strategies identified in the Transit Asset Management Plan as well as those identified in coordination with the appropriate State or MPO.

If a transit agency identifies any deficiencies during its annual safety performance assessment, it would be required to develop and carry out, under the direction of the Accountable Executive, a plan to address the identified safety deficiencies. This annual assessment of safety performance can be done in conjunction with the annual SMS policy review and annual auditing of the effectiveness of the agency's SMS as required in Sections 673.23(a)(4) and 673.27(b)(1)(v) and (vi).

### *673.29 Safety Promotion*

This section proposes that a transit agency establish competencies and training for all agency employees directly responsible for the management of safety, and establish and maintain the means for communicating safety performance and SMS information. Section 673.29(a)(1) would require that transit agency safety training programs require each employee, as applicable, to complete training to enable the person to meet his or her role and responsibilities for safety management, and to complete refresher training, as necessary, to stay current with the agency's safety management practices and procedures. This section would require that all employees receive training and refresher training, as necessary, on how to use the employee safety reporting program required in Section 673.23(b). This section also would require that all persons responsible for safety oversight, as defined by FTA in the interim provisions for the Safety Certification Training Program, 80 FR 10619, Feb. 27, 2015 (<http://www.gpo.gov/fdsys/pkg/FR-2015-02-27/pdf/2015-03842.pdf>), comply with the interim provisions and the final rule for the Public Transportation Agency Safety Certification Program.

Section 673.29(a)(2) would require a transit agency to ensure that all persons within its organization having roles or responsibilities for carrying out the agency's SMS are trained and competent to perform their duties under SMS.

Section 673.29(b) would require a transit agency to ensure that all employees are aware of any policies, activities, and procedures that are related to their role and safety management responsibilities. Safety communications would include information on hazards and safety risks that are relevant to the employee's role and responsibilities; explain reasons that a transit agency introduces or changes policies, activities or procedures; and communicates to an employee when actions are taken in response to reports submitted by the employee through the employee safety reporting program. FTA expects that each transit agency would define the means and mechanisms for effective safety communication based on their organization, structure, and size of operations.

## **Subpart D – Safety Plan Documentation and Recordkeeping**

### *673.31 Safety Plan documentation*

This section proposes that transit agencies keep records of their documents that meet the requirements of this part. FTA would expect a transit agency to maintain documents that set forth its Public Transportation Agency Safety Plan, including those related to the implementation of its Safety Management System (SMS), such as results from SMS processes and activities. For the purpose of reviews, investigations, audits, or other purposes, the section proposes that these documents be made available to FTA, State Safety Oversight Agencies in the case of rail transit systems, and other Federal agencies as appropriate.

### *673.33 Safety Plan records*

This section proposes that, in addition to the documents indicated above, a transit agency must maintain, at a minimum, the following records: safety risk mitigations, results from a transit agency's safety performance assessment, and records of employee safety training. FTA anticipates that the amount of records maintained by each transit agency would vary based on the agency's size and complexity. For example, it is reasonable to expect that a smaller agency would have fewer safety risk mitigations and

employee training records to maintain, whereas a large transit agency may have a robust safety management information system to track and monitor its safety risk mitigations, and perhaps another system dedicated to tracking employee safety training. For safety performance monitoring and measurement, the section proposes that the transit agency maintain documentation that it would use to determine how well it is meeting its safety objectives and safety performance targets, as well as safety performance indicators used to determine the effectiveness of SMS implementation.

## **Alternative 2: Modified SMS Approach**

### **Subpart B – Public Transportation Agency Safety Plans**

#### *673.11 General Requirements*

This section proposes the minimum requirements for the elements to be included in a Public Transportation Agency Safety Plan. Pursuant to 49 U.S.C 5329(d)(1), this section proposes that each operator of public transportation that receives Federal financial assistance under 49 U.S.C. Chapter 53 must develop and certify a Public Transportation Agency Safety Plan. As provided by 49 U.S.C. 5329(d)(3)(A), Section 673.11(d) proposes that a State must draft the Public Transportation Agency Safety Plan for 49 U.S.C. 5310 and 5311 providers, as well as for any small public transportation providers as defined in today's NPRM. A State is not required to develop a Public Transportation Agency Safety Plan for a particular transit agency that receives Federal financial assistance under 49 U.S.C. 5310, 49 U.S.C. 5311, or a small public transportation provider, if that agency notifies the State that it will develop its own plan.

Section 673.11(a)(1) proposes that the Public Transportation Agency Safety Plan, and any updates, must be signed by the transit agency's designated Accountable Executive and be approved by the transit agency's Board of Directors, or equivalent entity. This proposal is consistent with the statutory requirement in 49 U.S.C. 5329(d)(1)(A) that a Board of Directors (or equivalent entity) approve the transit agency's safety plan. In short, under today's NPRM, accountability for the contents in the Public Transportation Agency Safety Plan is formally elevated to the Accountable Executive and Board of Directors. Section 673.11(a)(7) proposes that this occurs annually to a timeline established by the agency, or State, in accordance with 49 U.S.C. 5329(d)(1)(D).

Pursuant to 49 U.S.C. 5329(d)(1)(B), (C), (D), (E), (F), and (G), a transit agency must establish: methods for identifying and evaluating safety risks throughout all elements of its public transportation system; strategies to minimize the exposure of the public, personnel, and property to hazards and unsafe conditions; a process and timeline for conducting an annual review and update of its safety plan; safety performance targets; a safety officer who reports directly to the general manager, president, or equivalent officer; and a comprehensive staff training program for the operations personnel and personnel directly responsible for safety. These statutory requirements fit into the four key pillars of SMS, as discussed in more detail above: Safety Management Policy, Safety Risk Management, Safety Assurance, and Safety Promotion. Consequently, FTA proposes to require each transit agency to develop and implement an SMS under Section 673.11(a)(2); this SMS will satisfy the statutory requirements of 49 U.S.C. 5329(d)(1)(B), (C), (D), (E), (F), and (G). In this proposal, FTA recognizes that a Public Transportation Agency Safety Plan for a large, multi-modal, complex public transportation system most likely will be

more complex than that of a very small bus operator. The scalability of SMS will allow transit agencies to develop safety plans that will meet the unique needs of their operating environments.

Proposed Section 673.11(a)(3) explains that each Public Transportation Agency Safety Plan must include safety performance targets based on the safety performance criteria and state of good repair measures established by FTA in the National Public Transportation Safety Plan. In the National Public Transportation Safety Plan, FTA is proposing to adopt four initial safety performance criteria: (1) Fatalities, (2) Injuries, (3) Safety Events, and (4) System Reliability.<sup>46</sup> These safety performance criteria represent categories of measures that are intended to reduce safety events, fatalities, and injuries. These measures are broad so that they will be relevant to all public transportation modes, and they are intended to focus transit agencies on the development of specific and measureable targets, as well as the actions each agency would implement to improve their own safety outcomes. Through the SMS process, FTA expects transit agencies to develop their own performance indicators and regularly monitor the performance of their systems to ensure that they are meeting their targets and improving safety outcomes. FTA is proposing to adopt these measures through a separate notice and comment process, and FTA directs readers to that docket if readers are interested in submitting comments on the safety performance criteria. FTA expects transit agencies to evaluate their safety performances and determine whether they should change their safety performance targets at least annually when the transit agencies are reviewing and updating their Public Transportation Agency Safety Plans. A State or transit agency must make its safety performance targets available to States and Metropolitan Planning Organizations (MPO) to aid States and MPOs in the selection of their own performance targets.

Section 673.11(a)(4) proposes that a Public Transportation Agency Safety Plan must address any future standards or requirements, as applicable, set forth in FTA's Public Transportation Safety Program and FTA's National Public Transportation Safety Plan.

Section 673.11(a)(5) proposes that each transit agency must establish a process and timeline for conducting an annual review and update of its Public Transportation Agency Safety Plan.

Proposed Section 673.11(a)(6) would require that each rail transit agency include, or incorporate by reference, in its Public Transportation Agency Safety Plan an emergency preparedness and response plan. FTA intends that each emergency preparedness and response plan would address, at a minimum: the assignment of employee responsibilities, as necessary and appropriate, during an emergency; the integration of responses to all hazards, as appropriate; and coordination with Federal, State, regional, and local officials with roles and responsibilities for emergency preparedness and response in the transit agency's service area. FTA understands that a transit agency may have developed an emergency preparedness and response plan that addresses these minimum requirements in accordance with regulations from other Federal and State agencies. Notably, FTA currently requires rail fixed guideway systems to have emergency preparedness plans through the State Safety Oversight Rule at 49 CFR 659.19(k). FTA intends to require rail transit systems to continue to implement the twenty-one elements of their system safety program plans as currently required under 49 CFR part 659; the four pillars of SMS

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<sup>46</sup> FTA may adopt additional performance criteria through future public comment processes.

cover the remaining twenty elements. FTA estimates it will take rail transit agencies 34 hours on average to comply with this and other requirements in Section 673.11(a).

FTA notes that there are safety models that include emergency preparedness as a key element. For example, FAA requires certain air carriers to have emergency preparedness plans. See 14 CFR 5.27. Additionally, FRA is proposing to require railroads to have emergency preparedness plans. See 77 FR 55403 (Sept. 7, 2012). Recent safety-related events have demonstrated the need for emergency preparedness plans in improving safety outcomes nationally.

Section 673.11(b) proposes that the Public Transportation Agency Safety Plan may include more than one mode of service. However, if a transit agency has a safety plan for its commuter rail service, passenger ferry service, or aviation service, then the transit agency may not use that plan for purposes of satisfying 49 CFR part 673; the transit agency must develop a separate Public Transportation Agency Safety Plan consistent with this part. FTA invites specific comment on how FTA could support the development of Public Transportation Agency Safety Plans for Transit Agencies of different sizes and modes.

Section 673.11(c) proposes that a transit agency must maintain its Public Transportation Agency Safety Plan in accordance with the recordkeeping requirements of Subpart D of this Part.

Section 673.11(d) proposes that a State must draft and certify a Public Transportation Agency Safety Plan on behalf of any 49 U.S.C. 5310, 49 U.S.C. 5311, or small public transportation provider. A State is not required to draft a Public Transportation Agency Safety Plan if a 49 U.S.C. 5310, 49 U.S.C. 5311, or small public transportation provider notifies the State that it will draft its own plan. In either instance, the transit agency must carry out the plan.

If a State drafts and certifies a Public Transportation Agency Safety Plan on behalf of a transit agency, and the transit agency later opts to draft and certify its own Public Transportation Agency Safety Plan, then the transit agency would be required to notify the State, and the transit agency would have one year from the date of the notification to draft and certify a Public Transportation Agency Safety Plan that is compliant with this part.

Section 673.11(e) proposes that any rail fixed guideway system that had a system safety program plan, as per requirements set forth in 49 CFR part 659 as of October 1, 2012, may keep that plan in effect until one year after the effective date of the final rule.

Section 673.11(f) proposes that agencies that operate passenger ferries regulated by the United States Coast Guard (USCG) or commuter rail service regulated by the Federal Railroad Administration (FRA) are not required to develop agency safety plans for those modes of service.

### *673.13 Certification of compliance*

Section 673.13(a) provides that not later than one year after the effective date of the final rule, each transit agency must certify its compliance with the requirements of this part. For transit agencies that receive Federal funding under 49 U.S.C. 5310, 49 U.S.C. 5311, and those identified as small public transportation



providers under 49 U.S.C. 5307, a State must certify compliance unless the provider opts to draft and certify its own safety plan. In those cases where a State certifies compliance for 49 U.S.C. 5310, 49 U.S.C. 5311, or small public transportation provider under 49 U.S.C. 5307, this certification must also occur within one year after the effective date of the final rule.

In addition to certification, Public Transportation Agency Safety Plans that are developed by transit agencies with rail transit systems must also be reviewed and approved by the appropriate State Safety Oversight Agency as per the requirements set forth in 49 CFR part 659, and the future recodification of those requirements at 49 CFR part 674. In accordance with 49 U.S.C. 5329(e)(4)(iv), State Safety Oversight Agencies must have the authority to review, approve, oversee, and enforce the implementation of the Public Transportation Agency Safety Plans of transit agencies operating rail fixed guideway public transportation systems.

Section 673.13(b) requires that each transit agency or State certify compliance with part 673 on an annual basis.

#### *§ 673.15 Coordination with metropolitan, statewide, and non-metropolitan planning processes*

This section proposes to require a State or transit agency to make its safety performance targets available to States and Metropolitan Planning Organizations to aid in the planning process. This section also proposes to require, to the maximum extent practicable, a State or transit agency to coordinate with States and Metropolitan Planning Organizations in the selection of State and MPO safety performance targets.

### **Subpart C – Safety Management Systems**

#### *673.21 General requirements*

This section outlines the SMS elements that each transit agency must establish in its Public Transportation Agency Safety Plan. Under today's NPRM, each transit agency would be required to implement an SMS; however, FTA would require that each transit agency would scale the SMS to the size, scope, and complexity of the transit agency's operations. Each transit agency would be required to establish its activities to include the four main pillars of SMS: (1) Safety Management Policy; (2) Safety Risk Management; (3) Safety Assurance; and (4) Safety Promotion. FTA expects that the scope and detail for each activity will vary based on the size and complexity of the system. FTA anticipates that activities, and documentation of those activities, for a small bus transit agency will be substantially less than those of a large multi-modal system. To help clarify SMS development and implementation, FTA intends to provide guidance to the industry, including templates designed to accommodate the variance in transit system mode, size and complexity.

#### *673.23 Safety Management Policy*

Under proposed Section 673.23(a), a transit agency would be required to establish the organizational accountabilities and responsibilities necessary for implementing SMS and capture these under the first component of SMS, Safety Management Policy. The success of a transit agency's SMS is dependent

upon the commitment of the entire organization and begins with the highest levels of transit agency management. FTA expects that the level of detail for organizational accountabilities and responsibilities would be commensurate with the size and complexity of the transit agency. FTA estimates that a rail agency would spend 34 hours, a large 5307 agency would spend 56.5 hours, and a small 5307 agency would spend 24.5 hours complying with this requirement.

The Safety Management Policy statement would contain the transit agency's safety objectives. These objectives would include a broad description of the agency's overarching safety goals, which would be based on that agency's unique needs. The Safety Management Policy statement also would include a reference to the agency's performance targets.

Under Section 673.23(b), a transit agency would need to include in its Safety Management Policy statement a process that allows employees to report safety conditions to senior management. This process would provide protections for employees who report safety conditions to senior management and a description of behaviors that are unacceptable and that would not be exempt from disciplinary actions. This is a critical SMS element for ensuring safety. A reporting program<sup>47</sup> allows employees who identify safety hazards and risks in the day-to-day duties to directly notify senior personnel, without fear of reprisal, so that the hazards and risks can be mitigated or eliminated. FTA estimates that a rail agency would spend 23 hours, a large 5307 agency would spend 80 hours, and a small 5307 agency would spend 40 hours complying with this requirement.

Section 673.23(c) proposes that the Safety Management Policy statement is communicated throughout the transit agency, as well as to the Board of Directors (or equivalent authority), and is made readily available to all employees of the transit agency and contractors.

Section 673.23(d) proposes that the transit agency establish its accountabilities and responsibilities necessary to meet the established safety performance targets. In general, a transit agency would need to describe its organizational structure and the procedures it must adopt in order for it to meet its safety performance targets. A transit agency would describe the authorities, accountabilities, and responsibilities for safety management as they relate to the development and management of the transit agency's SMS. The level of detail in this section would be commensurate with the size and complexity of transit agency operations. At a minimum, a transit agency would need to identify an Accountable Executive, a Chief Safety Officer or SMS Executive, agency leadership and executive management responsible for the implementation of a transit agency's safety plan, and key staff responsible for the implementation of a transit agency's safety plan.

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<sup>47</sup> NTSB issued Safety Recommendation R-10/02 for the WMATA Metrorail train collision accident on June 22, 2009, found at: <http://www.nts.gov/investigations/AccidentReports/Reports/RAR1002.pdf>. Through this report, NTSB recommends that "the FTA facilitate the development of non-punitive safety reporting programs at all transit agencies [in order] to collect reports from employees in all divisions within their agencies."

### *673.25 Safety Risk Management*

Section 673.25(a) proposes that each transit agency establish and implement its process for managing safety risk, including the identification of hazards, analysis of hazards, evaluation of safety risk, and mitigation of safety risk, in all elements of its public transportation system, including changes to its public transportation system that may impact safety performance. At a minimum, FTA would expect a transit agency to apply its safety risk management process to the design of a new public transportation system, changes to its existing public transportation system, new operations of service to the public, new operations or maintenance procedures or organizational change, and changes to operations or maintenance procedures.

Section 673.25(b)(1) would require a transit agency to establish a process for hazard identification and analysis, including the identification of the sources, both proactive and reactive, for identifying hazards. Activities for hazard identification analysis could include formalized processes where a transit agency identifies hazards throughout its entire system, logs them into a database, performs risk analyses, and identifies mitigation measures. These activities also could include safety focus groups, reviews of safety reporting trends, and for smaller bus systems, it could mean sitting down with a few operators in a room, discussing hazards on the system, deciding which ones pose the greatest risk, and then coming up with mitigation. FTA estimates that a rail agency would spend 200 hours, a large 5307 agency would spend 160 hours, and a small 5307 agency would spend 32 hours performing hazard identification and analysis activities.

Section 673.25(b)(2) would require a transit agency to include, as a source for hazard identification and analysis, data and information provided by an oversight authority and the FTA. FTA estimates that both a rail and a large 5307 agency would spend 2.5 hours complying with this provision, and a small 5307 agency would spend 3 hours.

FTA proposes that hazard identification and analysis activities are commensurate with the size of the transit agency operations. For example, FTA would anticipate that the number of identified hazards for a small, rural bus system may be less than the number of hazards identified for a large, multi-modal system.

Section 673.25(c) proposes that a transit agency establish activities for the evaluation and prioritization of safety risks related to the potential consequences of hazards identified and analyzed in Section 673.25(b). Transit agencies would need to evaluate safety risks in terms of both probability (the likelihood of the hazard producing the potential consequences) and severity (the damage the potential consequences of hazard that may be caused if the hazard is not eliminated or its consequences are not successfully mitigated). FTA estimates that a rail agency would spend 40 hours, a large 5307 agency would spend 34 hours, and a small 5307 agency would spend 11 hours performing evaluation and prioritization activities.

This section also proposes that transit agencies must establish criteria for the development of safety risk mitigations that are necessary based on safety risk evaluations. FTA estimates that a rail agency would spend 40 hours, a large 5307 agency would spend 32 hours, and a small 5307 agency would spend 21 hours developing safety risk mitigations.

### *673.27 Safety Assurance*

This section proposes that a transit agency develop and implement safety assurance activities that include safety performance monitoring and measurement and continuous improvement. FTA would expect that a transit agency's safety assurance activities would be scaled to the size and complexity of its operations, with the objective being that a transit agency can accurately determine whether or not it is meeting its safety objectives and safety performance targets, as well as the extent to which its SMS is being implemented effectively.

Each transit agency would be required to conduct an annual review of its safety risk mitigations. FTA anticipates that each transit agency would identify those safety risk mitigations that should be reviewed each year to ensure they are still effective.

In Section 673.27(b), FTA proposes that a transit agency establish activities to monitor its system for compliance with, and sufficiency of, its procedures for operations and maintenance; monitor its operations to identify hazards not identified through the Safety Risk Management process in proposed Section 673.25; monitor its operations to identify any risk mitigations that may be ineffective, inappropriate, or were not implemented as intended; investigate safety events (as defined in this NPRM) and any reports from non-compliance with applicable regulations, standards, and applicable legal authority continuous; and monitor information reported through the employee safety reporting program. FTA estimates that a rail agency would spend 438.5 hours, a large 5307 agency would spend 502.5 hours, and a small 5307 agency would spend 164 hours complying with proposed Section 673.27(b).

In Section 673.27(c), a transit agency would be required to regularly assess its safety performance. If a transit agency identifies any deficiencies during a safety performance assessment, it would be required to develop and carry out, under the direction of the Accountable Executive, a plan to address the identified safety deficiencies. FTA would expect a transit agency to conduct a safety performance assessment at least annually, and the safety performance assessment can be completed in conjunction with the annual review and update to its overall safety plan in Section 673.11(a)(5). FTA estimates that a rail agency would spend 88 hours, a large 5307 agency would spend 64 hours, and a small 5307 agency would spend 52 hours complying with proposed Section 673.27(c).

Section 673.27(d) would require transit agencies to establish a process for assessing its safety performance and develop and carry out plans to address any deficiencies identified. FTA estimates that a rail agency would spend 60 hours, a large 5307 agency would spend 68 hours, and a small 5307 agencies would spend 48 hours complying with proposed Section 673.27(d).

### *673.29 Safety Promotion*

This section would require a transit agency to establish a comprehensive safety training program for all employees and contractors directly responsible for the management of safety, including refresher training as necessary. Through the safety training programs, a transit agency would require each employee, as applicable, to complete training to enable the person to meet his or her role and responsibilities for safety management, and to complete refresher training, as necessary, to stay current with the agency's safety

management practices and procedures. FTA estimates that a rail agency would spend 68 hours, a large 5307 agency would spend 68 hours, and a small 5307 agency will spend 57 hours complying with proposed Section 673.29(a). FTA assumes that agency staff will not need to travel for training; therefore, no travel costs are estimated. FTA further assumes that no agency or person will pay fees or other expenses to attend training courses under this rule; therefore no such costs are estimated.

Section 673.29(b) would require a transit agency to communicate safety and safety performance information throughout the organization. Safety communications would include information on hazards and safety risks that are relevant to the employee's role and responsibilities and communicates to employees when actions are taken in response to reports submitted through an employee safety reporting program. FTA expects that each transit agency would define the means and mechanisms for effective safety communication based on their organization, structure, and size of operations. FTA estimates that a rail agency would spend 65 hours, a large 5307 agency will spend 140 hours, and a small 5307 agency will spend 76 hours complying with proposed Section 673.29(b).

## **Subpart D – Safety Plan Documentation and Recordkeeping**

### *673.31 Safety Plan documentation*

This section proposes that transit agencies keep records of their documents that meet the requirements of this part. FTA would expect a transit agency to maintain documents that set forth its Public Transportation Agency Safety Plan, including those related to the implementation of its Safety Management System (SMS), such as results from SMS processes and activities. For the purpose of reviews, investigations, audits, or other purposes, the section proposes that these documents be made available to FTA, State Safety Oversight Agencies in the case of rail transit systems, and other Federal agencies as appropriate. A transit agency would be required to maintain any of these documents for a minimum of three years.

### *673.33 Safety Plan records*

This section proposes that, in addition to the documents indicated above, a transit agency must maintain, at a minimum, the following records: safety risk mitigations, results from a transit agency's safety performance assessment, and records of employee safety training. FTA anticipates that the amount of records maintained by each transit agency would vary based on the agency's size and complexity. For example, it is reasonable to expect that a smaller agency would have fewer safety risk mitigations and employee training records to maintain, whereas a large transit agency may have a robust safety management information system to track and monitor its safety risk mitigations, and perhaps another system dedicated to tracking employee safety training. For safety performance monitoring and measurement, the section proposes that the transit agency maintain documentation that it would use to determine how well it is meeting its safety objectives and safety performance targets, as well as safety performance indicators used to determine the effectiveness of SMS implementation.

## **Appendix B: FTA's Safety Management Systems (SMS) Framework**

### **Introduction**

In recent years, the public transportation industry has developed a much better understanding of how accidents happen in public transportation systems. The industry now looks beyond an assignment of blame to employees or managers to examine how organizational factors contribute to incidents, accidents and near misses. We examine how an agency operates, how it allocates its resources, sets procedures, and trains its staff, and what level of importance an agency gives to resolving identified safety issues. Often, these factors reveal themselves through aging infrastructure, budget shortfalls, introduction of new technologies, employee turnover, organizational culture, growing ridership, and the effects of changing service environments on day-to-day transit operations and maintenance.

To further enhance the safety of public transportation, the Federal Transit Administration (FTA) is adopting the principles and methods of Safety Management Systems (SMS) as the basis for the Public Transportation Safety Program the Congress has authorized in 49 U.S.C. § 5329. SMS is a collaborative approach in which management and labor work together to ensure that each public transportation agency, no matter its size or service environment, has the necessary organizational structures, accountabilities, policies and procedures to direct and control resources to optimally manage safety. SMS builds on the industry's existing safety foundation to control safety risk better, detect and correct safety problems earlier, share and analyze safety data more effectively, and measure safety performance more accurately. Also, SMS provides States, their State Safety Oversight Agencies (SSOAs), and FTA with new tools for oversight and new approaches to promoting continuous safety vigilance and improvement.

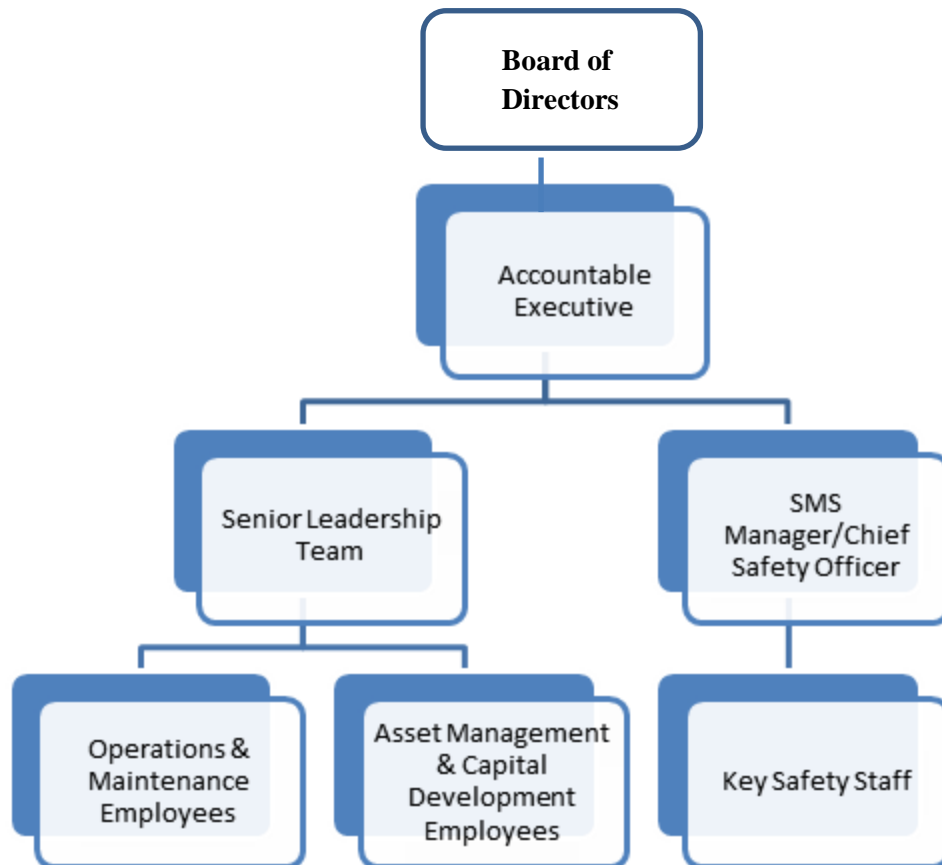
FTA is offering a Safety Management Systems Framework to provide practical advice on how public transportation agencies can develop and integrate SMS into their operations and managerial structures, and the States and SSOAs that will oversee rail transit systems' practice of SMS, in due course. FTA intends to incorporate SMS principles in future rulemakings for the National Public Transportation Safety Plan and Public Transportation Agency Safety Plans, both of which will be the subject of public notice and comment. FTA is encouraging the public transportation industry to voluntarily adopt the basic principles and methods of SMS set forth below.

### **Overview**

For decades, public transportation agencies have practiced system safety principles to prevent collisions, derailments, fires, structural collapses, and multiple casualty events. SMS builds on the industry's wealth of experience with system safety by bringing management processes, integrated data analysis, and organizational culture more squarely into risk management. SMS goes beyond the traditional approach of compliance with prescriptive requirements and regulations. SMS is a systematic, data-driven approach in which risks to safety are identified, then controlled or mitigated to acceptable levels. SMS brings business-like methods and principles to safety, similar to the ways in which an organization manages its finances, through safety plans, with targets and performance indicators, and continuous monitoring of safety performance throughout an organization.

Adopting SMS will increase each public transportation agency's understanding of risk as well as commitment to the safety of its passengers, employees, equipment and facilities, and will strengthen

agencies’ core competencies in accident investigation, hazard management, safety data acquisition and analysis, and internal auditing. Moreover, SMS builds a stronger culture for employees and managers to work together to solve safety problems. As a visual aid, the following is a typical organizational chart depicting roles and responsibilities for SMS in a public transportation agency:



**Figure B1: SMS Roles and Responsibilities<sup>48</sup>**

Some safety professionals refer to SMS as a “top-down” system of management inasmuch as there is a leader in the organization that is *accountable* for the implementation of SMS. In FTA’s SMS Framework, this top leader is referred to as the *Accountable Executive*. Typically, the Accountable Executive will be the head of a public transportation agency, its Chief Executive Officer, President, or Executive Director. Whatever the person’s job title, the Accountable Executive plays the central role in developing and carrying out an SMS. Without the executive’s active endorsement and acceptance of accountability for the safety performance of a public transportation agency, an SMS cannot be effective.

<sup>48</sup> For smaller agencies, there may not be any separation between the Accountable Executive and the Senior Leadership Team.

The extent to which an Accountable Executive will be involved in day-to-day SMS activities will depend both on the individual executive and the size and complexity of the organization.

SMS does not require an Accountable Executive to be an expert in safety. Rather, the Accountable Executive must understand how the SMS works in his or her organization; know the key personnel to call upon for evaluating safety information; and grasp the significant safety issues that face the organization. The Accountable Executive should use the reports and analysis performed as part of the SMS process to support the agency's decision-making. For an Accountable Executive, safety information, like financial, schedule and service information, is an integral part of how resources are allocated, budgets are set, and risks are managed.

An Accountable Executive benefits greatly from being supported by an independent *SMS Executive/Chief Safety Officer* who operates with the full authority of the Accountable Executive and is a direct report to the Accountable Executive. Optimally, the Accountable Executive will provide the SMS Executive with staff and budget commensurate to the size and complexity of the public transportation agency. An SMS Executive and staff should have stature and influence within the agency, and every means of access to both the Accountable Executive and other agency leadership.

Likewise, a public transportation agency's Executive Management team and Board of Directors have critical responsibilities for the agency's SMS. The Executive Management of an agency, including the designated SMS Executive, should develop the safety policy that is endorsed and actively supported by the Accountable Executive and approved by the Board of Directors. The Executive Management team should continuously promote the safety policy to the agency's employees and demonstrate its commitment to that policy by identifying and allocating the human and financial resources necessary to continuously support the SMS. Also, the Executive Management team should be responsible for establishing and meeting the objectives and performance standards for the SMS. It is the Executive Management team that should set safety targets and indicators to help monitor and measure the objectives of SMS performance. Ultimately, the Accountable Executive, in collaboration with the Executive Management team, needs to balance the agency's safety objectives with the resource needs for operations, maintenance, asset management, and capital development, in the strategic planning and budgeting process.

Depending on the size and complexity of a public transportation agency, the Executive Management team should consider using a group or committee structure, supported by basic or more advanced data management information tools, to meet to discuss safety issues and review safety performance on a regular basis.

More broadly, SMS encourages a public transportation agency's Executive Management, senior managers, supervisors and front-line employees to work together to identify hazards and address risks for the purpose of preventing accidents and incidents. Everyone should be familiar with SMS, and their own specific roles and responsibilities, through consistently applied training. At a minimum, every employee should understand his or her obligation to report hazards, identify risks, and fully participate in the SMS. Employees are responsible for understanding the key SMS accountabilities. Executive Management needs to be responsible for allocating the right resources to manage safety risks. Senior managers, supervisors and front-line employees will ensure the agency's investments deliver positive results for improved safety.



In the future, to ensure consistent implementation of SMS, a public transportation agency's safety performance will be assessed by oversight agencies. For rail transit systems, in particular, State Safety Oversight Agencies (SSOAs) will have primary responsibility for overseeing safety. FTA will have safety oversight authority for all modes of public transportation. State and Federal oversight agencies will play important roles in ensuring the integrity and effectiveness of SMS, and in applying SMS to new and emerging concerns for safety in public transportation.

### **SMS is Flexible and Scalable**

Hand in hand with the emphasis on accountability for safety performance, SMS is both flexible and scalable. SMS can be adapted to the mode, size, and complexity of any public transportation system, in any environment—urban, suburban, or rural—to help make an already safe industry even safer. It is telling that SMS has long been used in the aviation, maritime, railroad, and motor carrier industries, both domestic and international, by both for-profit and non-profit transportation providers, large and small. Both the National Transportation Safety Board (NTSB) and the National Safety Council (NSC) endorse the principles and methods of SMS. See, for example, the NTSB document at <http://www.nts.gov/safety/mwl-3.html> and the NSC site at <http://www.nsc.org/Measure/Pages/elements-of-an-effective-safety-management-system.aspx>. Indeed, the NTSB characterizes SMS as a “Most Wanted” practice for public transportation, largely because of the inherent flexibility of SMS, and its proven effectiveness across a range of organizations that operate under different business models, in differing physical and financial environments.

As we know, in public transportation, one size does not fit all. For that reason, in rules, guidance, and technical assistance, FTA will place the emphasis on *what* a public transportation agency *should do* to develop and carry out a comprehensive and robust SMS; FTA will not attempt to dictate *how* that same agency must accomplish an SMS. Although the structure and content of an SMS should essentially be the same for any public transportation system—rail or rubber tire—the level of detail in an SMS will address the size, complexity, and risks in that system's operations. Thus, this Safety Management System Framework now turns to the key components and functional elements of an SMS—many of which may already be in place at public transportation agencies, but perhaps not formalized.

### **Key Components and Functional Elements of a Safety Management System**

The fundamental purpose of any SMS is to provide a systematic means of achieving acceptable levels of safety risk. As depicted below, an SMS is comprised of four key components that work together to refine, reinforce, and sustain the implementation of an SMS throughout a public transportation agency: (1) Safety Management Policy, (2) Safety Risk Management, (3) Safety Assurance, and (4) Safety Promotion.



**Figure B2: Key Components of an SMS**

*Safety Management Policy* is the foundation of a public transportation agency’s SMS. An agency policy should clearly state the agency’s safety objectives and performance targets, and the organizational structure and procedures necessary to accomplish the objectives and targets. An agency policy should clearly define the safety responsibilities of executive leadership and employees throughout the organization. An agency policy should require that executive leadership be actively engaged in the agency's safety performance; also, that the Accountable Executive conduct regular, periodic reviews of the agency safety management policy, together with the agency’s budget and program resources for safety.

*Safety Risk Management* is comprised of activities and procedures that enable individuals to identify hazards and risks associated with the operations and maintenance of a public transportation system. Once hazards and risks are identified, safety risk management calls for development of means and measures to analyze and assess those hazards and risks, and controls to eliminate or reduce the hazards and risks.

*Safety Assurance* is the function of ensuring both the performance and effectiveness of the controls established under safety risk management. Also, safety assurance is the function of ensuring that a public transportation agency meets or exceeds its safety performance targets through the collection, analysis, and

assessment of data on the organization's performance. Further, safety assurance includes the activities of inspection and auditing to support oversight and performance monitoring.

*Safety Promotion* is the combination of training and continuous communication of safety information to employees, passengers, and the public, to enhance a public transportation agency's safety performance. How an agency might best conduct safety promotion will depend on the size and scope of its organization, but typically, safety promotion will entail formal training for employees, formal means of communicating safety information throughout an agency's service area, and a means for employees to report safety concerns without fear of retribution.

Within the four key components of an SMS—safety management policy, safety risk management, safety assurance, and safety promotion—are twelve functional elements, identified in the following topical outline:

**1.0    *Safety Management Policy***

- 1.1    Appointment of an Accountable Executive
- 1.2    Appointment of an SMS Executive and key personnel
- 1.3    Management commitment and responsibility
- 1.4    Integration with all-hazards emergency preparedness
- 1.5    SMS documentation and records

**2.0    *Safety Risk Management***

- 2.1    Hazard identification and analysis
- 2.2    Risk assessment and mitigation

**3.0    *Safety Assurance***

- 3.1    Safety performance monitoring
- 3.2    Management of change
- 3.3    Continuous improvement of the SMS

**4.0    *Safety Promotion***

- 4.1    Competencies and training
- 4.2    Safety communication

What follows is a brief summary of each of these twelve functional elements, within the context of each of the four key components of a Safety Management System.

## **1.0 Safety Management Policy**

For an SMS to be effective in any organization, the agency's executive leadership needs to commit a sufficient allocation of resources for the SMS. Specifically, the Accountable Executive and Executive Management team need to develop and carry out a written safety management policy that sets a clear, high-level direction for the public transportation agency to follow in managing the safety of its transit system. This same safety management policy should also identify the agency's safety objectives, and the relevant indicators, measures and targets for safety performance, as well as a commitment to actively support FTA and State oversight of the agency's SMS.

### **1.1 Appointment of the Accountable Executive**

The safety management policy should identify the Accountable Executive the public transportation agency has appointed to have ultimate responsibility for developing and carrying out the agency's SMS. The scope of the Accountable Executive's authority and responsibilities needs to be sufficient to ensure the effectiveness and efficiency of the SMS throughout the agency's organization.

### **1.2 Appointment of the SMS Executive and key safety staff**

The safety management policy should identify the SMS Executive the public transportation agency has designated as the individual responsible for carrying out the agency's SMS. The qualifications of the SMS Executive should be commensurate with the scope of responsibility for ensuring the effectiveness and efficiency of the agency's SMS. The safety management policy should also identify the accountabilities of all members of the agency's management, and all employees having roles and responsibilities in carrying out the agency's SMS. These safety responsibilities, accountabilities, and authorities should be documented and communicated throughout the agency's organization. Depending on the size and complexity of the public transportation agency, the safety management policy may identify the levels of agency management having authority to make decisions regarding the acceptability of risk.

### **1.3 Management commitment and responsibility**

The safety management policy must clearly articulate the public transportation agency's commitments to managing safety, and making the resources available that are necessary to carry out the agency's SMS. These commitments should be communicated consistently throughout the agency's organization, and championed by the Accountable Executive. The safety management policy should also articulate the agency's requirements for employee reporting of safety hazards and risks.

### **1.4 Integration with all-hazards preparedness**

The safety management policy should include an index of all of public transportation agency's plans and procedures for system safety, public safety, and emergency preparedness.

### **1.5 SMS documentation**

The public transportation agency should develop and maintain an SMS manual, consistent with the agency's safety management policy. Depending on the size and complexity of the public transportation agency, an SMS manual will vary, in volume, from a few pages to a much larger document. An SMS

manual should set forth a system description for the agency; the gap analysis; the accountabilities, responsibilities, and authorities of the Accountable Executive and the SMS Executive; the tools and activities for safety risk management and safety assurance; the agency's safety management training requirements; and the agency's means for safety communication. An SMS manual should also describe the agency's system for managing its records of safety risks. In due course, an agency's SMS manual will become part of the Public Transportation Agency Safety Plan required of all public transportation agencies by 49 U.S.C. § 5329(d).

## **2.0     *Safety Risk Management***

SMS is a logical, proven approach to the evaluation of safety risks and the application of appropriate resources to control those risks. Through SMS, a public transportation agency can identify the hazards to its safety and analyze the potential consequences of those hazards. The agency can then evaluate the risks it faces, and control those risks.

### **2.1     Hazard identification and analysis**

The public transportation agency should develop and maintain formal activities to ensure that hazards are identified, and that the potential consequences of those hazards are adequately analyzed. Hazard identification will be based on a combination of reactive and proactive methods of safety data collection. The extensiveness of hazard identification and analysis will vary based on the size and complexity of the public transportation agency and the nature of the hazards being identified and analyzed.

### **2.2     Risk assessment and mitigation**

The public transportation agency should create and implement a consistent process to ensure that safety risks are adequately assessed and controlled.

## **3.0     *Safety Assurance***

The public transportation agency will implement a process to monitor its safety performance. Through the activities of safety assurance under an SMS, an agency will investigate incidents and accidents; develop and maintain formal activities to ensure adequate assessment and control of the safety risks in its operations; monitor and audit its operational and maintenance processes; monitor the effectiveness of its corrective action plans; and manage employee reporting of hazards. An agency will also develop and maintain formal activities to identify changes within the organization that may affect its public transportation services; define the arrangements necessary to ensure safety performance before implementing changes; and eliminate or modify safety risk controls no longer needed, or effective, due to changes in the operational environment.

### **3.1     Safety performance monitoring**

The public transportation agency will develop and maintain means to verify the safety performance of its SMS, and to validate the effectiveness of the agency's safety risks controls. The agency will verify the safety performance of its SMS through its specified safety performance targets and indicators.

### 3.2 Management of change

The public transportation agency will develop and maintain formal activities to identify changes within its organization that may affect its public transportation services; define the arrangements necessary to ensure safety performance before implementing changes; and eliminate or modify safety risk controls no longer needed, or effective, due to changes in the agency's operational environment.

### 3.3 Continuous improvement of the SMS

The public transportation agency will develop and maintain formal activities to identify the causes of any sub-standard performance of its SMS; determine the implications of any sub-standard SMS performance in the agency's operations, and eliminate or mitigate the causes of sub-standard performance in the agency's SMS.

## **4.0 *Safety Promotion***

The public transportation agency will develop and maintain a safety management training program that ensures its personnel are trained and competent to perform their SMS duties. The scope of the safety training should be commensurate to each individual's role and responsibilities in the agency's SMS. An agency should also develop and maintain formal means for safety communication sufficient to ensure that all of its employees are knowledgeable of the SMS. Further, an agency should establish a process to ensure that appropriate personnel within its organization convey safety critical information to all its employees, and explain why particular safety actions are being taken, and why safety procedures have been changed or introduced.

### 4.1 Training and education

A public transportation agency will create a safety management training program that ensures its personnel are trained and competent to perform their SMS duties. The scope of the safety management training should be commensurate to each individual's role and responsibilities in the agency's SMS.

### 4.2 Safety communication

The public transportation agency will develop and maintain formal means for safety communication sufficient to ensure that all personnel are fully aware of the agency's SMS. The agency's management will disseminate safety critical information to all its employees, explain why particular safety actions are being taken, and explain why safety procedures are being changed or introduced.

## **FTA's Vision and Approach to Fostering Safety Management Systems**

SMS will not happen overnight throughout the industry. SMS will be rooted in each public transportation agency over time. Moreover, SMS will require a shift in philosophy from one of mechanistic oversight, reliant on compliance-based reviews, checklists, and audits, to one of holistic oversight, where a transit system's safety performance is closely monitored and managed through the four key components of SMS: safety management policy, safety risk management, safety assurance, and safety promotion.

Once a public transportation agency commits itself to an SMS, its policies, processes, and safety metrics will become increasingly important in assessing how well the agency is addressing safety issues and

concerns and providing a safe environment for its passengers, employees, and surrounding community. This transition will require a concerted effort amongst the public transportation agencies, States, their SSOAs, and FTA to advance safety commitments and capabilities.

## **Appendix C: Estimated Initial Hours Required to Implement SMS for Alternative 1**

The tables in this appendix present the specific assumptions that were used as the basis for the cost estimates in the RIA for the comprehensive SMS approach outlined under Alternative 1. The tables outline the hypothetical statutory requirements that would have been in place, had this alternative been enacted. Instead, these requirements were modified in the form of the preferred alternative, which is described in detail in Appendix D. For alternative 1, these estimated hours assumptions generated the initial costs, and further calculations using percentages generated the recurring costs. The columns are representative transit agency staff roles. Figures in each cell represent the estimated number of hours required for the particular task for that staff role. There are separate sets of tables for Rail agencies, large Section 5307 agencies, and small Section 5307 agencies. Cost estimates for Section 5311 and Section 5310 agencies were reckoned as fixed shares of the estimates for small Section 5307 agencies. As described in more detail in the RIA text, these labor hour assumptions were converted to total costs using information from the Department of Labor's Bureau of Labor Statistics (BLS) on wages, salaries, and benefits.<sup>49</sup> They were also adjusted to reflect the relative level of existing SMS maturity and the availability of FTA templates to reduce the burden.

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<sup>49</sup> BLS wage data for this industry is available here: [http://www.bls.gov/oes/current/naics3\\_485000.htm](http://www.bls.gov/oes/current/naics3_485000.htm). Wage information from NAICS 485000, 485100, and 485200. These categories are: Transit and Ground Passenger Transportation; and two subcategories: Urban Transit Systems and Interurban and Rural Bus Transportation.



**Table C1: Estimated Safety Management Policy (SMP) Hours Required for Rail Agencies**

673.23 Safety Management Policy			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.23(a)	Establish accountabilities and responsibilities and have written statement of safety management policy that includes: (1) agency safety objectives and performance targets, (2) explicit commitment to fulfill objectives and meet targets, (3) description of committed resources, (4) signed by Accountable Executive and reviewed no less than once a year		2.0	8.0	16.0	8.0	0.0	0.0
673.23(b)	Set forth an employee safety reporting program that includes (1) a process for employees to report to management, (2) protections for employees who report safety conditions, (3) description of employee behaviors that may result in disciplinary action	Typically, rail agencies have safety hot lines for employees. However, the program documented for employee reporting does not address all attributes as related to SMS	0.0	4.0	16.0	0.0	3.0	0.0
673.23(c)	Communicate safety management policy statement	Agency will have to identify how the document will be distributed across the agency	0.5	2.0	6.0	0.0	0.0	0.0
673.23(d)	Safety accountabilities and responsibilities. Establish organizational structure to meet performance targets; establish authorities, accountabilities and responsibilities for management of safety amongst these individuals as they relate to development of SMS:	Rail agencies currently document accountabilities and responsibilities in their SSPPs, though they will have to be modified to incorporate some of the new activities under SMS. Costs are captured in SSO rule. Modification costs are below by category.						
673.23(d)(1)	For accountable executive	See above	0.5	0.0	0.0	0.0	0.0	0.0
673.23(d)(2)	For chief safety officer	See above	0.0	5.0	0.0	0.0	0.0	0.0
673.23(d)(3)	For leadership and executive management team	See above	0.0	16.0	8.0	0.0	0.0	0.0
673.23(d)(4)	For key staff	See above	0.0	16.0	8.0	0.0	8.0	0.0
673.23(e)	Establish how emergency preparedness plans are integrated with SMS	Rail agencies currently document emergency management coordination in their SSPPs (costs captured in SSO rule), though they will have to be modified to index plans under SMS.	0.0	2.0	6.0	0.0	0.0	0.0
<b>SMP Total</b>			<b>3.0</b>	<b>53.0</b>	<b>60.0</b>	<b>8.0</b>	<b>11.0</b>	<b>0.0</b>

**Table C2: Estimated Safety Risk Management Process (SRMP) Hours Required for Rail Agencies**

673.25 Safety Risk Mgmt.			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.25(a)	Develop and implement Safety Risk Management process that includes identification of safety hazards, analysis of safety hazards, safety risk evaluation, and safety risk mitigation.	See individual activities below						
673.25(b)(1)	Establish hazard ID/analysis activities (include reactive and proactive data and info collection)	Agencies will need to update to include more comprehensive proactive sources	0.0	10.0	70.0	40.0	80.0	0.0
673.25(b)(2)	Include Fed/State info as hazard ID sources	Agencies will need to update existing systems to include this	0.0	0.5	2.0	0.0	0.0	0.0
673.25(b)(3)	Establish criteria for application of hazard ID/analysis to design of a new public transportation system; changes to existing system; new operations of service to the public; changes to operations or maintenance; findings identified through safety assurance	Rail agencies would need to update plan to include more extensive criteria for evaluating sources for hazards and identify data collection interfaces.	0.0	20.0	28.0	40.0	24.0	0.0
673.25(c)(1)	Establish evaluation/prioritization activities for safety risks	Rail agencies would need to update plan to account for prioritization based on data analysis.	0.0	6.0	16.0	6.0	6.0	6.0
673.25(c)(2)	Establish criteria for elevating risks to accountable executive	Agencies will need to update to provide more definitive criteria	0.0	1.0	0.0	0.0	1.0	0.0
673.25(c)(3)	Establish criteria for developing mitigations	Agencies will need to update to provide more definitive criteria	0.0	2.0	0.0	2.0	2.0	0.0
673.25(c)(4)	Establish criteria for mitigations that need AE approval	Agencies will need to update to provide more definitive criteria	1.0	1.0	0.0	0.0	1.0	0.0
673.25(c)(5)	Establish criteria for reporting to Board and other stakeholders	Agencies will need to update to provide more definitive criteria	0.5	0.5	0.0	0.0	0.5	0.0
<b>SRMP Total</b>			<b>1.5</b>	<b>41.0</b>	<b>116.0</b>	<b>88.0</b>	<b>114.5</b>	<b>6.0</b>

**Table C3: Estimated Safety Assurance Process (SAP) Hours Required for Rail Agencies**

673.27 Safety Assurance			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.27(a)	Develop and implement safety assurance process that includes: safety performance monitoring and measurement; management of change; periodic review of safety risk mitigations; and continuous improvement	See individual activities below						
673.27(b)(1)	Establish activities to acquire safety/monitoring data, including:	The SSO rule captures costs for much of the safety data acquisition activities.						
673.27(b)(1)(i)	continuous monitoring of protocols and procedures for operations and maintenance,	Agencies will need to expand data collection capacity.	0.0	12.0	24.0	20.0	40.0	0.0
673.27(b)(1)(ii)	continuous monitoring of agency's operational environment to detect changes,	Agencies will need to expand data collection capacity.	0.0	12.0	24.0	20.0	40.0	0.0
673.27(b)(1)(iii)	monitoring operations to identify hazards not identified through Safety Risk Management process above,	Agencies will need to expand data collection capacity.	0.0	8.0	0.0	8.0	0.0	0.0
673.27(b)(1)(iv)	monitoring operations to identify ineffective mitigations,	Agencies will need to expand data collection capacity.	0.0	8.0	0.0	8.0	0.0	0.0
673.27(b)(1)(v)	not less than annual auditing of effectiveness of SMS,	Rail agencies conduct internal safety audits to measure SSPP effectiveness. This will require revision to documents.	0.0	16.0	8.0	8.0	8.0	0.0
673.27(b)(1)(vi)	not less than annual reviewing of compliance with Fed/State regulations,	Rail agencies already have this documented and costs are covered in SSO rule	0.0	12.0	8.0	0.0	4.0	0.0
673.27(b)(1)(vii)	investigating safety events and reports of non-compliance,	Rail agencies already conduct accident and hazard investigations. Costs for documenting these activities are captured in SSO rule.	8.0	38.4	197.0	0.0	35.0	0.0
673.27(b)(1)(viii)	annual review of safety risk mitigations,	Agencies will require additional documentation of findings.	1.0	8.0	8.0	8.0	8.0	0.0
673.27(b)(1)(ix)	continuous monitoring of information, safety hazards, events, issues or concerns reported through employee reporting program	Will need to expand data collection capacity to account for enhanced employee safety reporting program.	0.0	4.0	12.0	16.0	0.0	0.0
673.27(b)(2)	Document safety performance indicators		0.0	9.0	12.0	8.0	0.0	0.0
673.27(c)(1)	Establish activities for continually monitoring for changes to its service area, infrastructure, equipment, systems, operating and maintenance procedures and its own organization that may introduce new hazards or performance	Rail agencies document a portion of management of change activities, but will need to add activities to be comprehensive.	0.0	8.0	20.0	0.0	4.0	0.0
673.27(c)(2)	Establish criteria to evaluate change for potential safety impact; if a change may impact performance, evaluate the proposed change through the Safety Risk Management process	This is not formalized in the rail industry.	0.0	16.0	8.0	16.0	16.0	0.0
673.27(d)(1)	Annual safety performance assessment		1.0	8.0	8.0	16.0	2.0	0.0
673.27(d)(2)	Develop and carry out corrective plans if deficiencies found	Rail agencies currently process CAPs and costs for documenting these activities are captured in the SSO rule.	1.0	8.0	8.0	0.0	8.0	0.0
673.27(d)(3)	Accountable executive must ensure that results of assessment given taken into account in adoption or revision of TAM plan		1.0	4.0	0.0	0.0	2.0	0.0
673.27(d)(4)	Accountable executive must report results to Board		1.0	8.0	8.0	0.0	0.0	0.0
<b>SAP Total</b>			<b>13.0</b>	<b>179.4</b>	<b>345.0</b>	<b>128.0</b>	<b>167.0</b>	<b>0.0</b>

**Table C4: Estimated Safety Promotion Program (SPP) Hours Required for Rail Agencies**

673.29 Safety Promotion			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.29(a)(1)	Establish safety mgmt. training program (must incorporate Public Transportation Agency Safety Training Certification Program for those responsible for safety oversight)	While transit agencies have provided safety training, documentation of safety management training is new.	0.0	20.0	24.0	0.0	0.0	24.0
673.29(a)(2)	Ensure employees are trained on SMS duties	New documentation requirement	0.0	8.0	24.0	0.0	5.0	80.0
673.29(b)(1)	Ensure employees are aware of safety duties	Rail agencies already document this and costs are captured in SSO rule.	0.5	0.0	0.0	0.0	0.0	0.0
673.29(b)(2)	Convey information on hazard and safety risks	Agencies will need to expand current measures to include this	0.5	8.0	16.0	0.0	8.0	0.0
673.29(b)(3)	Explain reasons for changes	Agencies will need to expand current measures to include this	0.5	8.0	16.0	0.0	8.0	0.0
673.29(b)(4)	Inform employees on safety actions taken in response to employee reports	Agencies will need to expand current measures to include this	0.5	8.0	16.0	0.0	8.0	0.0
<b>SPP Total</b>			<b>2.0</b>	<b>52.0</b>	<b>96.0</b>	<b>0.0</b>	<b>29.0</b>	<b>104.0</b>

**Table C5: Estimated Safety Management Policy (SMP) Hours Required for Large 5307 Agencies**

673.23 Safety Management Policy			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.23(a)	Establish accountabilities and responsibilities and have written statement of safety management policy that includes: (1) agency safety objectives and performance targets, (2) explicit commitment to fulfill objectives and meet targets, (3) description of committed resources, (4) signed by Accountable Executive and reviewed no less than once a year	It is anticipated that larger bus systems have documented roles and responsibilities, however, revisions must be made to address SMS	0.5	8.0	24.0	0.0	24.0	0.0
673.23(b)	Set forth an employee safety reporting program that includes (1) a process for employees to report to management, (2) protections for employees who report safety conditions, (3) description of employee behaviors that may result in disciplinary action	Typically, bus agencies have safety hot lines and local safety committees (larger) for employees or other mechanisms (for smaller agencies). However, usually, these programs for employee reporting do not address all attributes as related to SMS and for smaller systems are typically informal	0.0	40.0	16.0	0.0	24.0	0.0
673.23(c)	Communicate safety management policy statement	Agency will have to identify how the document will be distributed across the agency	0.5	8.0	0.0	0.0	0.0	0.0
673.23(d)	Safety accountabilities and responsibilities. Establish organizational structure to meet performance targets; establish authorities, accountabilities and responsibilities for management of safety amongst these individuals as they relate to development of SMS:	Most large bus agencies currently document accountabilities and responsibilities in their SSPPs, though they will have to be modified to incorporate some of the new activities under SMS						
673.23(d)(1)	For accountable executive	See above	0.5	0.0	0.0	0.0	0.0	0.0
673.23(d)(2)	For chief safety officer	See above	0.0	4.0	0.0	0.0	0.0	0.0
673.23(d)(3)	For leadership and executive management team	See above	0.0	8.0	12.0	0.0	0.0	0.0
673.23(d)(4)	For key staff	See above	0.0	8.0	12.0	0.0	8.0	0.0
673.23(e)	Establish how emergency preparedness plans are integrated with SMS	Will require all large systems to make revisions to documentation	0.0	8.0	12.0	0.0	12.0	0.0
<b>SMP Total</b>			<b>1.5</b>	<b>84.0</b>	<b>76.0</b>	<b>0.0</b>	<b>68.0</b>	<b>0.0</b>

**Table C6: Estimated Safety Risk Management Process (SRMP) Hours Required for Large 5307 Agencies**

673.25 Safety Risk Mgmt.			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.25(a)	Develop and implement Safety Risk Management process that includes identification of safety hazards, analysis of safety hazards, safety risk evaluation, and safety risk mitigation.	See individual activities below						
673.25(b)(1)	Establish hazard ID/analysis activities (include reactive and proactive data and info collection)	Will require the identification and documentation of more proactive sources for hazard ID	0.0	20.0	60.0	60.0	20.0	0.0
673.25(b)(2)	Include Fed/State info as hazard ID sources	New, but relatively minor task	0.0	0.5	2.0	0.0	0.0	0.0
673.25(b)(3)	Establish criteria for application of hazard ID/analysis to design of a new public transportation system; changes to existing system; new operations of service to the public; changes to operations or maintenance; findings identified through safety assurance		1.0	8.0	48.0	0.0	24.0	0.0
673.25(c)(1)	Establish evaluation/prioritization activities for safety risks		0.0	6.0	16.0	6.0	6.0	0.0
673.25(c)(2)	Establish criteria for elevating risks to accountable executive		1.0	4.0	0.0	0.0	4.0	0.0
673.25(c)(3)	Establish criteria for developing mitigations		0.0	4.0	16.0	0.0	12.0	0.0
673.25(c)(4)	Establish criteria for mitigations that need AE approval		1.0	4.0	0.0	0.0	4.0	0.0
673.25(c)(5)	Establish criteria for reporting to Board and other stakeholders		1.0	2.0	0.0	0.0	2.0	0.0
<b>SRMP Total</b>			<b>4.0</b>	<b>48.5</b>	<b>142.0</b>	<b>66.0</b>	<b>72.0</b>	<b>0.0</b>

**Table C7: Estimated Safety Assurance Process (SAP) Hours Required for Large 5307 Agencies**

673.27 Safety Assurance			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.27(a)	Develop and implement safety assurance process that includes: safety performance monitoring and measurement; management of change; periodic review of safety risk mitigations; and continuous improvement	See individual activities below						
673.27(b)(1)	Establish activities to acquire safety/monitoring data, including:							
673.27(b)(1)(i)	continuous monitoring of protocols and procedures for operations and maintenance,		0.0	12.0	24.0	0.0	40.0	0.0
673.27(b)(1)(ii)	continuous monitoring of agency's operational environment to detect changes,		0.0	12.0	16.0	8.0	40.0	0.0
673.27(b)(1)(iii)	monitoring operations to identify hazards not identified through Safety Risk Management process above,		0.0	8.0	0.0	0.0	8.0	0.0
673.27(b)(1)(iv)	monitoring operations to identify ineffective mitigations,		0.0	20.0	40.0	20.0	20.0	0.0
673.27(b)(1)(v)	not less than annual auditing of effectiveness of SMS,		0.0	8.0	16.0	8.0	8.0	0.0
673.27(b)(1)(vi)	not less than annual reviewing of compliance with Fed/State regulations,		0.0	12.0	8.0	0.0	4.0	0.0
673.27(b)(1)(vii)	investigating safety events and reports of non-compliance,		8.0	38.4	197.0	0.0	35.0	0.0
673.27(b)(1)(viii)	annual review of safety risk mitigations,		0.0	8.0	24.0	0.0	8.0	0.0
673.27(b)(1)(ix)	continuous monitoring of information, safety hazards, events, issues or concerns reported through employee reporting program		0.0	4.0	12.0	16.0	0.0	0.0
673.27(b)(2)	Document safety performance indicators		0.0	9.0	12.0	8.0	0.0	0.0
673.27(c)(1)	Establish activities for continually monitoring for changes to its service area, infrastructure, equipment, systems, operating and maintenance procedures and its own organization that may introduce new hazards or performance		0.0	8.0	20.0	0.0	4.0	0.0
673.27(c)(2)	Establish criteria to evaluate change for potential safety impact; if a change may impact performance, evaluate the proposed change through the Safety Risk Management process		0.0	8.0	16.0	0.0	8.0	0.0
673.27(d)(1)	Annual safety performance assessment		1.0	8.0	16.0	16.0	2.0	0.0
673.27(d)(2)	Develop and carry out corrective plans if deficiencies found		1.0	8.0	8.0	0.0	8.0	0.0
673.27(d)(3)	Accountable executive must ensure that results of assessment given taken into account in adoption or revision of TAM plan		1.0	4.0	0.0	0.0	2.0	0.0
673.27(d)(4)	Accountable executive must report results to Board		1.0	8.0	8.0	0.0	0.0	0.0
<b>SAP Total</b>			<b>12.0</b>	<b>175.4</b>	<b>417.0</b>	<b>76.0</b>	<b>187.0</b>	<b>0.0</b>

**Table C8: Estimated Safety Promotion Program (SPP) Hours Required for Large 5307 Agencies**

673.29 Safety Promotion			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.29(a)(1)	Establish safety mgmt. training program (must incorporate Public Transportation Agency Safety Training Certification Program for those responsible for safety oversight)	While transit agencies have provided safety training, documentation of safety management training is new	0.0	20.0	24.0	0.0	0.0	24.0
673.29(a)(2)	Ensure employees are trained on SMS duties		0.0	8.0	24.0	0.0	0.0	80.0
673.29(b)(1)	Ensure employees are aware of safety duties		0.5	2.0	0.0	0.0	0.0	0.0
673.29(b)(2)	Convey information on hazard and safety risks		0.0	8.0	16.0	0.0	8.0	0.0
673.29(b)(3)	Explain reasons for changes		0.0	8.0	16.0	0.0	8.0	0.0
673.29(b)(4)	Inform employees on safety actions taken in response to employee reports		0.0	8.0	60.0	0.0	40.0	0.0
<b>SPP Total</b>			<b>0.5</b>	<b>54.0</b>	<b>140.0</b>	<b>0.0</b>	<b>56.0</b>	<b>104.0</b>



**Table C9: Estimated Safety Management Policy (SMP) Hours Required for Small 5307 Agencies**

673.23 Safety Management Policy			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.23(a)	Establish accountabilities and responsibilities and have written statement of safety management policy that includes: (1) agency safety objectives and performance targets, (2) explicit commitment to fulfill objectives and meet targets, (3) description of committed resources, (4) signed by Accountable Executive and reviewed no less than once a year	60% of agencies (54) reviewed under the Bus Safety Program had set safety goals and objectives	0.5	12.0	0.0	0.0	12.0	0.0
673.23(b)	Set forth an employee safety reporting program that includes (1) a process for employees to report to management, (2) protections for employees who report safety conditions, (3) description of employee behaviors that may result in disciplinary action	Typically, bus agencies have safety hot lines and local safety committees (larger) for employees or other mechanisms (for smaller agencies). However, usually, these programs for employee reporting do not address all attributes as related to SMS and for smaller systems are typically informal.	4.0	16.0	0.0	0.0	20.0	0.0
673.23(c)	Communicate safety management policy statement	Agency will have to identify how the document will be distributed across the agency	0.5	2.0	0.0	0.0	0.0	0.0
673.23(d)	Safety accountabilities and responsibilities. Establish organizational structure to meet performance targets; establish authorities, accountabilities and responsibilities for management of safety amongst these individuals as they relate to development of SMS:	Most large bus agencies currently document accountabilities and responsibilities in their SSPPs, though they will have to be modified to incorporate some of the new activities under SMS.						
673.23(d)(1)	For accountable executive	See above	0.5	0.0	0.0	0.0	0.0	0.0
673.23(d)(2)	For chief safety officer	See above	0.0	2.0	0.0	0.0	0.0	0.0
673.23(d)(3)	For leadership and executive management team	See above	0.0	2.0	0.0	0.0	2.0	0.0
673.23(d)(4)	For key staff	See above	0.0	2.0	0.0	0.0	2.0	0.0
673.23(e)	Establish how emergency preparedness plans are integrated with SMS		2.0	10.0	0.0	0.0	6.0	0.0
<b>SMP Total</b>			<b>7.5</b>	<b>46.0</b>	<b>0.0</b>	<b>0.0</b>	<b>42.0</b>	<b>0.0</b>

**Table C10: Estimated Safety Risk Management Process (SRMP) Hours Required for Small 5307 Agencies**

673.25 Safety Risk Mgmt.			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.25(a)	Develop and implement Safety Risk Management process that includes identification of safety hazards, analysis of safety hazards, safety risk evaluation, and safety risk mitigation.	See individual activities below						
673.25(b)(1)	Establish hazard ID/analysis activities (include reactive and proactive data and info collection)	Approximately 60% of the 54 reviewed agencies had <i>informal</i> activities for hazard identification. Only 2 agencies had a formal process in place.	4.0	16.0	0.0	0.0	12.0	0.0
673.25(b)(2)	Include Fed/State info as hazard ID sources	All agencies had something in place to address information from Federal sources, however, it was not always comprehensive.	1.0	2.0	0.0	0.0	0.0	0.0
673.25(b)(3)	Establish criteria for application of hazard ID/analysis to design of a new public transportation system; changes to existing system; new operations of service to the public; changes to operations or maintenance; findings identified through safety assurance	50% of reviewed agencies <i>informally</i> identified hazards related to new or changes in operations.	1.0	14.0	0.0	0.0	10.0	0.0
673.25(c)(1)	Establish evaluation/prioritization activities for safety risks	Although formal criteria did not exist for any of the reviewed agencies, 50% of the agencies looked at methods for evaluating and prioritizing, yet they were <i>informal</i> .	1.0	6.0	0.0	0.0	4.0	0.0
673.25(c)(2)	Establish criteria for elevating risks to accountable executive	Although no formal criteria were established, 60% of the agencies elevated significant safety concerns to the CEO.	1.0	1.0	0.0	0.0	1.0	0.0
673.25(c)(3)	Establish criteria for developing mitigations	No formal criteria, however, in most cases regarding a serious safety concern, the CEO was involved.	1.0	12.0	0.0	0.0	8.0	0.0
673.25(c)(4)	Establish criteria for mitigations that need AE approval	No formal criteria	1.0	2.0	0.0	0.0	2.0	0.0
673.25(c)(5)	Establish criteria for reporting to Board and other stakeholders	No formal criteria, Boards rarely involved in safety decision making.	1.0	2.0	0.0	0.0	2.0	0.0
<b>SRMP Total</b>			<b>11.0</b>	<b>55.0</b>	<b>0.0</b>	<b>0.0</b>	<b>39.0</b>	<b>0.0</b>

**Table C11: Estimated Safety Assurance Process (SAP) Hours Required for Small 5307 Agencies**

673.27 Safety Assurance			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.27(a)	Develop and implement safety assurance process that includes: safety performance monitoring and measurement; management of change; periodic review of safety risk mitigations; and continuous improvement	See individual activities below						
673.27(b)(1)	Establish activities to acquire safety/monitoring data, including:							
673.27(b)(1)(i)	continuous monitoring of protocols and procedures for operations and maintenance,	100% of the agencies <i>informally</i> monitor.	1.0	16.0	0.0	0.0	16.0	0.0
673.27(b)(1)(ii)	continuous monitoring of agency's operational environment to detect changes,	100% of the agencies <i>informally</i> monitor.	1.0	10.0	0.0	0.0	20.0	0.0
673.27(b)(1)(iii)	monitoring operations to identify hazards not identified through Safety Risk Management process above,	Nearly 50% of the agencies <i>informally</i> monitor.	1.0	8.0	0.0	0.0	8.0	0.0
673.27(b)(1)(iv)	monitoring operations to identify ineffective mitigations,	Approximately 50% of the agencies <i>informally</i> monitor.	1.0	20.0	0.0	0.0	20.0	0.0
673.27(b)(1)(v)	not less than annual auditing of effectiveness of SMS,	Not currently done	1.0	12.0	0.0	0.0	12.0	0.0
673.27(b)(1)(vi)	not less than annual reviewing of compliance with Fed/State regulations,	No agencies formally monitor for compliance except in the instance of ensuring compliance with CDL and Drug and Alcohol testing requirements.	1.0	10.0	0.0	0.0	10.0	0.0
673.27(b)(1)(vii)	investigating safety events and reports of non-compliance,	100% of the agencies <i>informally</i> investigate areas of non-compliance, however the scope of the review is not across all areas of operations	6.0	38.0	0.0	0.0	4.0	0.0
673.27(b)(1)(viii)	annual review of safety risk mitigations,	Not done by any agencies.	1.0	16.0	0.0	0.0	6.0	0.0
673.27(b)(1)(ix)	continuous monitoring of information, safety hazards, events, issues or concerns reported through employee reporting program	Agencies respond to employee safety concerns, however, the process is informal.	1.0	12.0	0.0	0.0	12.0	0.0
673.27(b)(2)	Document safety performance indicators	40% of the agencies have safety performance indicators, however, 90% of these were lagging indicators.	1.0	20.0	0.0	0.0	10.0	0.0
673.27(c)(1)	Establish activities for continually monitoring for changes to its service area, infrastructure, equipment, systems, operating and maintenance procedures and its own organization that may introduce new hazards or performance	Not actively	1.0	20.0	0.0	0.0	4.0	0.0
673.27(c)(2)	Establish criteria to evaluate change for potential safety impact; if a change may impact performance, evaluate the proposed change through the Safety Risk Management process	Not done by any agencies.	1.0	16.0	0.0	0.0	10.0	0.0
673.27(d)(1)	Annual safety performance assessment	No formal process identified.	1.0	20.0	0.0	0.0	10.0	0.0
673.27(d)(2)	Develop and carry out corrective plans if deficiencies found	All agencies identified and implemented corrective actions as necessary, but the process was informal.	1.0	12.0	0.0	0.0	4.0	0.0
673.27(d)(3)	Accountable executive must ensure that results of assessment given taken into account in adoption or revision of TAM plan	New; costs will also be captured in the TAM rule.	1.0	4.0	0.0	0.0	2.0	0.0
673.27(d)(4)	Accountable executive must report results to Board	New	1.0	6.0	0.0	0.0	2.0	0.0
<b>SAP Total</b>			<b>21.0</b>	<b>240.0</b>	<b>0.0</b>	<b>0.0</b>	<b>150.0</b>	<b>0.0</b>

**Table C12: Estimated Safety Promotion Program (SPP) Hours Required for Small 5307 Agencies**

673.29 Safety Promotion			Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.29(a)(1)	Establish safety mgmt. training program (must incorporate Public Transportation Agency Safety Training Certification Program for those responsible for safety oversight)	All agencies have skill training and safety elements as a part of their training. But <u>all</u> agencies will have to provide SMS training, which is new.	1.0	24.0	0.0	0.0	8.0	24.0
673.29(a)(2)	Ensure employees are trained on SMS duties	See above	1.0	8.0	0.0	0.0	0.0	12.0
673.29(b)(1)	Ensure employees are aware of safety duties	Almost all agencies received a recommendation from the FTA review that safety duty training needed to be improved.	0.5	2.0	0.0	0.0	0.0	0.0
673.29(b)(2)	Convey information on hazard and safety risks	Approximately 80% of agencies held safety committee meetings to discuss safety risks and changes.	1.0	24.0	0.0	0.0	10.0	0.0
673.29(b)(3)	Explain reasons for changes	See above	1.0	12.0	0.0	0.0	4.0	0.0
673.29(b)(4)	Inform employees on safety actions taken in response to employee reports	See above	1.0	20.0	0.0	0.0	20.0	0.0
<b>SPP Total</b>			<b>5.5</b>	<b>90.0</b>	<b>0.0</b>	<b>0.0</b>	<b>42.0</b>	<b>36.0</b>

## **Appendix D: Estimated Initial Hours Required to Implement SMS for Alternative 2**

The tables in this appendix present the specific assumptions that were used as the basis for the cost estimates in the RIA for alternative 2, a modified SMS approach. These assumptions generated the initial costs, and further calculations using percentages generated the recurring costs. The rows of the tables represent specific task areas and are linked to the provisions of the proposed rule. The columns are representative transit agency staff roles. Figures in each cell represent the estimated number of hours required for the particular task for that staff role. There are separate sets of tables for Rail agencies, large Section 5307 agencies, and small Section 5307 agencies. Cost estimates for Section 5311 and Section 5310 agencies were reckoned as fixed shares of the estimates for small Section 5307 agencies. As described in more detail in the RIA text, these labor hour assumptions were converted to total costs using information from the Department of Labor’s Bureau of Labor Statistics (BLS) on wages, salaries, and benefits.<sup>50</sup> They were also adjusted to reflect the relative level of existing SMS maturity and the availability of FTA templates to reduce the burden.

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<sup>50</sup> BLS wage data for this industry is available here: [http://www.bls.gov/oes/current/naics3\\_485000.htm](http://www.bls.gov/oes/current/naics3_485000.htm). Wage information from NAICS 485000, 485100, and 485200. These categories are: Transit and Ground Passenger Transportation; and two subcategories: Urban Transit Systems and Interurban and Rural Bus Transportation.

**Table D1: Estimated Safety Management Policy (SMP) Hours Required for Rail Agencies**

Part 673.23	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.23(a)	Safety management policy. A transit agency must establish its organizational accountabilities and responsibilities and have a written statement of safety management policy that includes the agency's safety objectives and safety performance targets.		2.0	8.0	16.0	8.0	0.0	0.0
673.23(b)	A transit agency must establish a process that allows employees to report safety conditions to senior management, protections for employees who report safety conditions to senior management, and a description of employee behaviors that may result in disciplinary action.	Typically, rail agencies have safety hot lines for employees. However, the program documented for employee reporting does not address all attributes as related to SMS.	0.0	4.0	16.0	0.0	3.0	0.0
673.23(c)	The safety management policy must be communicated throughout the agency's organization.	Agency will have to identify how the document will be distributed across the agency.	0.5	2.0	6.0	0.0	0.0	0.0
673.23(d)	The transit agency must establish the necessary authorities, accountabilities, and responsibilities for the management of safety amongst the following individuals within its organization, as they relate to the development and management of the transit agency's Safety Management System (SMS):	Rail agencies currently document accountabilities and responsibilities in their SSPPs, though they will have to be modified to incorporate some of the new activities under SMS. Costs are captured in SSO rule. Modification costs are below by category.						
673.23(d)(1)	For Accountable Executive	See above	0.5	0.0	0.0	0.0	0.0	0.0
673.23(d)(2)	For Chief Safety Officer	See above	0.0	5.0	0.0	0.0	0.0	0.0
673.23(d)(3)	For leadership and executive management team	See above	0.0	16.0	8.0	0.0	0.0	0.0
673.23(d)(4)	For key staff	See above	0.0	16.0	8.0	0.0	8.0	0.0
<b>SMP Total</b>			<b>3.0</b>	<b>51.0</b>	<b>54.0</b>	<b>8.0</b>	<b>11.0</b>	<b>0.0</b>

**Table D2: Estimated Safety Risk Management Process (SRMP) Hours Required for Rail Agencies**

Part 673.25	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.25(a)	Safety Risk Management process. A transit agency must develop and implement a Safety Risk Management process for all elements of its public transportation system, including changes to its public transportation system that may impact safety performance. The Safety Risk Management process must be comprised of the following activities: identification of safety hazards, analysis of safety hazards, safety risk evaluation, and safety risk mitigation.	See individual activities below.						
673.25(b)	Safety hazard identification and analysis.							
673.25(b)(1)	A transit agency must establish a process for hazard identification and analysis.	Rail agencies would need to update to include more comprehensive proactive sources.	0.0	10.0	70.0	40.0	80.0	0.0
673.25(b)(2)	A transit agency must include, as a source for hazard identification and analysis, data, and information provided by an oversight authority and the FTA.	Rail agencies would need to update plan to include more extensive criteria for evaluating sources for hazards and identify data collection interfaces.	0.0	0.5	2.0	0.0	0.0	0.0
673.25(c)	Safety risk evaluation and mitigation.							
673.25(c)(1)	A transit agency must establish activities to evaluate and prioritize the safety risk associated with the potential consequences of safety hazards. Safety risks must be evaluated in terms of probability and severity and take into account mitigations already in place to reduce the probability or severity of the potential consequence(s) analyzed.	Rail agencies would need to update plan to account for prioritization based on data analysis.	0.0	6.0	16.0	6.0	6.0	6.0
673.25(c)(2)	A transit agency must establish criteria for the development of safety risk mitigations that are necessary based on the results of the agency's safety risk evaluation.	Rail agencies would need to update to provide more definitive criteria.	0.0	2.0	0.0	2.0	2.0	0.0
<b>SRMP Total</b>			<b>0.0</b>	<b>18.5</b>	<b>88.0</b>	<b>48.0</b>	<b>88.0</b>	<b>6.0</b>

**Table D3: Estimated Safety Assurance Process (SAP) Hours Required for Rail Agencies**

Part 673.27	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.27(a)	Safety assurance process. A transit agency must develop and implement a safety assurance process, consistent with this subpart.	See individual activities below.						
673.27(b)	Safety performance monitoring and measurement. A transit agency must establish activities to:							
673.27(b)(1)	Monitor its system for compliance with, and sufficiency of, the agency's procedures for operations and maintenance;	The SSO rule captures costs for much of the safety data acquisition activities.	0.0	12.0	24.0	20.0	40.0	0.0
673.27(b)(2)	Monitor its operations to identify hazards not identified through the Safety Risk Management process established in Section 673.25 of this subpart;	Rail agencies will need to expand data collection capacity.	0.0	8.0	0.0	8.0	0.0	0.0
673.27(b)(3)	Monitor its operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended;	Rail agencies will need to expand data collection capacity.	0.0	8.0	0.0	8.0	0.0	0.0
673.27(b)(4)	Investigate safety events to identify causal factors; and	Rail agencies will need to expand data collection capacity.	8.0	38.4	197.0	0.0	35.0	0.0
673.27(b)(5)	Monitor information reported through any internal safety reporting programs.	Will need to expand data collection capacity to account for enhanced employee safety reporting program.	0.0	4.0	12.0	16.0	0.0	0.0
673.27(c)	Management of change							
673.27(c)(1)	A transit agency must establish a process for identifying and assessing changes that may introduce new hazards or impact the agency's safety performance.		0.0	8.0	20.0	0.0	4.0	0.0
673.27(c)(2)	If a transit agency determines that a change may impact its safety performance, then the agency must evaluate the proposed change through the Safety Risk Management process.		0.0	16.0	8.0	16.0	16.0	0.0
673.27(d)	Continuous improvement.							
673.27(d)(1)	A transit agency must establish a process to assess its safety performance.	Rail agencies document a portion of management of change activities, but will need to add activities to be comprehensive.	1.0	8.0	8.0	16.0	2.0	0.0
673.27(d)(2)	If a transit agency identifies any deficiencies as part of its safety performance assessment, then the agency must develop and carry out, under the direction of the Accountable Executive, a plan to address the identified safety deficiencies.	This is not formalized in the rail industry.	1.0	8.0	8.0	0.0	8.0	0.0
<b>SAP Total</b>			<b>10.0</b>	<b>110.4</b>	<b>277.0</b>	<b>84.0</b>	<b>105.0</b>	<b>0.0</b>



**Table D4: Estimated Safety Promotion Program (SPP) Hours Required for Rail Agencies**

Part 673.29	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.29(a)	Competencies and training. A transit agency must establish a comprehensive safety training program for all agency employees and contractors directly responsible for the management of safety in the agency's public transportation system. The training program must include refresher training, as necessary.	While transit agencies have provided safety training, documentation of safety management training is new.	0.0	20.0	24.0	0.0	0.0	24.0
673.29(b)	Safety communication. A transit agency must communicate safety and safety performance information throughout the agency's organization that, at a minimum, conveys information on hazards and safety risks relevant to employees' roles and responsibilities and informs employees of safety actions taken in response to reports submitted through an employee safety reporting program.	Rail agencies must expand this area of their activities.	1.0	16.0	32.0	0.0	16.0	0.0
<b>SPP Total</b>			<b>1.0</b>	<b>36.0</b>	<b>56.0</b>	<b>0.0</b>	<b>16.0</b>	<b>24.0</b>

**Table D5: Estimated Safety Management Policy (SMP) Hours Required for Large 5307 Agencies**

Part 673.23	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.23(a)	Safety management policy. A transit agency must establish its organizational accountabilities and responsibilities and have a written statement of safety management policy that includes the agency's safety objectives and safety performance targets.	It is anticipated that larger bus systems have documented roles and responsibilities, however, revisions must be made to address SMS.	0.5	8.0	24.0	0.0	24.0	0.0
673.23(b)	A transit agency must establish a process that allows employees to report safety conditions to senior management, protections for employees who report safety conditions to senior management, and a description of employee behaviors that may result in disciplinary action.	Typically, bus agencies have safety hot lines and local safety committees (larger) for employees or other mechanisms (for smaller agencies). However, usually, these programs for employee reporting do not address all attributes as related to SMS and for smaller systems are typically informal.	0.0	40.0	16.0	0.0	24.0	0.0
673.23(c)	The safety management policy must be communicated throughout the agency's organization.	Agency will have to identify how the document will be distributed across the agency.	0.5	8.0	0.0	0.0	0.0	0.0
673.23(d)	The transit agency must establish the necessary authorities, accountabilities, and responsibilities for the management of safety amongst the following individuals within its organization, as they relate to the development and management of the transit agency's Safety Management System (SMS):	Most large bus agencies currently document accountabilities and responsibilities in their SSPPs, though they will have to be modified to incorporate some of the new activities under SMS.						
673.23(d)(1)	For Accountable Executive	See above.	0.5	0.0	0.0	0.0	0.0	0.0
673.23(d)(2)	For Chief Safety Officer	See above.	0.0	4.0	0.0	0.0	0.0	0.0
673.23(d)(3)	For leadership and executive management team	See above.	0.0	8.0	12.0	0.0	0.0	0.0
673.23(d)(4)	For key staff	See above.	0.0	8.0	12.0	0.0	8.0	0.0
<b>SMP Total</b>			<b>1.5</b>	<b>76.0</b>	<b>64.0</b>	<b>0.0</b>	<b>56.0</b>	<b>0.0</b>

**Table D6: Estimated Safety Risk Management Process (SRMP) Hours Required for Large 5307 Agencies**

Part 673.25	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.25(a)	Safety Risk Management process. A transit agency must develop and implement a Safety Risk Management process for all elements of its public transportation system, including changes to its public transportation system that may impact safety performance. The Safety Risk Management process must be comprised of the following activities: identification of safety hazards, analysis of safety hazards, safety risk evaluation, and safety risk mitigation.	See individual activities below.						
673.25(b)	Safety hazard identification and analysis.							
673.25(b)(1)	A transit agency must establish a process for hazard identification and analysis.	Will require the identification and documentation of more proactive sources for hazard ID.	0.0	20.0	60.0	60.0	20.0	0.0
673.25(b)(2)	A transit agency must include, as a source for hazard identification and analysis, data, and information provided by an oversight authority and the FTA.		0.0	0.5	2.0	0.0	0.0	0.0
673.25(c)	Safety risk evaluation and mitigation.							
673.25(c)(1)	A transit agency must establish activities to evaluate and prioritize the safety risk associated with the potential consequences of safety hazards. Safety risks must be evaluated in terms of probability and severity and take into account mitigations already in place to reduce the probability or severity of the potential consequence(s) analyzed.		0.0	6.0	16.0	6.0	6.0	0.0
673.25(c)(2)	A transit agency must establish criteria for the development of safety risk mitigations that are necessary based on the results of the agency's safety risk evaluation.		0.0	4.0	16.0	0.0	12.0	0.0
<b>SRMP Total</b>			<b>0.0</b>	<b>30.5</b>	<b>94.0</b>	<b>66.0</b>	<b>38.0</b>	<b>0.0</b>

**Table D7: Estimated Safety Assurance Process (SAP) Hours Required for Large 5307 Agencies**

Part 673.27	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.27(a)	Safety assurance process. A transit agency must develop and implement a safety assurance process, consistent with this subpart.	See individual activities in requirement column below.						
673.27(b)	Safety performance monitoring and measurement. A transit agency must establish activities to:							
673.27(b)(1)	Monitor its system for compliance with, and sufficiency of, the agency's procedures for operations and maintenance;		0.0	12.0	24.0	0.0	40.0	0.0
673.27(b)(2)	Monitor its operations to identify hazards not identified through the Safety Risk Management process established in Section 673.25 of this subpart;		0.0	8.0	0.0	0.0	8.0	0.0
673.27(b)(3)	Monitor its operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended;		0.0	20.0	40.0	20.0	20.0	0.0
673.27(b)(4)	Investigate safety events to identify causal factors; and		8.0	38.4	197.0	0.0	35.0	0.0
673.27(b)(5)	Monitor information reported through any internal safety reporting programs.		0.0	4.0	12.0	16.0	0.0	0.0
673.27(c)	Management of change							
673.27(c)(1)	A transit agency must establish a process for identifying and assessing changes that may introduce new hazards or impact the agency's safety performance.		0.0	8.0	20.0	0.0	4.0	0.0
673.27(c)(2)	If a transit agency determines that a change may impact its safety performance, then the agency must evaluate the proposed change through the Safety Risk Management process.		0.0	8.0	16.0	0.0	8.0	0.0
673.27(d)	Continuous improvement.							
673.27(d)(1)	A transit agency must establish a process to assess its safety performance.		1.0	8.0	16.0	16.0	2.0	0.0
673.27(d)(2)	If a transit agency identifies any deficiencies as part of its safety performance assessment, then the agency must develop and carry out, under the direction of the Accountable Executive, a plan to address the identified safety deficiencies.		1.0	8.0	8.0	0.0	8.0	0.0
<b>SAP Total</b>			<b>10.0</b>	<b>114.4</b>	<b>333.0</b>	<b>52.0</b>	<b>125.0</b>	<b>0.0</b>

**Table D8: Estimated Safety Promotion Program (SPP) Hours Required for Large 5307 Agencies**

Part 673.29	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.29(a)	Competencies and training. A transit agency must establish a comprehensive safety training program for all agency employees and contractors directly responsible for the management of safety in the agency's public transportation system. The training program must include refresher training, as necessary.	While transit agencies have provided safety training, documentation of safety management training is new.	0.0	20.0	24.0	0.0	0.0	24.0
673.29(b)	Safety communication. A transit agency must communicate safety and safety performance information throughout the agency's organization that, at a minimum, conveys information on hazards and safety risks relevant to employees' roles and responsibilities and informs employees of safety actions taken in response to reports submitted through an employee safety reporting program.		0.0	16.0	76.0	0.0	48.0	0.0
<b>SPP Total</b>			<b>0.0</b>	<b>36.0</b>	<b>100.0</b>	<b>0.0</b>	<b>48.0</b>	<b>24.0</b>

**Table D9: Estimated Safety Management Policy (SMP) Hours Required for Small 5307 Agencies**

Part 673.23	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.23(a)	Safety management policy. A transit agency must establish its organizational accountabilities and responsibilities and have a written statement of safety management policy that includes the agency's safety objectives and safety performance targets.	60% of agencies (54) reviewed under the Bus Safety Program had set safety goals and objectives.	0.5	12.0	0.0	0.0	12.0	0.0
673.23(b)	A transit agency must establish a process that allows employees to report safety conditions to senior management, protections for employees who report safety conditions to senior management, and a description of employee behaviors that may result in disciplinary action.	Typically, bus agencies have safety hot lines and local safety committees (larger) for employees or other mechanisms (for smaller agencies). However, usually, these programs for employee reporting do not address all attributes as related to SMS and for smaller systems are typically informal.	4.0	16.0	0.0	0.0	20.0	0.0
673.23(c)	The safety management policy must be communicated throughout the agency's organization.	Agency will have to identify how the document will be distributed across the agency.	0.5	2.0	0.0	0.0	0.0	0.0
673.23(d)	The transit agency must establish the necessary authorities, accountabilities, and responsibilities for the management of safety amongst the following individuals within its organization, as they relate to the development and management of the transit agency's Safety Management System (SMS):	Most large bus agencies currently document accountabilities and responsibilities in their SSPPs, though they will have to be modified to incorporate some of the new activities under SMS.						
673.23(d)(1)	For Accountable Executive	See above.	0.5	0.0	0.0	0.0	0.0	0.0
673.23(d)(2)	For Chief Safety Officer	See above.	0.0	2.0	0.0	0.0	0.0	0.0
673.23(d)(3)	For leadership and executive management team	See above.	0.0	2.0	0.0	0.0	2.0	0.0
673.23(d)(4)	For key staff	See above.	0.0	2.0	0.0	0.0	2.0	0.0
<b>SMP Total</b>			<b>5.5</b>	<b>36.0</b>	<b>0.0</b>	<b>0.0</b>	<b>36.0</b>	<b>0.0</b>

**Table D10: Estimated Safety Risk Management Process (SRMP) Hours Required for Small 5307 Agencies**

Part 673.25	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.25(a)	Safety Risk Management process. A transit agency must develop and implement a Safety Risk Management process for all elements of its public transportation system, including changes to its public transportation system that may impact safety performance. The Safety Risk Management process must be comprised of the following activities: identification of safety hazards, analysis of safety hazards, safety risk evaluation, and safety risk mitigation.	See individual activities below						
673.25(b)	Safety hazard identification and analysis.							
673.25(b)(1)	A transit agency must establish a process for hazard identification and analysis.	Approximately 60% of the 54 reviewed agencies had <i>informal</i> activities for hazard identification. Only 2 agencies had a formal process in place.	4.0	16.0	0.0	0.0	12.0	0.0
673.25(b)(2)	A transit agency must include, as a source for hazard identification and analysis, data, and information provided by an oversight authority and the FTA.	50% of reviewed agencies <i>informally</i> identified hazards related to new or changes in operations.	1.0	2.0	0.0	0.0	0.0	0.0
673.25(c)	Safety risk evaluation and mitigation.							
673.25(c)(1)	A transit agency must establish activities to evaluate and prioritize the safety risk associated with the potential consequences of safety hazards. Safety risks must be evaluated in terms of probability and severity and take into account mitigations already in place to reduce the probability or severity of the potential consequence(s) analyzed.	Although formal criteria did not exist for any of the reviewed agencies, 50% of the agencies looked at methods for evaluating and prioritizing, yet they were informal.	1.0	6.0	0.0	0.0	4.0	0.0
673.25(c)(2)	A transit agency must establish criteria for the development of safety risk mitigations that are necessary based on the results of the agency's safety risk evaluation.	No formal criteria, however, in most cases regarding a serious safety concern, the CEO was involved.	1.0	12.0	0.0	0.0	8.0	0.0
<b>SRMP Total</b>			<b>7.0</b>	<b>36.0</b>	<b>0.0</b>	<b>0.0</b>	<b>24.0</b>	<b>0.0</b>

**Table D11: Estimated Safety Assurance Process (SAP) Hours Required for Small 5307 Agencies**

Part 673.27	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.27(a)	Safety assurance process. A transit agency must develop and implement a safety assurance process, consistent with this subpart.	See individual activities below.						
673.27(b)	Safety performance monitoring and measurement. A transit agency must establish activities to:							
673.27(b)(1)	Monitor its system for compliance with, and sufficiency of, the agency's procedures for operations and maintenance;	100% of the agencies <i>informally</i> monitor.	1.0	16.0	0.0	0.0	16.0	0.0
673.27(b)(2)	Monitor its operations to identify hazards not identified through the Safety Risk Management process established in Section 673.25 of this subpart;	Nearly 50% of the agencies <i>informally</i> monitor.	1.0	8.0	0.0	0.0	8.0	0.0
673.27(b)(3)	Monitor its operations to identify any safety risk mitigations that may be ineffective, inappropriate, or were not implemented as intended;	Approximately 50% of the agencies <i>informally</i> monitor.	1.0	20.0	0.0	0.0	20.0	0.0
673.27(b)(4)	Investigate safety events to identify causal factors; and	100% of the agencies <i>informally</i> investigate areas of non-compliance, however the scope of the review is not across all areas of operations.	6.0	38.0	0.0	0.0	4.0	0.0
673.27(b)(5)	Monitor information reported through any internal safety reporting programs.	Agencies respond to employee safety concerns, however, the process is informal.	1.0	12.0	0.0	0.0	12.0	0.0
673.27(c)	Management of change							
673.27(c)(1)	A transit agency must establish a process for identifying and assessing changes that may introduce new hazards or impact the agency's safety performance.		1.0	20.0	0.0	0.0	4.0	0.0
673.27(c)(2)	If a transit agency determines that a change may impact its safety performance, then the agency must evaluate the proposed change through the Safety Risk Management process.		1.0	16.0	0.0	0.0	10.0	0.0
673.27(d)	Continuous improvement.							
673.27(d)(1)	A transit agency must establish a process to assess its safety performance.	No formal process identified.	1.0	20.0	0.0	0.0	10.0	0.0
673.27(d)(2)	If a transit agency identifies any deficiencies as part of its safety performance assessment, then the agency must develop and carry out, under the direction of the Accountable Executive, a plan to address the identified safety deficiencies.	All agencies identified and implemented corrective actions as necessary, but the process was informal.	1.0	12.0	0.0	0.0	4.0	0.0
<b>SAP Total</b>			<b>14.0</b>	<b>162.0</b>	<b>0.0</b>	<b>0.0</b>	<b>88.0</b>	<b>0.0</b>



**Table D12: Estimated Safety Promotion Program (SPP) Hours Required for Small 5307 Agencies**

Part 673.29	Requirement	Notes	Accountable Executive	Chief Safety Officer	Safety Staff	Safety Data Analyst	Operations/Maintenance Manager	Training Staff
673.29(a)	Competencies and training. A transit agency must establish a comprehensive safety training program for all agency employees and contractors directly responsible for the management of safety in the agency's public transportation system. The training program must include refresher training, as necessary.	All agencies have skill training and safety elements as a part of their training. But <u>all</u> agencies will have to provide SMS training, which is new.	1.0	24.0	0.0	0.0	8.0	24.0
673.29(b)	Safety communication. A transit agency must communicate safety and safety performance information throughout the agency's organization that, at a minimum, conveys information on hazards and safety risks relevant to employees' roles and responsibilities and informs employees of safety actions taken in response to reports submitted through an employee safety reporting program.	Almost all agencies received a recommendation from the FTA review that safety duty training needed to be improved. Approximately 80% of agencies held safety committee meetings to discuss safety risks and changes.	2.0	44.0	0.0	0.0	30.0	0.0
<b>SPP Total</b>			<b>3.0</b>	<b>68.0</b>	<b>0.0</b>	<b>0.0</b>	<b>38.0</b>	<b>24.0</b>